LARVAL STAGES OF CERTAIN ANTARCTIC FISHES

By INIGO EVERSON

THE literature on Antarctic fish larvae is limited to two papers (Regan, 1916; Nybelin, 1951). The present paper is concerned with a small collection of eggs and larvae made by the late J. W. S. Marr at Port Lockroy (lat. 64°50′S., long. 63°31′W.) in 1944, and another larger collection made by D. G. Bone, M. G. White and the author at Signy Island (lat. 60°43′S., long. 45°38′W.) during the southern summer of 1966–67.

The order of presentation of the fish families in this paper follows that of Norman (1938) in his standard work on that region.

Counts of vertebrae have been important in the identification and, as a check, they have been made on identified adult fish by means of dissections and X-radiographs to complement the work of Andriashev (1959). These results are given in the Appendix.

Notothenia rossii

Fig. 1

Material. Two specimens, 16·4 and 18·2 mm. in length, caught in a coarse-mesh plankton net at 2 m. from the surface in Borge Bay, Signy Island, on 18 January 1967. One specimen, 19·6 mm., caught as above on 30 January 1967.

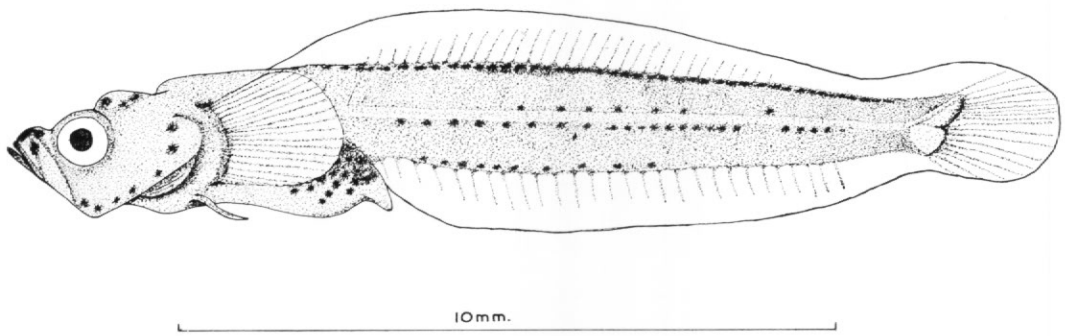

Fig. 1. A 16·2 mm. *Notothenia rossii* post-larva from Borge Bay, Signy Island; 18 January 1967.

Description. Fin-ray counts are possible on all specimens and the results are given in Table I. The low counts for the dorsal fin rays are due to the fact that the fin was still undergoing development and had not started to differentiate into the two parts seen in the adult fish.

In all specimens the vertebrae are too indistinct to allow an accurate count to be made.

TABLE I. FIN-RAY COUNTS FOR *Notothenia rossii* POST-LARVAE

Fin	*Date*		
	18 January 1967		*30 January 1967*
Dorsal	31	29	32
Anal	28	29	30
Pectoral	21	22	22

Pigmentation. In the head region, there are small patches of chromatophores on the snout and the occipital regions. There is also a line of six or seven chromatophores starting below the angle of the mouth and extending marginally to the dorsal edge of the operculum. On either side of the dorsal fin is a row of chromatophores extending for the length of the fin in which the rays are developed; there are a few chromatophores on either side of the anterior two-thirds of the anal fin. The skin overlying the gut has many chromatophores and there is a row on either side of the body over the vertebral column.

Trematomus newnesi

Fig. 2

Material. 34 specimens, 13·7–16·2 mm. in length, caught in a coarse plankton net in Borge Bay, Signy Island, at a depth of 2 m. on 1 January 1967. 15 specimens, 14·6–19·0 mm., caught as above on 10 January 1967. One specimen, 27·6 mm., caught as above on 30 January 1967.

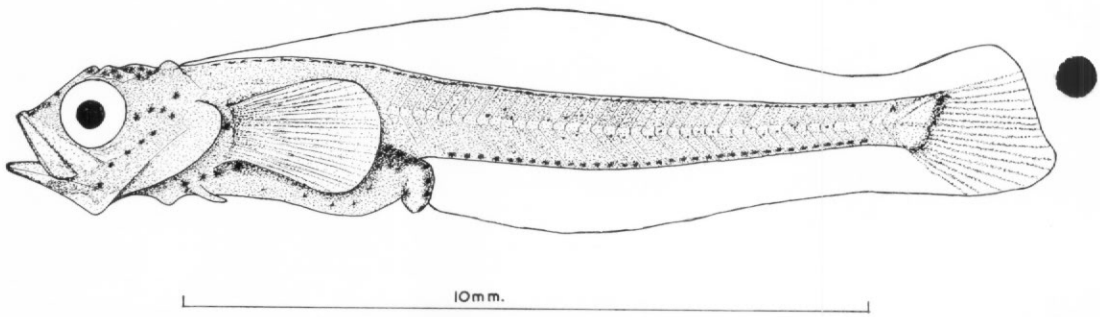

Fig. 2. A 15·3 mm. *Trematomus newnesi* post-larva from Borge Bay, Signy Island; 1 January 1967.

Description. There are 52–54 vertebrae in the 15 specimens on which a count is possible. There are 25 pectoral fin rays in each of the seven individuals on which a count is possible and 32–34 anal rays in four individuals. The pattern of development of the fin rays is shown in Table II.

On ten larvae measured the interorbital width is 29–34 per cent of the head length.

TABLE II. THE PATTERN OF DEVELOPMENT OF THE FIN RAYS IN *Trematomus newnesi*

Date 1967	*Dorsal fin*	*Anal fin*	*Pectoral fin*	*Caudal fin*
1 January	20 : 0 : 0	20 : 0 : 0	2 : 6 : 12	0 : 0 : 20
10 January	9 : 6 : 0	3 : 12 : 0	0 : 1 : 14	0 : 0 : 15
30 January	0 : 1 : 0	0 : 0 : 1	0 : 0 : 1	0 : 0 : 1

In each column the first figure refers to the number of fish in which no rays were developed, the second to fish with rays developed, and the third to fish with all or nearly all rays developed.

Pigmentation. There is a patch of chromatophores on the snout which narrows in the interorbital region and widens again in the occipital region. There are a few scattered chromatophores on the operculum. On the body, the skin overlying the gut contains many chromatophores and there is a line of approximately one to each myotome on either side of the dorsal and anal fins.

Nototheniidae

Fig. 3

Material. One specimen, 20·4 mm. in total length, caught in a coarse plankton net at a depth of 2 m. in Borge Bay, Signy Island, on 30 January 1967.

Description and discussion. Although the post-larva is similar in length to the examples of *Notothenia rossii* and *Trematomus newnesi* caught at the same time, the fin rays are only developed fully in the caudal and pectoral fins, the latter having 23 rays. There are 53 vertebrae. There are no chromatophores on the head and on the body they are restricted to a row of 12 on either side of the body.

From the material available it is impossible to identify the larva other than to place it in the family Nototheniidae. Specimens of *Pleuragramma*, described by Regan (1916), have been examined in the British Museum (Nat. Hist.), and it is certain that the present specimen does not belong to that genus, but it is most probably *Notothenia* or *Trematomus*.

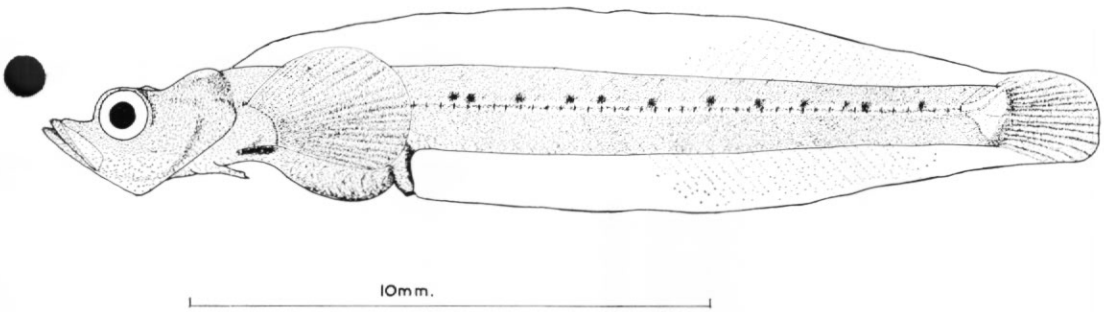

Fig. 3. A 20·4 mm. Nototheniidae post-larva from Borge Bay, Signy Island; 30 January 1967.

Harpagifer bispinus

Fig. 4a-c

Material. 12 ova, 2·6–2·8 mm. in diameter, collected by the late J. W. S. Marr from Port Lockroy on 1 June 1944. 30 yolk-sac stage larvae, 7·1–8·3 mm. in length, collected as above. Eight post-larvae, 8·5–10·1 mm. in length, caught in a coarse plankton net at a depth of 2 m. in Borge Bay, Signy Island, on 1 January 1967. 25 post-larvae, 8·4–10·5 mm. in length, caught as above on 10 January 1967. Four post-larvae, 8·8–10·4 mm. in length, caught as above on 18 January 1967. 19 post-larvae, 9·8–11·3 mm. in length, caught as above on 30 January 1967. One post-larva, 18·2 mm. in length, caught in an Agassiz trawl on the bottom in 30 m. depth on 14 March 1967.

Description. In the four fish on which a count was possible, two had 35 vertebrae and two had 36. The fin rays were only developed in the specimen caught on 14 March 1967 and they are as follows: dorsal 22 (probably not fully developed; a division into 1st and 2nd dorsal fins is not present), anal 19 and pectoral 16. A spine can be seen on the specimen caught in March on both the operculum and suboperculum.

Pigmentation. Chromatophores are fairly densely arranged in the interorbital and occipital regions but the rest of the head is clear except for a few on the opercular and suborbital regions. On either side of the dorsal fin there is a row of chromatophores extending for three-quarters of the length of the body, extending in a broad stripe across the body at the posterior end. There are a few chromatophores above the anterior half of the anal fin and the gut is heavily pigmented.

Discussion. The transverse band of chromatophores on the posterior one-third of the body is very characteristic of these larvae (Fig. 4b and c), and it is maintained into adulthood but becomes less distinct as cryptic coloration is developed.

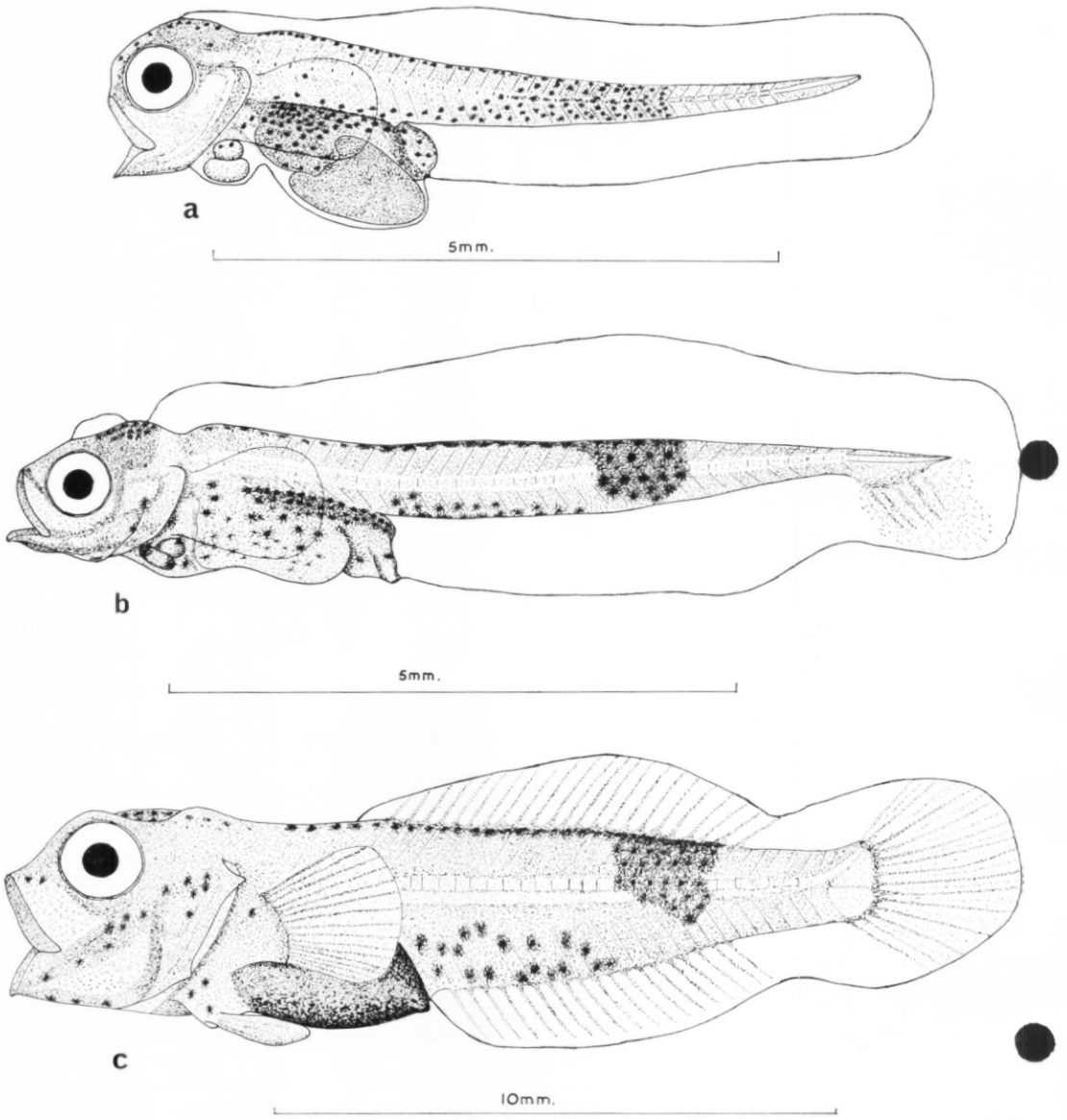

Fig. 4. *Harpagifer bispinis*.

a. 7·4 mm. yolk-sac stage larva from Port Lockroy; 1 June 1944.
b. 9·0 mm. post-larva from Borge Bay, Signy Island; 1 January 1967.
c. 18·2 mm. post-larva from Borge Bay, Signy Island; 14 March 1967.

Although the two sets of samples were taken from places quite far apart, they show that *Harpagifer* breeds in the spring and possibly has larvae for more than 5 months of the year. It is probable that the larva in Fig. 4c was very near to the "settling-out stage" as specimens have been taken during May in Borge Bay. These exhibit all the adult characteristics but they are only 24–28 mm. in total length which suggests that the final metamorphosis occurs late in the Antarctic autumn.

Chaenichthyidae

Fig. 5

Material. One specimen, 16·8 mm. in length, caught in a coarse plankton net at a depth of 2 m. in Borge Bay, Signy Island, on 2 January 1967.

Description. There are 63 vertebrae in this specimen. The development of the fin rays has only just started in the caudal; the rest of the fins have no sign of any rays at all. The mouth is large and has 30 well-developed teeth. The pelvic fins are relatively well developed and at this stage they are nearly half the head length.

Pigmentation. Apart from a patch of 13 chromatophores on the occipital region the head is clear. Along either side of the median fin, for most of its dorsal and ventral length, there is a row of small chromatophores. There are a few chromatophores on the skin overlying the gut.

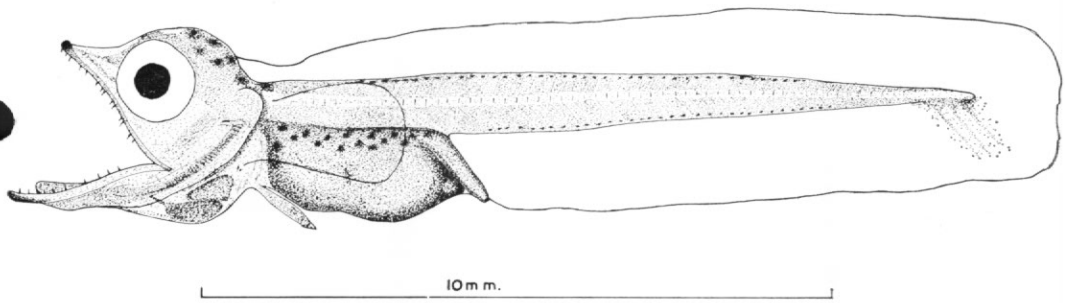

Fig. 5. A 16·8 mm. Chaenichthyidae larva from Borge Bay, Signy Island; 2 January 1967.

Discussion. This larva is quite different from the others described in this paper as, although the development is not very far advanced, the mouth is very large and the jaws have 30 teeth. Furthermore, the pelvic fins are precociously developed (a characteristic of Chaenichthyidae (Regan, 1916)).

Only two species of chaenichthyid fish are known to occur at present in the vicinity of Signy Island, *Chaenocephalus aceratus* and *Crydoraco antarcticus*, the former being by far the commonest although not frequent. From the information at present available for *Chaenocephalus aceratus* at Signy Island the breeding season would appear to be in June (see Table III).

TABLE III. MONTHLY RELATIVE GONAD AND OVA SIZES FOR *Chaenocephalus aceratus* AT SIGNY ISLAND

Month	*Relative gonad size**	*Diameter of ova* (mm.)
December	3·8	—
January	4·6	1·3; 2·4
February	13·3	2·4–3·5 (10)
March	9·8; 10·6	3·2; 3·2
June	7·1; 1·4	4·7; 1·0
July	2·0; 0·7	0·9

$$* = \frac{\text{Gonad weight}}{\text{Wet weight}} \times 100.$$

If this larva is *Chaenocephalus aceratus*, it indicates that the period of gestation is 3–4 months which, although rather long, is not unusual in polar fish, e.g. *Eleginus navaga* and *Boreogadus saida* from the Arctic are fish which spawn in December, in sub-zero sea temperatures, and the eggs hatch in May (Nikolskiy, 1954). The cycle for the two northern species is almost identical, seasonally, to that at present surmised for *Chaenocephalus aceratus* and, since this is the commonest chaenichthyid in the vicinity of Signy Island, it is probable that the larva belongs to this species, although more material is required before positive identification can be made.

ACKNOWLEDGEMENTS

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APPENDIX

Andriashev (1959) described the vertebral counts for a large number of Antarctic fishes and listed below are results for a few of the remaining species:

Notothenia nudifrons	51–53 (4)
N. gibberifrons	48–49 (8)
N. neglecta	(50) 52–53 (10)
Trematomus newnesi	53–54 (8)