

FICHES D'IDENTIFICATION DU PLANCTON

Edited by
G.A. ROBINSON

Institute for Marine Environmental Research
Prospect Place, The Hoe, Plymouth PL1 3DH, England

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GADIDAE

Ciliata Couch, 1832

by
NECLA DEMIR
Department of Biology
University of Istanbul
Turkey

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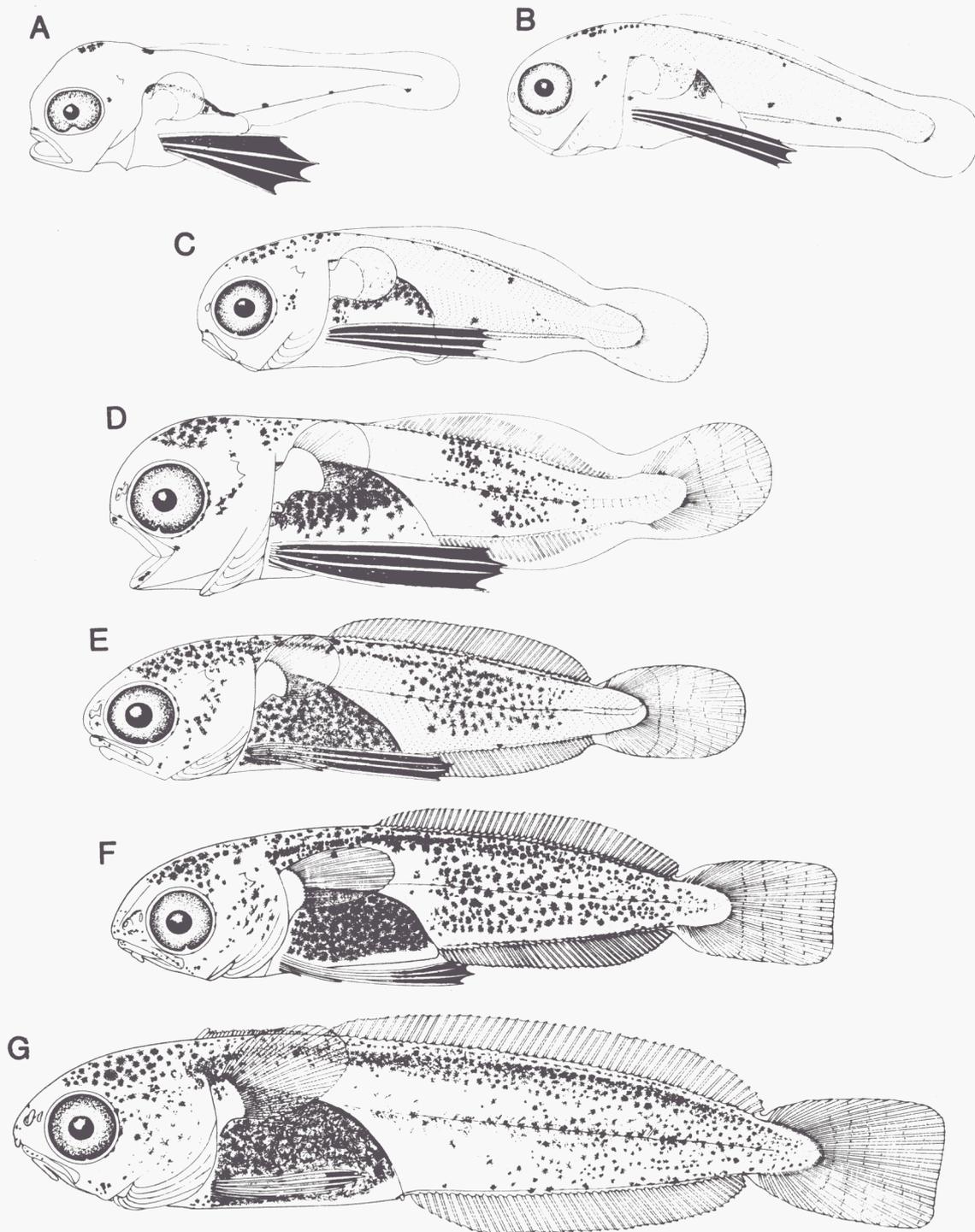


Figure 1. Post-larvae of *Ciliata mustela*. (A) 3.6 mm; (B) 5.0 mm; (C) 6.0 mm; (D) 6.9 mm; (E) 8.3 mm; (F) 11.6 mm; (G) 16.6 mm (transforming specimen).

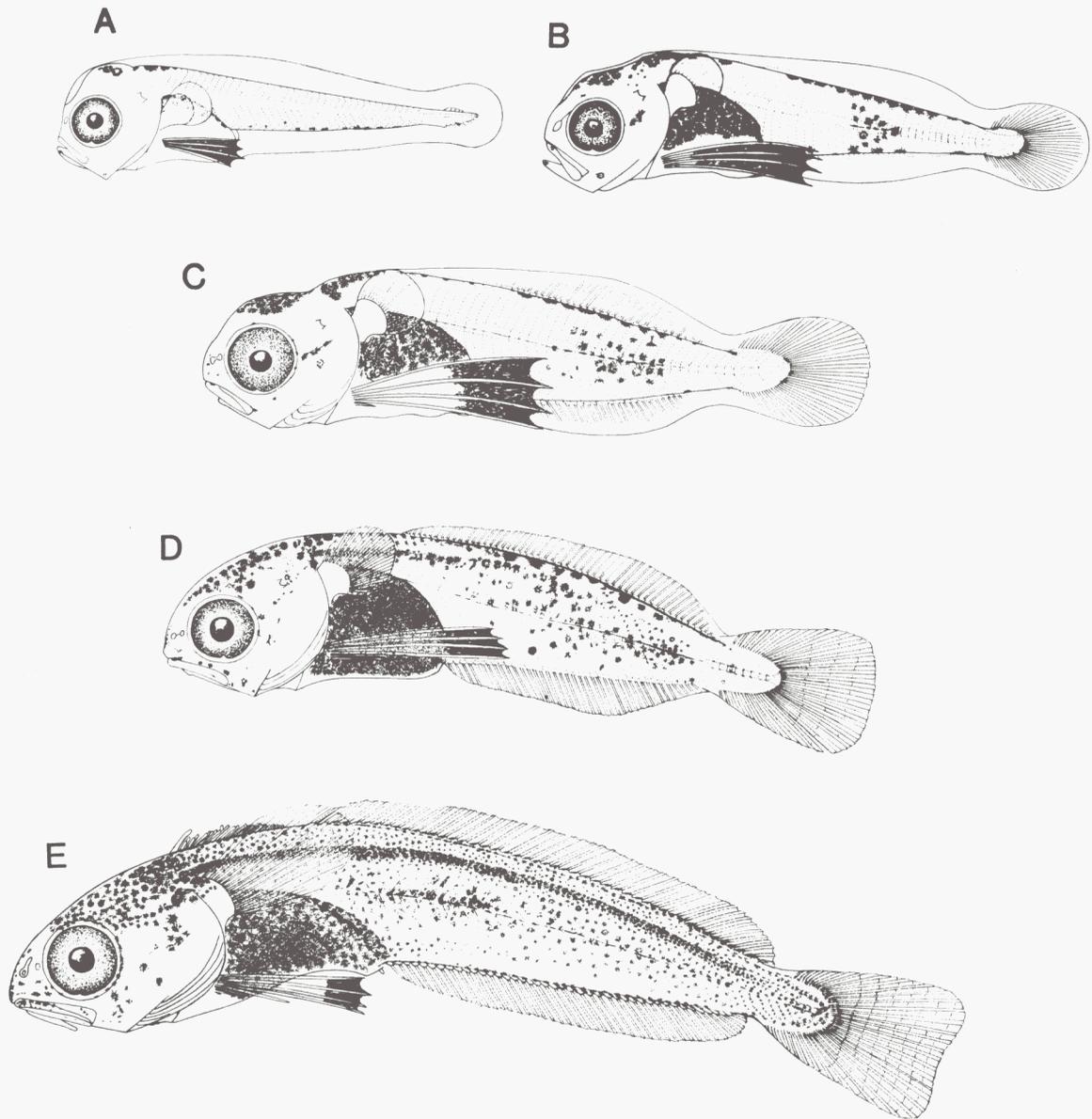


Figure 2. Post-larvae of *C. septentrionalis*. (A) 4.2 mm; (B) 5.9 mm; (C) 7.2 mm; (D) 10.2 mm; (E) 22 mm (transforming specimen).

Note: To avoid confusion with characteristic body pigmentation, Figures 1 and 2 do not show the embedded melanophores (melanophores arranged in a row on the neural tube, in a row ventral to the vertebral column, and in a row dorsal to the vertebral column, which start to develop after a length of 4–5 mm is reached) with the exception of some melanophores around the posterior 8–9 caudal vertebrae.

Gadidae

Ciliata Couch, 1832

Main distinguishing features of *Ciliata* post-larvae and pelagic juveniles compared with other rocklings

1. Presence of a pair of small temporal spines (pteroic spines) until a length¹ of 16–18 mm is reached. The maximum relative length of these spines is about 4.5–5 % HL (head length) at 3.5–4 mm, decreasing progressively to about 1.5–2 % HL at 16–18 mm. (The temporal spines in some *Gaidropsarus* and *Phycis* species are considerably larger.)
2. Presence of a pair of upper lip barbels after a length of 12–13 mm is reached in *Ciliata mustela* and 20–21 mm in *C. septentrionalis*.

Criteria used in identifying *Ciliata* post-larvae and pelagic juveniles

The following characteristics are the principal ones used in identification:

1. The pigment pattern on the body surface (useful until a length of about 9–10 mm).
2. The length of the pelvic fins as a percentage of body length and of their pigmented part as a percentage of pelvic length (useful between 3.5 and 10 mm).
3. The length of the upper lip barbels as a proportion of head length (useful above 12–13 mm).
4. The number of precaudal vertebrae (useful above 5 mm).
5. The number of pyloric caeca (useful above 9–10 mm).
6. The length at which the post-larval stage ends or the juvenile stage begins – that is, when the formation of the rays of the first dorsal fin is completed (useful above 19 mm).

¹ Body lengths given are standard length (SL).

Diagnoses of species

Ciliata mustela (Linnaeus, 1758)

- 1a. Three postanal ventral pigment spots are characteristics for *C. mustela* post-larvae until a length of about 5 mm. The anterior spot is just behind the anus (on the 3rd–5th postanal myomeres), the posterior one is below the tip of the notochord on the finfold (in some specimens two spots may be found instead of one), and the middle one is located about midway between them. After 5 mm, two anterior ventral spots begin to migrate upwards on the lateral surfaces of the tail and, by 6 mm, 4–5 small melanophores replace the second of these spots (Fig. 1A–C).
- 1b. The double rows of melanophores (viewed dorsally) on both sides of the body along the dorsal midline start to develop from the nape at about 3.5 mm, proceeding progressively towards the posterior and reaching the base of the caudal fin by 9–10 mm (Fig. 1A–E).
- 1c. The row of melanophores along the lateral line which starts to develop from above the anus at about 6.5–7 mm proceeds progressively to the base of the caudal fin, reaching it at about 10 mm (Fig. 1D–F).
- 1d. The scattered melanophores on the lateral surfaces of the body first appear on the antero-dorsal and postero-ventral surfaces of the tail (that is, above the anterior ventral spot and around the middle ventral spot) at about 5–6 mm and increasing in number proportionally with the size of post-larvae to spread over the entire lateral surfaces of the body (Fig. 1B–G).
2. In the early post-larvae between 3.5 mm and 10 mm in length the pelvic fins and their pigmented parts are considerably longer in *C. mustela* than in *C. septentrionalis* at comparable sizes (see Table 1).
3. The upper lip barbels appear at a length of about 12–13 mm. Their mean length as a proportion of head length ranges from 3 % HL at 12–13 mm to 10 % HL at 25–26 mm.
4. When fully developed (above 5 mm) there are usually 14 (rarely 13 or 15) precaudal vertebrae.
5. Usually 10 (rarely 9 or 11) pyloric caeca are present above 9–10 mm.
6. The juvenile stage starts at about 19 mm.

Ciliata septentrionalis (Collett, 1875)

- 1a. At a length of about 3.5–4 mm, melanophores arranged more or less in a single row along the ventral body midline extending from behind the anus (from the second or third postanal myomere) to about 80 % SL (25th or 27th postanal myomere) and a spot on the ventral side of the tip of the notochord on a future hypural plate are characteristics for this species. After 4–4.5 mm, the anteriormost 3 or 4 melanophores of this ventral series become embedded and migrate progressively to the ventral side of the vertebral column, while the rest form double rows of melanophores (viewed ventrally) on both sides of the tail along the ventral midline. With further development, some of the melanophores begin to migrate upwards on the lateral surfaces of the tail, while some others become embedded (Fig. 2A–D).
- 1b. The double rows of melanophores along the dorsal midline of the body start to develop on the nape and the midtail at about 4–4.5 mm and proceed progressively towards each other, becoming continuous, reaching the base of the caudal fin by 6–7 mm (Fig. 2A–C).
- 1c. The row of melanophores along the lateral line of the body starts to develop at about the midtail by 5 mm, extending progressively both anteriorly and posteriorly, stretching from the peritoneal pigment to the base of the caudal fin by 10–11 mm (Fig. 2B–D).
- 1d. The scattered melanophores on the lateral surfaces of the body start to develop at about the midtail around the melanophores on the lateral line by 5 mm, increasing gradually in number during later stages of development to cover the entire lateral surfaces of the body (Fig. 2B–E).
2. In the early post-larval stage between 3.5 and 10 mm, pelvic fins of *C. septentrionalis* are shorter and have shorter pigmented parts than *C. mustela* at comparable sizes (see Table 1).
3. The upper lip barbels appear at about 20–21 mm. Their mean length as a proportion of head length ranges from about 1 % HL at 21–22 mm to 4 % HL at 32–35 mm.
4. When fully developed (above 5 mm) there are generally 12–13 precaudal vertebrae (see Table 2 for other meristic characters).
5. Generally 7–8 (rarely 6 or 9) pyloric caeca are found above 9–10 mm.
6. The juvenile stage starts at about 24–25 mm.

SPAWNING PERIOD

C. mustela:

In the North Sea, from January to June with the maximum in spring months (Ehrenbaum, 1905–1909); off Plymouth, from March to September with the maximum from April to June (Demir *et al.*, 1985).

C. septentrionalis:

Off Plymouth, from March to September with the maximum from April to June (Demir *et al.*, 1985).

DISTRIBUTION

C. mustela:

Northeastern Atlantic from Portugal (Lisbon) to Finnmarken (Øxfjord) and Iceland; uncertain off Greenland; Skagerrak, Kattegat to Øresund (Svetovidov, 1973).

C. septentrionalis:

Northeastern Atlantic from the southern coast of British Isles to Øxfjord and Iceland; uncertain off Greenland (Svetovidov, 1973).

SOURCE OF MATERIAL

Both species (post-larva, pelagic juvenile):

British waters (off Plymouth, Bloody Bay, Ardalanish Bay, Tiree Passage). Adult specimens from near Plymouth.

Table 1

Comparison of the pelvic length and the length of pigmented part of pelvic fins of *Ciliata* spp. as a percentage of standard length and pelvic length respectively.

Size group (mm)	<i>C. mustela</i>				<i>C. septentrionalis</i>			
	Pelvic length		Length of pigmented part of pelvic fins		Pelvic length		Length of pigmented part of pelvic fins	
	Standard length		Pelvic length		Standard length		Pelvic length	
	$\bar{X} \pm s.d.$	(Range)	$\bar{X} \pm s.d.$	(Range)	$\bar{X} \pm s.d.$	(Range)	$\bar{X} \pm s.d.$	(Range)
3.5- 3.9	41.2±1.5	(40.0-43.2)	100		24.6±4.0	(19.4-28.2)	100	
4.0- 4.9	39.6±1.7	(37.5-42.6)	100		26.2±2.8	(21.4-31.9)	100	
5.0- 5.9	39.3±2.4	(35.1-42.1)	100		30.4±2.2	(27.5-35.7)	83.9±17.5	(55.6-100)
6.0- 6.9	39.1±1.4	(37.5-40.6)	100		31.0±2.6	(25.4-35.8)	59.7±11.8	(37.5-83.3)
7.0- 7.9	38.5±1.7	(37.3-40.3)	94.4± 9.6	(83.3-100)	31.3±2.0	(28.4-35.7)	50.0± 5.9	(33.3-63.6)
8.0- 8.9	35.7±0.6	(35.2-36.1)	60.6± 5.5	(56.7- 64.5)	31.6±1.6	(29.6-33.8)	45.4± 5.9	(35.7-52.0)
9.0- 9.9	35.6				29.4±2.1	(24.4-33.0)	39.3± 5.2	(32.1-48.1)
10.0-10.9					27.5±1.7	(24.3-31.0)	38.7± 4.9	(32.1-50.0)
11.0-11.9	29.4±2.4	(27.6-32.1)	50.9±13.9	(40.6-66.7)	26.8±1.4	(24.5-28.8)	37.0± 6.1	(28.1-46.7)
12.0-12.9	25.8				26.1±1.2	(24.2-27.5)	33.2± 3.0	(29.4-36.4)

Table 2

Meristic features of *Ciliata* spp.

Species	Vertebrae (including two ural centra)			Fin rays							
	Precaudal	Caudal	Total	First dorsal	Second dorsal	Anal	Caudal			Pectoral	Pelvic
							Primary	Procurrent			
							Superior	Inferior			
<i>C. mustela</i>	(13)14(15)	32-34	46-48	50-60	45-52	39-44	5	14-15	15-16	15-17	7-8
<i>C. septentrionalis</i>	12-13	31-34	44-47	45-59	44-50	38-45	4-5	14-15	15-16	15-19	7-8

Note: Data based on specimens both in adult and in late post-larval and pelagic juvenile stages.

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