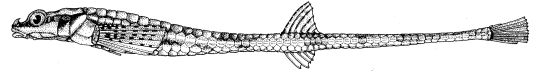


Aspidophoroides monopterygius* (Bloch, 1786)*Agonidae****Alligatorfish****Meristic Characters**

Myomeres:	48–52
Vertebrae:	48–52
Dorsal fin rays:	5–6
Anal fin rays:	5–6
Pectoral fin rays:	10–11
Pelvic fin rays:	1, 2
Caudal fin rays:	5+5

Range: Arctic to northern Pacific and Atlantic oceans; in the western North Atlantic Ocean from Greenland to Cape Cod, widespread on Grand Bank, northern and western Gulf of Maine, northeast Georges Bank; rarely occurring as far south as New Jersey

Habitat: Benthic in depths of 18–332 m over sandy or muddy substrates, also pebbly bottoms or those with broken shell; larvae have been collected in brackish as well as highly oceanic waters

Spawning: Not well described; larvae present in Gulf of Maine and Salem Harbor (Massachusetts) during spring

Eggs: – Undescribed; those of other species demersal, large, deposited in clumps under rocks

Larvae:

- Body very elongate, with preanus length <50% SL
- Head elongate, with pointy snout, somewhat concave profile, mouth only reaching anterior edge of eye
- Series of spines on top of head; see checklist below
- Note constriction, or 'loop', in mid-gut, with anus and terminus of gut semi-trailing
- Pectoral fin early forming, large and fan-shaped
- Dorsal and anal fins short-based, opposite each other; single dorsal fin situated at the halfway point of body
- Caudal fin small and rounded
- Rows of tiny spines form along the body; these correspond to rows of plates (modified scales) in adults
- Pigmentation includes a characteristic series of blotches along the body, ending on the caudal fin base; pectoral fin rays tipped with black pigment; melanophores scattered over much of gut; patches of fine pigment on edge of preopercle

Head Spine Checklist:

Parietal:	two rows of small spines in preflexion larvae become arched crest in later larvae
Coronal:	spine present
Tympanic:	spine present
Superior infraorbital:	1 st SIO present
Preopercular:	usually 4 large spines along margin; 2 nd and 3 rd spines form first; 1 st added in late flexion
Interopercular:	spine present (not shown in key)
Supracleithral:	spines present after late flexion
Subopercular:	spines present after late flexion
Nasal:	spine present in postflexion
Dentary:	spine present in postflexion (not shown in key)
Supraocular:	spine present in postflexion
Pterotic:	spine present in postflexion
Postocular:	spines situated on top of head in postflexion; note shape as dermal plates

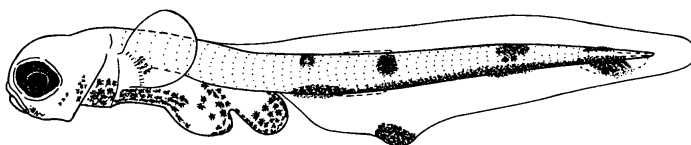
Note:

1. Pectoral fin ray count lower than in *Uncina olriki*
2. Larvae occur in plankton until they settle to bottom habitats at a size of about 29.0 mm

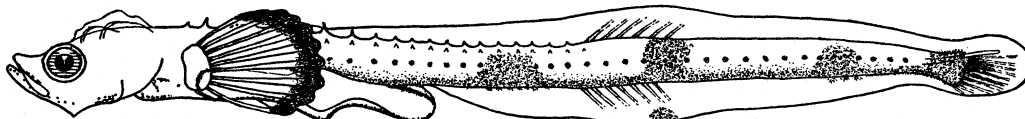
Figures: Adult: Kanayama, 1991; **A, D:** Bev Vinter (Busby, 1998); **B:** Bigelow and Schroeder, 1953; **C:** Wayne Laroche (Washington *et al.*, 1984b); agonid head spines: Busby and Ambrose, 1993

References: Bigelow and Schroeder, 1953; Elliott and Jimenez, 1981; Washington *et al.*, 1984a; Yabe, 1985; Maeda and Amaoka, 1988; Busby, 1998; Klein-M^{ac}Phee, 2002h

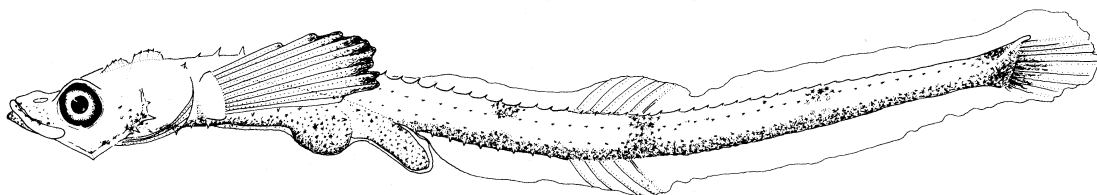
Aspidophoroides monoptygius



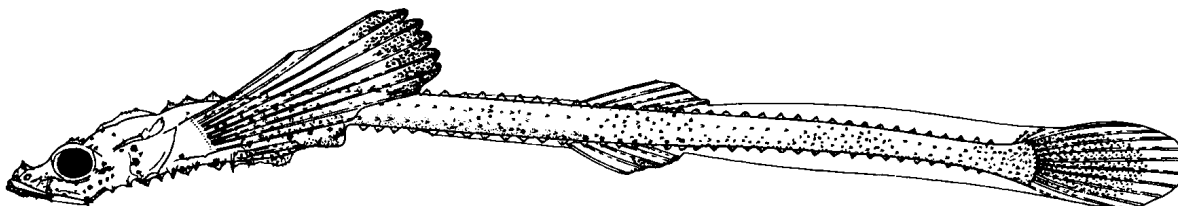
A. 5.6 mmSL



B. 11.0 mmSL



C. 14.3 mmSL

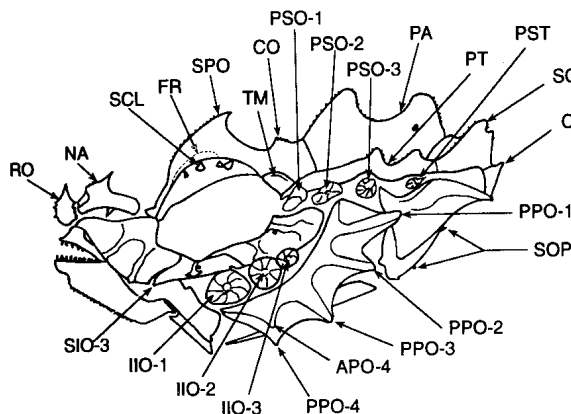


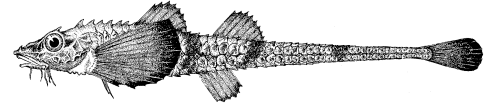
D. 28.0 mmSL

Agonid Head Spines

PA	Parietal	TM	Tympanic
SPO	Suprocular	OP	Opercular
SC	Supracleithral	FR	Frontal
CO	Coronal	SOP	Subopercular
PT	Pterotic	RO	Rostral
NA	Nasal	SCL	Sclerotics *
CL	Cleithral		
APO-4	4 th anterior preopercular		
PST	Posttemporal *		
PPO-	Posterior preopercular 1-4		
SIO-	Superior infraorbital 1-6		
IIO-	Inferior infraorbital 1-3 (1-2*)		
PSO	Postocular 1-3 (2-3*)		

* = Indicates a dermal plate



Leptagonus decagonus* (Bloch and Schneider, 1801)*Agonidae****Atlantic poacher**

Range: Arctic seas into northern Pacific and Atlantic oceans; in the western North Atlantic from arctic waters to Greenland, Newfoundland, northern Nova Scotia and Grand Bank, as far south as 44° 15'N

Habitat: Benthic in deep, cold waters (0–5°C) in depths of 27–392 m over sandy or muddy substrates

Spawning: Not well described; ripe eggs have been found winter into late spring; larvae have been collected spring into late summer

Eggs: – Undescribed; those of other species demersal, large, deposited in clumps under rocks

Larvae:

- Body very elongate, with preanus length <50% SL
- Preanus length decreases through development; distance between anus and anal fin origin increases
- Body compressed in tail region; not as hexagonal in cross-section as that of *Ulcina olriki*
- Head elongate, with pointy snout, somewhat concave profile, mouth only reaching anterior edge of eye
- Series of spines on head; see checklist below
- Barbels form under maxillary during larval stage
- Note constriction, or 'loop', in mid-gut, with anus and terminus of gut semi-trailing
- Pectoral fin early forming, large and fan-shaped; pelvic fin rays form late
- Dorsal (2) and anal fins short-based; 2nd dorsal fin origin posterior to level of anal fin origin
- Caudal fin rounded
- Rows of tiny spines form along the body; these correspond to rows of plates (modified scales) in adults
- Pigmentation includes characteristic series of blotches along body, ending at tip of notochord; pectoral fins covered with scattered melanophores, may have darker margin; most gut pigment on dorsal surface; some pigment extends onto D₂ and A fins; head and snout with scattered pigment spots

Meristic Characters

Myomeres:	44–49
Vertebrae:	44–49
Dorsal fin rays:	V–VIII, 5–8
Anal fin rays:	6–8
Pectoral fin rays:	15–17
Pelvic fin rays:	I, 2
Caudal fin rays:	6+5

Head Spine Checklist: (See key to head spines on *Aspidophoroides monopterygius* figure page)

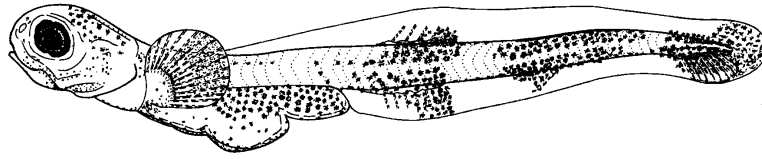
Parietal:	row of small spines in early flexion, form ridges or crests with serrate edges in late flexion larvae
Preopercular:	usually 4 large spines along margin; all spines present by 13.7 mm
Supraocular:	spines develop by 16.3 mm
Nasal:	spines develop by 16.3 mm
Superior infraorbitals:	spines present in juveniles
Inferior infraorbitals:	spines present in juveniles
Frontal:	spines present in juveniles
Postocular:	spines present in juveniles; note shape as dermal plates
Posttemporal:	spines present in juveniles
Pterotic:	spines present in juveniles

- Note:**
1. This species has 2 dorsal fins, the anterior of which consists of spines; the other 2 species that occur in study area have only one dorsal fin and lack dorsal fin spines
 2. High number of pectoral fin rays
 3. Larvae occur in plankton until about 24 mmSL; size at which they settle to the bottom unknown

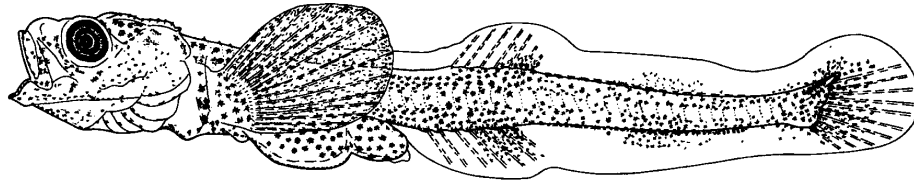
Figures: Adult: D. R. Harriott (Scott and Scott, 1988); **A, B, D:** Bev Vinter (Busby, 1998); **C:** Ehrenbaum, 1905

References: Dannevig, 1919; Dunbar, 1947; Washington *et al.*, 1984a; 1984b; Yabe, 1985; Maeda and Amaoka, 1988; Busby, 1998

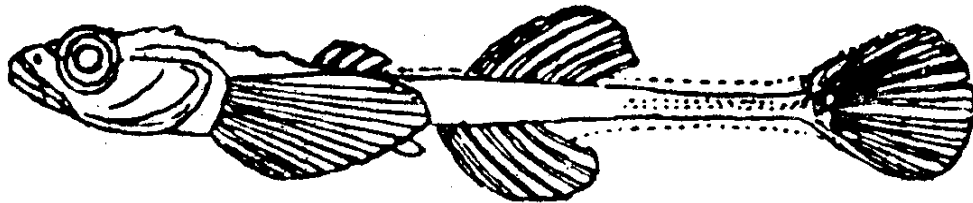
Leptagonus decagonus



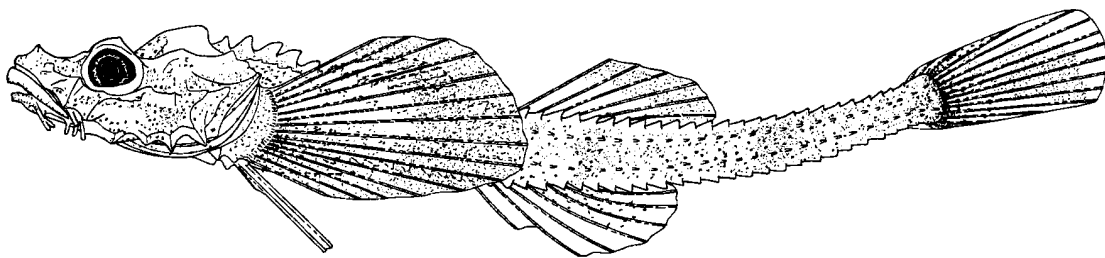
A. 12.2 mmSL



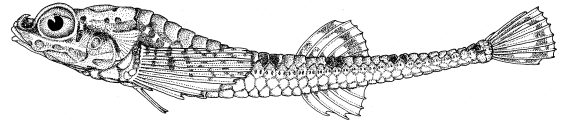
B. 15.7 mmSL



C. 21.0 mmSL



D. 29.5 mmSL

Ulcina olriki* (Lütken, 1876)*Agonidae****Arctic alligatorfish**

Range: Northern Pacific and Atlantic oceans; in the western North Atlantic from Arctic to coastal waters of Labrador as far south as 52°22'N; also Hudson Bay

Habitat: Benthic in depths of 18–110 m over sandy, muddy or rocky substrates

Spawning: Not well described; 250 ripe eggs found in a single female during Jul off west Greenland

Eggs: – Ripe ovarian eggs 0.75–1.5 mm in diameter; those of other species demersal, large, deposited in clumps under rocks

Larvae:

- Body very elongate, with preanus length <50% SL
- Body is laterally compressed and hexagonal in cross-section
- Head elongate, with pointy snout, somewhat concave profile, mouth only reaching anterior edge of eye
- Series of spines on head; see checklist below
- Note constriction, or 'loop', in mid-gut, with anus and terminus of gut semi-trailing
- Pectoral fin early forming, large and fan-shaped
- Dorsal and anal fins short-based, opposite each other; single dorsal fin situated at halfway point of body
- Caudal fin small and rounded
- Rows of tiny spines form along the body; these correspond to rows of plates (modified scales) in adults; spines more prominent than in larvae of *Leptagonus decagonus*
- Pigmentation includes a characteristic series of blotches along the body, ending on the caudal fin base; pectoral fin rays tipped with black pigment; melanophores scattered over much of gut, especially mid-section and terminus; pigment extends from bar on body onto dorsal and anal fins; scattered spots on head and snout

Meristic Characters

Myomeres:	37–39
Vertebrae:	37–39
Dorsal fin rays:	5–7
Anal fin rays:	5–7
Pectoral fin rays:	14–15
Pelvic fin rays:	1, 2
Caudal fin rays:	5+5

Head Spine Checklist: (See key to head spines on *Aspidophoroides monopterygius* figure page)

Parietal:	row of small spines in early flexion, form ridges or crests in late flexion
Preopercular:	usually 4 large spines along margin; all spines present by 13.7 mm
Supraocular:	spines developed by 16.3 mm
Nasal:	spines developed by 16.3 mm
Superior and inferior infraorbital:	spines present in juveniles
Frontal:	spines present in juveniles
Postocular:	spines present in juveniles; note shape as dermal plates
Posttemporal:	spines present in juveniles
Pterotic:	spines present in juveniles

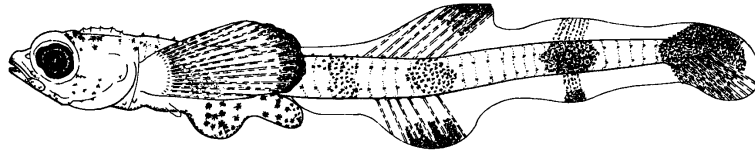
Note:

1. Pectoral fin ray count higher than in *Aspidophoroides monopterygius*
2. Larvae occur in plankton until about 20–21 mmSL; size at which they settle to the bottom unknown

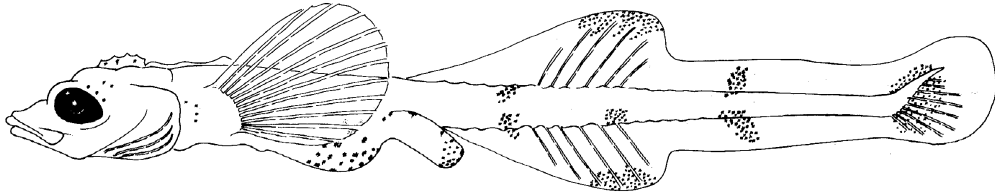
Figures: Adult: Kanayama, 1991; **A, D:** Bev Vinter (Busby, 1998); **B:** Rass, 1949 (redrawn); **C:** Dunbar, 1947

References: Dunbar, 1947; Washington *et al.*, 1984b; 1984b; Yabe, 1985; Maeda and Amaoka, 1988; Busby, 1998

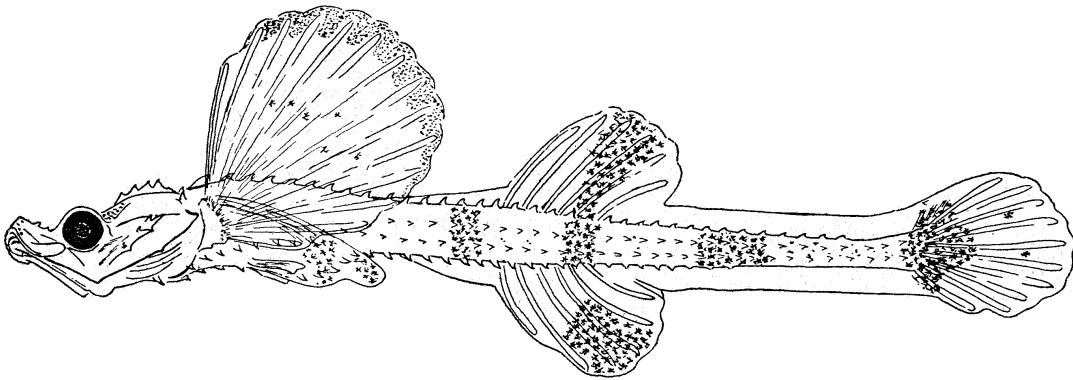
Ulcina olriki



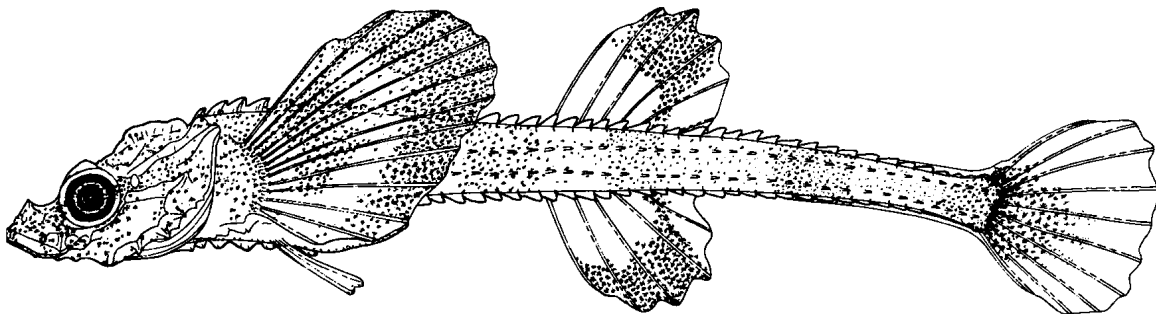
A. 10.5 mmSL



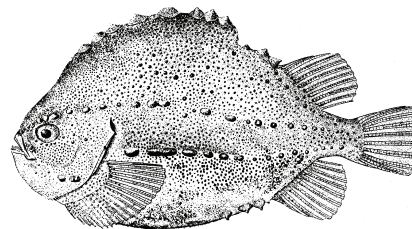
B. 14.5 mmSL



C. 20.0 mmSL



D. 25.0 mmSL

Cyclopterus lumpus* Linnaeus, 1758*Cyclopteridae****Lumpfish**

Range: Arctic and North Atlantic oceans; in the western North Atlantic from Davis Strait and Greenland to Chesapeake Bay

Habitat: Pelagic, becoming demersal during reproduction in depths to 329 m

Spawning: Early spring in coastal waters

Eggs:

- Demersal, adhesive, pink, in masses
- Deposited in nests constructed by male
- Diameter: 2.2–2.6 mm
- Chorion thick, hard
- Oil globules: multiple, coalesce into one
- Incubation 10–70 days; male provides protection from predation and aeration

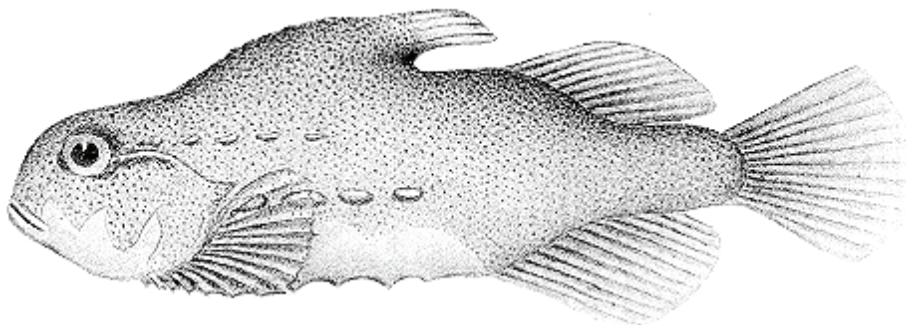
Meristic Characters

Myomeres:	28–29
Vertebrae:	28–29
Dorsal fin rays:	VI–VIII, 9–11
Anal fin rays:	9–10
Pectoral fin rays:	19–20
Pelvic fin rays:	Disk
Caudal fin rays:	11–12

Larvae:

- Hatching occurs at 5.6 mmSL or smaller (Newfoundland) with pectoral rays and suction disk fully formed
- Hatching size 4.0–7.4 mm in Gulf of Maine
- Tadpole-shaped with large, wide head, slender tail
- Tubercles begin to form over eyes at 18 mm, over body at 22 mm; by 25 mm, small tubercles scattered over much of body
- Full complements of 2nd dorsal and anal fin rays formed by 5.6 mmSL; 1st dorsal and caudal fin rays complete by 6.1 mmSL
- 1st dorsal fin pedunculate
- Pigmentation includes scattering of small spots over most of head and body; note unpigmented band from snout to opercle edge;

Note: 1. Larvae and juveniles may use tide pools as nursery from Jun–Dec, often associated with algae and seagrass

Early Juvenile:

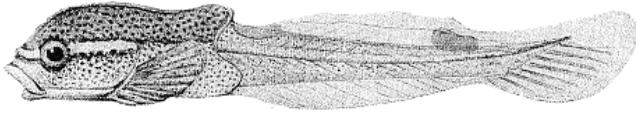
H. 34.0 mm

Note development of tubercles, large, pedunculate 1st dorsal fin and slender form; background pigment is green, olive, brown or yellow; have occurred in near-surface waters in Bay of Fundy Jul–Sep

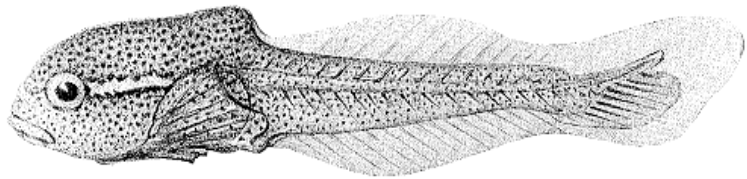
Figures: Adult: H. L. Todd (Klein-M^{ac}Phee, 2002i); A–H: Agassiz, 1882

References: Ueno, 1970; Fritzsche, 1978; Able *et al.*, 1984; Scott and Scott, 1988; Klein-M^{ac}Phee, 2002i

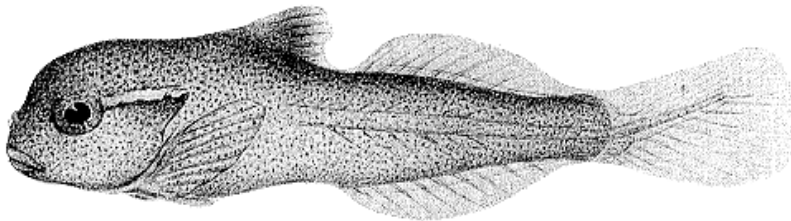
Cyclopterus lumpus



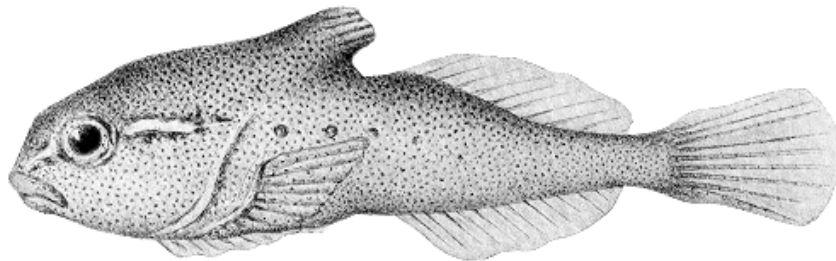
**A, B. 4.0 mm
(Lateral and Dorsal Views)**



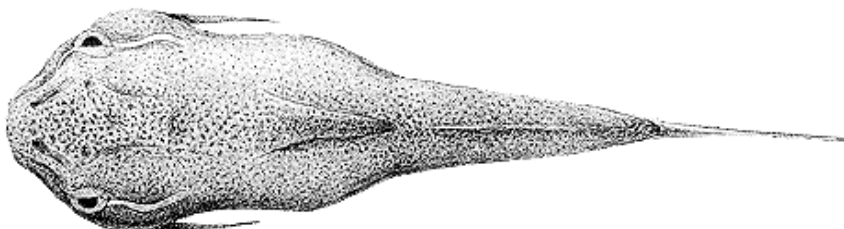
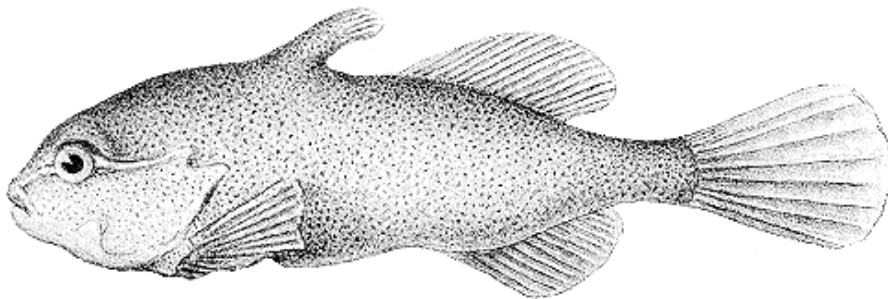
C. Size undescrbed



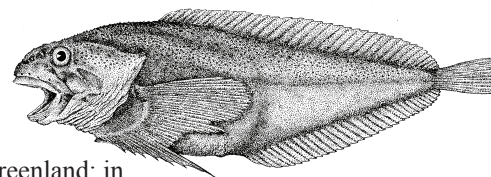
D. 5.0 mm



E. 10.0 mm



**F,G. 20.0 mm
(Lateral and Dorsal Views)**

Liparis tunicatus* Reinhardt, 1837*Liparidae****Kelp snailfish**

Range: Arctic Ocean from western Alaska and Chukchi Sea to western Greenland; in study area occurs south along the coast of Labrador to Saglek Bay (58°30' N, 63°00' W)

Habitat: Demersal in shallow water (usually <50 m), close to shore, often associated with kelp beds (*Laminaria* sp.); uses suction disk to attach to kelp blades; bottom substrates usually pebbly or rocky, more rarely sandy to muddy

Spawning: Undescribed; a single report of undeveloped gonads during summer (Able and McAllister, 1980)

Eggs: – Undescribed

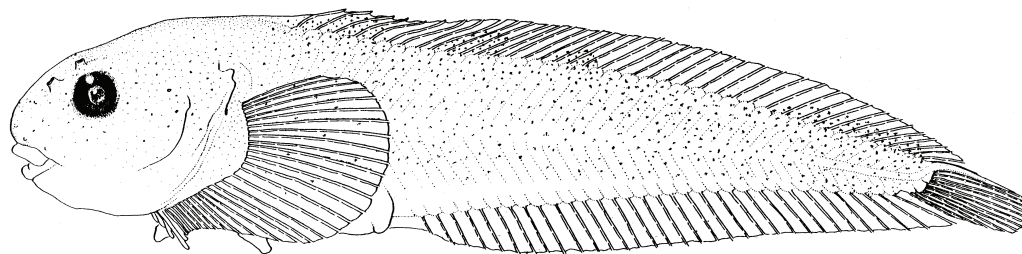
Larvae:

- Developmental series undescribed; characters based on a single late-flexion stage larva (Fig. A)
- Head flat-topped
- Nostrils tubular, prominent
- Suction disk moderately large (13–14% SL)
- Gill slit opening very small throughout development; see comparative table on *L. fabricii* page
- Head length 22–27% SL
- Preanus length about 41% SL
- Snout to anal fin 46–48% SL
- Fin rays complete by 17.0 mm
- Pigmentation includes scattering of melanophores over dorsal and lateral surfaces of head and body, with few blotches on dorsal fin rays; ventral surfaces of head and body relatively unpigmented

Meristic Characters

Myomeres:	45–50
Vertebrae:	45–50
Dorsal fin rays:	39–44
Anal fin rays:	33–37
Pectoral fin rays:	32–38
Pelvic fin rays:	Disk
Caudal fin rays:	4–6+4–6

- Note:**
1. Similarities to larvae of *L. coheni* and *L. gibbus*:
 - High numbers of myomeres and fin rays
 - Large sizes at all developmental stages
 - No development of notch in anterior part of dorsal fin
 2. Best distinguished from *L. gibbus* by lower pectoral fin ray count and very small gill opening; this species and *L. coheni* do not overlap geographically

**A. 17.9 mmNL**

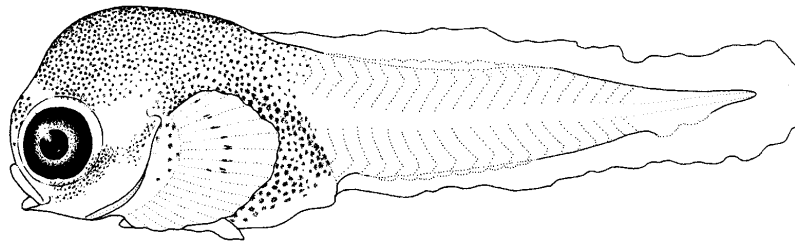
Figures: D. R. Harriott (Scott and Scott, 1988); **A:** M. P. Fahay (Able *et al.*, 1986); **B:** Betsy Washington (Able *et al.*, 1984)

References: Able and McAllister, 1980; Able *et al.*, 1984; Scott and Scott, 1988

*Liparis tunicatus***Notes on Larvae of Cyclopteridae and Liparidae**

Larvae of these families typically have a short, bulbous head and tadpole-shaped body. They are similar to larvae of some cottids, scorpaenids, triglids and ceratioids, but they:

- Lack head spines
- Have a restricted gill opening that closes ontogenetically; (see table on *Liparis fabricii* page for rates of closing)
- Have a highly modified pelvic disk that forms early in ontogeny (may be secondarily lost in some genera)
- Have a broad-based pectoral fin that begins at the upper level of eye and ends near cleithral symphysis
- Have a well-developed finfold that envelopes the posterior end of the body



B. 5.0 mmSL (*Cyclopterus lumpus*)

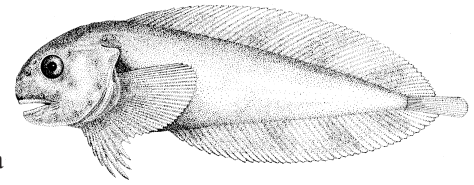
Larvae of Liparidae are similar to those of Cyclopteridae, but they:

- Have more myomeres (38-86 vs: 23-29)
- Are more elongate
- Have more dorsal and anal fin elements
- Are less developed and less pigmented at hatching

Larval characters in 3 genera of Liparidae

	<i>Liparis</i>	<i>Careproctus</i>	<i>Paraliparis</i>
Suction disk	Present, forms early	Present, forms early	Absent
Hatches	In preflexion stage	In late flexion or postflexion	In late flexion or postflexion
Nostrils	2 pairs	Single pair through development	Single pair through development
Lower lip	Typically tri-lobed	Single	Single
Pectoral fin base	Cluster of spots on inner surface	Inner surface not pigmented with cluster of spots	Inner surface not pigmented with cluster of spots
Fin rays	Begin anteriorly	Complete complements at hatch	Complete complements at hatch
Head length	Longer	Shorter	Shorter
Preanus length	Longer	Shorter	Shorter

Larvae of *Rhodichthys* are undescribed; they hatch from large eggs (5.5 mm diameter) and lack modified pelvic suction disks (Andriashev, 1954). *Pseudnos* species are humpbacked dwarves, seldom exceeding 50 mmSL, and lack suction disks. Their larvae are also undescribed.

Liparis fabricii* Krøyer, 1847*Liparidae****Gelatinous snailfish**

Range: Circumpolar; in study area from Arctic and Atlantic coastal Canada from northern Ellesmere Island to Grand Bank

Habitat: Pelagic in midwater layers and benthic in depths >50 m to a maximum 600 m

Spawning: Sep–Oct in Russian Arctic (Andriashev, 1954); larvae present Aug near Baffin Island and Labrador (Dunbar, 1947)

Eggs: – Undescribed

Larvae:

- Relatively shallow-bodied, short-headed form with large eye, short preanus length, and small suction disk
- Relatively large sizes at all developmental stages (hatching, flexion, disk formation)
- Disk forms at 8.6–11.5 mm
- Flexion begins at lengths of 11.9–13.4 mm and is complete by 48.2–52.1 mm
- Relatively high number of myomeres and fin rays
- Nostrils complete split into 2 pairs at 14.1–17.2 mm
- Pectoral fin rays complete during postflexion; caudal fin rays complete by 21 mm; dorsal and anal fin rays complete by about 20 mm
- Darkly pigmented peritoneum and pectoral fin; prominently barred pigment pattern forms on body and fins; a cluster of small melanophores on the medial surface of the pectoral fin base; at preflexion, larvae have scattered row of melanophores along base of anal fin and on dorsolateral surface of gut

Meristic Characters

Myomeres:	48–53
Vertebrae:	48–53
Dorsal fin rays:	43–49
Anal fin rays:	36–42
Pectoral fin rays:	32–37
Pelvic fin rays:	Disk
Caudal fin rays:	4–5+5–6

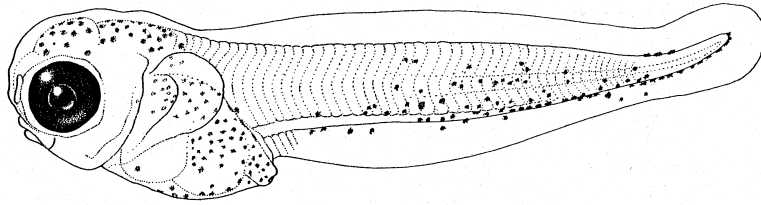
- Note:**
1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids
 2. The larvae of this species, *L. atlanticus* and *L. gibbus* are the only liparid larvae with lateral body pigment present during preflexion stage
 3. The gill slit closes ontogenetically in *Liparis* larvae; the rate of closing is less in *L. fabricii*; *L. tunicatus* has a very small opening throughout development (see table below)

Species	Flexion Stage	Gill Slit Length (% HL)
<i>Liparis atlanticus</i>	Preflexion	64
	Postflexion	13
<i>Liparis inquilinus</i>	Preflexion	66
	Postflexion	20
<i>Liparis coheni</i>	Preflexion	60
	Postflexion	19
<i>Liparis gibbus</i>	Preflexion	45
	Postflexion	36
<i>Liparis fabricii</i>	Preflexion	51
	Flexion	43
<i>Liparis tunicatus</i>	Flexion	13
	Postflexion	9

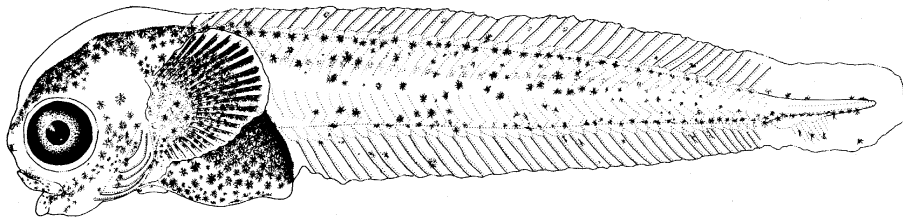
Figures: Adult: Stein and Able, 1986; **A:** M. P. Fahay (Able *et al.*, 1986); **B–D:** Betsy Washington (Able *et al.*, 1984)

References: Dannevig, 1919; Able and McAllister, 1980; Able *et al.*, 1986

Liparis fabricii

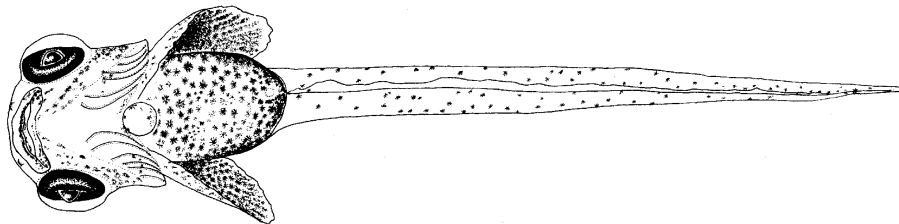


A. 9.2 mmNL



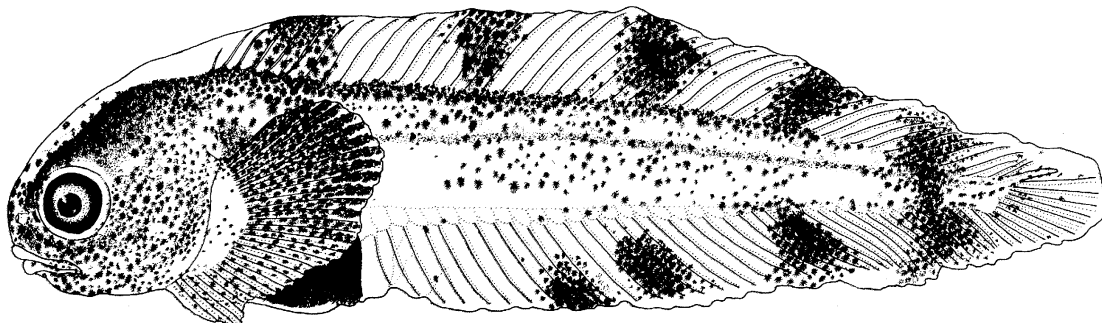
B. 16.7 mmNL

Note densely pigmented head, peritoneum and pectoral fin rays

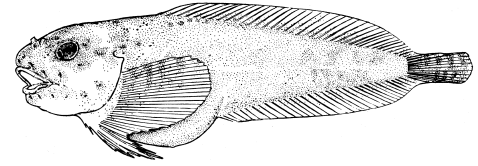


C. 16.7 mmNL (Ventral View) Venter of gut densely pigmented

Note very small suction disk



D. 32.8 mmNL

Liparis coheni* Able, 1976*Liparidae****Gulf snailfish**

Range: Western North Atlantic Ocean from Gulf of St. Lawrence to Gulf of Maine and Georges Bank

Habitat: Demersal in depths of 4–210 m

Spawning: Winter to early spring in St. Lawrence River Estuary and Gulf of Maine

Eggs: – Undescribed

Larvae:

- Hatching size undescribed; smaller than 7.0 mm
- Early larvae deep-headed with tapering tail; later larvae become less tapered with shallower heads
- Preanal ventral outline tends to be flat
- Suction disk becomes visible at 5.4 mm (or earlier)
- Eye diameter to disk length ratio smaller than in comparably sized *L. gibbus*
- Nostril splits into 2 pairs at 7.8–9.6 mm
- Preanus length increases from 44% SL in preflexion to 47% SL in flexion; decreases during postflexion to 43% SL
- Snout to anal fin increases from 46% SL during preflexion to 48% SL during postflexion
- Head length increases from about 24% SL during preflexion to 29% SL during postflexion; head length larger than in comparably sized *L. gibbus*
- Flexion occurs between 8.5 and 20.7 mm
- Sequence of fin ray formation: P₁ – D, A – C
- Notch does not form in anterior part of dorsal fin; fin rays are uniform or graduated in length
- Pigmentation includes a cluster of small melanophores on the medial surface of the pectoral fin base; at preflexion, larvae have melanophores on dorsolateral surface of gut and on dorsum of head; small melanophores form clusters on ventral surface of head and posterior to disk; melanophores along base of anal fin occur on every 2nd or 3rd anal fin pterygiophore; scattered spots on caudal fin rays; lateral surface of body without pigment until >12.0 mm
- Adult pigmentation is attained during late flexion or postflexion stages; ranges from uniformly dark to a variety of striped or barred patterns

Meristic Characters

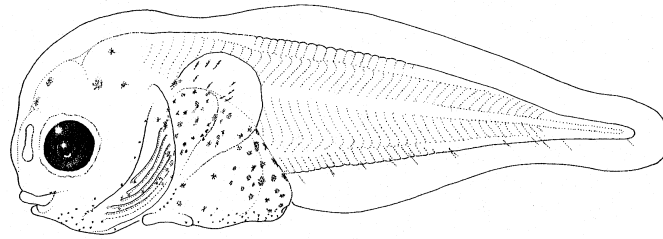
Myomeres:	42–46
Vertebrae:	42–46
Dorsal fin rays:	36–41
Anal fin rays:	30–35
Pectoral fin rays:	32–40
Pelvic fin rays:	Disk
Caudal fin rays:	5+5–6

- Note:**
1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids
 2. Similarities to larvae of *L. gibbus* and *L. tunicatus*:
 - High numbers of myomeres and fin rays
 - Large sizes at all developmental stages
 - No development of notch in anterior part of dorsal fin

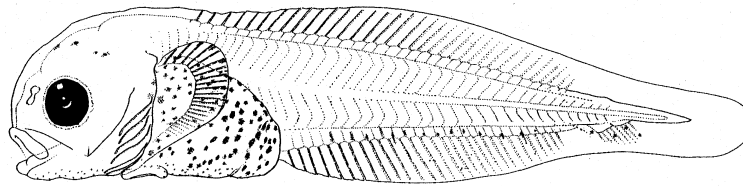
Figures: Adult: R. Bradley (Able, 1976); **A–C, E:** M.P. Fahay (Able *et al.*, 1986); **D:** Betsy Washington (Able *et al.*, 1984)

References: Hauser, 1973; Able 1976; Able and Irion, 1985; Able *et al.*, 1984; Klein-MacPhee, 2002i

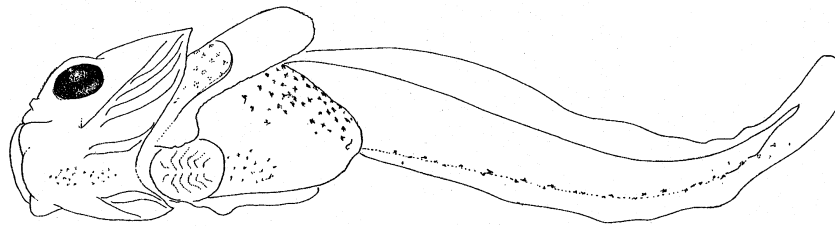
Liparis coheni



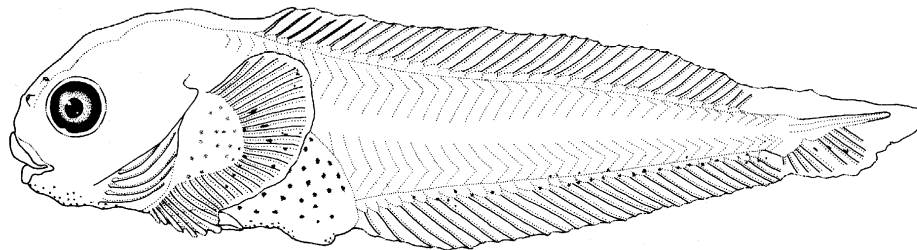
A. 7.3 mmNL



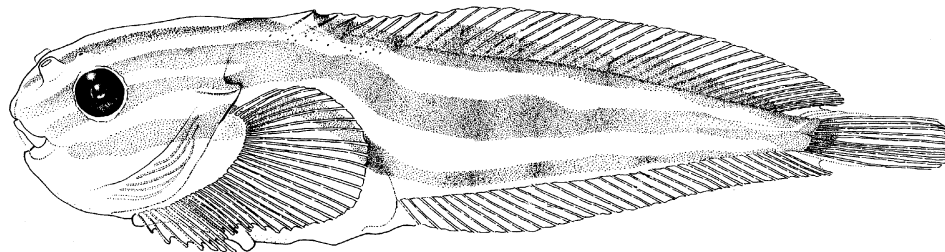
B. 9.6 mmNL



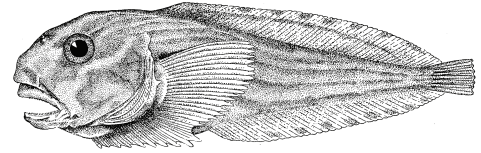
C. 12.5 mmNL (Ventral View)



D. 13.6 mmNL



E. 20.0 mmNL

Liparis gibbus* Bean, 1881*Liparidae****Dusky snailfish**

Range: Circumpolar; in western North Atlantic from Canadian Arctic and Greenland to southern Gulf of St. Lawrence and Newfoundland

Habitat: Demersal in depths of 30–540 m; rock, sand and mud substrates; larvae are pelagic, but may be most common in the lower part of water column

Spawning: Spring–summer in St. Lawrence River Estuary; Jul–Sep in Arctic

Eggs: – Undescribed

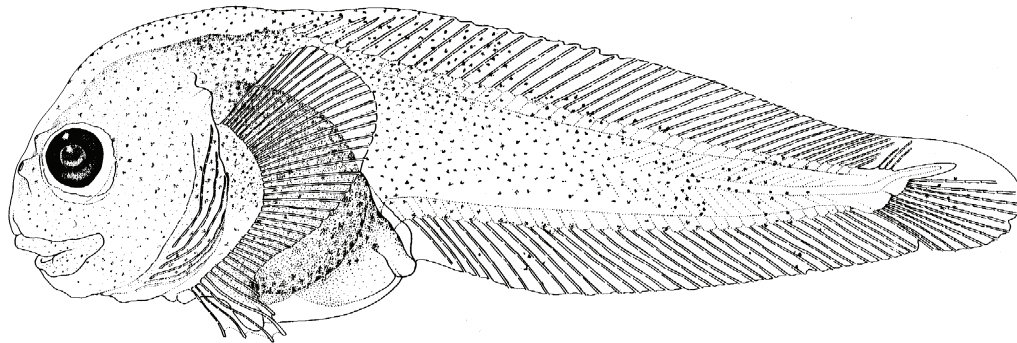
Larvae:

- Hatching size undescribed
- Preanal ventral outline tends to bulge (more so than in *L. coheni*)
- Suction disk appears at 7.4 mm
- Larger eye diameter to disk length ratio than in comparably sized *L. coheni*
- Nostrils split into 2 pairs at 12.7–15.4 mm
- Preanus length 35% SL during preflexion, increases to 43% SL during flexion, then decreases to 39% SL in postflexion
- Snout to anal fin 35% SL during preflexion, increases to 45% SL during later stages
- Head length 18% SL in preflexion, increases to 28% SL in postflexion (smaller than in *L. coheni*)
- Flexion occurs between 7.4 and 10.3 mm
- Sequence of fin ray formation: P₁ – D, A – C
- Notch does not form in anterior part of dorsal fin; fin rays are uniform or graduated in length
- Pigmentation includes a cluster of small melanophores on the medial surface of the pectoral fin base; in preflexion, larvae develop a row of melanophores along base of anal fin, on dorsolateral surface of gut, lateral melanophores on tail, and dorsal surface of head; all pigment more dense in Arctic larvae

Meristic Characters

Myomeres:	44–50
Vertebrae:	44–50
Dorsal fin rays:	38–46
Anal fin rays:	32–37
Pectoral fin rays:	37–45
Pelvic fin rays:	Disk
Caudal fin rays:	4–5+5–6

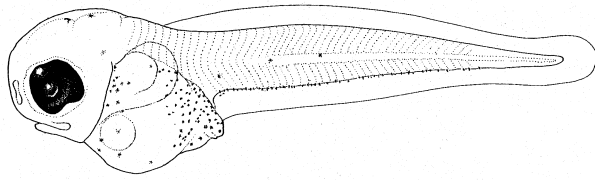
- Note:**
1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids
 2. Similarities to larvae of *L. coheni* and *L. tunicatus*:
 - High numbers of myomeres and fin rays
 - Large sizes at all developmental stages
 - No development of notch in anterior part of dorsal fin

Late Flexion Larva:**H. 20.7 mmNL (Arctic)**

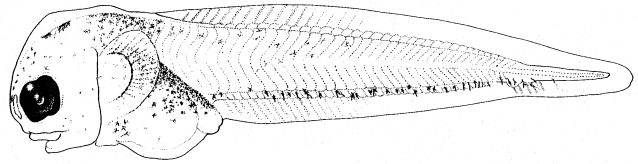
Figures: Adult: D. R. Harriott (Scott and Scott, 1988); **A–H:** M. P. Fahay (Able *et al.*, 1986)

References: Able, 1978; Able and McAllister, 1980; Able *et al.*, 1986; Scott and Scott, 1988

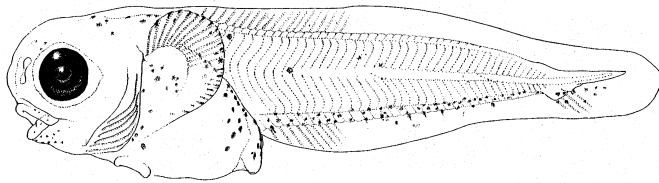
Liparis gibbus



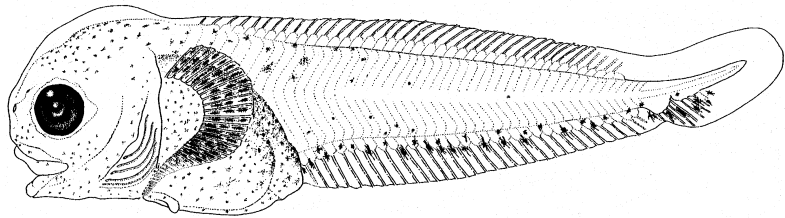
A. 5.7 mmNL



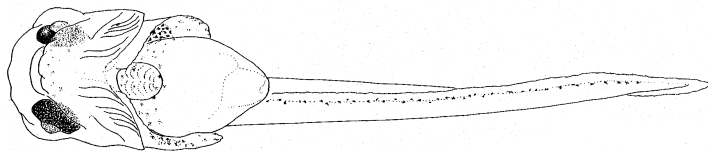
B. 9.1 mmNL (Arctic)



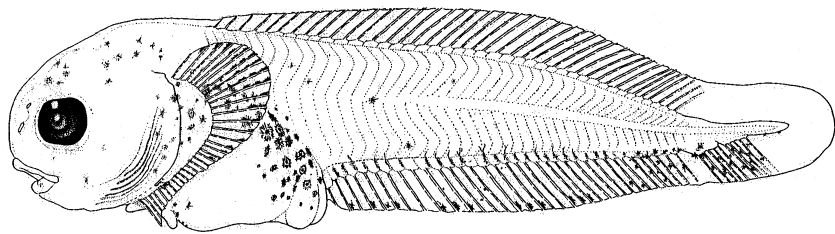
C. 10.5 mmNL



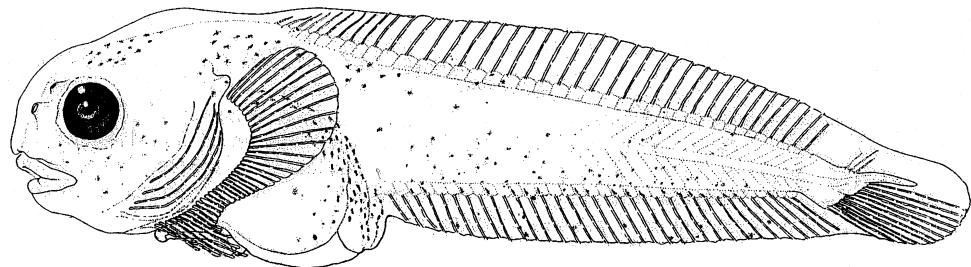
D. 13.0 mmNL (Arctic)



**E. 12.7 mmNL
(Ventral View)**



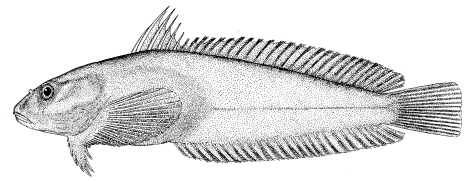
F. 14.3 mmNL



G. 20.1 mmNL

Liparis atlanticus* (Jordan and Evermann, 1898)*Liparidae**

Atlantic sea snail



Range: Western North Atlantic Ocean from Ungava Bay to Connecticut and Long Island, including Georges Bank

Habitat: Intertidal pools to subtidal, usually <2 m; rarely as deep as 90 m

Spawning: Mar–Jun in New Hampshire, mostly Jun in Newfoundland and northern Gulf of St. Lawrence; larvae present Jun–Sep in St. Lawrence River Estuary

Eggs: – Undescribed

Larvae:

- Hatching size undescribed; early larvae have large, rounded head, slender tapering tail
- Preanal ventral outline tends to be flat
- Suction disk becomes visible at 3.3 mmNL
- Smaller eye diameter to disk length ratio at comparable sizes than *Liparis inquilinus*
- Nostril splits into 2 pairs at 5.1–9.4 mmNL
- Preanus length increases during preflexion and flexion (39–50% SL), then decreases during postflexion (45% SL) as anus migrates anteriorly
- Snout to anal fin increases from 41% SL during preflexion to 53% SL during postflexion
- Head length increases from about 20% SL during preflexion to 28% SL during postflexion
- Flexion occurs between 5.8 and 17.1 mm
- Sequence of fin ray formation: P₁, D, A – C
- Notch forms in anterior part of dorsal fin as anterior fin rays elongate
- Anterior dorsal fin rays form fleshy, finger-like extensions during postflexion stage; become more pronounced in adults, especially males in spawning season
- During preflexion, larvae have a row of melanophores along base of anal fin and on dorsolateral surface of gut; lateral melanophores form on tail during preflexion stage (soon after hatching); spots form a band across midpoint of body, expand anteriorly and posteriorly; a cluster of small melanophores on the medial surface of the pectoral fin base; scattered spots on head, especially ventral surface; melanophores on dorsum of head form later than in *L. gibbus* or *L. coheni*; small melanophores on venter between disk and anus highly variable, may be absent
- Entire head and body become covered with melanophores during postflexion stage

Meristic Characters

Myomeres:	38–42
Vertebrae:	38–42
Dorsal fin rays:	31–35
Anal fin rays:	25–29
Pectoral fin rays:	27–31
Pelvic fin rays:	Disk
Caudal fin rays:	5–6+5–6

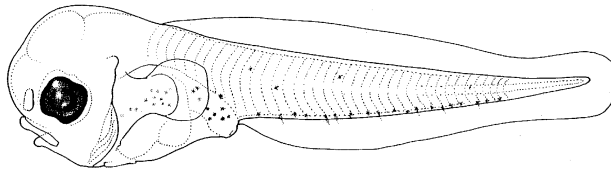
Note:

1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids
2. Similarities to larvae of *L. inquilinus*:
 - Low numbers of myomeres and fin rays
 - Small sizes at all developmental stages
 - Development of notch in anterior part of dorsal fin

Figures: Adult: D. R. Harriott (Scott and Scott, 1988); **A–B, E:** M. P. Fahay (Able *et al.*, 1986); **C–D:** Betsy Washington (Able *et al.*, 1986)

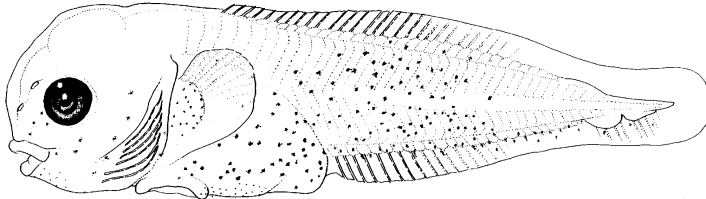
References: Detwyler, 1963; Able, 1978; Able and McAllister, 1980; Able and Irion, 1985; Able *et al.*, 1986

Liparis atlanticus



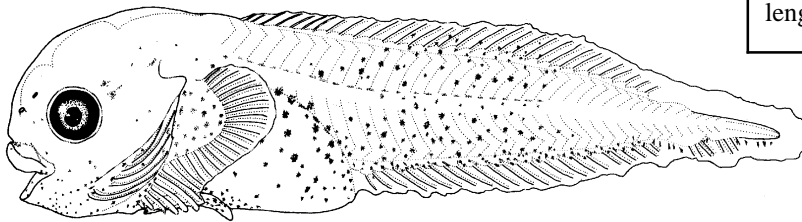
A. 3.7 mmNL

Characters in common with *Liparis inquilinus* include low number of myomeres and fin rays, small sizes at all development stages, and development of notch in anterior dorsal fin outline

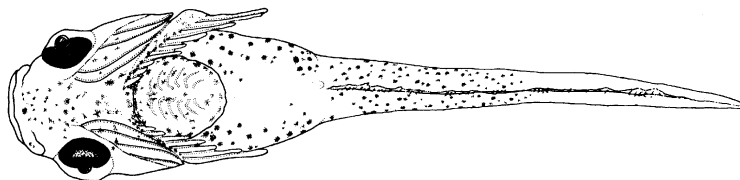


B. 5.8 mmNL

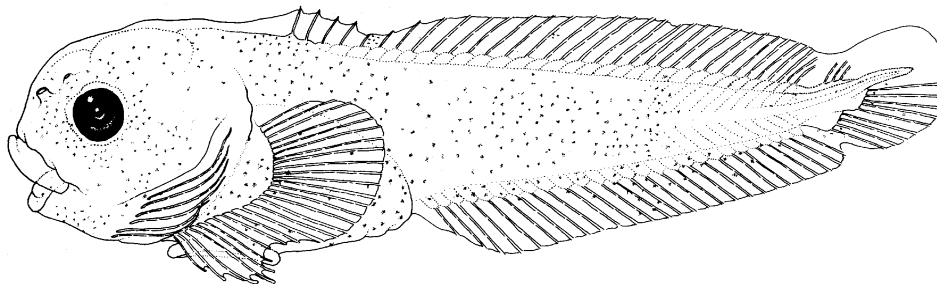
Liparis inquilinus lacks pigment on sides of body until large sizes (>8.0 mm); eye diameter approaches disk length



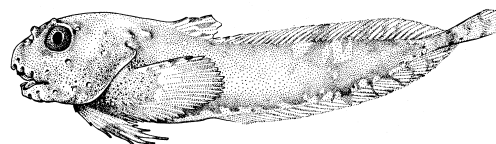
C. 7.9 mmNL



D. 7.9 mmNL (Ventral View)



E. 9.2 mmNL

Liparis inquilinus* Able, 1973*Liparidae****Inquiline snailfish**

Range: Western North Atlantic Ocean from Newfoundland to Cape Hatteras, including Gulf of St. Lawrence, Gulf of Maine and Georges Bank

Habitat: Demersal in depths of 3–97 m; often commensal with sea scallop (*Placopecten magellanicus*), especially during summer; leave scallop association and move into shallower water to spawn during fall and winter

Spawning: Feb–Apr; larvae planktonic Apr–Jun; eggs deposited in clumps, possibly on hydroids; individual females spawn more than one batch

Eggs:

- Demersal, adhesive, pinkish
- Diameter: 1.0–1.3 mm
- Oil globules present: single or 3–8

Larvae:

- Hatching size undescribed; early larvae have large, rounded head, slender tapering tail
- Preanal ventral outline tends to bulge, with disk directed slightly anteriorly
- Larger eye diameter to disk length ratio at comparable sizes than *Liparis atlanticus*
- Suction disk becomes visible at 3.7–6.0 mm
- Preanus length increases during preflexion and flexion (42–45% SL), then decreases during postflexion (40% SL) as anus migrates anteriorly
- Snout to anal fin increases from 41% SL during preflexion to 46% SL during postflexion
- Head length increases from about 21% SL during preflexion to 25% SL during postflexion
- Flexion occurs between 8.1–19.0 mm
- Sequence of fin ray formation: P₁, C, D, A
- Notch forms in anterior part of dorsal fin as anterior fin rays elongate during postflexion stage
- Anterior dorsal fin rays are elongate and resemble those of adult by 10.2 mmTL, but lack the fleshy extensions found in *L. atlanticus*
- Lateral melanophores on tail do not begin forming until flexion is well underway; melanophores begin in region of nape and expand posteriorly at about 8.0 mm; a cluster of small melanophores on the medial surface of the pectoral fin base; at preflexion, larvae have a row of melanophores along base of anal fin and on dorsolateral surface of gut; small melanophores appear behind chin and between disk and anus during flexion stage; dorsum of head unpigmented until about 12.0 mm; melanophores on pectoral fin rays variable, may be absent

Note:

1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids
2. Similarities to larvae of *L. atlanticus*:
 - Low numbers of myomeres and fin rays
 - Small sizes at all developmental stages
 - Development of notch in anterior part of dorsal fin

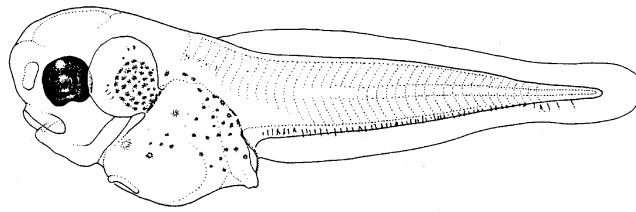
Meristic Characters

Myomeres:	38–42
Vertebrae:	38–42
Dorsal fin rays:	33–38
Anal fin rays:	28–31
Pectoral fin rays:	30–35
Pelvic fin rays:	Disk
Caudal fin rays:	5+5–6

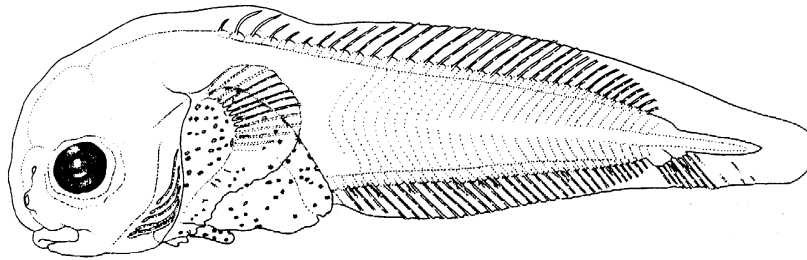
Figures: Adult: J. Davis (Able, 1973); A–D: M. P. Fahay (Able *et al.*, 1986)

References: Able, 1973; Able and Musick, 1976; Able and Irion, 1985; Able *et al.*, 1986; Klein-M^{ac}Phee, 2002i

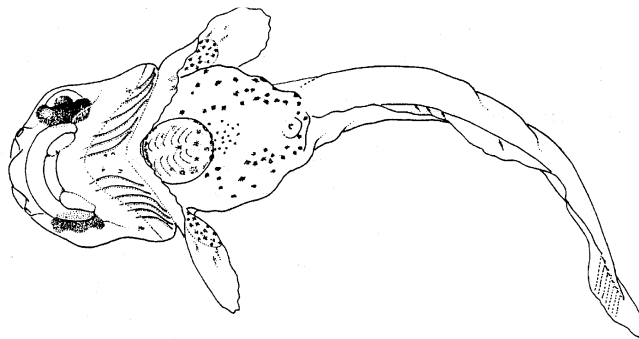
Liparis inquilinus



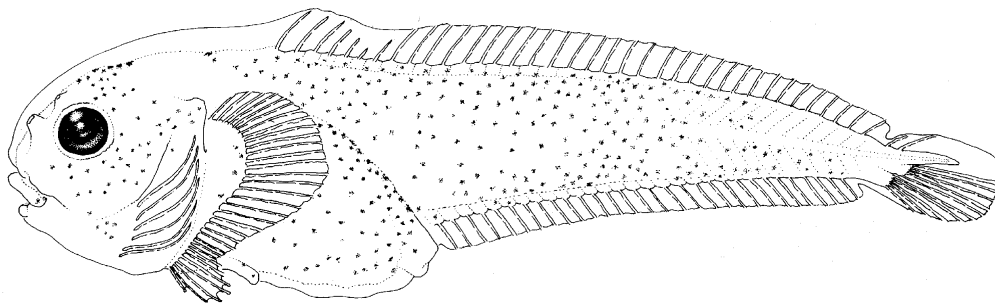
A. 4.9 mmNL



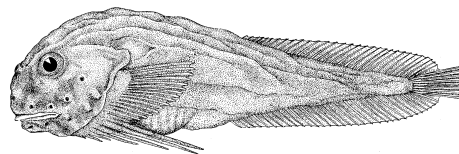
B. 8.5 mmNL



**C. 8.5 mmNL
(Ventral View)**



D. 16.4 mmNL

Careproctus reinhardti* (Krøyer, 1862)*Liparidae****Sea tadpole**

Range: Arctic and North Atlantic oceans from Laptev Sea to Greenland and Gulf of St. Lawrence

Habitat: Demersal in depths of 200–1,000 m; larvae are also demersal (unlike pelagic larvae of other liparids)

Spawning: Undescribed; small individuals (<20 mm) have been collected throughout spring and summer in St. Lawrence River Estuary and Chaleur Bay

Eggs: – Undescribed

Larvae:

- Hatch at advanced stage of development; size undescribed
- Suction disk present at hatching
- Adult complements of fin rays present at hatching
- Diagnostic meristic characters develop before hatching
- Nostrils do not split into 2 pairs as in other liparids
- Head length increases from 19% SL during flexion to 21.5% SL during postflexion
- Preanus length changes little from 27.5% SL during flexion to 25% SL during postflexion
- Snout to anal fin changes little; about 32% SL through development
- 16–30 pyloric caeca present (8–13 in a congener, *C. ranula*)
- Flexion complete by 17.2–21.1 mm
- Postflexion stage larvae resemble adults, except have narrower tails and lack elongate rays on lower lobe of pectoral fin
- Peritoneum only lightly pigmented; other pigment uniformly distributed over-all except that head and ventral surface of gut are unpigmented

Meristic Characters

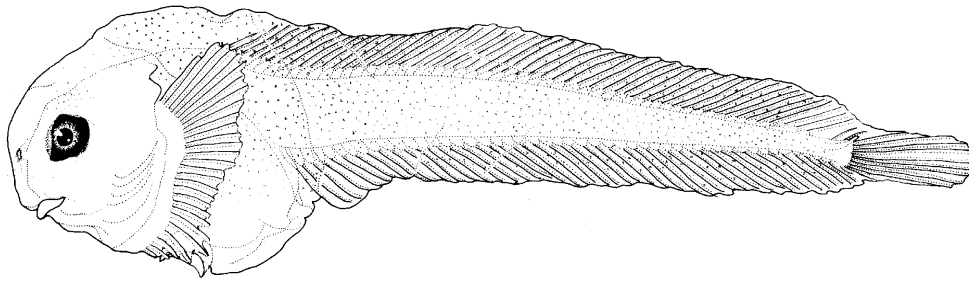
Myomeres:	56–63
Vertebrae:	56–63
Dorsal fin rays:	50–58
Anal fin rays:	41–52
Pectoral fin rays:	25–34
Pelvic fin rays:	Disk
Caudal fin rays:	8–11

Note: 1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids

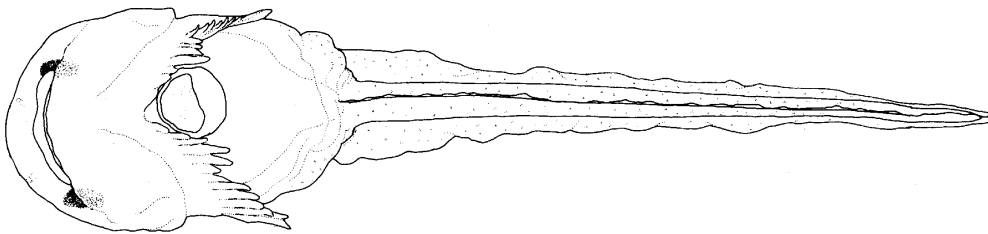
Figures: Adult: D. R. Harriott (Scott and Scott, 1988); **A–B:** Betsy Washington (Able *et al.*, 1984)

References: Brunel *et al.*, 1978; Able and Irion, 1985; Able *et al.*, 1986; Scott and Scott, 1988

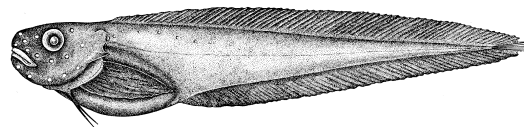
Careproctus reinhardti



A. 12.6 mmSL



**B. 12.6 mmSL
(Ventral View)**

Paraliparis calidus* Cohen, 1968*Liparidae****Lowfin snailfish**

Range: Western North Atlantic Ocean from Gulf of St. Lawrence to Gulf of Mexico

Habitat: Demersal in depths of 150–732 m; larvae probably occur very near the bottom

Spawning: Undescribed; small juveniles have been collected in ice-free months from May–Oct

Eggs: – Diameter: 2.9–3.2 mm

Larvae:

- Hatching size undescribed, but probably hatch at advanced stage of development
- Suction disk lacking
- Dorsal and anal fin ray counts high; adult complements present at 14.0 mm
- Flexion complete by 18.6–20.7 mm
- Head length 13–17% SL in flexion and postflexion stages
- Preanus length 23 to 21% SL in flexion and postflexion stages
- Snout to anus about 30% SL
- Teeth in several rows (single row in *P. copei*)
- Nostrils do not split into 2 pairs as in other liparids; (inadvertently illustrated as 2 in Able *et al.*, 1984)
- Pectoral fins bi-lobed; any rays in interspace less-developed than in *P. copei*
- Note 6 principal caudal fin rays (8 or 9 in *P. copei*)
- Pigment includes melanophores on dorsal surface of nape and along dorsal fin base; abdomen and gill chamber darkly pigmented; lacks dark pigment around mouth

Meristic Characters

Myomeres:	–
Vertebrae:	–
Dorsal fin rays:	58–63
Anal fin rays:	54–58
Pectoral fin rays:	20–22
Pelvic fin rays:	none
Caudal fin rays:	6

Note: 1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids

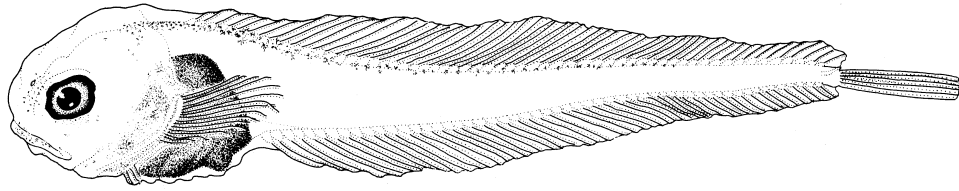
2. Similarities to larvae of *P. copei*:

- Lacks suction disk at all sizes
- High dorsal and anal fin rays counts
- Pectoral fin rays in 2 groups with rudimentary rays in interspace
- Darkly pigmented peritoneum
- Anterior position of anus

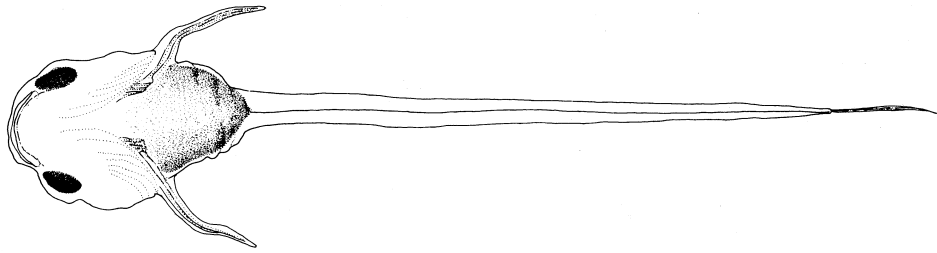
Figures: Adult: Mildred H. Carrington (Cohen, 1968); **A–B:** Betsy Washington (Able *et al.*, 1986)

References: Cohen, 1968; Wenner, 1979; Able and Irion, 1985; Able *et al.*, 1986

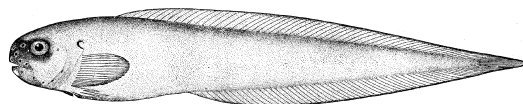
Paraliparis calidus



A. 12.9 mmSL



**B. 12.9 mmSL
(Ventral View)**

Paraliparis copei* Goode and Bean, 1896*Liparidae****Blacksnout snailfish**

Range: North Atlantic Ocean and eastern South Atlantic Ocean; in the western North Atlantic from Davis Strait to Cape Hatteras

Habitat: Demersal in depths of 200–1,088 m

Spawning: Undescribed; possibly year-round off Virginia; possibly spring-summer in St. Lawrence River Estuary

Eggs: – Undescribed

Larvae:

- Hatching size undescribed, but probably hatch at advanced stage of development
- Suction disk lacking
- Dorsal and anal fin ray counts high; adult complements present at small size
- Flexion size undescribed
- Head length about 16.5% SL
- Preanus length about 23% SL
- Snout to anal fin about 30% SL
- Teeth in single row (several rows in *P. calidus*)
- Nostrils do not split into 2 pairs as in other liparids; (inadvertently illustrated as 2 in Able *et al.*, 1984)
- Pectoral fins bi-lobed; any rays in interspace better-developed than in *P. calidus*
- Teeth in single row (several rows in *P. calidus*)
- Note 8 or 9 principal caudal fin rays (6 in *P. calidus*)
- Peritoneum, gill chamber darkly pigmented; dark pigment present around mouth and on snout; pigment absent on nape and along dorsal fin base

Meristic Characters

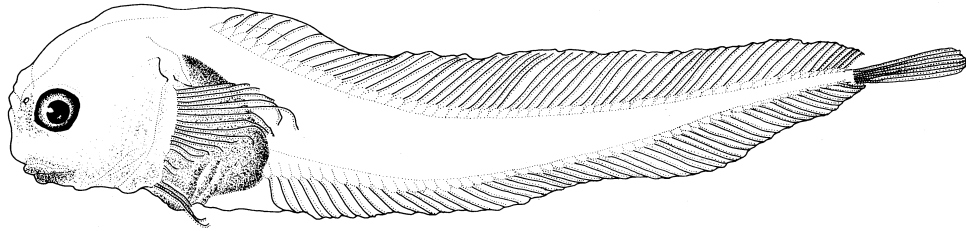
Myomeres:	–
Vertebrae:	–
Dorsal fin rays:	59–68
Anal fin rays:	54–60
Pectoral fin rays:	20–22
Pelvic fin rays:	none
Caudal fin rays:	8–9

- Note:**
1. See *Liparis tunicatus* page for summary of distinguishing characters in larvae of liparids and cyclopterids
 2. Similarities to larvae of *P. calidus*:
 - Lacks suction disk at all sizes
 - High dorsal and anal fin ray counts
 - Pectoral fin rays in 2 groups with rudimentary ray in interspace
 - Darkly pigmented peritoneum
 - Anterior position of anus

Figures: Adult: Goode and Bean, 1896; A: Betsy Washington (Able *et al.*, 1986)

References: Wenner, 1979; Able and Irion, 1985; Able *et al.*, 1986

Paraliparis copei



A. 24.0 mmSL