

**A KEY TO THE  
PLANKTONIC EGGS OF  
SOME NEW ZEALAND  
MARINE TELEOSTS**

**By**

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**Fisheries Research Division  
Occasional Publication No. 9**

**1975**

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## INTRODUCTION

DURING a study on the planktonic eggs and larvae of New Zealand marine teleosts (Robertson 1973) a key was prepared to aid the identification of some of these eggs.

The eggs of most marine teleost species fall into one of two categories: planktonic or benthic. Most marine teleost species have planktonic eggs and only these are considered here. Most planktonic eggs are similar in appearance, usually being spherical and transparent with a smooth chorion. The diameter, however, may range between 0.50 and 4.25 mm.

Some species have eggs which can be recognised by their departure from these generalisations, for example, the oval eggs of the anchovy and the sculptured eggs of macrourids. Many planktonic eggs contain droplets of oil in the yolk sac. The number, size, colour, and position of these oil droplets are of diagnostic significance in recognition of eggs of different species. A further distinguishing feature is the width of the perivitelline space, that is, the space between the yolk sac and the chorion. This space is generally narrow, but in a few species it is characteristically wide, for ex-

ample, in the eggs of pilchards and marine eels. As development progresses, the appearance of chromatophores on the embryo may also be helpful in distinguishing otherwise similar eggs.

Although many studies of planktonic teleost eggs have been conducted in the North Sea, Mediterranean Sea, North and South Pacific Oceans, and Indian Ocean, there have been few attempts to produce keys to aid egg identification. Heincke and Ehrenbaum (1900) and Hiemstra (1962) have produced keys to the teleost eggs of the North Sea. Lee (1966) and Marinaro (1971) have published keys to the teleost eggs of the Mediterranean Sea, many of which are common to the North Sea. The more recent of these keys have been compiled from data which have accumulated over the last century from observations on teleost eggs of the North Sea and the Mediterranean. No such attempts have been made in the Southern Hemisphere, presumably because of the lack of information on the early life history of many marine teleosts and because there are few data available on egg characteristics of southern teleost species.

# METHODS

Mature eggs were stripped from running ripe females and were examined microscopically before and after preservation in isotonic neutral formalin. Ideally, the eggs would have been fertilised and developmental features noted, but this was not possible with all fish, as ripe males and females of the less common species were seldom caught together. Measurements were made to  $\pm 0.025$  mm with an ocular micrometer.

Some eggs could be identified from features of the advanced embryo or by hatching the egg and comparing the features of the yolk sac larva with known species.

Plankton samples were collected at the sea surface with a variety of net types (Robertson 1973) from stations off Otago, Canterbury, Kaikoura, Castlepoint, East Cape, Bay of Islands, and Fiordland, and at scattered stations around the North and South Islands.

Descriptions by other authors of eggs suspected to occur in New Zealand waters but not taken in the

plankton in this study are also included in the key.

The following scale of abundance and classification, based on numbers per 500 m<sup>3</sup>, is used:

- 1: rare
- 1-10: occasional
- 11-100: common
- 101-1000: abundant
- 1001-10 000: very abundant
- >10 000: extremely abundant

## Limitations of Key

According to Whitley (1968), there are about 413 marine teleost species known in New Zealand waters. Of these, about 64 species are viviparous (for example, *Helicolenus papillosus*), have benthic eggs (such as *Acanthoclinus quadridactylus*), or spawn elsewhere (for example, *Mola mola*); so the eggs of such species cannot be distinguished by using this key.

This key is most applicable to the teleost species commonly occurring between the coastline and the edge of the continental shelf (Table 1).

TABLE 1: A Summary of the Limitations of the Egg Key

Species	Approximate number	Number described in key as percentage of left-hand figure
Marine teleosts occurring in New Zealand waters	413 (Whitley 1968)	14
Species having or likely to have planktonic eggs	349 (includes mesopelagic and bathypelagic species)	19
Species which commonly occur between coast and edge of shelf and have planktonic eggs.	62	89

but is limited to the areas listed above. The eggs in each group in the key are arranged in ascending order of size.

The authors of the species considered are included in the appendix.

The use of the key may occasionally lead to the choice between two or more species whose egg characteristics overlap. Another criterion, correlation with the spawning times of the species in the area, is then necessary to confirm the identity of

the egg. When two or more such species spawn simultaneously in the same area their eggs are very difficult to separate, for example, *Peltothamphus novaezealandiae* and *P. tenuis*.

The character divisions used in constructing the key are outlined in Fig. 1, and the eggs of some species are shown in Figs. 2 to 9. It is hoped that the key will be amended in future as the features of eggs at present undescribed become known.

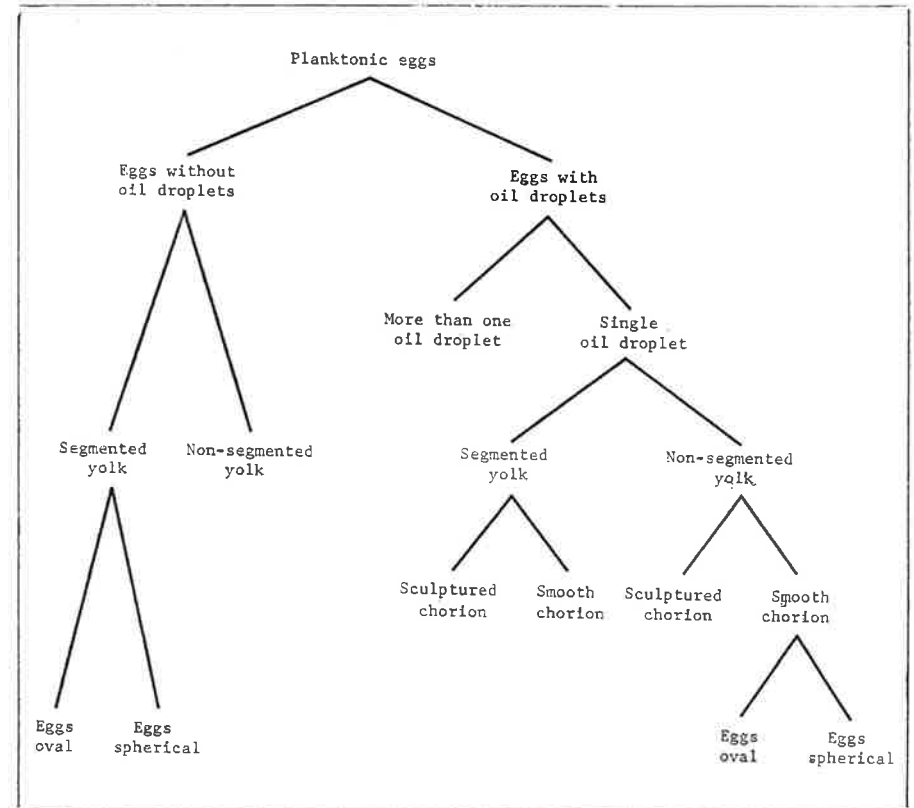


Fig. 1: Character divisions used in the egg key.

# IDENTIFICATION KEY

## Eggs without Oil Droplets

### SEGMENTED YOLK

#### *Egg Oval*

Length of long axis 1.060–1.400 mm. Length of short axis 0.480–0.625 mm. Common to extremely abundant in neritic waters **except** south-east coast of South Island (that is, Puysegur Point to Moeraki) (Fig. 2).

..... *Engraulis australis*

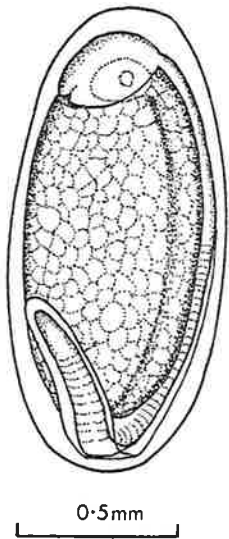


Fig. 2

Length of long axis 1.150–1.200 mm. Length of short axis 1.000–1.075 mm. Embryo has ventral melanophores one-third and two-thirds of the distance

from anus to tail tip. Occasional in Otago waters in spring.

..... *Echiodon* sp.

#### *Egg Spherical*

Diameter 0.810–1.100 mm. Narrow perivitelline space, anus of late-stage embryo nearer to tip of tail than to yolk sac. Common to very abundant in neritic waters on east coast of South Island, Tasman Bay, and Marlborough Sounds in winter and spring (Fig. 3a).

..... *Sprattus antipodum*

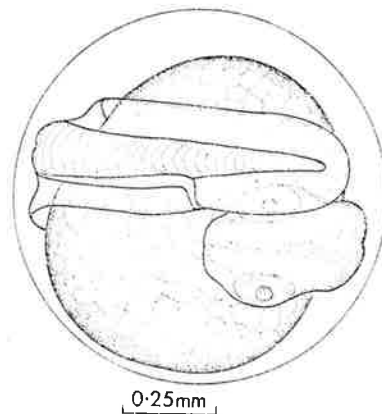


Fig. 3a

Diameter 1.775–1.900 mm. Yolk loses its segmentation at blastopore closure. Pigmentation on embryo ceases at caudal ped-

uncle. Occasional over the deep shelf at Kaikoura, Fiordland, and Chatham Islands during summer and autumn (Fig. 3b).

..... *Paratrachichthys trailli*



Fig. 3b

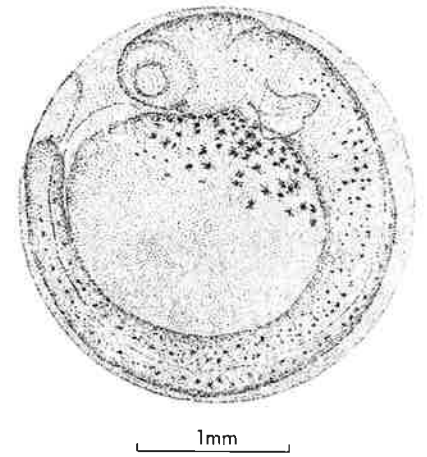


Fig. 4a

Diameter 1.975–2.125 mm. Advanced embryo has inconspicuous pectoral fins and many melanophores along body axis. Occasional in central and southern New Zealand neritic waters in spring and summer.

..... *Coriodax pullus*

### NON-SEGMENTED YOLK

Diameter 2.400–2.900 mm. Slightly ovoid. Chorion finely stippled. Occasional in off-shore waters around New Zealand (excluding south-eastern waters south of 44°S) (Fig. 4a).

..... *Scomberesox saurus*

Diameter 1.925–2.175 mm. Advanced embryo has well-pigmented retinae and distinctively large, green and black pigmented pectoral fins. Occasional in south-eastern New Zealand neritic waters in spring (Fig. 4b).

..... *Congiopodus leucopaecilus*

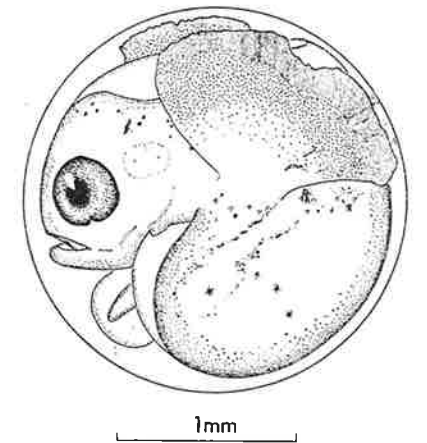


Fig. 4b

Diameter 2.050–2.450 mm. Late embryo darkly pigmented. Oc-

casional in southern New Zealand neritic waters in spring.

*Notothenia microlepidotu*

Diameter 3.250–4.050 mm. Egg has a distinctively pink appearance when preserved in formalin. Embryo very well developed before hatching, that is, long filamentous process on first dorsal spine, long knobbed pelvic fins. Rare in off-shore northern New Zealand waters throughout year (Fig. 4c).

*Regalecus glesne*

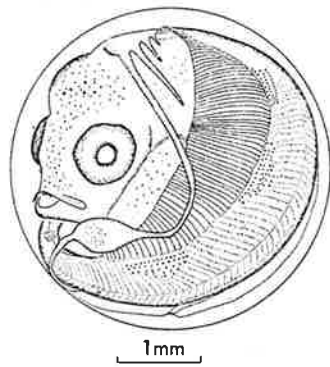


Fig. 4c

### Eggs with Oil Droplets

#### More than One Oil Droplet

2–4 oil droplets (rarely one). Diameter 0.575–0.675 mm. Oil droplet diameter 0.075–0.100 mm. Occasional in neritic South Island waters in winter and spring.

*Peltorhamphus tenuis*

2–6 oil droplets. Diameter 0.625–0.675 mm. Oil droplet diameter 0.075–0.100 mm. Abundant in South Island neritic waters in winter and spring (Fig. 5a).

*Peltorhamphus novaezeelandiae*

2–7 oil droplets (rarely one). Diameter 0.575–0.700 mm. Oil droplet diameter 0.075–0.100 mm. Common in Hauraki Gulf

from June to November (Colman 1973).

*Rhombosolea leporina*

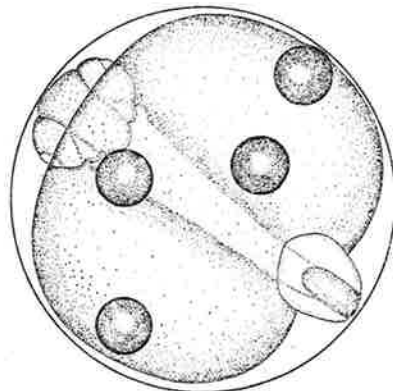


Fig. 5a

2–13 oil droplets (rarely one). Diameter 0.575–0.725 mm. Oil droplet diameter 0.075–0.100 mm. Oil droplets initially cop-

per coloured. Occasional in Otago neritic waters in spring and summer.

*Rhombosolea plebeia*

8–22 oil droplets. Diameter 0.650–0.725 mm. Oil droplet diameter 0.050–0.075 mm. Common in sheltered neritic waters in summer and autumn.

*Crapatalus angusticeps*

8–18 oil droplets. Diameter 0.850–0.950 mm. Oil droplet diameter 0.075–0.125 mm. Occasional to common in neritic waters of Otago from July to August and Marlborough Sounds–Tasman Bay from June to December (Fig. 5b).

*Pelotretis flavilatus*

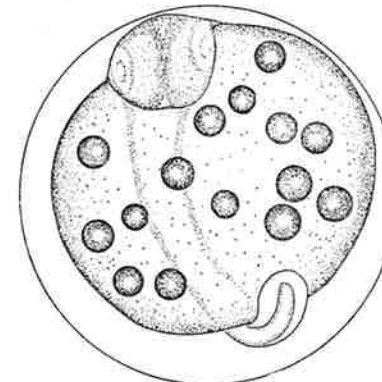


Fig. 5b

2–7 oil droplets. Diameter 1.175–1.250 mm. Oil droplets greenish. Perivitelline space 0.125–0.175 mm. Rare on east coast of South Island in spring to autumn.

*Mendosoma lineatum*

21–28 oil droplets. Diameter about 1.5 mm. Rare in Otago waters in winter and spring.\*

*Colistium nudipinnis*

14–26 oil droplets. Diameter 1.000–1.080 mm. Oil droplet diameter 0.060–0.100 mm. Rare in Otago waters in winter and spring.

*Colistium guntheri*

3–9 oil droplets. Diameter 1.800–2.000 mm. Oil droplet diameter 0.075–0.125 mm. Common in Otago Harbour in summer.

*Genyagnus monopterygius*

20–35 oil droplets. Diameter 2.000–2.225 mm. Rare in Bay of Plenty in autumn.

*Allomycterus jaculiferus*

3–18 oil droplets. Diameter 2.250–2.450 mm. Oil droplet diameter 0.075–0.150 mm. Occasional along south-east coast of South Island in spring.

*Kathetostoma giganteum*

1–9 oil droplets. Diameter 2.900–3.430 mm. Wide perivitelline space (0.900 mm). Oil droplets migrate to posterior margin of segmented yolk. Embryo has large number of myotomes. Common on east coast of North Island in summer and autumn (Castle and Robertson 1974) (Fig. 5c).

*Gnathophis incognitus*  
and /or *G. habenatus*

\*Anderton (unpublished notes).

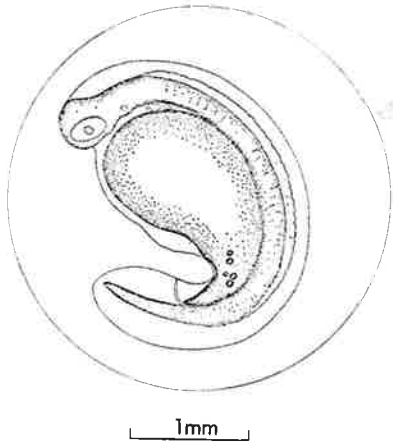


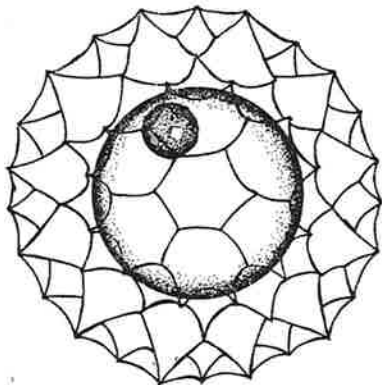
Fig. 5c

One Oil Droplet

SEGMENTED YOLK

**Sculptured Chorion**

Diameter 1.800–2.050. Oil droplet diameter 0.250 mm. Very characteristically sculptured chorion raised up into hexagonally spaced points. Chorion



0.5mm

Fig. 6.

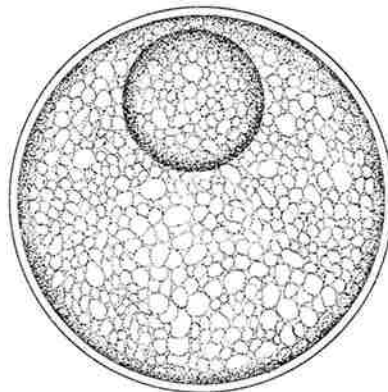
about 0.5 mm thick. Common to extremely abundant in offshore waters around whole of New Zealand in spring to autumn (Fig. 6).

..... *Maurolicus muelleri*

**Smooth Chorion**

Diameter 0.550–0.600 mm. Oil droplet diameter 0.200 mm. Yolk very granular with small segments. Chorion very fine and delicate. Not taken in surface plankton. In northern offshore waters in summer (Fig. 7a).

..... *Lampanyctus steinbecki*



0.25mm

Fig. 7a

Diameter 0.760–0.860 mm. Oil droplet diameter 0.200–0.240 mm. Common to abundant in North Island coastal waters in summer (Fig. 7b).

..... *Caranx georgianus*

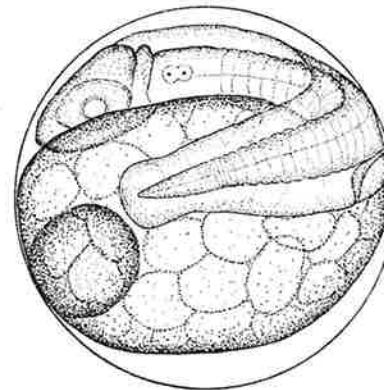
Diameter 0.720–0.820 mm. Oil droplet diameter 0.180–0.220

mm. North Island coastal waters in summer.

..... *Trachurus mccullochi*

Diameter about 1.1–1.3 mm. Oil droplet diameter 0.25 mm. North Island coastal waters? Summer? (Not taken in the plankton in this study.)\*

..... *Trachurus declivis*



0.5mm

Fig. 7b

Diameter 1.670–1.800 mm. Oil droplet diameter 0.350–0.450 mm. Oil droplet yellow. Rare. Yolk segmented into large spherules.

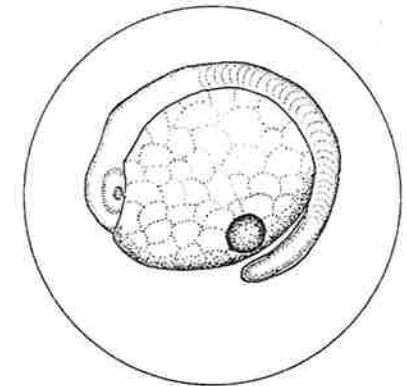
..... *Argentina elongata*

Diameter 1.320–1.700 mm. Oil droplet diameter 0.150 mm. Wide perivitelline space 0.650–

\*Where a particular species is described as not being present in the plankton, the season listed refers to the time of year when ripe adults were collected.

0.850 mm. Common to abundant in most neritic waters except south-east of South Island (Fig. 7c).

..... *Sardinops neopilchardus*



0.5mm

Fig. 7c

NON-SEGMENTED YOLK

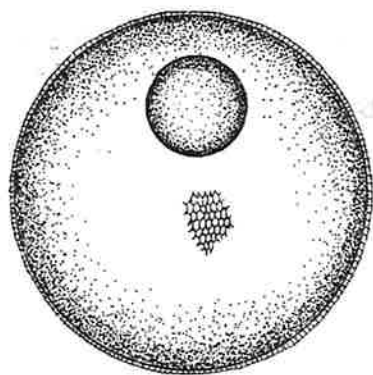
**Sculptured Chorion**

Diameter 0.950–1.050 mm. Oil droplet diameter 0.250–0.300 mm. Oil droplet red-pink. Surface of chorion has fine raised hexagonal pattern. Occasional in central and southern offshore waters in spring and summer.

..... *Coelorhynchus aspercephalus*

Diameter 1.071–1.125 mm. Oil droplet diameter 0.250 mm. Oil droplet colourless; otherwise as above (Fig. 8).

..... *Coelorhynchus australis*



0.5mm

Fig. 8

**Smooth Chorion**

*Egg Spherical*

Diameter 0.525–0.600 mm. Oil droplet diameter 0.150 mm. Common to very abundant in neritic, south-east South Island waters in spring (Fig. 9a).

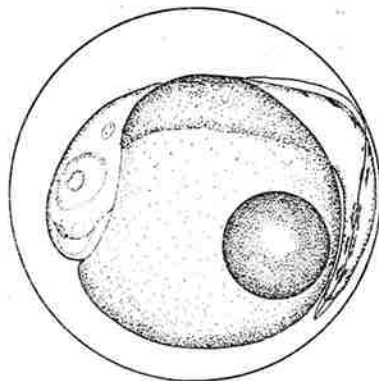
*Auchenoceros punctatus*

Diameter 0.650–0.725 mm. Oil droplet diameter 0.150 mm. Common in Otago Harbour in summer.

*Novodon convexirostris*

Diameter 0.60–0.72 mm. Oil droplet diameter 0.28 mm. Northern North Island waters in autumn (Thomson 1963). (Not taken in plankton in this study.)

*Mugil cephalus*



0.25mm

Fig. 9a

Diameter 0.725–0.800 mm. Oil droplet diameter 0.150 mm. Common in northern and southern neritic waters in spring.

*Pseudolabrus celidotus*

Diameter 0.775–0.925 mm. Oil droplet diameter 0.175–0.200 mm. Kaikoura–Cook Strait, summer to autumn. (Not taken in plankton in this study.)

*Anthias pulchellus*

Diameter 0.775–0.875 mm. Oil droplet diameter 0.112–0.125 mm. Common off east coast of South Island in spring and summer.

*Arnoglossus scapha*

Diameter 0.775–0.875 mm. Oil droplet diameter 0.175 mm. Occurs occasionally in neritic Otago waters in spring.

*Pseudolabrus fucicola*

Diameter 0.775–0.900 mm. Oil droplet diameter 0.175 mm. Possibly a spring spawner. (Not taken in the plankton in this study.)

*Pseudophycis bacchus*

Diameter 0.850–0.900 mm. Oil droplet diameter 0.150 mm. Rare in Otago outer shelf waters in summer.

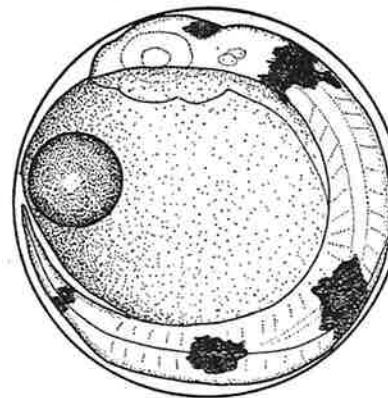
*Hoplichthys haswelli*

Diameter 0.900–0.980 mm. Oil droplet diameter 0.240–0.280 mm. In central and northern New Zealand waters in summer. (Not taken in plankton in this study.)

*Arripis trutta*

Diameter 0.862–0.966 mm. Oil droplet diameter 0.250 mm. North Island waters in summer (Cassie 1956). (Not taken in plankton in this study.)

*Chrysophrys auratus*



0.5mm

Fig. 9b

Diameter 0.875–0.950 mm. Oil droplet diameter 0.200–0.225 mm. East Cape in autumn. (Not taken in plankton in this study.)

*Chironemus spectabilis*

Diameter 0.900–1.025 mm. Oil droplet diameter 0.200–0.225 mm. Patch of black pigment behind embryonic head, three more along body, spacing about equidistant. Common over outer shelf waters in Fiordland, Kaikoura – Cook Strait, East Cape in summer to autumn (Fig. 9b).

*Cheilodactylus macropterus*

Diameter 0.925–1.025 mm. Oil droplet diameter 0.200–0.225 mm. East Cape in autumn. (Not taken in the plankton in this study.)

*Cheilodactylus douglasi*

Diameter 0.975–1.075 mm. Oil droplet diameter 0.200–0.225 mm. In southern New Zealand waters, outer shelf summer to autumn. (Not taken in plankton in this study.)

*Notopogon lilliei*

Diameter 1.000–1.275 mm. Oil droplet diameter 0.300–0.350 mm. Kaikoura in autumn. (Not taken in plankton in this study.)

*Serirolella punctata*

Diameter 1.100–1.250 mm. Oil droplet diameter 0.225–0.300 mm. Late stage embryo has lateral rows of melanophores in the head region and a band of pigment between anus and tail. Common in southern New

Zealand waters, deep shelf, in spring and summer (Fig. 9c).

*Parapercis colias*

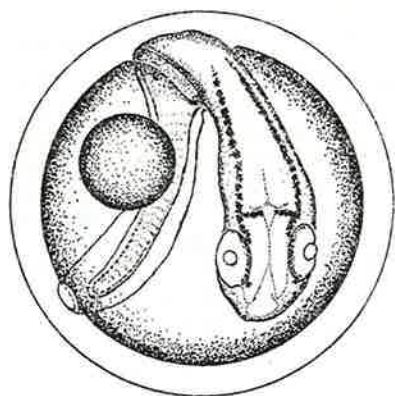


Fig. 9c

Diameter 0.912–1.064 mm. Oil droplet diameter 0.243–0.274 mm. Central and southern New Zealand waters in spring to autumn. (Not recognised in plankton in this study.)

*Thysites atun*

Diameter 1.075–1.175 mm. Oil droplet diameter 0.225–0.250 mm. Rare. Otago coast in summer.

*Parapercis gilliesii*

Diameter 1.300–1.500 mm. Oil droplet diameter 0.275 mm. Advanced embryo and yolk spotted with regularly spaced melanophores. Occasional in most coastal waters (mid-shelf) during summer and autumn (Fig. 9d).

*Chelidonichthys kumu*

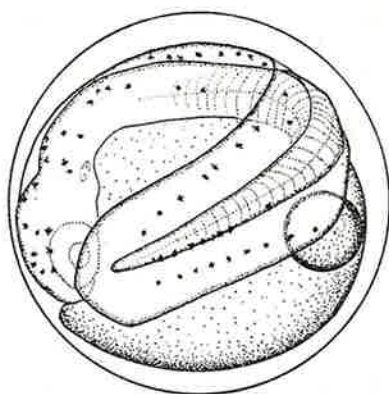


Fig. 9d

Diameter 1.425–1.600 mm. Oil droplet diameter 0.350–0.400 mm. Four small dorsal melanophores almost equally spaced. Two to three ventral post-anal melanophores. Occasional in central and southern mid-shelf waters in spring to autumn (Figs. 9e and 9f).

*Seriolella brama*

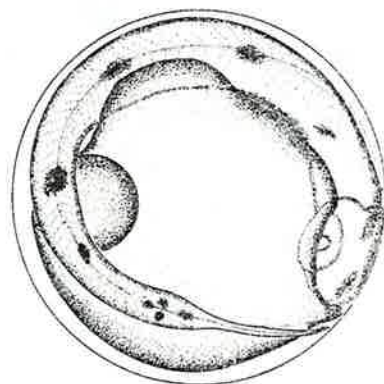


Fig. 9e

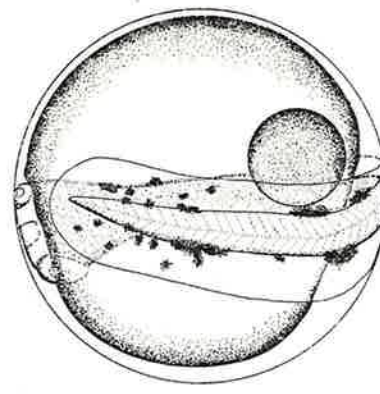


Fig. 9f

Diameter 1.600–1.750 mm. Oil droplet diameter 0.328 mm. East Cape in autumn. (Not taken in plankton in this study.)

*Pterygotrigla picta*

Diameter 1.625–1.750 mm. Oil droplet diameter 0.400–0.425 mm. Chorion may be light pink. Melanophores distinct in late embryo—two dorsal, one caudal, and one ventral mid-way between the two dorsal. Common in north-eastern mid-

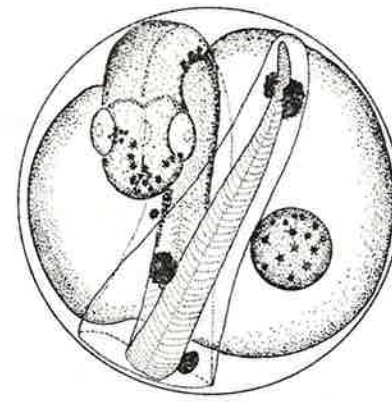


Fig. 9g

shelf waters in autumn. (Fig. 9g).

*Lepidopus caudatus*

Diameter 1.775–2.100 mm. Oil droplet diameter 0.325 mm. Rare. Bay of Plenty, East Cape–Kaikoura, in spring–autumn.

*Zeus japonicus*

Diameter 2.000–2.250 mm. Oil droplet diameter 0.275–0.375 mm. Rare. Otago waters in spring to summer.

*Zenopsis nebulosus*

## ACKNOWLEDGMENTS

I am grateful to Dr E. J. Batham for the use of the facilities at the Portobello Marine Laboratory, where this study was completed, and to Dr J. B. Jillett, who supervised my Ph.D. studies. Thanks are also due to Dr D. Eggleston

and Mr G. D. James, of the Fisheries Research Division, for providing ripe eggs from four species of fish.

This study was financially assisted by a Marine Department Research Fellowship.

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## Species

## Author and date

<i>Acanthoclinus quadridactylus</i>	(Bloch and Schneider, 1801)
<i>Allomycterus jaculiferus</i>	(Cuvier, 1818)
<i>Anthias pulchellus</i>	Waite, 1899
<i>Argentina elongata*</i>	Hutton, 1879
<i>Arnoglossus scapha</i>	(Bloch and Schneider, 1801)
<i>Arripis trutta</i>	(Bloch and Schneider, 1801)
<i>Auchenoceros punctatus</i>	(Hutton, 1873)
<i>Caranx georgianus</i>	(Cuvier, 1833)
<i>Cheilodactylus douglasi</i>	Hector, 1875
<i>Cheilodactylus macropterus</i>	(Bloch and Schneider, 1801)
<i>Chelidonichthys kumu</i>	(Lesson and Garnot, 1826)
<i>Chironemus spectabilis</i>	(Hutton, 1872)
<i>Chrysophrys auratus†</i>	(Forster, 1801)
<i>Coelorhynchus aspercephalus</i>	(Waite, 1911)
<i>Coelorhynchus australis</i>	(Richardson, 1839)
<i>Colistium guntheri†</i>	(Hutton, 1873)
<i>Colistium nudipinnis</i>	Waite, 1911
<i>Congiopodus leucopaecilus</i>	(Richardson, 1846)
<i>Coridodax pullus</i>	(Forster, 1801)
<i>Crapatalus angusticeps</i>	(Hutton, 1874)
<i>Echiodon</i> sp.*	
<i>Engraulis australis*</i>	(White, 1790)
<i>Genyagnus monopterygius</i>	(Bloch and Schneider, 1801)
<i>Gnathopis habenatus</i>	(Richardson, 1848)
<i>Gnathopis incognitus</i>	Castle, 1963
<i>Helicolenus papillosus</i>	(Bloch and Schneider, 1801)
<i>Hoplichthys haswelli</i>	(McCulloch, 1907)
<i>Kathostoma giganteum</i>	Haast, 1873
<i>Lampanyctus steinbecki</i>	Bolin, 1939
<i>Lepidopus caudatus</i>	(Euphrasen, 1778)
<i>Maurollicus muelleri*</i>	(Gmelin, 1788)
<i>Mendosoma lineatum</i>	Guichenot, 1849
<i>Mola mola</i>	(Linnaeus, 1758)
<i>Mugil cephalus</i>	Linnaeus, 1758
<i>Notopogon lilliei</i>	Regan, 1914
<i>Notothenia microlepidota</i>	Hutton, 1875
<i>Novodon convexirostris</i>	(Bloch and Schneider, 1801)
<i>Parapercis colias</i>	(Bloch and Schneider, 1801)
<i>Parapercis gilliesii</i>	(Hutton, 1879)
<i>Paratrachichthys trailli</i>	(Hutton, 1876)
<i>Pelotretis flavilatus</i>	Waite, 1911
<i>Peltorhamphus novaezeelandiae</i>	Günther, 1862
<i>Peltorhamphus tenuis</i>	James, 1972
<i>Pseudolabrus celidotus</i>	(Forster, 1801)
<i>Pseudolabrus fucicola</i>	(Richardson, 1840)
<i>Pseudophycis bacchus</i>	(Bloch and Schneider, 1801)

\*Egg descriptions from planktonic eggs.

†Egg descriptions from literature.

*Pterygotrigla picta*  
*Regalecus glesne*\*  
*Rhombosolea leporina*†  
*Rhombosolea plebeia*  
*Sardinops neopilchardus*  
*Scomberesox saurus*\*  
*Seriotelella brama*  
*Seriotelella punctata*  
*Sprattus antipodum*  
*Thyrsites atun*  
*Trachurus declivis*  
*Trachurus mccullochi*  
*Zenopsis nebulosus*  
*Zeus japonicus*

(Günther, 1880)  
 (Ascanius, 1778)  
 Günther, 1873  
 Richardson, 1843  
 (Steindachner, 1879)  
 (Walbaum, 1792)  
 (Günther, 1860)  
 (Bloch and Schneider, 1801)  
 (Hector, 1872)  
 Euphrasen, 1791  
 (Jenyns, 1841)  
 (Nichols, 1920)  
 (Temminck and Schlegel, 1845)  
 (Richardson, 1845)

\*Egg descriptions from planktonic eggs.  
 †Egg descriptions from literature.

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Printed by Universal Printers Ltd., Vivian Street, Wellington,  
under the authority of A. R. Shearer, Government Printer, Wellington,  
New Zealand.  
1975