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A guide to the identification of pelagic
O-group gadoids

T. WATSON

LOWESTOFT, 1982

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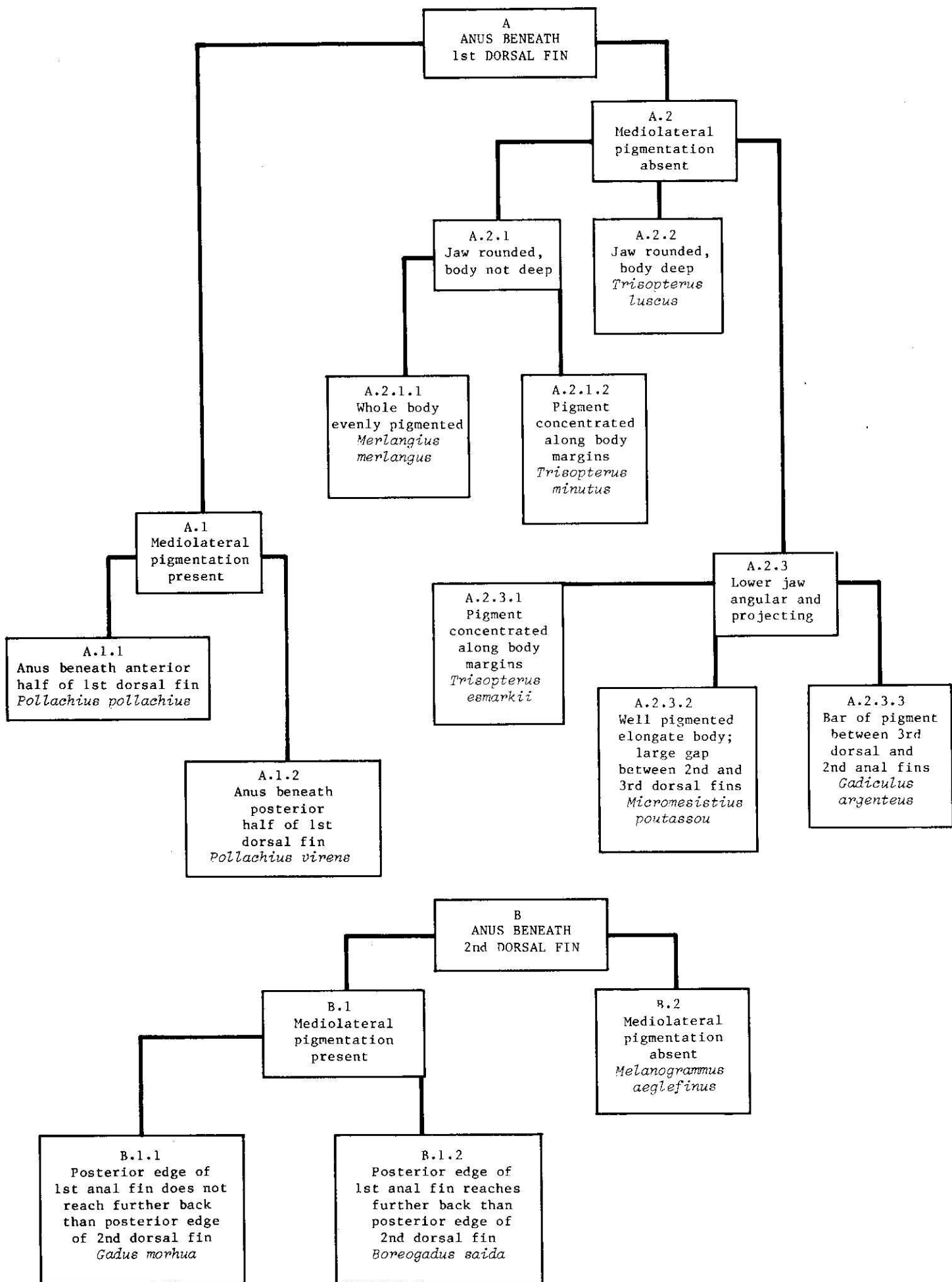


Figure 1 Key to the identification of 0-group gadoids

1 Introduction

The purpose of the guide is to assist in the identification of 0-group gadoids in the early summer, when they range in length from 1 to 10 cm. At this post-larval stage they have well-developed pigment on their heads, developing fins and bodies, and they are beginning to resemble the adults in shape.

The guide deals only with those species which have three dorsal fins and two anal fins. It consists of a key, a description, an illustration of each species and notes on the distribution and occurrence of the young. Approximately half the drawings were done at sea using fresh material examined under a low-power binocular microscope. The remainder were done ashore using specimens fixed and preserved in formalin, which therefore may have lost some pigment. Fin ray counts of all species other than *Boreogadus saida* were made by the author; for convenience adult fish were used for these although 0-group specimens were examined to confirm that the rays could be seen in the post-larval pelagic specimens.

The primary identification features are the position of the anus in relation to the dorsal fins and the presence or absence of a definite line of pigment spots on the mediolateral line.

2 The key

The identification key with sequence of character recognitions is shown in Figure 1. Much of the information for the skeleton of the key is taken from Schmidt (1905, 1906). The first feature examined is the position of the anus relative to the dorsal fins. A is used to indicate that the anus is beneath the first dorsal fin and B to indicate that it is beneath the second dorsal fin. The next feature examined is the mediolateral line for the presence or absence of pigmentation: its presence is indicated by 1 and its absence by 2.

Table 1 Fin ray count

Species	First dorsal	Second dorsal	Third dorsal	First anal	Second anal	Number of observations
<i>Pollachius pollachius</i>	11-14	16-20	15-19	25-30	15-20	16
<i>Pollachius virens</i>	13-15	18-22	19-24	23-28	18-23	13
<i>Merlangius merlangus</i>	12-15	18-25	18-22	30-35	20-25	15
<i>Trisopterus minutus</i>	12-15	21-26	19-25	25-29	20-25	15
<i>Trisopterus luscus</i>	11-14	20-26	16-20	28-35	17-22	14
<i>Trisopterus esmarkii</i>	12-17	22-27	22-26	26-33	24-32	19
<i>Micromesistius poutassou</i>	11-14	10-14	23-26	33-39	22-27	14
<i>Gadiculus argenteus thori</i>	11-13	13-16	15-18	15-19	17-19	20
<i>Gadus morhua</i>	12-15	16-22	17-20	17-23	17-19	11
<i>Boreogadus saida</i>	11-15	12-17	17-23	14-20	18-24	*
<i>Melanogrammus aeglefinus</i>	13-16	18-23	18-22	19-25	18-23	7

*From Wheeler, 1969

For haddock *Melanogrammus aeglefinus* (B.2) no further examination is necessary but for all the other species at least one other point must be examined. Jaw length, body shape, distribution of pigment and the precise position of the anus are all important identification characters.

For example, the identification of blue whiting *Micromesistius poutassou* should proceed:

anus beneath first dorsal fin: A;

mediolateral pigmentation absent: A.2;

angular jaw and body not deep or club shaped: A.2.3;

large gap between second and third dorsal fins: A.2.3.2, *M. poutassou*.

3. Description of species

This follows the same order as the key and has the same combination of letters and numbers to provide a link with the key. Fin ray counts for the species covered are given in Table 1.

A. Anus beneath first dorsal fin

A.1 Mediolateral pigmentation present

A.1.1 The anus is beneath the anterior half of the first dorsal fin:

Pollachius pollachius-pollack (Figure 2)

The body is heavily pigmented but the tail lacks pigment in specimens that are less than 2.5 cm in total length. The anterior edge of the first anal fin starts in front of the anterior edge of the second dorsal fin. The rear edge of the caudal fin is concave. The lower jaw projects from beneath the upper in large specimens.

The tail of the pollack, *P. pollachius*, becomes pigmented at 2.5 cm and that of the saithe, *P. virens*, at 2.0 cm but this characteristic may be subject to regional variation and it would be unwise to rely on this feature alone for the separation of these two species.

A.1.2 The anus is beneath the posterior half of the first dorsal fin:

Pollachius virens-saithe (Figure 3a & b)

The saithe is very similar to the pollack in having a heavily pigmented body but the tail becomes pigmented when the fish attains 2.0 cm total length. The anterior edge of the first anal fin starts adjacent to or just in front of the second dorsal fin. The lower jaw is level with or projects slightly from beneath the upper jaw. The rear edge of the caudal fin is forked.

A small barbel is present when the fish reaches 8 cm in length, although a low-powered microscope may be required to see it. At this stage the mediolateral pigmentation may be obscured by the general body pigmentation and the whole body may be a dark golden colour. Positive identification can be assisted by a fin ray count or by fixation in formalin for three days, which causes leaching of the general body pigment thus allowing the pigment of the mediolateral line to be seen.

A.2 Mediolateral pigmentation absent

A.2.1 The snout is rounded. The body is not deep or club shaped.

A.2.1.1 The whole body is evenly pigmented, as are the fins and the tail:

Merlangius merlangus-whiting (Figure 4a & b)

The anterior edge of the first anal fin reaches further forward than the posterior edge of the first dorsal fin. The first anal fin is comparatively long and has 30-35 fin rays. The rear edge of the caudal fin is straight. The anus is beneath the anterior half of the first dorsal fin.

A.2.1.2 The body pigment is concentrated along the body margins:

Trisopterus minutus-poor cod (Figure 5a & b)

The anterior edges of the first anal fin and second dorsal fin are vertically in line with each other. The first anal fin has between 25 and 29 rays and the rear edge of the caudal fin is straight. The anus is beneath the posterior half of the first dorsal fin (see also *T. esmarkii* below).

A.2.2 The snout is rounded and the body deep or club shaped:

Trisopterus luscus-pout or bib (Figure 6)

The deep body is evenly pigmented but the tail lacks pigment until the fish exceeds 4 cm in length. The anus lies beneath the anterior half of the first dorsal fin. The pelvic fins are long, reaching back to or past the anus in specimens that are more than 2.5 cm long. The anal fins are joined, but in damaged specimens the membrane may be split and the two fins appear separate. The rear edge of the caudal fin is slightly concave. In large specimens (4.0 cm) a spot of concentrated pigment can be seen at the base of the pectoral fin.

A.2.3 The lower jaw is angular and projecting. The body is not deep or club shaped.

A.2.3.1 Body pigment is concentrated along the body margins:

Trisopterus esmarkii-Norway pout (Figure 7a & b)

The chromatophores are larger and more numerous on the ventral margin than on the dorsal margin. Although large specimens (4 cm and above) have pigment over the entire body, it remains much denser along the margins. The rear edge of the caudal fin is concave and the anus is beneath the posterior half of the first dorsal fin.

Norway pout, *T. esmarkii*, and poor cod *T. minutus*, are very similar. The differences between them, in jaw length chromatophore distribution and caudal fin shape, are only marginal in small specimens. A ray count of the second anal fin will (if the rays are sufficiently well developed) usually assist identification (*T. minutus* 20-25; *T. esmarkii* 24-32).

A.2.3.2 The body is elongated and well pigmented and there is a large gap between the second and third dorsal fins:

Micromesistius poutassou-blue whiting (Figure 8a & b)

The first anal fin is long with 33-39 rays and the caudal fin is forked. The anus is well forward, being beneath or a little in front of the anterior edge of the first dorsal fin. Except in small specimens which have unpigmented tails the sides are completely covered by dense pigmentation. The fish is coloured grey-blue when fresh.

A.2.3.3 A bar of pigment between the third dorsal and second anal fins:

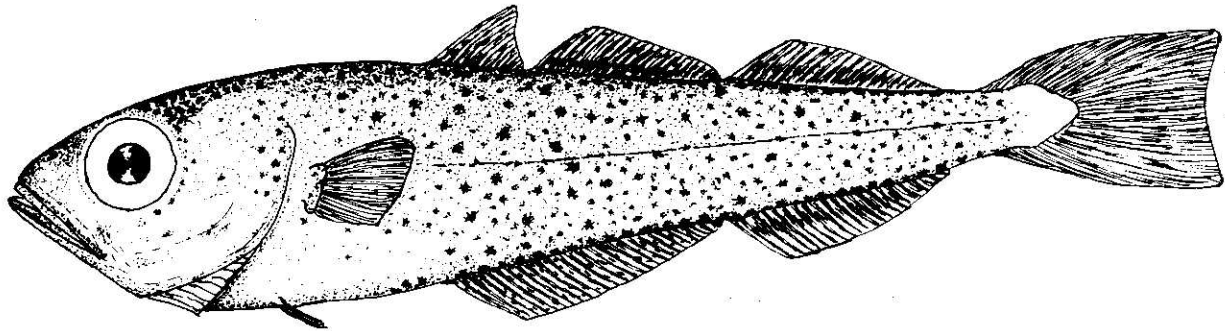


Figure 2 *Pollachius pollachius* pollack

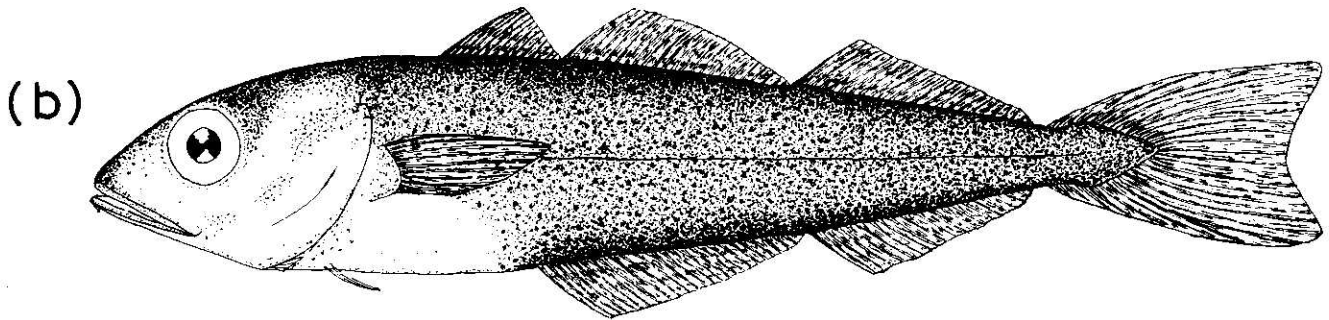
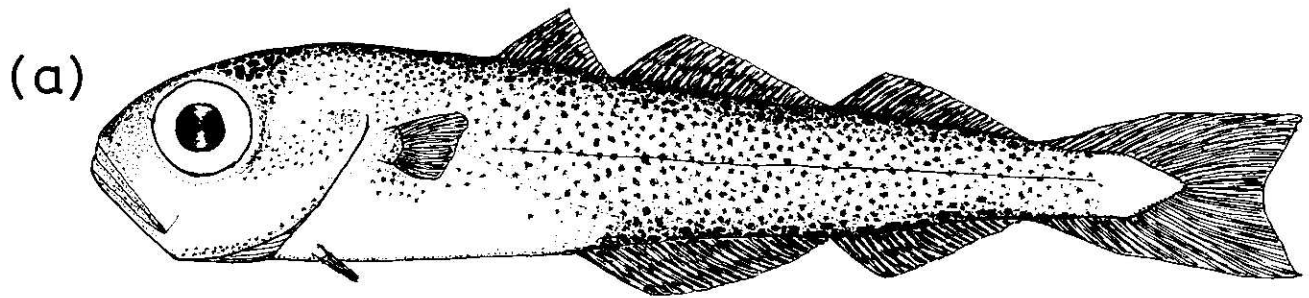


Figure 3 *Pollachius virens-saithe*

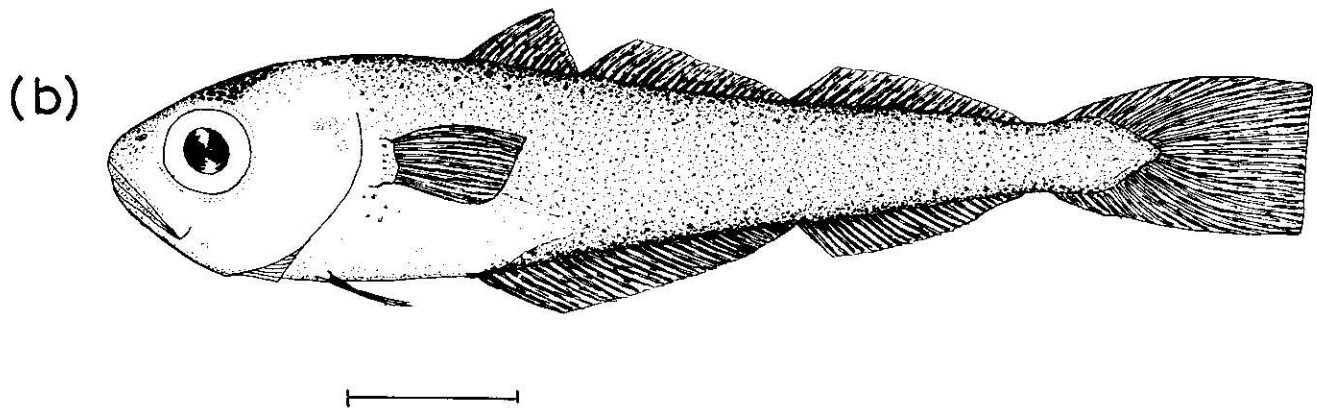
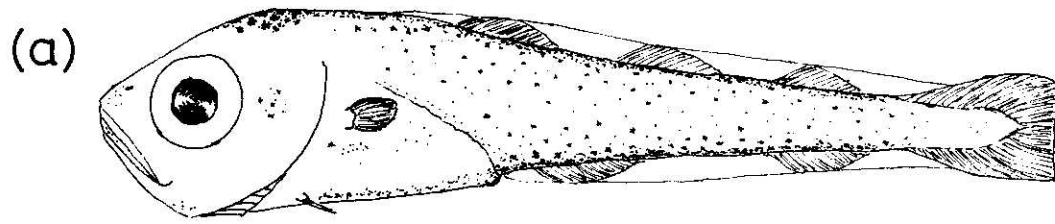


Figure 4 *Merlangius merlangus*-whiting

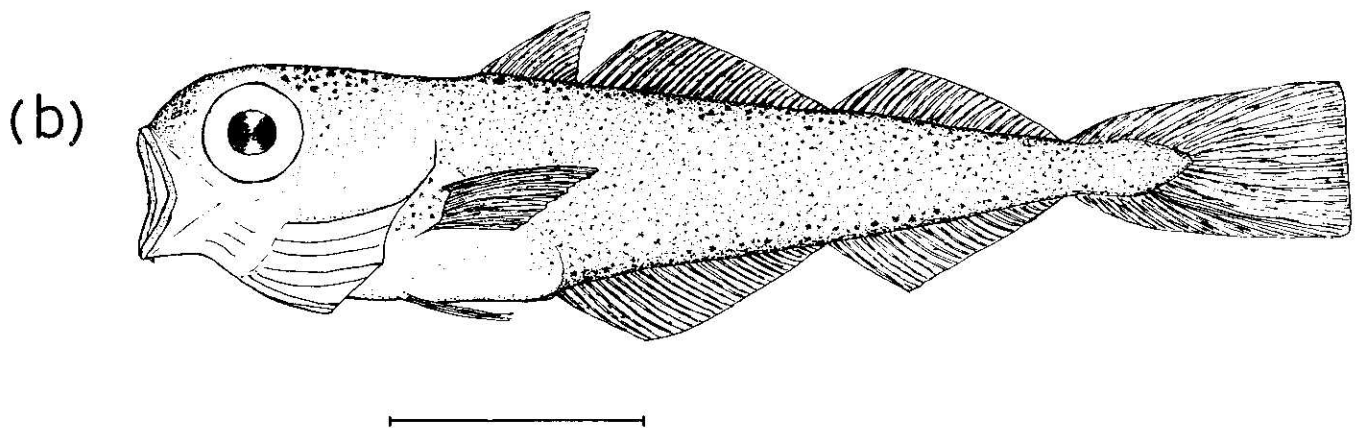
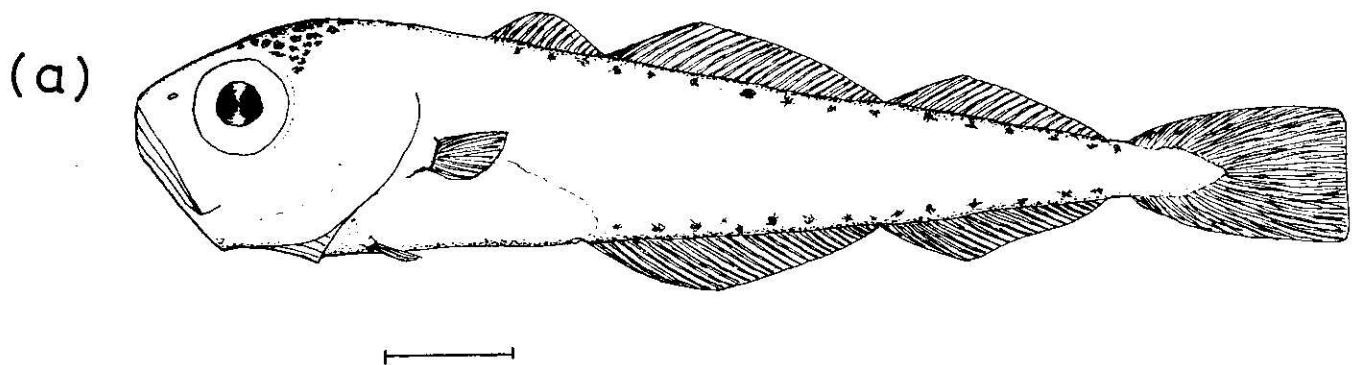


Figure 5 *Trisopterus minutus*-poor cod

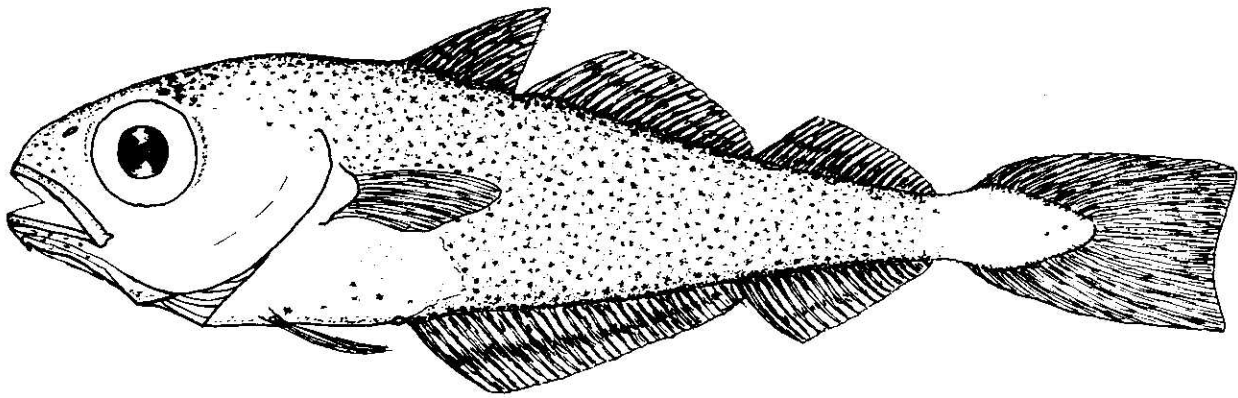


Figure 6 *Trisopterus luscus*-pout or bib

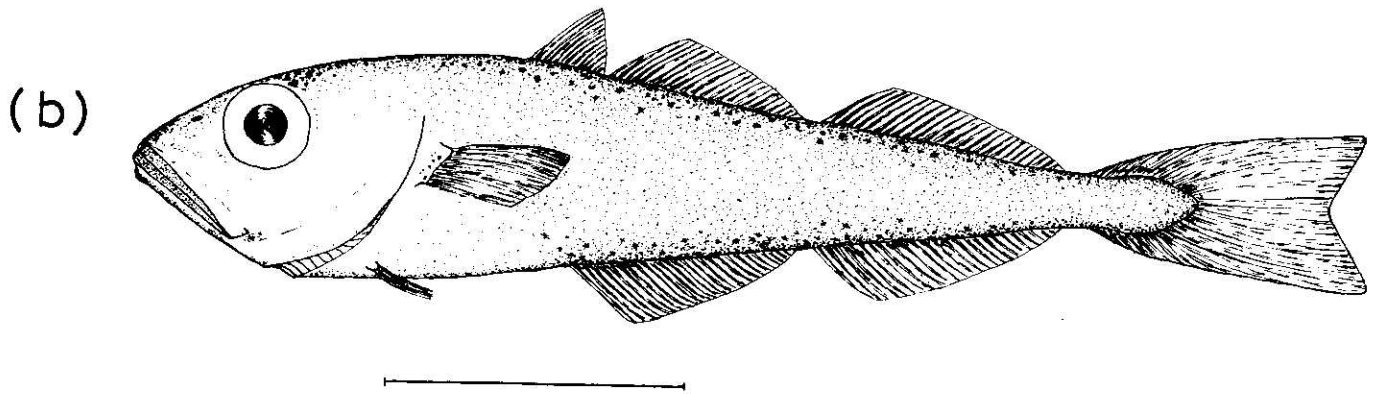
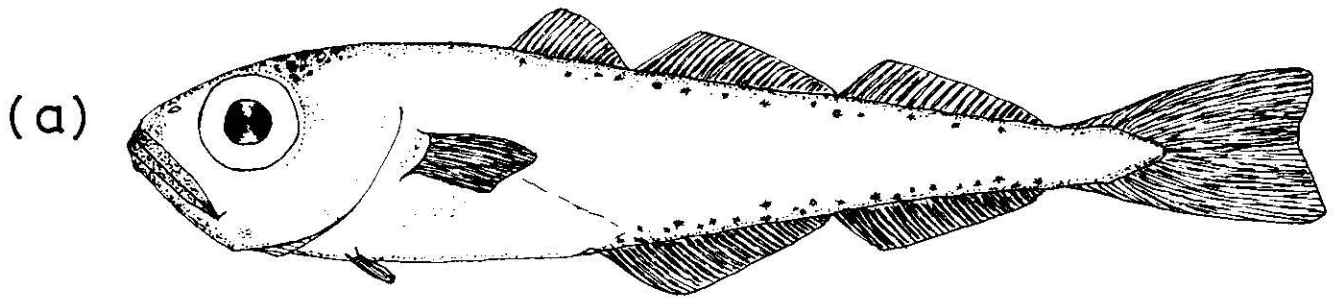


Figure 7 *Trisopterus esmarkii*-Norway pout

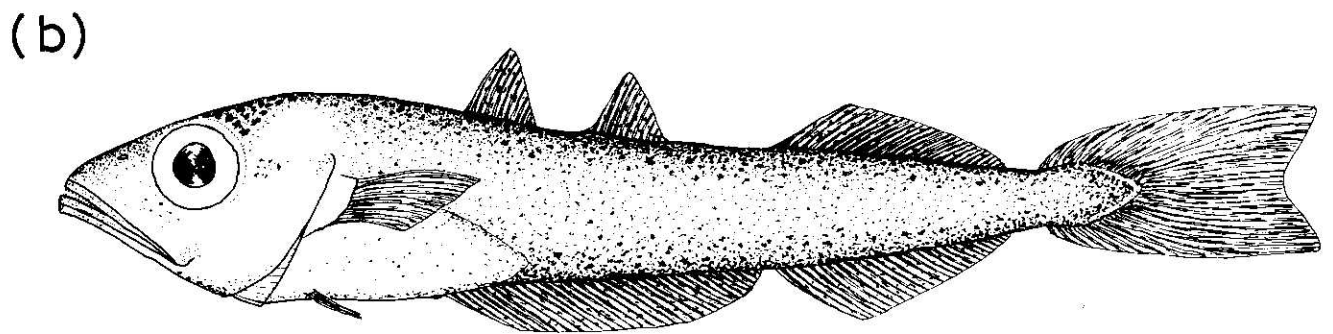
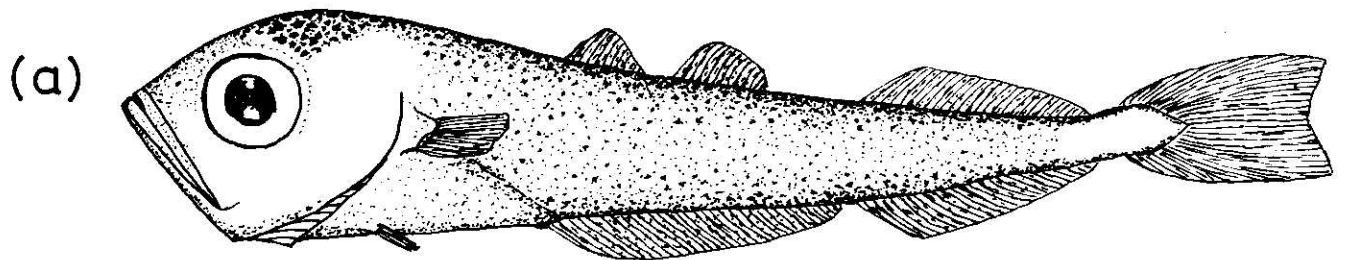


Figure 8 *Micromesistius poutassou*-blue whiting

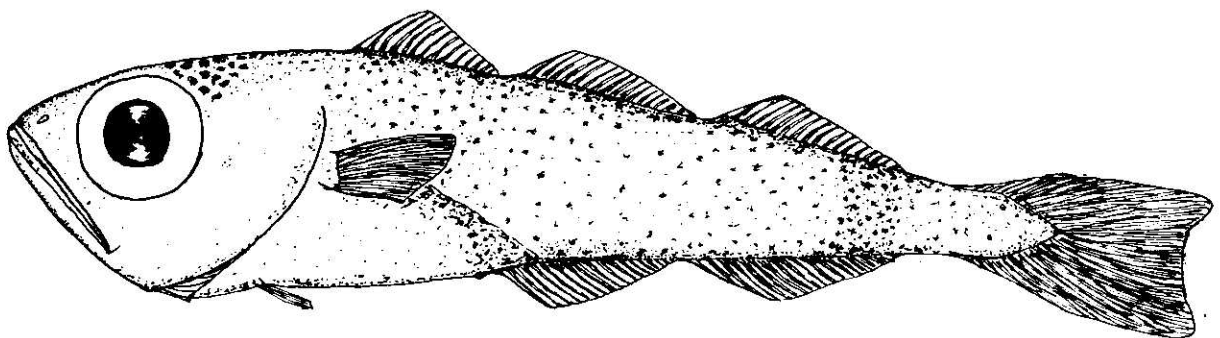


Figure 9 *Gadiculus argenteus thori*-silvery pout

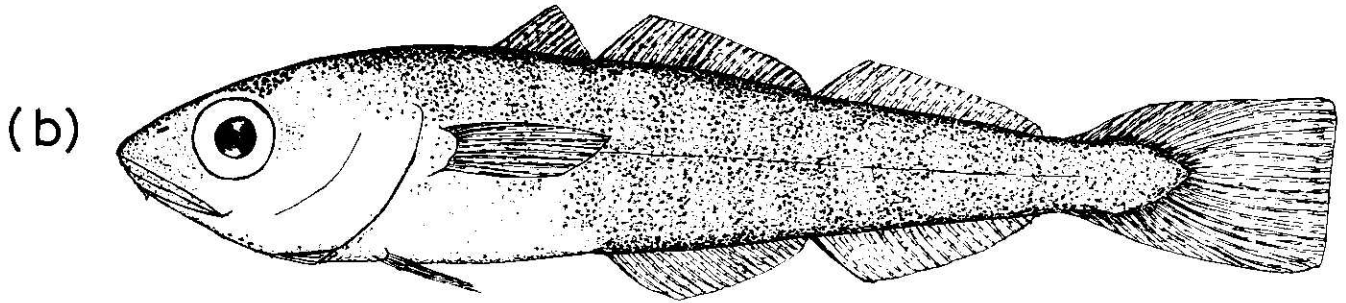
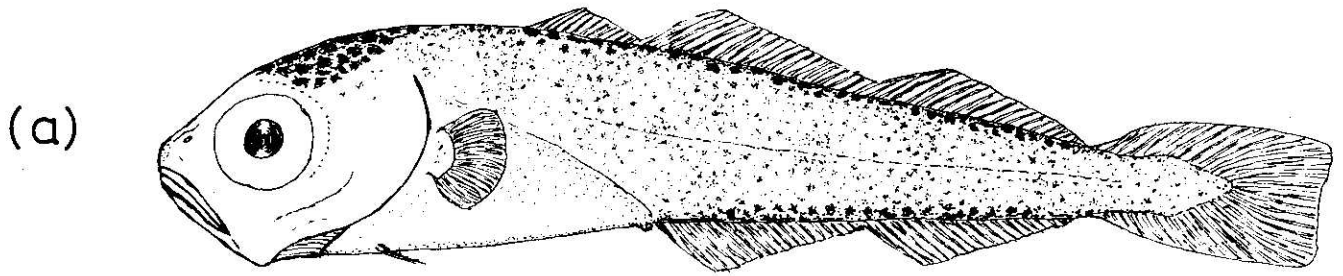


Figure 10 *Gadus morhua*-cod

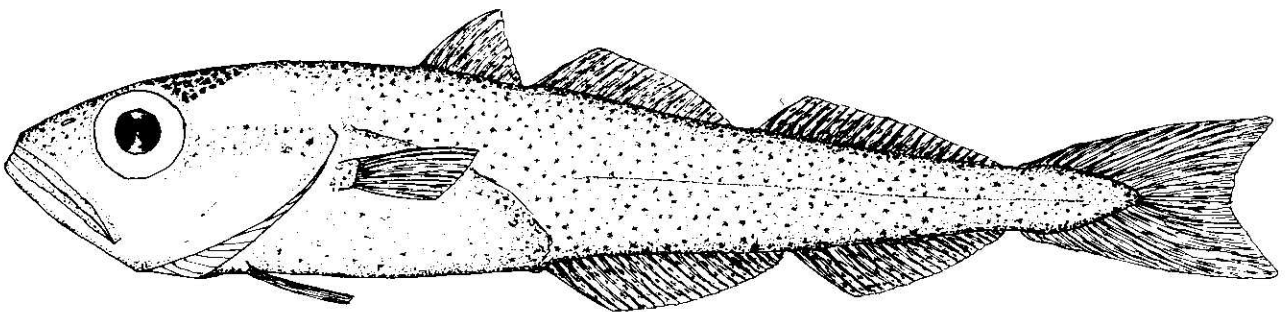


Figure 11 *Boreogadus saida*-polar cod

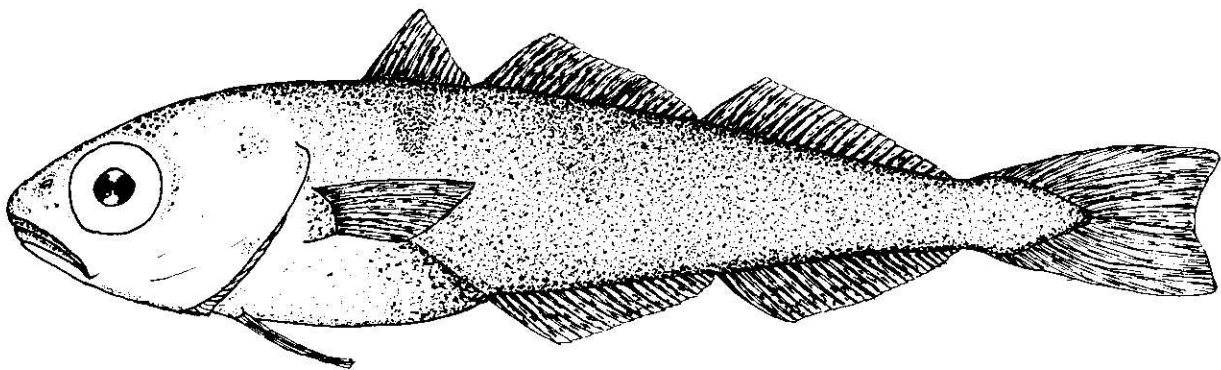


Figure 12 *Melanogrammus aeglefinus*-haddock

Gadiculus argenteus thori-silvery pout (Figure 9)

The eye is large, as is the angular projecting jaw. The rear edge of the caudal fin is concave and the anus is beneath the posterior half of the first dorsal fin. General body pigment, although not dense, is distributed over the whole body. The fish is club-shaped.

B. Anus beneath the second dorsal fin

B.1 Mediolateral pigmentation present

B.1.1 The posterior edge of the second dorsal fin is in line with that of the first anal fin:

Gadus morhua-cod (Figure 10a & b)

The whole body right back to the caudal fin is pigmented although the density of pigment is uneven. The rear edge of the caudal fin is straight. Specimens over 3.5 cm have a small barbel. The snout is rounded and the lower jaw does not project.

B.1.2 The posterior edge of the first anal fin is further back than that of the second dorsal fin:

Boreogadus saida-polar cod (Figure 11)

The body is elongated and evenly pigmented. The caudal fin is forked and the dorsal and anal fins are well spaced. The lower jaw is angular and slightly projecting.

B.2 Mediolateral pigmentation absent:

Melanogrammus aeglefinus-haddock (Figure 12)

The body is club shaped and grey-blue in colour when fresh. All the fins are well pigmented and the pelvic fins are long, reaching back to the anus in specimens longer than 4 cm. Large specimens have an area of concentrated pigment between the first dorsal and pectoral fins. This pigment produces a dark patch usually referred to as the 'thumb-print'. The snout is rounded and the lower jaw does not project. The rear edge of the caudal fin is concave.

4 Notes on the distribution of species and on the occurrences of pelagic young in the north-east Atlantic with special reference to waters around the British Isles (see also Figure 13)

Pollachius pollachius-pollack

The pollack is a species that is usually associated with coastal waters and is found from the northern Norwegian coasts to the Bay of Biscay. It occasionally occurs off southern Iceland and the northern coasts of the Mediterranean Sea.

The pelagic young are not captured frequently and are found even closer inshore than the adults. Around

the British Isles they are most common near southern and western coasts.

Pollachius virens-saithe

The saithe has a wider range than its close relation the pollack. It extends further north and west, and is found off Greenland and from New England to Newfoundland and Labrador. On the western side of the Atlantic it is known as the pollock. The southern limit of its range in the north-east Atlantic is the Bay of Biscay.

Although spawning usually takes place in deep water the pelagic young are usually found in inshore waters. Around the British Isles they occur along the coasts of northern England, Scotland and in the Irish Sea.

Merlangius merlangus-whiting

One of the more common gadoids, it is found mainly in shallow water. It does not occur further west than Iceland or north of Norway, but it is found in the Baltic Sea and as far south as the northern Mediterranean Sea. A sub-species is found in the Black Sea.

The whiting has an extended spawning season (January-May) and the young, which occur off most of the British coasts, therefore have a wide size range.

Trisopterus minutus-poor cod

A small gadoid, the poor cod is a southern species whose range does not extend further north than the Faroes. In the south it is found in the Mediterranean as far east as the Adriatic Sea.

Although occurring all round the British Isles the young are most common along the southern and western coasts in early summer.

Trisopterus luscus-pout or bib

The distribution of the pout is similar to that of the poor cod but it is not found around the Faroe Isles or as far north as the Norwegian coast. The pout is more closely associated with inshore waters than the poor cod.

The pelagic 0-group pout are rarely caught in off-shore survey hauls, probably because of their distribution which is close inshore.

Trisopterus esmarkii-Norway pout

The Norway pout is similar in size to the poor cod. It is usually found in deep water from the English Channel to the Barents Sea and is abundant to the south, west and north-west of Iceland and the deeper parts of the northern North Sea.

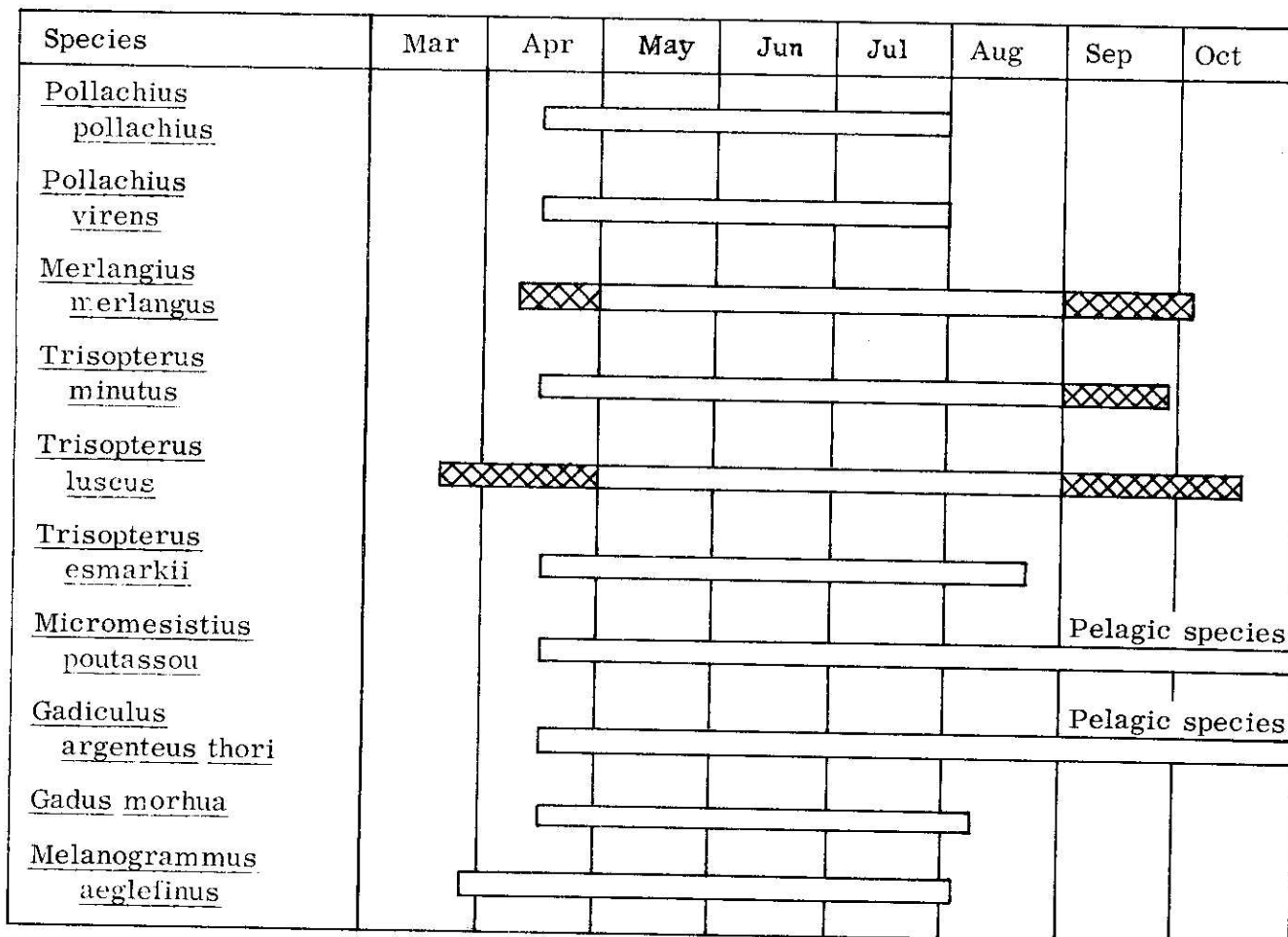


Figure 13 Occurrence of pelagic 0-groups in the waters around the British Isles. Hatching denotes occasional occurrences.

The young are often encountered in large concentrations off north and north-eastern Scotland. They are also found in the Irish Sea and to the west of Ireland.

Micromesistius poutassou-blue whiting

This predominantly mid-water species found in deep water at the edge of the continental shelf, sometimes does occur in the English Channel and Irish Sea. The adults are widely distributed, being found from the Adriatic Sea to Iceland and Spitzbergen. They have also been recorded in the north-west Atlantic.

The main spawning concentration on the eastern side of the Atlantic is located over deep water to the west of the British Isles (Pawson, 1979). The resulting eggs and larvae drift in a north-easterly direction and as young 0-groups may be caught around the Faroe Isles, the Orkneys and in the northern North Sea.

Spawning fish and/or eggs and larvae have also been recorded in other areas including the Bay of Biscay, south-east Iceland and along the Norwegian coast.

Gadiculus argenteus thori-silvery pout

The silvery pout is a small oceanic species usually found in deep water. Its distribution extends from the north African coast and the western Mediterranean Sea to the north-west coast of Norway; it is rare at Iceland and not found in the Barents Sea. The population south of the Bay of Biscay is recognised as a sub-species *G. argenteus argenteus*.

The occurrence of pelagic 0-group silvery pout around the British Isles is limited to the north and west, although being an oceanic species it is not often encountered in 0-group surveys over the continental shelf.

Gadus morhua-cod

The cod is the most widely distributed gadoid. It ranges over the continental shelf of the North Atlantic region from North Carolina, Newfoundland and Labrador in the west to Novaya Zemlya in the east; in European waters the northern limit of its range is north of Spitzbergen and the southern limit is the Bay of Biscay. Cod are also common in the Baltic Sea. There are many separate spawning populations, and regional sub-stocks are recognised in all areas, for example, the North Sea, Irish Sea, Faroes and Barents Sea.

Although widely distributed, the pelagic young are found in discrete areas. For example in the North Sea a small patch usually occurs off the Yorkshire coast in June: larger and denser concentrations are found to the east of the Shetland Isles and off the coast of Denmark but they are rarely found in the central part of the North Sea. 0-group cod are also found in the Irish Sea and off Scottish coasts.

Boreogadus saida-polar cod

As the name suggests this is a circumpolar northern species found only in Arctic waters, around Spitzbergen, the Barents Sea, the north of Iceland and off Greenland.

Melanogrammus aeglefinus-haddock

This is a widely distributed species with a range similar to that of cod although it is not found in the Baltic Sea. The southern limit of its range in European waters is the northern part of the Bay of Biscay. On the western side of the Atlantic it is found off Labrador, Newfoundland and Greenland.

The main concentrations of pelagic young around Britain occur off the Scottish coasts. They have also been found in smaller numbers in the Irish Sea and Bristol Channel. These 0-group fish have in June a very wide size distribution ranging from 1-10 cm.

Acknowledgement

I am indebted to Mr J.H. Nichols for his advice in the preparation of this paper.

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