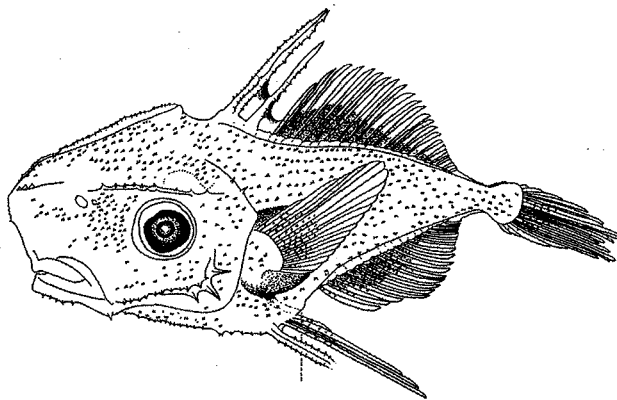




PRELIMINARY GUIDE TO THE IDENTIFICATION OF THE EARLY LIFE
HISTORY STAGES OF THE FAMILIES LUVARIDAE, PEMPHERIDAE, MERLUCCIDAE, &
MELANONIDAE OF THE WESTERN CENTRAL NORTH ATLANTIC

BY

Talat W. Farooqi, Richard F. Shaw, & David C. Lindquist



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It will be in separate chapters entitled Luvaridae, Merluccidae, Melanonidae, & Pempheridae in the "Guide to the early life history stages of fishes of the western central North Atlantic".

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The Louvar, *Luvarus imperialis* (Rafinesque, 1810), family Luvaridae, occurs in tropical and temperate marine waters worldwide and have been reported from: eastern Atlantic (Blache, 1964; Ibanez, 1981); eastern Pacific (Gotshall & Fitch, 1968); North and South western Atlantic (Buen, 1957); and New Zealand (Paulin et al., 1982). Luvaridae belongs to super family Luvaroidea of suborder Acanthuroidei which consists of about 453 species distributed among 5 families (Eschmeyer, 1998). Most of these families are associated with coral reef habitats as adults except pelagic Luvaridae, which is best known by its only known representative, *Luvarus imperialis* (Rafinesque, 1810). This species is infrequently collected as postlarval juveniles in the coastal waters between Lat. 40°N and 90°S. A few early works described the placement of *Luvarus* under Scombridae/Carangidae (Gunther, 1860; Waite, 1902; Regan, 1903; Monad, 1968) or under Luvariformes (Jordan, 1923; Roule, 1924) but never reached a phylogenetic or classificatory conclusion until 1989 when Tyler et al. (1989) provided detailed morphology, phylogenetic relationships and osteological description and agreed with an initially proposed idea of Regan (1902) who placed Luvaridae as being closely allied to Acanthuroidei. Adult morphology and larval characters among families of Acanthuroidei (Table 1) support the hypothesis that Luvaridae, Siganidea, Zanculidae, and Acanthuridae are a monophyletic group in the following sequence: Siganids --- Luvarids --- Zanculids --- Acanthurids (Leis & Richards, 1984; Tyler et al. 1989).

Larvae of these families share the following characters: moderately to very deep compressed body; serrated ridges on head and snout; prolonged pelagic juvenile metamorphosis stage; small to large preopercular spines; dome shaped head in preflexion larvae; unusual shape of pelvic girdle; ventrally directed spine at the posterior ventral corner of the retroarticular; early forming specialized scales; locking mechanism for the anterior most dorsal spines; 22-23 vertebrae; and 16-17 principal caudal rays. Acanthuroid species have a special pelagic stage life history often referred to as Lystricinella --- Astrodernella --- Luvarella for *Luvarus* (Gregory & Conrad, 1943) and acronurus for acanthuridae. The most recent larval description of *Luvarus imperialis* and comparison with other acanthuroidei are by Nishikawa (1987), Johnson and Washington (date); Leis & Richards (1984), and Tyler et al. (1989). Meristic characters and available life history information is summarized in Table 1.

Table 1. Summary of meristics and postflexion information of larval acanthuroids (adult counts in parentheses).

(Data from Leis & Richards, 1984; Johnson & Washington, 1987; Tyler et al., 1989).

Meristics/Characters	SIGANIDAE	LUVARIDAE	ZANCLIDAE	ACANTHURIDAE
DORSAL FIN	XII-XIV, 9-11	II, 23 (12-13)	VII, 38-42	IV-IX, 19-33
ANAL FIN	VII, 9-10	18 (13-14)	III, 31-35	II-IV, 18-32
PECTORAL FIN	14-21	17-20 (18)	18-19	14-19
PELVIC	I, 3, I	I, 4 (0)	I, 5	I, 3-I, 5
Caudal	17	16	3-8 + 8-3	16
Vertebrae	23	22	22	22-23
Preopercular spine	large (tiny in preflexion larvae)	large	tiny (long in preflexion larvae)	tiny
Retrorse lacrimal spine	absent	absent	present	absent
Scales	absent	present	present	present (absent in Zebrasoma & Paracanthurus)
Pelvic girdle	absent	absent	present	present
Body shape	not deep	moderately deep	kite-shaped	kite-shaped
Head shape	moderate, round	square	laterally compressed	laterally compressed
Elongate dorsal spine	second	second	third	second
Serrated dorsal spine	third	second & third	first to third (third filamentous very long)	second
Serrated anal spine	second	absent	first to third	second
Sub-pelvic keel	serrate	smooth	smooth	serrate
Mid ventral keels	-0	0	2	1 to many
Retroarticular spine	present	present	present	present
Serrate ridge on pterotic	1	1	1	1
Serrate ridge on Nasal	1	2	1	0-2 (some on postflexion larvae)
Serrate ridge on premaxilla	0	1	1	1
Serrate ridge on angulaorticular	2	1	1	1
Serrate ridge on clithrum	0	0	1	1

Meristics/Characters	SIGANIDAE	LUVARIDAE	ZANCLIDAE	ACANTHURIDAE
Serrate ridge on supraclithrum	1	1	1	1
Serrate ridge on supraoccipital	1	3	3	1
Serrate ridge on posttemporal	1	2	2	1
Locking flanges pterygiophores Dorsal Anal	absent absent	first absent	first 3 first	first first
Scales orientation	absent	horizontal	vertical	vertical (absent in Zebrasoma & Paracanthurus)
Scales arrangement	absent	irregular	irregular	rows
Scales projections	absent	fan shaped	fan shaped	triangular
Scales basal plate	absent	ovoid	ovoid	ovoid-elongate
Scales specialized tissue	absent	absent	absent	present
Scale type (adult)	cycloid	spinulose	spinulose	spinulose (ctenoid in Acanthurus & Ctenochateus)
Egg type	demersal	unknown	pelagic	pelagic
Diameter/oil droplets	< 1 mm, many	unknown	unknown	< 1 mm, single
Settling size	60 mm	unknown	> 75 mm	>60 mm
Hatching size	> 2 mm	unknown	< 2.8 mm	1.7 mm
Notochord flexion	3.8-5.2 mm	unknown	4.0-4.5 mm	3.5-4.6 mm
Pigments on head	yes	no	yes	yes
Pigments on gut	yes	yes	yes	yes
Pigments on caudal	no	yes	no	no
Pigments under dorsal fin	no	no	yes	no
Pigments above anal fin	yes	no	yes	no
Pigments above notochord	no	yes	no	no
Pigments on pectoral fin rays	no	yes	no	no
Pigments on upper jaw	no	yes	no	no

LUVARIDAE*Luvarus imperialis* (Rafinesque, 1810)**MERISTICS**

	Range
Vertebrae:	
Precaudal	9
Caudal	13
Total	22
Number of fin spines and rays	
First Dorsal	II
Second Dorsal	23 {12-13}*
Total Dorsal Elements	25
Anal	18 {13-14}*
Total Anal Elements	18
Pectoral	18 {17-20}*
Pelvic	I,4 {0}*
Caudal	
Dorsal Secondary	7
Principal	8 + 8
Ventral Secondary	8
Total	31
Gillrakers on first arch	
Upper	4-6
Lower	11-14
Total	15-20
Branchiostegals	5

LIFE HISTORY

Range: Southern New England to Gulf of Mexico

Habitat: Epi-to mesopelagic, 0-400 + meters

ELH pattern: Eggs unknown, Pelagic larvae

Spawning:

Season: summer (based on a gravid female landed at Morro Bay in May '53)

LITERATURE

Leis & Richards 1984, Nishikawa 1987, Moore et al. 2003, Tyler et al. 1989, Gotshall & Fitch 1968, Johnson & Washington 1987, Blache 1964.

EARLY LIFE HISTORY DESCRIPTION**EGGS:**

Diameter:	unknown
No. of Oil Globules:	unknown
Oil Globule Diameter:	unknown
Yolk:	unknown
Shell:	unknown
Hatch Size:	< 3.5 mm

LARVAE:

Length at flexion:	6-7 mm
Length at transformation:	9-10 mm
Sequence of fin development:	P ₂ & D spines, D ₁ , P ₁ , C, A.
Pigmentation:	Preflexion: few spots on upper jaw & gut; a row of pigments on notochord tip; few pigments on C.
Flexion & Post Flexion:	Pigments on bases of P ₁ , D ₂ & A fins; numerous pigments on caudal peduncle

Diagnostic Characters:

From Acanthurids as deep bodied not kite-shaped; distinctive truncated snout, short snout. From siganidae as no anal spines & low number of D & A fin rays. From zancidae as preflexion larvae will develop D & P₂ spines early & lacking pigments at base of D & on gut. *Luvarus* develops early pointed scales; heavy serrations on square shaped head & serrated edge in front of D₁; elongated serrated P₂ & D₁ spines which are three times diameter of eye, later with growth spines of fins & many soft rays are lost; minute spines on P₁ & P₂ fin starts at <5 mm & by 10 mm all fins covers with spines; spiny ridge on ascending process of premaxillary bone as in *Zanclus* but lack elongated preopercular spines.

ILLUSTRATIONS

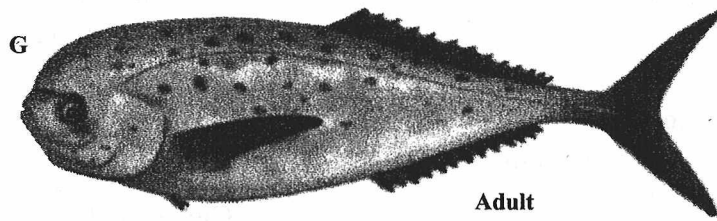
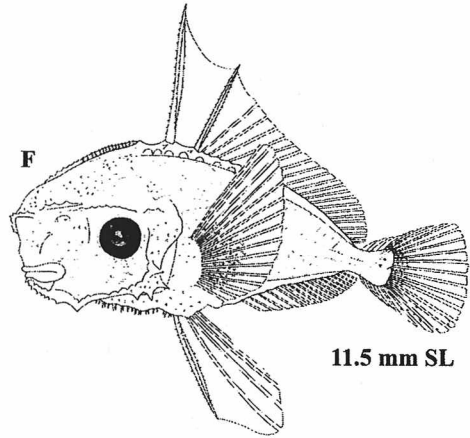
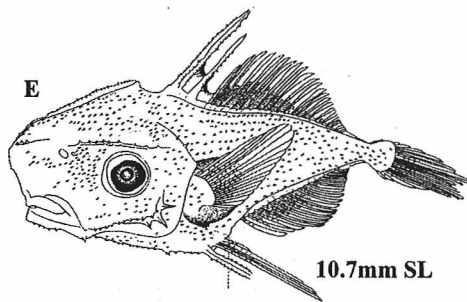
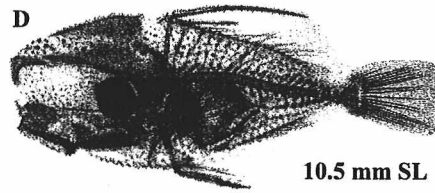
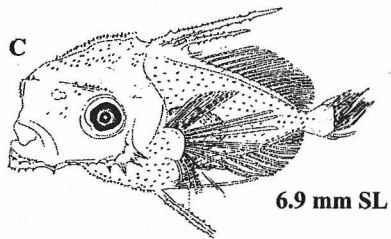
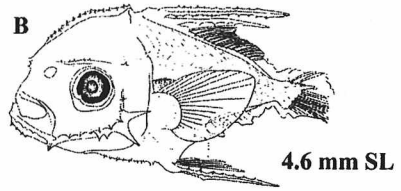
A-C, E from Nishikawa 1987, (western Pacific specimen)

D, from Tyler et al. 1989

F, modified after Fahay 1983, (eastern Atlantic species)

G, from Eschmeyer et al. 1983

*Adult counts in brackets



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PEMPHERIDAE

By Talat W. Farooqi, Richard F. Shaw & David Lindquist

The sweepers, family Pempheridae comprises of 7 genera and 45 species distributed in western Atlantic and Indo-west Pacific regions (Eschmeyer, 1998). Only one genus *Pempheris* with two species *Pempheris schomburgkii* and *Pempheris poeyi* occurs in western central Atlantic. Meristic characters of both the species are given in table 1. *Pempheris mexicana*, (Cuvier), *Pempheris muelleri*, (Miranda Ribeiro) and *Pempheris polio*, (Breder) are synonyms of *Pempheris schomburgkii*.

Pempheridid are small to moderate size, large eyed, deeply compressed body with short dorsal fin, long anal fin, ventral keel anterior to pelvic fins and lateral line extending well out on the caudal fin. The head is mostly scaled; the body is covered with mostly ctenoid or weakly ctenoid scales with flank scales often being cycloid. Scales extend well onto the caudal fin. The base of the anal fin has a scale sheath covering the bases of all rays (Mooi 2002). These nocturnal fishes typically occur in schools and inhabit rocky bottoms near shores and hide under adequate cover of densely branching coral, ledges, and caves or deep during the day. They are crepuscular-nocturnal feeders that leave their daily shelter out into adjacent open waters to feed on drifting meroplanktonic

crustaceans. Many species have luminescent organs.

Pempheridae are oviparous and spawn pelagic large spherical eggs about 1.2 – 1.4 mm in diameter (Mito, 1962 a). The larvae hatch with unpigmented eyes, elongated gut, and a non functional mouth. As yolk sac absorbs light pigments appear on head, snout, and heavy pigments on dorsal and ventral margins of trunk which rapidly thins during flexion. The gut is initially straight, and begins to coil anteriorly during preflexion, head becomes larger and deeper, a conspicuous gas bladder appears above the gut.

During flexion stage small supracleithral spines and several small preopercular spines form (retained in adults) as does the small interopercular spine. The pelvic fin rays begin to form earlier and by early post flexion stage all fin rays are completed. The dorsal and anal fin rays start during flexion and posterior most anal rays may not be formed until after settlement (Leis and Rennis, 1983). The spines in dorsal and anal rays form following flexion. A small portion of dorsal fin fold retains until settlement and resembles an adipose fin. The pectoral fin rays appear during flexion and completes before settlement which occurs as early as 6mm (Leis and Rennis, 1983). Juveniles are often completely transparent except for their internal organs and skeleton (Mooi 2002).

Table 1. Meristic characters for species known to occur in the western central Atlantic. Number in () is the commonly found count for that range. (Source of data: Mooi, 2002; Randall, 1968)

Genus / Species	Dorsal	Anal	Pelvic	Pectoral	BR	Vertebrae	Caudal	Lateral line scales
<i>Pempheris schomburgkii</i>	V, 8 – 9	III, 29 – 36 (31-34)	I, 5	17 – 18	7	10 + 15	7(9 + 8)5	52 – 60
<i>Pempheris poeyi</i>	IV, 8 – 9(9)	III, 22 – 26 (23-24)	I, 5	15 – 16	7	10 + 15	7(9 + 8)5	49 – 51

PEMPHERIDAE

MERISTICS

Vertebrae:	
Precaudal	10
Caudal	15
Total	25
Number of fin spines & rays:	
Dorsal spines	IV
Dorsal rays	8-9
Anal spines	III
Anal rays	23-24(22-26)
Pectoral rays	15-16
Pelvic	I,5
Caudal	3-7+9/8+3-7
Total	23-31
Gill rakers on first arch	
Upper	5-6
Lower	18-20
Total	24-27
Branchiostegals	7

LIFE HISTORY

Range: western North Atlantic, Bahamas, Cuba, Tobago, Colombia, & Venezuela.

Habitat: Nocturnal, typically occurs in schools & hide in densely branched corals, ledges, caves or deep during the day. Rocky shores, reef crest to 30 m depth. Common in the Bahamas.

ELH Pattern: Oviparous, planktonic eggs & larvae.

LITERATURE

Leis & Rennis 1983, Mooi 2002, Williams et al. 1999.

***Pempheris poeyi* (Bean 1885)**

EARLY LIFE HISTORY

DESCRIPTION

Eggs: unknown.

Larvae:

Length at flexion: 3-4 mm.

Length at transformation: 6-7mm.

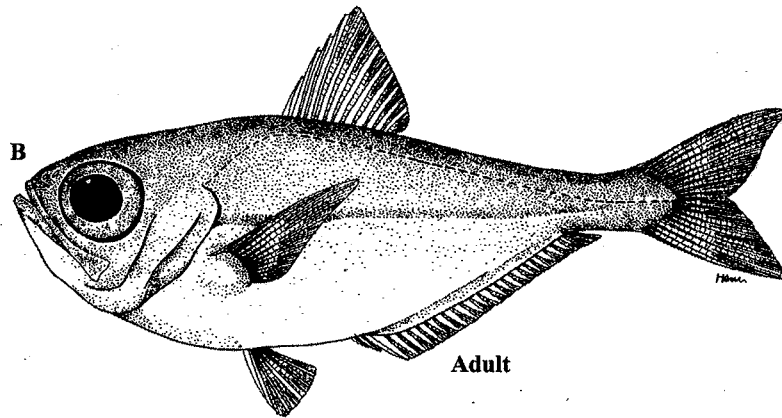
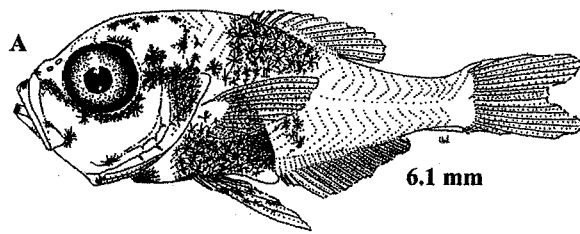
Sequence of fin development: P₂, D₂, A, D₁, P₁.

Pigmentation: Flexion – heavy pigmentation anteroventrally on gut & ventral margins of trunk under D & above A spines. Few melanophores over mid & hind brain, gas bladder, tip of snout & lower jaw, under lower margin of eye, oncleithral symphysis & scattered pigmentation on P₂ fin membrane.

Diagnostic characters: Heavy pigmentation on anterior half of trunk; pigments on P₂ fin membrane; tip of P₂ fin extends posterior of A origin; small preopercular spines, D₁ & A rays (all present by 6-7 mm).

ILLUSTRATIONS

A) 6.1 mm SL larva, original; B) adult from Mooi 2002.



MERISTICS

Vertebrae:	
Precaudal	10
Caudal	15
Total	25
Number of fin spines & rays:	
Dorsal spines	V
Dorsal rays	8-9
Anal spines	III
Anal rays	31-34(29-36)
Pectoral	17-18
Pelvic	I,5
Caudal	3-7+9/8+3-7
Total	23-31
Gill rakers on first arch:	
Upper	6-7
Lower	18-20
Total	24-27
Branchiostegals:	7

LIFE HISTORY

Range: western North Atlantic including Bermuda, (absent from northern Gulf of Mexico), from se Florida, Bahamas to Brazil.

Habitat: Nocturnal, typically occurs in schools & hide in densely branching corals, ledges, caves or deep during day, rocky shores & reefs; 0-30 m.

ELH Pattern: Oviparous, planktonic eggs & larvae.

LITERATURE

Leis & Rennis 1983, Mooi 2002, Williams et al. 1999.

EARLY LIFE HISTORY**DESCRIPTION**

Eggs: unknown.

Larvae:

Length at flexion: 3-4 mm.

Length at transformation: 6-7 mm.

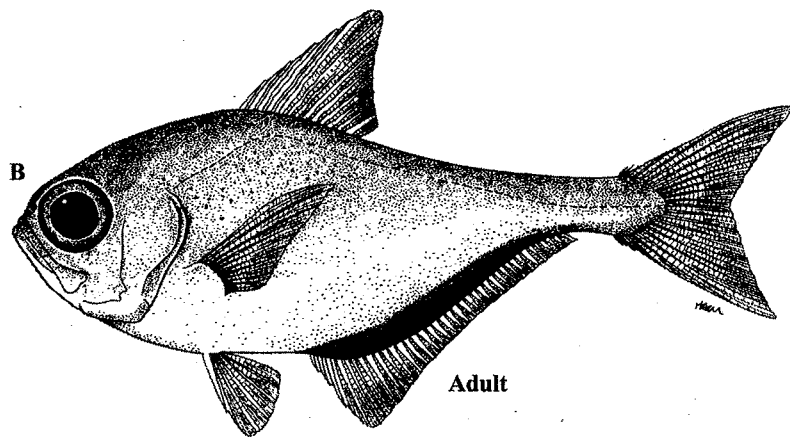
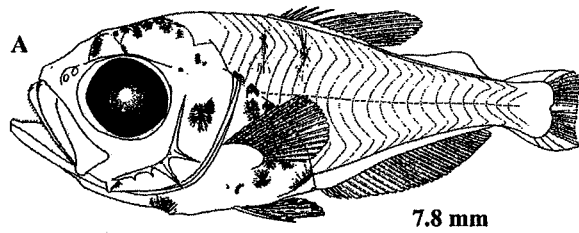
Sequence of fin development: P₂, D₂, A, D₁, P₁

Pigmentation: Flexion/postflexion – light pigmentation anteroventrally on gut & few melanophores under anterior D fin base; few melanophores over mid & hind brain, gas bladder & tip of snout. One melanophore on cleithral symphysis & scattered pigments on P₂ fin membrane.

Diagnostic characters: Few melanophores on mid region of trunk; tip of P₂ behind A fin origin; moderately long preopercular spines, minute teeth; D spines & A rays (all present by 6-7 mm).

ILLUSTRATIONS

A) 7.8 mm SL larva, original; B) adult from Mooi 2002



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The family Merlucciidae comprises one genus and 13 species of benthopelagic fishes distributed on the continental shelves and upper slopes of the Atlantic, eastern Pacific and southwestern Indian Oceans, and off southern New Zealand (Nelson 1994). Two species are known to occur in the western central North Atlantic: *Merluccius albidus*, the offshore hake, and *Merluccius bilinearis*, the silver hake. A third species, *Merluccius magnoculus*, was described from specimens collected in the northern Gulf of Mexico (Ginsburg 1954); however, these specimens had similar meristic and morphometric characteristics as *M. albidus* and, thus, *M. magnoculus* was relegated to the synonymy of *M. albidus* (Karnella 1973). *Merluccius albidus* and *M. bilinearis* closely resemble each other, although they are distinguishable by the number of gill rakers on the first arch (8-11 vs. 16-20, respectively). Also, of the two species, only *M. albidus* is found in the Gulf of Mexico and Caribbean Sea.

Merluccid hakes are characterized by the presence of a V-shaped ridge on the dorsal surface of the skull (Cohen et al. 1990). They have large heads (25-33% BL; Ginsburg 1954) with large eyes and no chin barbel. The mouth is large and oblique, and the jaws contain well-developed teeth. The first dorsal fin is short and triangular with the first ray developed into a flexible spine. The second dorsal fin and the anal fin are long and similar in shape; i.e., both are deeply notched at midlength. The caudal fin is truncate, becoming more forked with growth, and the caudal skeleton includes X-

Y bones. Pectorals are long and slender, and located posterior to the pelvic fins. The pelvic fins have seven rays and are moderately elongated.

Merluccid hakes are oviparous and spawn pelagic, smooth, transparent eggs about 0.8-1.2 mm in diameter with a single conspicuous oil globule (Fahay and Markle 1984). The larvae hatch with unpigmented eyes, a nonfunctional mouth and well-developed pigment patterns. Like other gadiforms, the larvae are generally tadpole-shaped with a short, single-loop gut that exits laterally through the finfold rather than medially. The caudal is the first fin to form in merluccids and gadids, in contrast to other gadiforms where the pelvic forms first. Pelvic fins generally form second or third in merluccids and last in gadids. Rays of the first dorsal fin begin to form before those of the second dorsal fin in merluccids, as opposed to after in most other gadiforms that have multiple dorsal fins. The sequence of fin development, a relatively high number of precaudal vertebrae (25-28), and two distinct postanal bands of pigment may be used to distinguish merluccid larvae from other gadiform larvae of the western central North Atlantic. Transformation to the juvenile stage is gradual in merluccids, and is followed by a pelagic-juvenile stage. Descent to the bottom occurs at sizes >20 mm (Fahay 1983). Eggs and larvae of *M. albidus* and *M. bilinearis* have been described by Marak (1967), Saüskan and Serebryakov (1968), Colton and Marak (1969), and Fahay (1983).

Table Merlucciidae 1: Meristic characters for the merluccid species in the western central Atlantic Ocean. Data from: Ginsburg (1954); Karnella (1973).

Species	Vertebrae			Fin Rays					Gill Rakers	
	Pre-Caudal	Caudal	Total	1D	2D	A	P ₁	P ₂	Upper	Lower
<i>Merluccius</i>										
<i>albidus</i>	25	26-30	50-56	1, 10-13	35-41	35-42	12-17	7	1-3	8-9
<i>bilinearis</i>	27-28	26-27	54-56	1, 11-14	36-42	37-42	13-17	7	2-6	10-17

MERLUCCIIDAE*Merluccius albidus* (Mitchill 1818)**MERISTICS**

Vertebrae:	
Precaudal	25
Caudal	26-30
Total	54(50-56)
Number of fin spines and rays:	
First Dorsal	I,11(I,10-13)
Second Dorsal	39(35-41)
Anal	39(35-42)
Pectoral	15(12-17)
Pelvic	7
Caudal:	
Dorsal Secondary	16
Principal	6+3
Ventral Secondary	18
Total	40
Gill Rakers on first arch:	
Upper	2(1-3)
Lower	8(9)
Total	9-11
Branchiostegals	7

LIFE HISTORY

Range: Georges Bank to Surinam, including Gulf of Mexico & Caribbean Sea.
Habitat: Benthopelagic at depths of 80-1170 m, most abundant 160-640 m.
ELH Pattern: Oviparous, planktonic eggs & larvae; juveniles taken in benthic trawl surveys at 70-440 m.
Spawning: April-July off New England, extending to early autumn in Gulf of Mexico & Caribbean Sea; however eggs have been collected year-round.

LITERATURE

Cohen et al. 1990, Fahay 1983, Ginsburg 1954, Karnella 1973, Marak 1967.

EARLY LIFE HISTORY DESCRIPTION**EGGS:**

Diameter: 0.99-1.24 mm
No. of Oil Globules: 1
Oil Globule Diameter: 0.29-0.36 mm

Yolk: Homogeneous
Shell: Smooth, transparent

Hatch Size: 3.0-3.8 mm

Incubation: 6-8 days

Pigmentation: On yolk & oil globule, on head, near

jaws, on body dorsal to yolk sac & over vent.

Diagnostic Characters: Egg & oil globule larger, more pigment on head & body than *M. bilinearis*.

LARVAE:

Length at flexion: ca. 9-10 mm

Length at transformation: ca. 20 mm

Sequence of Fin Development: C, D₁, P₂, D₂ & A, P₁

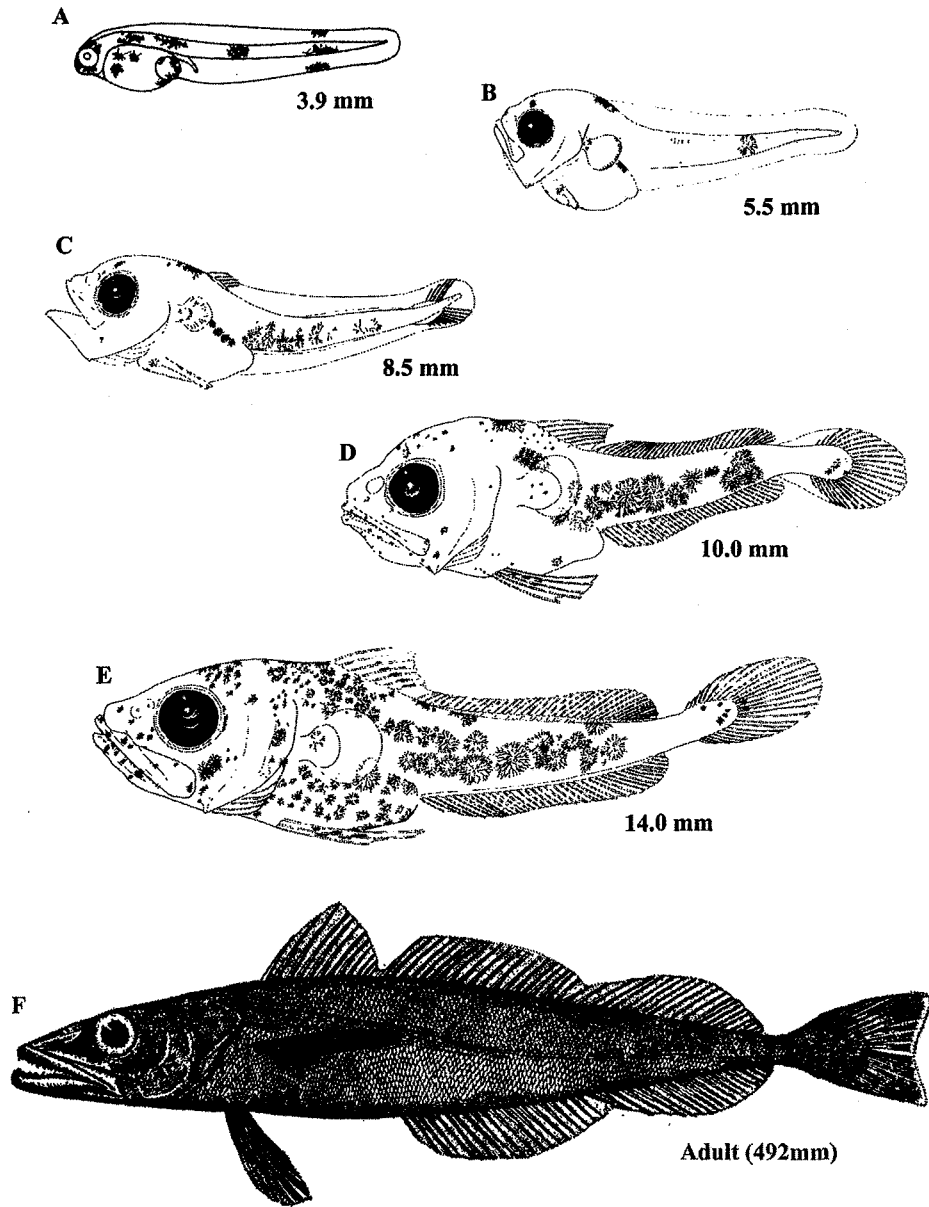
Pigmentation: *Preflexion*- Four main concentrations on body: dorsal of gut, over vent, & two bands at midpoint of tail, & 2/3 distance to end of tail (anterior band less intense than posterior band); pigment also present at base of paired fins. *Flexion*- Increasing on head & body overall; on jaws & snout; at end of notochord; lateral row develops behind P₁.

Postflexion- Increasing over gut & body; on operculum; at base of caudal fin; extending onto membranes of D₁ & P₂.

Diagnostic Characters: Anterior band less intense than posterior band; no pigment at end of notochord until about 10 mm NL; lateral series of expanded melanophores behind P₁; P₁ & P₂ fins always pigmented.

ILLUSTRATIONS

A) Marak 1967; B-E), Fahay 1983; F) Ginsburg 1954.



MERISTICS

Vertebrae:		
Precaudal	27-28	
Caudal	26-27	
Total	54(55-56)	
Number of fin spines and rays:		
First Dorsal,	1,12(1,11-14)	
Second Dorsal	40(36-42)	
Anal	41(37-42)	
Pectoral	15(13-17)	
Pelvic	7	
Caudal:		
Dorsal Secondary	13-15	
Principal	6+3	
Ventral Secondary	15-17	
Total	34-37	
Gill Rakers on first arch:		
Upper	4(2-6)	
Lower	14(10-17)	
Total	16-20	
Branchiostegals	7	7

LIFE HISTORY

Range: Grand Banks & Gulf of St. Lawrence to Cape Fear, North Carolina, USA.

Habitat: Benthopelagic, nearshore to 914 m, most abundant 50-300 m.

ELH Pattern: Oviparous, planktonic eggs & larvae; juveniles taken in benthic trawl surveys at 5-350 m.

Spawning: adults move inshore to spawn during spring; spawning occurs May to November off New England & into winter off Mid-Atlantic states.

LITERATURE

Cohen et al. 1990, Colton & Marak 1969, Fahay 1983, Ginsburg 1954, Sauskan & Serebryakov(1968.

EARLY LIFE HISTORY DESCRIPTION**EGGS:**

Diameter: 0.88-0.95 mm

No. of Oil Globules: 1

Oil Globule Diameter: 0.24-0.29 mm

Yolk: Homogeneous

Shell: Smooth, transparent

Hatch Size: 2.6-3.5 mm

Incubation: 48 hours

Pigmentation: On yolk & oil globule, on head,

scattered on head & body

Diagnostic Characters: Egg & oil globule smaller, pigment on head & body lighter than *M. albidus*.

LARVAE:

Length at flexion: ca. 9-10 mm

Length at transformation: ca. 20 mm

Sequence of Fin Development: C, D₁, P₂, D₂ & A, P₁

Pigmentation: *Preflexion*- Scattered over head &

occipital region; melanophore on gill cover; on dorsal

gut & nape; two postanal bands that vary from

distinct spots to dendritic accumulations; melanophore

at tip of notochord after yolk absorption. *Flexion*-

Additional pigment near eyes; beneath P₁; near end of

tail; along dorsum. *Postflexion*- Large melanophores

along entire dorsum except caudal region; on jaws;

base of caudal rays; increasing beneath P₁ & on

peritoneum. *Transformation/Juvenile*- increasing on

jaws, gut & dorsolateral body.

Diagnostic Characters: Two postanal bands equal in

intensity; P₁ & P₂ fins unpigmented (or

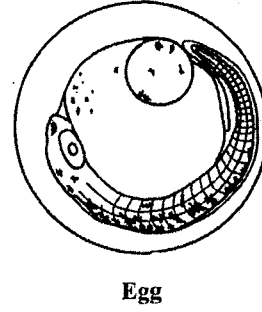
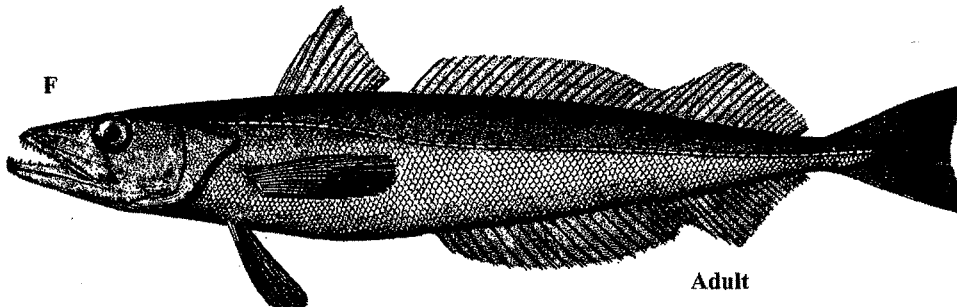
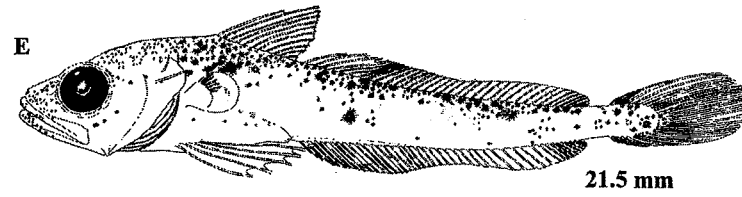
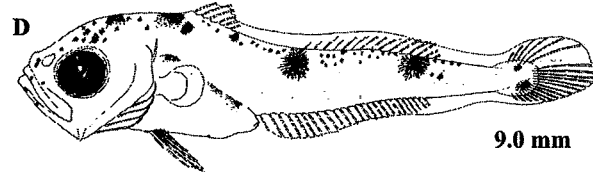
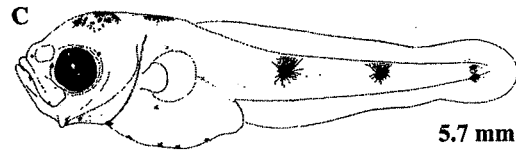
rarely pigmented).

ILLUSTRATIONS

Egg, Sauskan & Serebryakov 1968;

A) Colton & Marak 1969; B-E) Fahay 1983;

F) Goode 1884.



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Melanonids were formerly placed in the family Moridae; however, they lack an otophysic connection and X-Y caudal bones, and, therefore, are considered to be a separate family (Marshall 1965). The family includes one genus and two species of meso- to bathypelagic fishes: *Melanonus gracilis*, which is circumantarctic; and *Melanonus zugmayeri*, which has been found in tropical and warm-temperate waters of the Atlantic, Pacific and Indian Oceans, including the Gulf of Mexico and Caribbean Sea (Howes 1991).

Melanonids are relatively small fishes, with a maximum-recorded size of 28 cm (Cohen 1986). The body is slender, tapering to a narrow caudal peduncle. The head is blunt, has no chin barbel, large sensory lateralis pores, and is covered with numerous small, fleshy ridges. The mouth is large and extends to about the posterior margin of the eyes. The teeth are of moderate size and occur in narrow bands on the jaws, vomer, and palatine. The morphology of the jaw teeth appears to be diagnostic between the two species, i.e., they are

uniformly short in *M. gracilis*; and uneven in size, with some long and needle-like in *M. zugmayeri* (Cohen 1986). The dorsal fin of melanonids is long and often notched or appearing as two fins. The anal fin is also long. The caudal fin is small and rounded to slightly pointed, with numerous procurrent fin rays extending forward onto the peduncle to near the dorsal and anal fin insertions. The pectoral fin is narrow based and located at midflank, below the origin of the dorsal fin. The pelvic fin has seven rays and is located slightly anterior to the pectoral fin base.

Melanonids are rare and, therefore, very little is known of their life history. Eggs and larvae have not been described for these fishes. The smallest melanonids that have been identified are about 15 mm SL (Fahay & Markle 1984; Matarese et al. 1989). In these specimens, the fins are all formed and the body shape is similar to the adults. Melanonids at this size are characterized by their small eyes, dark peritoneum, and distinctive caudal fin (Fahay & Markle 1984).

MELANONIDAE*Melanonus zugmayeri* (Norman, 1930)**MERISTICS**

	Range
Vertebrae:	
Precaudal	13
Caudal	47
Total	58-62
Number of fin spines and rays:	
First Dorsal	67-80
Second Dorsal	
Anal	52-61
Pectoral	14-16
Pelvic	5-7
Caudal:	
Dorsal Secondary	23-25
Principal	6+3
Ventral Secondary	22-25
Total	55-60
Gill Rakers on first arch:	
Upper	3-4
Lower	6-11
Total	
Branchiostegals	7

LIFE HISTORY

Range: Circumglobal in temperate to tropical waters; in western Atlantic from Carolinas to Venezuela, including Gulf of Mexico & Caribbean Sea.
Habitat: Oceanic, mesopelagic to bathypelagic, collected at depths from 200-1300 m.
ELH Pattern: Eggs unknown, larvae likely pelagic.
Spawning: No information.

LITERATURE

Cohen 1986, Fahay & Markle 1984, Howes 1991.

EARLY LIFE HISTORY DESCRIPTION

EGGS: unknown.

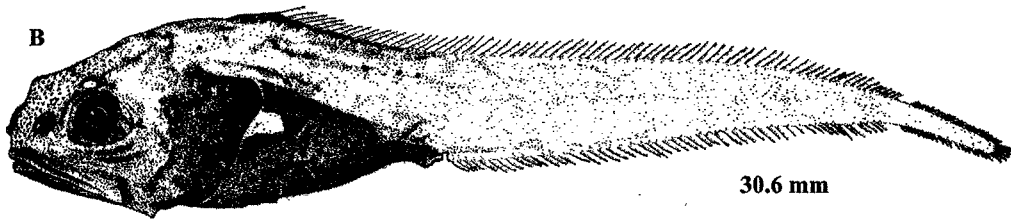
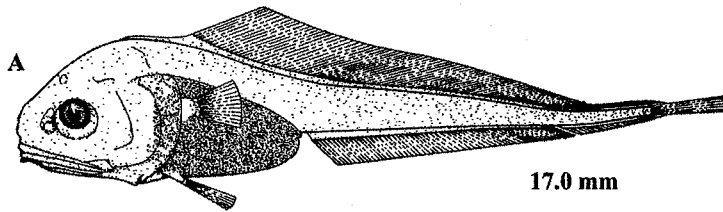
LARVAE: unknown

JUVENILE:

Diagnostic characters: meristic characters.

ILLUSTRATIONS

A) Matarese et al. 1989; B, Fahay & Markle 1984.



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