

The Food of Post-Larval Fish.

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INTRODUCTION.

INVESTIGATION of the food of larval and post-larval fish from the tow-nets has been continued throughout the year (1918) in the same way as previously,* by examining the contents of stomach and intestine in the fresh state. From May 24th a new big net made of stramin, with a wooden frame 36 inches by 25 inches, was used in addition to the ordinary tow-nets. Any live specimens, and these were chiefly caught in the big net, were kept in small aerated aquaria standing in running water and fed with plankton in order to see, when possible, what food they ate. In this way a few post-larval fish went through the metamorphosis into the adult form. Details of these will be found in another paper in the same number of the Journal (page 9).

The tow-nettings were regularly examined by Miss Webb in order to see whether the fish were feeding on what was commonest at the moment, and this was found to be usually the case, so far as the Copepods were concerned, although most of the young fish seemed to select their food to a certain extent. In any month the Copepods which are at that time commonest in the plankton are those most eaten by the young fish, but most of them have preferences and select in various degrees.

Thus in June *Calanus finmarchicus* and *Acartia clausi* were the commonest Copepods, *Temora longicornis* coming next, *Pseudocalanus elongatus* and *Oithona similis* not occurring so frequently. The commonest young fish in the tow-nets in the same month were the Whiting, Pollack, Rockling and Ballan Wrasse (*Labrus bergylta*). It has been shown last year that the Whiting chiefly eats *Pseudocalanus*, and this is borne out in this year's records. In June *Pseudocalanus* is still its chief food, although *Calanus* and *Acartia* are commoner, and these it also eats occasionally. In July, however, when *Pseudocalanus* was usually absent and *Calanus* abundant the Whiting's food was chiefly *Calanus*. The Pollack, on the other hand, in June took *Calanus* more often than *Pseudocalanus* and *Acartia* although it ate all three. *Labrus bergylta* was the only fish of the three to eat *Temora* in June and this is its usual food. The Rockling, *Onos mustela*, alone ate large numbers of *Oithona similis* and very little else.

* Journ. Mar. Biol. Assocn. XI, p. 433, 1918.

It is almost entirely the Copepods which are eaten by the young fish, except those still in the larval state or very small post-larval forms, which eat unicellular organisms and larval mollusks. Cirripede larvæ and the Cladocera, i.e. *Podon* and *Evadne*, when present are, however, eagerly devoured. Larval mollusks form the chief food of the young Gar-fish, *Rhamphistoma belone*, which in its turn is the chief food, with the Rockling, of young Brill of about 1 to 1½ inches in length which are common inshore in summer.

As usual the first fish to appear in the tow-nets are Herring and Sprat. These two and an occasional Pouting are the only species in January. None contained food, and there was little in the plankton except diatoms, although Copepods were on the increase towards the end of the month.

In February, besides Herring, Sprat and Pouting, the Lesser Sand-Eel, *Ammodytes tobianus* and *Cottus bubalis*, were common, and *Agonus cataphractus* and the Lump-Sucker, *Cyclopterus lumpus*, occurred. No food was seen in the Herring except green food remains, a larval bivalve occurred in the Sprat and green food remains in *Ammodytes*, whilst *Cottus* and *Agonus* had eaten *Balanus* nauplii. The plankton was rich in species towards the middle of the month, *Balanus* nauplii occurring first on February 15th.

A large increase of fish occurred in March—Herring, Sprat, *Ammodytes tobianus*, *Cottus bubalis*, Rockling, Whiting and *Solea lutea*. All the Herring that contained any food had eaten *Pseudocalanus*, 17 out of 77 specimens, the rest being empty. The Sprats contained no food. *Ammodytes* and the Rockling contained green food remains, *Cottus* contained *Pseudocalanus* and *Temora* and the Whiting *Pseudocalanus*.

There was a great abundance of life in the plankton in March, *Pseudocalanus* and *Temora* being some of the commonest Copepods throughout the month.

In April the Herring have disappeared and there are only a few Sprat, but there is a large increase of young fish of other kinds—*Cyclogaster Montagu*, *Cottus bubalis*, Rockling, Pouting, Whiting, Pollack, *Callionymus lyra*, Sole, Flounder, Merry Sole, Thickback, *Ammodytes tobianus* and *Gobius* sp. all occurred. The Sprat still contained green food remains or no food at all, *Cyclogaster* contained *Acartia* and *Temora*, *Cottus* contained chiefly *Temora*, but also *Pseudocalanus*, Copepod nauplii and a larval bivalve, the Rockling contained *Temora* and *Pseudocalanus*, chiefly the latter; *Euterpina acutifrons*, Copepod nauplii and a crab zoëa were also eaten. The Pouting contained *Pseudocalanus* and green food remains, the Whiting, which was very abundant during April nearly always contained *Pseudocalanus*, but occasionally *Temora* and Copepod nauplii. Once it had eaten *Balanus* nauplii and once an *Acartia*. The

Pollack contained *Pseudocalanus*. *Callionymus* was often empty, but had often eaten *Pseudocalanus* and once a *Temora* nauplius. The flat fish contained no food.

It is striking that *Pseudocalanus* is the almost universal food of the fish in April, *Temora* coming next, *Acartia* rarely, and these are all that occur more than once in any of the fish. The April plankton is rich in life of various kinds with plenty of Copepods, but of the Copepods *Pseudocalanus*, *Temora* and *Acartia* are certainly the commonest forms.

Fish were fairly numerous in May, the Whiting still continuing to be commonest. Besides the Whiting there occurred Sprat, *Gobius* sp., Flounder, Rockling, Pollack, *Ammodytes tobianus*, *Callionymus lyra* and *Trigla* sp. Up to May 24th the Whiting was feeding almost entirely on *Pseudocalanus*, although again occasionally on *Temora* and *Acartia*, and, very rarely, on *Calanus*. On May 17th one had a specimen of *Calanus* in its mouth and another had two *Calanus* and one *Centropages typicus* also in its mouth. These must have been feeding in the jars after capture. After this *Acartia* was rather more often taken although still *Pseudocalanus* predominated, but on May 27th 37 specimens had all been feeding on *Calanus*, many of which were still in the mouth, some inside, and also some *Temora*, but on that date only one *Pseudocalanus*. After this *Pseudocalanus*, *Acartia* and *Calanus* are all taken, but *Pseudocalanus* is still the favourite. Those specimens that are below 9 mm. in length apparently do not take *Calanus*, but those of quite a large size will take, and often seem to prefer, the smaller forms such as *Pseudocalanus*. The Sprat again contained green food remains or were empty, the Rockling contained Copepod nauplii, *Calanus*, *Pseudocalanus* and *Oithona similis*, *Ammodytes* contained green food remains and Copepod remains including *Pseudocalanus*. The Pollack up to nearly the end of May contained chiefly *Pseudocalanus*, with occasional *Temora*, *Calanus*, *Acartia* and *Oithona*; from May 27th to the end of the month it was chiefly *Calanus*. Sometimes, however, the Pollack contained several different Harpacticids. *Callionymus* contained *Pseudocalanus*, *Temora*, *Acartia* and Copepod nauplii. Thus again this month *Pseudocalanus*, *Temora* and *Acartia* with *Calanus* in addition are the chief food of the young fish, *Pseudocalanus* being commonest until nearly the end of the month and afterwards *Calanus*.

The plankton is full of Copepods all through the month, but there is a distinct falling off in frequency of *Pseudocalanus*, and towards the end of the month *Calanus* is specially abundant and is apparently eaten by those fish that usually feed on *Pseudocalanus*.

A number of fish occurred in June. The Whiting is still the commonest. *Labrus bergylta*, Rockling, *Ammodytes tobianus*, Pollack, *Cyclogaster Montagu*, Sprat, *Gobius Ruthensparri*, Pouting, *Cyclopterus lumpus*,

Callionymus lyra and *Trigla* sp. also occurred. The Whiting again fed chiefly on *Pseudocalanus*, although *Calanus* was frequently taken especially after capture, when the fish must have fed in the jar. Again *Acartia* and *Temora* were occasionally taken. *Gobius* contained *Acartia* and *Pseudocalanus*. *Labrus* contained *Temora*, the Rockling contained *Oithona* almost exclusively, the Pollack contained chiefly *Calanus*, but also *Pseudocalanus*, *Acartia* and Harpacticids. The other fish contained no food.

In the tow-nets there was much life, *Calanus* and *Acartia* being the chief Copepods, *Pseudocalanus* and *Oithona* not so common.

The plankton other than the young fish was not specially recorded for July, except on the 1st and 2nd of the month. Young fish were on the decrease, *Labrus bergylta* being the commonest, Whiting has nearly disappeared, *Gobius Ruthensparri*, Rockling, *Cyclopterus lumpus*, *Ctenolabrus rupestris*, *Blennius ocellaris*, *Blennius gallerita*, *Lepadogaster Candolli*, *Ammodytes* sp., *Trachinus vipera*, *Solea lascaris*, Turbot, Brill, *Rhamphistoma belone* and *Callionymus lyra* all are present. *Labrus* had fed chiefly on *Temora*, although *Podon intermedius* had been eaten frequently, the only other food being occasional Harpacticids. The Whiting had fed on *Calanus* and *Pseudocalanus*, but also on *Podon*, *Acartia* and *Hyperia* sp. No Whiting was caught in the tow-nets after this month. *Gobius* contained *Temora* and *Podon*; the Rockling contained *Pseudocalanus*, *Oithona* and remains of Amphipods; *Ctenolabrus* contained *Temora*; *Blennius gallerita* contained *Podon* and *Acartia*; *Lepadogaster Candolli* contained *Podon* chiefly, but also *Temora*, larval gastropods and Harpacticids; *Ammodytes* contained *Podon*, *Oithona* and *Calanus* nauplius; *Trachinus* contained *Temora*, *Pseudocalanus* and larval gastropods; the Turbot contained the amphipod *Apherusa clevei*; *Rhamphistoma* contained chiefly larval gastropods, but the older specimens also contained Harpacticids and *Podon*. The rest contained no food.

Podon intermedius occurred commonly in the plankton throughout July and was eaten by seven different sorts of young fish, so that it is evidently a favourite food.

Not many fish were caught in August, *Labrus bergylta* and *Gobius* spp. being the commonest. *Trachinus vipera*, *Lepadogaster Candolli* and *bimaculatus*, *Blennius gattorugine* and *ocellaris*, *Arnoglossus* sp., *Ammodytes* sp., *Rhamphistoma belone*, Rockling, *Ctenolabrus rupestris* and *Callionymus lyra* were also present. *Labrus* had eaten *Temora* only, as also had *Ctenolabrus rupestris*; *Trachinus* which is a rather varied feeder had also eaten chiefly *Temora*, but also larval *Gebia*, *Podon*, larval gastropods, larval bivalve, *Corycaeus anglicus*, *Oithona similis* and *Pseudocalanus*; *Blennius gattorugine* had eaten *Podon*; *Lepadogaster*

Candolli contained *Podon* and *Temora*; *Arnoglossus* contained the diatom *Tabellaria*; *Rhamphistoma* as usual contained larval gastropods. *Gobius* contained *Temora*, *Pseudocalanus* and Harpacticids; *Callionymus* contained *Pseudocalanus*, *Temora* and Harpacticids.

The plankton for August is abundant, *Calanus* and *Acartia* being the commonest Copepods; Decapod larvæ are abundant, particularly *Gebia*, which was eaten by *Trachinus*.

Much fewer fish were caught in September: a Sprat of 32 mm., *Gobius* spp., *Ctenolabrus rupestris*, *Caranx trachurus*, *Ammodytes* sp., *Blennius ocellaris* and *galerita*, Pilchard, Pollack, *Arnoglossus* sp., *Lepadogaster gouani* and *bimaculatus*. The Sprat contained *Balanus* cypris larvæ and larval gastropods; the Pollack contained *Acartia* and *Temora*; *Ammodytes* contained Copepod nauplii including *Calanus*; *Caranx trachurus* contained *Temora*; *Blennius ocellaris* which measured 30 and 31 mm. contained Decapod larvæ; the Pilchards were empty except for one indistinguishable Copepod; *Lepadogaster bimaculatus* contained larval gastropods, *Balanus* nauplius and Harpacticids, besides a fish's egg; *Gobius* contained *Temora*, *Pseudocalanus* and Harpacticids; the remainder contained no food.

The plankton early in the month was characterized by large numbers of the Ctenophore, *Bolina infundibulum*, accompanying which were many *Hyperia*. The latter, however, were not eaten by any of the fish examined, although when given to the fish in the small aquaria the smaller specimens were eaten by *Cyclopterus lumpus* and *Solea vulgaris*. The number of Copepods in the plankton decreases, but *Acartia* and *Calanus* are still abundant at times. *Pseudocalanus* and *Temora* although eaten by the fish are not so common in the tow-nets.

Still fewer fish were caught in October, November and December, the tow-nettings not being regularly taken in November. The fish included Pilchard, *Gobius microps*, *Blennius ocellaris*, *Cyclopterus lumpus*, *Lepadogaster bimaculatus* and *Arnoglossus* sp. The last contained *Pseudocalanus*; *Blennius* and *Gobius* had eaten *Corycæus anglicus*, the remainder contained no food.

From October to December there is less and less in the plankton, and especially in December very few Copepods are present. *Corycæus anglicus* is at times common in all three months.

From the above observations it is seen that Copepods are certainly the chief food of the young fish caught in the tow-nets, and by far the most important as food are the four species *Pseudocalanus elongatus*, *Temora longicornis*, *Calanus finmarchicus* and *Acartia clausi*. Nearly all the commonest larval and post-larval fish feed upon one or more of these, evidently selecting them from the rest of the food. The large numbers of Crustacea larvæ other than Copepods, with the exception

of Cirripede larvæ, are very little eaten by these small fish. Cladocera which only occur in summer are, however, often eaten when present. It is only very seldom that Decapod larvæ are found inside the young fish from the tow-nets, an occasional larval *Gebia* or *Hippolyte*, crab larvæ or small Amphipods sometimes occurring, but the young fish will take these when in captivity for want of anything better. If Copepods are available, however, they always choose these rather than the Decapod larvæ, but when hungry they will take the larvæ if not too spiny nor too large.

LABRUS BERGYLTA ASC. BALLAN WRASSE.

Fifty-four specimens of the Ballan Wrasse, 4 to 10 mm. long, were examined from the tow-nettings June to August from inside and outside the Breakwater and as far out as the Panther buoy (see plan of Sound, 1917).^{*} 16 contained no food, 21 contained *Temora*, 7 contained *Podon*, 5 contained Harpacticids and the rest contained Copepod remains which were almost certainly *Temora*. Thus *Temora* is the favourite food, and although not very common through June and July yet it was nearly always present in the tow-nettings. This agrees with last year's records when Copepod nauplii, especially *Temora*, were found to be the predominant food of the Ballan Wrasse, other small organisms also being eaten. The smallest specimen, of 4 mm., had eaten nearly full-grown *Temora*. Two live specimens were kept in aquaria and fed on small plankton chiefly consisting of Copepod nauplii and young Copepods at first. Afterwards they ate *Temora*, *Acartia* and *Podon*, but not *Calanus*, which was always left, even by a fish 13 mm. long. *Balanus* nauplii were also eaten and oyster spat, but the pteropod *Limacina retroversa* was refused.

CTENOLABRUS RUPESTRIS L.

Four specimens, 8 to 9 mm. long, occurred in the tow-nettings from the Breakwater, Panther and Knap in July and August. All contained Copepods, one with indistinguishable remains, the others with *Temora longicornis*, so that it is likely that this fish feeds like *Labrus* and prefers *Temora*.

CARANX TRACHURUS L. HORSE MACKEREL.

Two specimens in September, 15 and 27 mm. long. The larger contained no food, the smaller contained *Temora* and other Copepod remains.

^{*} Journ. Mar. Biol. Assocn. XI, p. 459, 1918.

TRACHINUS VIPERA CUV. LESSER WEAVER.

Nineteen specimens from July to August, 3 to 12 mm. in length, from both inside and outside the Breakwater. 7 contained *Temora*, adult and nauplii, 2 contained *Pseudocalanus*, 1 contained a larval *Gebia*, one an *Oithona similis* and one a *Corycaeus anglicus*, 3 contained several larval gastropods. The few records from last year showed varied food, so that evidently the young *Trachinus* takes a variety although it is chiefly Copepods.

COTTUS BUBALIS EUPH. FATHER LASHER.

Thirty-eight specimens from February to April, chiefly from inside although occasionally from outside the Breakwater, from 3 to 8 mm. in length. 25 contained no food, 7 contained *Temora*, 3 contained *Pseudocalanus*, 2 contained *Balanus* nauplii and 3 contained larval mollusks. As before we see that *Cottus* has a varied diet, but this year no diatoms were observed inside it.

TRIGLA SP.

Six specimens of *Trigla*, probably *gurnardus*, but perhaps 2 species, were examined. Four contained no food, one contained Copepod remains and another Copepod eggs.

AGONUS CATAPHRACTUS L. ARMED BULLHEAD.

One specimen on February 26th from the region of the Panther buoy, 8 mm. long, contained 2 *Balanus* nauplii.

BLENNIUS OCELLARIS L. BUTTERFLY BLENNY.

Two live specimens in July and August only lived a few days and when dead contained no food.

BLENNIUS GALERITA L. MONTAGUI'S BLENNY.

Two specimens in July and September. One contained no food, the other of 10 mm. contained *Podon* and *Acartia*.

BLENNIUS GATTORUGINE BLOCH.

Three specimens in August, one alive but only lived a few days, one contained no food and the third contained *Podon*.

GOBIUS MINUTUS L.

One specimen in August from inside the Breakwater measuring 12 mm. contained *Pseudocalanus*. 20 smaller specimens which were probably this species occurred from March to August. Those of 2.4 mm. were without food, larger specimens up to 7 mm. contained *Pseudocalanus* and *Temora*.

GOBIUS MICROPS KROYER.

Seventeen specimens from inside the Breakwater from 8 to 12 mm. Most of these contained no food, one contained a *Pseudocalanus* and one a larval gastropod. A specimen 10 mm. long on July 24th has been kept in a small aquarium and is still alive, having been fed on miscellaneous small plankton, chiefly Copepods. It now (December 18th) measures 16 mm. and has all the adult features.

GOBIUS RUTHENSPARRI EUPH.

This is the commonest goby from the tow-nettings in the Sound. 54 specimens were examined from 4 to 14 mm. Copepod nauplii being the chief food, the peridinium *Prorocentrum micans* was in one, *Acartia*, *Temora*, *Podon* and Harpacticids also being present. A specimen of 30 mm. from the Cattewater in July contained the following: 1 *Acartia clausi*, 4 larval gastropods, 6 larval bivalves, 1 *Idya furcata*, 5 Harpacticids indet. One specimen captured alive on June 7th measured 14 mm. It was kept alive until December 5th when it measured 25 mm. It was fed on plankton containing numerous small adult and larval Copepods and sometimes *Balanus* nauplii, all of which were eaten. Oyster spat and *Limacina retroversa* were refused. Evidently small Crustacea form its natural food. This is probably the *Gobius* sp. (a) recorded last year.

GOBIUS PAGANELLUS (L.).

Although this is the commonest goby of the shore rocks its young stages do not occur often in the tow-nets. 8 specimens were examined, 4.5 to 11 mm. long, 2 contained *Pseudocalanus*, one contained *Temora* and 3 contained Harpacticids. A specimen of 20 mm. from the Cattewater contained the following: 33 Harpacticids, one mite, 6 skins of insect larvæ, Copepod eggs. This is the *Gobius* sp. (b) recorded last year.

CALLIONYMUS LYRA L. DRAGONET.

Thirty-eight specimens from April to August from both inside and outside the Breakwater. 20 of these contained no food; of the remainder

7 contained *Pseudocalanus*, 5 contained *Temora*, one contained *Acartia*, one an Harpacticid and the remainder contained Copepod remains. Last year's records show it to be a miscellaneous feeder. At 3 mm. it had eaten *Pseudocalanus*, so that it can feed on fairly large Copepods when almost newly hatched.

CYCLOGASTER MONTAGUI DONOV.

Three specimens in April and June. Only one contained food—*Acartia* and *Temora*.

CYCLOPTERUS LUMPUS L. LUMP SUCKER.

Out of 7 from the tow-nets from February to December, 6 were kept alive, measuring 10 to 25 mm. The other contained *Idotea* sp., and Amphipod and Harpacticids. These young *Cyclopterus* live among the *Zostera* eating such things as frequent the weed. The live specimens ate small Crustacea of all kinds and would take *Leander* larvæ almost as long as themselves; young Isopods were also eagerly eaten, almost any Copepods and *Balanus* nauplii.

LEPADOGASTER CANDOLLI RISSO.

Eighteen specimens in July and August, 4 contained no food, 5 contained *Temora*, 6 contained *Podon*, one a *Pseudocalanus* and 2 contained Harpacticids. Evidently small Crustacea form its usual food. One was kept alive and fed on fine plankton containing small Copepods, *Podon* and *Balanus* larvæ.

LEPADOGASTER GOUANI LACEP.

This is the common shore form. Only 2 specimens occurred in the tow-nets from near the Breakwater. One contained larval gastropods, the other was kept alive and fed on the same food as *L. Candolli*.

LEPADOGASTER BIMACULATUS DONOV.

Two specimens obtained from near the Breakwater and Panther buoy. One was kept alive and fed on the same food as the other two, the second, measuring 6 mm., contained larval gastropods, larval bivalve, *Balanus* nauplius, Harpacticids and a fish egg.

RHAMPHISTOMA BELONE (L.). GAR-FISH.

Four specimens from the region of Panther and Knap in July and August from 8 to 36 mm. were all feeding on larval gastropods, as many

as 85 in the largest in addition to 18 Harpacticids and 3 *Podon*. One of 11 mm. contained 33 larval gastropods. Several post-larval Gar-fish brought in from the Cattewater also had fed chiefly on larval gastropods and very little else, the stomachs and intestines being full of them. Many young Brill were feeding on these Gar-fish, some as long as themselves being swallowed.

One Gar-fish, which had just completed its metamorphosis and developed the long beak, was put alive into a small aquarium with some very fine plankton consisting chiefly of small Copepods and Copepod nauplii, which had congregated at the surface on one side of the glass. The fish instantly rushed into the middle of these and lashing about with its beak snapped up the food at an amazing rate. Unfortunately it died the same day.

PLEURONECTES FLESUS L. FLOUNDER.

Four specimens from March to May, 7 to 9 mm. long. None contained food.

PLEURONECTES MICROCEPHALUS DONOV. MERRY SOLE.

One specimen of 6 mm. from between Cawsand and Penlee contained no food.

SOLEA VULGARIS QUENS. SOLE.

One specimen from the Panther on April 12th, 11 mm. long, kept alive. For two months it was fed on *Temora*, afterwards on other Crustacea. Still alive on December 18th measuring 40 mm.

SOLEA LASCARIS BONAP. LEMON SOLE.

One live specimen from the Knap on July 15th, 9 mm. long, fed on small Crustacea, chiefly Copepods, died November 18th, measuring 23 mm. At first it ate chiefly *Acartia* and *Pseudocalanus*, afterwards adult *Temora* and *Calanus*, also the smaller Decapod larvæ and small Isopods, but it refused oyster spat.

SOLEA LUTEA RISSO.

One specimen from off White Patch on March 11th, 14 mm. long, contained no food.

SOLEA VARIEGATA DONOV. THICKBACK.

Two specimens in June from the Panther and West Channel, 6 and 10 mm. long. The larger specimen contained no food, the smaller was kept alive for two days only, being fed on small plankton.

ARNOGLOSSUS SP.

Four specimens, probably *Arnoglossus laterna*, in July and August, 7 to 31 mm., 2 contained no food, one contained a *Pseudocalanus* and the largest contained the diatom *Tabellaria*.

RHOMBUS MAXIMUS L. TURBOT.

One specimen from the Knap, July 23rd, measuring 13 mm. contained the Amphipod *Apherusa clevii*.

RHOMBUS LÆVIS RONDEL. BRILL.

Two live specimens in July, one of 15 mm. died the next day having eaten 4 *Anomalocera Pattersoni*, the other of 27 mm. lived till October 6th, having eaten various Crustacea. On July 17th several specimens from 9 to 30 mm. were brought in from the Cattewater; the smallest contained larval bivalves and larval gastropods, the older specimens contained young *Rhamphistoma* and Rockling.

GADUS MERLANGUS L. WHITING.

Two hundred and eighty-eight specimens were obtained altogether from the tow-nets, the first on March 12th, the last on July 24th, from the Sound near the White Patch and Breakwater and beyond the Breakwater by the Knap and Panther buoys and off Cawsand and Penlee. They measured from 3.5 to 35 mm. The smallest, which must have been hatched quite recently, in some cases contained Copepod nauplii showing that it can eat such solid food almost directly. 73, measuring 4 to 21 mm., contained no food, 5 were kept alive in a small aerated aquarium and 3 of these lived for several weeks, being fed on small Crustacea of various kinds, chiefly Copepods from the plankton. 134 from 4.5 to 33 mm. contained *Pseudocalanus*, the largest containing 33 specimens besides other Crustacea. *Pseudocalanus*, common in the tow-nets during April, was the principal food until nearly the end of May, although it was rare or absent in the tow-nets during May and not abundant afterwards. *Acartia* and *Calanus* are eaten when *Pseudocalanus* is not so common, and *Temora* is all the time occasionally eaten, being present in 19 and the nauplius in 5. *Acartia* occurred in 22 (except in one case, after May 23rd), *Calanus* in 41, all after May 11th; most of these *Calanus* were in the mouth and alive and must have been taken from the tow-nettings after capture. However, it is certain that the Whiting does eat *Calanus*, for when *Calanus* was given to the live specimens

from the tow-nets it was taken eagerly. *Balanus* nauplii occurred once only in a Whiting in April, Copepod nauplii indistinguishable in 5, *Podon* in 3 in July.

Thus the favourite food of the Whiting is shown to be, as it was last year, *Pseudocalanus*. This year, having larger numbers to work with, it was determined that although *Pseudocalanus* is evidently the favourite food and is taken principally even when *Temora*, *Acartia* and *Calanus* are present in large numbers, yet these three are only taken occasionally except when *Pseudocalanus* is rare and then *Calanus* may be taken abundantly by those of about 9 mm. upwards. Crab megalopæ occurred in two specimens of 22 and 35 mm. and the latter also contained remains of Decapod larvæ. A specimen of 55 mm. contained remains of a Whiting so that a cannibal diet begins at an early age. The two live Whiting of 22 mm., each swallowed a live Whiting of 10 mm. put into the aquarium to live with them. They were snapped up the moment they were put in. A young *Hyperia* was contained in a Whiting of 24 mm. It thus appears that after about 20 mm. other animals are taken as well as Copepods. The live specimens measured 16 to 19 mm., and one grew to 35 mm. All the time they would always eat Copepods, although they took young Isopods and Decapod larvæ if Copepods were not present. They would, however, prefer the Copepods and take these first if a mixture of Copepods and Decapod larvæ were given. *Pseudocalanus* was preferred, *Acartia*, *Calanus* and *Temora* coming next in order of preference. Larvæ with long spines such as *Porcellana* were refused even by the largest Whiting. Oyster spat and *Limacina* were also refused.

GADUS LUSCUS L. POUTING.

The Pouting is one of the earliest of the young fish, occurring from January to June but not commonly. The specimens measured 3 to 8 mm. In the smallest there is green food remains and Copepod nauplii. The specimen of 8 mm. had eaten *Pseudocalanus*. On December 16th two Pouting measuring 18 and 23 mm. were brought from Jennycliff Bay, having been caught in the shrimp trawl. Both had fed on young Amphipods, the larger specimen also contained *Pseudocalanus*, *Candacia armata* and *Calanus*.

GADUS POLLACHIUS L. POLLACK.

Thirty-three specimens from 7 to 25 mm., from both inside and outside the Breakwater, from April to September. Of these 3 were alive, one living nearly two months. Only two of the remainder contained no food, of the others 19 contained *Pseudocalanus*, 12 contained *Calanus*,

5 contained *Temora*, 6 contained *Acartia*, 2 contained *Oithona*. Sometimes several of these species were eaten together, the largest number in any one fish under 10 mm. being 7 *Pseudocalanus* and one *Acartia*, those of larger size containing many more. A few had eaten Harpacticids in numbers. The commonest food is certainly *Pseudocalanus* and *Calanus*. The live specimens were given the same food as the Whiting and seemed to eat all the Copepods, but *Calanus* first. They also took various Decapod larvæ and attempted to eat oyster spat, but refused *Limacina*. One kept alive for 5 days only had eaten many Copepods, chiefly *Temora*, a crab megalopa and oyster spat.

ONOS MUSTELA L. ROCKLING.

Seventy-three specimens from March to August, 2.5 to 35 mm. The smallest contained green food remains, a few up to 7 mm. contained no food; all the rest were usually full of Copepods, ova and crab larvæ being occasionally present. In April the food taken was almost entirely *Pseudocalanus* and young *Temora*, usually both together. *Euterpina acutifrons* and a crab zoëa occurred once each, the latter in a specimen only 7 mm. long. In May and June *Oithona similis* was chiefly eaten, *Pseudocalanus* and *Calanus* occasionally, and once a larval mollusk. In July one of 34 mm. contained Amphipod remains in addition to *Pseudocalanus*. Last year in the few specimens examined *Temora* nauplii formed the chief food. It seems that even in the larger specimens the ordinary food consists of the smaller Copepods, although larval crustacea such as crab zoëæ can be taken by quite small specimens and Amphipods by those of a larger size. In captivity the Rockling ate almost any food given to it from the plankton, including young Isopods and *Leander* larvæ. It, however, refused both oyster spat and *Limacina*, although its ordinary food is sometimes larval gastropods. On July 17th and 23rd several young Rockling, 12 to 27 mm., were brought in from the Cattewater. These contained larval gastropods, crab megalopæ, larval *Gnathia* and Harpacticid remains, which shows well the varied character of their diet. These Rockling from near the coast were serving as food for the young Brill which were also eating the young Gar-fish.

AMMODYTES TOBIANUS L. LESSER SAND EEL.

From February to June the Lesser Sand Eel was common in the tow-nets, 109 being examined, 3 to 21 mm. Nearly all contained green food remains as before, or were empty. There was seldom anything definite in the green stuff, but twice the diatom *Coscinodiscus* was present. In one of 4 mm. there were remains of Copepod nauplii, but this is

unusual. In specimens of 19 to 21 mm. Copepod remains were present including *Pseudocalanus*.

From July to September a species of *Ammodytes* difficult to distinguish from *tobianus*, but probably *lanceolatus* occurred. Out of 26 specimens 21 were empty, one contained ova, probably of a Copepod, one contained *Oithona similis*, *Podon* and a fish egg, the remainder contained *Calanus nauplii*.

SYGNATHUS ROSTELLATUS NILLS.

Seven specimens from January to September, 17.5 to 105 mm. ; 4 of these were alive, but only lived a few days and when examined contained no food ; one contained 18 *Calanus*, another contained remains of *Calanus* and *Acartia* and the smallest contained no food.

CLUPEA HARENGUS L. HERRING.

Not so many herring were caught in the tow-nets this year. Only 87 in all, from January to March. The few caught in January and February contained no food. In March the only food present was *Pseudocalanus* in 17 out of 59, the rest being empty except for parasitic worms which frequently occurred. The Trematodes, *Pharyngora bacillaris* and *Derogenes varicus*, were common, also larval cestodes. *Pseudocalanus* was an important part of the herring food last year, although several other small Crustacea and larval mollusks were eaten.

CLUPEA PILCHARDUS L. PILCHARD.

Thirteen Pilchard occurred in the tow-nets in September, 9 to 36 mm. Only one contained any food and that was an unidentifiable Copepod.

CLUPEA SPRATTUS L. SPRAT.

Fifty-three Sprat were obtained from January to September. The smaller specimens as before contained green food remains or were empty, the only exceptions being one of 6 mm. containing a larval bivalve and one of 4 mm. containing the diatom *Coscinodiscus excentricus*. All the others were empty except one of 32 mm. in September which contained 4 *Balanus* cypris larvæ and 3 larval gastropods. This specimen was interesting, as its tail was very much frayed and found to contain a number of encysted larval trematodes arranged along the rays of the tail fin. These appeared to be a species of *Gasterostomum* and apparently accounted for the dilapidated state of the tail.

ANGUILLA VULGARIS TURTON. EEL.

One specimen of 40 mm. from Jennycliff Bay on March 22nd was perfectly transparent, but had completed its metamorphosis. It contained Crustacea remains.

AMPHIOXUS LANCEOLATUS. THE LANCELET.

One specimen of a larval Amphioxus occurred in the tow-nets on August 6th. It measured 6 mm. in length and although swimming about vigorously in the jar, when it was removed to a glass aquarium with a sandy bottom it remained in the sand and burrowed. Unfortunately it only lived two days. In its intestine were several sand grains and 3 *Coscinodiscus* sp.

LITERATURE.

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RECORD OF LARVAL AND POST-LARVAL FISH FROM
THE TOW-NETTINGS.

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
Jan. 7	Panther	<i>Syngnathus rostellatus</i>	1	17.5	No food.
8	Off White Patch	<i>Clupea harengus</i>	1	11	"
		<i>Clupea sprattus</i>	4	4-5	"
	Breakwater	<i>Gadus luscus</i>	1	5	"
		<i>Clupea sprattus</i>	3	3-6.5	"
11	Off Picklecombe Fort, W.	<i>Clupea harengus</i>	2	14-15	"
	West Channel	"	1	12	"
14	Breakwater	<i>Gadus luscus</i>	1	3	"
29	Knap	<i>Clupea harengus</i>	2	9-9.5	"
	West Channel	"	2	9-11	"
Feb. 2	Breakwater	"	1	9	"
	Middle Sound	"	1	9	"
5	Off White Patch	<i>Cottus bubalis</i>	1	5.5	"
12	Panther	<i>Cyclopterus lumpus</i>	1	40	<i>Idotea</i> sp., Amphipod and Harpacticoid indet.
	Breakwater	<i>Clupea harengus</i>	1	29	No food.
15	Panther	<i>Gadus luscus</i>	1	3	"
		<i>Ammodytes tobianus</i>	11	4-5	Green food remains.
	Knap	<i>Clupea sprattus</i>	1	6	Green food remains, larval bivalve.
		<i>Ammodytes tobianus</i>	1	4	No food.
	Breakwater	"	3	5-10	Green food remains.
		<i>Clupea sprattus</i>	9	5-7	" " "
		<i>Gadus luscus</i>	1	3	" " "
18	Knap	<i>Ammodytes tobianus</i>	7	4-6	" " "

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
18 Feb.		<i>Clupea sprattus</i>	1	4	No food.
		<i>Gadus luscus</i>	1	3	Copepod nauplii.
	Breakwater	<i>Ammodytes tobianus</i>	2	5	Green food remains.
		<i>Cottus bubalis</i>	2	4.5-5	No food.
		<i>Clupea sprattus</i>	2	4-5	"
	West end of Breakwater	<i>Ammodytes tobianus</i>	1	5	Green food remains.
19	Knap	<i>Clupea sprattus</i>	3	4-7	No food.
		<i>Ammodytes tobianus</i>	3	5-6	Green food remains.
	Off White Patch	"	3	4.5-5	" " "
		<i>Clupea sprattus</i>	1	6	" "
		<i>Cottus bubalis</i>	1	3	No food.
22	Middle Sound	"	1	3-5	"
		<i>Ammodytes tobianus</i>	1	4-5	Green food remains.
25	New Grounds	<i>Cottus bubalis</i>	3	4	<i>Balanus</i> nauplii.
		<i>Clupea sprattus</i>	5	4-7	<i>Coscinodiscus excentricus</i> .
	Middle Sound	"	3	4-7	No food.
26	Panther	<i>Agonus cataphractus</i>	1	8	<i>Balanus</i> nauplii.
		<i>Clupea sprattus</i>	2	8	No food.
		<i>Ammodytes tobianus</i>	1	3	"
	Breakwater	<i>Clupea sprattus</i>	1	5	"
		<i>Cottus bubalis</i>	1	4	Larval gastropod, <i>Balanus</i> nauplii.
March.					
1	Off White Patch	<i>Clupea sprattus</i>	1	8	No food.
4	Breakwater	<i>Cottus bubalis</i>	3	4.5-5	"
		<i>Ammodytes tobianus</i>	1	4.5	"
	Knap	<i>Cottus bubalis</i>	1	5-5	"
5	Off White Patch	"	1	5	"
		<i>Gobius</i> sp. (cf. <i>minutus</i>)	1	2.4	"
8	Off White Patch	"	1	2.5	"
		<i>Onos mustela</i>	1	2.5	Green food remains.
11	Off White Patch	<i>Solea lutea</i>	1	14	No food.
		<i>Ammodytes tobianus</i>	1	5-5	"
	Breakwater	"	1	6-5	Green food remains.
	Panther	"	4	6-7	No food.
12	Panther	"	5	5-6	"
		<i>Clupea harengus</i>	36	17-22	<i>Pseudocalanus elongatus</i> .
		<i>Cottus bubalis</i>	1	4	No food.
	Back of Breakwater	<i>Pleuronectes flesus</i>	18		"
		<i>Clupea harengus</i>	33	17-24	<i>Pseudocalanus elongatus</i> .
		<i>Ammodytes tobianus</i>	24	4-6.5	Green food remains.
		<i>Gadus merlangus</i>	1	8	<i>Pseudocalanus elongatus</i> .
		<i>Cottus bubalis</i>	1	4.5	No food.
	Knap	"	5	5	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> , larval gastropod.
		<i>Clupea harengus</i>	8	17-22	<i>Pseudocalanus elongatus</i> .
		<i>Ammodytes tobianus</i>	4	5-5	No food.
18	West Channel	"	15	4-7	<i>Coscinodiscus excentricus</i> , green food remains.
		<i>Cottus bubalis</i>	1	4	No food.
	Middle Sound	<i>Ammodytes tobianus</i>	1	4-5	Green food remains.
	Breakwater	<i>Cottus bubalis</i>	1	5	No food.
19	Off White Patch	"	1	8	<i>Temora longicornis</i> .
		<i>Clupea harengus</i>	2	19-24	No food.
		<i>Clupea sprattus</i>	1	18	"

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
March.					
19	Breakwater	Gobius sp. (probably minutus)	1	2	No food.
		Ammodytes tobianus	7	4-9	Green food remains, ovum.
		Cottus bubalis	2	3-5-4	<i>Temora longicornis</i> .
22	Panther	Ammodytes tobianus	1	8-5	Green food remains.
	Jennycliff.	Anguilla vulgaris	1	40	Crustacea remains.
April.					
2	Breakwater	Cyclogaster Montagui	1	5	<i>Acartia clausi</i> , <i>Temora longicornis</i> .
		Cottus bubalis	1	4	No food.
5	Panther	Onos mustela	1	2-5	"
		Gadus luscus	1	3	"
		Clupea sprattus	1	4	"
8	Panther	Gadus merlangus	5	7-11	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> , <i>Balanus nauplii</i> .
		Callionymus lyra	4	2-5-4	<i>Pseudocalanus elongatus</i> .
		Cottus bubalis	5	4	No food.
	Breakwater	"	5	4	Copepod nauplius, larval bivalve.
		Clupea sprattus	2	4	No food.
		Gadus merlangus	2	5-7	"
	Knap	"	6	4-11	<i>Pseudocalanus elongatus</i> , Copepod nauplius.
		Callionymus lyra	3	2-5	No food.
10	Off White Patch	"	1	5	"
	2 miles south of Breakwater	Gadus merlangus	4	7-9	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> .
	Breakwater	"	2	6-8	<i>Pseudocalanus elongatus</i> .
12	Panther	Solea vulgaris	1	11	Kept alive.
		Gadus merlangus	15	6-8	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> .
		Pleuronectes flesus	1	7	No food.
		Ammodytes tobianus	1	21	<i>Pseudocalanus elongatus</i> .
		Cottus bubalis	3	4	Young <i>Temora</i> , <i>Temora</i> nauplius.
	Breakwater	Gadus merlangus	8	5-10	<i>Pseudocalanus elongatus</i> , Copepod remains.
		Clupea sprattus	1	6	Green food remains.
	Off White Patch	Gadus merlangus	1	7	<i>Pseudocalanus elongatus</i> .
	Knap	Pleuronectes flesus	1	7	No food.
		Clupea sprattus	2	12-17	"
		Gadus merlangus	7	5-8	<i>Pseudocalanus elongatus</i> .
		Cottus bubalis	2	4-5	"
15	Between Cawsand and Penlee	Gadus merlangus	7	4-8	<i>Temora longicornis</i> , <i>Pseudocalanus elongatus</i> , Copepod remains, green food remains.
		Onos mustela	1	2-5	No food.
		Pleuronectes microcephalus	1	6	"
	West end of Breakwater	Gadus merlangus	5	5-10	<i>Pseudocalanus elongatus</i> and eggs, <i>Temora longicornis</i> , Copepod remains.
	West Channel	"	1	6	<i>Pseudocalanus elongatus</i> .
		Gadus luscus	1	8	"
16	Knap	Gobius sp.	1	7	No food.
		Callionymus lyra	2	2-5-3	"
		Gadus merlangus	1	5	<i>Temora</i> nauplius.
	Panther	"	6	5-7	<i>Pseudocalanus elongatus</i> .
		Callionymus lyra	2	2-5-3	No food.

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
April.					
16	Panther	<i>Cottus bubalis</i>	1	6	<i>Temora longicornis</i> .
		<i>Gobius sp. (cf. minutus)</i>	1	5	<i>Temora</i> nauplius.
19	Cawsand to Penlee	<i>Gadus merlangus</i>	2	3.5	Green food remains, Copepod nauplii.
	Cawsand to Breakwater	"	1	3.5	Copepod nauplii.
	West Channel	<i>Gobius sp. (cf. minutus)</i>	3	6.5-8	No food.
		<i>Solea variegata</i>	1	10	"
22	Breakwater	<i>Gadus merlangus</i>	6	4-10	<i>Pseudocalanus elongatus</i> , Copepod remains.
		<i>Callionymus lyra</i>	4	3	Copepod remains.
	Knap	<i>Gadus merlangus</i>	1	7	"
23	White Patch	"	1	7	<i>Pseudocalanus elongatus</i> .
	Breakwater	"	6	4-11	<i>Pseudocalanus elongatus</i> , Copepod remains.
	Panther	<i>Callionymus lyra</i>	1	3	No food.
26	Knap	<i>Gadus merlangus</i>	2	7	Copepod remains.
	Off White Patch	<i>Gobius sp. (cf. minutus)</i>	1	5	No food.
	Panther	<i>Callionymus lyra</i>	1	3.5	"
	Breakwater	<i>Gadus merlangus</i>	4	7-10	Copepod remains.
	Breakwater	<i>Gadus pollachius</i>	5	10-13	<i>Pseudocalanus elongatus</i> .
		<i>Onos mustela</i>	16	6-7	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> , <i>Temora</i> nauplii <i>Euterpina acutifrons</i> , crab zoëa.
		<i>Gadus merlangus</i>	8	5-11.5	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> , <i>Temora</i> nauplius, Copepod nauplii.
	Panther	"	3	5-7	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> .
		<i>Clupea sprattus</i>	1	9	No food.
		<i>Onos mustela</i>	1	3.5	"
	Knap	<i>Gadus merlangus</i>	1	6	<i>Temora</i> nauplius.
		<i>Gobius sp. (cf. minutus)</i>	1	7	"
		<i>Cottus bubalis</i>	1	5	"
May.					
1	Breakwater	<i>Gadus merlangus</i>	1	7	<i>Pseudocalanus elongatus</i> .
3	Jennycliff Bay	"	1	9	<i>Temora longicornis</i> , <i>Temora</i> nauplius.
6	Knap	"	3	6-14	<i>Pseudocalanus elongatus</i> , Copepod nauplius.
7	Knap	"	5	6-22	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> .
		<i>Gobius sp. (cf. minutus)</i>	2	4-6	No food.
	Panther	<i>Gadus merlangus</i>	16	5-11	<i>Pseudocalanus elongatus</i> , young <i>Temora</i> .
		<i>Clupea sprattus</i>	1	10	No food.
		<i>Pleuronectes flesus</i>	1	9	"
		<i>Gobius sp. (cf. minutus)</i>	1	6	"
	Breakwater	<i>Gadus merlangus</i>	8	5-10	<i>Pseudocalanus elongatus</i> , young <i>Temora</i> .
		<i>Clupea sprattus</i>	1	8	No food.
10	Knap	<i>Gadus merlangus</i>	6	6-8	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> , Copepod remains.
		"	2	4.5-6	<i>Pseudocalanus elongatus</i> .
	Breakwater	<i>Onos mustela</i>	1	6	No food.
	Panther to back of Breakwater	"	1	5	"
		<i>Gadus merlangus</i>	21	5-13	<i>Pseudocalanus elongatus</i> , young <i>Temora</i> and nauplii.

Date. May.	Locality.	Fish.	No. Size in mm.		Food present.
10	Off White Patch	<i>Gadus merlangus</i>	1	6	No food.
13	Breakwater	"	16	7-19	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> .
	Panther	"	4	8-11	<i>Pseudocalanus elongatus</i> .
		<i>Gadus pollachius</i>	9	7-21	<i>Pseudocalanus elongatus</i> , <i>Calanus finmarchicus</i> , <i>Temora longicornis</i> , <i>Oithona similis</i> .
		<i>Ammodytes tobianus</i>	1	19	Copepod remains.
	Off White Patch	<i>Gadus merlangus</i>	3	5-8	"
14	Panther	<i>Callionymus lyra</i>	1	4	<i>Pseudocalanus elongatus</i> .
		<i>Onos mustela</i>	1	3-5	Copepod nauplii.
	Breakwater	<i>Gadus merlangus</i>	3	8-10	<i>Pseudocalanus elongatus</i> .
		<i>Callionymus lyra</i>	2	3-4	No food.
	Off White Patch	"	1	2-5	Copepod nauplii.
17	1½ miles south of Breakwater	<i>Gadus merlangus</i>	7	7-11	<i>Pseudocalanus elongatus</i> , <i>Calanus finmarchicus</i> .
	2 miles south of Breakwater	"	11	6-10	<i>Pseudocalanus elongatus</i> , Crustacea remains.
		<i>Callionymus lyra</i>	1	5	No food.
	3 miles south of Breakwater	<i>Gadus merlangus</i>	3	7-12	Copepod remains.
	Breakwater	<i>Gadus pollachius</i>	2	16-18	<i>Calanus finmarchicus</i> , <i>Pseudocalanus elongatus</i> .
	Panther	<i>Gadus merlangus</i>	5	6-12	<i>Pseudocalanus elongatus</i> , Crustacea remains, <i>Calanus finmarchicus</i> , <i>Centropages typicus</i> .
		<i>Onos mustela</i>	1	7	Copepod remains and eggs.
22	Breakwater	<i>Gadus pollachius</i>	1	18	<i>Pseudocalanus elongatus</i> , Copepod remains.
24	Breakwater	<i>Gadus merlangus</i>	29	5-10	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> , Cope- pod remains.
		<i>Clupea sprattus</i>	3	7-17	No food.
		<i>Ammodytes tobianus</i>	13	6-10	Green food remains, <i>Coscinodiscus</i> sp.
		<i>Onos mustela</i>	1	4	No food.
		<i>Gobius</i> sp. (cf. <i>minutus</i>)	2	3-7	"
		<i>Gobius paganellus</i>	1	4-5	"
		<i>Trigla</i> sp.	1	7	Copepod eggs.
	Off White Patch	<i>Callionymus lyra</i>	1	6	<i>Acartia clausi</i> .
		<i>Gadus merlangus</i>	6	7-9	"
		<i>Ammodytes tobianus</i>	2	7	No food.
	Knap	<i>Callionymus lyra</i>	4	3-8	Young <i>Temora</i> and <i>Temora</i> nauplii.
		<i>Gadus merlangus</i>	4	7-12	<i>Pseudocalanus elongatus</i> . Copepod remains.
		<i>Ammodytes tobianus</i>	2	4-5	No food.
		<i>Onos mustela</i>	1	4	<i>Pseudocalanus elongatus</i> .
	Panther	<i>Callionymus lyra</i>	3	5-6	Young <i>Temora</i> .
		<i>Gadus merlangus</i>	11	8-14	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> , Cope- pod remains.
		<i>Gadus pollachius</i>	1	19	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> .
		<i>Ammodytes tobianus</i>	6	6	Green food remains.
		<i>Gobius</i> sp. (cf. <i>minutus</i>)	1	6	No food.
27	Panther	<i>Sygnathus rostellatus</i>	2	95-105	<i>Calanus finmarchicus</i> , <i>Acartia clausi</i> .

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
May.					
27	Panther	Gadus merlangus	40	6-55	<i>Calanus finmarchicus</i> , <i>Temora longicornis</i> , <i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> , Harpacticids, remains of <i>Gadus merlangus</i> .
		Gadus pollachius	2	18-23	<i>Calanus finmarchicus</i> <i>Acartia clausi</i> .
		Onos mustela	6	5-7	Copepod nauplii.
		Trigla sp.	1	9	No food.
	Knap	Gadus merlangus	2	8-10	<i>Calanus finmarchicus</i> . Copepod remains.
		Onos mustela	2	6-32	<i>Calanus finmarchicus</i> , Copepod remains.
	Breakwater	Gadus merlangus	7	6-12	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> , Cope- pod remains.
28	Knap	Gadus pollachius	3	17-25	<i>Calanus finmarchicus</i> , <i>Temora longicornis</i> , <i>Acartia clausi</i> , Har- pacticids.
		Gadus merlangus	5	7-14	Copepod remains.
		Onos mustela	1	4	No food.
		Gobius sp. (cf. minutus)	2	3-3.5	"
	Breakwater	Gadus pollachius	2	20	<i>Calanus finmarchicus</i> , <i>Temora longicornis</i> , <i>Tigriopus fulvus</i> .
		Onos mustela	5	4-11	<i>Oithona similis</i> , <i>Pseudo-</i> <i>calanus elongatus</i> , Copepod nauplii.
		Gadus merlangus	3	8-10	Copepod remains.
		Clupea sprattus	1	5	Green food remains.
		Pleuronectes flesus	1	9	Copepod remains.
	Panther	Gadus merlangus	2	10.5-12	No food.
		Onos mustela	31	8	<i>Oithona similis</i> , young Copepods.
31	Panther to Break- water	"	2	5	Green food remains.
	Panther	"	1	12	<i>Oithona similis</i> , Cope- pod eggs.
		Gadus merlangus	5	9-15	<i>Calanus finmarchicus</i> , <i>Pseudocalanus elongatus</i> .
	Off White Patch	Onos mustela	1	25	Copepod remains.
		Gadus pollachius	1	22	<i>Idya furcata</i> , <i>Micro-</i> <i>setella norvegica</i> , Har- pacticus chelifer, Har- pacticus uniremis.
June.					
3	Breakwater	Ammodytes tobianus	1	5	No food.
	Knap	Onos mustela	1	9.5	Larval gastropod.
	Panther	"	1	8	Copepod remains.
		Gadus merlangus	1	8	<i>Calanus finmarchicus</i> .
		Labrus bergylta	2	3-4	No food.
4	Breakwater	Gadus pollachius	1	22	Alive.
	Panther to west end of Breakwater	"	2	18	<i>Calanus finmarchicus</i> , <i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> .
		Gadus merlangus	1	8	Copepod remains.
	Panther	"	1	9	<i>Calanus finmarchicus</i> .
		Onos mustela	3	8-10	<i>Oithona similis</i> .
		Cyclogaster Montagu	2	7	No food.

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
June.					
4	Off White Patch	<i>Gadus merlangus</i>	1	8	No food.
	Knap	<i>Clupea sprattus</i>	1	22	"
		<i>Gadus merlangus</i>	1	9	Copepod remains.
		<i>Gadus pollachius</i>	2	14-16	<i>Calanus finmarchicus</i> , <i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> , <i>Oithona similis</i> .
		<i>Onos mustela</i>	3	8-22	<i>Oithona similis</i> , <i>Pseudocalanus elongatus</i> .
7	Breakwater	<i>Gadus merlangus</i>	1	13	Copepod remains.
		<i>Gadus pollachius</i>	1	20	<i>Calanus finmarchicus</i> , <i>Pseudocalanus elongatus</i> , <i>Dactylopusia vulgaris</i> , <i>Dactylopusia tisboides</i> .
	Panther to Breakwater.	<i>Onos mustela</i>	1	12	<i>Oithona similis</i> , Copepod remains.
		<i>Gobius Ruthensparri</i>	18	9-14	<i>Temora nauplius</i> and Copepod nauplii.
	Panther	<i>Gobius paganellus</i>	1	11	<i>Temora longicornis</i> .
		"	15	7-12	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> .
	Off White Patch	<i>Ammodytes tobianus</i>	1	14	No food.
		<i>Gadus merlangus</i>	2	7-8	Copepod remains.
		<i>Gobius Ruthensparri</i>	2	9-10	Copepod nauplii.
11	Breakwater to Panther	"	5	4-13	"
	Knap	"	3	5	No food.
		<i>Onos mustela</i>	1	5	"
	Breakwater	<i>Onos mustela</i>	1	5	"
12	Panther to Breakwater	<i>Gobius Ruthensparri</i>	1	13	<i>Acartia clausi</i> .
		<i>Labrus bergylta</i>	1	6	Not examined.
	Panther	<i>Cyclopterus lumpus</i>	1	10	"
		<i>Gadus merlangus</i>	1	10	Copepod remains.
	Knap	"	1	13	<i>Calanus finmarchicus</i> , <i>Pseudocalanus elongatus</i> .
14	Breakwater	"	1	5	<i>Acartia clausi</i> .
	Off White Patch	"	5	7-13	<i>Pseudocalanus elongatus</i> , <i>Calanus finmarchicus</i> , <i>Oithona similis</i> , <i>Acartia clausi</i> , <i>Podon intermedius</i> .
19	Middle Sound	"	23		<i>Pseudocalanus elongatus</i> , <i>Oithona similis</i> .
		<i>Gobius sp. (cf. minutus)</i>	1	3	Alive.
	Cawsand	<i>Gasterosteus spinachia</i>	1	20	"
21	Knap	<i>Onos mustela</i>	2	4.5-5	No food.
	Panther	"	1	7	"
		<i>Gadus pollachius</i>	1	12	<i>Calanus finmarchicus</i> , <i>Acartia clausi</i> .
	Breakwater	<i>Onos mustela</i>	1	4	No food.
		<i>Cyclopterus lumpus</i>	1	15	Alive.
		<i>Gadus merlangus</i>	3	5-15	<i>Temora</i> , young, and nauplius, <i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> .
24	Knap	"	2	9-14	<i>Calanus finmarchicus</i> .
		<i>Labrus bergylta</i>	1	8	Young <i>Temora</i> .
		<i>Cyclopterus lumpus</i>	1	15	Not examined.
	Panther	<i>Labrus bergylta</i>	1	7	No food.
		<i>Gadus merlangus</i>	2	7	Copepod remains

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
June.					
24	Panther to Breakwater	Gadus merlangus	2	9-10	Copepod remains.
		Roccus labrax (?)	1	9	Not examined.
		Trigla sp.	3	9-11	Copepod remains.
		Labrus bergylta	1	5-5	No food.
		Callionymus lyra	2	5	"
	Breakwater	Gadus merlangus	2	9-10	Acartia clausi, Copepod remains.
25	Panther	"	1	19	Calanus finmarchicus.
	Breakwater	"	1	13	Copepod remains.
	Panther to Breakwater	Onos mustela	1	10	Copepod eggs.
		Labrus bergylta	3	6-12	Young Temora, Copepod remains.
		Trigla sp.	1	8	No food.
	Knap	Gobius Ruthensparri	2	6	Not examined.
		Labrus bergylta	1	6	No food.
28	Off White Patch	Gadus merlangus	3	7-10	Copepod remains.
	Breakwater	Onos mustela	4	5	No food.
	Panther to Breakwater	"	5	5-6	"
	Panther	Solea lascaris	1	6	"
	Knap	Gadus merlangus	1	5	Crustacea remains.
		Labrus bergylta	1	7	"
July.					
1	Panther	Gadus merlangus	5	14-29	Calanus finmarchicus, crab megalopa.
		Onos mustela	1	8	Ova.
		Ammodytes sp.	1	15	"
		Clupea sprattus	1	19	No food.
		Labrus bergylta	2	7	"
	Off White Patch	Gadus merlangus	1	25	Calanus finmarchicus.
	Knap	Rhombus maximus	1	27	Not examined.
	Breakwater	Gadus merlangus	2	26-28	"
		Onos mustela	1	20	"
2	Knap	Gadus merlangus	2	22-35	Crab megalopa, decapod larvae, Calanus finmarchicus.
		Trigla sp.	1	9	No food.
	Breakwater	Labrus bergylta	1	7	Young Temora, Temora nauplii.
	Panther	Labrus bergylta	1	6	Young Temora.
		Callionymus lyra	2	6-7	No food.
5	Knap	Gobius Ruthensparri	1	5	Not examined.
	Panther	"	2	5-14	Copepod nauplii, Pro-rocentrum micans.
		Onos mustela	1	5	No food.
	Breakwater	Labrus bergylta	1	9	Young Temora.
8	Panther	Blennius ocellaris	1	18	Alive.
		Cyclopterus lumpus	1	16	"
		Ctenolabrus rupestris	1	9	Copepod remains.
		Gadus merlangus	1	13	Pseudocalanus elongatus.
		Labrus bergylta	5	6-7	Ova, Copepod remains.
		Gobius Ruthensparri	1	9	Not examined.
	Off White Patch	Onos mustela	1	7	No food.
	Breakwater	Labrus bergylta	2	5-6	Crustacea remains.
9	Panther	Labrus bergylta	3	7-8	Copepod remains.
	Knap	Lepadogaster Condolli	1	5	Harpacticids.
		Labrus bergylta	2	6-7	Young Calanus, Temora longicornis, Harpacticids.
		Ammodytes sp.	1	14	Calanus nauplii.

Date. July.	Locality.	Fish.	No.	Size in mm.	Food present.
9	Breakwater	<i>Gadus merlangus</i>	2	11-15	<i>Calanus finmarchicus</i> , <i>Pseudocalanus elongatus</i> .
		<i>Ammodytes</i> sp.	3	9-45	No food.
		<i>Trachinus vipera</i>	1	6	Not examined.
		<i>Labrus bergylta</i>	5	5-6	Young <i>Temora</i> , Copepod remains.
15	Knap	<i>Lepadogaster Candolli</i>	1	4-5	No food.
		<i>Gobius Ruthensparri</i>	1	6	"
		<i>Solea lascaris</i>	1	9	Not examined.
		<i>Ctenolabrus rupestris</i>	1	8	<i>Temora longicornis</i> .
		<i>Gobius Ruthensparri</i>	2	5-8	No food.
		<i>Labrus bergylta</i>	2	6-7	<i>Podon intermedius</i> , <i>Temora longicornis</i> .
16	Breakwater	"	1	7	<i>Temora longicornis</i> , <i>Podon intermedius</i> , Harpacticids.
	Panther to Breakwater	"	2	7	<i>Temora longicornis</i> , <i>Podon intermedius</i> .
		<i>Blennius galerita</i>	1	10	<i>Podon intermedius</i> , <i>Acartia clausi</i> , Copepod eggs.
		<i>Lepadogaster Candolli</i>	1	5	No food.
19	Off White Patch Breakwater	<i>Cyclopterus lumpus</i>	1	25	Alive.
		<i>Gadus merlangus</i>	3	21-24	<i>Podon intermedius</i> , <i>Hyperia</i> sp.
23	Knap	<i>Rhombus maximus</i>	1	13	<i>Apherusa clevei</i> .
		<i>Labrus bergylta</i>	2	5-7	<i>Temora longicornis</i> , Harpacticids, larval gastropods.
		<i>Lepadogaster Candolli</i>	1	6	<i>Podon intermedius</i> , Harpacticids.
	Panther	<i>Rhamphistoma belone</i>	1	30	Larval gastropods, Harpacticids.
		<i>Ctenolabrus rupestris</i>	1	9	<i>Temora longicornis</i> .
		<i>Trachinus vipera</i>	1	6	"
		<i>Gobius Ruthensparri</i>	1	7	<i>Podon intermedius</i> .
	Breakwater	<i>Blennius ocellaris</i>	1	14	Alive.
		<i>Trachinus vipera</i>	1	12	"
		<i>Ammodytes</i> sp.	1	11	<i>Oithona similis</i> , <i>Podon intermedius</i> , fish eggs.
24	Panther	<i>Clupea sprattus</i>	2	31-33	No food.
		<i>Rhombus laevis</i>	1	15	Alive.
		<i>Gadus merlangus</i>	1	33	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> , <i>Podon intermedius</i> .
		<i>Onos mustela</i>	2	17-34	Amphipod remains, <i>Pseudocalanus elongatus</i> , <i>Oithona similis</i> .
		<i>Rhamphistoma belone</i>	2	11-36	Larval gastropods, Harpacticids, <i>Podon intermedius</i> .
		<i>Gobius microps</i>	2	10	No food.
		<i>Trachinus vipera</i>	1	9	<i>Pseudocalanus elongatus</i> .
		<i>Ammodytes</i> sp.	1	15	No food.
		<i>Gobius microps</i>	1	8	"
	New Grounds Breakwater	"	1	10	Alive.
29	Panther to Breakwater	<i>Lepadogaster Candolli</i>	8	5-7	<i>Temora longicornis</i> , <i>Podon intermedius</i> , larval gastropods, Copepod nauplii, Harpacticids.
		<i>Lepadogaster gouani</i>	1	5	Larval gastropods.
		<i>Callionymus lyra</i>	1	8	No food.

Date.	Locality.	Fish.	No.	Size in mm.	Food present.
July.					
29	Knap.	Labrus bergylta	1	6	<i>Temora longicornis</i> , <i>Podon intermedius</i> .
	Breakwater	Trachinus vipera	1	6	Larval gastropods.
	Knap	Labrus bergylta	4	5-6	<i>Podon intermedius</i> , <i>Temora</i> juv., larval gastropods.
		Trachinus vipera	4	5-8	<i>Temora longicornis</i> , Copepod remains.
		Ammodytes sp.	1	7	No food.
Aug.					
2	Breakwater	Gobius microps	1	12	Larval gastropod.
		Gobius minutus	1	12	<i>Pseudocalanus elongatus</i> .
	Panther	Trachinus vipera	1	12	Alive.
		Ammodytes sp.	1	8	No food.
		Lepadogaster Candolli	1	5	<i>Podon intermedius</i> .
		Labrus bergylta	1	6	<i>Temora</i> nauplii.
6	West Channel	Gobius microps	1	9	<i>Pseudocalanus elongatus</i> .
		Blennius gattorugine	1	30	No food.
		Amphioxus lanceolatus	1	6	Coscinodiscus sp.
7	Breakwater	Gobius microps	2	9	Copepod remains.
		Labrus bergylta	1	7	Alive.
	Knap	"	2	7	<i>Temora longicornis</i> , <i>Temora</i> nauplii.
	Panther	Arnoglossus sp.	1	13	<i>Tabellaria</i> , sp.
9	Breakwater	Trachinus vipera	1	8	Larval <i>Gebia</i> , <i>Podon intermedius</i> , <i>Temora longicornis</i> .
		Labrus bergylta	1	7	<i>Temora longicornis</i> .
		Gobius paganellus	2	9	<i>Pseudocalanus elongatus</i> , Harpacticids.
	Panther	Blennius ocellaris	1	30	Not examined.
		Labrus bergylta	1	4	Copepod remains.
		Trachinus vipera	1	7	<i>Temora longicornis</i> .
		Ammodytes sp.	1	12	No food.
		Blennius gattorugine	1	30	<i>Podon intermedius</i> .
	Knap	Rhamphistoma belone	1	8	Larval gastropods, Crustacea remains.
12	New Grounds to Melampus	Trachinus vipera	1	30	Larval <i>Gebia</i> , <i>Temora longicornis</i> .
	Panther	Labrus bergylta	1	4	<i>Temora longicornis</i> .
	Breakwater	Trachinus vipera	1	10	<i>Podon intermedius</i> , <i>Temora longicornis</i> .
		Gobius microps	1	8	No food.
		Labrus bergylta	1	5	<i>Temora</i> nauplii.
		Ammodytes sp.	1	13	<i>Calanus</i> nauplius.
		Blennius gattorugine	1	30	Not examined.
		Onos mustela	1	35	"
13	Breakwater	Ammodytes sp.	4	4-10	No food.
	Off White Patch	Trachinus vipera	1	7	Alive.
		Gobius sp.	1	9	Not examined.
16	Panther	Gobius paganellus	2	9-13	Harpacticids.
	Breakwater	Lepadogaster Candolli	1	7	No food.
19	Breakwater	Ammodytes sp.	1	12	"
		Lepadogaster Candolli	1	6	Not examined.
		Trachinus vipera	2	4	Young <i>Temora</i> , <i>Temora</i> nauplii.
20	Off White Patch	Gobius Ruthensparri	1	12	Not examined.
	Panther to Breakwater	"	1	13	"
		Lepadogaster Candolli	1	5	<i>Temora longicornis</i> .
26	Breakwater	"	1	5-5	"
		Otenolabrus ruspetris	1	8	"

Date.	Locality.	Fish.	No. Size in mm.		Food present.
Aug.					
26	Breakwater.	<i>Trachinus vipera</i>	1	3	Larval gastropods, larval bivalve.
	Penlee to Knap	<i>Lepadogaster Candolli</i>	1	6	<i>Pseudocalanus elongatus</i> .
		<i>Callionymus lyra</i>	1	6	<i>Temora longicornis</i> , Harpacticids.
27	Knap	"	2	6-7	<i>Pseudocalanus elongatus</i> .
		<i>Trachinus vipera</i>	1	7	<i>Pseudocalanus elongatus</i> , <i>Temora longicornis</i> , <i>Corycaeus anglicus</i> , <i>Oithona similis</i> .
30	Knap to Breakwater	<i>Arnoglossus</i> sp.	1	7	No food.
Sept.					
2	Knap	<i>Gobius Ruthensparri</i>	1	8	<i>Temora longicornis</i> , Harpacticids.
5	Off White Patch	<i>Blennius galerita</i>	1	32	No food.
	Panther	<i>Gadus pollachius</i>	1	8	<i>Acartia clausi</i> , <i>Temora</i>
9	Breakwater	<i>Lepagodaster gouani</i>	1	8	Not examined.
		<i>Ammodytes</i> sp.	1	6	Copepod nauplii.
13	Panther	<i>Lepadogaster bimaculata</i>	1	6	Larval gastropods, larval bivalve, <i>Balanus</i> nauplius, fish egg, Harpacticids.
16	Middle Sound	<i>Caranx trachurus</i>	2	15-27	<i>Temora longicornis</i> , Copepod remains.
		<i>Sygnathus rostellatus</i>	4	50	Not examined.
		<i>Gobius microps</i>	9	9-10	Harpacticids, <i>Corycaeus anglicus</i> .
		<i>Gobius paganellus</i>	2	9	Not examined.
		<i>Ctenolabrus rupestris</i>	1	8	No food.
		<i>Ammodytes</i> sp.	8	9-28	"
		<i>Blennius ocellaris</i>	2	30-31	Copepod and decapod remains.
18	Knap	<i>Ammodytes</i> sp.	1	15	No food.
23	Middle Sound	<i>Clupea pilchardus</i>	1	25	"
		<i>Sygnathus rostellatus</i>	1	40	<i>Pseudocalanus elongatus</i> , <i>Acartia clausi</i> .
24	Penlee to Knap	<i>Clupea pilchardus</i>	2	35-36	No food.
	Jennycliff Bay	"	6	17-27	"
27	Breakwater	"	3	24-26	Remains of Copepod.
Oct.					
1	Panther	<i>Arnoglossus</i> sp.	2	10	<i>Pseudocalanus elongatus</i> .
	Breakwater	<i>Clupea pilchardus</i>	1	9	No food.
4	Breakwater	<i>Blennius ocellaris</i>	1	17	<i>Corycaeus anglicus</i> .
	Panther to Breakwater	<i>Clupea pilchardus</i>	1	10	No food.
	Jennycliff Bay	<i>Gobius microps</i>	1	7	<i>Corycaeus anglicus</i> .
Nov.					
29	Breakwater	<i>Lepadogaster bimaculatus</i>	1	15	Alive.
Dec.					
6	Breakwater	<i>Cyclopterus lumpus</i>	1	20	"