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Ödsmål, Kville sn, Bohuslän

Hällristning Rock carving
Fiskare från Bronze age
bronsåldern fishermen



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On the habitat behaviour of the lobster
(*Homarus vulgaris*) in Swedish waters.

by

Bernt I. Dybern, Leif Jacobsson
and Hans Hallbäck

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Abstract

The European lobster lives on rocky or stony bottoms at moderate depths. The result of diving observations on the Swedish west coast show that it seems to prefer bottoms where stones and boulders lie on soft bottom material. Under the stones the lobsters dig out hollows or tunnels with one or more openings where they live, using the hollows as hiding-places.

Where the bottom conditions do not permit the lobsters to dig out hollows they hide in natural hollows among stones or in crevices in the rocks. Also in the latter cases the hollows may have more than one opening.

Besides the function as hiding places the hollows are also look-outs, very often situated on slopes with the main opening directed downwards. Places where the algal carpet is not too thick seem to be preferred.

Many observations seem to indicate that the hollows are only temporary living places, since the lobsters very often, obviously spontaneously, leave them to seek other places of residence.

Hitherto no significant differences in the habitat behaviour between the sexes have been established.

The lobster bottoms.

There is a great deal of information in the literature about the types of bottom preferred by the adult European lobster (*Homarus vulgaris*). In the Mediterranean area the animal is thus found on rocky bottoms (Alvarez 1946). On the coasts of the Adriatic Sea it is met with in the "zona littorale sommersa" and "i fondi detrici" down to about 30 m (Vatova 1928). From the British Isles e.g. Thomas (1958) reports it from below the water mark in the coastal fringe on or near rocky bottoms, and Simpson (1958) mentions that its main habitat is where stones and rocks, often covered with algae, are found. Sometimes it may also inhabit sandy bottoms with stones, as outside Yorkshire. Havinga (1951) and Korringa (1957) report that on the coast of the Netherlands the main habitat is among the stones belonging to the big embankments. Besides mentioning occurrences on rocky and stony bottoms around Helgoland, Ehrenbaum (1896) says that during the cold part of the year some lobsters dig themselves down into shallow soft bottoms, where they stay until the end of the winter.

From the Scandinavian waters Appellöf (1899, 1909), Stephensen (1910), A. Dannevig (1936), G. Dannevig (1962), Poulsen (1927) and Höglund (1964)

consider the typical lobster habitats to be rocky bottoms with boulders and stones, often covered with algae. The importance of the boulders and stones is stressed, because they give many good hiding-places. Very often they lie on sand, making it possible for the lobsters to improve different kinds of hollows under them through digging them out.

On the European coasts adult lobsters seldom seem to be found deeper than about 40 m.

The information about the way of living of the very young lobsters, after that they have reached the bottom stages, is more scanty, since they are difficult to catch. However, Appellöf (1899, 1909) and A. Dannevig (1927), in breeding experiments, have observed that during the first bottom stages the small lobsters tend to seek hiding-places and that already then they have the ability to dig.

Evidently the American lobster (Homarus americanus) generally lives in the same habitats as the European one (c.f. e.g. Herrick 1895, Templeman 1937, Paloheimo 1963, Mc Leese & Wilder 1964). However, there seem to be some differences, since the American lobster also inhabits off-shore bottoms outside the north-eastern coast of North America, where it is caught by trawlers down to about 250 fms (Schroeder 1959). Observations in lobster ponds also indicate that it has a distinct ability to dig saucer-shaped depressions in soft bottoms (see e.g. Mc Leese & Wilder, op. cit., Fig. 3), a behaviour not mentioned concerning the European lobster.

Swedish investigations on the habitat behaviour of the lobster.

The occurrence of the lobster in Swedish waters are confined to the west coast from the Norwegian frontier to the island of Ven in Öresund. In the northern part the coast is as a whole rocky and stony. In the southern part there are many big beaches, in some places interrupted by rocky or stony sections. Outside this southern part, at different distances from the the shore-line, and of the banks of the Kattgat^e many parts of the bottoms are stone-covered.

The Institut of Marine Research at Lysekil has started an investigation of the habitat behaviour of the lobster along the whole west coast in order to get an idea of the capability of the animal to make use of the bottom conditions to get suitable living places. The investigation is mainly carried out as scuba diving operations completed with aquarium experiments. The following is an account of some of the results obtained hitherto.

A typical coastal section of the northern west coast.

In Fig. 1 is shown a part of the skerry-yard on the northern Swedish west coast. Most of the shore-lines are rocky with the rocks continuing to different depths, generally about 10-20 m below the surface, where the mud-

line begins (Fig. 2 A,B,C). Sometimes the rocky shore-lines are interrupted by shallow sections, consisting of soft-bottoms (Fig. 2 D). Soft bottom sections may also be found in depressions between the rocks, as depicted in Fig. 2 C. The tide differences are only about 20-30cm, but tidal currents, together with currents brought about by meteorological conditions, are strong enough to carry away most of the finest material from the shore-line slopes of the mainland and the skerries; the bottoms therefore mainly consist of gravel, sand and shell-sand. Stones and boulders are very common on and below the slopes. Down to about 12-15 m they are generally covered with a thick algal vegetation, but below these depths only with a relatively thin carpet of red algae.

The lobster occurrence in the area.

Divings were made, mainly during July and August 1966, in the area described, together covering about one third of the shore-lines. A total of 74 lobsters were found, 60 during the day-time and 14 during night-divings (Table 1). 59 could be determined as to the sex. Since the divings were performed during a rather long time there is, of course, a possibility that a few moving lobsters were met with more than once, but because the aim of the investigation was to see how the lobsters were distributed and what habitats they had chosen, this is of minor importance.

Table 1.

Sex	Males		Females		Not determined	
	Under-sized	Full-sized	Under-sized	Full-sized	Under-sized	Full-sized
Above 10 m	2	4	1	3	3	-
10-14 m	5	13	1	21	11	-
Below 14 m	2	3	1	3	1	-
Total	29		30		15	

Males and females were about equally distributed horizontally over the area and the same thing was valid when under-sized and full-sized individuals were compared.

30 lobsters were under-sized, that is below 21 cm total length and not allowed to be fished in Sweden. 5 of those were only about 10-12 cm, a size usually not captured in creels or nets. Only one of them could be determined as to the sex (male; 11,5 cm).

The vertical distribution appears from Table 1. Most of the lobsters were found at 10-14 m depth. No significant difference concerning the sexes

or sizes was found. The deepest individual was observed at 18 m depth. No lobster was found on the mud even at a short distance from the rocks and stones.

The choice of habitat.

The 60 lobsters found during the day-time were all but 5 met with on hard bottom sections under or close by stones and boulders without (Fig. 6) or with (Fig. 7) an algal carpet, or, in a very few cases, in a natural hollow in the rock (Fig. 2 B).

It is thus evident that hollows under or among stones and boulders are preferred by the lobster as hiding-places during the day-time. Of the 60 individuals 40 were hiding in hollows under stones lying directly on soft-bottom material in which they had improved the hollows through digging. Most of these hollows had one opening with a wall of digged out material in front of them (Fig. 3 C, E), but some had more than one opening, the lobsters thus living in more or less complicated tunnel systems (Fig. 3 A, B, F). Of the remaining 20 lobsters the majority was hiding in natural hollows under stones also lying on soft-bottom material but without having digged them out (Fig. 4 A-D, F). Only a couple of lobsters were found in hard bottom hollows situated among heaps of stones or formed directly by the rocks (Fig. 4 E). 5 lobsters were found not lying in hollows, all of them relatively big in size.

Table 2 gives a summary of the choice of residence of the lobsters found during the day-time divings. The figures are not big enough to permit any definite conclusions as to eventual differences between the sexes. Concerning the sizes of the lobsters, it seems as if the small ones hide more often than the bigger ones, a fact also supported by observations in other parts of the Swedish west coast.

Of the 14 lobsters found during the relatively few night-divings only 3 were found hiding in hollows, the others strolling around and met with for instance on rock-shelves (Fig. 5 A) or on open surfaces between stones (Fig. 5 B). However, as it is then difficult to find the hiding-places nothing certain can as yet be said about the ratio between hiding and walking lobsters during the night.

Table 2.

The sites of the lobsters found during the day-time divings!

- I. In digged out hollows with two or more openings.
- II. In digged out hollows with one opening.
- III. In natural hollows, not digged out, with one or more openings.
- IV. Not lying in a hollow.

Size	Sex	I	II	III	IV
Under-sized individuals < 21 cm	male	2	2	3	-
	female	-	1	-	-
	not det.	7	3	3	-
Full-sized individuals > 21 cm	male	2	9	3	1
	female	3	11	6	4
	not det.	-	-	-	-
Total		14	26	15	5
Berried femals (all full-sized)		2	8	2	2

Experiences from other parts of the coast.

During the time of investigation divings have been made along the whole Swedish west coast and also on some of the banks in the Kattegat. Most of the many lobsters met with were hiding in similar manner as those described from the above-mentioned area. However, the relative frequency of the hiding-types I-III in table 2 varies somewhat with the nature of the bottoms. Where lots of stones are lying upon each other the lobsters are often found in cave-like hollows among the stones without having access to any soft-bottom material. This is for instance the case on some of the banks of the Kattegat. In the area south of Kullen, at the entrance of the Öresund, big parts of the bottom consist of more or less horizontal rocks. There the lobsters seem to prefer crevice-like dwellings under small overhanging edges, in this case, too, lying on the bare rock.

The use of the lobster hollows.

The main use of the hollows is certainly as a shelter. It is striking that so many lobsters live in hollows, both constructed and natural, having more than one opening. When attacked, for instance by a diver, a lobster usually retires backwards into the hollow. If this hollow has a back opening, the animal can swiftly disappear through it, swimming backwards to another

hiding-place.

Another use of the hollows is as look-outs. A closer examination reveals that if the hiding-place is situated on a slope, which is most common, the only opening or the main opening if there are more than one, is generally directed down towards the slope (c.f. Fig. 6 and 7). It is also evident that most of the lobsters prefer hiding-places situated where the vegetation is thin (Fig. 6) rather than hollows more or less concealed behind a thick algal carpet (Fig. 7).

How long does a lobster stay in its hollow?

When diving at suitable places one often finds many empty lobster burrows. For instance during the early period of protection of the lobster, when it is not allowed to be caught and the populations are thus not disturbed, one can revisit a hollow, before inhabited, after only one day or a few days only to find that the lobster is not there. It therefore seems as if lobsters for some reason or other easily leave their hiding-places. It also happens that a new lobster takes possession of a hollow, just before inhabited by an other individual. - On the other hand there are examples of lobsters who have lived in the same hollows for many days or even weeks.

Aquarium experiments.

In order to make possible a closer study of the digging behaviour of the lobster, a series of aquarium-experiments have been performed. In this way we have, among other things been able to study how it improves its hollow in the soft-bottom material under a stone. The observations by Appelöf and Dannevig that also very small lobsters have the same capability to dig as the adult ones are confirmed.

If a lobster is given the chance to choose between a hollow already big enough to protect its whole body but without soft-bottom material, and a very small hollow under a stone lying on sand, it generally chooses the latter one and digs it out.

When a hollow is digged out it often happens that the lobster spontaneously leaves it, seeking a new similar place where it starts again to construct a new hollow. In this way it may slowly move around the aquarium-basin, constructing a row of burrows under the stones.

The observations, both in the aquarium and in nature, of the abandoning of the hollows, may reveal an important feature of the life of the lobster, being perhaps a kind of vagabond, moving around from one temporary home to the other. The movements do not, however, cover any great area, since the lobster is a rather stationary animal, which is shown through a lot of marking experiments.

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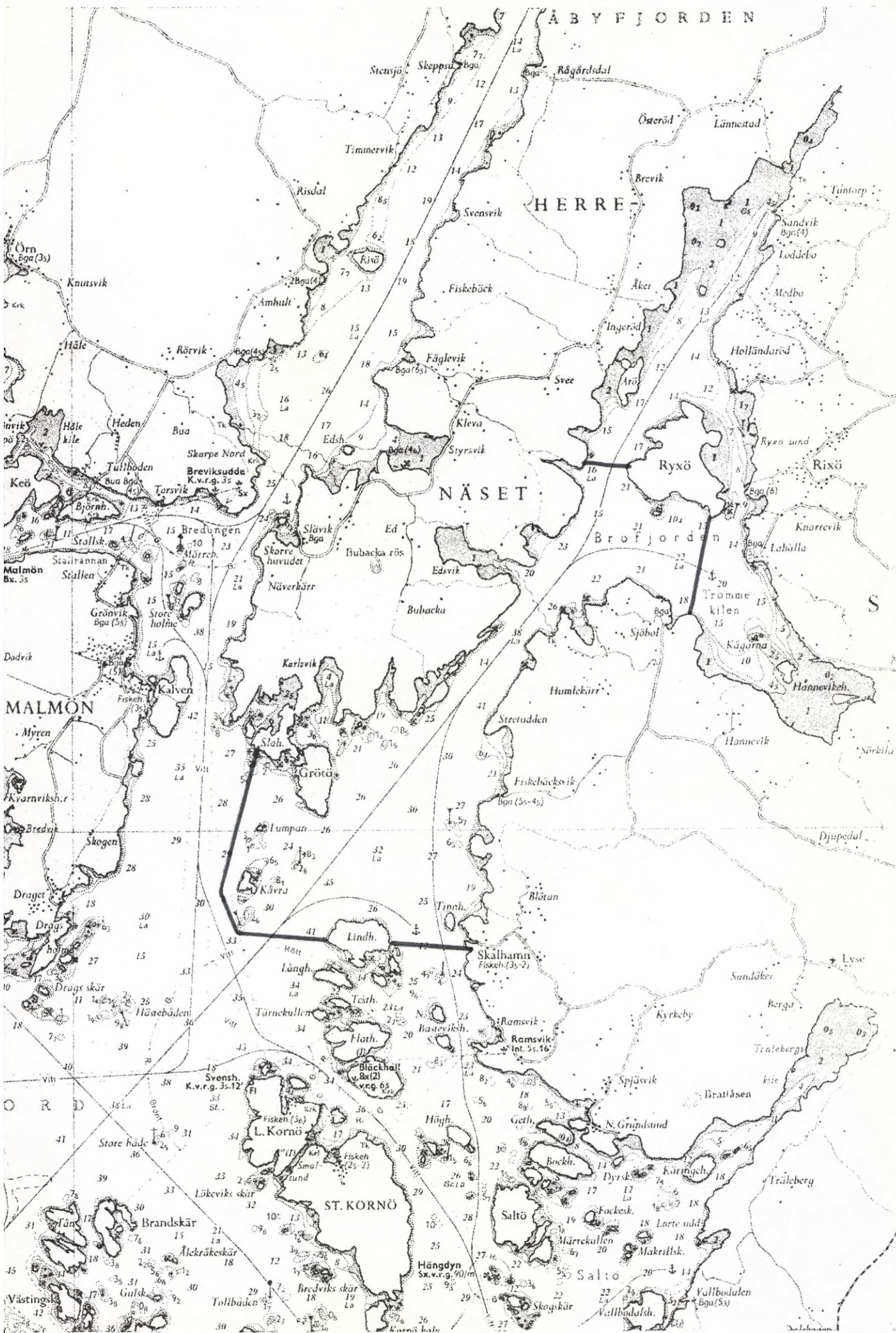


Fig. 1

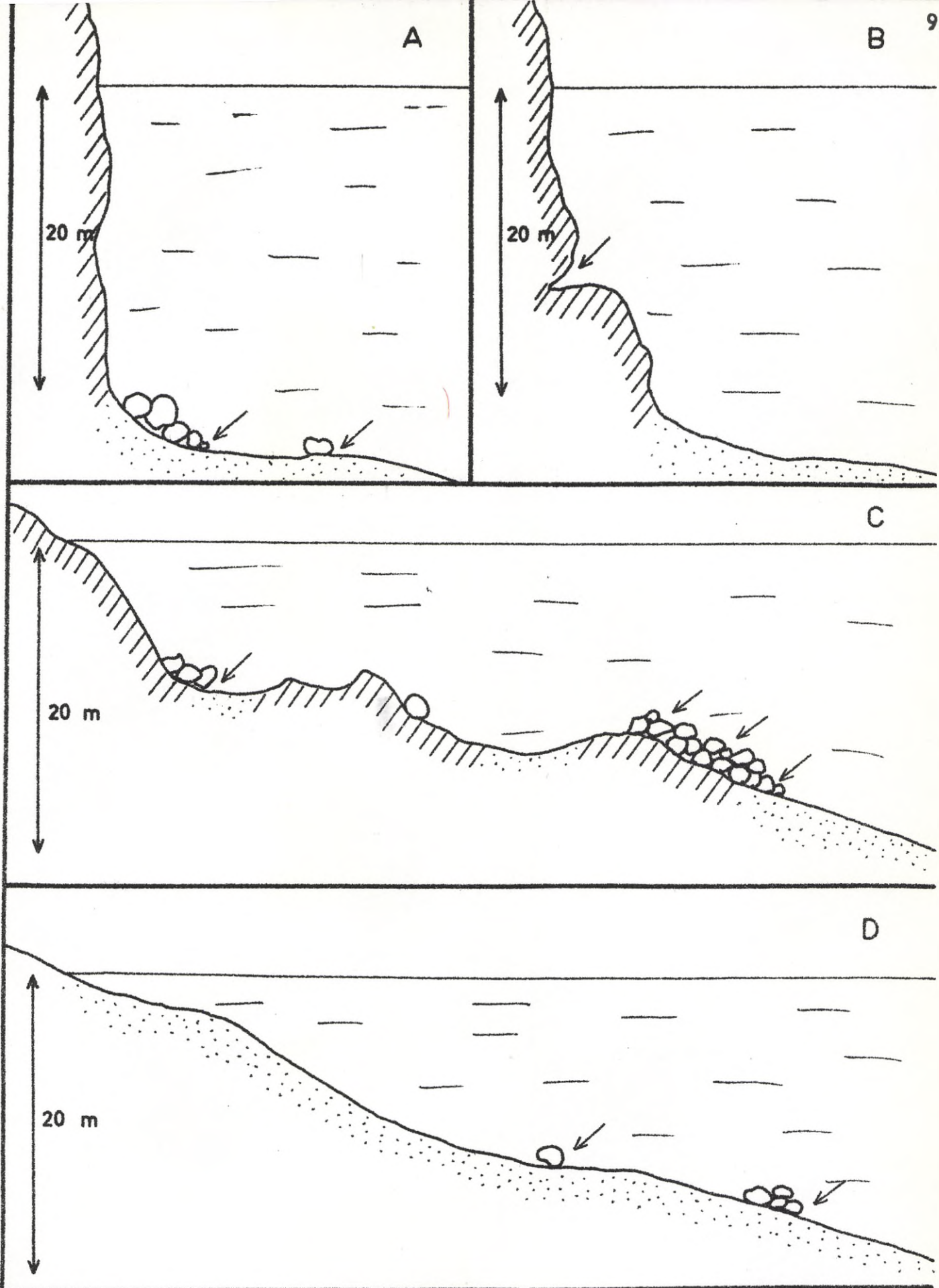






Fig. 2

 Soft bottom
 Rocky bottom

 Boulders and stones
 Lobster site

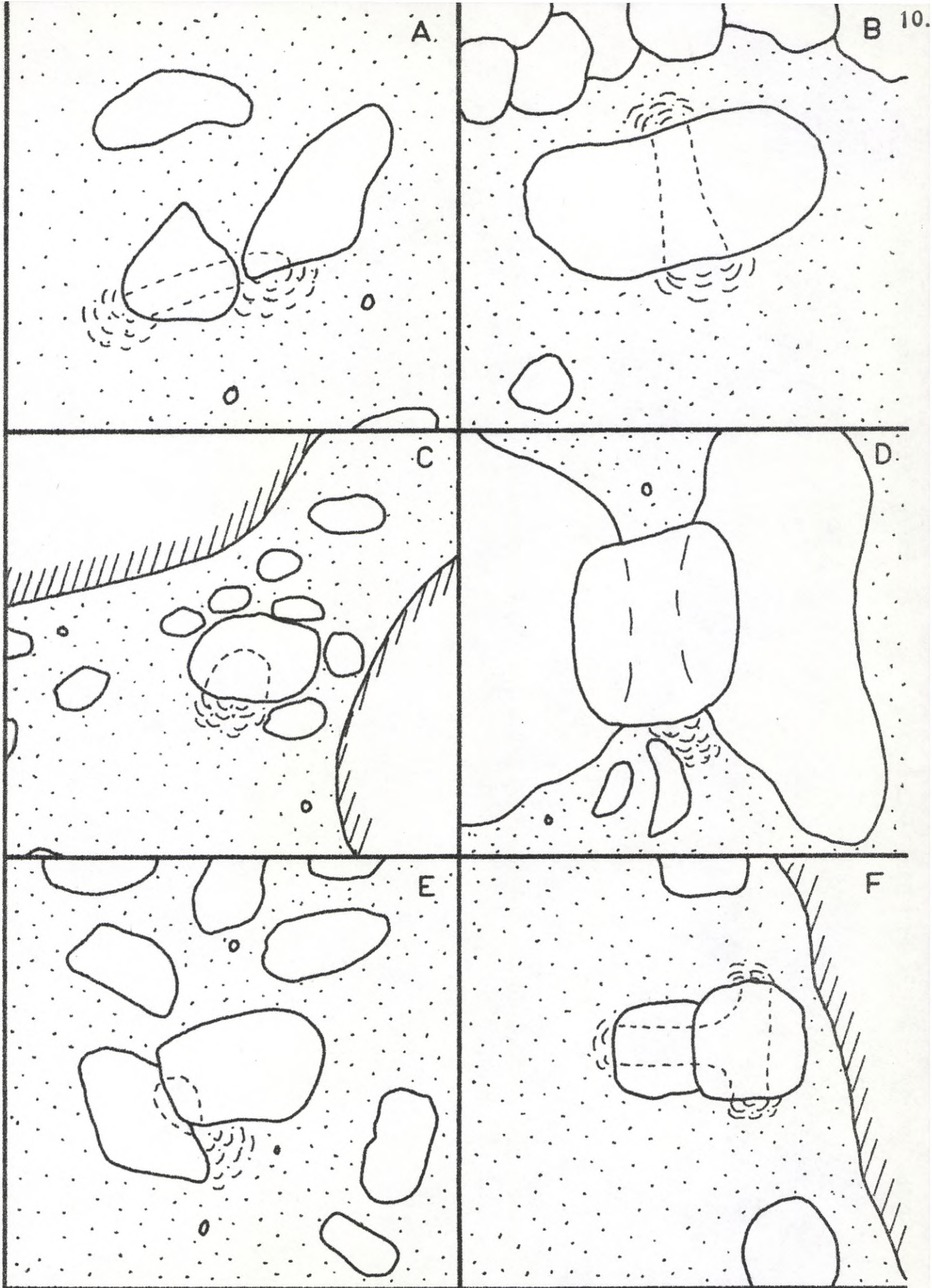


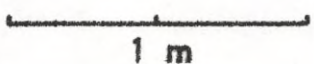
Fig. 3

Some types of excavated lobster burrows.

Soft bottom

Rocky bottom

Stones and boulders



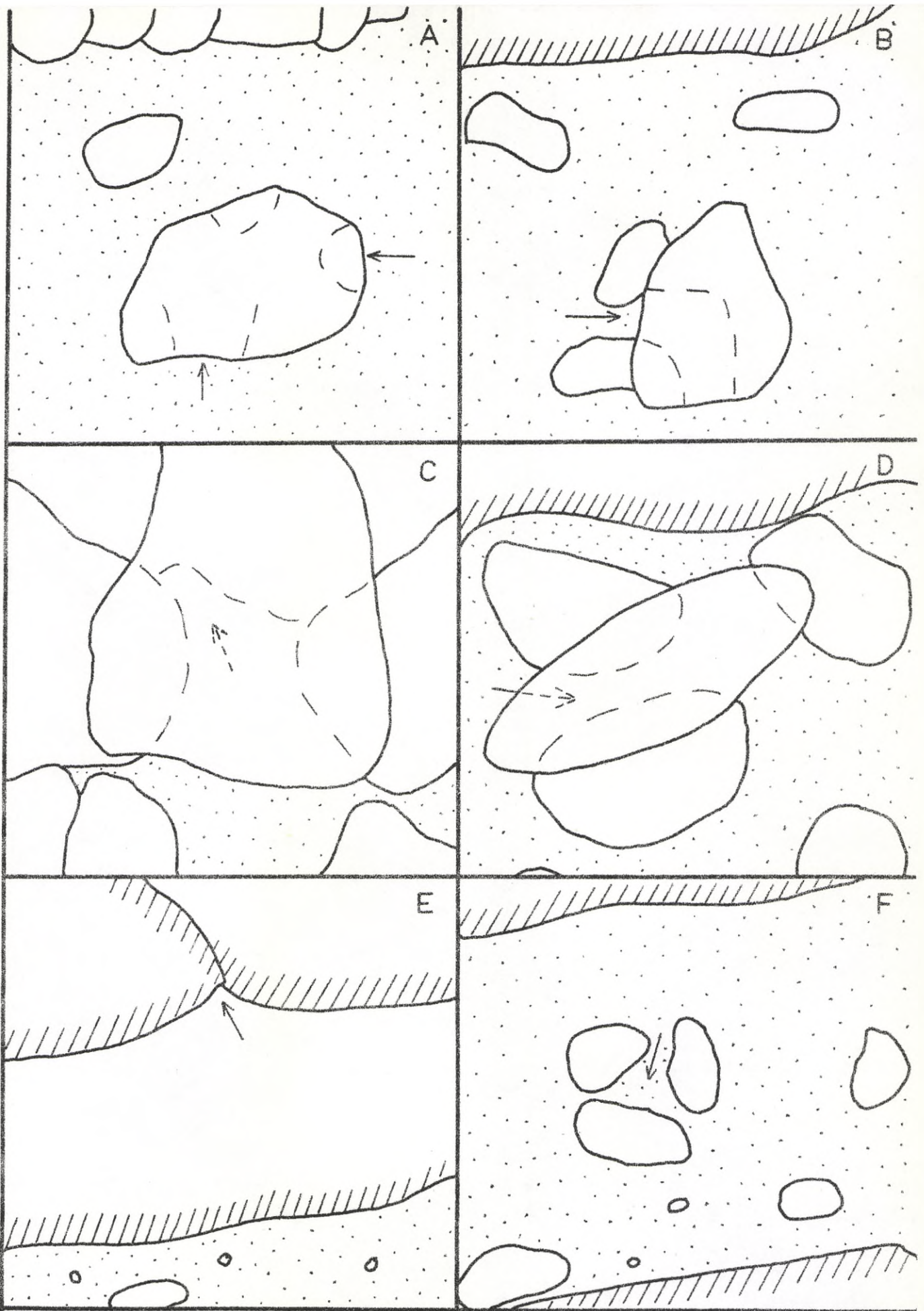


Fig. 4

Some types of not excavated hiding - places.

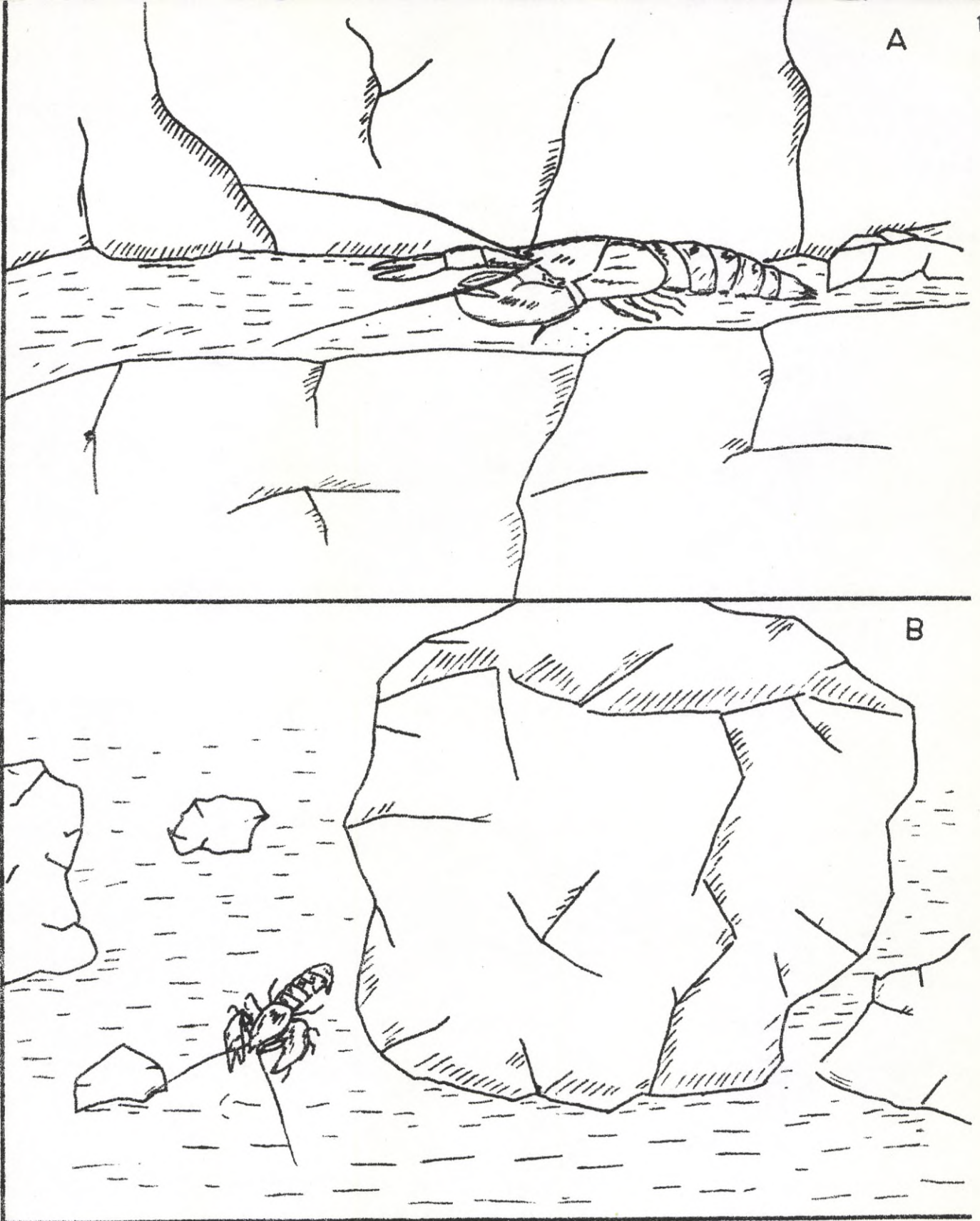
Soft bottom

Stones and boulders

Rocky bottom

Lobster

1 m



A. Lobster creeping on a rock-shelf.

B. Lobster walking among stones and boulders.

Fig. 5



Fig. 6

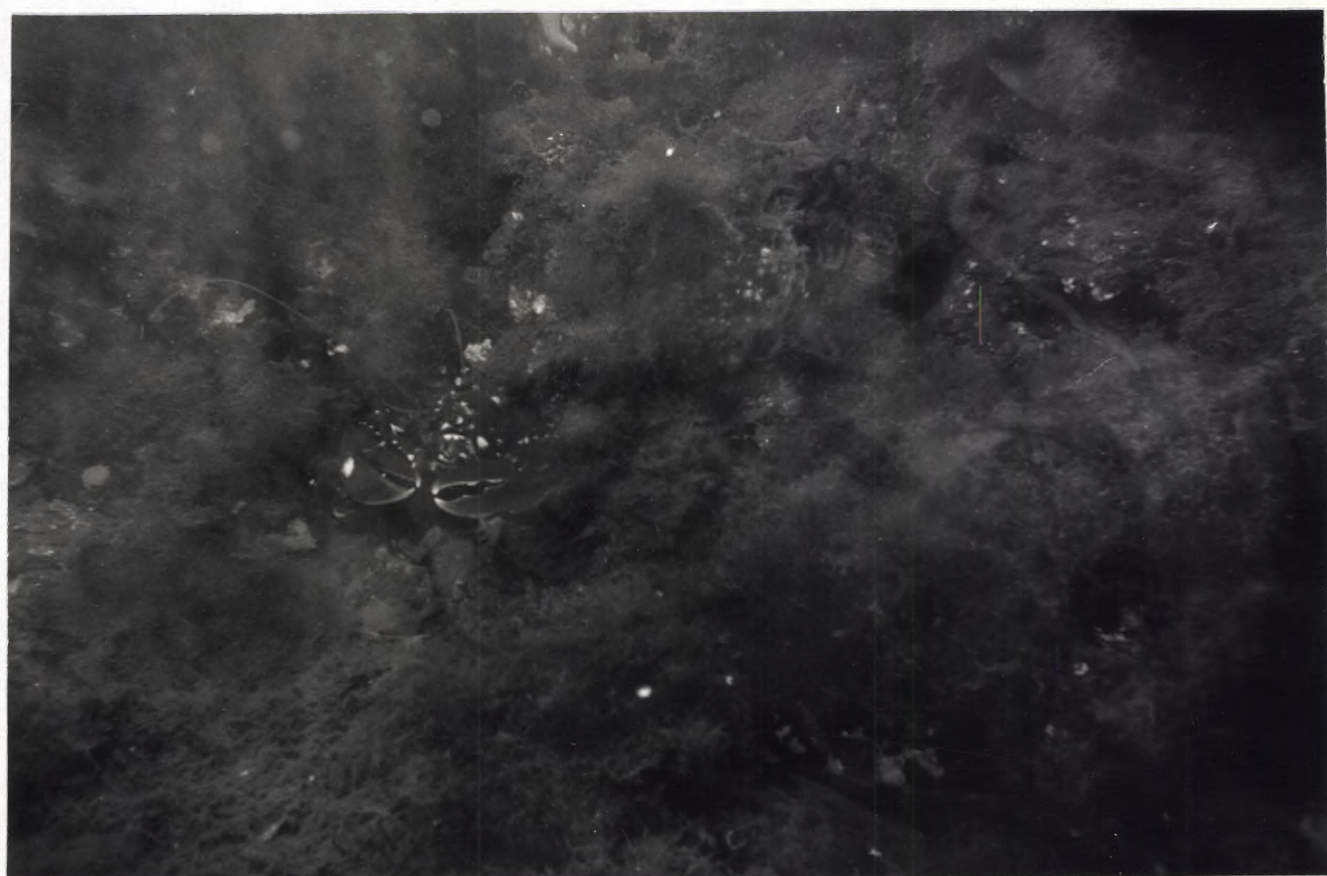


Fig. 7

