



Coordination to Support Fisheries Management in the  
Western and Central Mediterranean. CopeMed Phase II



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**TRAINING COURSE ON ICHTHYOPLANKTON**  
**Identification Sheets**

by

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## CONTENTS

Introduction .....	5
Explanatory figures .....	6
Clef de détermination des larves alécithes de Téléostéens .....	8
CLUPEIDAE .....	12
<i>Sardina pilchardus</i> .....	12
<i>Sardinella aurita</i> .....	14
ENGRAULIDAE .....	16
<i>Engraulis encrasicolus</i> .....	16
GONOSTOMATIDAE .....	18
<i>Cyclothone braueri</i> .....	18
STERNOPTYCHIDAE .....	20
<i>Maurolicus muelleri</i> .....	20
PHOTICHTHYDAE .....	22
<i>Vinciguerria attenuata</i> .....	22
STOMIDAE .....	24
<i>Stomias boa</i> .....	24
ARGENTINIDAE .....	26
<i>Argentina sphyraena</i> .....	26
MYCTOPHIDAE .....	28
<i>Benthoosema glaciale</i> .....	28
<i>Ceratoscopelus maderensis</i> .....	30
<i>Diaphus holti</i> .....	32
<i>Hygophum benoiti</i> .....	34
<i>Hygophum hygomii</i> .....	36
<i>Lampanyctus crocodilus</i> .....	38
<i>Lampanyctus pusillus</i> .....	40
<i>Lobiancha dofleini</i> .....	42
<i>Myctophum punctatum</i> .....	44
<i>Notoscopelus (Notoscopelus) elongatus</i> .....	46
PARALEPIDIDAE .....	48
<i>Lestidiops jayakari</i> .....	48
<i>Paralepis coregonoides</i> .....	50
MERLUCCIIDAE .....	52
<i>Merluccius merluccius</i> .....	52
GADIDAE .....	54
<i>Gaidropsarus mediterraneus</i> .....	54
<i>Micromesistius poutassou</i> .....	56
<i>Trisopterus luscus</i> .....	58
CAPROIDAE .....	60
<i>Capros aper</i> .....	59

SERRANIDAE .....	62
<i>Anthias anthias</i> .....	62
<i>Dicentrarchus labrax</i> .....	64
<i>Serranus cabrilla</i> .....	66
<i>Serranus hepatus</i> .....	68
CEPOLIDAE .....	70
<i>Cepola rubescens</i> .....	70
CARANGIDAE .....	72
<i>Trachurus mediterraneus</i> .....	72
<i>Trachurus trachurus</i> .....	74
MULLIDAE .....	76
<i>Mullus surmuletus</i> .....	76
SPARIDAE .....	78
<i>Boops boops</i> .....	78
<i>Diplodus sargus</i> .....	80
<i>Pagrus pagrus</i> .....	82
LABRIDAE .....	84
<i>Coris julis</i> .....	84
TRACHINIDAE .....	86
<i>Trachinus draco</i> .....	86
SCOMBRIDAE .....	88
<i>Auxis rochei</i> .....	88
<i>Scomber scombrus</i> .....	90
<i>Thunnus alalunga</i> .....	92
<i>Thunnus thynnus</i> .....	94
GOBIIDAE .....	96
<i>Lebetus guilleti</i> .....	98
CALLIONYMIDAE .....	100
<i>Callionymus</i> .....	100
BLENNIDAE .....	102
<i>Parablennius pilicornis</i> .....	102
<i>Parablennius gattorugine</i> .....	104
MUGILIDAE .....	106
<i>Mugil cephalus</i> .....	106
SCORPAENIDAE .....	108
<i>Scorpaena porcus</i> .....	108
TRIGLIDAE .....	110
<i>Eutrigla gurnardus</i> .....	110
BOTHIDAE .....	112
<i>Arnoglossus laterna</i> .....	112
SOLEIDAE .....	114
<i>Buglossidium luteum</i> .....	114
<i>Microchirus variegatus</i> .....	116
Literature .....	118

## Introduction

The identification of fish eggs and larvae is a relatively tedious task that requires detailed observation abilities. Fish eggs of different species, with a few exceptions, are very similar and fish larvae undergo very important morphological, morphometric and pigmentation changes which have prevented the development of dichotomous keys. Moreover, the early life stages of many fishes, mainly embryo stages, are undescribed. Despite this, for the Mediterranean Sea there are dichotomous partial keys for both fish egg (Marinero, 1971) and larvae (Aboussoun, 1964). However, they are only applicable to some developmental stages, do not include all species and in some cases drive us to blind stops.

There are three traditional methods to identify fish egg and larvae of a species:

- The culture of fish eggs and larvae from adults caught at sea
- To use fish early life stages collected at sea that allow construct ontogenetic series from juveniles, which can be identified with the same keys used for adults, to the larval and embryo forms
- The 3<sup>rd</sup> method, named “**look alike**” consists of comparing our individuals with descriptions made by other authors. This is an eliminatory processes in which we at the end we “assign” an individual to a concrete specie. This is also the method we are going to use in this course.

More recently, molecular techniques are being used to identify fish eggs and larvae.

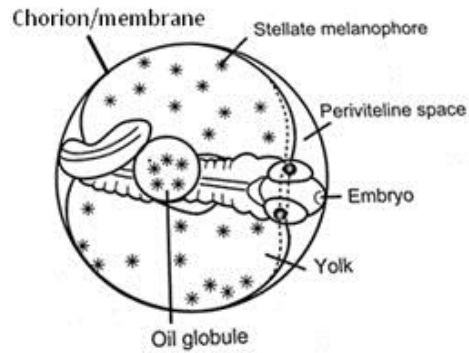
The main morphological and morphometric features used in fish egg identification are: egg shape and size, absence/presence, number, position and color (for live individuals) of oil globules, type of surface membrane and size of the perivitelline space.

The characters used in larval identification are: morphology (body form), morphometric and meristic characters, presence of specialised larval characters (are generally adaptation to a plankton life), larval pigmentation patterns and eye form and size.

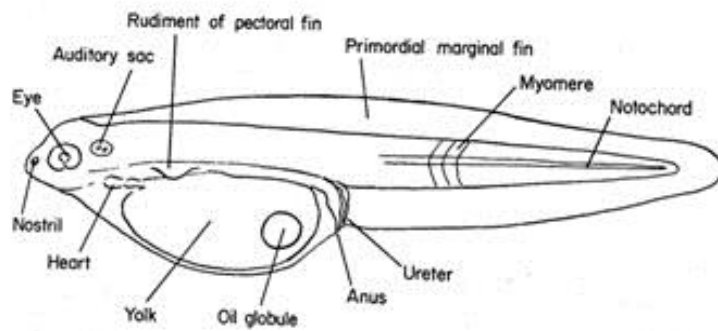
In this course, funded by the "*Coordination to Support Fisheries Management in the Western and Central Mediterranean. CopeMed Phase II*", we will introduce students in the amazing and, at the same time, relatively complicated world of the ichthyoplankton identification.

## Explanatory figures

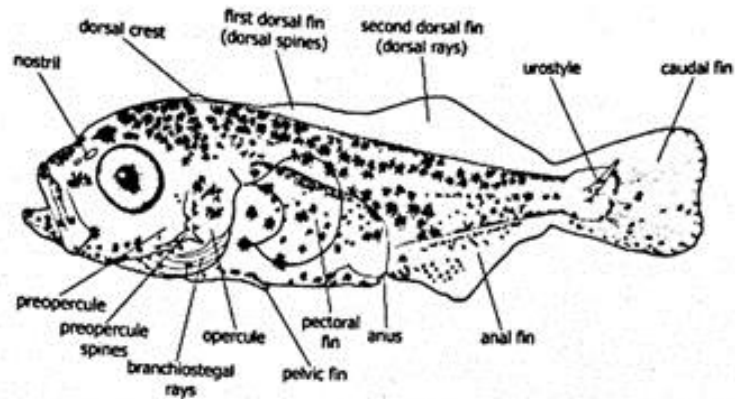
### Main anatomic features of a fish egg



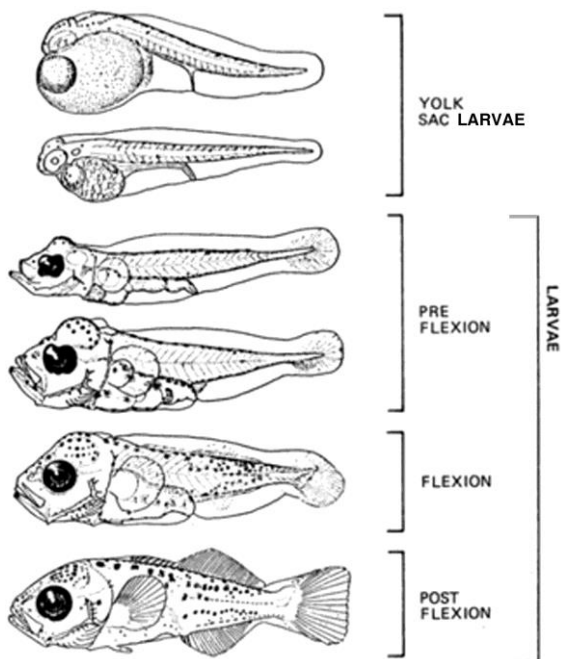
### Main anatomic features of a yolk sac larva



### Main anatomic features of a larva



**Larval developmental stages**



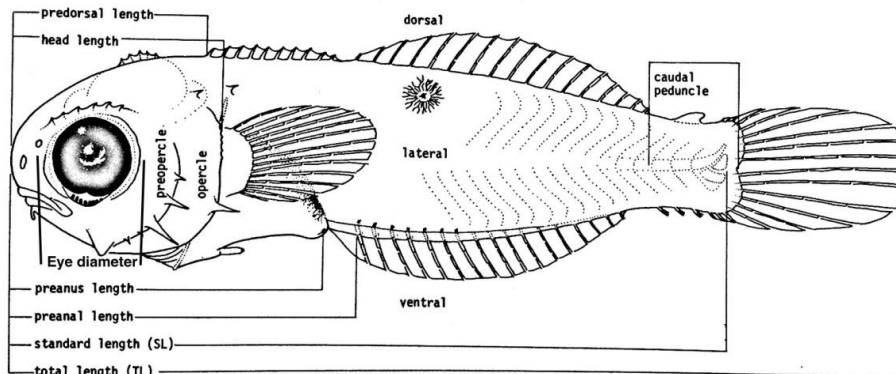
**Larval stage:** from hatching to attainment of complete fin ray counts and beginning of squamation (juvenile)

- **Yolk sac larva:** from hatching to exhausting of yolk reserves
- **Preflexion larva:** since yolk exhausting to the start of upward flexion of the notochord
- **Flexion larva:** from reflexion to the development of hypural bones assuming a vertical position
- **Postflexion larva:** from the formation of the caudal fin to the attainment of full external meristic complements (fin rays)

**Juvenile:** young fish, fundamentally like the adult in meristic characters (excluding scalation) but smaller and reproductively inactive

**The most important measurements of a larva**

- **Total length (TL)** is the distance from the tip of the snout to the caudal fin end
- **Standard length (SL)** is the distance between the tip of the snout and the urostyle end
- **Preanus length** is the distance between the tip of the snout and the anus
- **Head length** is the distance from the tip of the snout to the border of the cleitrum
- **Eye diameter** is the maximum diameter of the eye



## Clef de détermination des larves alcithes de Téléostéens

by Aboussouan (1964)

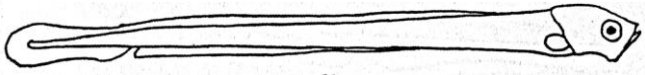
**pAn supérieure ou égale au 2/3 LT**

- Lt + de 4 fois et - de 6 dans LT  
= AnC + de 4 fois dans LT

..... *Argentinidae*  
..... *Clupeidae*  
..... *Engraulidae*



Argentinidae



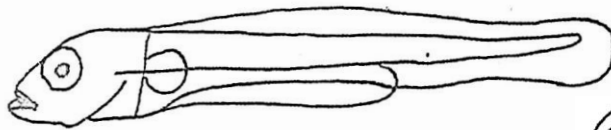
Clupeidae



Engraulidae

= AnC + de 2 fois et - de 4 dans LT

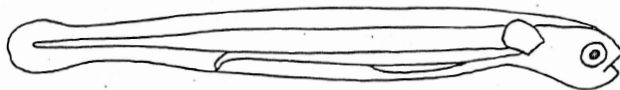
..... *Sphiraenidae*  
..... *Ammodytidae*  
..... *Synodidae*



Sphiraenidae



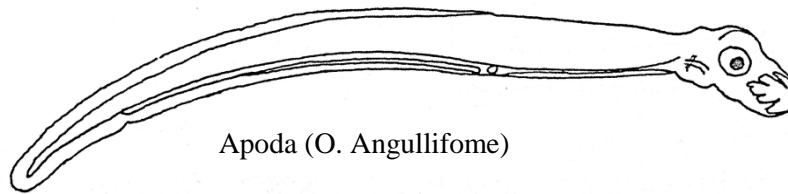
Ammodytidae



Synodidae

- Lt + de 6 fois dans LT, corps transparent, aplati latéralement, dents  
larvaires grandes

..... *Apoda*



Apoda (O. Angullifome)

<p><b>pAn</b> = preanus length  <b>LT</b> = total length  <b>Lt</b> = head length  <b>AnC</b> = anus - urostile length</p>
--



pAn voisine de 1/2 LT ou légèrement supérieure

- pas de vessie natatoire visible

= TD linéaire fait un angle droit sur la primordiale, Ht + de

5 fois dans LT, larve élancée .....

Labridae

= TD globuleux, corps trapu, urostyle saillant

x tête plus haute que longue, front haut .....

Zeidae

Caproidae

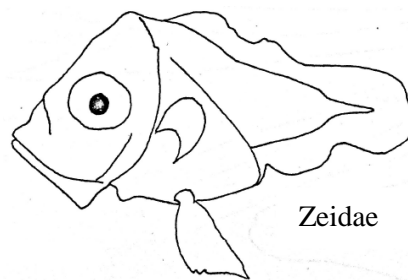
x tête aussi longue ou plus longue que haute, front bas .....

Callionymidae

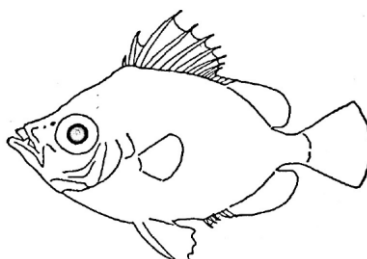
Sciaenidae



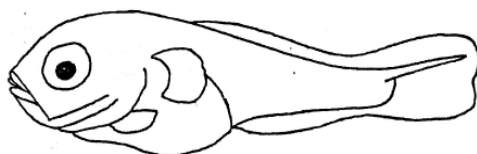
Labridae



Zeidae



Caproidae



Callionymidae



Sciaenidae

- vessie natatoire visible

= TD rectiligne, vessie bien visible et large entre pectorales et anus, Ht + de 4 fois dans LT, DO supérieur à pO .....

Gobiidae

= TD courbe à son extrémité postérieure ou massif

x tête aussi longue que haute, Ht moins de 4 fois dans LT,

DO supérieur ou égal à pO, pas de ventrales.....

Carangidae

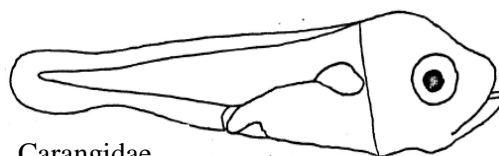
x tête + longue que haute, Ht + de 4 fois dans LT,

DO inférieur à pO, ventrales précoces.....

Serranidae



Gobiidae



Carangidae



Serranidae

**TD** = gut  
**Ht** = head height  
**LT** = total length  
**DO** = eye diameter  
**pO** = preorbital distance

pAn comprise entre le 1/3 et 1/2 de LT

- DO - de 2 fois dans Ht

= ampoule urinaire bien visible et large, pas de ventrales ..... *Thunnidae*

= pas d'ampoule urinaire large, ventrales précoces ..... *Trachinidae*

- DO + de 2 fois et - de 3 dans Ht

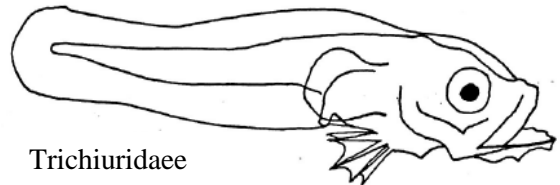
= pO supérieure à DO, bouche grande fendue horizontalement, front concave, pectorales précoces et larges.

x nageoire primordiale dépasse la tête en avant ..... *Scorpaenidae*

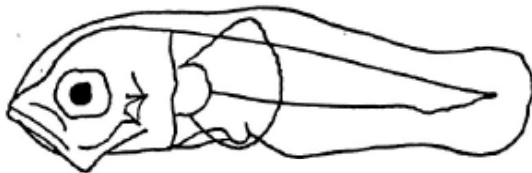
x nageoire primordiale ne dépasse pas la tête en avant ..... *Trielidae*



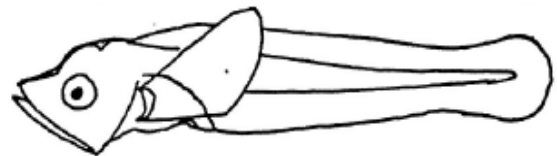
Thunnidae



Trichiuridae



Scorpaenidae



Trielidae

= pO inf. ou égale DO, bouche fendue obliquement, front convexe, ventrales précoces, anus n'atteint pas le bord de la primordiale .....

*Gadidae*  
*Macruridae*



Gadidae



Macruridae

DO plus de 3 fois dans Ht, bouche petite la fente atteint à peine l'oeil au maximum, tête ronde, nageoire primordiale ample, front haut et vertical.

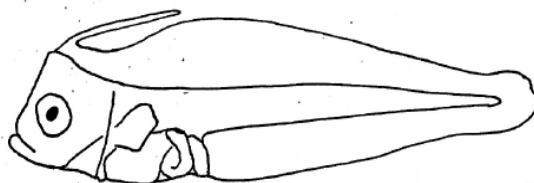
= appendice céphalique généralement présent .....

*Bothidae*

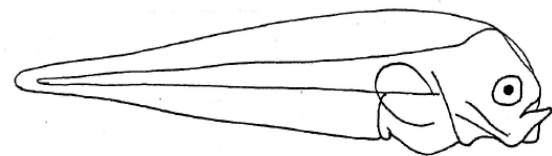
= pas d'appendice céphalique .....

*Soleidae*

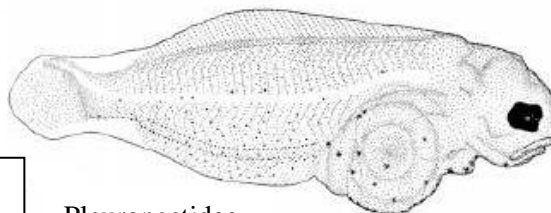
*Pleuronectidae*



Bothidae



Soleidae

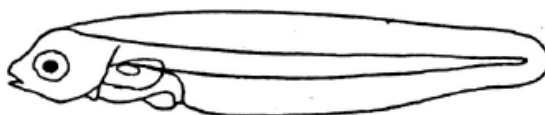


Pleuronectidae

LT = total length  
DO = eye diameter  
pO = preorbital distance  
Ht = head height

pAn comprise entre le 1/4 et le 1/3 de LT, TD dilaté antérieurement

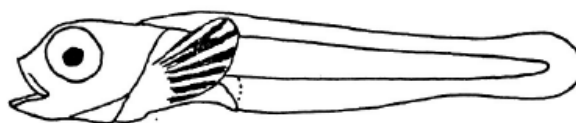
- TD fait un angle droit sur la primordiale, vessie natatoire visible, DO compris + de 2 fois dans Ht ..... *Sparidae*
- TD ne fait pas d'angle droit
  - = DO plus de 2 fois dans Ht, épines operculaires précoces et fortes ..... *Cepolidae*
  - = DO moins de 2 fois dans Ht, pectorales en général bien développées et longues, pas d'épines ..... *Blennidae*



Sparidae



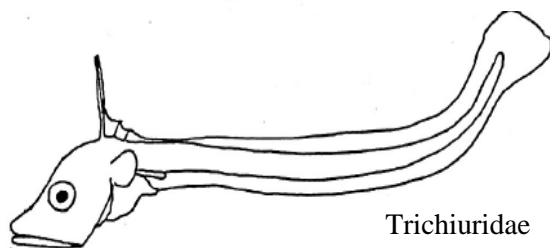
Cepolidae



Blennidae

pAn comprise entre le 1/5 et le 1/4 de LT.

- appendice céphalique présent, tête plus longue que haute, DO plus de 2 fois dans Ht, pO sup. à DO ..... *Trichiuridae*
- pas d'appendice céphalique
  - = tête plus longue que haute, DO moins de 2 fois dans Ht, bouche petite atteint à peine l'oeil, front fuyant ..... *Atherinidae*
  - = tête aussi longue que haute, bouche forme un bec, fente buccale atteint l'oeil, pO sup. à DO ..... *Paralepididae*
  - = tête plus haute que longue, pO inf. à DO, front haut, DO 3 fois dans Ht ..... *Bramidae*



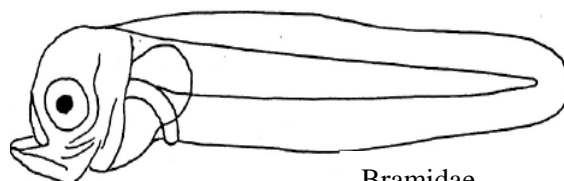
Trichiuridae



Atherinidae



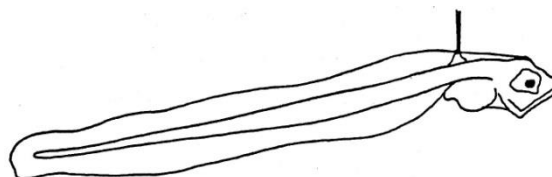
Paralepididae



Bramidae

pAn inférieure ou égale au 1/5 de LT

- appendice post-céphalique présent ..... *Carapidae*



Carapidae

**TD** = gut  
**Ht** = head height  
**LT** = total length  
**DO** = eye diameter  
**pO** = preorbital distance

## CLUPEIDAE

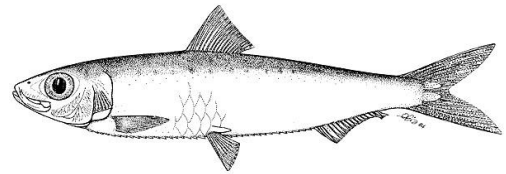
*Sardina pilchardus* Walbaum, 1792

**Habitat:** -Pelagic, coastal

**Spawning:** -September - May

**Eggs:**

- Pelagic, spherical
- Diameter: 1.30–1.90 mm
- Chorion: smooth
- Oil globule: single, 0.14-018 mm in diameter
- Perivitelline space: large
- Yolk: segmented



Adult

**Yolk sac larvae**

- Hatch size: 3.3-4.0 mm with the typical clupeid form
- Pigmentation: yolk sac larvae have two parallel rows of small melanophores in the dorsal region, extending from the head to the tail

**Larva:**

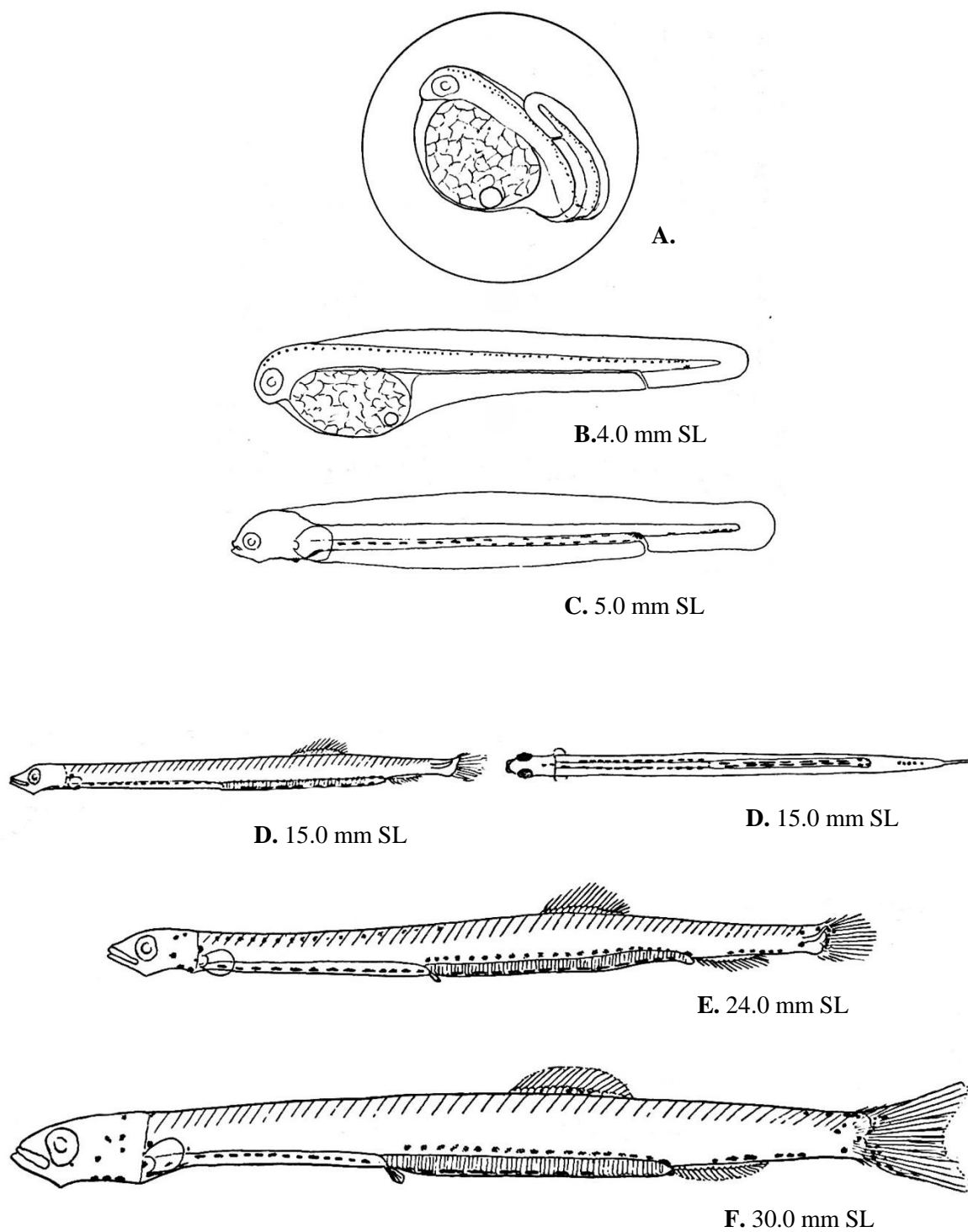
- Body elongated and slender with the gut differentiated into two regions
- Preanal length: c.a. 80% SL
- Melanophores alienated on both sides of the body, over the gut, and two similar lines of melanophores along the ventral part of the second region of the gut, caudal fin pigmented; melanophores between the anus and the caudal fin (this character helps to distinguish this species from *S. aurita*)
- Dorsal fin located anterior to the anus
- Length at flexion: 10.0 mm SL



**Adult:** Whitehead et (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976)



**A-F:** Russell (1976)

**Habitat:** Pelagic in inner continental shelf waters

**Spawning:** June to September

**Eggs:**

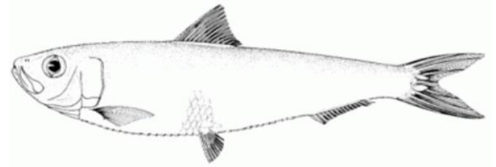
- Pelagic, spherical
- Diameter: 1.20–1.40 mm
- Chorion: smooth and thin
- Oil globule: single, 0.12 mm in diameter
- Perivitelline space: large
- Yolk: segmented

**Yolk sac larvae:**

- Hatch size: 3.5 mm with the typical clupeid form
- Pigmentation: No melanophores are visible on the body

**Larva:**

- Body elongated and slender although more robust than in *S. pilchardus*. The head is also larger than in this species
- Preanus length: c.a 90 %
- Melanophores: alienated on both sides of the gut and over this, caudal fin pigmented, no melanophores between the anus and the caudal fin (this character helps to distinguish between this species and *S. pilchardus*)
- Dorsal fin located anterior to the anus
- Length at flexion: c.a. 10 mm SL



Adult

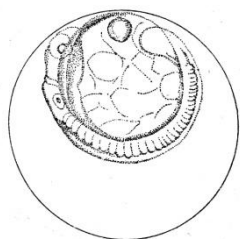


**Adult:** Whitehead et al. (1984-1986)

**Photos:** F. Alemany

**Literature:** Alemany (1997), Olivar and Fortuño (1991), Raffaele (1888), Whitehead et al. (1984-1986)

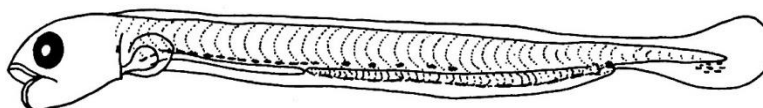
*Sardinella aurita*



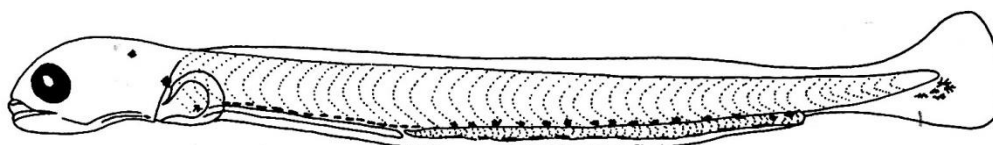
A.



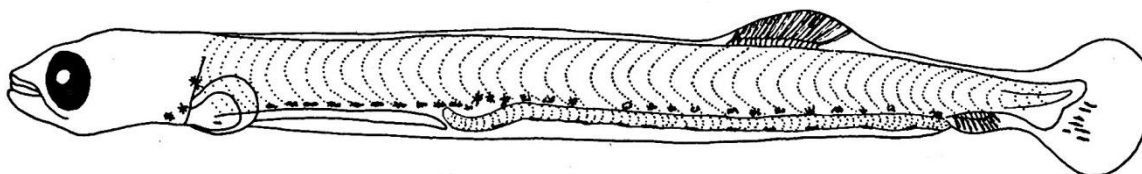
B. 2.6 mm SL



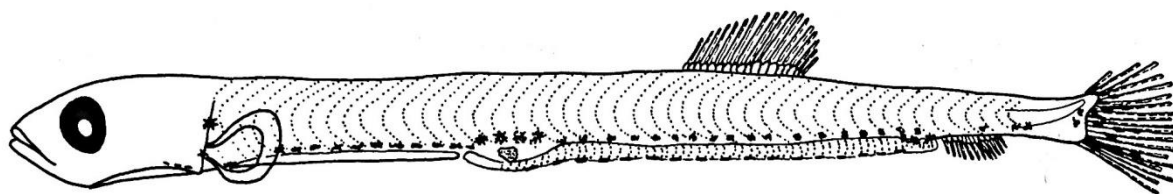
C. 5.3 mm SL



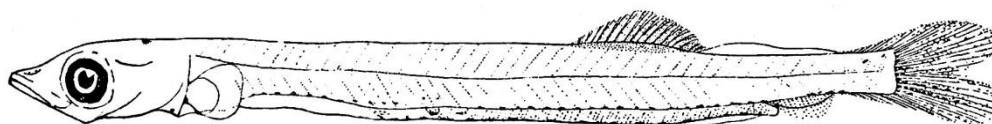
D. 7.0 mm SL



E. 10.3 mm SL



F. 15.5 mm SL



G. 16.5 mm SL

A, G: D'Ancona (1931-1956); B: Alemany (unpublished); C-F: Olivar and Fortuño (1991)

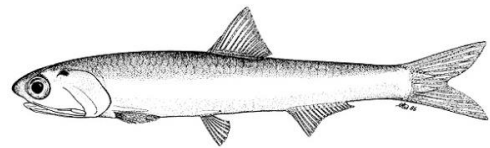
## ENGRAULIDAE

*Engraulis encrasicolus* Linnaeus, 1758

**Habitat:** -Pelagic, coastal (anchoa)

**Spawning:** -Summer

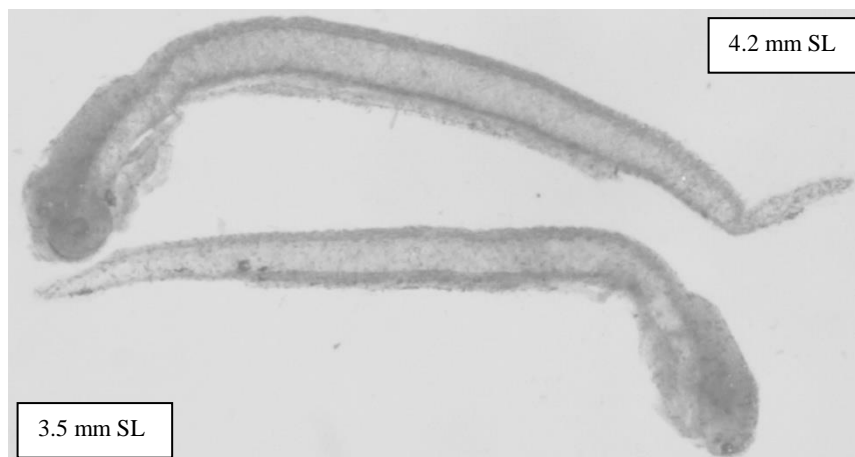
**Eggs:** -Pelagic, ovoid  
-Diameter: 1.2-1.9 x 0.5-1.2 mm  
-Chorion: smooth  
-No oil globule  
-Perivitelline space: small  
-Yolk: segmented



Adult

**Yolk sac larvae:** -Hatch size: 3.3-4.0 mm with the typical clupeoid form  
-Yolk sac very elongated stretching nearly to the anus (allows distinguishing this species from the two clupeid species, *S. pilchardus* and *S. aurita*)

**Larva:** -Body elongated and slender, gut relatively shorter than in *S. pilchardus* and *S. aurita*  
-Preanus length: c.a 75% SL  
-Pigmentation: similar to *S. pilchardus*  
-Dorsal fin located over the anus (allows distinguishing this species from *S. aurita* and *S. pilchardus*)  
-Length at flexion: unknown



3.5 mm SL



Not sized

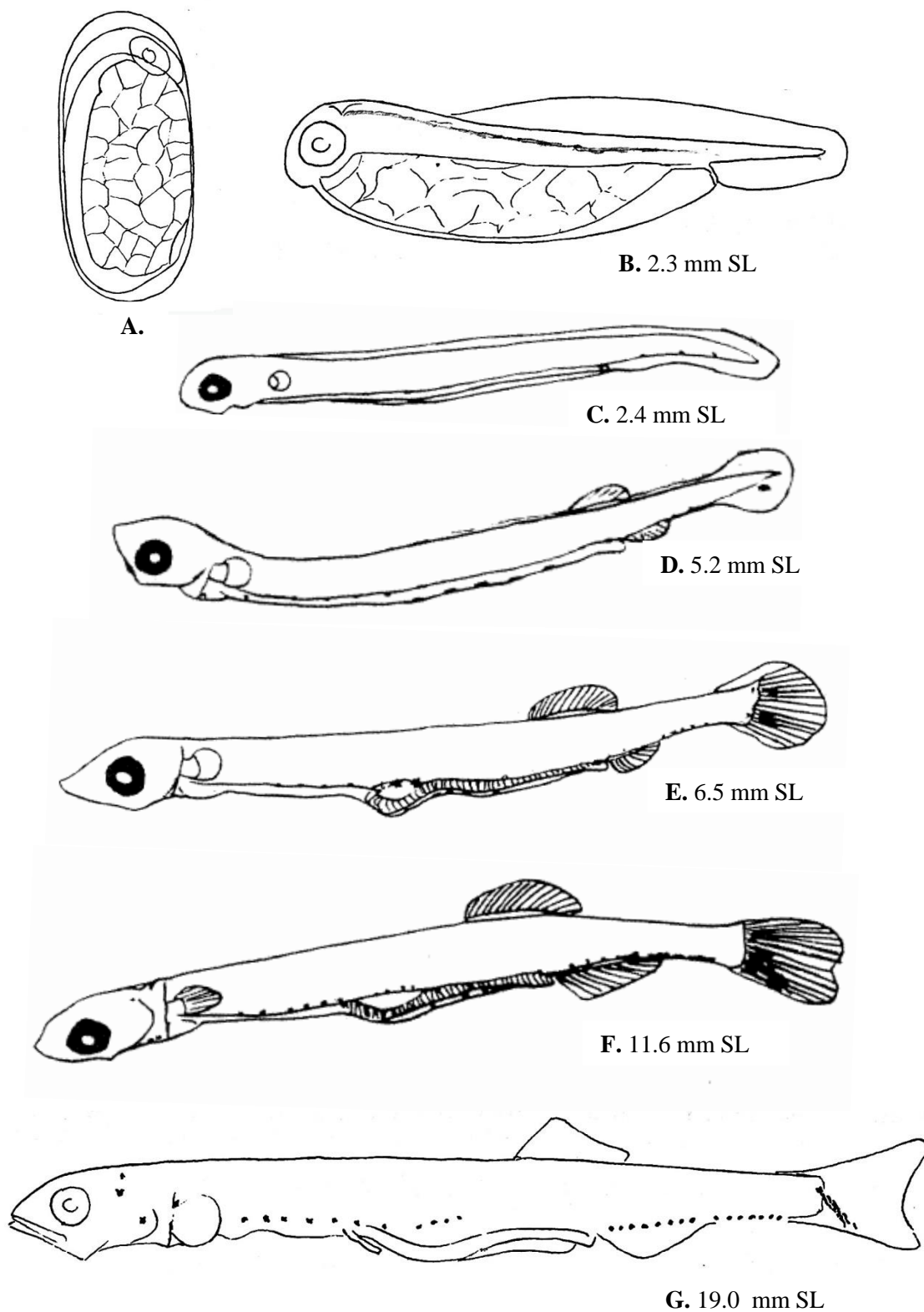
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodríguez, F. Alemany

**Literature:** Alemany (1997), Russell (1976), Whitehead et al. (1984-1986)



*Engraulis encrasicolus*



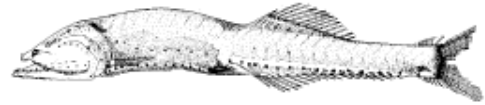
**A, B, G:** Russell (1966); **C-E:** Alemany (unpublished)

## GONOSTOMATIDAE

*Cyclothone braueri* Jespersen & Taning, 1926

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**Habitat:** -Oceanic mesopelagic, 250-900 m depth



Adult

**Spawning:** -Spring-autumn

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: elongate with a prominent swimbladder
- Preanus length: slightly >50% SL
- Eye round
- Pigmentation: a prominent spot on the ventral part of the caudal peduncle; melanophores on either side of the gut, at about the border of the pectoral fins; other at the mid-gut and a third one over the hindgut; the air bladder is also pigmented on dorsal surface; along the postanal ventral region there is a series of 9-12 equidistant melanophores that become internal with development. At around 8.8 mm SL, there are a row of 5-6 internal melanophores on the ventrolateral anterior region of the body and 3 internal melanophores on the upper part of caudal peduncle
- Length at flexion: c.a. 4.8 mm

**Adult:** Whitehead et al. (1984-1986)

**Photos:**

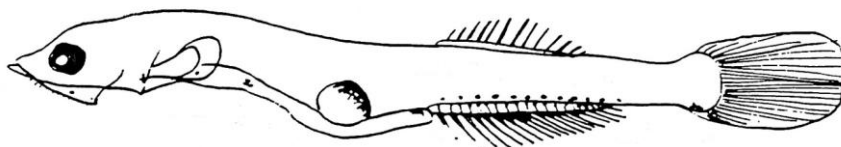
**Literature:** Alemany (1997), Fahay (1983), Richards (2006), Sabatés (1988)



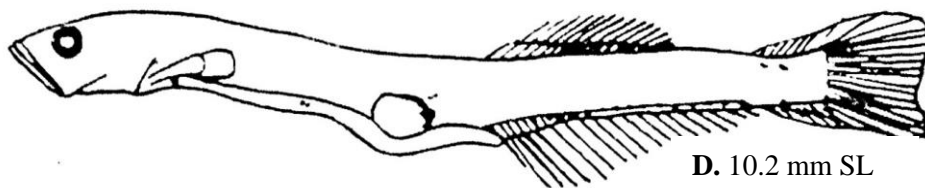
A. 2.3 mm SL



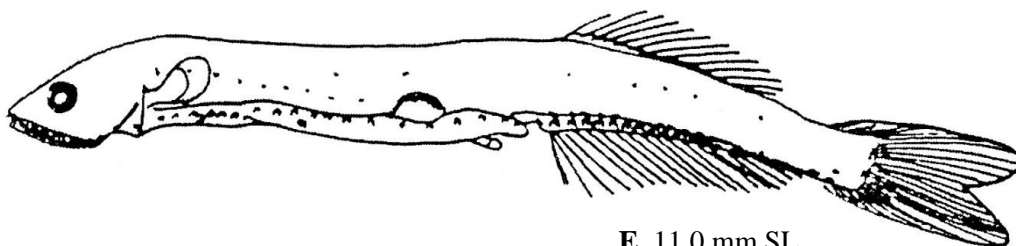
B. 4.0 mm SL



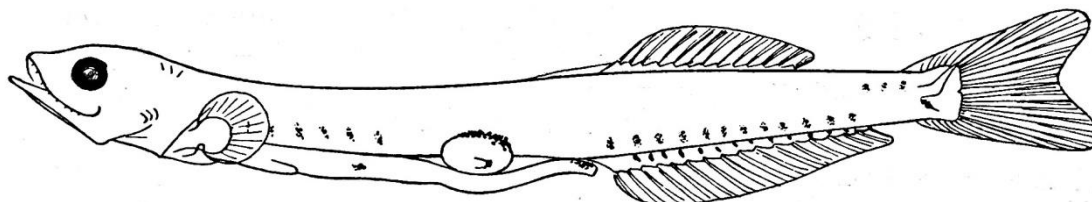
C. 6.1 mm SL



D. 10.2 mm SL



E. 11.0 mm SL



F. 12.5 mm SL

A-E: Alemany (unpublished); F: D'Ancona (1931-1956)

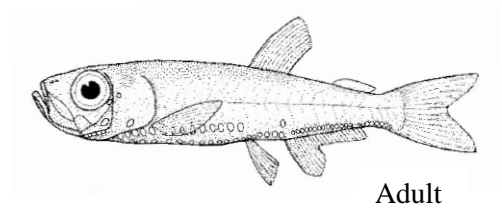
## STERNOPTYCHIDAE

*Maurolicus muelleri* (Gmelin, 1788)

**Habitat:** -Mesopelagic, 40-400 m depth

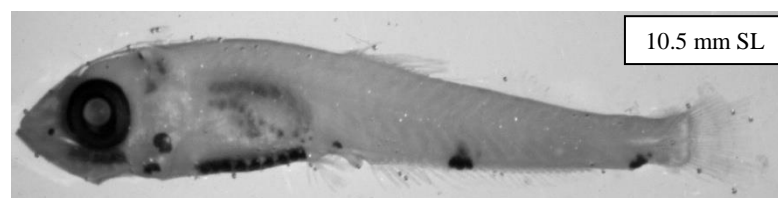
**Spawning:** -Over the whole year

**Eggs:** -Pelagic, spherical  
-Diameter: 1.32-1.58 mm  
-Chorion: sculptured with points arranged hexagonally  
-Oil globule single, 0.26-0.28 mm in diameter  
-Perivitelline space: narrow  
-Yolk: segmented



**Yolk sac larvae:** -Not described

**Larva:** -Body: relatively elongated  
-Eye vertically elliptical, becoming round in late larvae  
-Preanus length: about 50% SL, increasing with development  
-Pigmentation: young larvae unpigmented, melanophores appear in larvae > 10 mm SL  
-At around 6 mm SL, shows a photophore under the eye and two in the ventral region, at the level of the swim bladder  
-Length at flexion: unknown

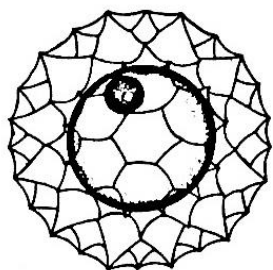


**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (1983), Whitehead et al. (1984-1986)

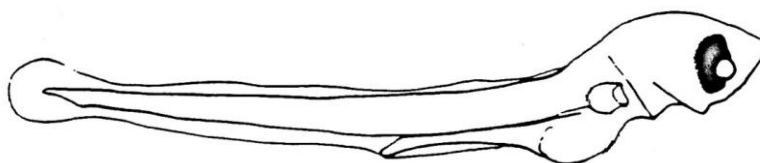
*Maurolicus muelleri*



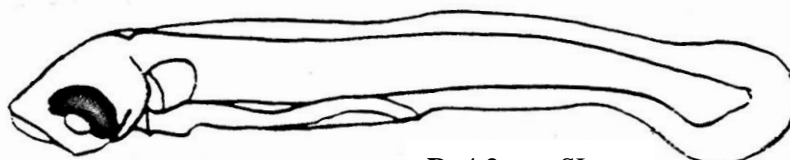
A



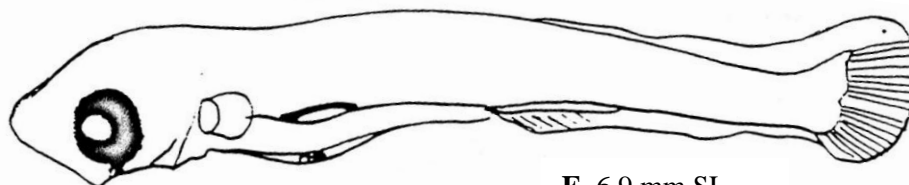
B. 1.9 mm SL



C. 2.9 mm SL



D. 4.2 mm SL



E. 6.9 mm SL



F. 8.0 mm SL

A: Fahay (1983); B-F: Alemany (unpublished)

**PHOTICHTHYDAE**

*Vinciguerria attenuata* (Cocco, 1838)

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**Habitat:** -Mesopelagic, 250-600 m depth

**Spawning:** -Spring-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: slender and elongated with swim bladder (not present in young larvae)
- Preanus length: about 75% SL
- Pigmentation: larvae <6 mm SL show 6-8 stellate melanophores on both sides of the body. Larger larvae, the lateral row disappears; show a prominent median caudal spot and the swim bladder is also pigmented
- Length at flexion: unknown



Adult

**Adult:** Whitehead et al. (1984-1986)

**Photos:**

**Literature:** Alemany (1997), Fahay (1983), Whitehead et al. (1984-1986)

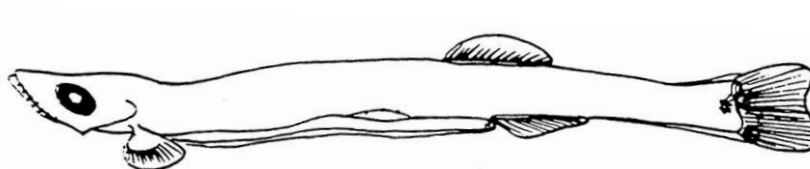
*Vinciguerria attenuata*



A. 4.0 mm SL



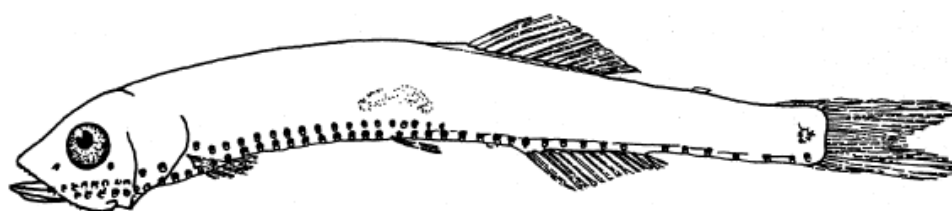
B. 7.0 mm SL



C. 13.5 mm SL



D. 18.3 mm SL



E. 18.5 mm SL

A-C: Alemany (unpublished); D-E: Jespersen and Tåning (1926)

## STOMIDAE

*Stomias boa* (Risso, 1810)

**Habitat:** -Mesopelagic, deep oceanic waters to more than 1,000 m depth



Adult

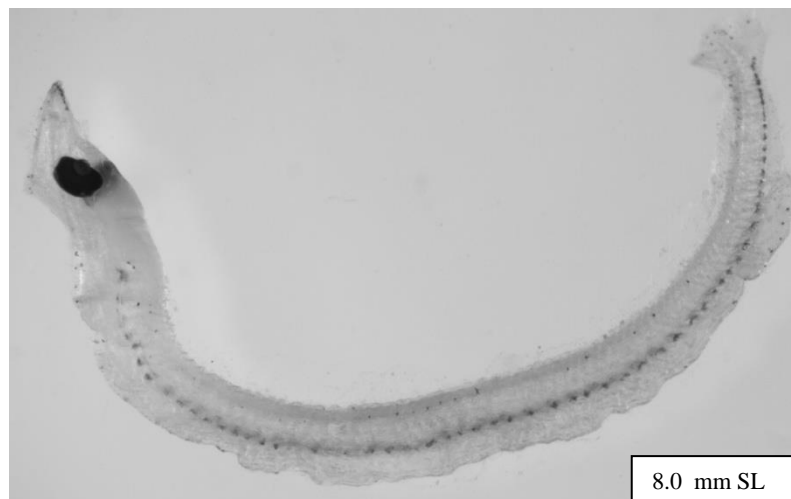
**Spawning:** -Spring-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: elongated with long head and prominent jaws
- Preanus length: c.a. 88% SL
- Pigmentation: young larvae show a line of melanophores over the gut, between the pectoral fin and the urostile. Around 6 mm SL, they appear melanophores in the dorsal-caudal region that extend forward in older larvae
- Length at flexion: unknown



**Adult:** Whitehead et al. (1984-1986)

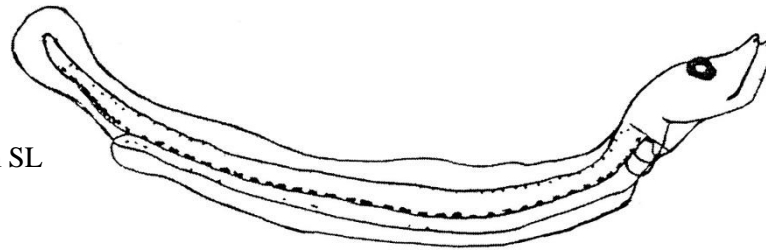
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (1983), Whitehead et al. (1984-1986)

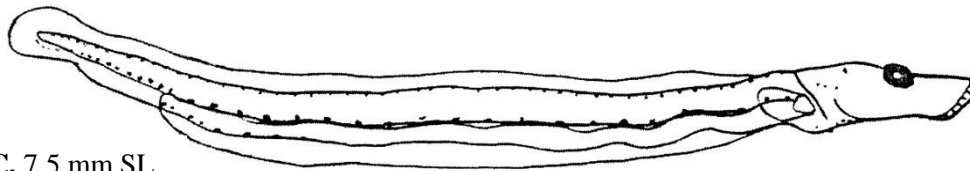




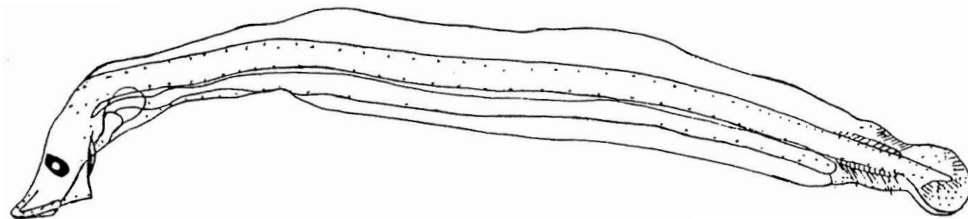
A. 4.0 mm SL



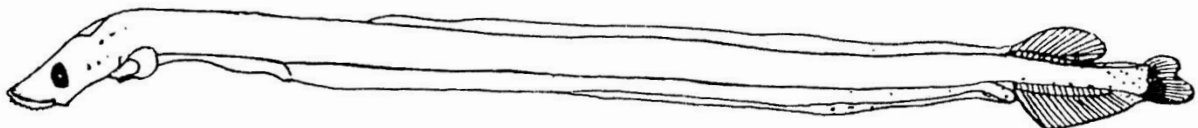
B. 5.8 mm SL



C. 7.5 mm SL



D. 11.7 mm SL



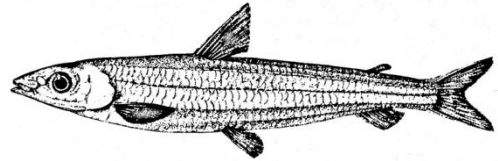
E. 21.0 mm SL

A-E: Alemany (unpublished)

**Habitat:** -Pelagic, coastal

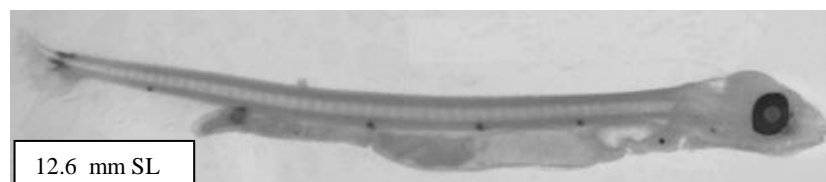
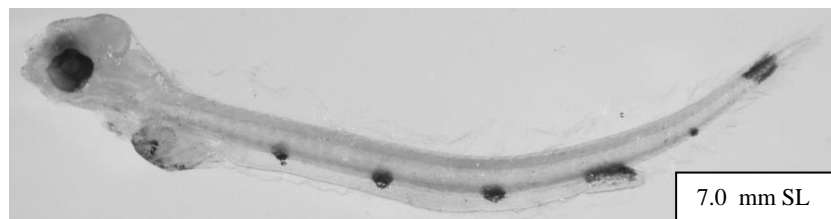
**Spawning:** -Spring

**Eggs:** -Pelagic, spherical  
 -Diameter: 1.70-1.85 mm  
 -Chorion: smooth  
 -Oil globule: single, 0.37-0.47 mm in diameter  
 -Perivitelline space: small  
 -Yolk: segmented



**Yolk sac larvae:** -Hatch size: may be between 7.0 and 7.5 mm and the larva has a typical elongated form  
 -Pigmentation: there are large stellate melanophores on the yolk sac and groups of melanophores along the dorsal side of the gut, with a postanal dorsal and ventral group

**Larva:** -Body: elongated and slender  
 -Preanus length: c.a. 76% SL  
 -Pigmentation: 6 groups of melanophores distributed approximately equidistant along the ventral region of the trunk and two opposed melanophores near the caudal end; tips of the upper and lower jaw pigmented; caudal fin pigmented  
 -Length at flexion: c.a. 13 mm SL

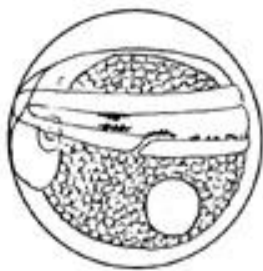


**Adult:** Whitehead et al. (1984-1986)

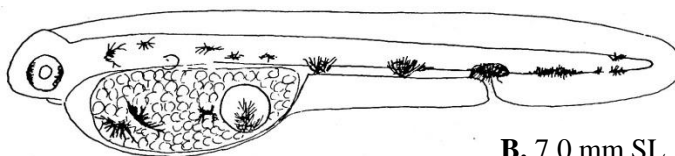
**Photos:** J.M. Rodriguez

**Literature:** Russell (1976), Whitehead et al. (1984-1986)

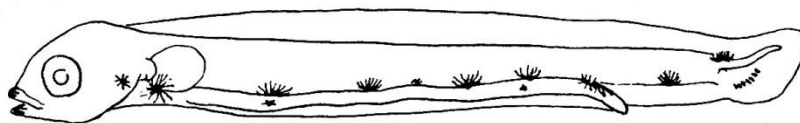
*Argentina sphyraena*



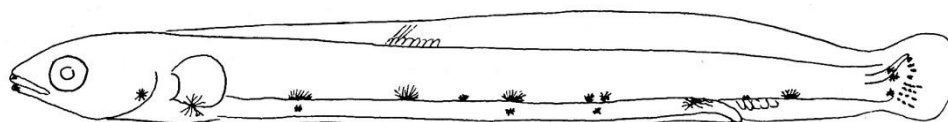
A



B. 7.0 mm SL



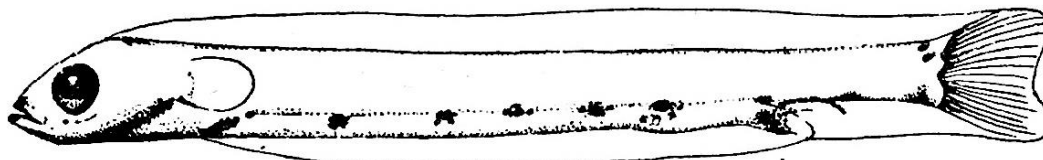
C. 13.0 mm SL



D. 20.0 mm SL



E. 23.25 mm SL



F. 29.0 mm SL

A- E: Russell (1976); F: D'Ancona (1931-1956)

**MYCTOPHIDAE**

*Benthosema glaciale* Reinhardt, 1837

**Habitat:** -Mesopelagic, 275–850 m during day, surface to 225 m at night

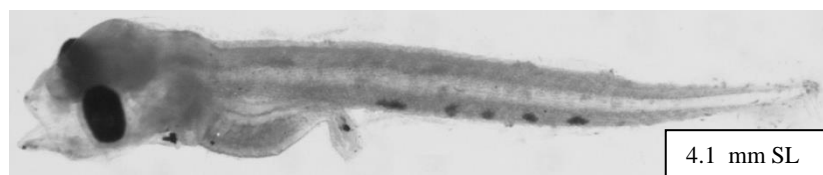
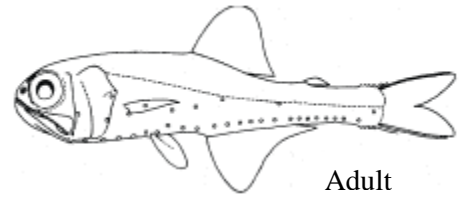
**Spawning:** -Spring-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: moderately elongate, eye slightly elliptical with choroid ventrally
- Preanus length: around 33% of SL
- Pigmentation: spot at posterior edge of the opercle, spots at tips of snout and lower jaw, three ventral spots from cleithral symphysis to anus, ventral spots on tail reduces to a single spot over mid-anal fin at about 11 mm, pectoral fin rays pigmented
- Length at flexion: 5-7 mm

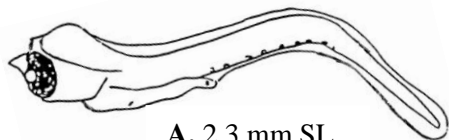


**Adult:** Whitehead et al. (1984-1986)

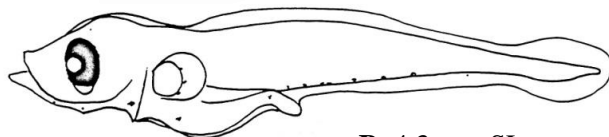
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (1983), Whitehead et al. (1984-1986)

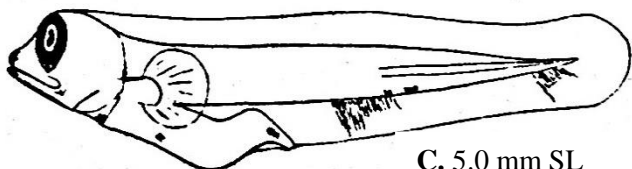
*Benthosema glaciale*



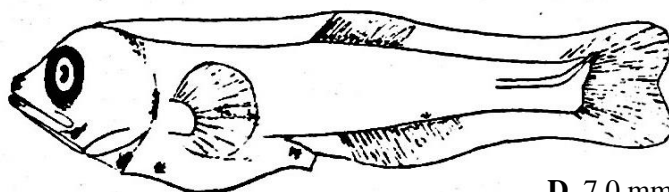
A. 2.3 mm SL



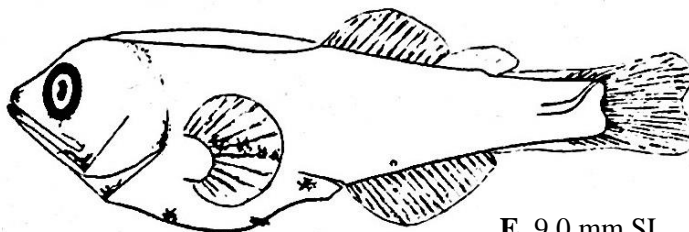
B. 4.3 mm SL



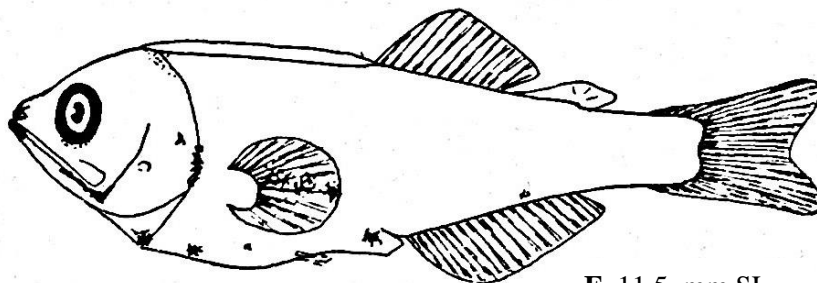
C. 5.0 mm SL



D. 7.0 mm SL



E. 9.0 mm SL



F. 11.5 mm SL

A, B: Alemany (unpublished), C-F: Tåning (1918)

**MYCTOPHIDAE**

*Ceratoscopelus maderensis* Lowe, 1839

**Habitat:** -Mesopelagic in depths of 330–600 m during the day, 0–175 m at night

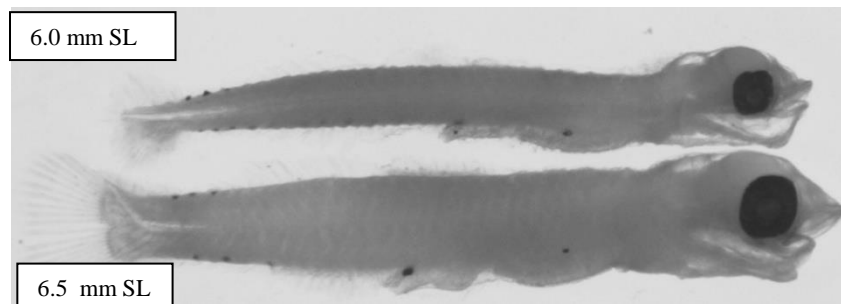
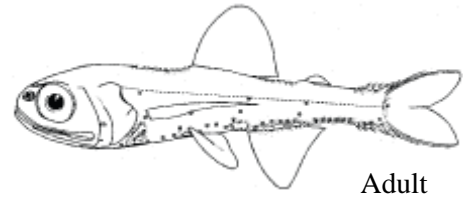
**Spawning:** -Spring-autumn

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: elongate, moderately slender
- Preanus length: >50% SL in small larvae, increases to >60% SL in larger larvae
- Pigmentation: in small larvae, there are spots on the lateral surface of the gut, over the hindgut and a continuous line of melanophores between the anus and the caudal fin that reduce with development; in larger larvae, 3 of 4 melanophores extend forward from the dorsal edge of the caudal peduncle
- Length at flexion: c.a. 6 mm SL

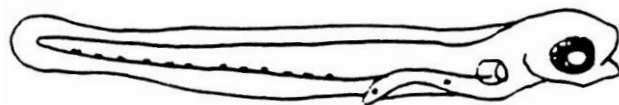


**Adult:** Whitehead et al. (1984-1986)

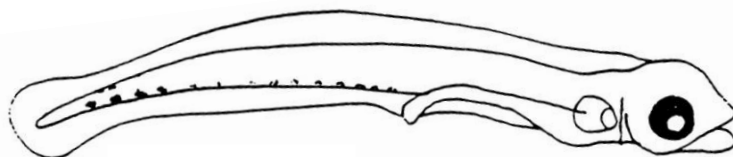
**Photos:** J.M. Rodríguez

**Literature:** Alemany (1997), Fahay (1983), Tåning (1918)

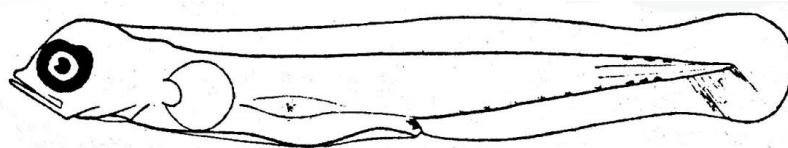
*Ceratoscopelus maderensis*



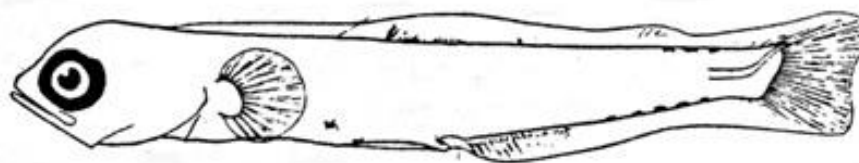
A. 2.0 mm SL



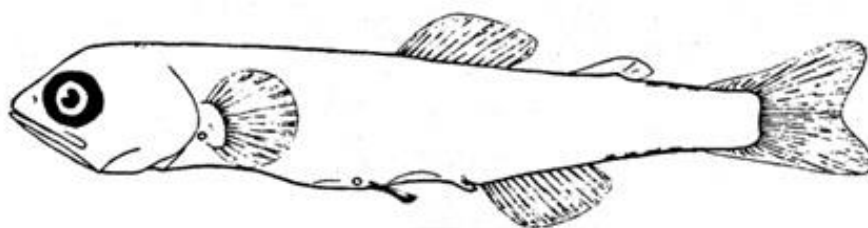
B. 2.85 mm SL



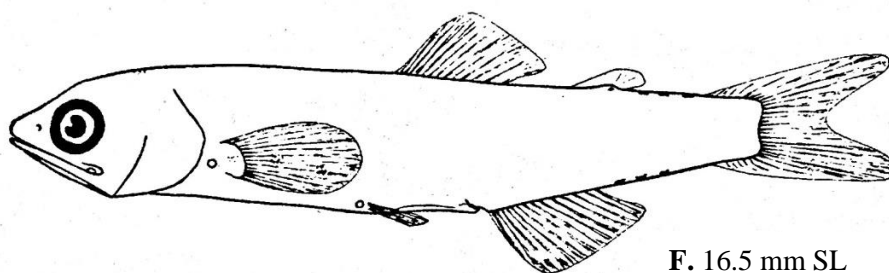
C. 5.0 mm SL



D. 7.0 mm SL



E. 11.5 mm SL



F. 16.5 mm SL

A, B: Alemany (unpublished), B-F: Tåning (1918)

**Habitat:** -Mesopelagic, 80- 675 m depth

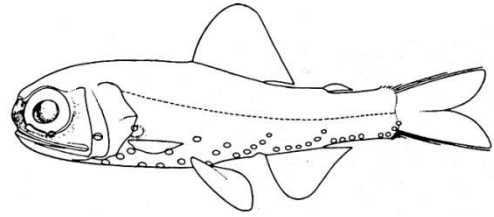
**Spawning:** -Spring-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: slender with round eye
- Preanus length: <50% SL
- Pigmentation: spot over the hindgut, melanophores on the cleithral symphysis, row of ventral melanophores between the anus and the caudal region; single, large spot on lower half of the caudal fin base
- Length at flexion: < 5mm

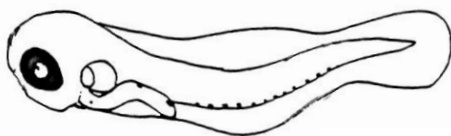


**Adult:** Whitehead et al. (1984-1986)

**Photos:**

**Literature:** Alemany (1997), Fahay (1983), Whitehead et al. (1984-1986), Tåning (1918)

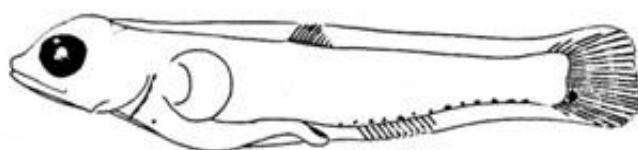




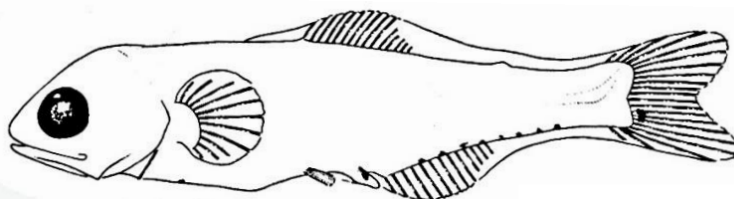
A. 2.0 mm SL



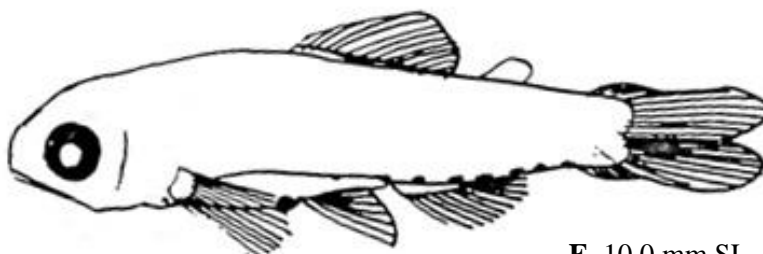
B. 3.0 mm SL



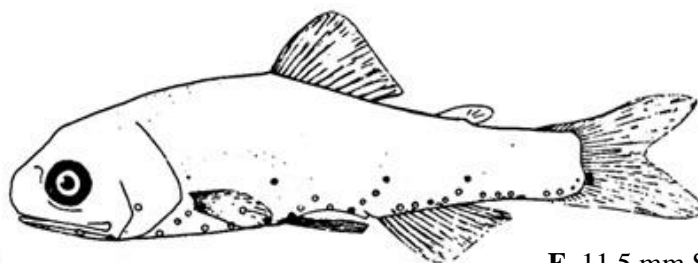
C. 5.0 mm SL



D. 6.5 mm SL



E. 10.0 mm SL



F. 11.5 mm SL

A, B: Alemany (unpublished), C-F: Tåning (1918)

Larvae of the two species of this genus, *H. benoiti* and *H. hygomi*, are very similar. They are only differentiated by the pigmentation pattern

**Habitat:** -Mesopelagic in depths of 100- 1000 m during the day, 700-1000 m at night (*H. benoiti*); 600-750 m at night close to surface during the day

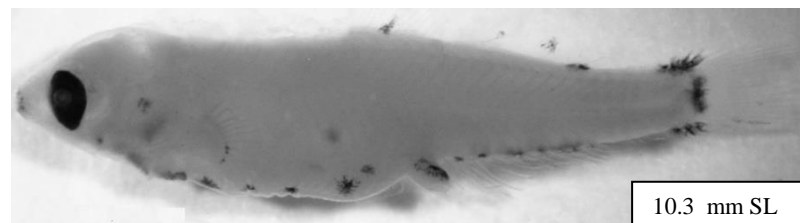
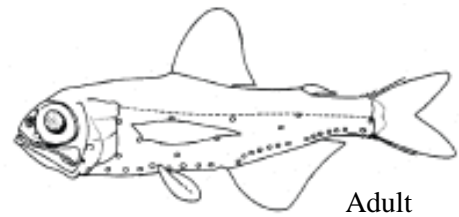
**Spawning:** -Spawning peak in spring-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -<2.5 mm SL

**Larva:**

- Body: moderately slender; body depth increases with development; the anus is at anterior margin of the anal fin; eyes unstalked, moderately elliptical with prominent choroid tissue
- Preanus length: 50% SL increases with development
- Pigmentation: ventral series of melanophores on isthmus, continuing to cleitrum; series of melanophores on each side of the gut (disappear with development in *H. hygomi*), a melanophore on the hindgut
- Length at flexion: 5.0-5.5 mm SL in *H. benoiti* and 6-7 SL in *H. hygomi*



**Adult:** Whitehead et al. (1984-1986)

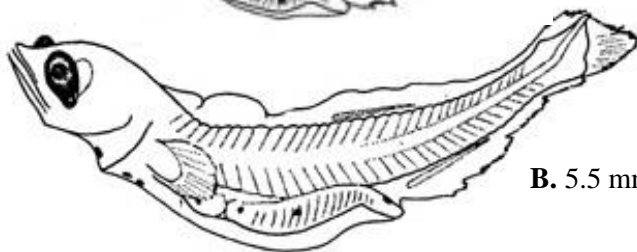
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (1983); Richards (2006)

*Hygophum benoiti*



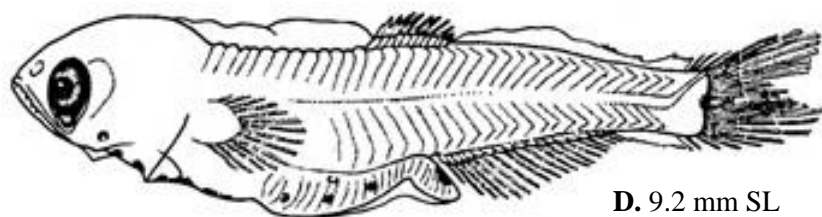
A. 2.9 mm SL



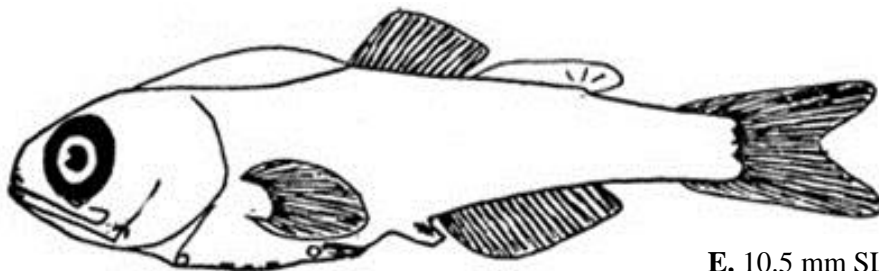
B. 5.5 mm SL



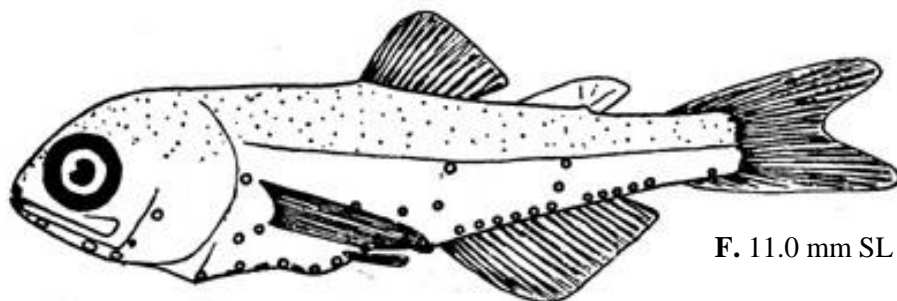
C. 7.8 mm SL



D. 9.2 mm SL



E. 10.5 mm SL



F. 11.0 mm SL



G. Melanophores present on isthmus

A-D: Olivar and Palomera (1994); E, F: Tåning (1918); G. Badcock and Merrett (1976)

## MYCTOPHIDAE

*Hygophum hygomii* (Lütken, 1892)

**Habitat:** -Mesopelagic in depths of 425–750 m during the day, 0–125 m at night

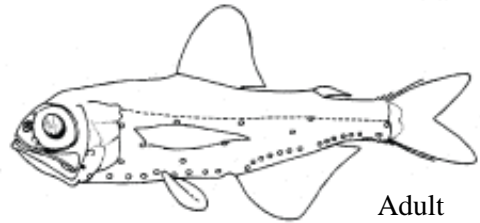
**Spawning:** -Fall–winter with a peak in late fall; life cycle of one year, almost all adults die during the winter

**Eggs:** -Undescribed

**Yolk sac larvae:** -<2.5 mm

**Larva:**

- Body: moderately slender, depth increases slightly through development
- Preanus length: <60% SL
- Pigmentation: melanophores rarely found at tip of snout, lower jaw, and on caudal fin rays; prominent spot on hindgut; series of 1 or 2 spots along gut; few spots near cleithral symphysis; series of ventral spots, postanally, reduced to a single spot over mid-anal fin (not shown on figures)

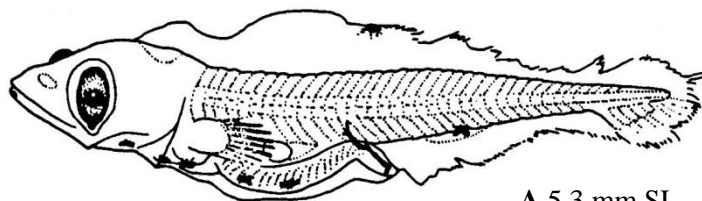


**Adult:** Whitehead et al. (1984-1986)

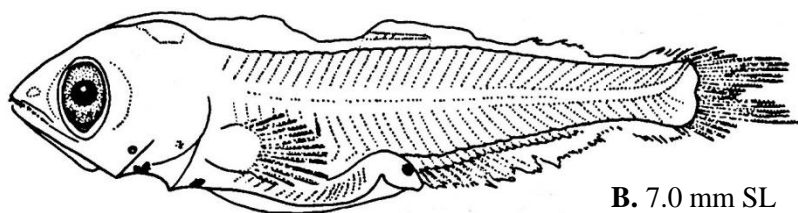
**Photos:**

**Literature:** Alemany (1997), Fahay (1983), Olivar and Palomera (1994), Tåning (1918)

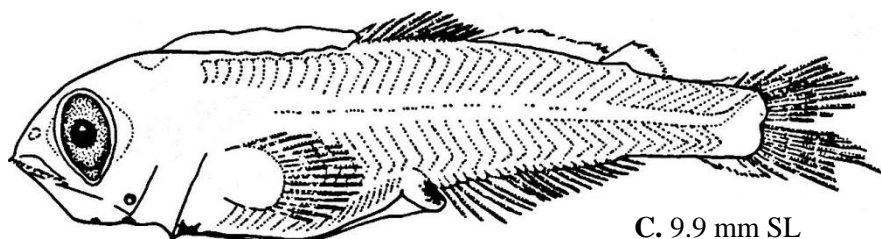
*Hygophum hygomii*



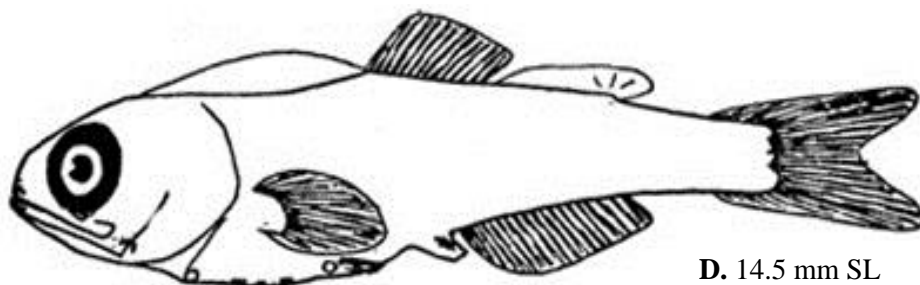
A. 5.3 mm SL



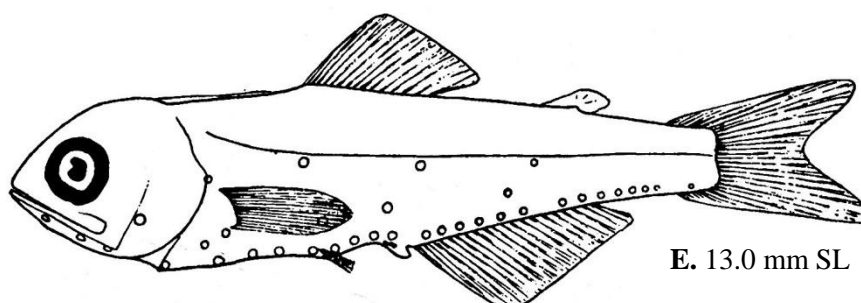
B. 7.0 mm SL



C. 9.9 mm SL



D. 14.5 mm SL



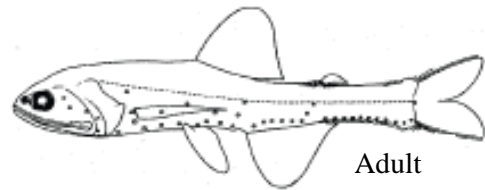
E. 13.0 mm SL

A-C: Olivar and Palomera (1994); D-E: Tåning (1918)

**MYCTOPHIDAE**

*Lampanyctus crocodilus* (Risso, 1810)

**Habitat:** -Mesopelagic in depths of 100-200 and 700-1000 m during the day, 45-150 and 400-1000 m at night



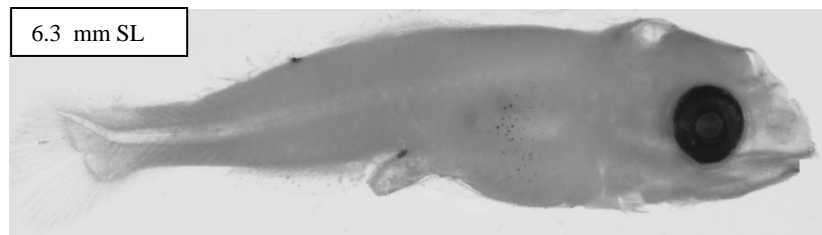
**Spawning:** -Spring-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -<2 mm

**Larva:**

- Body: Body elongate initially, soon deepens, especially through pectoral region; well developed teeth in the upper jaw since young larvae
- Preanus length: increases from around 25% SL in young larvae to about 60% in late larvae
- Eye moderately large and round
- Pigmentation: prominent melanophores on top of head and on dorsum between dorsal and adipose fins; spots at tip of lower jaw and over the hindgut; peritoneal pigment added in later stages; spots on pectoral fin base; late stages add pigment to anterior myosepta
- Length ant flexion: c.a.5 mm

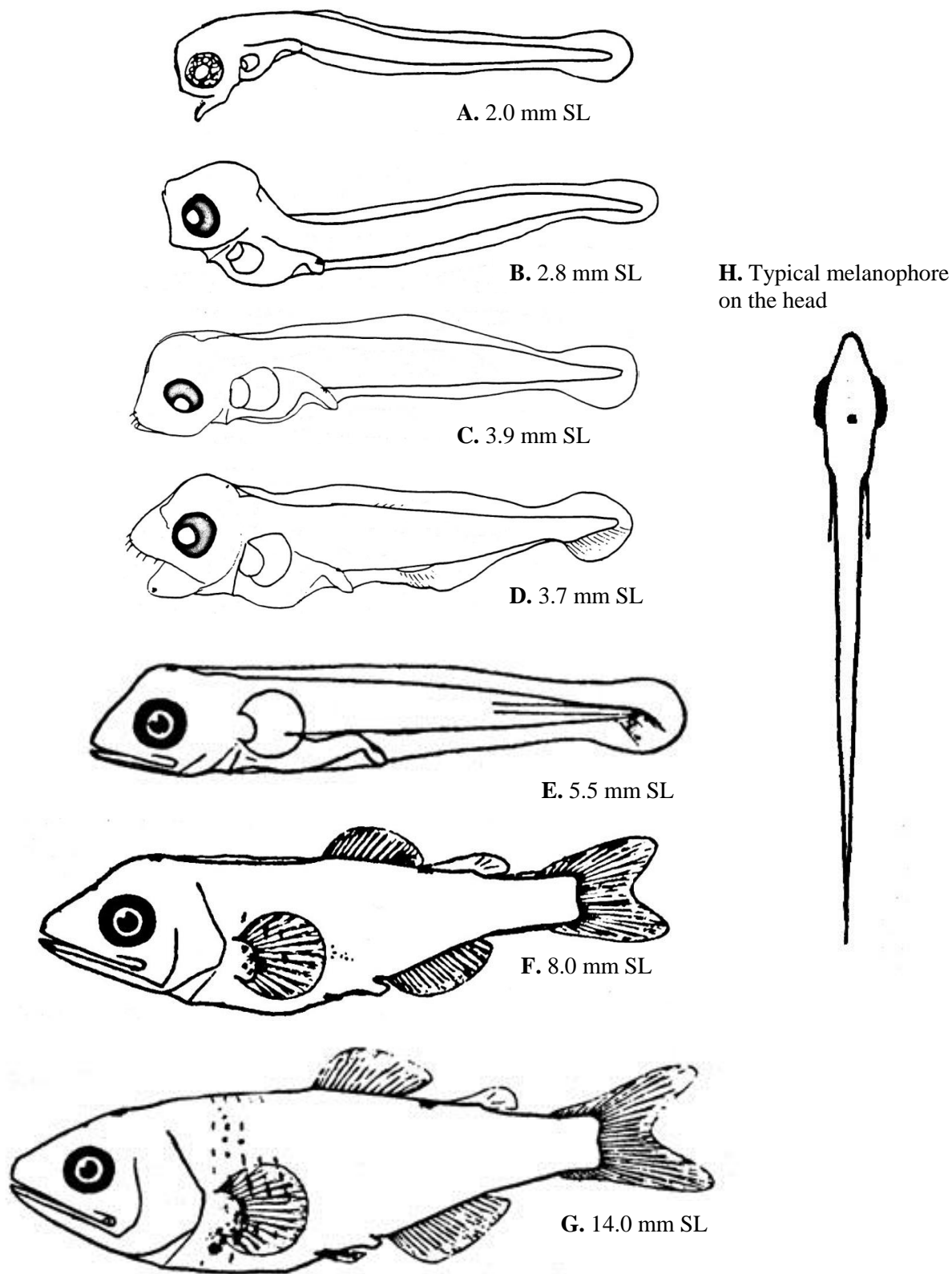


**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (1983), Richards (2006)

*Lampanyctus crocodilus*



A-D: Alemany (unpublished); E-H: Tåning (1918)

## MYCTOPHIDAE

*Lampanyctus pusillus* (Johnson, 1890)

**Habitat:** -Mesopelagic, between 500-1000 m during the day, 50–150 m at night

**Spawning:** -Peaks end of summer-autumn

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed  
-Hatch size: <2 mm SL

**Larva:** -Body: elongate initially, soon becomes very deep and stout; large head; round eye; well developed teeth in the upper jaw since young larvae  
-Preanus length: increases from around 30% SL in young larvae to about 65% in late larvae  
- Eye large and round  
-Pigmentation: 1 to 3 melanophores from snout to top of head; spots at tip of lower jaw; spots over the opercle, pectoral fin base, anterior gut and over the hindgut; internal pigment on air bladder; ventral spots on the abdominal region; a series of paired melanophores along dorsum and a lateral series along the lateral midline appear in older larvae  
-Length at flexion: c.a.4-5 mm



**Adult:** Whitehead et al. (1984-1986)

**Photos:**

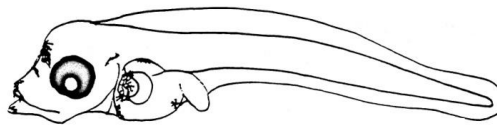
**Literature:** Alemany (1997), Fahay (1983), Richards (2006)



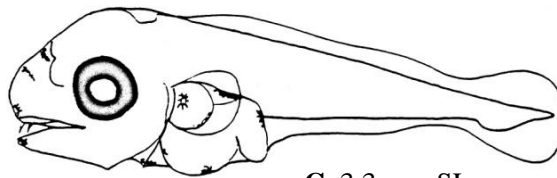
*Lampanyctus pusillus*



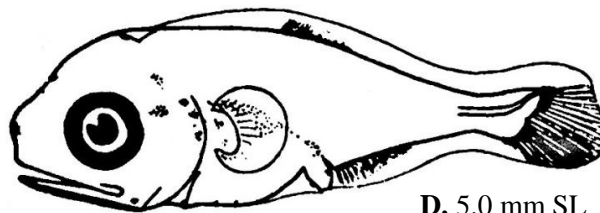
A. 1.9 mm SL



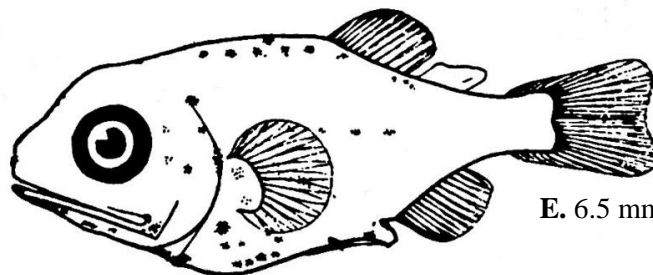
B. 3.0 mm SL



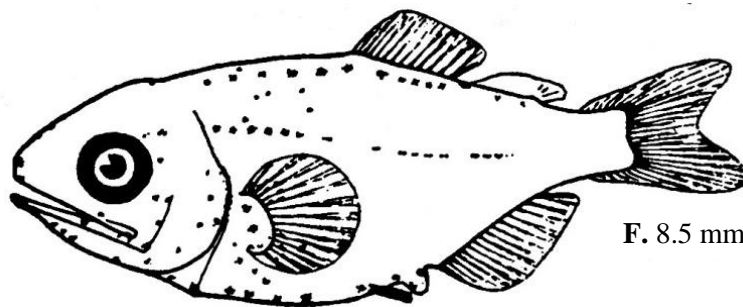
C. 3.3 mm SL



D. 5.0 mm SL



E. 6.5 mm SL



F. 8.5 mm SL

A-C: Alemany (unpublished); D-F: Tåning (1918)

**MYCTOPHIDAE**

***Lobiancha dofleini* (Zugmayer, 1911)**

**Habitat:** -Mesopelagic, between 375-600 m during the day, 25-400 m at night

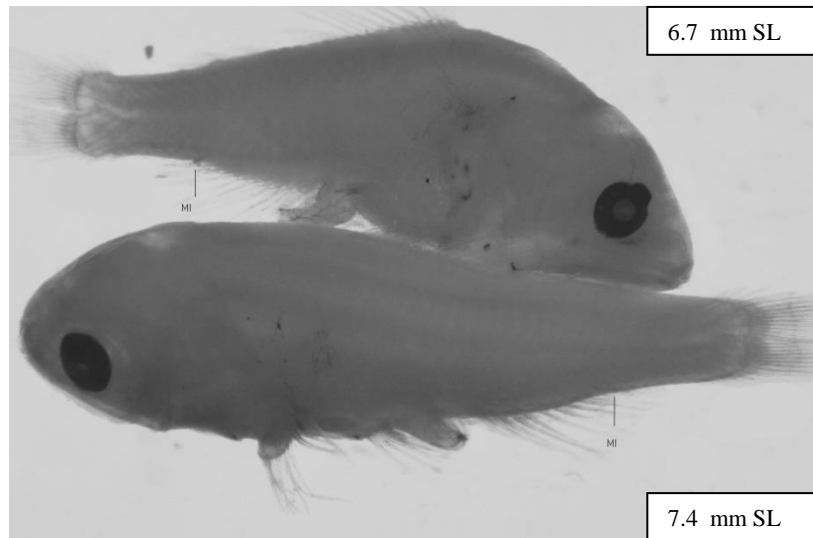
**Spawning:** -Peaks from February to June

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: young larvae relatively elongate, soon becomes deep and stout, especially through anterior half of body
- Eye: small and round in early stages, becoming slightly elliptical with a mass of choroid tissue ventrally
- Preanus length: 50-60% in late larvae
- Pectoral fin well developed, almost reaching the anus, with elongated upper rays
- Pigmentation: air bladder pigmented; 2 spots over hindgut, on each side; melanophores on gut; on ventral midline anterior to cleithral symphysis, over this and along the anal fin base; pectoral fin base and rays pigmented; spots form on dorsum of body in late stages
- Length at flexion: 5-6 mm

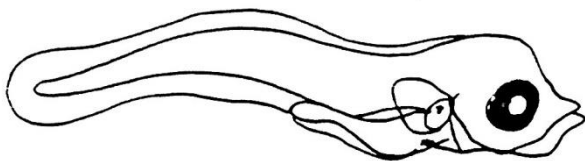


**Adult:** Whitehead et al. (1984-1986)

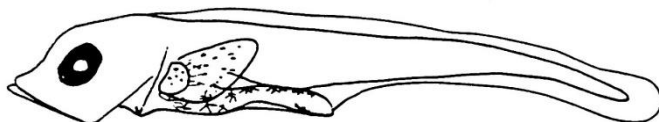
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (1983), Richards (2006)

*Lobiancha dofleini*

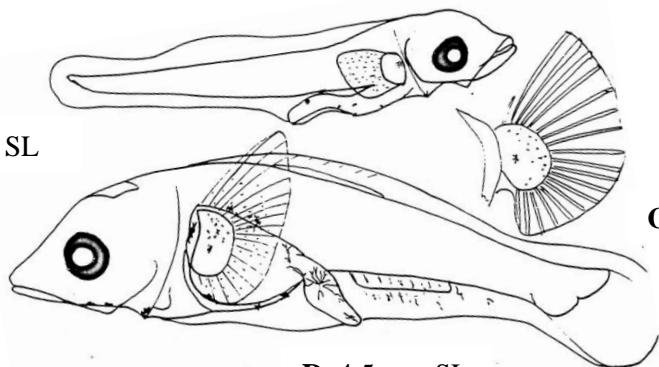


A. 2.2 mm SL



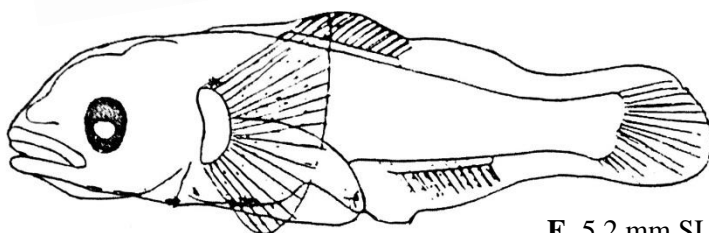
B. 3.0 mm SL

C. 3.5 mm SL

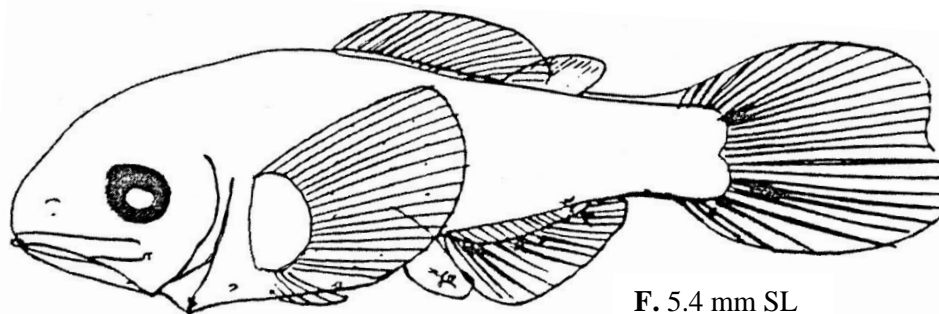


D. 4.5 mm SL

G. Detail of the pectoral



E. 5.2 mm SL



F. 5.4 mm SL

A-G: Alemany (unpublished)

**MYCTOPHIDAE**

*Myctophum punctatum* Rafinesque, 1810

**Habitat:** -Mesopelagic, at depths of 100-150 and 700-1000 m during the day, and <190 and 700-800 m at night

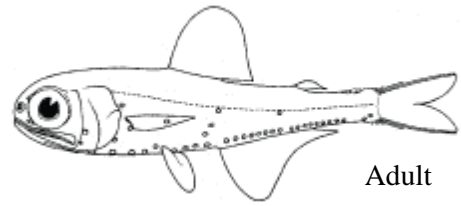
**Spawning:** -End of winter-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: elongate initially becomes slightly deeper
- Preanus length: around 50-60% LS
- Head large and flat
- Eye slightly narrow, stalked, with tapered choroid mass
- Pigmentation: ventral series of spots from anus to head; spots occur on edges of both jaws and on upper part of opercle; several ventral postanal melanophores; two well developed melanophores over the urostile; pigment may occur on posterior rays of dorsal, anal and adipose fins; rays and base of pectoral fin pigmented; spots occur on edges of both jaws and on upper part of opercle
- Length at flexion: 7.0mm SL

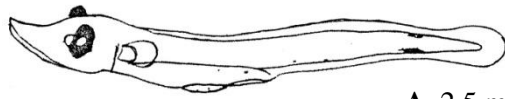


**Adult:** Whitehead et al. (1984-1986)

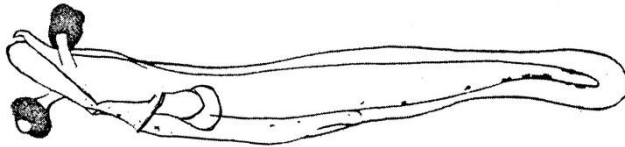
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (1983)

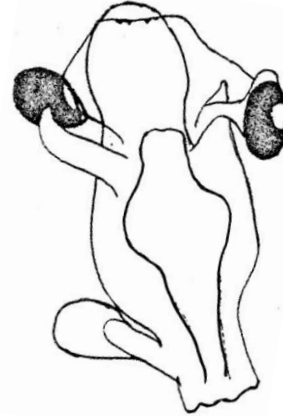
*Myctophum punctatum*



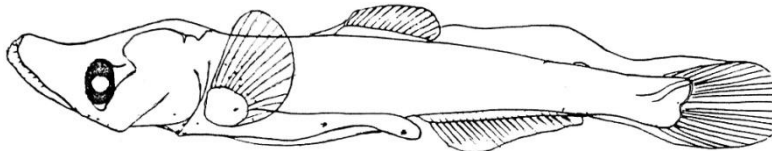
A. 2.5 mm SL



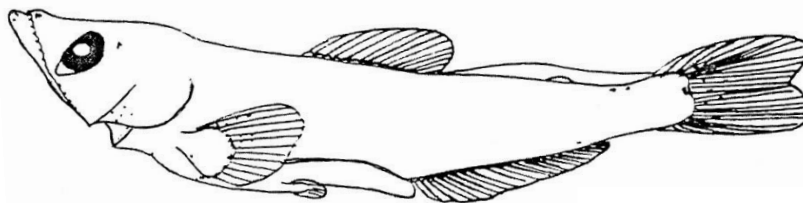
B. 5.0 mm SL



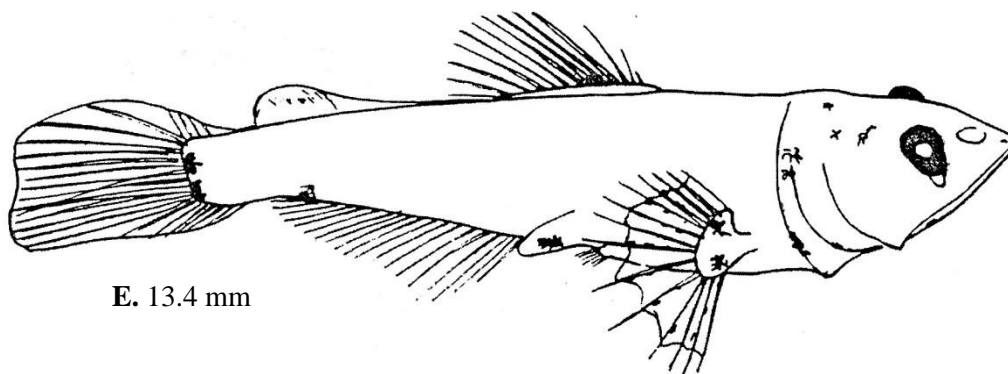
F. Detail of the head



C. 8.2 mm SL



D. 12.0 mm SL



E. 13.4 mm

A-F: Alemany (unpublished)

## MYCTOPHIDAE

## *Notoscopelus (Notoscopelus) elongatus* (Costa, 1844)

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**Habitat:** -Mesopelagic, at depths of 375-1000 m during the day, 45-150 m at night

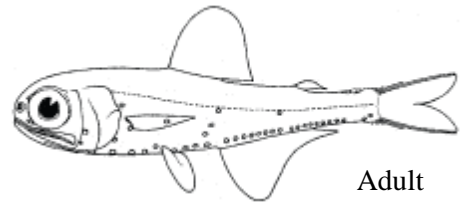
**Spawning:** -Spring-summer

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: elongate initially becomes deep and compressed
- Preanus length: increases from around 25 to 50-60% LS
- Eye large
- Pigmentation: increases with development; initially at jaw tips, two over the head (increases to 4 in larger larvae); peritoneum pigmented; with development appear two rows of dorsal melanophores
- Length at flexion: almost completed at 6.0mm SL

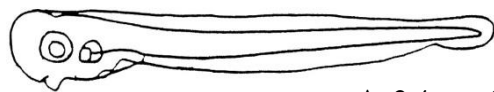


**Adult:** Whitehead et al. (1984-1986)

**Photos:**

**Literature:** Alemany (1997), Palomera (1983)

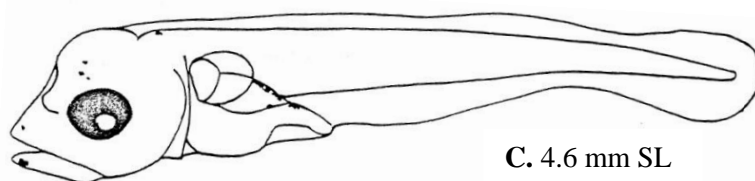
*Notoscopelus (Notoscopelus) elongatus*



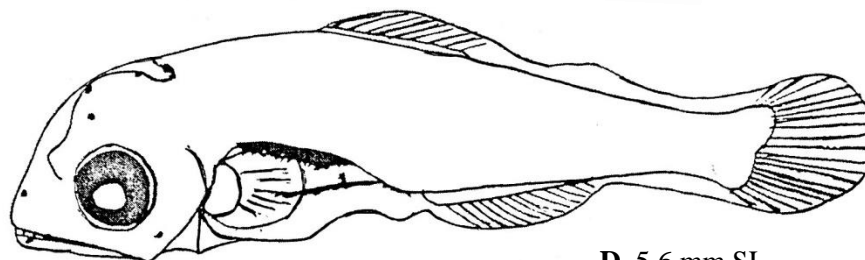
A. 2.4 mm SL



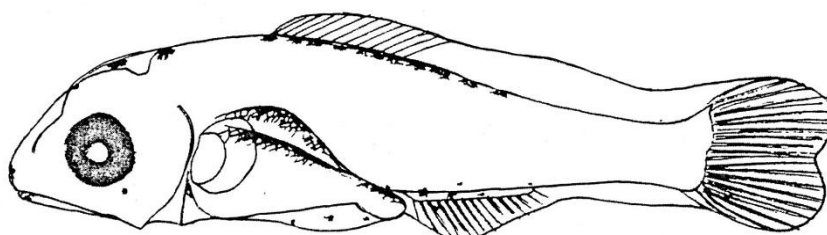
B. 3.0 mm SL



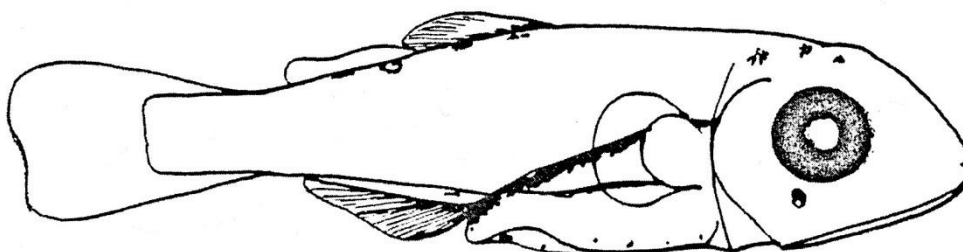
C. 4.6 mm SL



D. 5.6 mm SL



E. 6.7 mm SL



F. 6.5 mm SL

A-F: Alemany (unpublished)

**PARALEPIDIDAE**

*Lestidiops jayakari* (Boulenger, 1889)

**Habitat:** -Mesopelagic, between 200-2000 m

**Spawning:** -Probably year round

**Eggs:** -Undescribed

**Yolk sac larvae:** -Undescribed

**Larva:**

- Body long and slender
- Preanus length: short in young larvae, about 20% SL, increases with development
- Pigmentation: two large stellate postanal, ventral melanophores and two series of small melanophores, one above and the other below of the urostile, tip of the upper and lower jaw pigmented; up to 12 peritoneal patches of pigment form with development
- Length at flexion: unknown



Adult



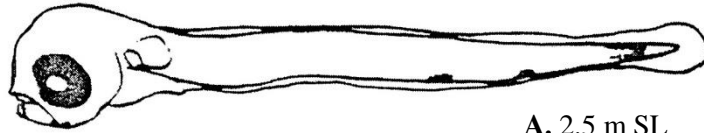
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

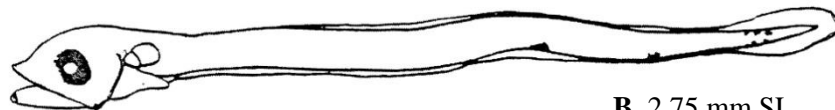
**Literature:** Alemany (1997), Fahay (2007)



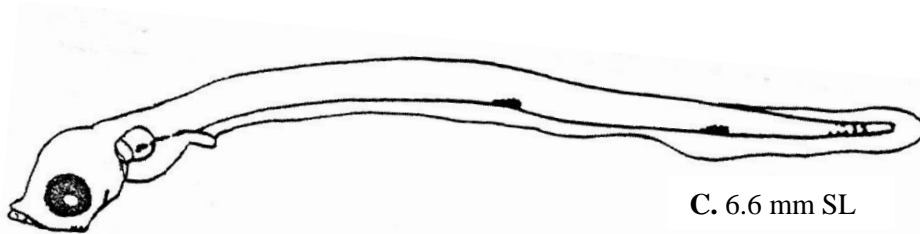
*Lestidiops jayakari*



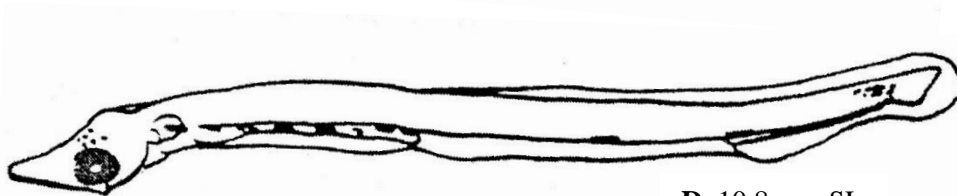
A. 2.5 mm SL



B. 2.75 mm SL



C. 6.6 mm SL



D. 10.8 mm SL



E. 15.0 mm SL



F. 25.0 mm SL

A-D: Alemany (unpublished); E-F: Fahay (1983)

**PARALEPIDIDAE**

*Paralepis coregonoides* (Risso, 1820)

**Habitat:** -Meso to bathypelagic

**Spawning:** -Spring-summer

**Eggs:** -Undescribed

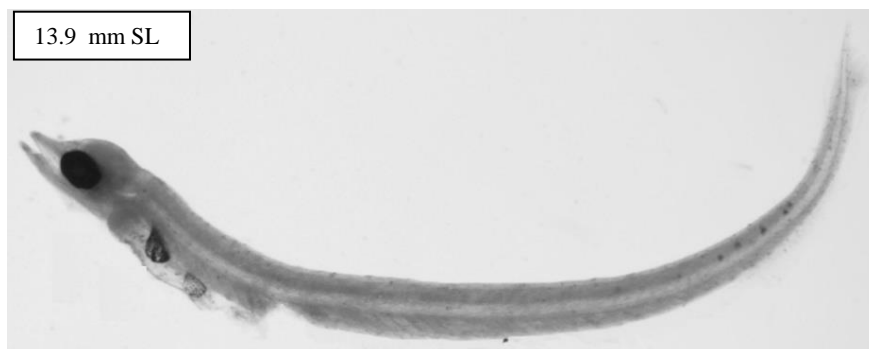
**Yolk sac larvae:** -Undescribed

**Larva:**

- Body: Body elongate, snout relatively long
- Preanus length: increases from around 30% SL
- Pigmentation: at 6 mm SL show a deep melanophore above the notochord tip; the number of peritoneal patches increases from 1 in larvae of 6 mm SL to 3 in older larvae; larger larvae show 3 deep spot above and 4 below the urostile; the row of internal melanophores on upper sides of the body increases in number with development
- Length at flexion: c.a. 10-15 mm



Adult



**Adult:** Whitehead et al (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (2007); Richards (2006)

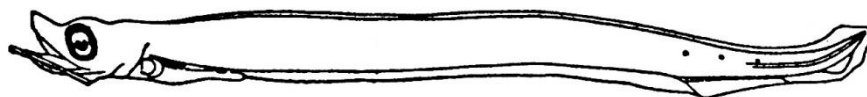
*Paralepis coregonoides*



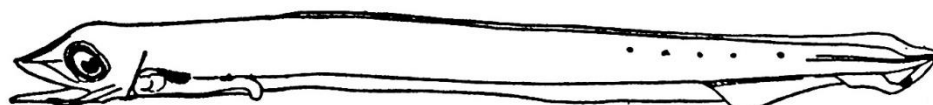
A. 2.2 mm SL



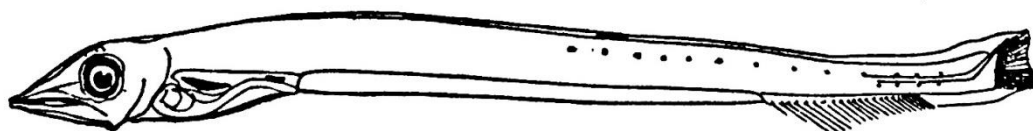
B. 6.0 mm SL



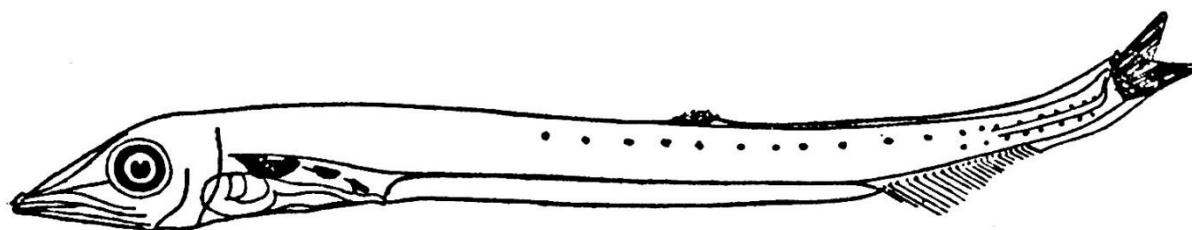
C. 11.8 mm SL



D. 13.5 mm SL



E. 18.0 mm SL



F. 22.0 mm SL

A: Alemany (unpublished), B-F: Ege (1930)

## MERLUCCIIDAE

*Merluccius merluccius* (Linnaeus, 1758)

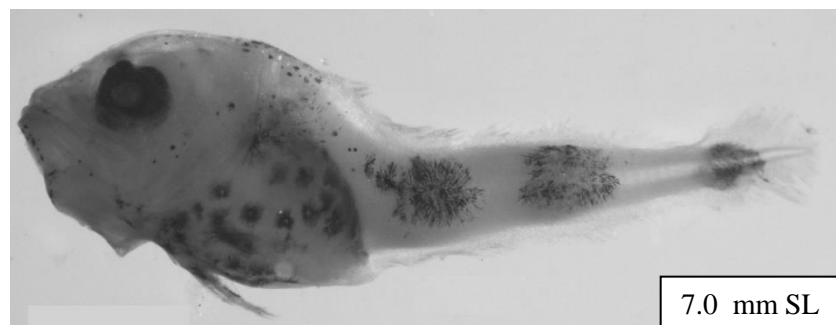
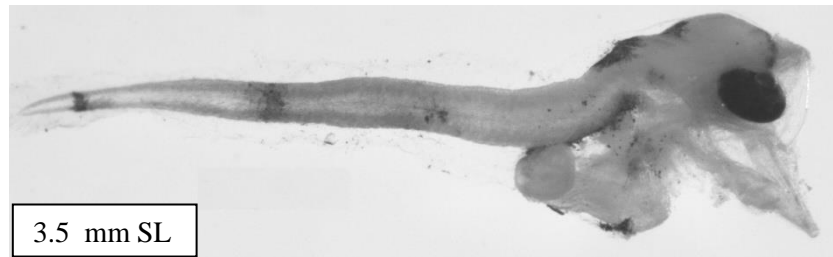
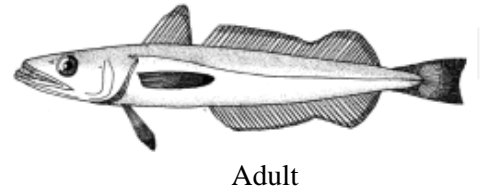
**Habitat:** -Midwater or at bottom, mainly between 70 and 700 m depth

**Spawning:** -All year round with the spawning peak in spring

**Eggs:** -Pelagic, spherical  
-Diameter: 0.94-1.03 mm  
-Chorion: smooth  
-Oil globule: single, 0.25-0.28 mm in diameter  
-Yolk: unsegmented

**Yolk sac larvae:** Hatch size: c.a. 3 mm  
-Pigmentation: there are 3 postanal stellate melanophores

**Larva:** -Body: relatively short with a large-deep head and abdominal region  
-Pelvic fins appear early, at 4-6 mm length  
-Preanus length: c.a. 45% SL  
-Pigmentation: three stellate melanophores in the lateral-postanal region of the trunk; the peritoneal region and pelvic fins are pigmented; melanophores on the snout, lower jaw and on the neck  
-Length at flexion: no data. For other *Merluccius* species has been established between 2.5 and 3.8 mm

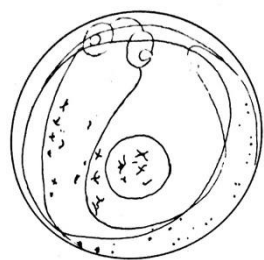


**Adult:** Whitehead et al. (1984-1986)

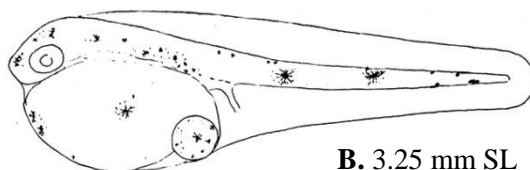
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976), Richards (2006), Whitehead et al. (1984-1986)

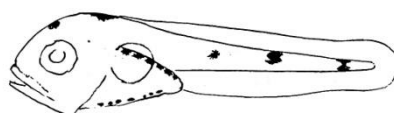
*Merluccius merluccius*



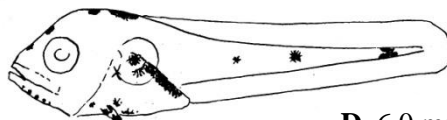
A



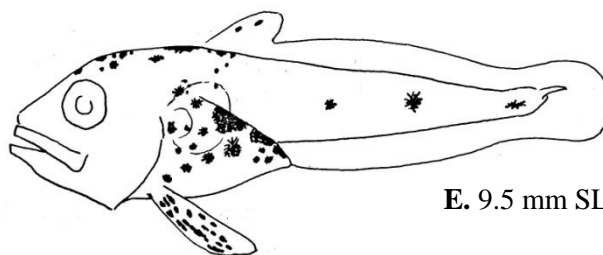
B. 3.25 mm SL



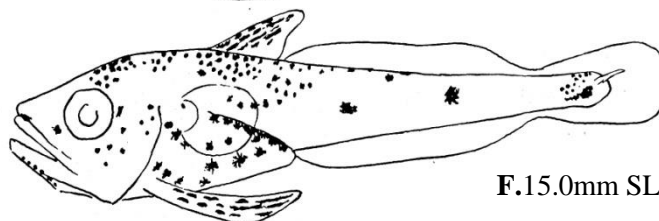
C. 4.25 mm SL



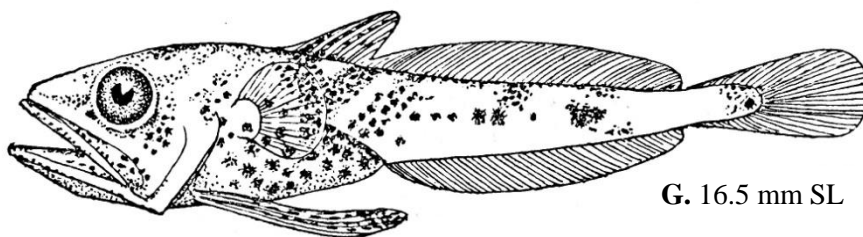
D. 6.0 mm SL



E. 9.5 mm SL



F. 15.0 mm SL



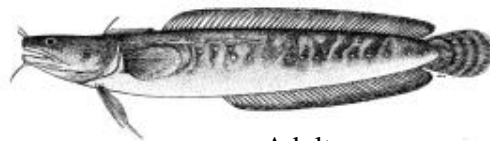
G. 16.5 mm SL

A-F: Russell (1976), G: D'Ancona (1931-1956)

## GADIDAE

*Gaidropsarus mediterraneus* Linnaeus, 1758

**Habitat:** -Benthic, littoral, from around 20 to 120 m depth



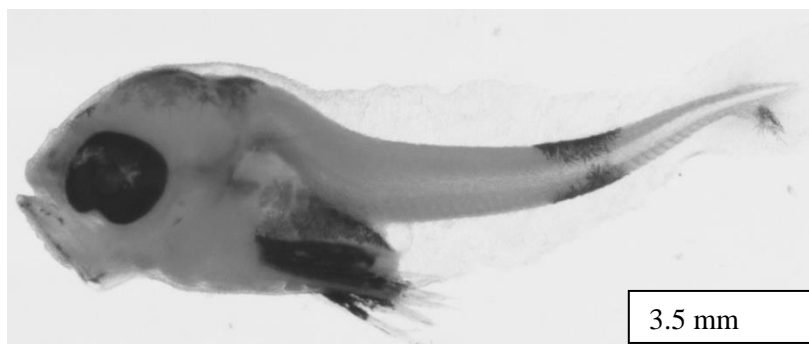
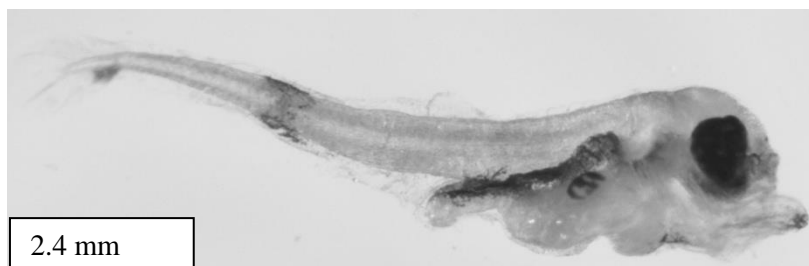
Adult

**Spawning:** -Winter-early spring

**Eggs:** -Pelagic, spherical  
-Diameter: 0.66-0.74 mm  
-Chorion: smooth  
-Oil globule: single, 0.15-0.19 mm in diameter  
-Yolk: unsegmented

**Yolk sac larvae:** -Hatch size: 1.8-1.9 mm  
-Pigmentation: similar to larva with the only difference of a pigment located at the end of the gut that extends to the dorsal region of the body

**Larva:** -Body: typical of gadid species, relatively short with a relatively large head and abdominal region  
-Preanus length: <50% SL  
-Pigmentation: two opposed melanophores (one dorsal and the other ventral) in the midway-postanal region of the trunk and another in the ventral part of the caudal fin; melanophores on the neck, head lower jaw and peritoneal region  
-Pelvic fins large and heavily pigmented  
-Length at flexion: unknown

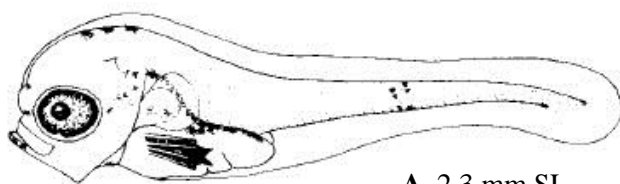


**Adult:** FAO

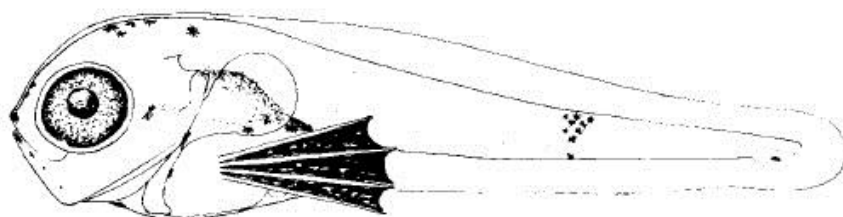
**Photos:** J.M. Rodriguez

**Literature:** Aboussouan (1964), Alemany (1997), D'Ancona (1931-1956), Demir (1982)

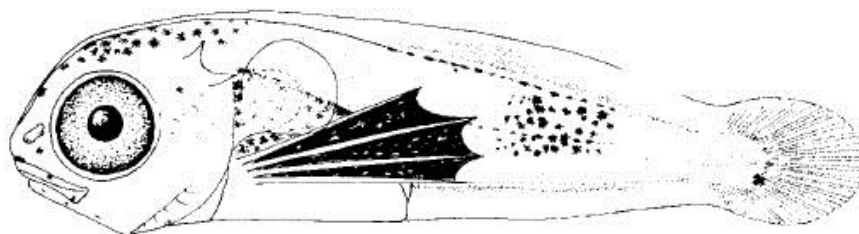
*Gaidropsarus mediterraneus*



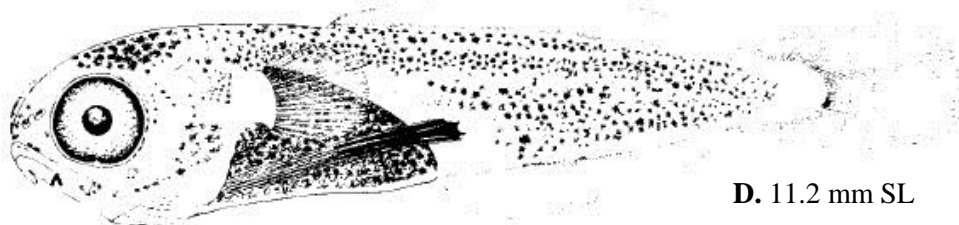
A. 2.3 mm SL



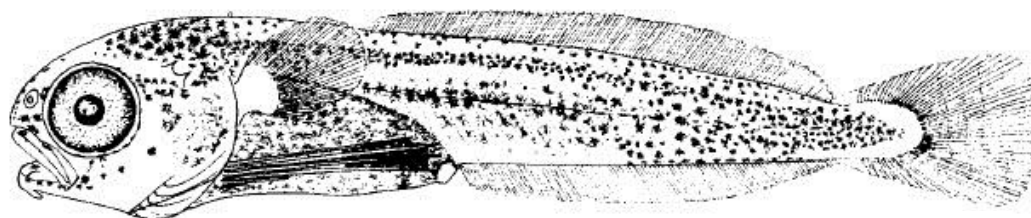
B. 3.2 mm SL



C. 6.2 mm SL



D. 11.2 mm SL



E. 13.7 mm SL

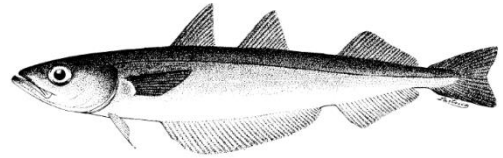
**GADIDAE**

*Micromesistius poutassou* (Risso, 1826)

**Habitat:** -Mesopelagic, at 30-400 m over depths of 160-3000 m

**Spawning:** -January-March

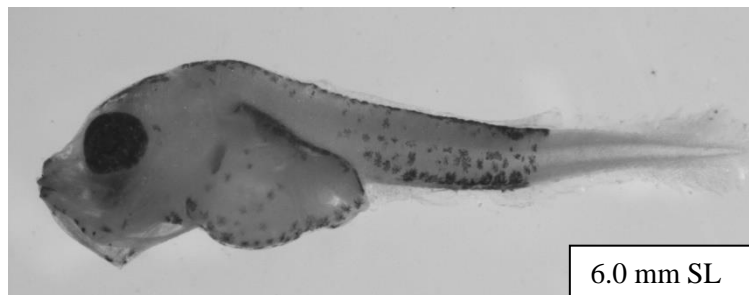
**Eggs:** -Pelagic, spherical  
-Diameter: 1.0-1.14 mm  
-Chorion: smooth  
-No oil globule  
-Perivitelline space: narrow  
-Yolk: unsegmented



Adult

**Yolk sac larvae:** -Hatch size: 2.0-2.2 mm  
-Pigmentation: in recently hatched larvae, melanophores distributed over the body except the caudal region, yolk sac unpigmented; posteriorly, shows a dorsal and a ventral bar of paired melanophores over the trunk and a cap of melanophores on the head

**Larva:** -Body: typical of the gadid species, relatively short with a relatively large head and abdominal region  
-Preanus length: <50% of SL  
-Pigmentation: dorsal (from the head) and ventral (from the anus) rows of paired melanophores, with the dorsal rows longer than the ventral, melanophores on the head and peritoneal region; no melanophores on the sides of the trunk at sizes <6 mm  
-Length at flexion: unknown



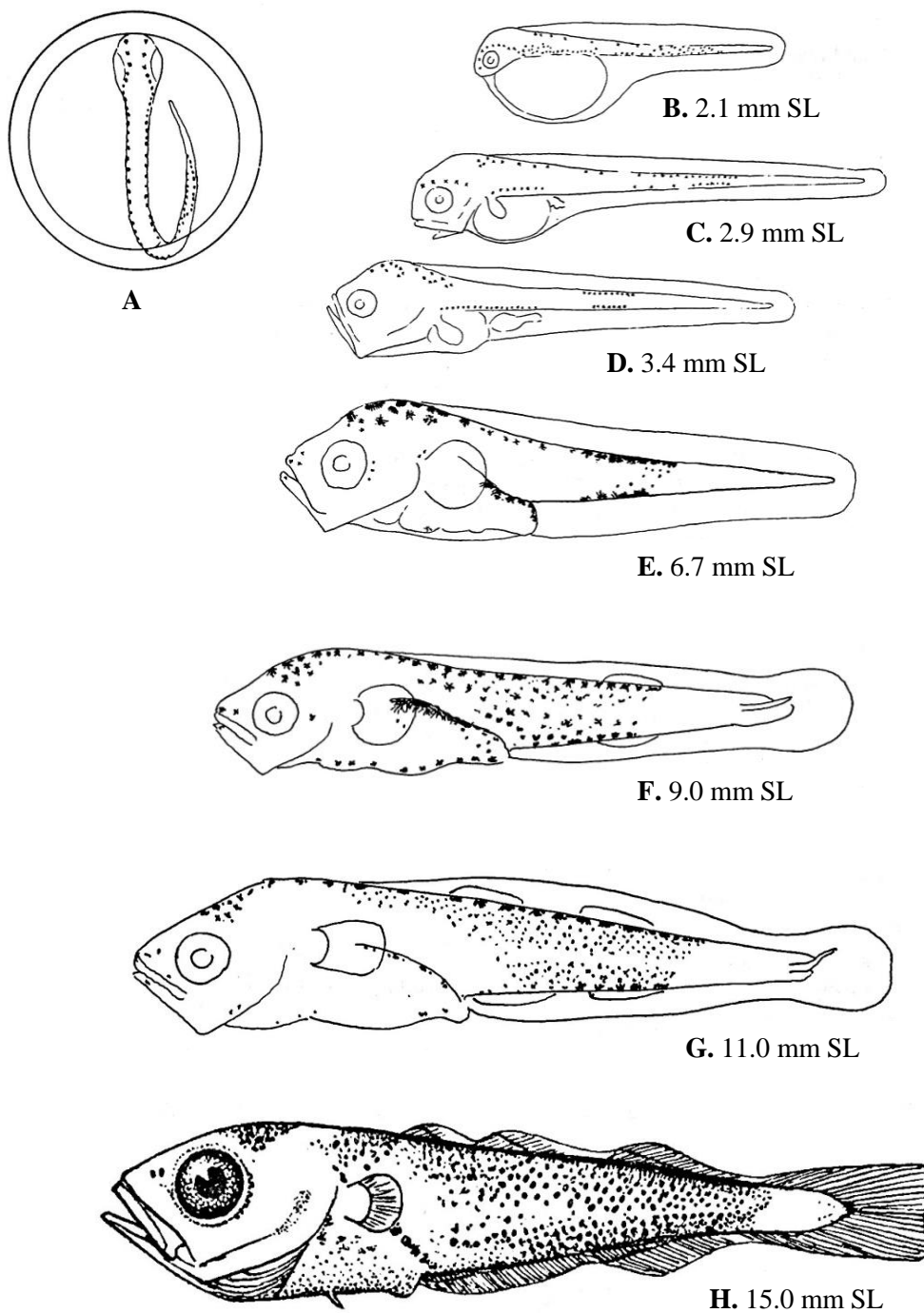
**Adult:** FAO species catalogue

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976), Sabatés (1988), Whitehead et al. (1984-1986)



*Micromesistius poutassou*

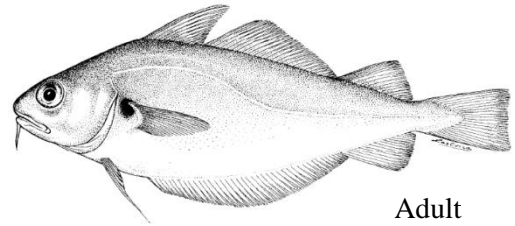


**A-G:** Russell (1976); **H:** D'Ancona (1931-1956)

**Habitat:** -Benthic, 30-100 m depth

**Spawning:** -March-April

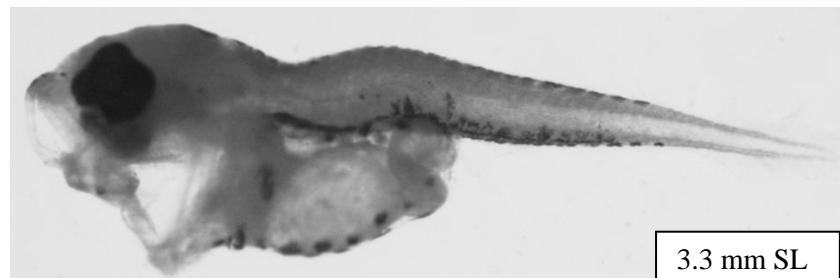
**Eggs:** -Pelagic, spherical  
-Diameter: 1.0-1.23 mm  
-Chorion: smooth  
-No oil globule  
-Yolk: unsegmented



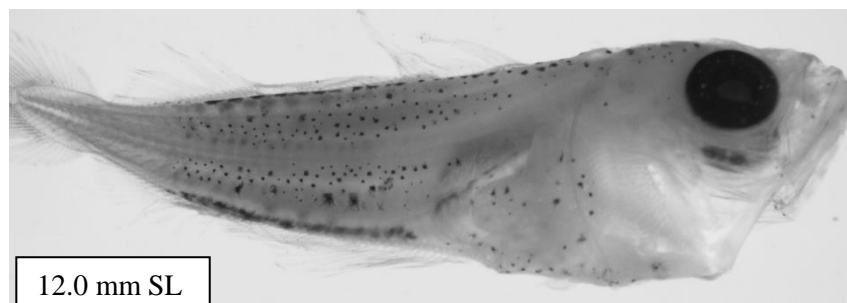
Adult

**Yolk sac larvae:** -Hatch size: <3.0 mm  
-Pigmentation: in recently hatched larvae, very similar to *M. poutassou*; posteriorly, shows a well marked dorsal (from the head) and a ventral (from the anus) paired rows of melanophores to about two third of the postanal region

**Larva:** -Body: typical of the gadid species, relatively short with a relatively large head and abdominal region  
-Preanus length, around 50% of SL  
-Pigmentation: dorsal (from the head) and ventral (from the anus) rows of paired melanophores with the dorsal rows longer than the ventral  
-Length at flexion: unknown



3.3 mm SL

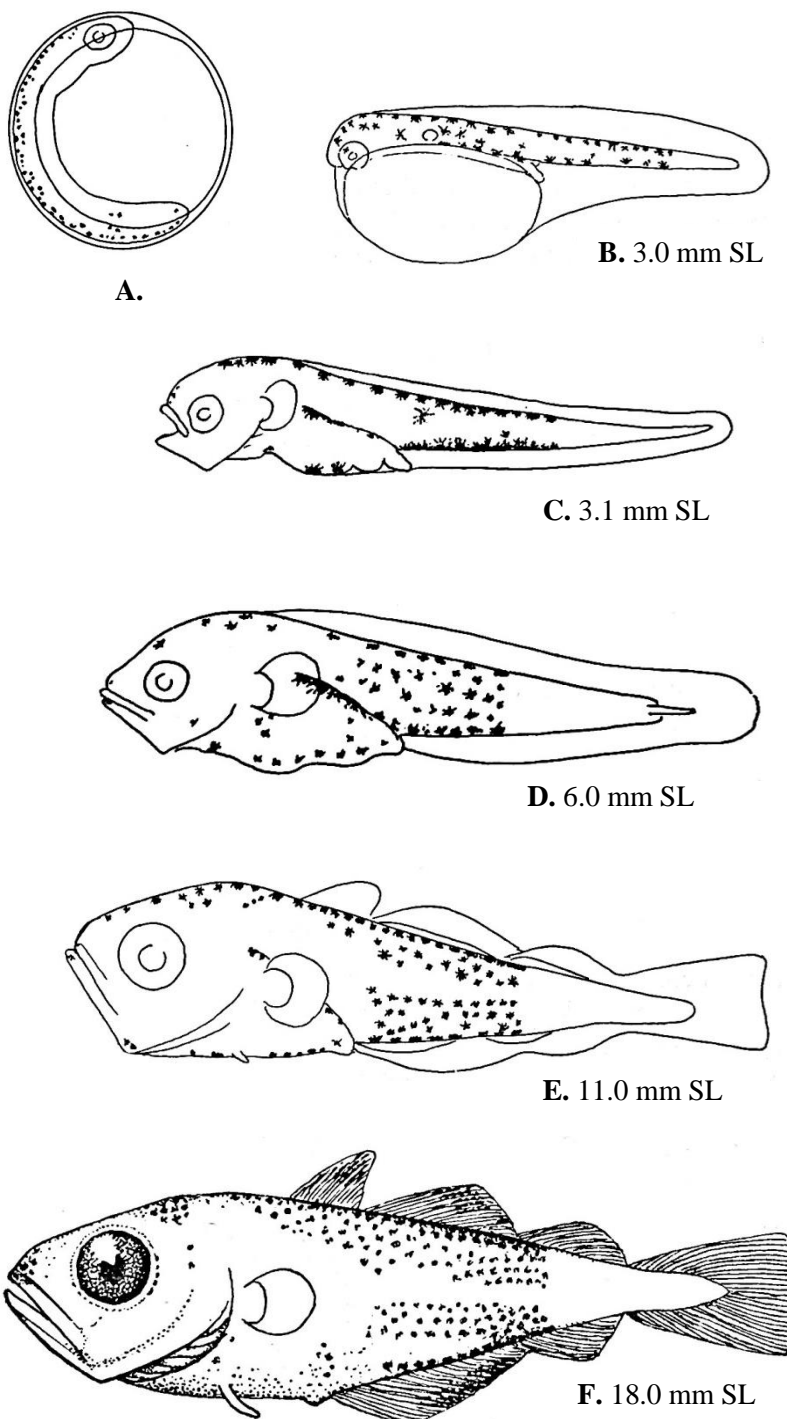


12.0 mm SL

**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Russell (1976), Whitehead et al. (1984-1986)

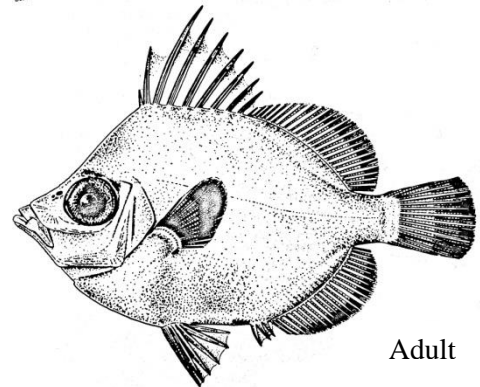


A-E: Russell (1976), F: D'Ancona (1931-1956)

**Habitat:** -Benthic, between 25 and 600 m

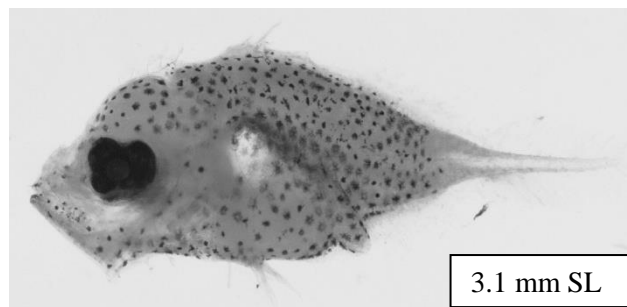
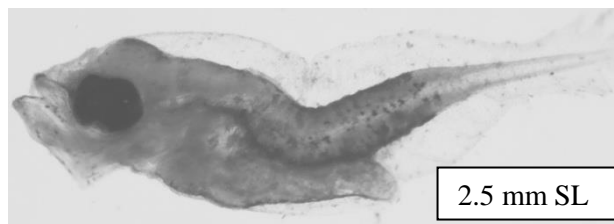
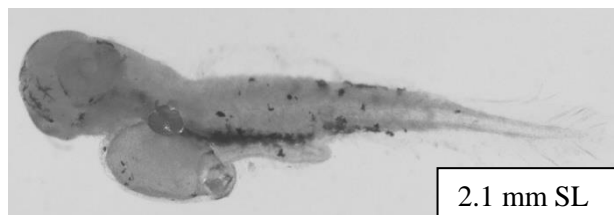
**Spawning:** -Spring-summer

**Eggs:**  
 -Pelagic, spherical  
 -Diameter: 0.90-1.01 mm  
 -Chorion: smooth  
 -Oil globule single, 0.15-0.17 mm in diameter  
 -Yolk: unsegmented



**Yolk sac larvae:** -Hatch size: 2.02-2.46 mm  
 -Pigmentation: strongly developed with large, stellate melanophores distributed over the body, except at the end of the caudal region

**Larva:**  
 -Body: thin during the first stages of development; at around 3 mm SL, it already has a rhomboid form; opercular spines and a spiny crest over the head appear with development; the first dorsal fin is spinous  
 -Preanus length: c.a. 50% of SL  
 -Pigmentation: only the caudal region remains pigment free  
 -Length at flexion: unknown

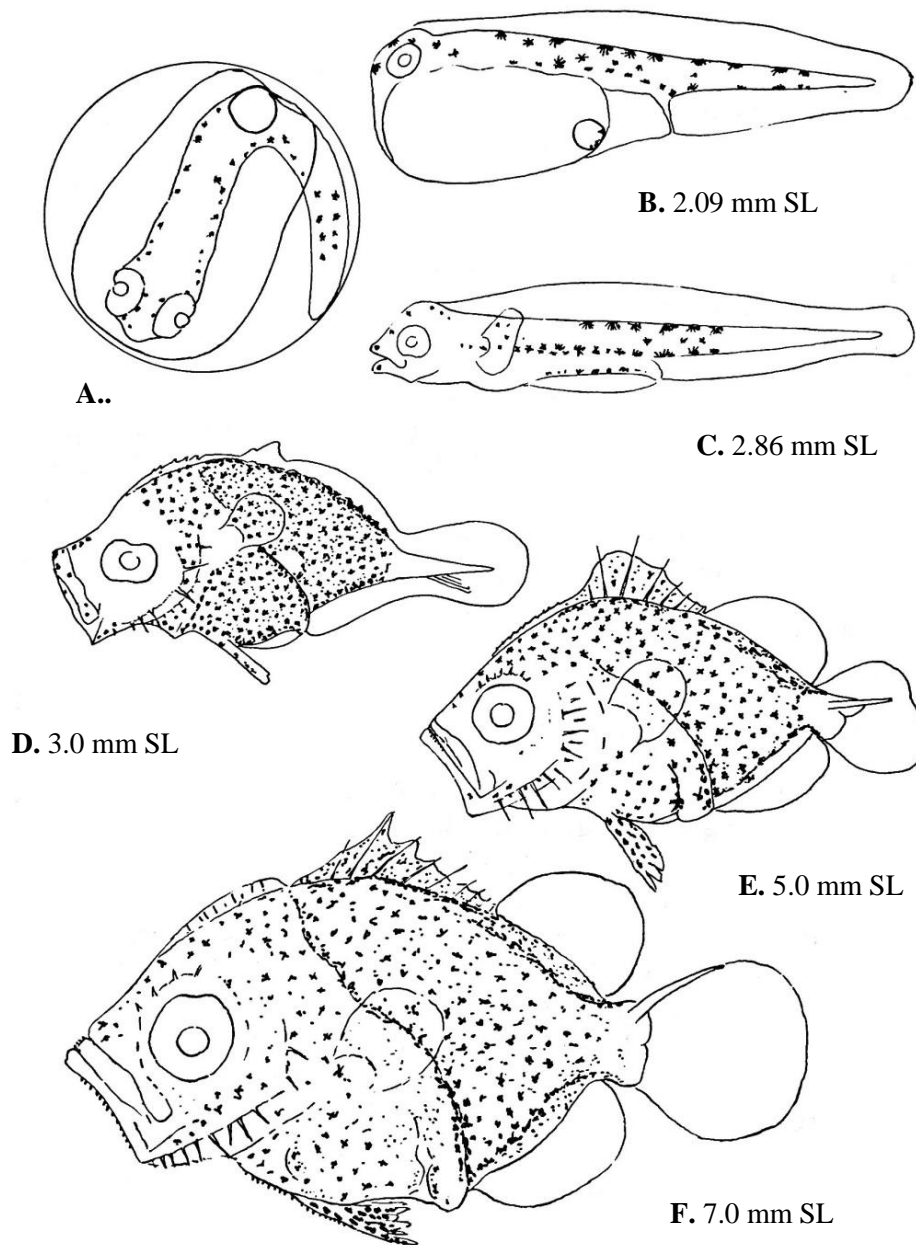


**Adult:** Whitehead et al (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976), Whitehead et al. (1984-1986)

*Capros aper*



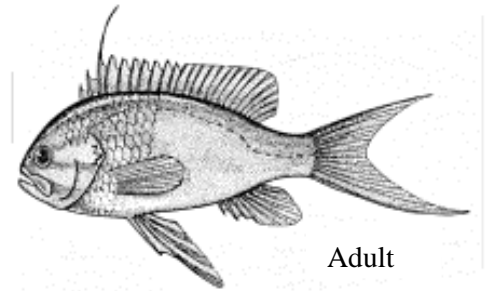
A-F: Russell (1976)

**Habitat:** -Benthic, shelf-upper slope to 200 m

**Spawning:** -June-September

**Eggs:** -Undescribed

**Yolk sac larvae:** -Hatch size: probably <2 mm SL  
 -Preanus length: c.a. 50% SL  
 -Pigmentation: consist of a group of melanophores (two dorsal, one ventral and some smaller lateral) at the level of the anus



**Larva:** -Body: head and trunk height increases with development; shows two series of preopercular and a series of opercular spines; the central spine of the exterior preopercular and opercular series, the second ray of the dorsal and the first and second of the pelvic fins are considerably developed in older larvae  
 -Preanus length: >50% SL  
 -Pigmentation: some peritoneal melanophore; a relatively large spot over the hindgut and another one opposed to it in the dorsal region of the body that moves backward with development; a series of melanophores between the anus and the caudal region that reduces to three in late stages of development.  
 -Length at flexion: 3.3-6.0 mm SL

**Adult:** Whitehead et al. (1984-1986)

**Photos:**

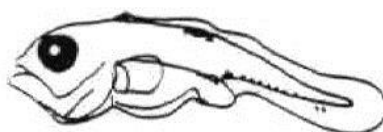
**Literature:** Alemany (1997), D'Ancona (1931-1956), Sabatés (1988), Whitehead et al. (1984-1986)



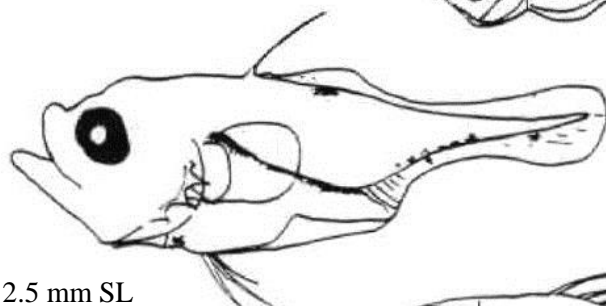
A. 1.7 mm SL



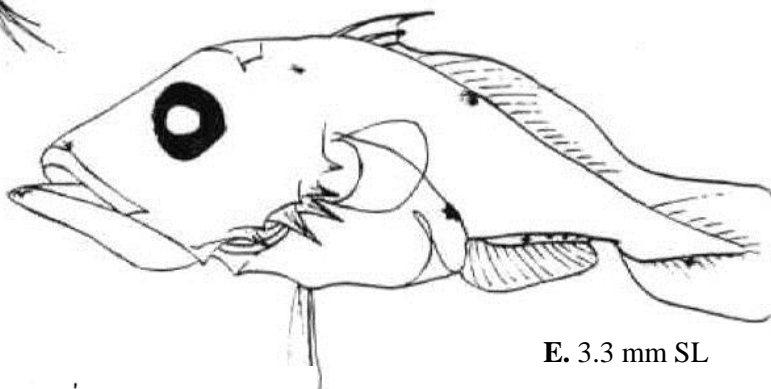
B. 1.9 mm SL



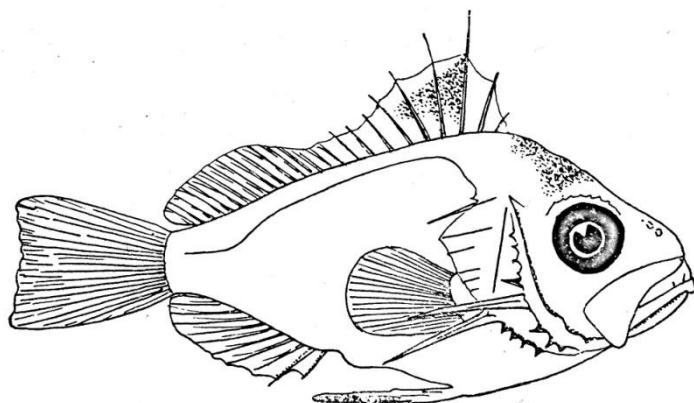
C. 1.7 mm SL



D. 2.5 mm SL



E. 3.3 mm SL



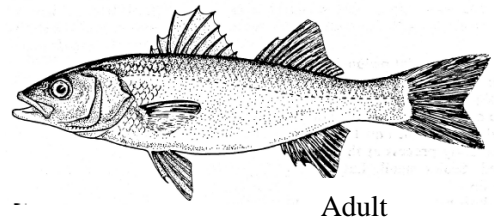
F. 16.0 mm SL

A-E: Alemany (unpublished); F: D'Ancona (1931-1956)

**Habitat:** -Benthic, over shelf

**Spawning:** -Winter

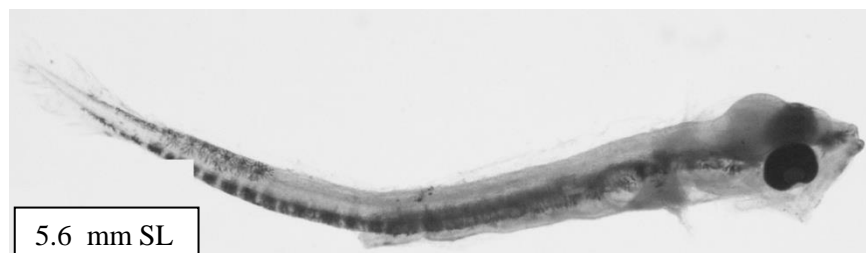
**Eggs:** -Pelagic, spherical  
-Diameter: 1.20-1.51mm  
-Chorion: smooth  
-Oil globule single, 0.36-0.46 mm in diameter  
-Yolk: unsegmented



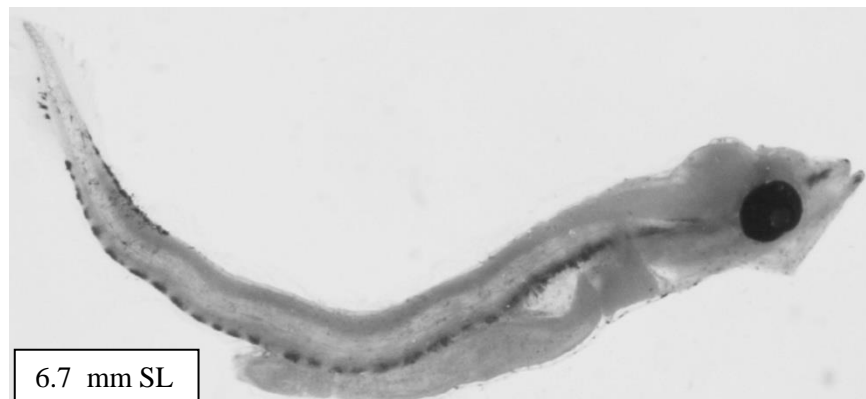
Adult

**Yolk sac larvae:** Hatch size: 3.61-4.05 mm  
-Body and gut elongated  
-Preanus length: >50% SL  
-Pigmentation: strongly pigmented with melanophores forming bands along the body, the yolk and oil globule are also pigmented

**Larva:** -Body elongated and narrow  
-Preanus length: >50% SL  
-Pigmentation: the streaking feature is the continuous line of melanophores screeching from the snout to the base of the caudal fin. Dorsal melanophores reduce with development to the caudal region. Tip of snout and lower jaw also pigmented  
-Length at flexion: around 6 mm SL



5.6 mm SL



6.7 mm SL

**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

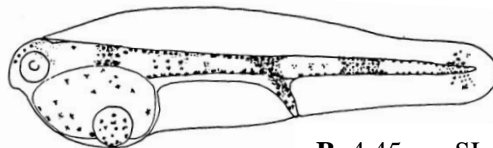
**Literature:** Russell (1976), Sabatés (1988), Whitehead et al. (1984-1986)



*Dicentrarchus labrax*



A.



B. 4.45mm SL



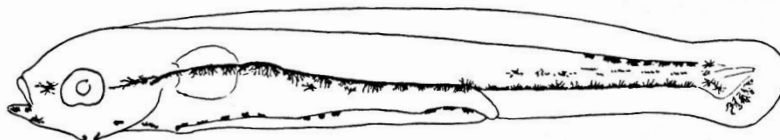
C. 5.0 mm SL



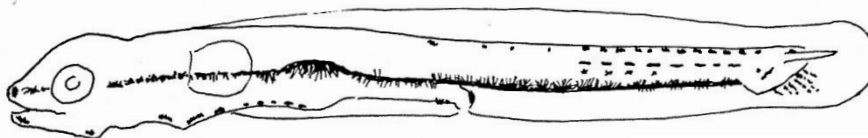
D. 5.0 mm SL



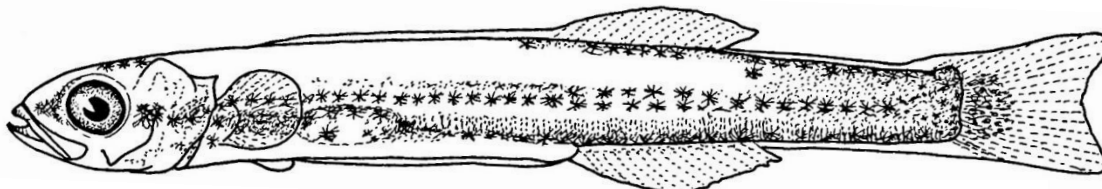
E. 6.0 mm SL



F. 9.0 mm SL



G. 11.0 mm SL



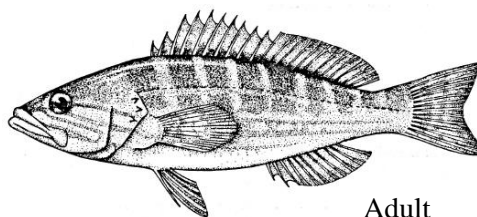
H. 17.0 mm SL

A-G: Russell (1976); H: D'Ancona (1931-1956)

**Habitat:** -Benthic, shelf- upper slope to 200 m

**Spawning:** -Spring-summer

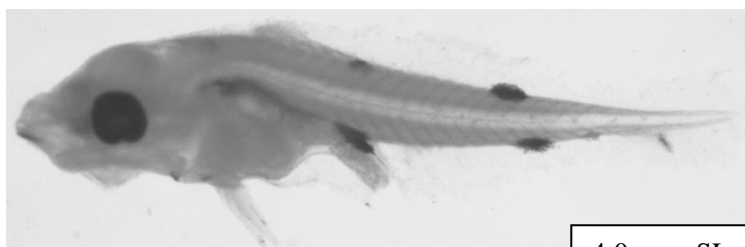
**Eggs:** -Pelagic, spherical  
-Diameter: 0.9-0.97 mm  
-Chorion: smooth  
-Oil globule single, 0.14-0.15 mm in diameter  
-Yolk: unsegmented



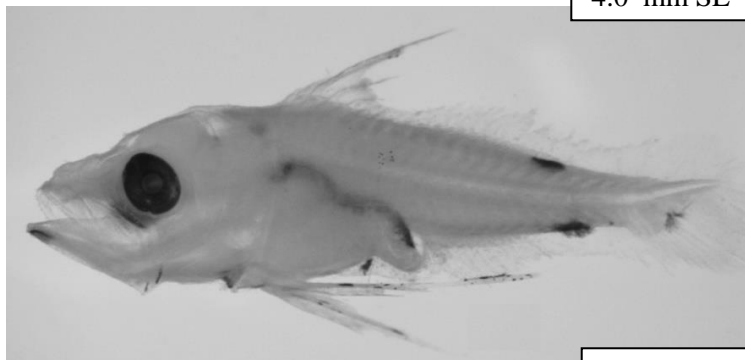
Adult

**Yolk sac larvae:** -Hatch size: 1.84-2.3 mm SL  
-Pigmentation: a dorsal row of melanophores extends along the body; a large melanophore over the hindgut and another opposed in the dorsal region of the primordial fin; one dorsal and other ventral about the midpoint of the postanal region

**Larva:** -Body height increases with development; shows three series of preopercular spines, one of which exceeds the operculum border in older larvae, and an opercular spine in the upper part of the operculum. Pelvic fins and the third spine ray of the dorsal fin are relatively elongated  
-Preanus length: >50% SL  
-Pigmentation: pair of opposed melanophores, one dorsal and the other ventral, located at the midway along the caudal region; caudal fin base pigmented; spot on the hindgut; in young larvae the ventral abdominal region is pigmented and may have several melanophores in the postanal region; pelvic fins pigmented  
-Flexion begins at around 4.8 mm SL and it is completed at 9.7 mm SL



4.0 mm SL



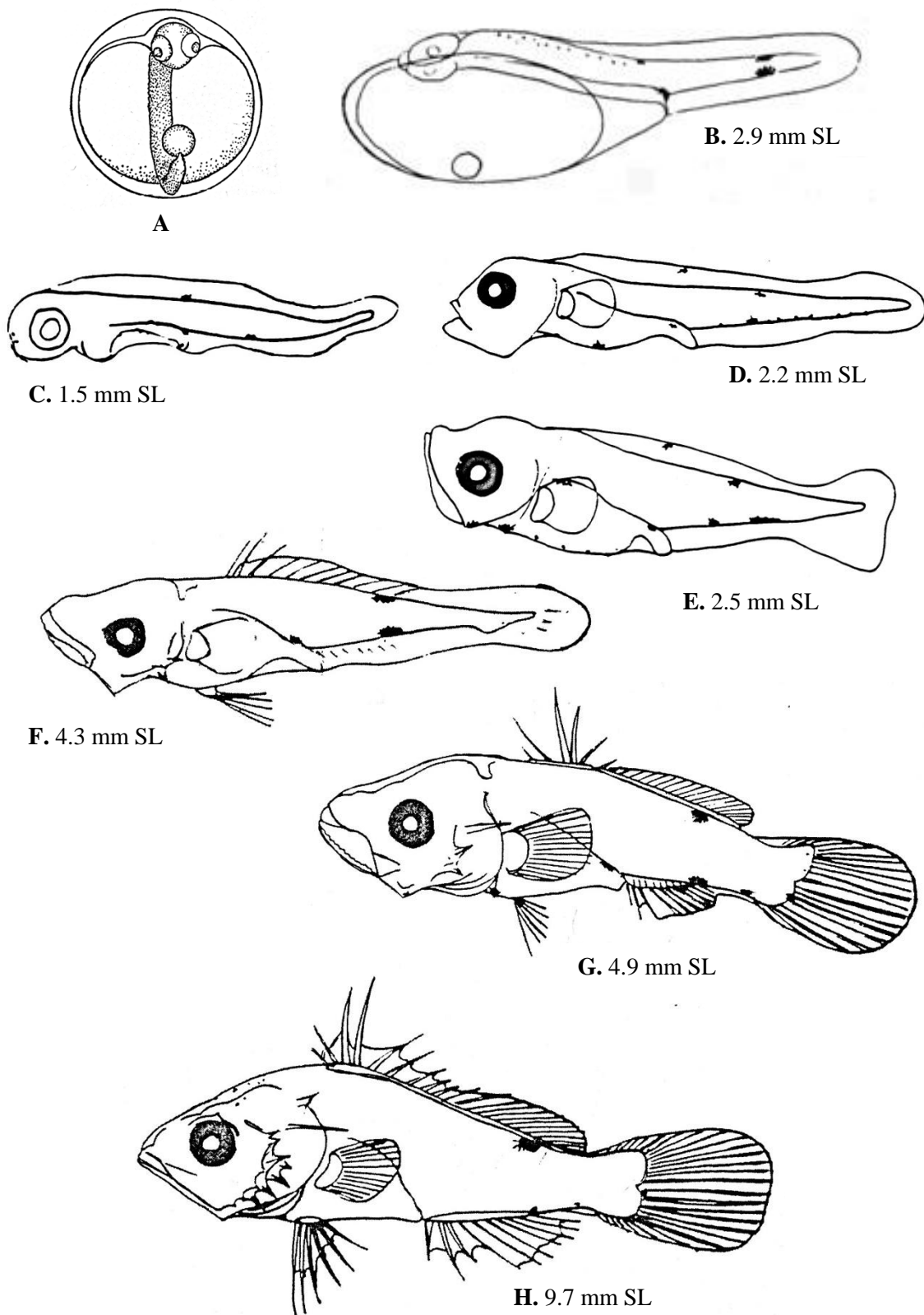
6.2 mm SL

**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), D'Ancona (1931-1956), Russell (1976), Sabatés (1988), Whitehead et al. (1984-1986)

*Serranus cabrilla*



**A:** D'Ancona (1931-1956); **B:** Russell (1976); **C-H:** Alemany (unpublished)

## SERRANIDAE

*Serranus hepatus* (Linnaeus, 1758)

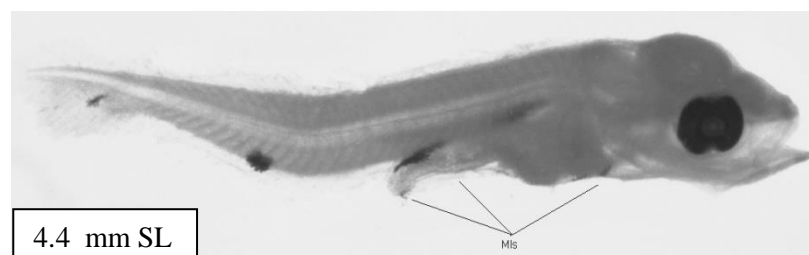
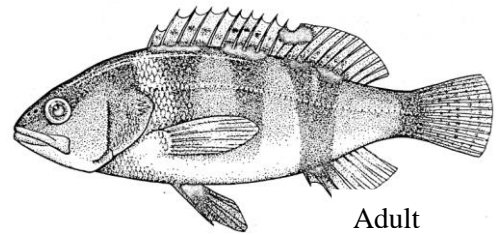
**Habitat:** -Benthic, 5 to 320 m depth over grasslands or sandy and muddy bottoms

**Spawning:** -March-August

**Eggs:** -Pelagic, spherical  
-Diameter: 0.78 mm  
-Chorion: smooth  
-Oil globule single, 0.14 mm in diameter  
-Yolk: unsegmented

**Yolk sac larvae:** -Undescribed

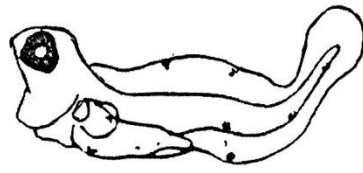
**Larva:** -Body very similar to *S. cabrilla*, differences lie on the weakly developed pelvic fins, on the less developed opercular spines and on the pigmentation pattern  
-Preanus length: >50% SL  
-Pigmentation: small sized larvae show two dorsal melanophores and one ventral over the primordial fin; larger larvae show three regularly spaced postanal melanophores, a melanophore over the hindgut, on the symphysis cleithral, the gas bladder and the gut are also pigmented  
-Flexion almost completed at 5.7 mm SL



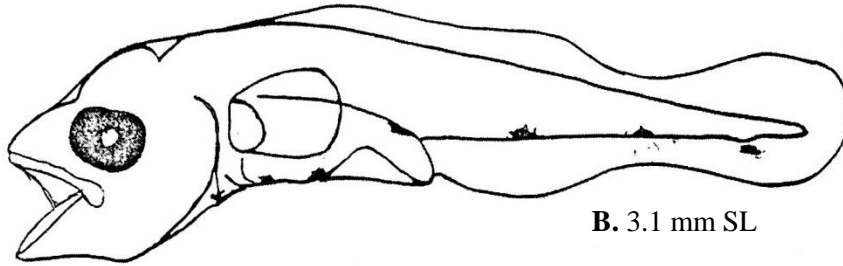
**Adult:** Whitehead et al. (1984-1986)

**Photos:**

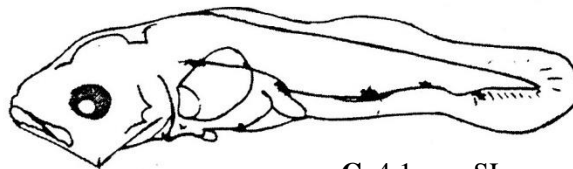
**Literature:** Alemany (1997), D'Ancona (1931-1956), Sabatés (1988), Whitehead et al. (1984-1986)



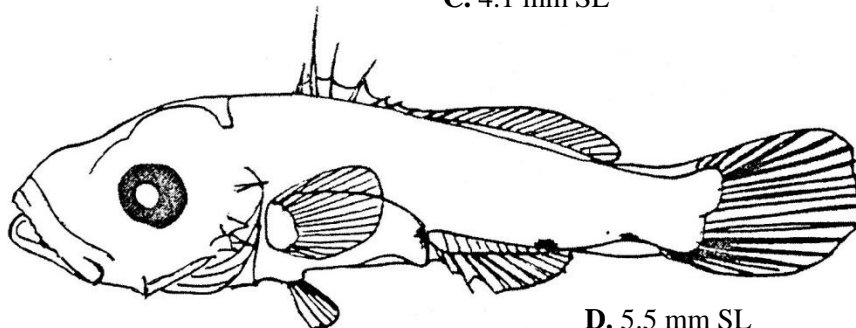
A. 1.5 mm SL



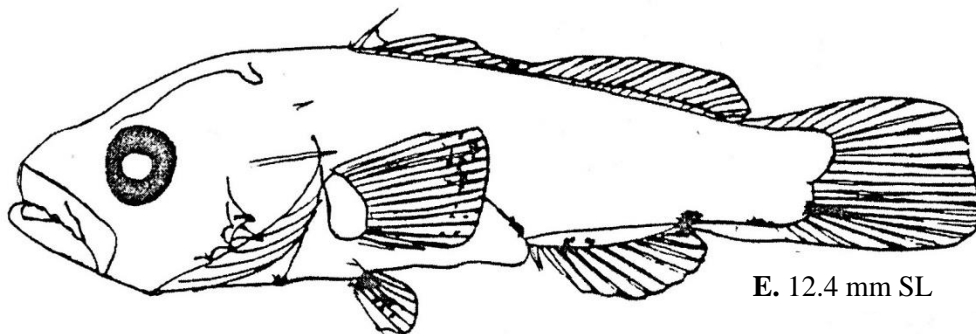
B. 3.1 mm SL



C. 4.1 mm SL



D. 5.5 mm SL



E. 12.4 mm SL

**Habitat:** -Benthic, on mud and sandy bottoms  
15-400 m depth, but mainly to 100 m

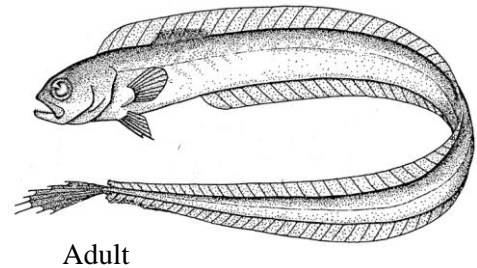
**Spawning:** -Spring-autumn

**Eggs:** -No trustworthy information is available

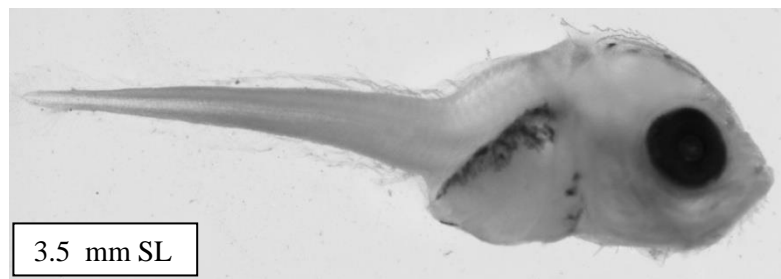
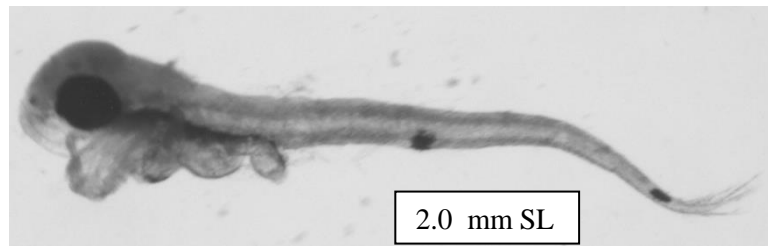
**Yolk sac larvae:** -Hatch size: not known

**Larva:**

- Head height increases with development; over the head develops an occipital crest and a series of preopercular spines
- Preanus length: increases from <40 to c.a. 50% SL with development; <2 mm larvae do not still show signal of spines on the head, typical of the species; older larvae develops an occipital and a supraorbital crests and preopercular spines; the occipital crest begins as two spines and later changes to toothed ridge with a longer posterior spine; the supraorbital crest shows 4 or 5 spines; there up to 7-9 preopercular spines, the spines on the angle being longer and one of which develops two secondary spines on either side; there is a row of 6-7 small denticles along the lower margin of the jaw
- Pigmentation: small larvae show melanophores, on lower jaw tip, peritoneum, hindgut, under the urostile and a group of 1-3 ventral melanophores; with development melanophores appear on the head, cheek, jaw and snout and the abdomen; melanophores between the anus and the caudal region disappear
- Flexion size not known



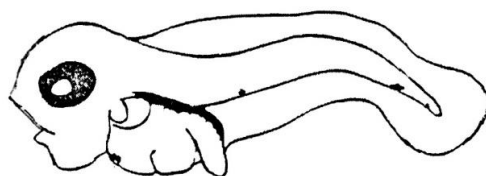
Adult



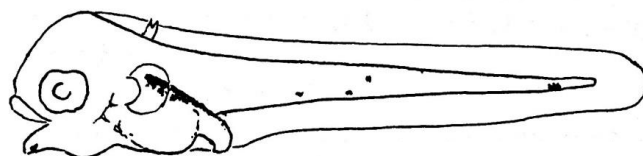
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

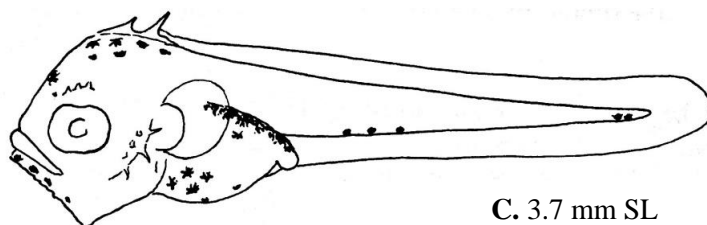
**Literature:** Alemany (1997), Russell (1976); Whitehead et al. (1984-1986)



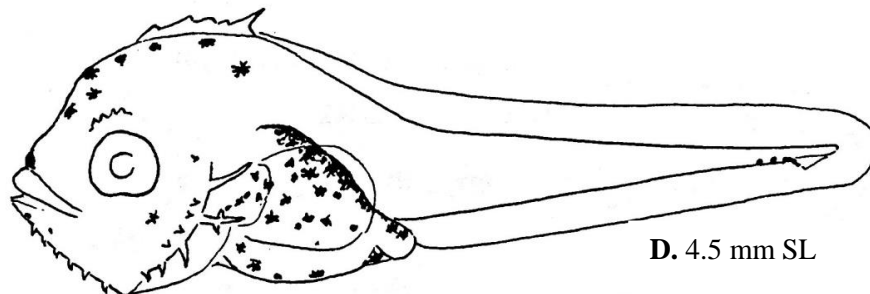
A. 1.7 mm SL



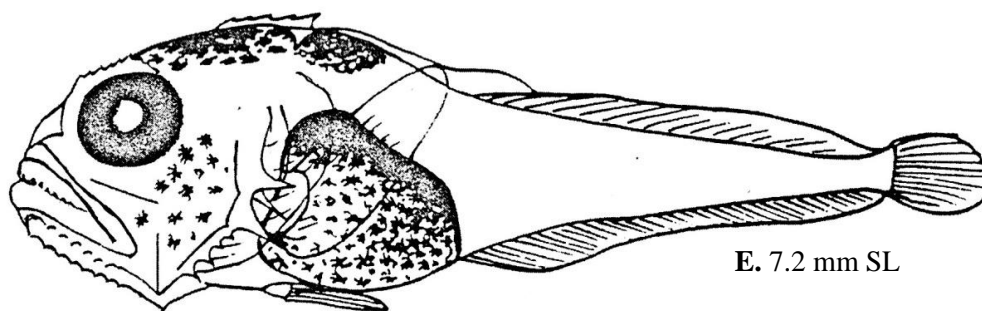
B. 3.0 mm SL



C. 3.7 mm SL



D. 4.5 mm SL



E. 7.2 mm SL

A, E: Alemany (unpublished); B-D: Russell (1976)

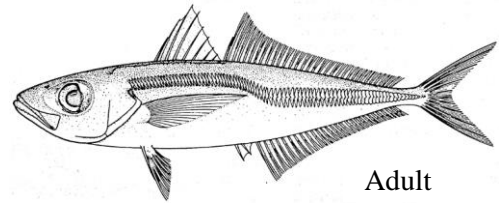
## CARANGIDAE

## *Trachurus mediterraneus* (Steindachner, 1868)

**Habitat:** -Bentho-pelagic, between 40 and 500 m depth

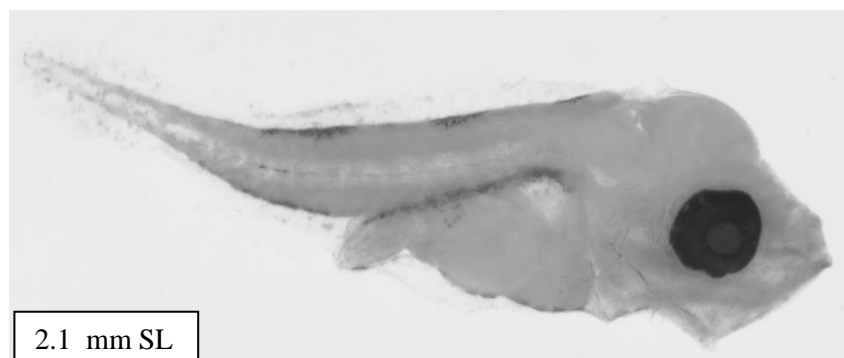
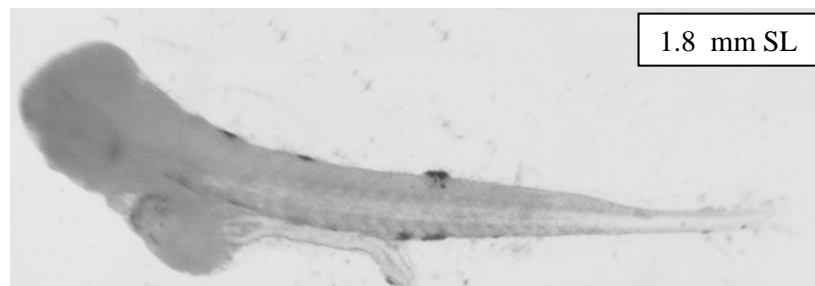
**Spawning:** -Spring-summer

**Eggs:** -Pelagic, spherical  
-Diameter: 1.0-1.04 mm  
-Chorion: smooth  
-Oil globule single, c.a. 0.24 mm in diameter  
-Yolk: segmented



**Yolk sac larvae:** -Hatch size may be around 1.5 mm  
-The most characteristic feature is the anterior position of the oil globule, beyond the anterior margin of the head; the anus is situated some distance behind of the yolk sac, at about the mid-point of the body  
-Pigmentation: shows 3-4 dorsal melanophores in the trunk region and other similar over the gut. The hindgut and the oil globule are also pigmented

**Larva:** -Body height increases with development; over the head develops an occipital crest and a series of preopercular spines  
-Preanus length: around 50% SL  
-Pigmentation: slightly pigmented although the melanophores are of considerable size; the number of melanophores over the lateral body walls, over the head, under the gut and lower jaw increases with development  
-Flexion almost completed at 4.8 mm SL



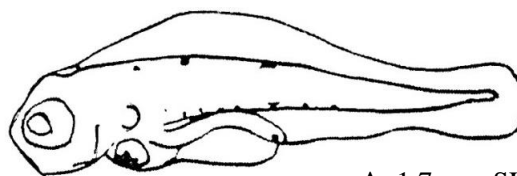
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

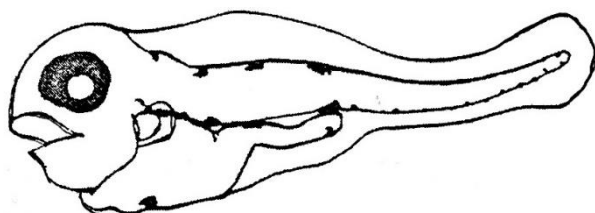
**Literature:** Alemany (1997), D'Ancona (1931-1956), Sabatés (1988), Whitehead et al. (1984-1986)



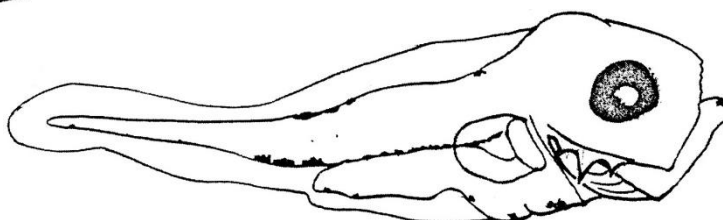
*Trachurus mediterraneus*



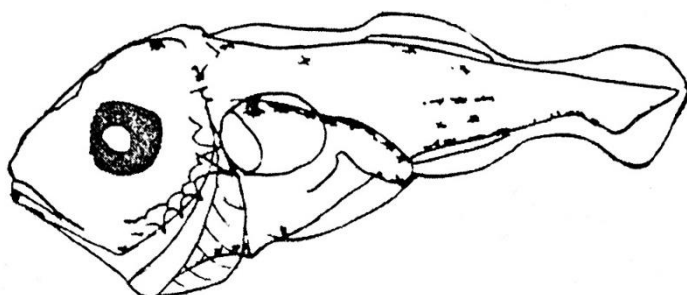
A. 1.7 mm SL



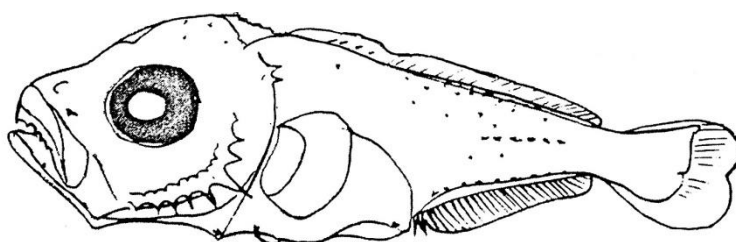
B. 1.9 mm SL



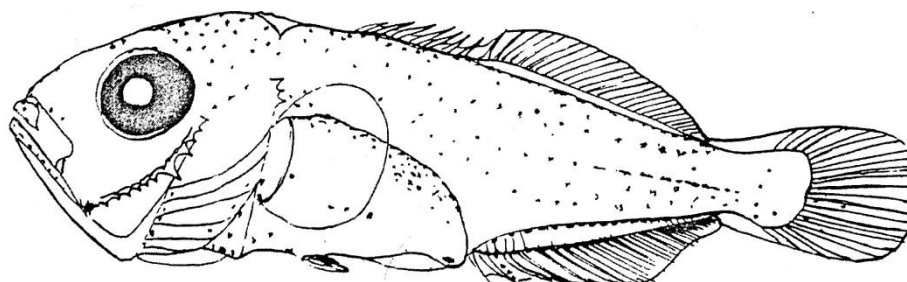
C. 3.1 mm SL



D. 3.6 mm SL



E. 4.9 mm SL



F. 6.1 mm SL

A-F: Alemany (unpublished)

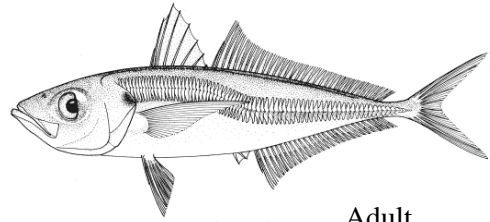
## CARANGIDAE

## *Trachurus trachurus* (Linnaeus, 1758)

**Habitat:** -Benthic, over sandy bottoms between 100 and 200 m depth, occasionally to 500 m

**Spawning:** -Over the whole year

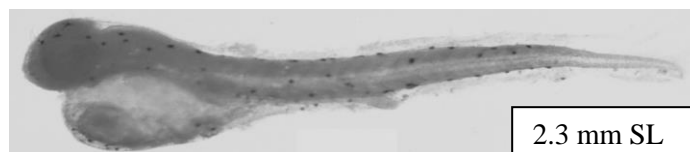
**Eggs:** -Pelagic, spherical  
-Diameter: 0.81-1.04 mm  
-Chorion: smooth  
-Oil globule single, 0.19-0.28 mm in diameter  
-Yolk: segmented



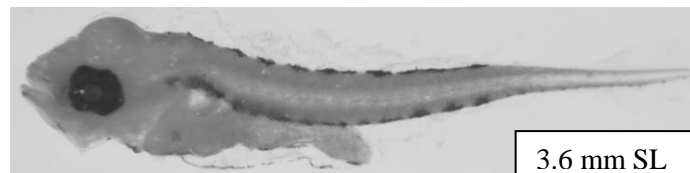
Adult

**Yolk sac larvae:** -Hatch size c.a. 2.5 mm  
-Body and location of the oil globule similar to *T. mediterraneus*  
-Pigmentation: melanophores are irregularly distributed over the body except in the unpigmented tail region, oil globule also pigmented

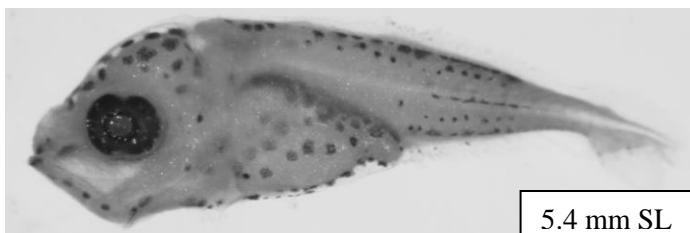
**Larva:** -Body, very similar to *T. mediterraneus*, shows preopercular spines and an occipital crest; differences between both species mainly lies on the pigmentation pattern  
-Preanus length: around 50% SL  
-Pigmentation: dorsal and ventral body contour of melanophores; the dorsal row, of around 10 melanophores, ends about mid-way between the anus and the caudal end; the ventral row consists of 4-5 large postanal melanophores, followed by a number of small melanophores extending nearly to the end of the urostyle; numerous melanophores on the lower jaw, along the abdomen and the upper surface of the gut and on the head  
-Flexion may begin around 5 mm SL



2.3 mm SL



3.6 mm SL



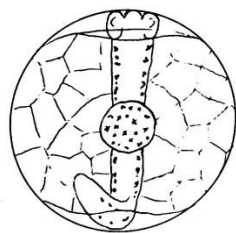
5.4 mm SL

**Adult:** Whitehead et al. (1984-1986)

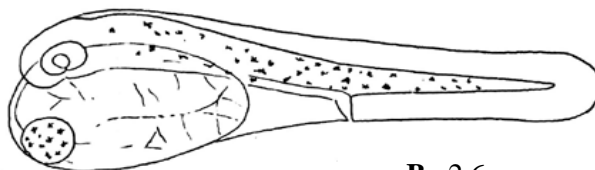
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), D'Ancona (1931-1956), Russell (1976), Sabatés (1988), Whitehead et al. (1984-1986)

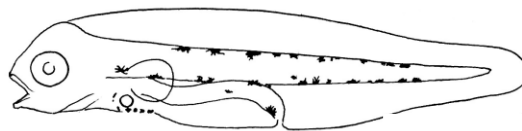
*Trachurus trachurus*



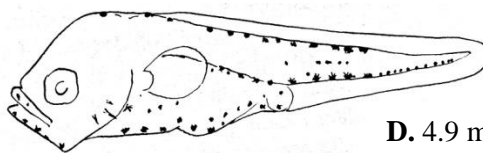
A.



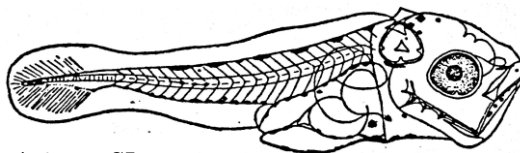
B. 2.6 mm



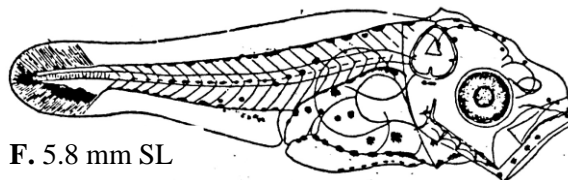
C. 3.2 mm SL



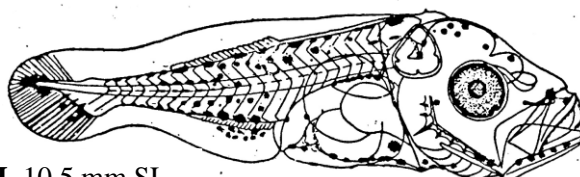
D. 4.9 mm SL



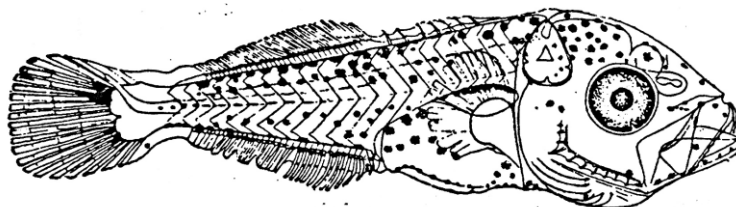
E. 4.6 mm SL



F. 5.8 mm SL



H. 10.5 mm SL



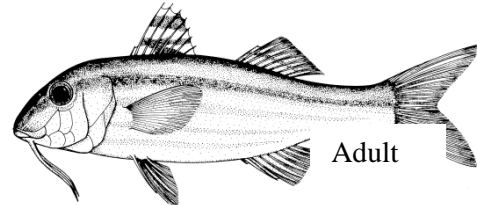
G. 7.0 mm SL

A-D; Russell (1976); E-H, Demir (1961)

**Habitat:** -Benthic, over rocky bottoms, to 400 m depth

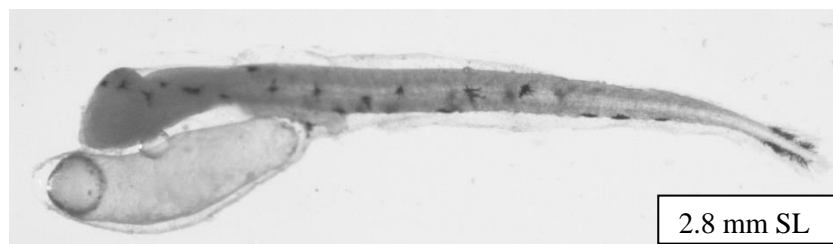
**Spawning:** -May-July

**Eggs:** -Pelagic, spherical  
-Diameter: 0.81-0.91 mm  
-Chorion: smooth  
-Oil globule single, 0.23-0.25 mm in diameter  
-Yolk: segmented



**Yolk sac larvae:** -Hatch size: c.a. 2.83 mm  
-The most characteristic feature is the yolk sac projected beyond the snout with the oil globule located at the anterior end of the yolk; anus situated close behind to the posterior end of the yolk sac  
-Pigmentation: melanophores are irregularly distributed over the body; oil globule strongly pigmented

**Larva:** -Body relatively elongated  
-Preanus length: about 67% SL, increases with development  
-Pigmentation: ventral row of 10-12 postanal melanophores extending from the anus to about two-third of the postanal region; tail end reduced to 2 or 3 melanophores over and below the urostile; mediolateral line of melanophores which begins to develop from the posterior end; peritoneal region pigmented  
-Flexion occurs between <4 and 7.6 mm SL

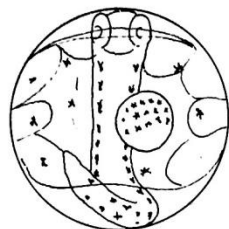


**Adult:**

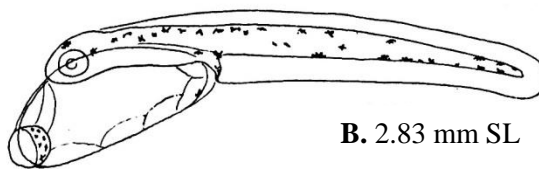
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976)

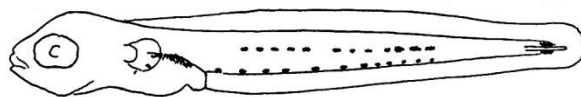
*Mullus surmuletus*



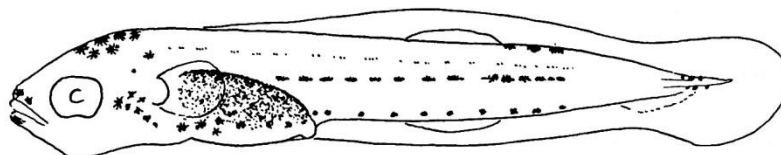
A.



B. 2.83 mm SL



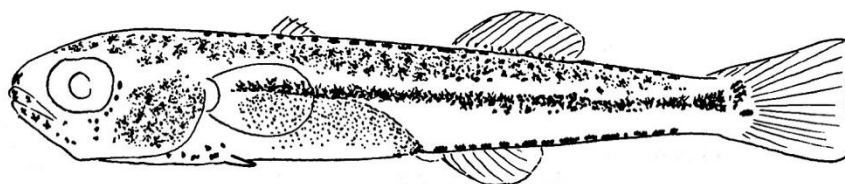
C. 4.2 mm SL



D. 5.7 mm SL

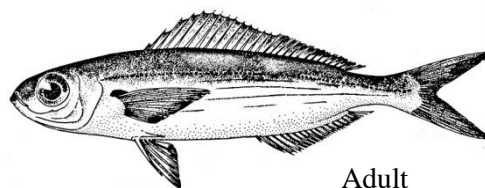


E. 8.0 mm SL

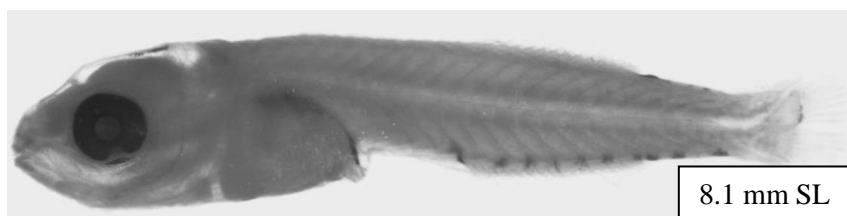
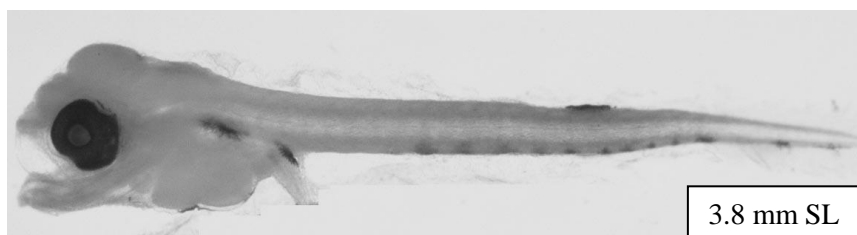


F. 12.5 mm SL

- Habitat:** -Benthic, to 200-350 m depth
- Spawning:** -April-May
- Eggs:** -Pelagic, spherical  
-Diameter: 0.89 mm  
-Chorion: smooth  
-Oil globule single, 0.2 mm in diameter  
-Yolk: unsegmented



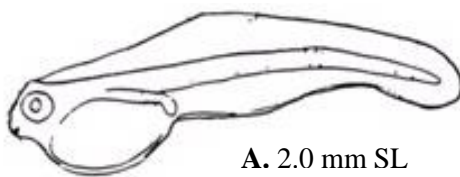
- Yolk sac larvae:** -Hatch size: < 2 mm  
-Body elongate, the anus does not reach the border of the primordial fin  
-Pigmentation: a dorsal and a opposed ventral bar of pigment about the middle of the caudal region; a series of postanal ventral melanophores and one or two under the urostile
- Larva:** -Body elongated with a prominent gas bladder; older larvae also shows two series of preopercular spines  
-Preanus length: c.a. 40% SL  
-Pigmentation: young larvae the same as yolk sac larvae; from 5.7 mm the ventral bar disappears; peritoneum pigmented; also shows single melanophore under the hindgut, under the gut and on the head  
-Flexion completed at 7.6 mm SL



**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

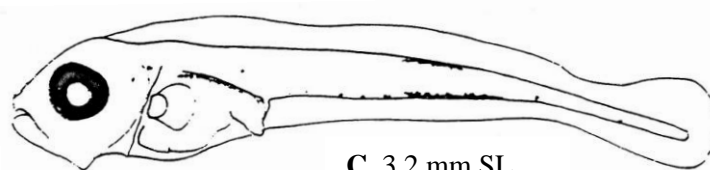
**Literature:** Alemany (1997), D'Ancona (1931-1956), Sabatés (1988), Whitehead et al. (1984-1986)



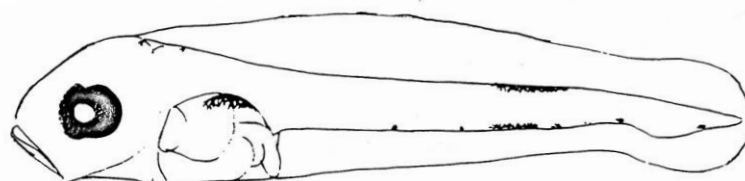
A. 2.0 mm SL



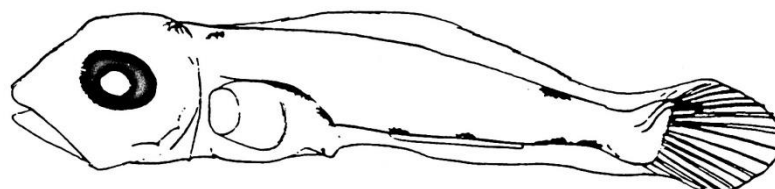
B. 2.5 mm SL



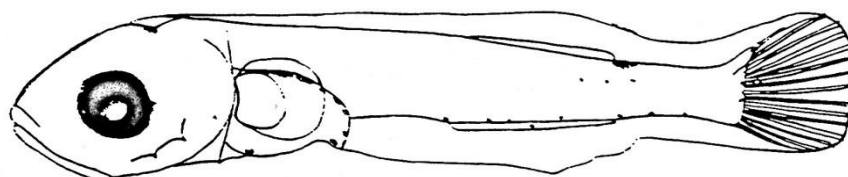
C. 3.2 mm SL



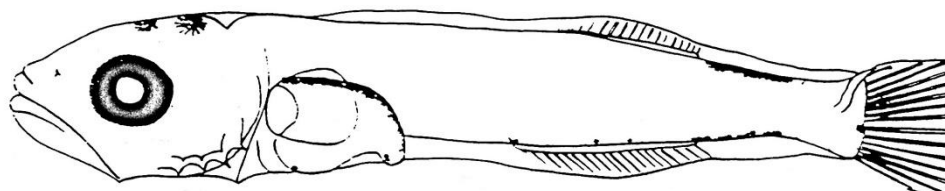
D. 4.0 mm SL



E. 5.6 mm SL



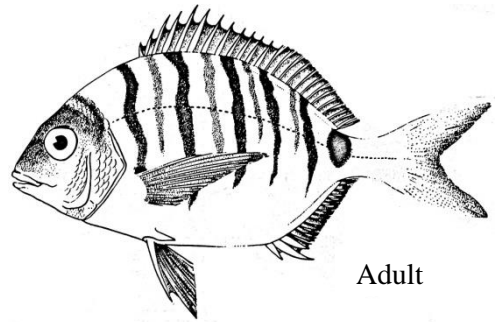
F. 6.0 mm SL



G. 7.4 mm SL

A-G: Alemany (unpublished)

The genus *Diplodus* includes several species whose larvae are very similar, mainly during the first stages of development. The only species for which these stages are described is *D. sargus*.



**Habitat:** -Benthic, to 200-350 m depth

**Spawning:** -All year round

**Eggs:** -Pelagic, spherical  
 -Diameter: c.a. 0.90 mm  
 -Chorion: smooth  
 -Oil globule single, c.a. 0.2 mm in diameter  
 -Yolk: unsegmented

**Yolk sac larvae:** -Hatch size: c.a. 2.5 mm  
 -Body elongate, the anus reaches the border of the primordial fin  
 -Pigmentation: scattered melanophores over the dorsum, no ventral melanophores; with development, dorsal melanophores disappear and appear ventral melanophores; oil globule pigmented

**Larva:** -Body elongated (the most among this genus); older larvae shows two series of preopercular spines  
 -Preanus length: c.a. 30% of SL in young larvae, increases with development  
 -Pigmentation: a ventral line of melanophores from the anus; dorsum and ventral regions of gut pigmented; occipital and shoulder regions pigmented  
 -Flexion size: ca 5.6 mm

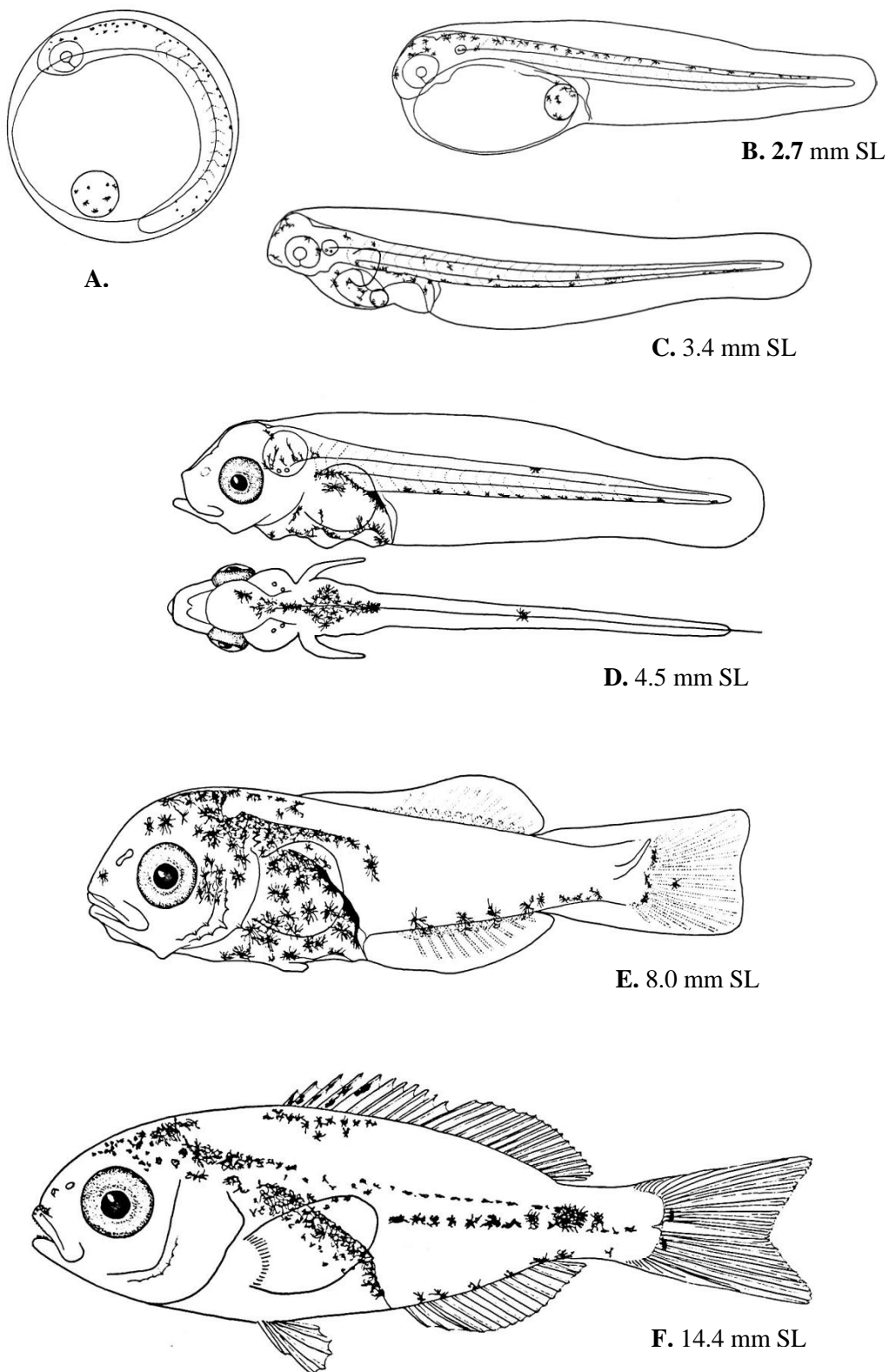
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Brownell (1973), Sabatés (1988), Whitehead et al. (1984-1986)



*Diplodus sargus*



A-F: Brownell (1979)

## SPARIDAE

*Pagrus pagrus* (Linnaeus, 1758)

**Habitat:** -Benthic, over sandy and rocky bottoms to 200 m depth

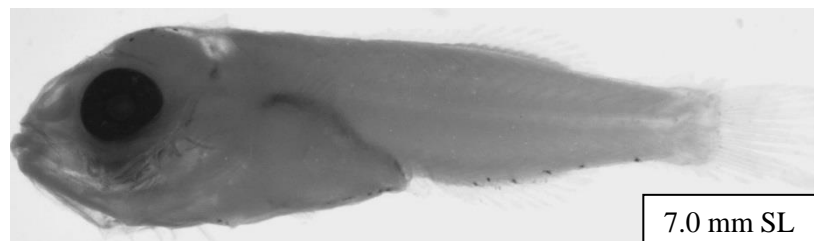
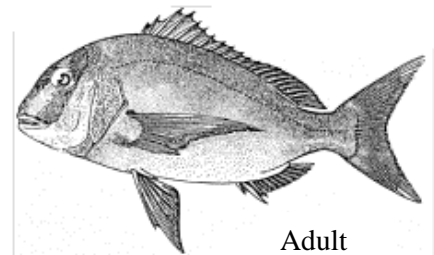
**Spawning:** -May-September

**Eggs:** -Unknown

**Yolk sac larvae:** -Unknown

**Larva:**

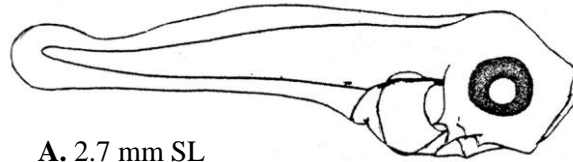
- Body: head and trunk shows a considerable height; an occipital crest that disappears at c.a. 9 mm LS (this is a specific character of this Sparidae species); preopercular spines are well developed; older larvae show a supraorbital arch
- Preanus length: <50 SL
- Pigmentation: scantily pigmented; the peritoneum is pigmented; shows a series of 6 postanal melanophores, a melanophore on the head and other over the hindgut
- Flexion size: unknown



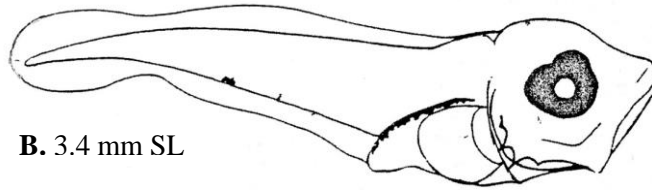
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

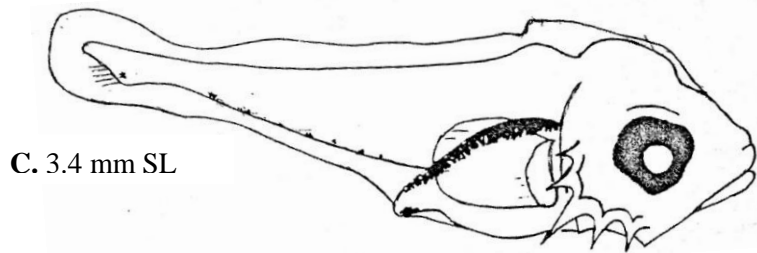
**Literature:** Alemany (1997), Sabatés (1988), Whitehead et al. (1984-1986)



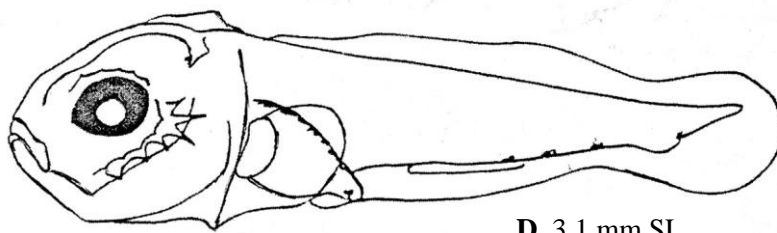
A. 2.7 mm SL



B. 3.4 mm SL



C. 3.4 mm SL

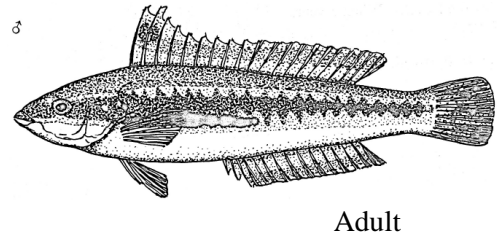


D. 3.1 mm SL

**Habitat:** -Benthic, littoral, over rocky bottoms or eelgrass beds to 120 m depth

**Spawning:** -April-August

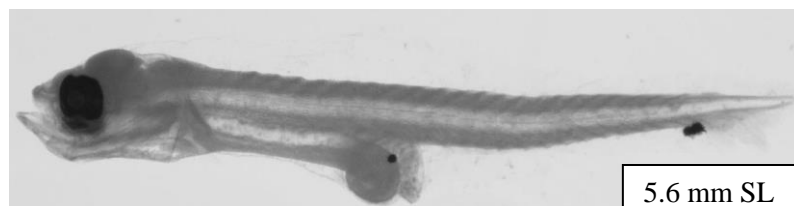
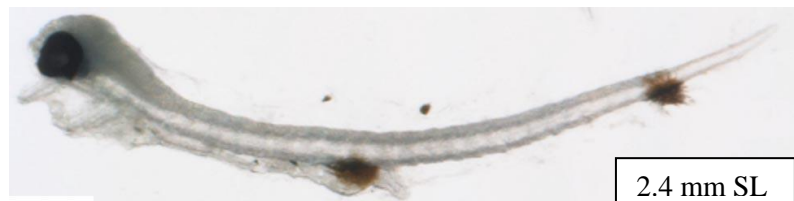
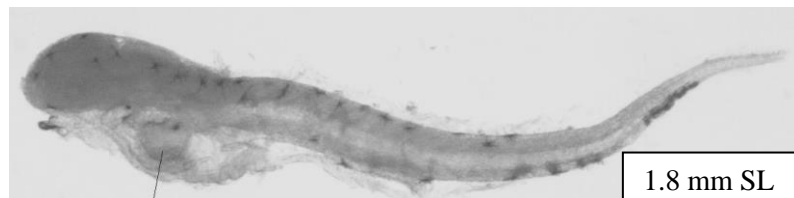
**Eggs:** -Pelagic, spherical  
-Diameter: 0.60-0.67 mm  
-Chorion: smooth  
-Oil globule single, 0.12-0.16 mm in diameter  
-Yolk: unsegmented



Adult

**Yolk sac larvae:** -Hatch size: 2.24 mm; oil globule at the anterior end of the yolk sac; several dorsal melanophores that reduce to two with development; ventrally shows a row of melanophores that extends from the head along the ventral region of the trunk, ending in a strong melanophore

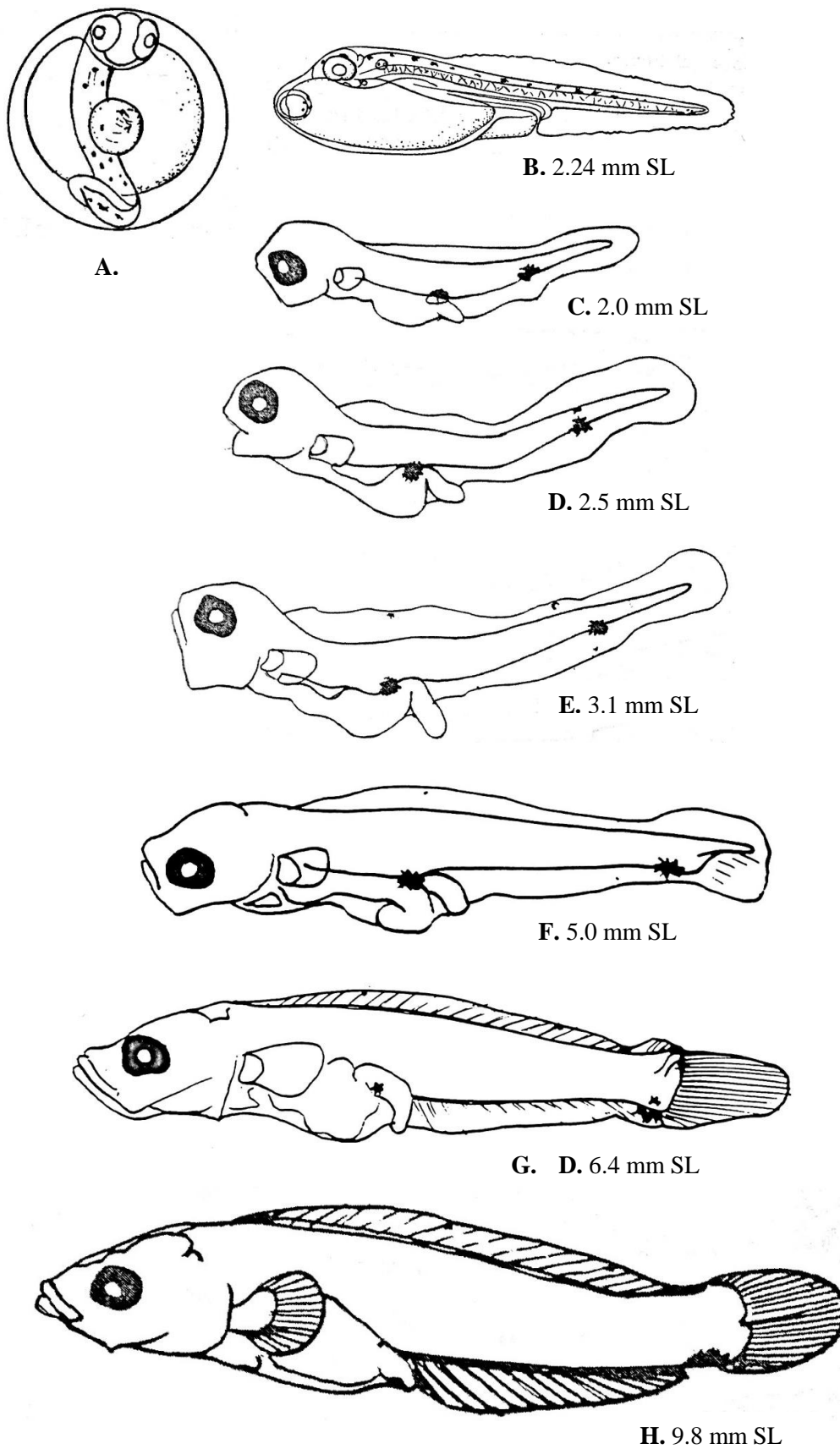
**Larva:** -Body: elongated; gut with a prominent loop  
-Preanus length: around 50% SL  
-Pigmentation: dorsal melanophores displace with development to the primordial and later to the dorsal fin; ventrally shows two prominent melanophores, one over the gut, close to de anus and the other in the caudal region  
-Length at flexion: completed at 9.8 mm



**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Sabatés (1988), Whitehead et al. (1984-1986)

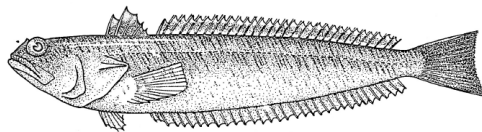


A-B: D'Ancona (1931-1956); C-H: Alemany (unpublished)

## TRACHINIDAE

*Trachinus draco* Linnaeus, 1758

**Habitat:** -Benthic, littoral, over mud, sandy or gravel bottoms, to 150 m depth



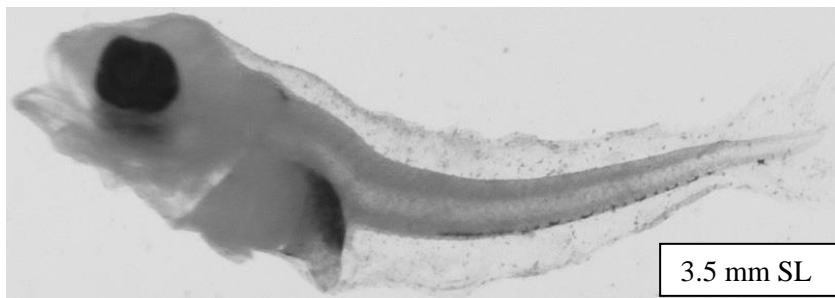
Adult

**Spawning:** -Spring-summer

**Eggs:** -Pelagic, spherical  
-Diameter: 0.96-1.11 mm  
-Chorion: smooth  
-Oil globule single, 0.19-0.23 mm in diameter  
-Yolk: unsegmented

**Yolk sac larvae:** -Hatch size: c.a. 3.2 mm; oil globule and anus situated at the anterior and the posterior end the yolk sac, respectively; show melanophores on the snout, two behind the eyes, on the dorsal anterior part of the body, one near the anus, a row of ventral melanophores on the postanal ventral region with a postanal bar, midway between the anus and the tail end

**Larva:** -Body: relatively elongated and slender becoming more robust with development; pelvic fins appear at c.a. 4 mm SL; older larvae show 5 preopercular spines  
-Preanus length: around 40% SL  
-Pigmentation: early stages similar to yolk sac larvae; with development, the beginning of the ventral postanal row of melanophores moves backward and reduces in number; disappears the postanal bar of melanophores and increases the peritoneal pigment; pelvic fins darkly pigmented  
-Flexion: almost completed at 5.1 mm



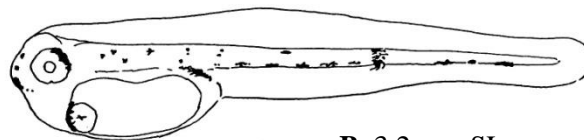
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

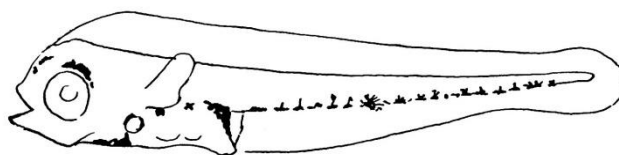
**Literature:** Alemany (1997), Munk and Nielsen (2005), Russell (1976), Sabatés (1988)



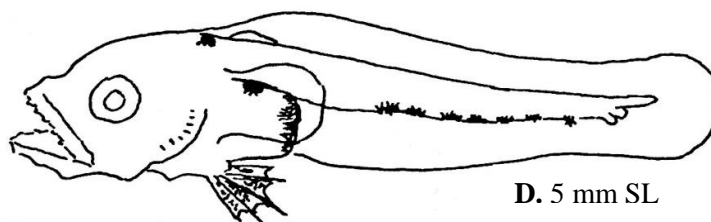
A.



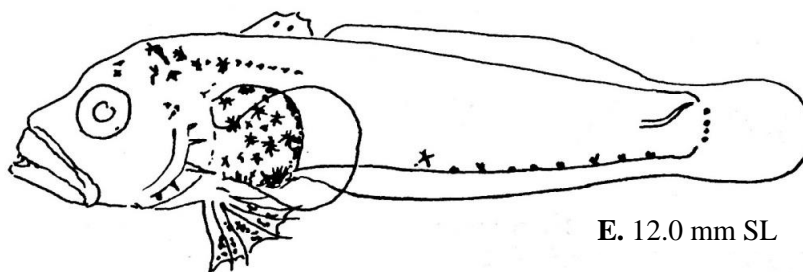
B. 3.2 mm SL



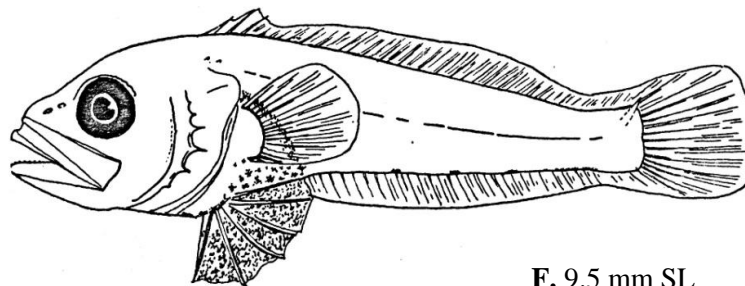
C. 3.5 mm SL



D. 5 mm SL



E. 12.0 mm SL



F. 9.5 mm SL

A-E: Russell (1976); F: (D'Ancona (1931-1956))

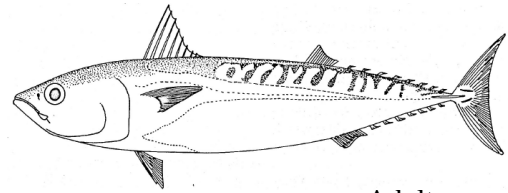
## SCOMBRIDAE

*Auxis rochei* Risso, 1810

**Habitat:** -Epipelagic, inshore waters and near islands

**Spawning:** -May-November

**Eggs:** -Pelagic, spherical  
-Diameter: 0.82-1.10 mm  
-Chorion: smooth  
-Oil globule single, 0.24-0.29 mm in diameter  
-Yolk: unsegmented



Adult

**Yolk sac larvae:** -Hatch size: 2.14 mm SL; show melanophores on the dorsum of the neck, a row of ventral melanophores on the postanal ventral region, some melanophores under the gut and in the peritoneal region and a dorsal melanophore close to the caudal region

**Larva:** -Body: moderately elongated, becoming deeper with development; gut compact and triangular; relatively short jaws  
-Preanus length: increases from c.a. 37% to 50% SL  
-Pigmentation: early stages similar to yolk sac larvae; with development, the beginning of the ventral postanal row of melanophores moves backward and reduces in number; the pigmentation of the peritoneal region increases; numerous melanophores in the occipital region  
-Flexion: 4.5-6.0 mm

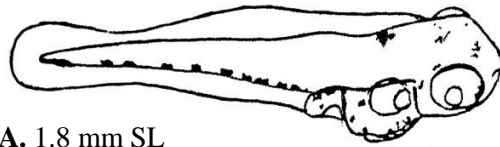


**Adult:** Whitehead et al. (1984-1986)

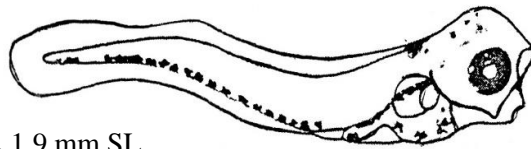
**Photos:** F. Alemany

**Literature:** Alemany (1997), Fahay (2007), Richards (2006), Sabatés (1988), Whitehead et al. (1984-1986)

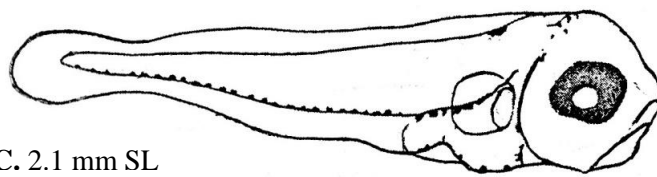




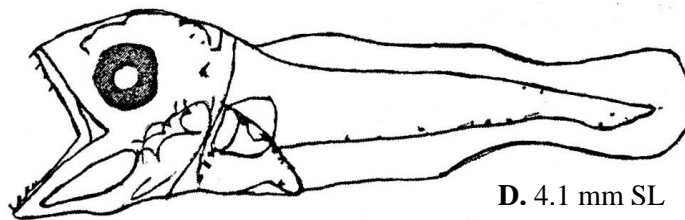
A. 1.8 mm SL



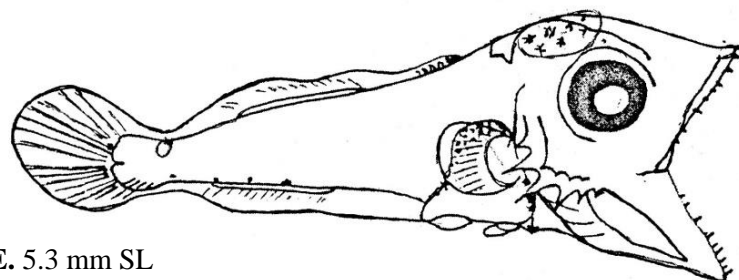
B. 1.9 mm SL



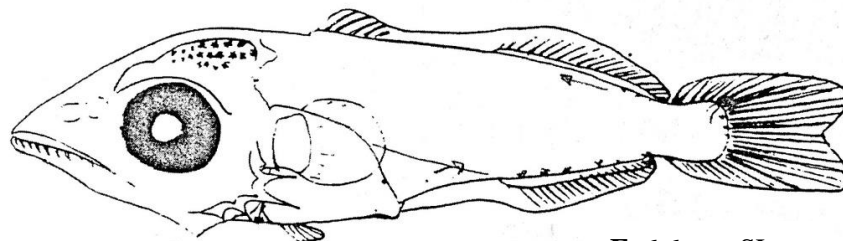
C. 2.1 mm SL



D. 4.1 mm SL



E. 5.3 mm SL

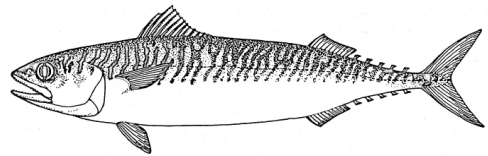


F. 6.6 mm SL

**Habitat:** -Epipelagic or meso-demersal in depths to 200-250 m

**Spawning:** -Spring-early summer

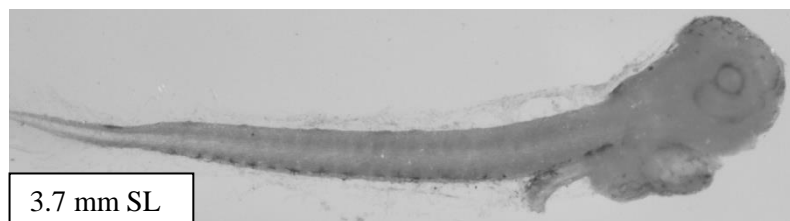
**Eggs:** -Pelagic, spherical  
-Diameter: 1.0-1.38 mm  
-Chorion: smooth  
-Oil globule single, 0.28-0.35 mm in diameter  
-Yolk: unsegmented



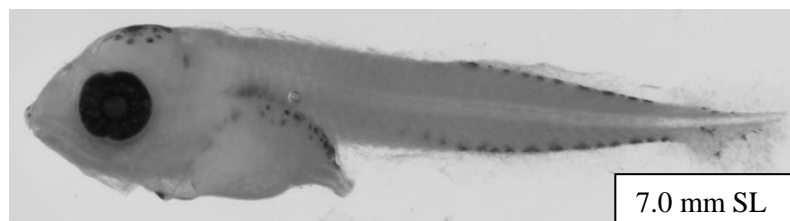
Adult

**Yolk sac larvae:** -Hatch size: 3.3 mm SL; show melanophores on the head, double rows of irregularly distributed melanophores along the dorsal and ventral contours of the body, peritoneal pigment, melanophores on the snout and behind the eye; the oil globule, located at the posterior end of the yolk, is pigmented

**Larva:** -Body: moderately elongated, becoming stubbier with development; head moderate; gut compact and triangular; relatively short jaws; do not show head spines; teeth prominent >4.0 mm SL  
-Preanus length: increases from c.a. 40% SL to >60% SL  
-Pigmentation: postanal rows of dorsal and ventral melanophores starting some distance from the anus; in the earliest stages there may be fewer melanophores in the dorsal row equaling their number (14-15) with development; peritoneum pigmented; some melanophores along the urostyle and on the base of the caudal fin; a group of melanophores on the head and sometimes on the snout and lower jaw; there are no melanophores on body sides  
-Length at flexion: 5.0-7.0 mm



3.7 mm SL



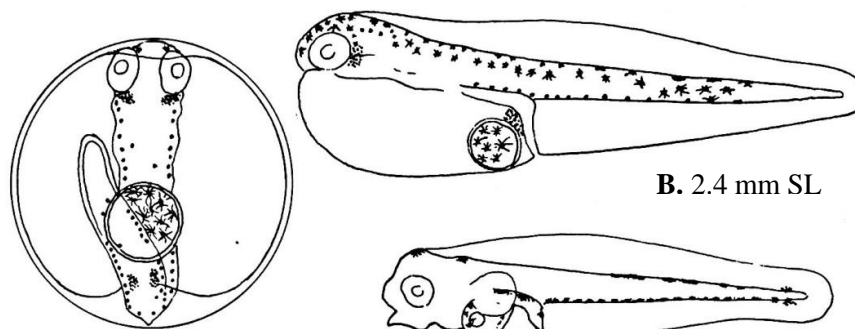
7.0 mm SL

**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Richards (2006), Sabatés (1988), Whitehead et al. (1984-1986)

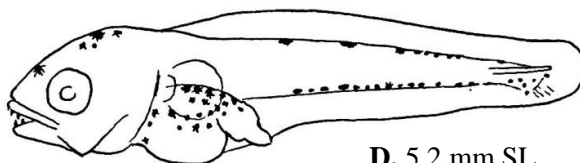
*Scomber scombrus*



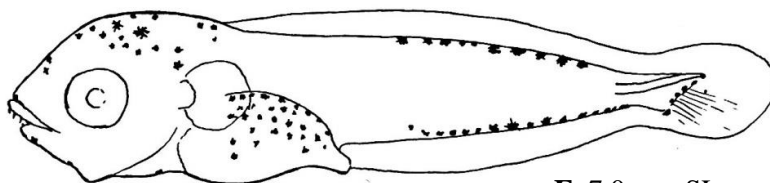
A.

B. 2.4 mm SL

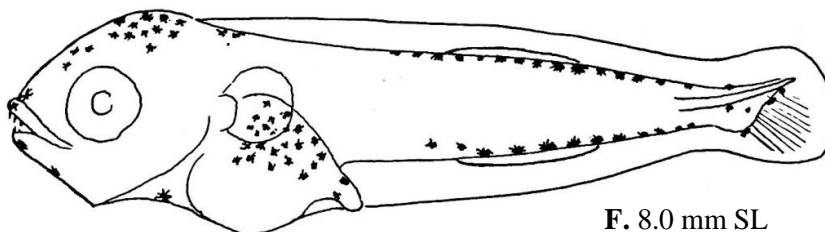
C. 3.7 mm SL



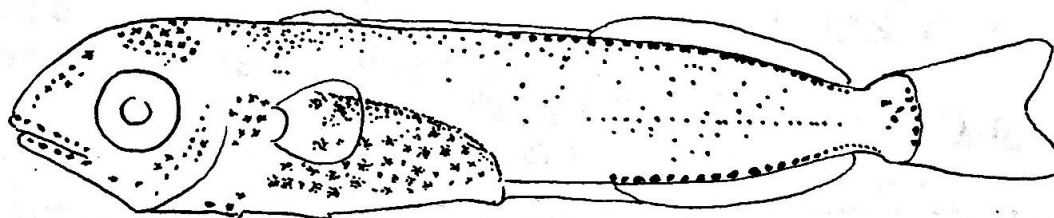
D. 5.2 mm SL



E. 7.0 mm SL



F. 8.0 mm SL



G. 14.0 mm SL

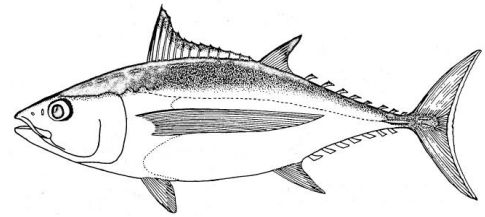
## SCOMBRIDAE

*Thunnus alalunga* (Bonnaterre, 1788)

**Habitat:** -Epi-mesopelagic to 100 m depth

**Spawning:** -July-September

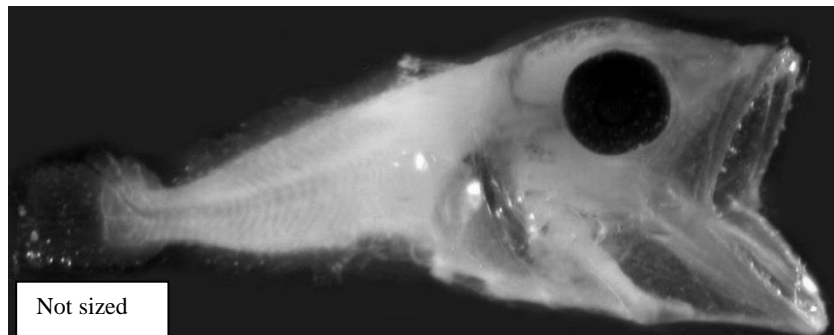
**Eggs:** -Pelagic, spherical  
-Diameter: 0.84-0.94 mm  
-Chorion: smooth  
-Oil globule single, 0.24mm in diameter  
-Yolk: unsegmented



Adult

**Yolk sac larvae:** -Hatch size: 2.6 mm SL; show melanophores over the yolk, gut and two, one dorsal and other ventral close to the tip of the urostile

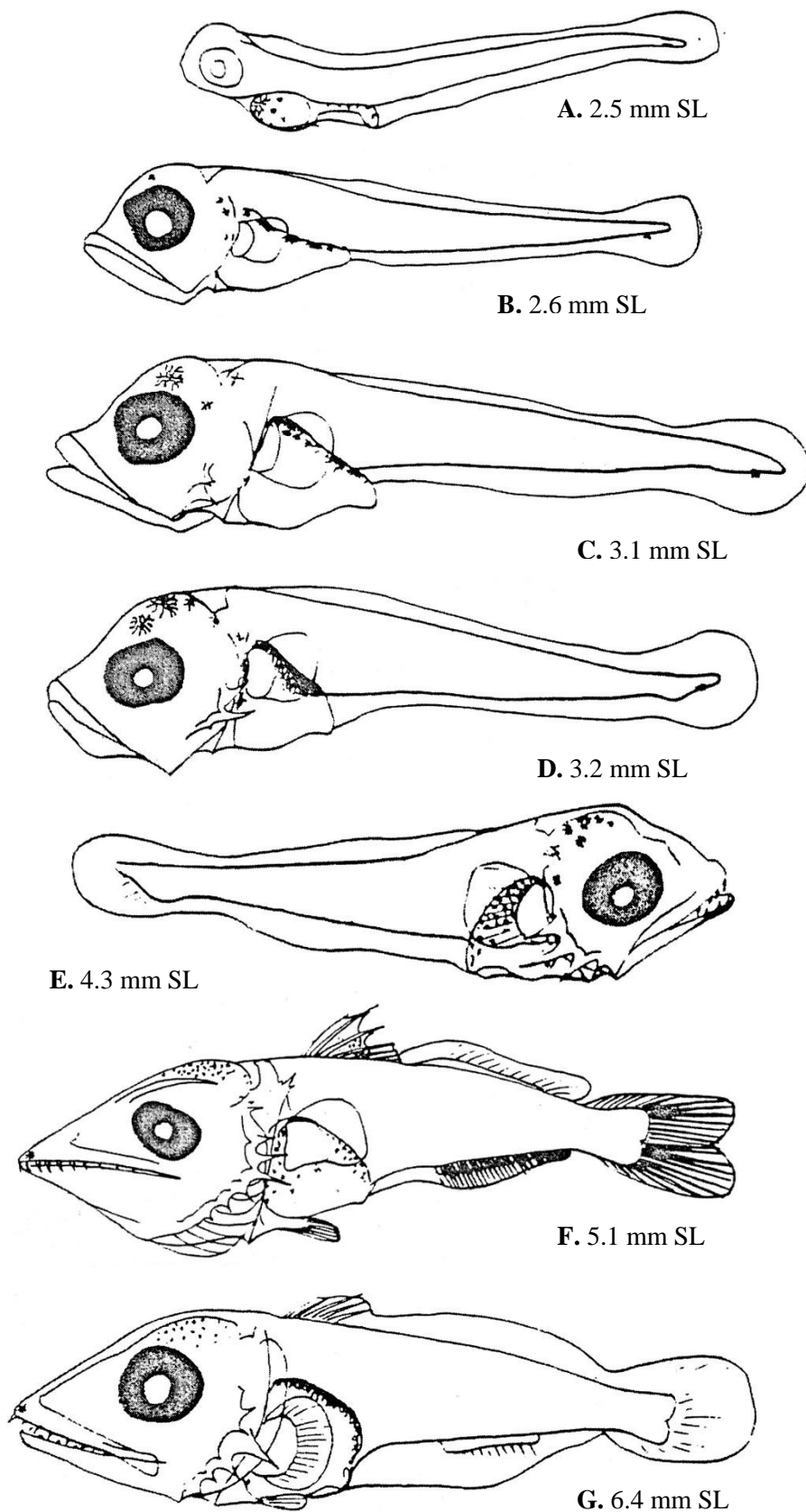
**Larva:** -Body: moderately stocky, deepest through the pectoral region, tapering to a narrow caudal peduncle; large head with pointed snout and jaws; preopercular and post temporal spines; gut compact and triangular  
-Preanus length: increases from around 40% SL to c.a. 55% SL  
-Pigmentation: disappear the dorsal melanophore over the urostile; pelvic region strongly pigmented; occipital region pigmented; older larvae show a melanophore at the tip of the snout  
-Flexion: 5.0-7.0 mm SL



**Adult:** Whitehead et al. (1984-1986)

**Photos:** F. Alemany

**Literature:** Alemany (1997), Fahay (2007), Richards (2006)



A-G: Alemany (unpublished)

## SCOMBRIDAE

*Thunnus thynnus* (Linnaeus, 1758)

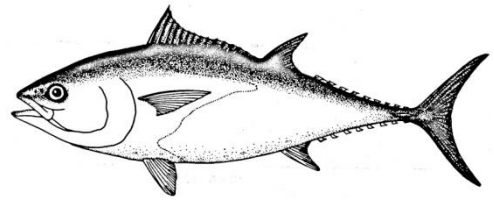
**Habitat:** -Epi-mesopelagic, carrying out transoceanic migrations

**Spawning:** -May-July

**Eggs:** -Pelagic, spherical  
-Diameter: 1.0-1.12 mm  
-Chorion: smooth  
-Oil globule single, 0.25-0.28 mm in diameter  
-Yolk: unsegmented

**Yolk sac larvae:** -Hatch size: 3.0 mm TL

**Larva:** -Body: stout, deepest through the pectoral region, tapering to a narrow caudal peduncle; large head with pointed snout and jaws; gut compact and triangular  
-Preamble length: increases from around 40% SL to c.a. 55% SL  
-Pigmentation: 4 postanal dotted ventral melanophores; a dorsal melanophore about the middle of the body; peritoneal region strongly pigmented  
-Length at flexion: 5.0-7.0 mm SL



Adult



Not sized

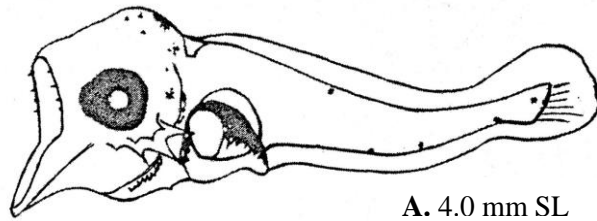


Not sized

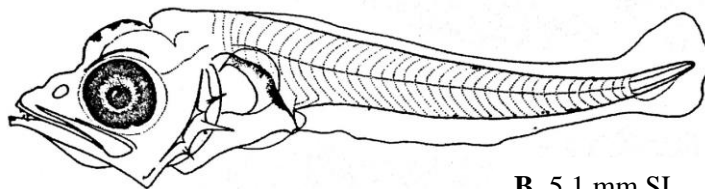
**Adult:** Whitehead et al. (1984-1986)

**Photos:** F. Alemany

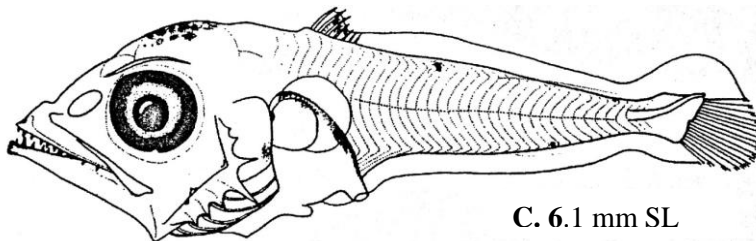
**Literature:** Alemany (1997), Fahay (2007), Richards (2006), Whitehead et al. (1984-1986)



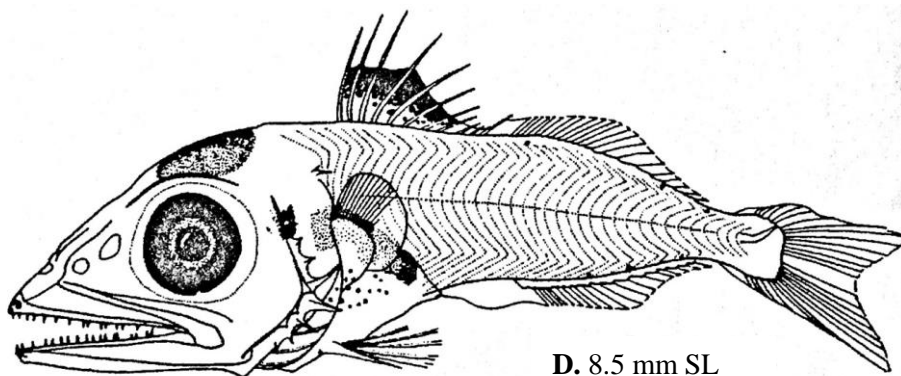
A. 4.0 mm SL



B. 5.1 mm SL



C. 6.1 mm SL



D. 8.5 mm SL

A: Alemany (unpublished); B-D: Richards (2006)

The Mediterranean Sea is inhabited by around 40 species of the family Gobiidae. The identification of larvae to specific level is very difficult because larvae of different species are very similar and because of scarcity of information on larval development of many species. For many species there is no information on their early life story stages, for other there is only information on the eggs and recently hatched larvae or on the later stages of larval development



Adult

**Habitat:** -Benthic littoral, over sandy or rocky bottoms

**Spawning:** -Depends on the species

**Eggs:** -Known for some species; so far known, all are demersal

**Yolk sac larvae:** Known for some species

**Larva:**

- Body: moderately elongated; small to moderate head, no cephalic spines; eyes, rounded, and large; gut straight or relatively curved below the gas bladder; prominent gas bladder, located midway along the gut
- Preanus length: c.a. 50% SL
- Pigmentation: the typical pigmentation consists of melanophores on the dorsal region of the gas bladder, one over the hindgut, from one to many, single or paired, on the ventral midline of the postanal region
- Flexion: 5.0-7.0 mm SL

..

**Adult:** Whitehead et al. (1984-1986)

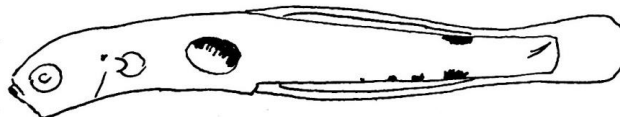
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Fahay (2007), Richards (2006), Russell (1976), Sabatés (1988), Tortonese (1976)





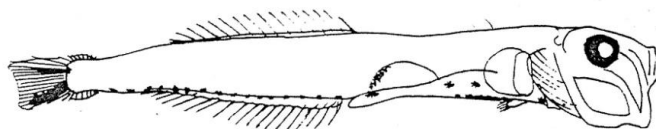
A. *Cristallogobius linearis* 4.0 mm SL



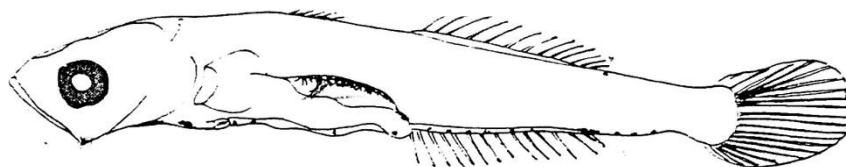
B. *Cristallogobius linearis* 9.0 mm SL



C. *Cristallogobius linearis* 11.2 mm SL



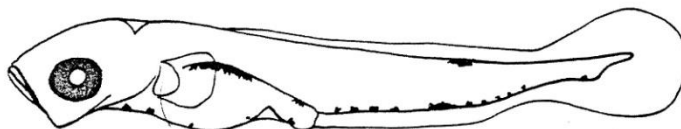
D. *Cristallogobius linearis* 14.5 mm SL



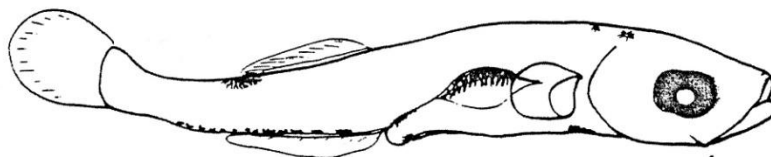
E. *Aphia minuta* 7.6 mm SL



F. *Pomatochistus microps* 3.2 mm SL



G. *Pomatochistus microps* 9.0 mm SL



H. *Pomatochistus microps* 11.2 mm SL

A-C: Russell (1976); D,H: Alemany (unpublished)

**GOBIIDAE**

*Lebetus guilleti* (Le Danois, 1913)

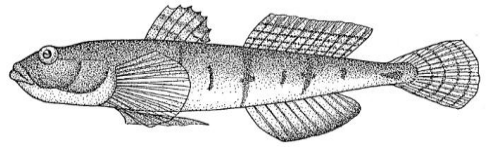
**Habitat:** -Benthic littoral, over coarse grounds

**Spawning:** -Larvae in the plankton from February to December in the Balearic Sea

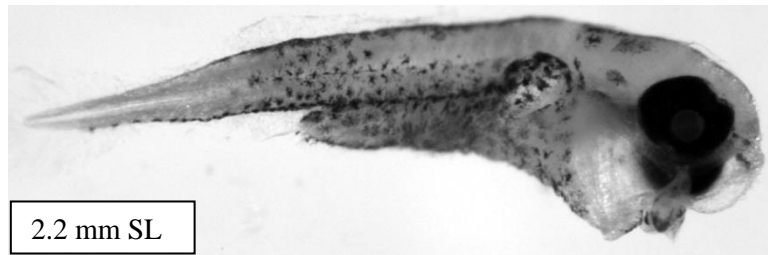
**Yolk sac larvae:** -Not known for most species

**Larva:**

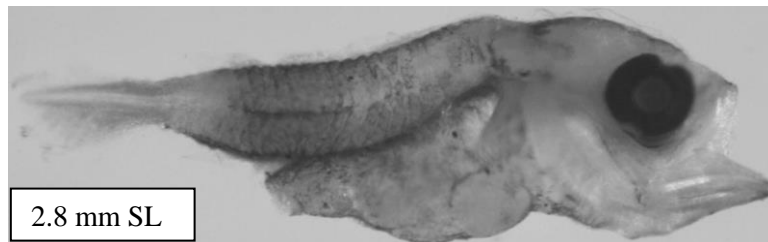
- Body: short and robust; small to moderate head, no cephalic spines; eyes, rounded, and large; prominent gas bladder; pelvic fins develop quickly
- Preanus length: c.a. 67% SL
- Pigmentation: the body is covered by melanophores except in the caudal region; there is a well-marked lateral row of melanophores and another ventral s from the anus to the base of the caudal fin
- Flexion: 5.0-7.0 mm SL



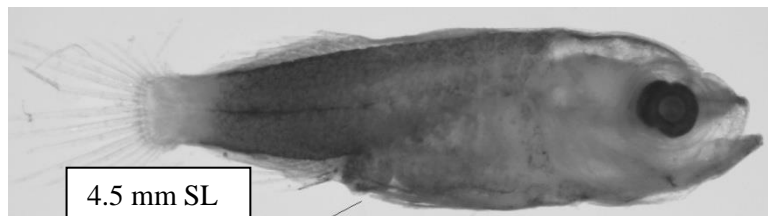
Adult



2.2 mm SL



2.8 mm SL

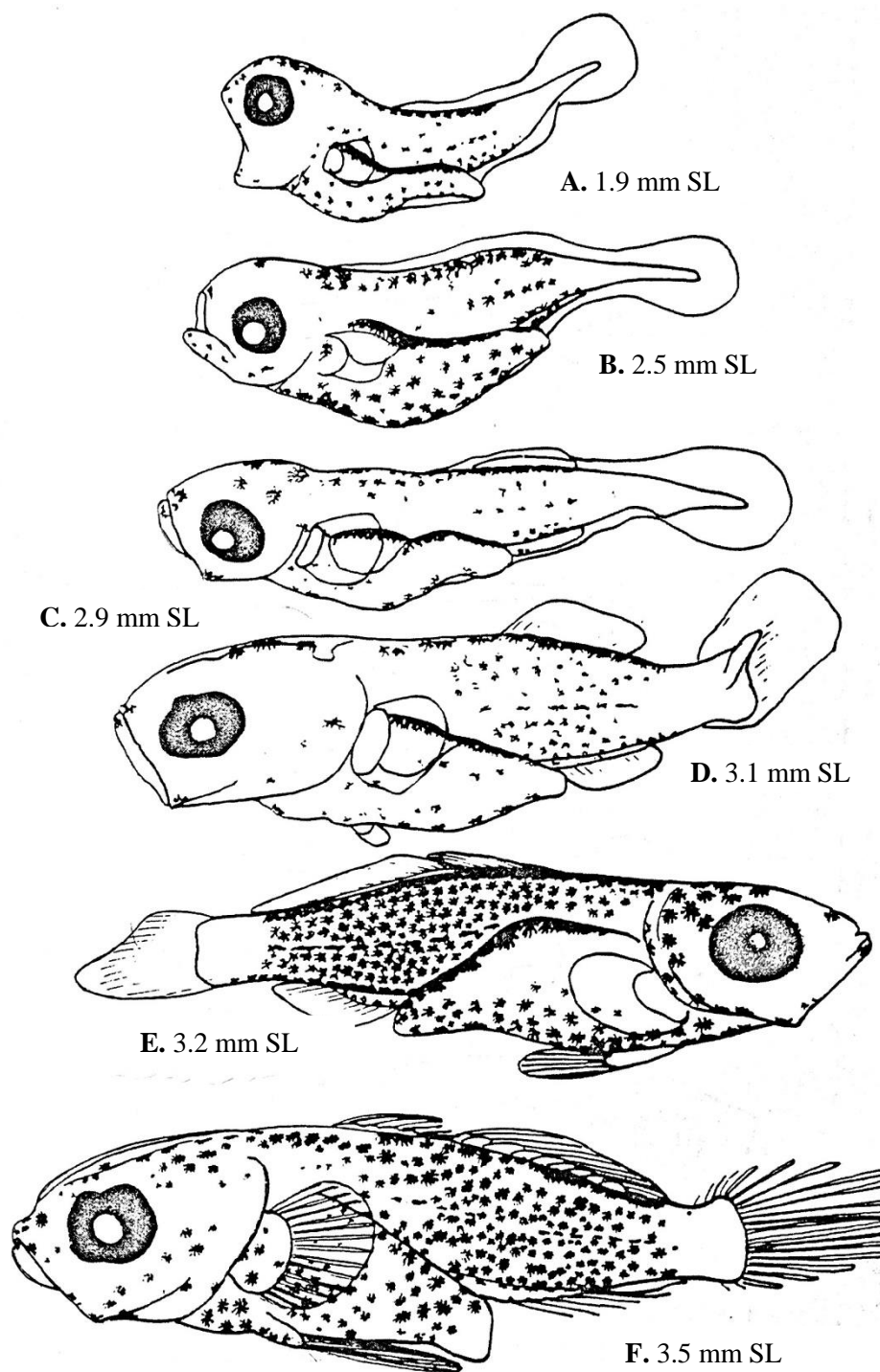


4.5 mm SL

**Adult:** Whitehead et al. (1984-1986)

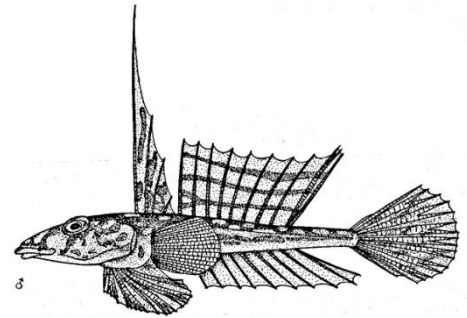
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976), Whitehead et al. (1984-1986)



A-F: Alemany (unpublished)

In the Western Mediterranean there are 6 species of the genus *Callionymus*. The younger larvae, <3 mm SL, of this genus are indistinguishable because they are very similar, in some species identical. The identification at the species level is only possible larvae >3 mm, when larvae develop the preopercular spines, pelvic fins and the pigmentation pattern, characters that allow distinguishing the species of this genus.

Adult (*C. lira*)

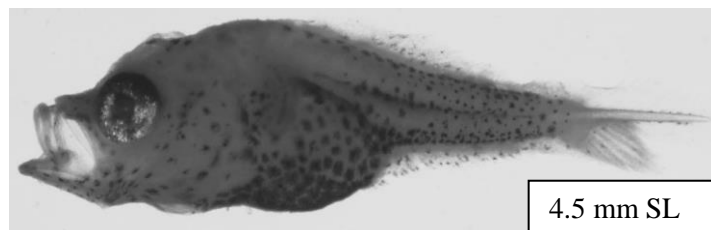
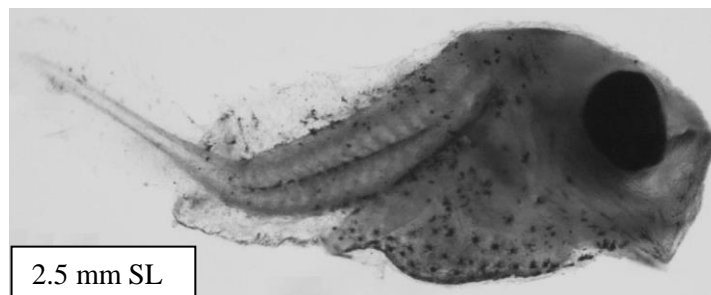
**Habitat:** -Benthic, over sandy bottoms to 650 m depth

**Spawning:** -Probably all year with the maximum in spring-autumn

**Eggs:** -Pelagic, spherical  
-Diameter: 0.55-0.97 mm  
-Chorion: in some species shows hexagonal sculptures  
-No oil globule  
-Yolk: segmented

**Yolk sac larvae:** -Hatch size: c.a. 2 mm (*C. lira*); the yolk appears fully absorbed at 2.3 mm SL

**Larva:** -Body: thick head and abdomen; shows a bifurcated preopercular spine that allows differentiate species; the urostile is strongly developed and up curved at its end  
-Preanus length: around 50% SL  
-Pigmentation: strongly pigmented  
-Flexion size: no data



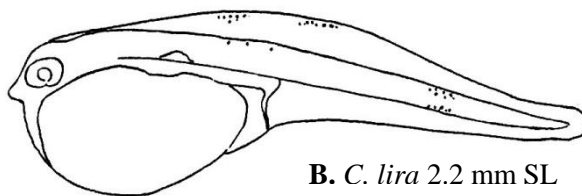
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

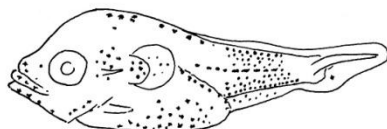
**Literature:** Alemany (1997), Russell (1976), Sabatés (1988), Whitehead et al. (1984-1986)



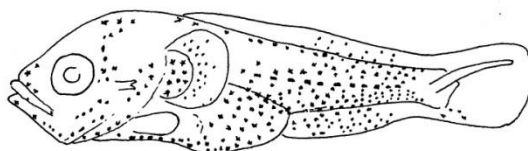
**A.** *C. lira*



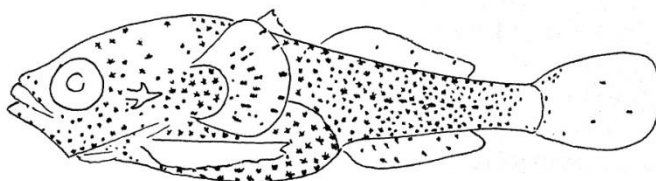
**B.** *C. lira* 2.2 mm SL



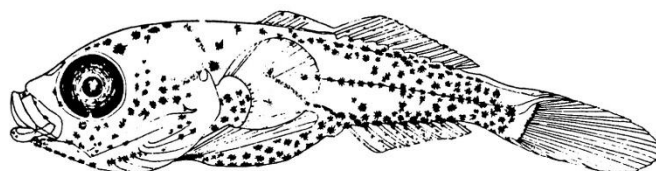
**C.** *C. lira* 4.5 mm SL



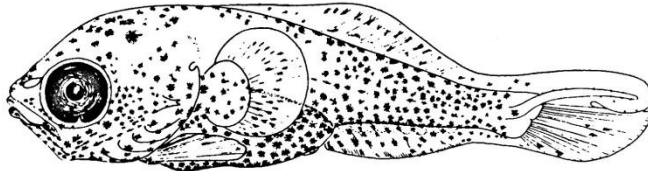
**D.** *C. lira* 6.0 mm SL



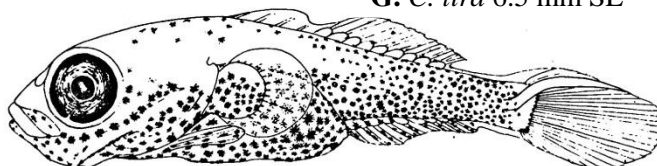
**E.** *C. lira* 10.0 mm SL



**F.** *C. reticulatus* 6.0 mm SL



**G.** *C. lira* 6.5 mm SL



**H.** *C. maculatus* 6.6 mm SL

**BLENNIDAE**

*Parablennius pilicornis* (Cuvier, 1829)

**Habitat:** -Benthic, littoral

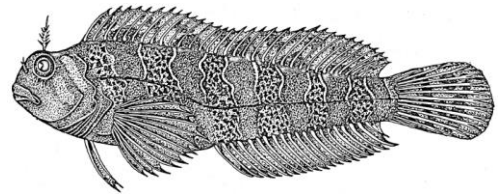
**Spawning:** -No data

**Eggs:** -No data

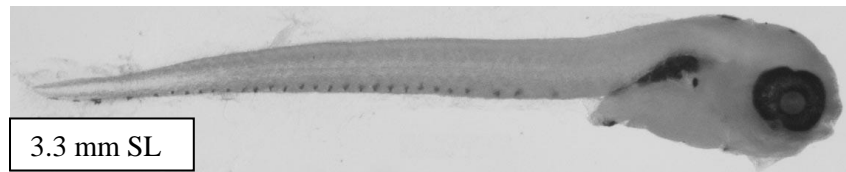
**Yolk sac larvae:** -No data

**Larva:**

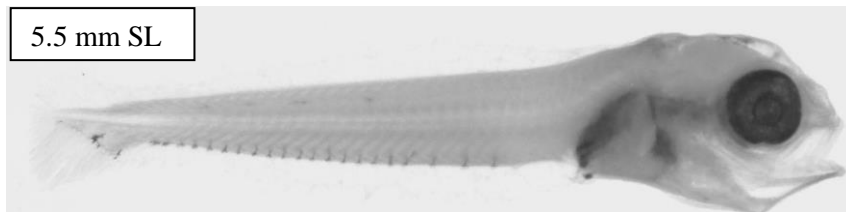
- Body elongated; pectoral fin fairly large; shows preopercular spines from 4 mm SL
- Preanus length: 36% of SL in young larvae diminishes to 32% in older larvae
- Pigmentation: young larvae, only one stellate melanophore on head, many in older larvae; dorsal surface of the gut heavily pigmented, the pigmentation of the abdominal region increases with development; melanophore ventrally over the anus (vent); a ventral row of melanophores from the anus to the tip of the body; older larvae show a melanophore in the base of the caudal fin; dorsal pigmentation appear in larvae of 13 mm SL
- Flexion occurs between 5 and 6 mm SL



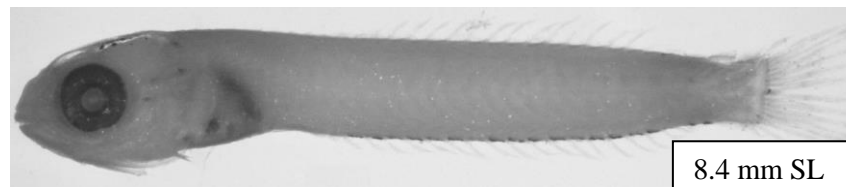
Adult



3.3 mm SL



5.5 mm SL



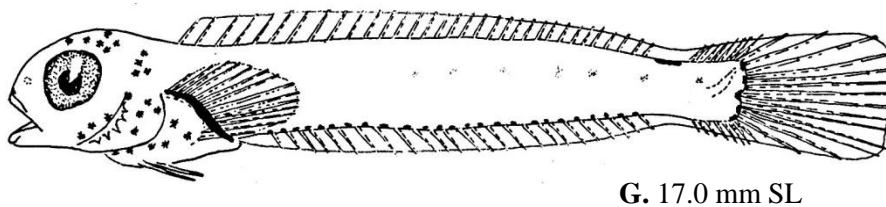
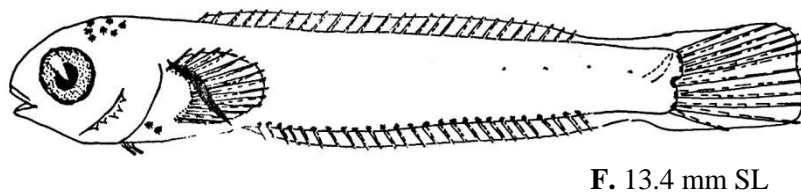
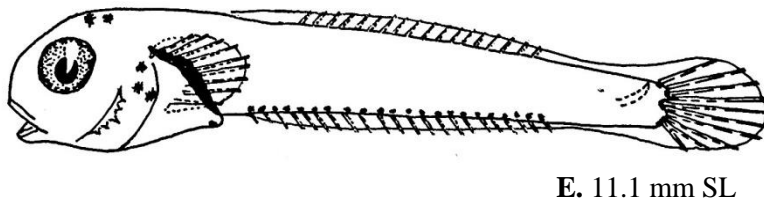
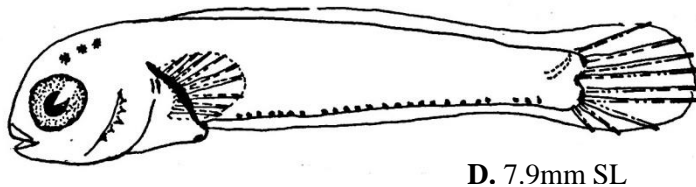
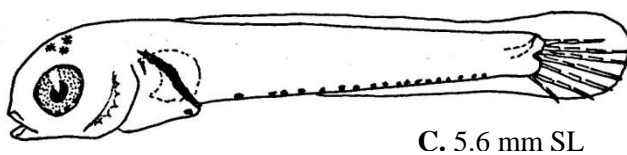
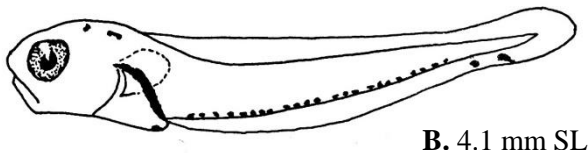
8.4 mm SL

**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Olivar (1986), Olivar and Fortuño (1991), Whitehead et al. (1984-1986)

*Parablennius pilicornis*



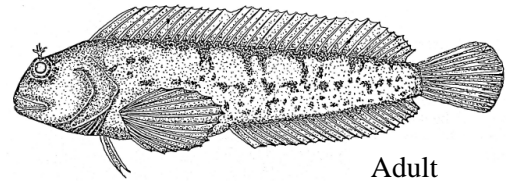
**BLENNIIDAE**

*Parablennius gattorugine* (Cuvier, 1829)

**Habitat:** -Benthic, littoral

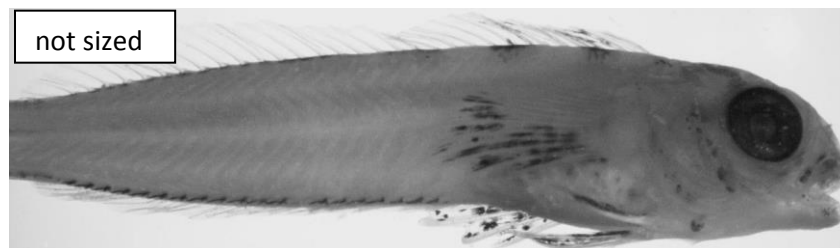
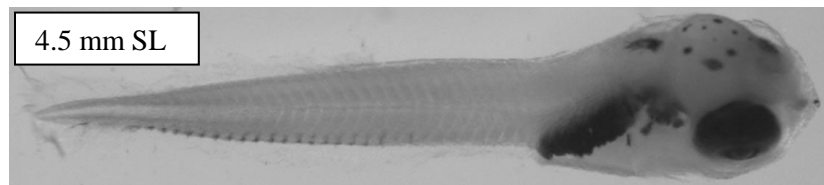
**Spawning:** -No data

**Eggs:** -Demersal, hemispherical  
-Diameter: 1.6 mm  
-No oil globule  
-Yolk: unsegmented



**Yolk sac larvae:** -Hatch size: 4.9 mm  
-Pigmentation: peritoneal pigment on dorsal side on the intestine from behind the eye to the anus; few melanophores on the snout and top of the head; apparently, no postanal ventral row of melanophores; pectoral fin unpigmented

**Larva:** -Body elongated; pectoral fin fairly large; shows preopercular spines from 4 mm SL  
-Preanus length: c.a. one third of SL  
-Pigmentation: black peritoneal pigment covering the dorsal side of the gut to almost the anus; postanal row of 19-21 melanophores regularly spaced that starts some distance behind the anus; melanophores on the head and snout; some caudal melanophores; at >18 mm the dorsal paired bands across the dorsal fin are apparent  
-Length at flexion: unknown



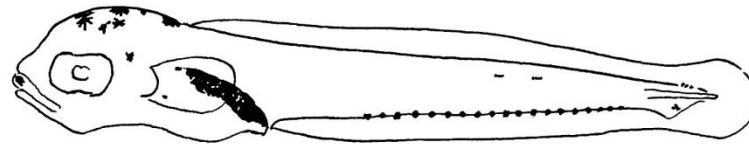
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

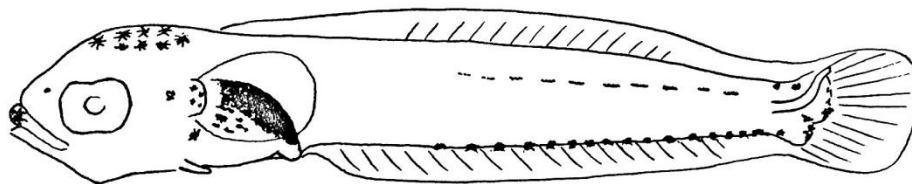
**Literature:** Russell (1976), Whitehead et al. (1984-1986)



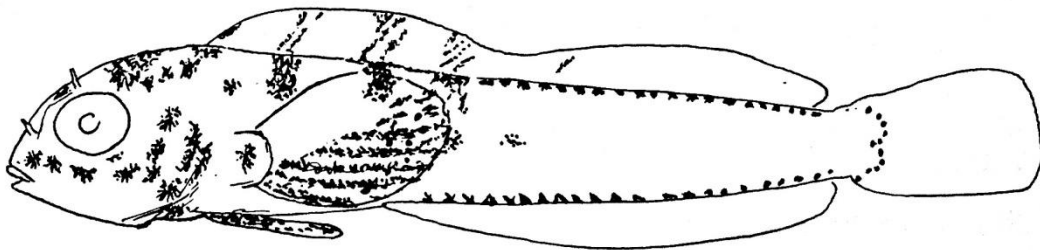
*Parablennius gattorugine*



A. 5.6 mm SL



B. 9.3 mm SL

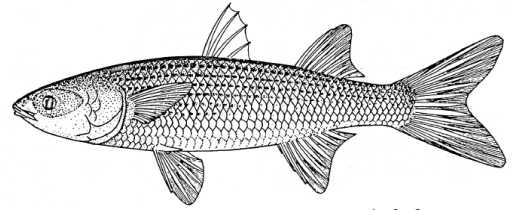


C. 20.0 mm SL

**Habitat:** -Pelagic, inshore, entering lagoons and estuaries

**Spawning:** -August-November

**Eggs:** -Pelagic, spherical  
-Diameter: 0.72 mm  
-Chorion: smooth, fine raised striations  
-Oil globule single, 0.28 mm in diameter  
-Yolk: unsegmented



Adult

**Yolk sac larvae:** -Hatch size: c.a. 2.5 mm  
-Pigmentation: heavily pigmented except the caudal region where there are a dorsal and a ventral rows of around 4 dotted melanophores each; oil globule strongly pigmented

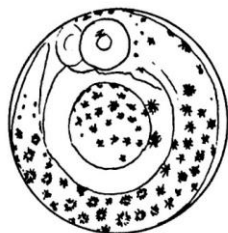
**Larva:** -Body relatively stubby with large, bulky gut, moderate head and small mouth  
-Preanus length: up to 70% SL  
-Pigmentation: strongly pigmented except the lateral region of the head and the caudal region where dotted melanophores persist; pigment is heaviest on dorsum, dorsal surface of the gut and on the postanal ventral region; there is a lateral row of melanophores  
-Length at flexion: 4.0-5.0 mm SL

**Adult:**

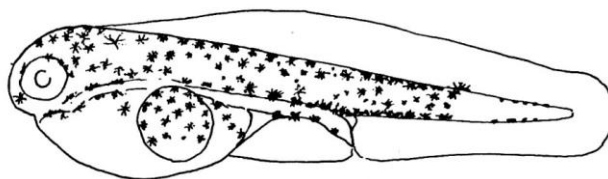
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997): Fahav81983). Froese and Paulv (2015). Whitehead et al. (1984-1986)

*Mugil cephalus*



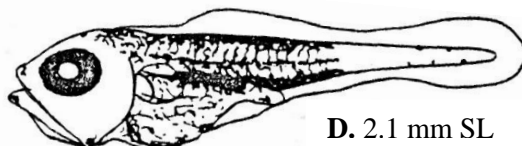
A.



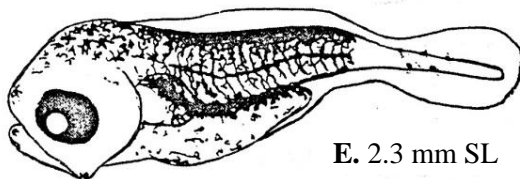
B. 2.5 mm SL



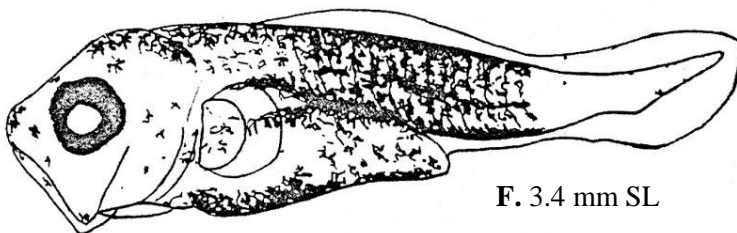
C. 1.5 mm SL



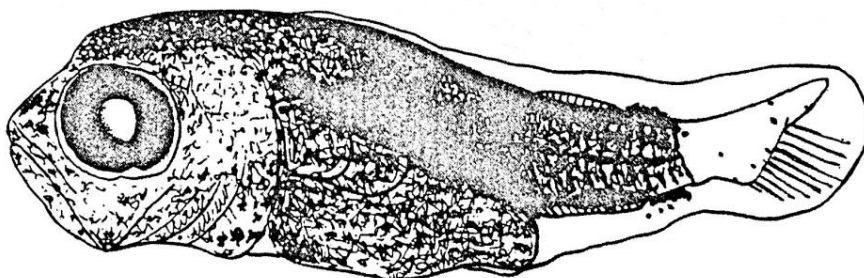
D. 2.1 mm SL



E. 2.3 mm SL



F. 3.4 mm SL



G. 3.8 mm SL

A-B: Rusell (1976);-G: Alemany (unpublished)

## SCORPAENIDAE

*Scorpaena porcus* Linnaeus, 1758

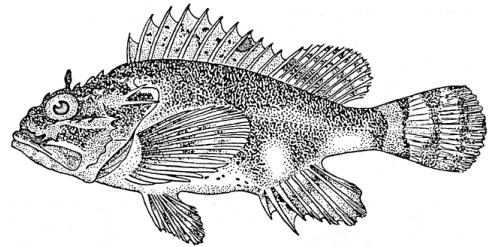
**Habitat:** -Benthic, littoral, common among rocks and algae

**Spawning:** -May-August

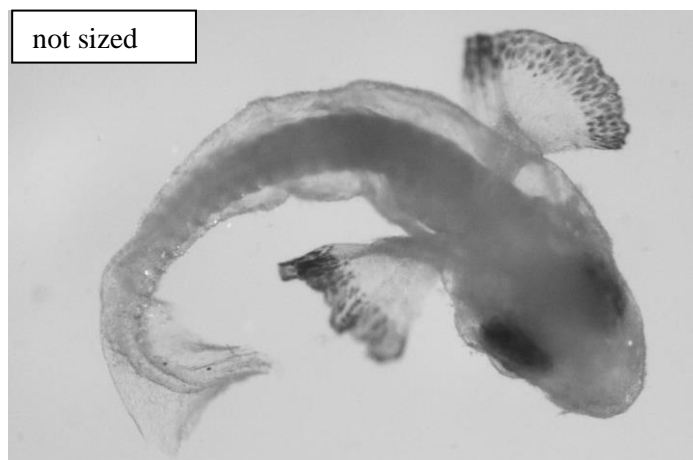
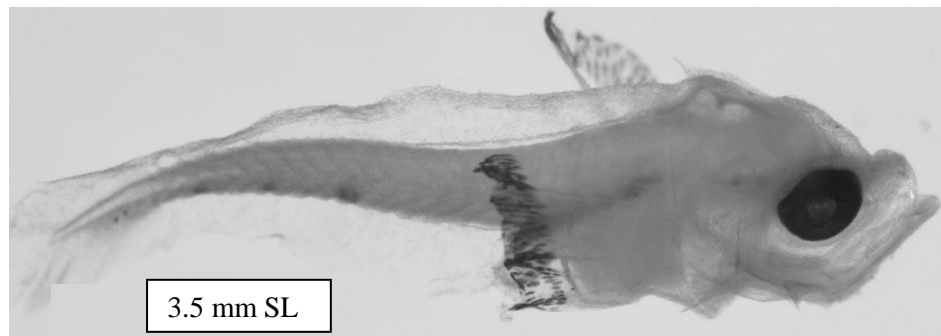
**Eggs:** -Pelagic, elliptic  
-Size: 0.92 mm by 0.84 mm  
-Chorion: smooth  
-No oil globule single  
-Yolk: unsegmented

**Yolk sac larvae:** -Hatch size: c.a. 1.7 mm  
-Pigmentation: unpigmented

**Larva:** -Body short increases in height with development; head relatively large and armed with spines and crests; pectoral fins strongly developed  
-Preanus length: c.a. 50% SL  
-Pigmentation: peritoneum strongly pigmented; young larvae show a row of postanal melanophores that reduces in number, to 2-4, with development; pectoral fin edges pigmented  
-Flexion: completed at 3.4 mm SL



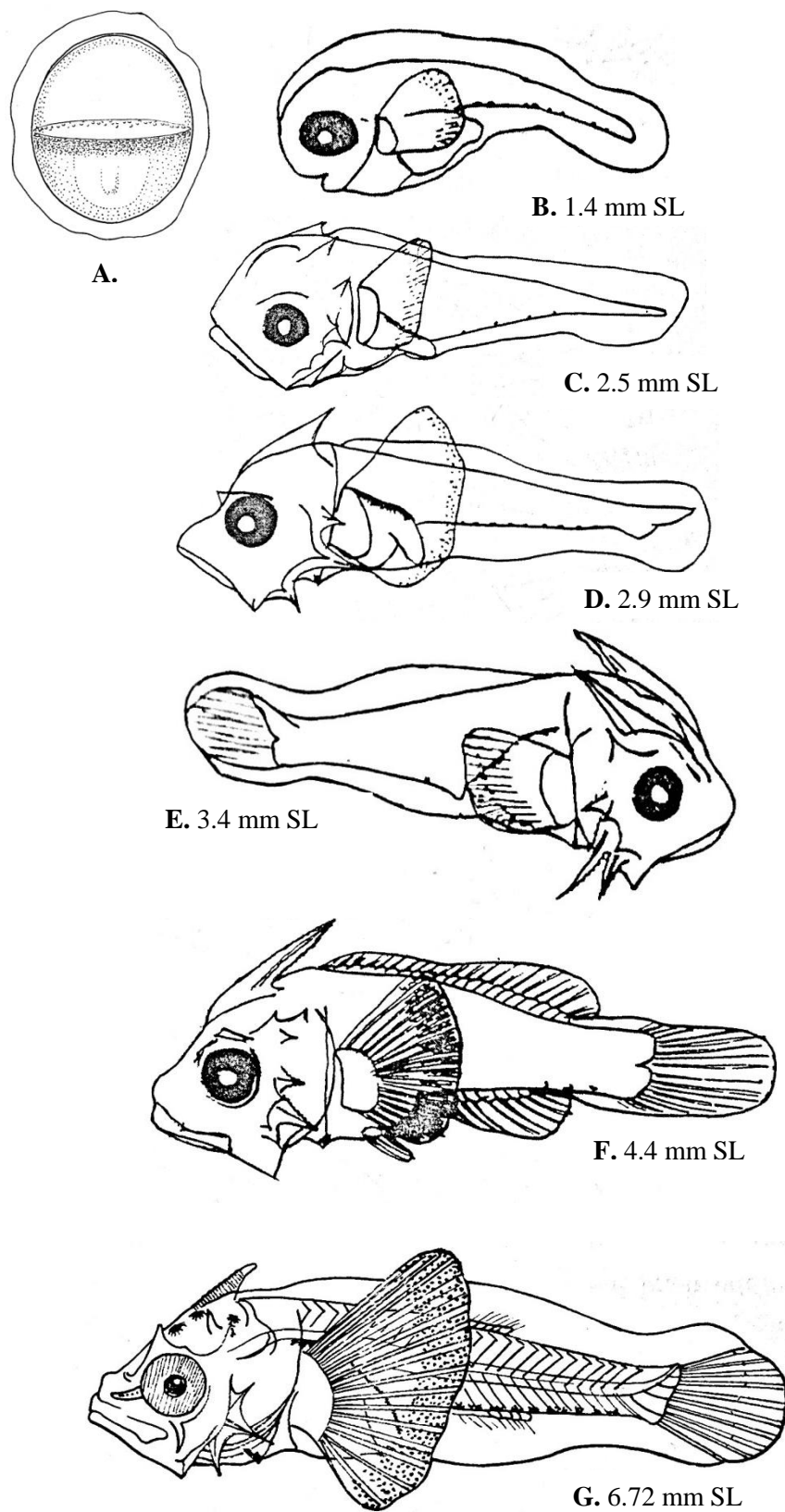
Adult



**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), D'Ancona et al. (1931-1956), Froese and Pauly (2015), Whitehead et al. (1984-1986)

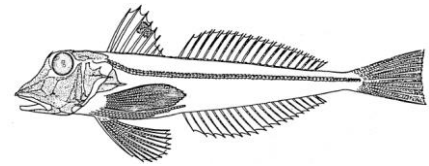


**A, G:** D'Ancona (1931-1956); **B-E:** Alemany (unpublished)

## TRIGLIDAE

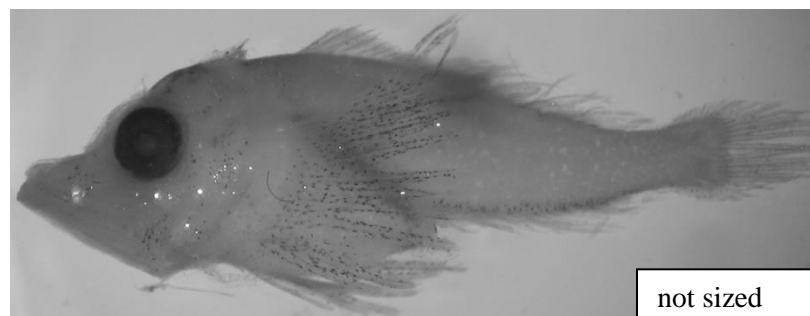
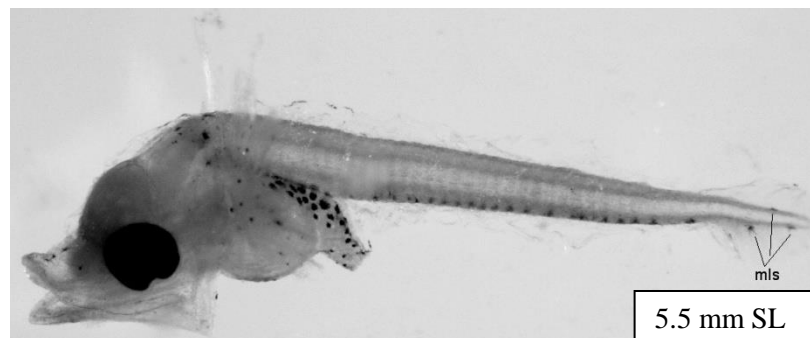
*Eutrigla gurnardus* Linnaeus, 1758

- Habitat:** -Benthic, littoral, over muddy, sandy and rocky bottoms
- Spawning:** -January-June
- Eggs:** -Pelagic, spherical  
-Size: 1.27-1.55 mm in diameter  
-Chorion: smooth  
-Oil globule: single, 0.25-0.33 mm in diameter  
-Yolk: unsegmented



Adult

- Yolk sac larvae:** -Hatch size: 3.0-4.0 mm  
-Pigmentation: the body, yolk and oil globule is covered with chromatophores; during development the pigmentation decreases and the black predominates; there is a postanal ventral row of melanophores
- Larva:** -Body relatively large in relationship with other Triglidae species; head depressed and armed with a supraorbital and a double occipital crests and three opercular spines; pectoral fins relatively large  
-Preanus length: increases from c.a. 38% to c.a. 50% with development  
-Pigmentation: peritoneum strongly pigmented; a row of postanal melanophores, several melanophores over the head, upper jaw and ventral abdominal region; border of the rays of the pectoral fin pigmented  
-Flexion size: unknown

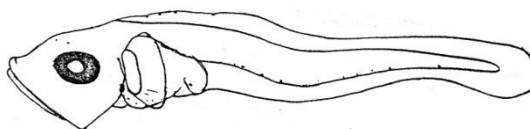


**Adult:** Whitehead et al. (1984-1986)

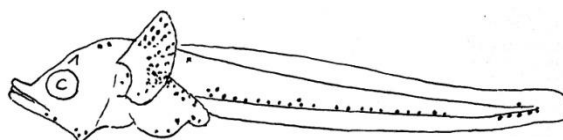
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976), Sabatés (1988), Whitehead et al. (1984-1986)

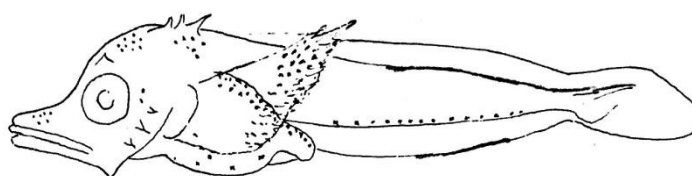
*Eutrigla gurnardus*



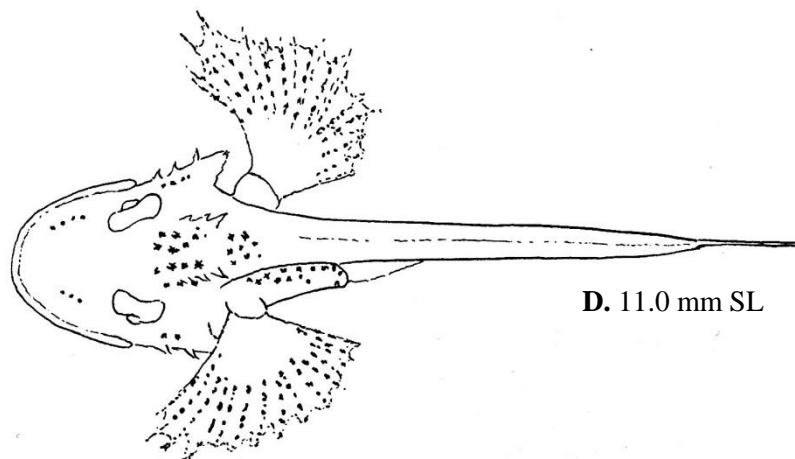
A. 3.3 mm SL



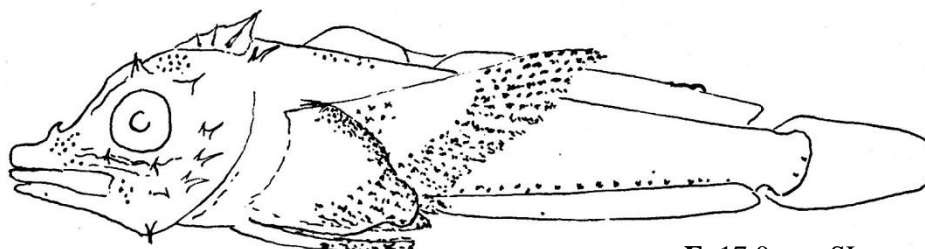
B. 5.5 mm SL



C. 10.0 mm SL



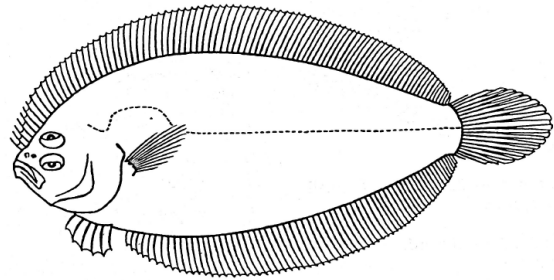
D. 11.0 mm SL



E. 17.0 mm SL

A: Alemany (unpublished); -B-D: Russell (1976); E: D'Ancona (1931-1956)

In the Mediterranean Sea inhabit 5 species of the genus *Arnoglossus*. The identification of larvae of different species is difficult because their morphology and pigmentation pattern is similar in all of them. Here we show the early development of *A. laterna*, the only species of this genus where all the early life stages are described



Adult

**Habitat:** -Benthic, over muddy and sandy bottoms to 200 m depth, occasionally to 400 m

**Spawning:** -April-August

**Eggs:** -Pelagic, spherical  
 -Size: 0.60-0.76 mm in diameter  
 -Chorion: smooth  
 -Oil globule: single, 0.11-0.15 mm in diameter  
 -Yolk: unsegmented

**Yolk sac larvae:** -Hatch size: c.a. 2.5 mm  
 -Pigmentation: only show brown-red chromatophores, this pigmentation disappears with development

**Larva:** -Body: relatively elongated, increases in height and becomes laterally depressed with development; the gut also becomes curved; shows an elongated tentacle over the head and a prominent gas bladder;  
 -Preanus length: c.a. 40% SL  
 -Pigmentation: two rows of evenly spaced ventral melanophores extending from the anus; a dorsal bar of melanophores close to the caudal region; melanophores along the abdominal ventral contour, lower jaw and over the hindgut; gas bladder pigmented  
 -Flexion size: unknown



6.2 mm SL

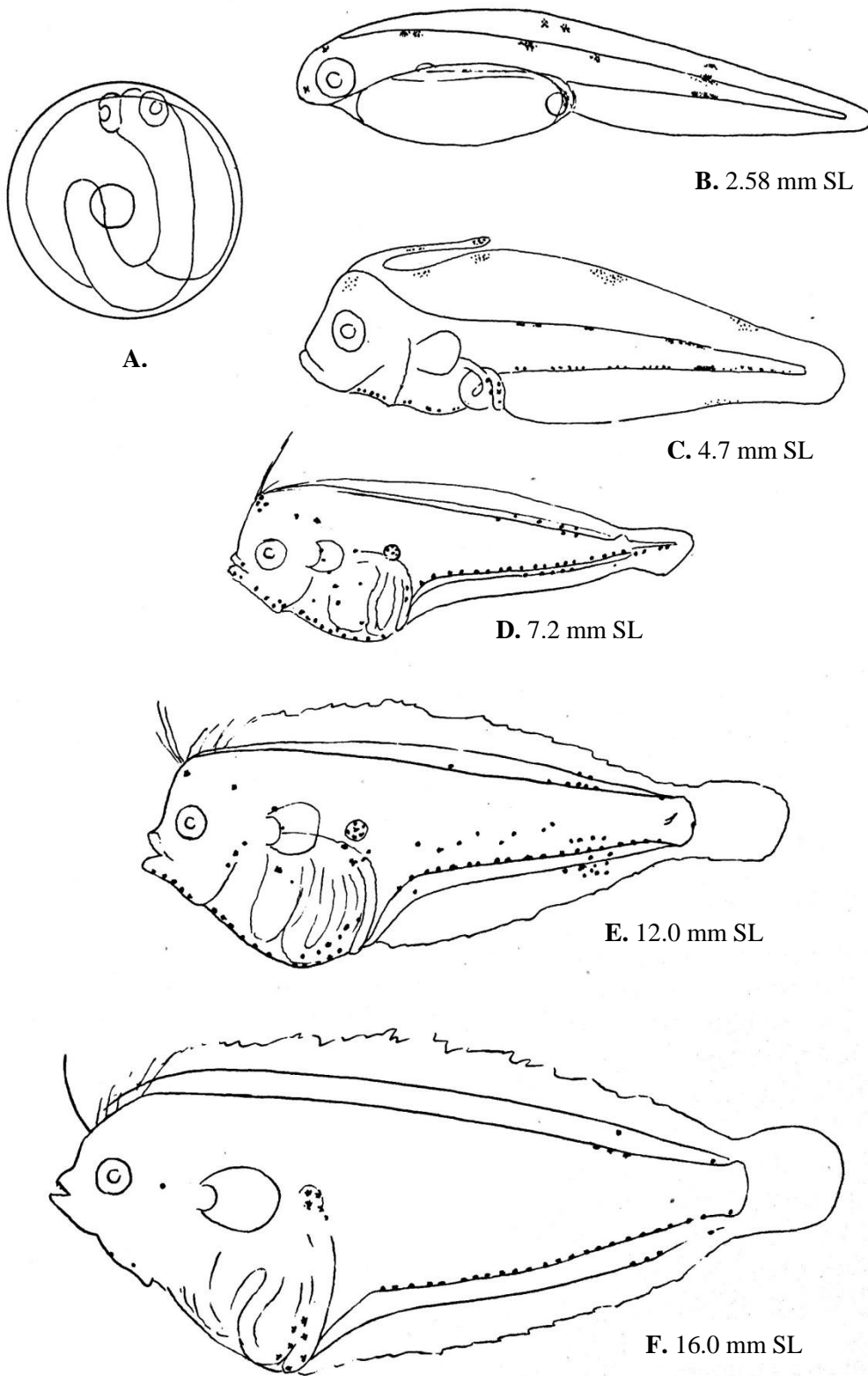
**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Russell (1976), Sabatés (1988), Whitehead et al. (1984-1986)



*Arnoglossus laterna*

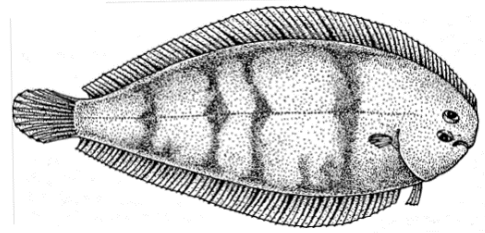


A-F: Russell (1976)

**Habitat:** -Benthic, over sandy bottoms between 5 and 450 m depth

**Spawning:** -Spring-winter

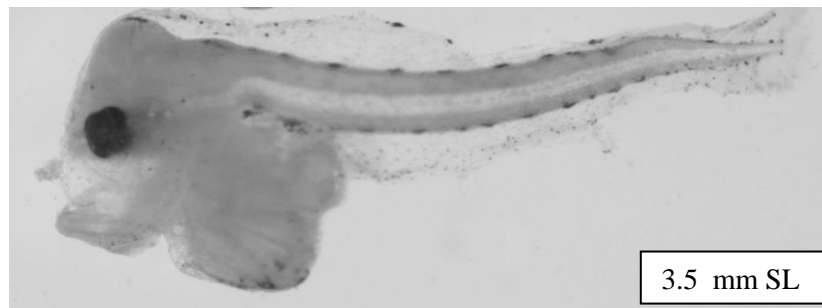
**Eggs:** -Pelagic, spherical  
-Size: 0.64-0.94 mm in diameter  
-Chorion: smooth  
-12-15 small oil globules  
-Yolk: segmented



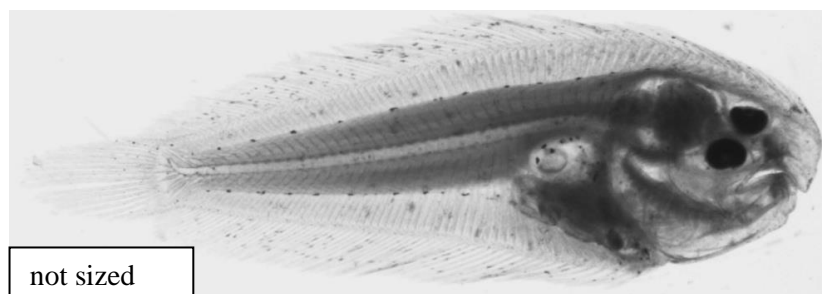
Adult

**Yolk sac larvae:** -Hatch size: c.a. 2.0 mm  
-Pigmentation: melanophores on the head, four stellate melanophores on the dorsal and two on the ventral primordial fins; some melanophores on the body margins

**Larva:** -Body: short with a prominent head and deep abdominal region; the body becomes laterally compressed with development; prominent gas bladder; asymmetry begins at around 6.0 mm SL and it is almost completed at 8 mm SL  
-Preanus length: < 50% SL  
-Pigmentation: evenly spaced melanophores along the dorsal (9-13) and ventral (8-11) body contours; gas bladder and pectoral fin pigmented  
-Flexion size: unknown



3.5 mm SL



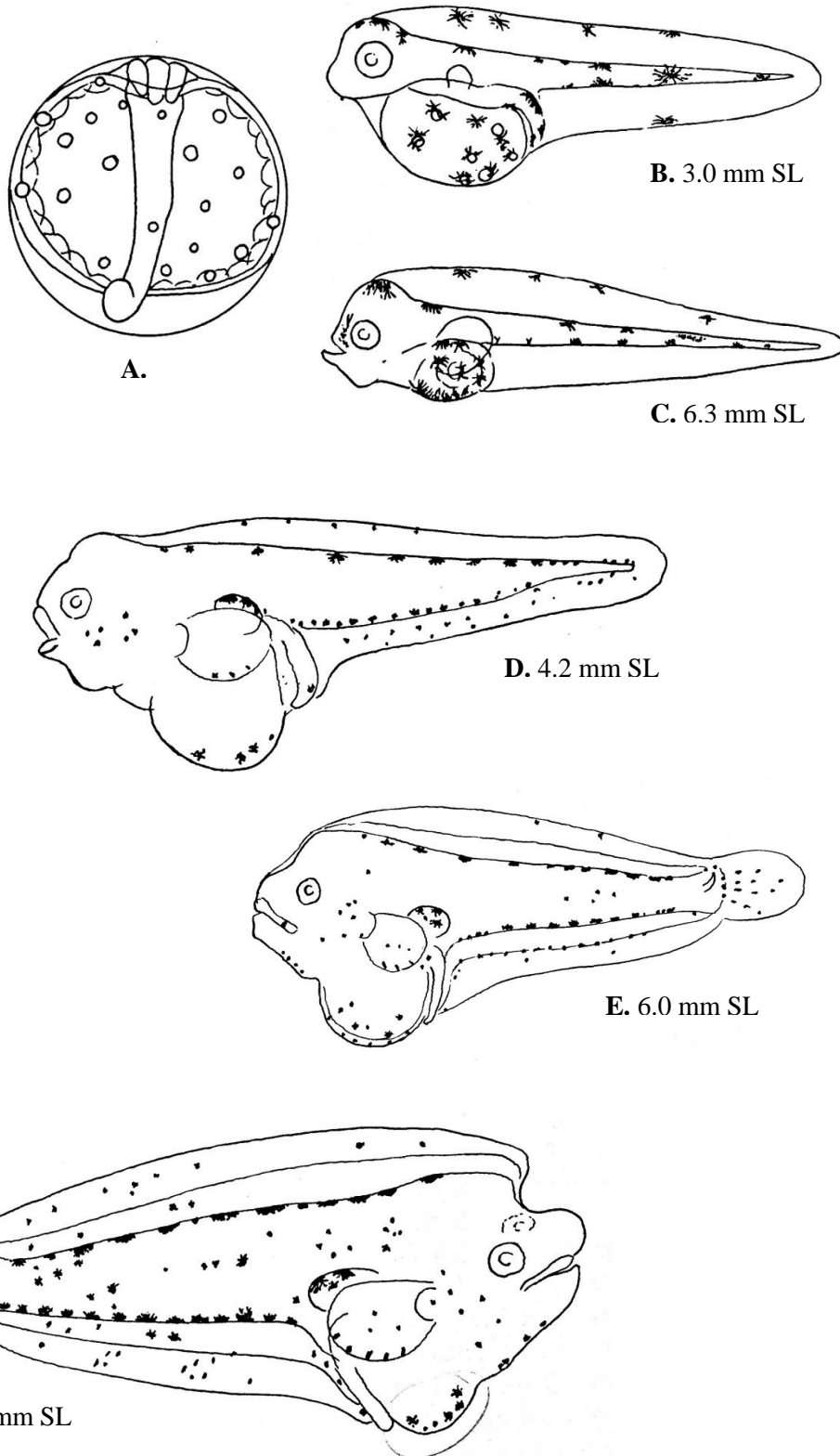
not sized

**Adult:** Whitehead et al. (1984-1986)

**Photos:** J.M. Rodriguez

**Literature:** (1997), Munk and Nielsen (2005), Russell (1976), Whitehead et al. (1984-1986)

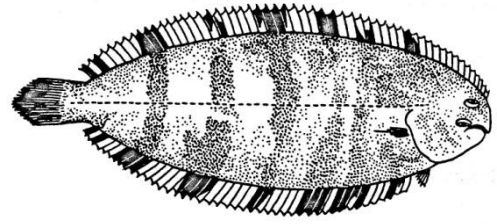
*Buglossidium luteum*



**Habitat:** -Benthic, over sand and mud of continental shelf and slope, at depths of 80-400 m

**Spawning:** -Spring

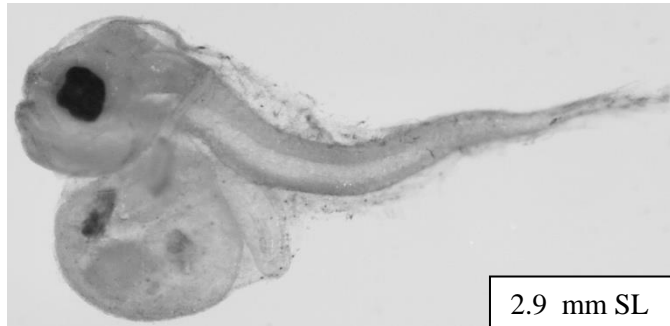
**Eggs:** -Pelagic, spherical  
-Size: 1.28-1.42 mm in diameter  
-Chorion: smooth  
-50 or more scattered oil globules  
-Yolk: segmented



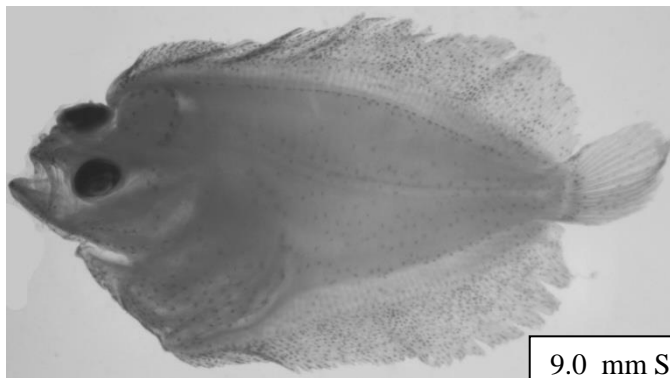
Adult

**Yolk sac larvae:** -Hatch size: c.a. 2.5 mm  
-Pigmentation: the body and primordial fins covered with small stellate melanophores; rows of stellate melanophores are apparent along the body contours

**Larva:** -Body: short with a prominent head and deep abdominal region; no gas bladder; asymmetry completed at 12 mm SL  
-Preanus length: c.a. 50% SL  
-Pigmentation: similar to that of the yolk sac larvae: body and fins covered with small or single melanophores; the melanophores of the dorsal and ventral rows are slither larger than the others and tend to merge together to form continuous rows, of 70 on the dorsal and 50 in the ventral row  
-Flexion size: unknown



2.9 mm SL



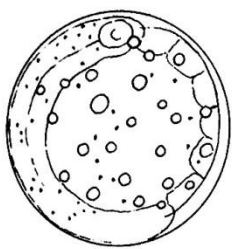
9.0 mm SL

**Adult:** Whitehead et al. (1984-1986)

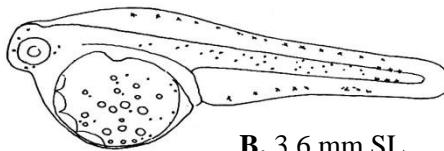
**Photos:** J.M. Rodriguez

**Literature:** Alemany (1997), Munk (2005), Russell (1976), Whitehead et al. (1984-1986)

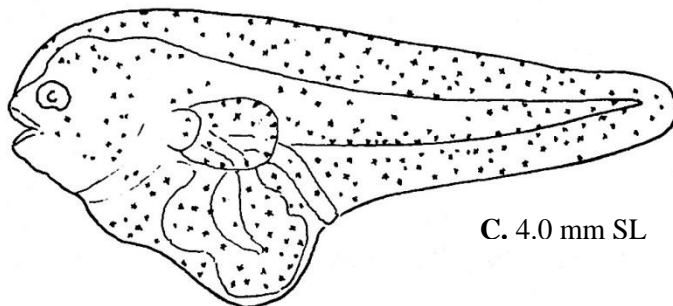
*Microchirus variegatus*



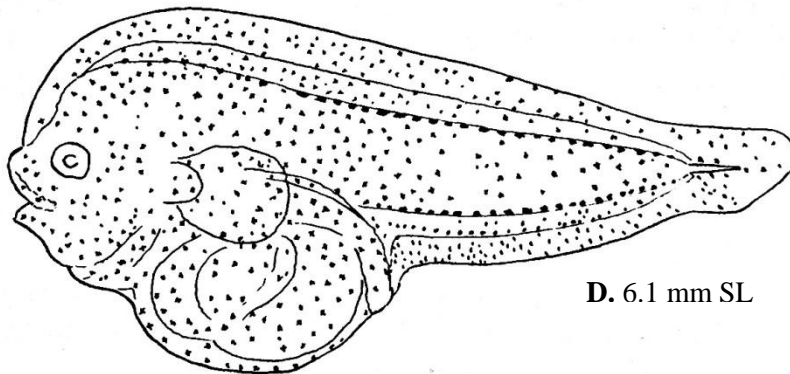
A.



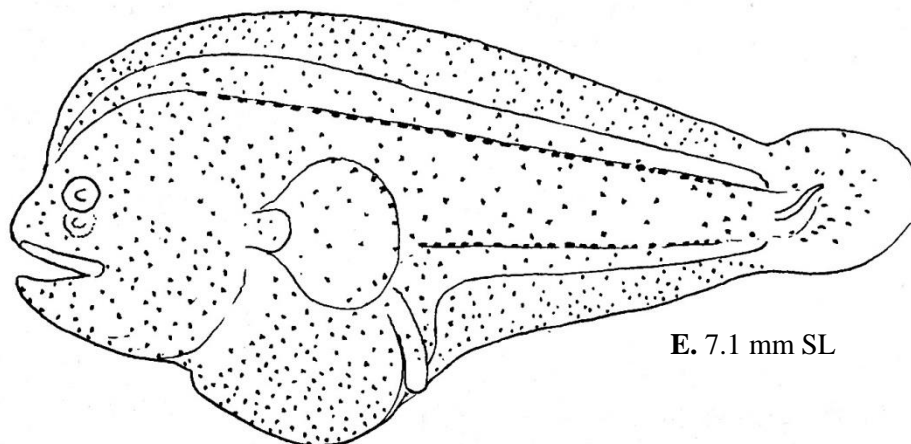
B. 3.6 mm SL



C. 4.0 mm SL



D. 6.1 mm SL



E. 7.1 mm SL

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