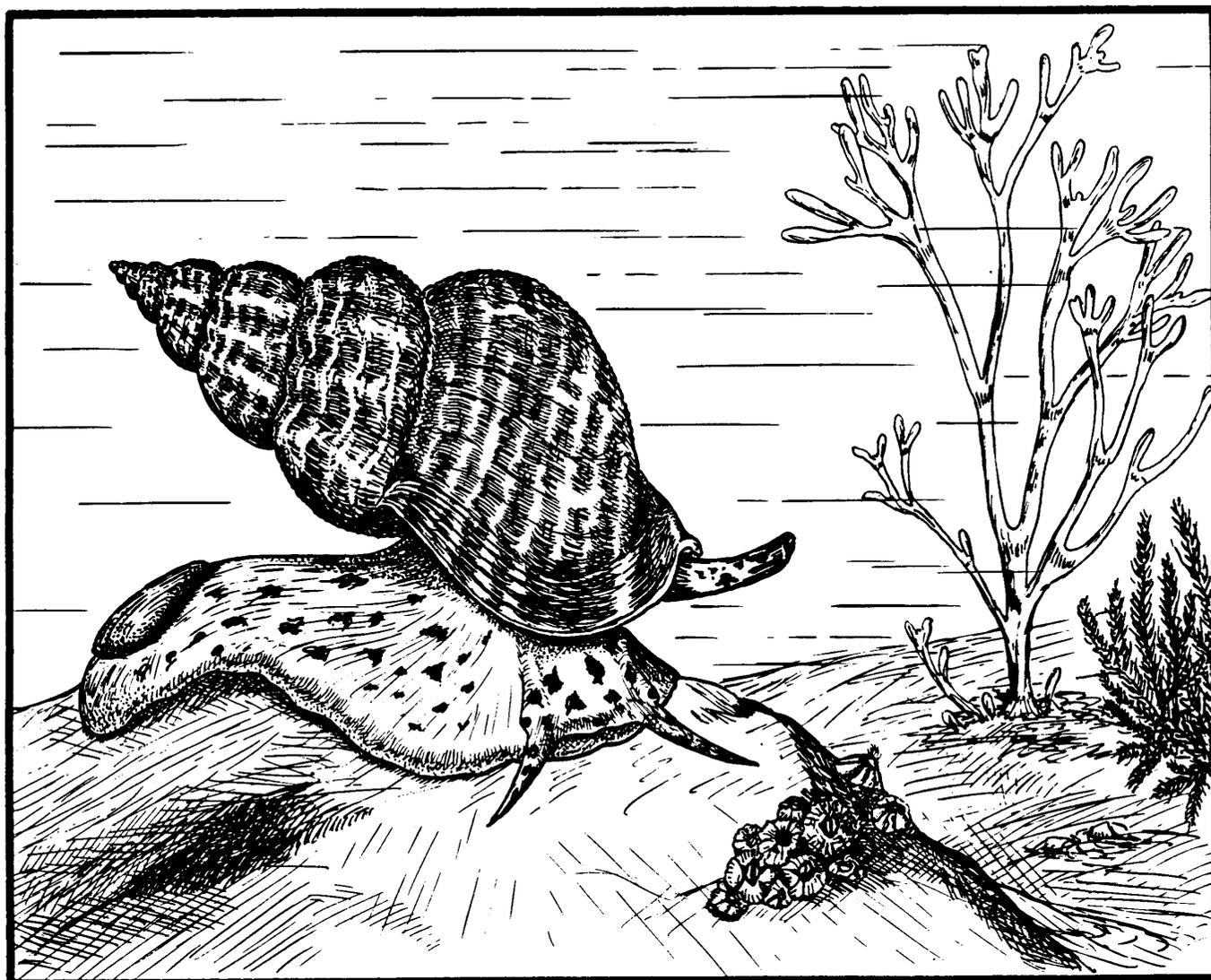


MINISTRY OF AGRICULTURE, FISHERIES AND FOOD

WHELKS



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JANUARY 1967

Whelks are of some importance to inshore fishermen on the east and south coasts of England. In this leaflet Donald Hancock summarizes their biology and describes the fishery.

A handwritten signature in black ink, appearing to read 'H. A. Cole', with a long horizontal flourish underneath.

H. A. Cole

Director of Fishery Research

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W H E L K S

INTRODUCTION

The common whelk (Buccinum undatum L.) provides a locally important fishery in some parts of Britain, particularly on the east and south coasts. It is a carnivorous marine snail, occurring commonly all round our coasts from the intertidal zone to deep water, both in estuaries and open seas. It is widely distributed throughout the North Atlantic and Arctic Oceans, and on the coast of Britain is nearing the southern limit of its range. It inhabits a variety of sea bottoms, though it is normally found on bottoms of mud mixed with sand and shells. The best commercial whelks are found in the open sea, where the flesh is white and shells are full; inside estuaries and rivers the flesh is darker in colour and may be of poor quality. The "red" or "almond" whelk (Neptunea antiqua L.), which has a smoother, usually reddish coloured, shell, is often taken with common whelks in pots, particularly on the Norfolk coast. The two species are not separated for market.

NATURAL CHARACTERISTICS

Biology

The whelk has a robust, spirally coiled shell, usually a muddy yellow or brown in colour. The outer layer is easily removed, has a furry appearance, and is often encrusted with barnacles, sponges and other marine organisms. Underneath, the cleaned shell may be white or pink, often striped with a deep red. Whelks are usually coiled to the right, though occasional left-handed ones are taken. In young fast-growing whelks the lip of the shell is thin and easily broken, but as they get older the lip becomes thickened and opaque. The shell opening is elongated into an open canal, through which the siphon is extended. When the whelk withdraws into its shell the aperture is closed by an oval horny disc, the operculum, attached to the foot.

When the body is extended the most obvious feature is the large muscular foot, the under surface of which is freely lubricated with slime and used for creeping over the bottom. On the head are two tentacles, with a simple light-sensitive eye at the base of each. Below and between the tentacles is an aperture through which the feeding proboscis may be extended; this is a muscular tube, capable of great extension and bearing the true mouth at its tip. Inside the proboscis is the radula (a long ribbon covered by rows of tiny teeth) which behaves like a band over a pulley, the front teeth rasping away at the food.

The shell of the whelk is lined by a thin layer of body wall, the mantle, which secretes the shell. The front portion of the mantle is extended into an incomplete tube, the siphon, which when extended projects beyond the forward tip of the shell. Water passes through the siphon into the mantle cavity which contains the gill, the water-testing organ, and the anus. The gill extracts oxygen from the water.

Although whelks are sometimes found in the intertidal zone, this can often prove fatal to them. Unlike most other snails, which withdraw into the shell and close the aperture by the operculum when exposed to the air, the whelk extends its foot and waves it in the air, thus increasing the chance of becoming damaged as a result of drying or being attacked by enemies. When it lives on a fairly soft sea bottom, the whelk spends some of its time completely buried with just its siphon protruding; it can bury itself completely in a bottom of mud and shells in just a few minutes. The whelk normally moves against the flow of water, and is extremely sensitive to the presence of food, which it can detect and approach rapidly. Whelks marked with paint and liberated on whelk grounds off Whitstable for later recapture did not however show any major migrations.

Feeding

The whelk is carnivorous, feeding on both dead and living animal flesh. It will certainly feed on dead fish or crabs, for these are used as bait. East coast fishermen frequently report the occurrence of large numbers of whelks along mussel and cockle "trails", that is concentrations of young mussels and cockles, on which the whelks are believed to feed. On the south coast, whelks occur in abundance on scallop beds, and fishermen consider them to be serious enemies of scallops. Whelks have been suspected of eating oysters, but under natural conditions have only very occasionally been taken in the process of feeding on healthy oysters.

In captivity, the response of whelks to opened mussels and cockles is remarkably rapid, and they soon approach and start feeding on them. In nature, whelks are evidently attracted from a distance to baited pots; even when experimental dredging and grabbing has revealed a low density of whelks, good catches have nevertheless often been obtained in baited pots in the same area.

Experimental work in the laboratory has shown that whelks can readily open and eat live shellfish. Cockles and mussels were usually preferred; oysters, slipper limpets and clams were eaten less often. The whelk opens a cockle by holding the shell with its foot, and inserting the lip of its own shell between the valves of the cockle. The proboscis is then inserted and feeding commences, the whole process of opening and eating the cockle usually taking

less than one hour. In the laboratory young whelks ate barnacles, and the flesh of already opened cockles and mussels.

In the laboratory the maximum feeding rate was always in the spring. Feeding did occur during the winter, but it practically ceased at extremely low temperatures and also during the warmest summer months.

Breeding

Unlike many sea creatures which spawn during rising temperatures in spring and summer, the whelk commences spawning in November of each year when the temperature has dropped below about 9°C. The sexes are separate, the male being distinguished by a large muscular penis behind the right side of the head. Fertilization takes place in late autumn, and soon afterwards the female spawns, attaching rounded clusters of yellowish egg capsules to stones and shells on the sea bottom (Plate 1). Each capsule may contain up to 3 000 eggs, but only a small proportion of these develops, usually about 13-14 per capsule; the largest number observed hatching from a single capsule was 25. The remainder of the eggs are known as "nurse" eggs and are used as food by the developing embryos; these develop within the capsule, through various larval stages, to fully formed juvenile whelks which crawl out during February and March. Sometimes several whelks may spawn together, and after the young have hatched the masses of empty capsules may become detached and be washed up on the shore. Generally the largest whelks deposit the greatest number of capsules, which are bigger and contain more eggs and embryos than those of smaller whelks. At Whitstable and in the River Crouch whelks do not commence spawning until they are nearly 2 inches in length, that is, at 2-3 years of age.

Growth

It is not possible to apply any of the usual methods of age-determination (such as annual growth rings) to whelks; it is known, however, that after spawning the rate of growth slows down considerably, and this may be accompanied by thickening of the lip of the shell. The most rapid growth occurs in spring and early summer each year. At Whitstable the growth pattern seems to be that the whelks grow to about 1 inch shell length in their first year, with decreasing amounts in following years. It is evident that whelks live to an age of ten years or more, and in places may grow to a very large size. Estuarine whelks are usually smaller than those from the open sea, though there is considerable variation from place to place; for example, whelks from the River Crouch seldom exceed 2½ inches, whereas those from Salcombe Estuary may be up to 4 inches in length. Commercial whelks from the Norfolk coast may be up to 3½ inches in length, but although those from the Kent coast may also occasionally reach this size they more usually measure less than 3 inches. In Scotland whelks measuring up to 6 inches have been found.

Enemies

Natural enemies of the whelk include fish such as cod and dogfish. Edible crabs and common shore crabs have been found to crack open the shells of whelks in whelk pots and eat the flesh. In captivity a 9 inch lobster was seen to crack open and eat 1½-2 inch whelks. The shell of the whelk is often attacked by the boring worm Polydora, and also provides a home for barnacles and other encrusting organisms. The empty shell of a whelk is often inhabited by a hermit crab.

FISHING METHODS AND GEAR

Method of capture

In northern Holland whelks are caught commercially by means of dredges; in Britain, however, although oyster dredges have been tried they were found to be very inefficient; this may have been because of the whelk's habit of burrowing into the surface layers of the sea bed, and also, perhaps, because the whelks were insufficiently concentrated to make this method of fishing worth while. The normal method of fishing in this country is by baited pots (Plate 2), and two main types are employed.

On the east coast, from Grimsby to Harwich and at Whitstable, the iron pot is used almost exclusively, the original design being claimed by Sheringham fishermen. This has the same form as a Cornish lobster pot, but is made of a perforated iron base and an iron frame, laced with rope of between ¼ and 3/8 inch diameter; "two part backs" from used herring net cork ropes are cheap and very popular. The mouth of the pot is made into a funnel using a "criny" of small mesh or shrimp netting, which hinders the escape of whelks after capture; to avoid chafing, the lacing of the criny is fixed underneath the iron rim of the pot, not around it (Figure 1 and Plate 2). The whole pot is dipped in cold "barn tar", a process required regularly for preservation of the gear, and said by the fishermen to increase its attraction for whelks; barn tar contains tar thinned with creosote, and is normally used for painting farm buildings. Alternatively pots may be dipped in heated ordinary tar. There is a fixed bait line across the inside of the pot, and the bait is held between two cords and a sliding twine "button". The bait line should not be fixed too near the bottom of the pot, or the whelks caught first will consume the bait and reduce its fishing power. These pots are manufactured mainly at Sheringham; a local variety made and used at Whitstable differs only in height. Pots used locally in Yorkshire are much larger and have sides sloping right from the large base; in these there is no bait line, the bait (fish offal, etc.) being placed loosely in the pots.

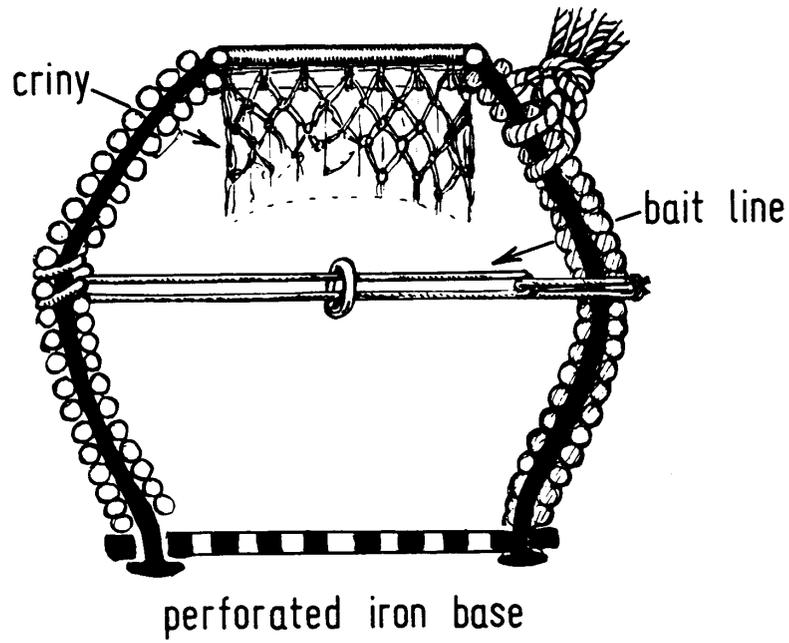
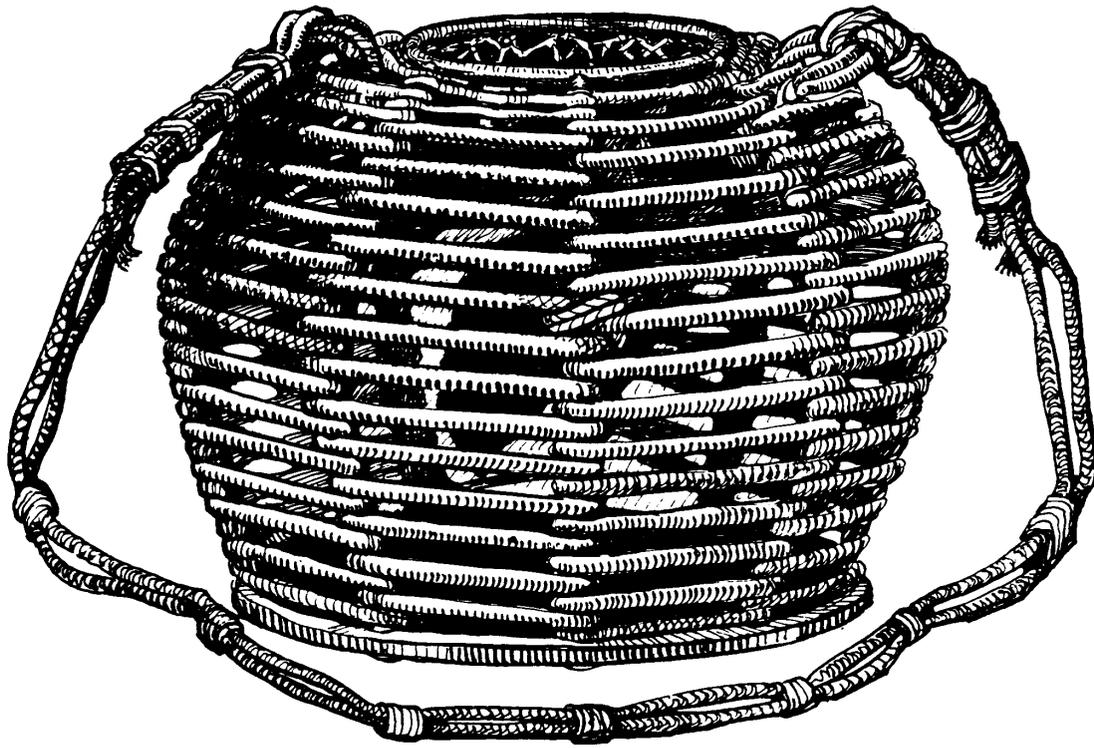


Figure 1 Sheringham iron and rope whelk pot

Each iron pot is fitted with a rope handle. At Whitstable and Cromer usually 24 pots (36 at Wells and Brancaster, and from 50 to 70 at Grimsby) are attached at intervals along a back rope to form a "shank", with a line and flag and cork buoy attached to each end of the shank. In some places, notably Whitstable, each shank is shot across the tide; this is related to the whelk's feeding behaviour and ensures that the bait has the greatest attractive effect. At Wells and off Yorkshire most fishermen prefer to shoot the shanks against the tide, thus keeping the line slack and the pots vertical. In favourable weather the pots are recovered daily, emptied, rebaited and stowed till a whole shank is inboard, then relaid, perhaps in a fresh area (Plate 4).

The basket pot is basically similar to the iron pot. The bottom of a cockle or potato basket is removed and replaced by square-meshed twine netting. A shrimp netting or small-meshed netting criny is attached round the other (narrow) end of the basket and pulled tight into a circular shelf by a drawstring. The pots are tarred for preservation, and three heavy housebricks are attached to the outside of the base (Plate 2). Bait is tied to the bait string by pieces of twine. These pots are usually laid separately, along the tide, using a line with a series of small corks to mark the position of each pot.

Cockle baskets are most commonly used, but variations made from potato, bread, and fruit baskets are used along the south coast from Margate to Brighton. At Bognor Regis and Selsey old Cornish prawn pots are used. Circular wire frames covered with hessian and sprat netting are used at Poole and Portland, and metal milk crates covered with net at Eastbourne. Baskets used separately like this have the advantage over shanks of iron pots in sea areas with heavy traffic, since only single baskets are likely to be lost, and these can be replaced with little capital outlay.

A method of fishing for whelks known as "trotting" was once regularly practised, particularly in east coast estuaries. This involved the attachment of bunches of shore crabs at intervals along a length of line. The lines were laid across the tide for about six hours and hauled in with the whelks still clinging to the bait. This method had the disadvantage that whelks were liable to be detached from the bait as the lines were hauled through the water, and particularly when surfacing.

Bait

East coast fishermen consider salted herring to be the best bait and use this almost exclusively, but sometimes salted whiting, tope, cods' heads and fish offal are used (Table 1). Shark meat and frozen whale meat have also been used successfully. At Whitstable and on the south coast salted skate and dogfish offal are popular, together with common shore crabs. Fish bait may be dead and salted, but should not be rotten. Fish and crab bait are often used together and experimental work has shown that the two baits will catch more whelks than

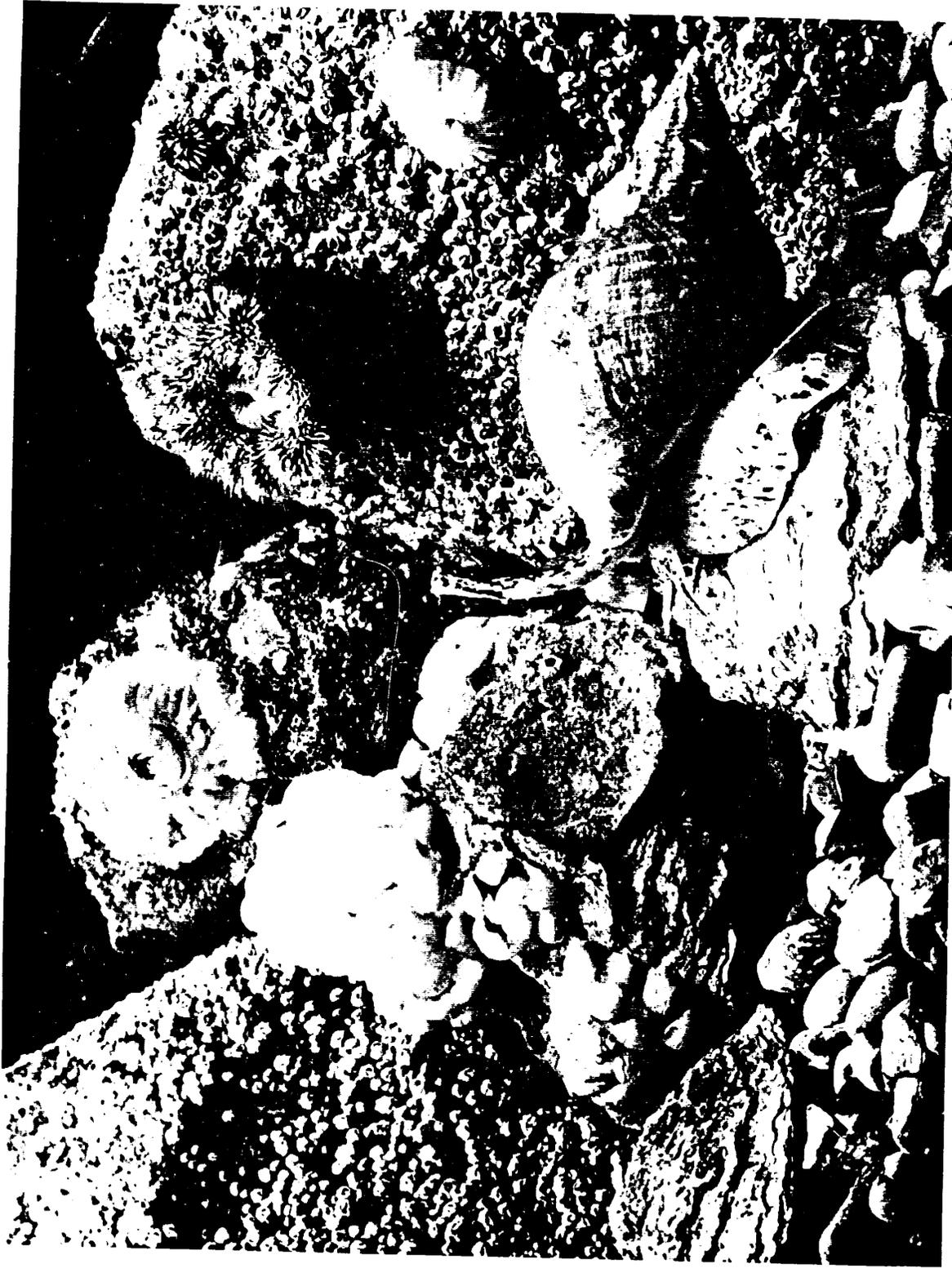


Plate 1 The common edible whelk (*Buccinum undatum* L.) and its spawn

Photo: B. W. Jones

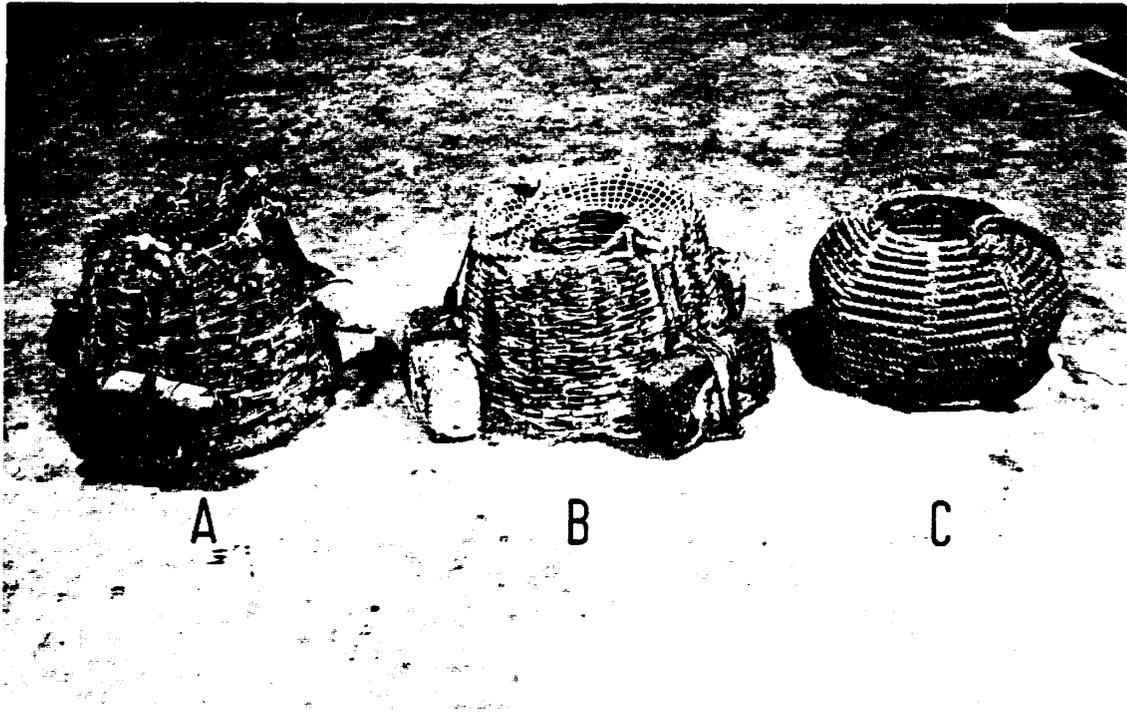


Plate 2 Whelk pots (a) made from a cockle basket, (b) made from a potato basket and (c) the Sheringham iron pot

Photo: P. J. Warren



Plate 3 Whelk boats at Whitstable, Kent

Photo: D. A. Hancock

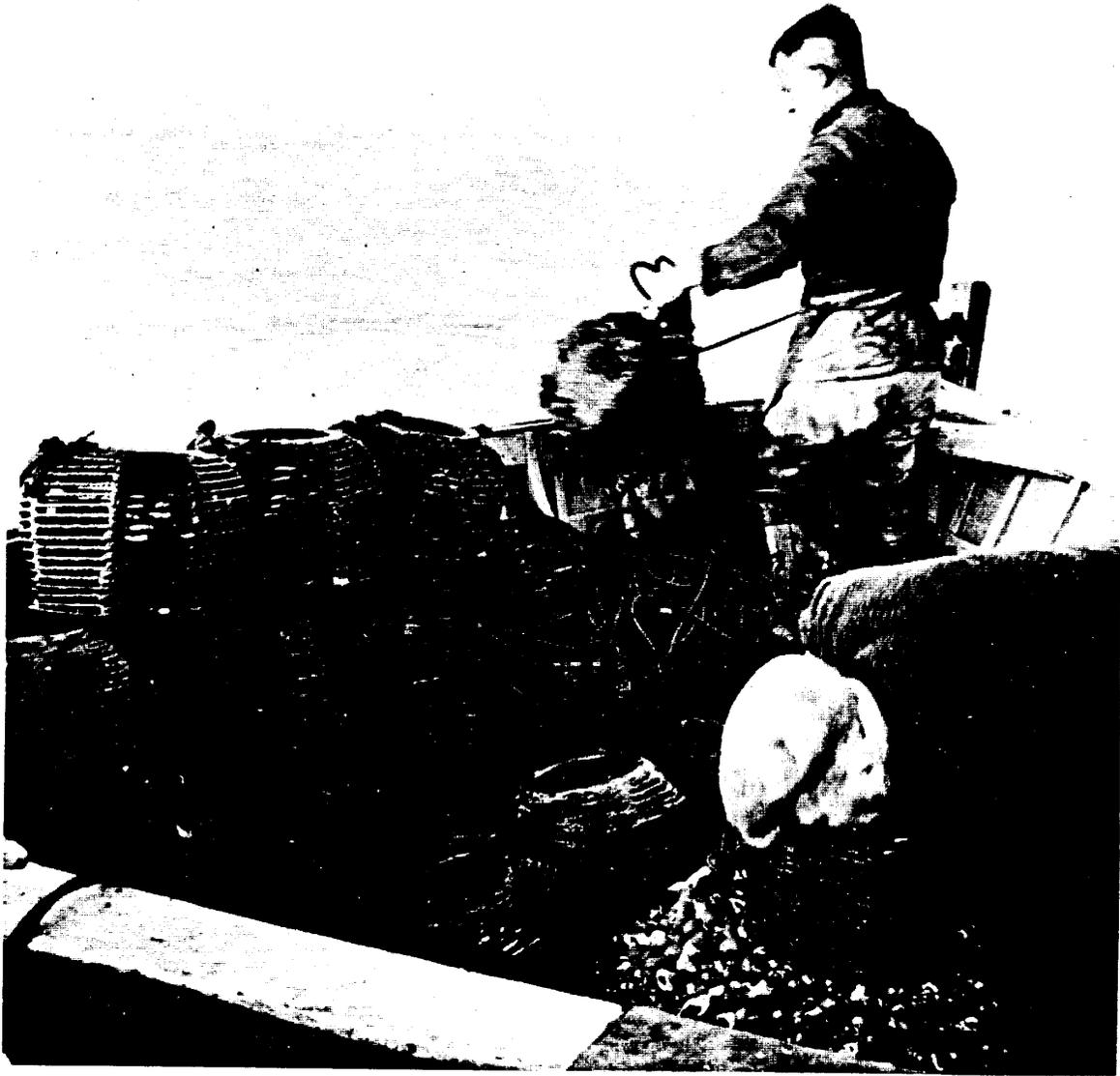


Plate 4 Hauling and rebaiting whelk pots aboard the
AUDREY RUSSEL off Whitstable

Photo: A. C. Simpson



Plate 5 Bringing the whelk catch ashore at Whitstable

Photo: A. C. Simpson

Table 1 Boats, gear and landings at the known whelk ports in England during 1962 and 1965

Port	Number of		Type of pot	Bait	Annual landings				Fishing season
	Boats	Men			1962		1965		
					cwt	£	cwt	£	
Grimsby	3	15-18	Iron pot	Tope, cods' heads, gurnard, coalfish	7 600	11 735	1 750	2 841	All year, mainly winter
Brancaster	4	8	Iron pot	Herring	6 877	12 709	9 270	13 514	Mainly summer
Wells	7	16	Iron pot	Herring	12 663	28 740	17 615	33 760	All year
Cromer	3	6	Iron pot	Herring, whitefish	419	737	1 447	3 018	Winter
Gt. Yarmouth	1	1	Iron pot	Herring, whitefish	164	624	8	30	Summer
Felixstowe	2	2	Iron pot	Whitefish	675	1 215	568	1 136	All year
Harwich	1	1	Iron pot	Whitefish	37	96	155	401	Summer
Whitstable	5	10	Iron pot	Skate, dogfish, shore crabs	4 976	9 537	1 762	3 728	All year
Margate	1	2	Basket	Fish offal	57	119	228	672	June-September
Ramsgate	1	2	Basket	Skate offal	206	430	115	312	April-September
Folkestone	3	6	Basket	Dogfish heads	Est. 5-6 bushels per boat per day		NR	NR	March-December
Hythe	2	2	Basket	Dogfish heads	248	300	60	85	April-September
Bexhill	1	2*	Basket	Crushed mussel	Small landings		NR	NR	October-April

*Part-time

NR - no record

either bait used separately. It is believed that when live shore crabs are attracted into the pots their presence acts as a deterrent to whelks, and in any case they destroy the bait. On the other hand, the presence of dead crabs in the pots not only attracts whelks, but seems also to deter shore crabs. Edible crabs are sometimes used as bait for whelks; like their use in lobster pots this seems to be a highly undesirable practice, particularly when the same fishermen expect to catch edible crabs for market at other times of the year.

More unusual baits include horseflesh and cormorant or shag flesh, which have been used at Poole, and crushed mussels in small sacking bags at Bexhill.

Boats and gear

Boats used for whelking are in the main double-ended, clinker-built open boats with fairly broad beams and plenty of room for hauling and stowing gear. They are usually 22 ft long at Wells, and somewhat shorter at Whitstable (see Plate 3). At Wells, a considerable advance has been obtained by the use of two 35 ft lifeboats, each provided with an independently powered capstan aft to assist in lifting the pots. These boats often fish up to 18 miles from the coast, using over 200 pots in greater depths than those normally fished for whelks, and this mechanical assistance is a great asset under these conditions. Some conventional east coast whelk boats also have capstans but on most of them the pots are hauled by hand, a daily routine involving the lifting, emptying, rebaiting and shooting of up to 150 pots per boat. Boats used for whelk fishing from Grimsby are larger and all about 50 ft long.

MARKETING

Landings

By far the most important port for whelk landings in this country at present is Wells in Norfolk, where 17 615 cwt valued at £33 760 were landed in 1965. The Norfolk grounds are also fished from nearby Brancaster where over 9 000 cwt were landed in 1965. In 1958, grounds at the western edge of the Yorkshire Hole worked by five whelk boats from Grimsby yielded 4 751 cwt between October and April, but by 1962 a summer fishery had also developed and the year's landings increased to 7 600 cwt. By 1965, however, landings at Grimsby had decreased to 1 750 cwt. The next most important whelk port is Whitstable in Kent, where in 1962 five boats landed 4 976 cwt, valued at £9 537. Here again, the landings have recently fallen, to 1 762 cwt in 1965, partly because of the smaller number of boats, and possibly also because of the effects of the severe winter of 1962-63 on the developing young whelks. Landings at other whelk ports in 1962 and 1965 are shown in Table 1. In addition small landings have been made at Eastbourne, Brighton, Bognor Regis,

Selsey, Poole, Portland, Brixham, Newlyn, Milford Haven and Barrow-in-Furness. Whelks are also taken in lobster and crab pots, and small incidental landings are made at various ports. Some potting for whelks for use as bait for long-lines is practised on the Yorkshire coast.

Markets

The greatest demand for whelks is during the holiday season, when they are supplied mainly to seaside resorts; in poor seasons for holidaymakers, and during the winter months, most of the catches are sent to Billingsgate. This is the practice at Wells and Brancaster; during the summer these towns also send considerable quantities to Midland cities, and a similar procedure is followed at smaller whelking ports. During the winter months Grimsby whelks are supplied to Yorkshire fishermen as bait for long-lines used mainly to catch cod, and also to the boiling houses of Boston, Cleethorpes and Lytham St. Annes. Whelks landed at Folkestone supply the coastal trade in summer and the bait trade during the winter. Whelks from various ports are also used for preserving and bottling, as in the cockle and mussel trade.

Fishing season

This is largely related to markets, but is also influenced by alternative shellfisheries. The hard core of whelk fishermen from Wells, Brancaster, Whitstable, Folkestone, Poole and Felixstowe Ferry fish throughout the year. At Grimsby the winter fishery is the most important, and a large proportion of the whelks landed there are used as bait in the winter long-line fishery off Yorkshire. At most other ports fishing for whelks takes place only in summer, but at Bexhill and Cromer whelking is a winter fishery. At Cromer, and to some extent Grimsby, the crab fishery takes precedence in summer, though small incidental landings of whelks may be made from crab pots.

Catching season

Catches of whelks are said by fishermen to be poor in hot summers (when the warming of the water tends to make the whelks sluggish), during early winter when spawning is taking place, and also at extreme low temperatures. Rough weather in winter, of course, results in fewer landings when boats are unable to put to sea; moreover, the quality of the flesh is generally poorest in winter. These seasonal variations in the catch are illustrated in Figure 2, which shows the catches of whelks taken at Whitstable during 1959. The best catches were taken in spring and towards the end of the year, though the number of pots being fished remained virtually the same throughout the summer. In July and August poor landings were the result of the hot summer, and in January fewer pots were lifted, because of bad weather.

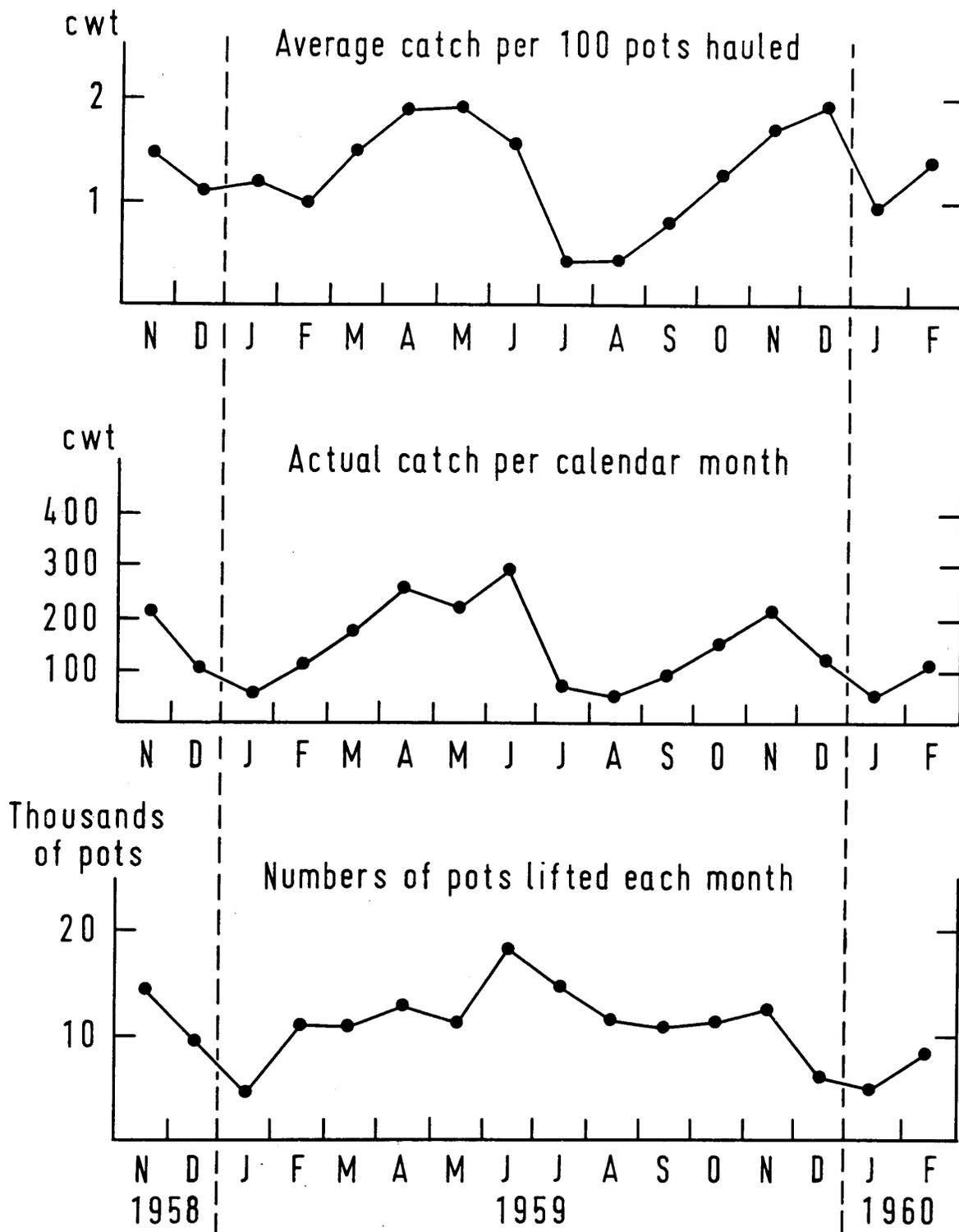


Figure 2 Landings of whelks at Whitstable during 1959

Preparation for sale

Whelks are normally boiled at the place of landing, usually in sea water, in large open "coppers" fired by coal. A recent development is heating by oil burners which has reduced the cost considerably. The whelks are bagged up at sea in net bags, each holding a wash measure (= 5 gallons 3 pints 1 gill, or roughly $\frac{1}{3}$ cwt). The bags are dropped in the boiling water and brought to the boil again. The time of boiling varies from about 5 minutes on the south coast to 12 or more minutes on the east coast. The whelks are cooled in baskets and packed in sacks ready for despatch; in some cases, when the immediate demand is slack, they are retained in cold storage after boiling. Cooked whelks are sometimes picked from the shells before despatch from the ports - this helps to reduce the transport costs.

Whelks intended for bait in the long-line fishery are not cooked but despatched alive, and as the line fishery is a winter one there is usually no trouble about their condition on arrival. When baiting the lines the whelks are broken open and the uncooked meats put on the hooks; this is a messy and laborious process, but recent experiments at the Humber Laboratory have shown that when live whelks are deep frozen, then thawed, the flesh can be removed from the shell even more easily than after cooking. The flesh may then be refrozen for later use, and weighs only about one-third of the total weight including shells. Preliminary experiments to compare frozen and fresh whelks as bait for long-lines showed, however, that fresh whelks consistently caught more fish than did frozen whelks.

BY-LAWS

The following by-laws relating to whelks are operative in the Sea Fisheries Districts shown:-

Lancashire and Western Sea Fisheries District (20 September 1951) and Dee Fisheries District (2 July 1895)

Methods of fishing. No person shall use any method or instrument of fishing for sea fish other than the following:-

A pot, hook or basket, for taking eels, prawns, shrimps, lobsters, crabs or whelks.

Suffolk and Essex Fisheries District (Covehithe to Dovercourt - Sea Fisheries powers now exercised by the Essex and East Suffolk and Norfolk River Boards - 14 September 1898)

Close season. No person shall fish for or take otherwise by hand any whelks between the 15th day of May and the 15th day of August

both inclusive in any year. Provided always that any person holding a written Authority in that behalf, signed by the Clerk of the Board, may during the month of May, subject to any conditions contained in the Authority, remove whelks from one part of the said area to another part thereof, for stocking or breeding purposes.

Instruments. No person shall fish for or take cockles, mussels, whelks or periwinkles otherwise winkles except: -

- (a) By hand
- (b) With a rake not exceeding 3 feet in width, with the teeth not more than half-an-inch in width, nor having a less clear space than half-an-inch between each tooth, and used only when the cockle bed, mussel bed, whelk bed, or periwinkle otherwise winkle bed, is covered with at least two feet of water.
- (c) With pots, hoopnets, or lines.

WHELKS IN OTHER COUNTRIES

The statistics issued by the International Council for the Exploration of the Sea for 1960 showed landings of whelks for only four member countries; these were Belgium (1 594 cwt), Holland (2 342 cwt), Germany (472 cwt) and England (33 719 cwt). This seems to be due to a regional popularity and not to availability, because whelks occur in large numbers in seas fished by countries where no whelks are eaten. For example, in 1910 the whelks in the Limfjord of Denmark caused such havoc to plaice caught in gill nets that they were included on a list of five animals harmful to Danish fisheries. In a campaign organized by the Danish scientist C. G. J. Petersen vast numbers of whelks were captured. However, although numerous possibilities were explored, no use could be found for them, except as bait for eels, and the project was abandoned as uneconomical.

Dr. Lambert, in his work "Les Coquillage Comestibles", mentioned that whelks are dredged or handpicked along the north and west coasts of France, and used in soups or eaten boiled with vinegar; the ICES statistics, however, record no whelk landings for that country. There is a possibility that live whelks exported from Britain would find a market in France.

In the United States, although several species, including our own common whelk, Buccinum undatum, occur in plenty, none is utilized as food.

CONCLUSIONS

This survey of the whelk fishery has shown how different ways of catching whelks have been developed to meet the needs of different areas. At Whitstable, small open boats, each with only two men as crew, fish daily, hauling their pots by hand at relatively short distances from the shore. On the east coast, larger cabin boats with more crew aided by pot-haulers work a large number of pots in deeper water at greater distances from the shore, while at Grimsby larger keelboats, more heavily manned and with live-storage facilities, work for longer periods and at greater distances. The type of pot, the method of fishing and the choice of bait appear to be quite suited to the particular conditions where they are used and capable of producing adequate catches to satisfy the present limited, and rather inflexible, markets. One of the main problems of the existing whelk fishery is the maintenance of a steady supply of cheap bait, and here the development of an artificial bait could prove very useful. The expansion of markets, both in this country and overseas, is of prime importance to the future development of the whelk industry, for this would allow proper exploitation of grounds already fished and the development of new fisheries in the many areas which are as yet unexploited and where an abundance of whelks is known to exist.

ACKNOWLEDGEMENTS

The considerable assistance given by Mr. Harold Rowden of Whitstable, both with information and practical help, is gratefully acknowledged. Thanks are also due to other whelk fishermen around the coast, to Mr. D. K. Francis, Chief Fishery Officer to Kent and Essex Sea Fisheries Committee, and to the staff of the Ministry's District Inspectorate, for providing information on whelk fishing in their areas.

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