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THE BURROW STRUCTURE OF *Ocypode cursor* (LINNAEUS, 1758) ON THREE SHORES SOUTH OF BEIRUT, LEBANON

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ABSTRACT:

Sixty burrows of the ghost crab, Ocypode cursor (L.1758) were investigated from each of three sandy beaches, Ramlet-el-Baida, Ouza'i and Sidon approximately 3, 8 and 40 km respectively south of Beirut, Lebanon. Of the total 180 burrows, the following types are reported in order of their percent occurence: 1. Slightly bent burrow (26.0 %); 2. Branching burrow (23.8 %); 3. Vertically tapering burrow (21.6 %); 4. 90° bent burrow (13.8 %); 5. U-shaped burrow (8.8 %); 6. Strictly vertical burrow (3.3%) and 7. Multiple (2 and 3)-opening burrow (2.7 %). Topographical variations at each of the three sandy beaches appear to affect the burrow structure of the crab.

INTRODUCTION

An investigation of the burrow structure of the ghost crab, Ocypode cursor (LINNAEUS, 1758) was conducted on three sandy shores along the coast of Lebanon.

Although O. cursor is primarily nocturnal, adults, but more commonly juveniles, may sometimes be seen active by day. The crabs spend a good portion of the day buried in the sand, and

when they come out they stay in close proximity to their burrows, going only occasionally to the water to moisten their gills. O.cursor may be seen searching for food, digging and cleaning their burrows, scavenging from debris washed ashore, sometimes stalking small animals as prey, or even chasing one another. When they sense the presence of possible danger, the crabs usually scurry back towards their burrows with great speed and agility.

The burrows of the crab are normally located in the intertidal zone both vertically downward and horizontally from the water edge and vary in depth according to the level at which moisture is reached in the sand. Also, the size of the burrows depend upon the age and size of the crab. The deeper adult borrows appear to occur higher up on the beach than those of the juveniles.

OLIVIER (7) described the burrows of Ocypode as being U-shaped with two openings to the outside. COWLES (3) described three kinds of burrows for Ocypode arenaria in Florida. One consisted of a tunnel which was not perfectly straight and made about a 45° angle with the surface. This tunnel had a vertical passage branching off away from the water but sometimes opened to the outside to be used for escape. The depth of this burrow ranged from 3o-6o cm. A second type of burrow, according to COWLES, occurred high on the beach and was similar to the first but was much deeper and had no branching passages. The depth recorded was 126.25 cm. The third type of burrow COWLES described was made by juveniles and extended vertically downard for only a few centimetres.

VANDERBILT (8) reported two types of burrows for Ocypode albicans in Florida. One had a single tunnel extending down 6o-15o cm, and the other was shorter and usually had one or more passages branching off from it which were most likely used for escape.

COTT (2) described the open borrows of Ocypode ceratophthalmus as sloping uniformly at an angle of 7o° with the surface and twisting in a clockwise direction. Also according to COTT, when the sand was dry, the burrows did not bend but had the tendency to taper at the end, thus having the widest diame-

ter at the top.

Three shapes of burrows for Ocypode quadichaudii were described by CRANE (4) as follows: a/ a 15-3o cm deep burrow bent to the right and continuing for about the same distance in this direction (reported as the most usual form dug by adults); b/ the burrow went 15-3o cm down and then spiralled slowly; c/ an obique burrow, 22.5 cm deep.

BARRASS (1) investigated the burrows of Ocypode ceratophthalmus on the sandy shores of the Inhaça Island. He described the open burrows as more or less inclined or almost vertical, and also found that half of the burrows twisted clockwise while the other half twisted counterclockwise.

Observations by HUGHES (6) conducted at different places along the Moçambique coast described the burrows of Ocypode ceratophthalmus as gently sloping and then spiralling downward either clockwise or counterclockwise. The burrow was recorded as ranging from 3o-13o cm in depth. He also reported that the juvenile burrows of this species frequently twisted gently at an angle of up to 9o° but did not spiral like an adult burrow. Some of these burrows were straight and almost vertical, while others tended to be slightly curved. Their depth was dependent on the length of time the crab had to dig and its position on the beach. HUGHES further observed that juvenile burrows which were high on the beach were up to 3o cm deep while those lower down were only 6-1o cm deep.

PRESENT INVESTIGATION

Observations during this investigation were made between March and August, 1975, on the sandy beaches of Ramlet-el-Baida, Ouza'i, and Sidon approximately 3, 8, and 4o km respectively south of Beirut, Lebanon (Fig.1).

A total of 18o burrows, 6o from each beach, were investigated. Thirty of these were classified as juvenile burrows because of their small size. Figure 2 shows the entrance to a burrow of Ocypode cursor in its natural environment.

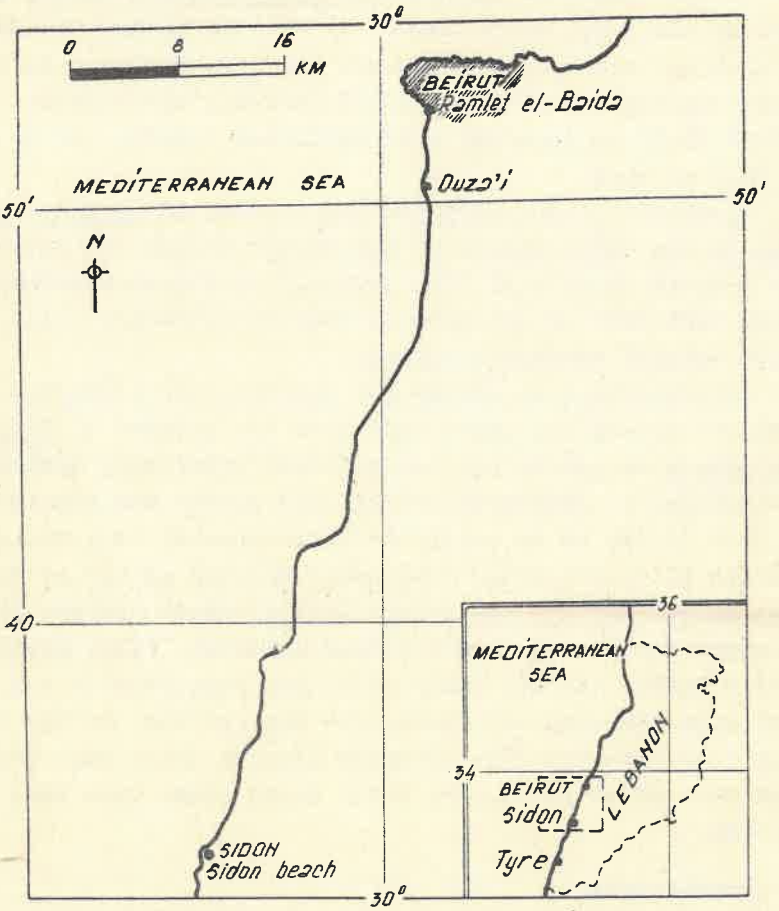

Fig.1 - Location of the three sandy beaches on the coast of Lebanon where this investigation took place:
Ramlet-el-Baida, Ouza'i, and Sidon, 3, 8, and 40 km, respectively, south of Beirut.

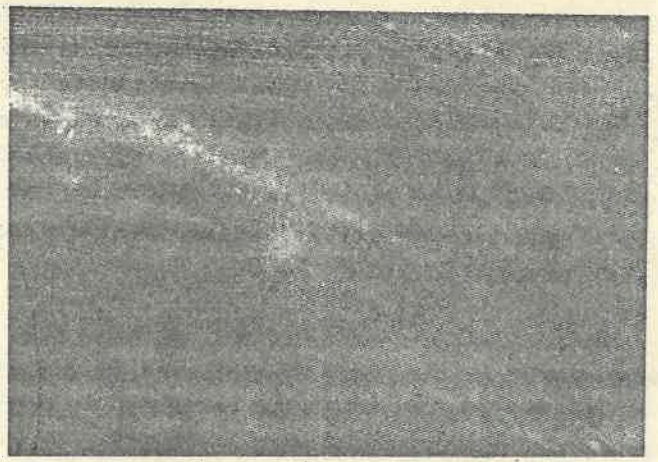

Fig.2 - Entrance to a burrow of Ocypode cursor in its natural environment

METHODS

Cement, sand, and fresh water were mixed by volume in the ratio of 2:1:2. A funnel approximately 15 cm in diameter with a neck measuring about 8 cm in length and 2 cm in diameter was

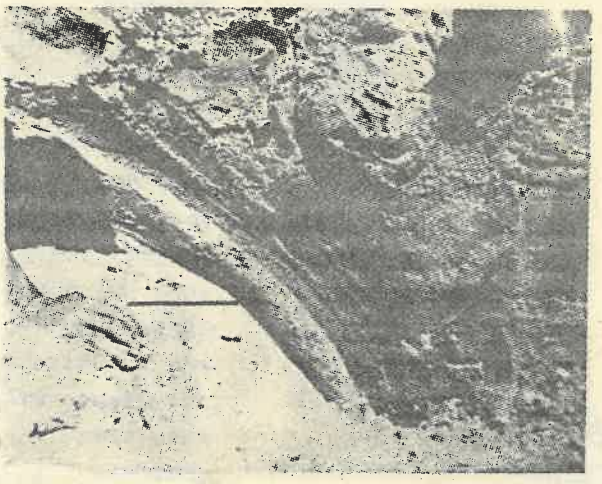

Fig.3 - A burrow mold of Ocypode cursor uncovered to show its curvature.

used to pour the mixture into each burrow. The cement mixture was poured very slowly in order to fill the entire burrow and prevent the sandy sides from collapsing and thus resulting in a poor representation. After the mixture was allowed to harden for at least 1o hours, the burrow molds were dug out with great care, making sure each was removed intact. Figure 3 shows a mold after it had hardened with the sand partially cleared away to expose the curvature of the burrow.

RESULTS

The results of the observations made on the burrow architecture of Ocypode cursor along the three sandy beaches south of Beirut, Lebanon are reported here. All of the burrows investigated were of the open type.

Fig.4 - A mold of a Slightly bent burrow of Ocypode cursor

The beach at Ouza'i is strictly made of sand with no pebbles. Sixty burrows were investigated at Ouza'i and the types of burrows dug on this beach by O. cursor appear to be as follows:

1. Slightly bent burrow: This is the most familiar adult type (Fig.4). The burrow is about 3o cm deep and is dug vertically to the surface, then bends slightly away from the water. The burrow diameter ranges from 4.o - 4.3 cm and is uniform throughout its length except for the base where it is slightly greater. About 4o% of the burrows investigated at Ouza'i were of this type.

2. U-shaped burrow: This type of burrow is U-shaped with only one opening to the outside. The burrow diameter ranges from 4.3 - 5.5 cm and is slightly larger at the base of the curve. It is approximately 27 cm in length (Fig.5). About 15% of the total burrows studied were of this type.

Fig.5 - A mold of a U-shaped burrow of Ocypode cursor

3. 90° bent burrow: This burrow is dug at an angle to the surface for about 25.0 - 30.0 cm, twists at an angle of 90° and then continues in this direction for about 15 cm. Its diameter measures from 3.0 - 4.5 cm (Fig.6). Of the burrows investigated at this beach, about 16,5% were of this type.

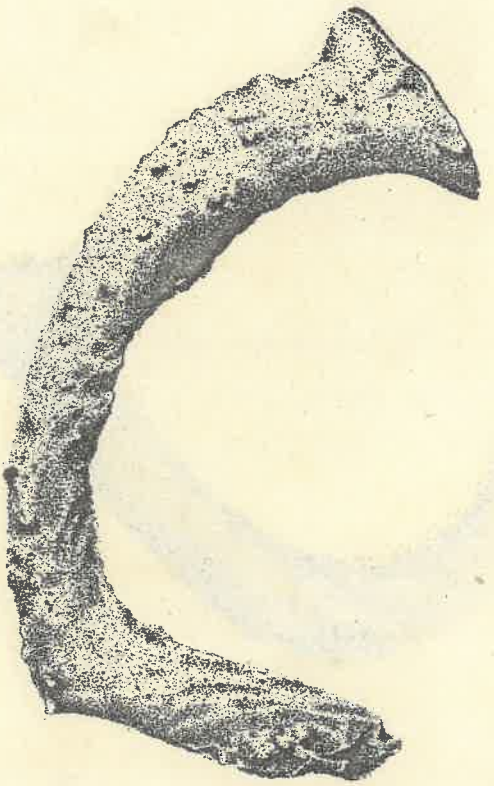

Fig.6 - A mold of a 90° bent burrow of Ocypode cursor

4. Branching burrow: This type consists of two or more branches. It is approximately 3o.o cm deep with a diameter ranging from 2.o - 4.o cm. About 16.5% of the burrows investigated here were of this type (Fig.7).

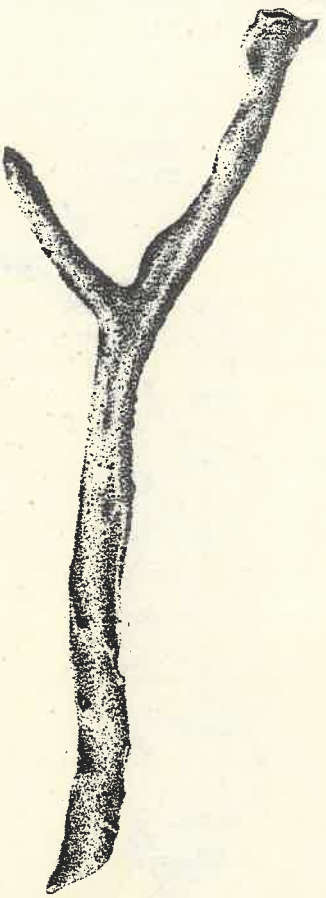

Fig.7 - A mold of a Branching burrow of Ocypode cursor

In addition to these four rather distinct and common types of burrows, two other less common types were found and are described as follows:

5. Strictly vertical type: Four out of the sixty burrows investigated at Ouza'i were strictly vertical, continuing downward in this direction to about 2o.o cm. The diameter was approximately 5.o cm (Fig.8).

Fig.8 - A mold of a Strictly vertical burrow of Ocypode cursor

6. Multiple-opening type: Two burrows with two openings to the outside (Fig. 9A) and one with three openings to the outside (Fig. 9B) were found. Such extra openings are most probably used for escape. The burrow with two openings measured about 35.0 cm in depth with the openings ranging from 4.5 - 5.5 cm in diameter. The one with three openings was about 35.0 cm deep and the average diameter of the openings was 4.5 cm.

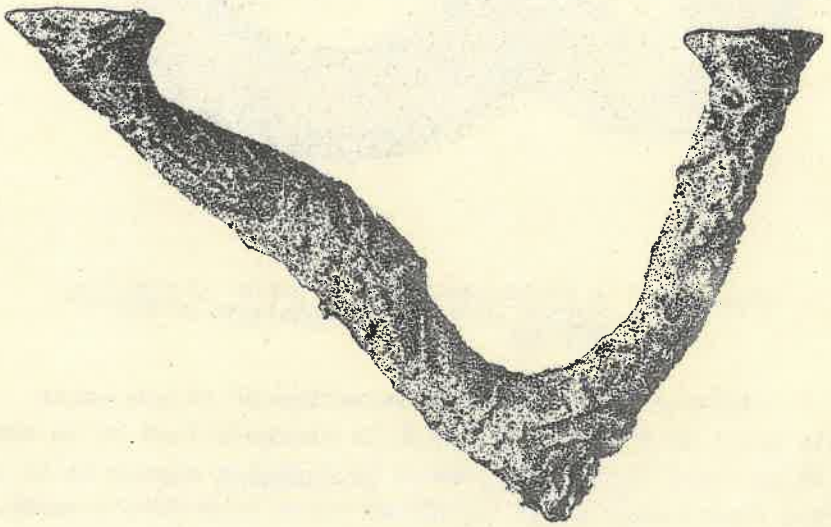

Fig. 9A - A mold of a Multiple-opening type burrow of Ocypode cursor with two openings to the outside.

Fig. 9B - A Multiple-opening burrow of Ocypode cursor with three openings to the outside.

Sixty more burrows were investigated at the beach slightly south of Sidon. This beach is characterized by an abundance of pebbles. Burrows dug there by O. cursor appear to be of the first four common types mentioned above from Ouza'i beach. 38% were found to be of the slightly bent type, 13% of the U-shaped type, 15% of the 90° bent type and 32% of the branching type. It was also noted that there appear to be more branching burrows at the Sidon beach than at Ouza'i, with more branches per burrow.

The last part of the investigation was at the Ramlet-el-Baida beach which is characterized by its dry and hightly granualar sand. Sixty burrows were studied and they were of the following three types:

1. Vertically tapering type: This burrow is dug cally down from the surface and continues in this direction to about 72.0 cm before it tapers at its lower end. The burrow diameter is about 5 cm. 65% of the burrows investigated at Ramlet-el-Baida were of this type (Fig.1o).

2. Branching type: This burrow has one or more branches and is about 45.0 cm deep. Its diameter ranges from 2.5 - 4.0 cm, but closer to 2.5 cm. 25% of the total number of burrows studied at this beach were of this type (Fig.7).

3. 90° bent type: 1o% of the burrows investigated at Ramlet-el-Baida were of this type (Fig.6).

Fig.1o - A mold of a Vertically tapering burrow of Ocypode cursor.

REMARKS

The types of burrows of O.cursor investigated on three sandy shores of Beirut, Lebanon show slight differences in their structure from one location to another. This is most likely due to variations in beach topography. At Ramlet-el-Baida, the sand is much drier than it is at both Sidon and Ouza'i beaches. Moisture may not be available at a depth of about 9o.o cm and hence, could affect the tapering of certain burrows at their lower ends. This agrees with COTT's (1929) report that tapering in burrows dug by O.ceratophthalmus is a result of the dryness in the sand. Beach pebbles are also common at

the Sidon beach and might account for the abundance of branches in the burrows there. Crabs encountering pebbles in the process of digging a burrow could be restricted from moving deeper into the sand and would therefore have to dig in another direction. A more specific description of the shores of Lebanon is given by EMERY and GEORGE (5).

In general, adult burrows of O.cursor were found to be larger than the juvenile ones and are most abundant in late spring to early summer. The juvenile burrows were found to be either of the slightly curved or the branching type with an average depth of about 15.0 cm. They appear to be more frequent in the early spring. Burrows closer to the water edge are shallower and shorter in length than those further away from it.

ACKNOWLEDGEMENTS

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REFERENCES:

1. BARRASS R. - 1963 - The burrows of Ocypode ceratophthalmus (Pallas) (Crustacea, Ocypodidae) on a tidal wave beach at Inhaça island, Moçambique. J.Anim.Ecol., 32: 73-85.

2. COTT H.B. - 1930 - Observations on the natural history of the racing crab Ocypoda ceratophthalma from Beira. Proc. zool.Soc.Lond., 1929: 755-765.

3. COWLES R.P. - 1908 - Habits, reactions and associations in Ocypoda arenaria. Pap.Tortugas Lab., 2: 1-41.

4. CRANE J., 1941 - On the growth and ecology of crabs of the genus Ocypode. Zoologica,N.Y., 26: 297-310.

5. EMERY K.O. and GEORGE G.J. - 1963 - The Shores of Lebanon. Catholic Press, Beirut.

6. HUGHES D.A. - 1966 - Behavioural and ecological investigations of the crab Ocypode ceratophthalmus (Crustacea, Ocypodidae). J.Zool., Lond., 150: 129-143.

7. OLIVIER G.A. - 1802 - Voyage dans l'Empire Ottoman, l'Egypte et la Perse, fait par ordre du Gouvernement, pendant les six premières années de la République, 4: 1-456.

8. VANDERBILT W.K. - 1923 - Scientific Results of the Cruises of the Yachts "Eagle and Ara". Huntington, Long Island, N.Y.