The zoobenthos of the Sirbonian lagoons

by

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About 80 kilometers of the north coast of Sinai is occupied by a system of lagoons, perhaps the most unexplored waterbody along the Mediterranean shores, the Sinus Sirbonicus of classical times. The lagoons were later renamed by the arabs into Sebkhat el Bardawil (« The swamps of Baldwin » — possibly after the crusader king Baldwin I who died in nearby El Arish). There are also theories which are trying to identify the lagoons with Yam Suf, the Reed Sea of the biblical exode.

Many answers to the archeological questions are probably burrowed among the ruins of Mons Cassius a 50 m high mound which probably served as point of attachment to the Nile sediments which formed the long and narrow sandbar of the lagoon. The bar is only a few meters high and a few hundreds of meters broad. The whole water surface of the lagoons is around 700 square kilometers and shows very considerable fluctuations.

Waterdepth in the lagoons probably nowhere exceeds 3 m and the big and shallow surface is frequently agitated by heavy storms. Stormy seas also frequently transgrede the sand bar. In recent years, two main and probably an additional two openings to the sea, have been artificially maintained. These are the so called Buaz; the western one is Buaz el Bardawil and the big eastern one Buaz el Husseini.

The Sirbonian lagoons are part of the water system of the Isthmus of Suez. They are connected with Lake Menzaleh through the sand covered swamps of the Rumani triangle. The Sirbonian lagoons proper may be divided into three parts : 1. The western, fairly narrow section, which contains the Buaz el Bardawil extends to the big peninsula which protrudes northward from the Sinai mainland and to Mons Cassius on the main bar. 2. The central and broadest part of the lagoon which on the line of the railway station of Masfak reaches 30 km wide has an important opening in its eastern part, the Buaz el Husseini. 3) Finally, the eastern section is formed of a number of more or less isolated small basins which almost reach the outskirts of El Arish.

Along the shores of the lagoons and especially on the sandy peninsulas, there is a wide variety of small ponds, showing all the ranges of hypersalinity, associated with summer temperatures as high as 50 °C.

The salinity of the open lagoons oscillates as a rule between 50 to 80 $^{o}/_{oo}$, with a slight increase from north to south in the Masfak area. Because of the openings at both ends of the lagoon system, nothing of the impressive salinity gradients, comparable to those of the Laguna Madre or the Sivash may be found in the Sirbonian lagoons. Even the seasonal variations of the salinity are not much pronounced and this may be explained by the existing opening and by the inflow of gales above the bar. There is also a possibility that the lagoons may be fed by phreatic freshwater.

Wind activity plays today an important role in building the dune like peninsulas and internal bars. The main bar is formed by the anticlockwise longshore current and thus contains an important fraction of dark, heavy mineral sands, brought by the Nile.

A the water edge of the lagoons there are considerable thanatocoenoses of *Cardium edule* and the snail *Pirenella* spp. The two species, *Pirenella conica* and *P. caillaudi* are the dominant element in the most shallow belt of the lagoons. Below 20 cm depth they are progressively replaced by *Cardium* which

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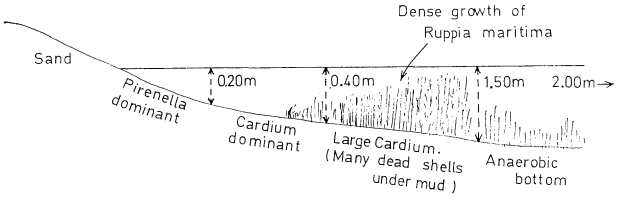
remains dominant to the depth of about 50 cm. The large bottom surfaces between 50 cm and 150-200 cm, i.e. the majority of the lagoon bottoms, are covered with a thick growth of *Ruppia maritima*. A thick felt of epiphytic filamentous algae covers the growths of *Ruppia*. On the deepest bottoms of the lagoons, *Ruppia* becomes scarce and the detritic bottoms are often anaerobic.

The macrobenthos of the bottoms is further represented by portunide crabs (*Charybdis* spp.) and occasionally penaeid shrimps. On the *Ruppia* stems and leaves there are many colonies of hydrozoans (among them *Cordylophora*) and also many sabellide worms. On the few wooden structures in the lagoons there are rich growths of *Balanus amphitrite* and clusters of *Mytilus variabilis*.

The meiobenthos is surprisingly rich for a hypersaline basin. For instance no less than 21 species of bottom living copepode species have been identified till now. These copepods may be classified into three faunal complexes : 1. the fauna of the highly hypersaline pools on the peninsulas is formed of *Cletocamptus confluens* and *Nitocra* cf. *lacustris*; 2. the typical fauna of the lagoons is formed of *Heterolaophonte sigmoides*, *Robertsonia salsa* and *R. knoxi*, *Longipedia* sp., *Canuellina insignis*, *Neocyclops salinarum* and *Euryte* sp. The faunal complex of the Buaz areas contains a considerable addition of marine species.

The Ostracoda are represented by two typical brackish forms, *Cyprideis torosa* and *Aglaiocypris* sp. The amphipods are quite numerous and varied. Mysidacea reach locally considerable numbers. The same is true for the chironomide *Cricotopus mediterraneus* which lives among *Ruppia* together with fairly frequent hydracarians. Nematods are however surprisingly scarce in the whole lagoon.

The plankton as well as the fish fauna of the lagoons are very rich. The sirbonian lagoons yield especially high catches of mullets.



Schematic section of the Sirbonian Lagoon

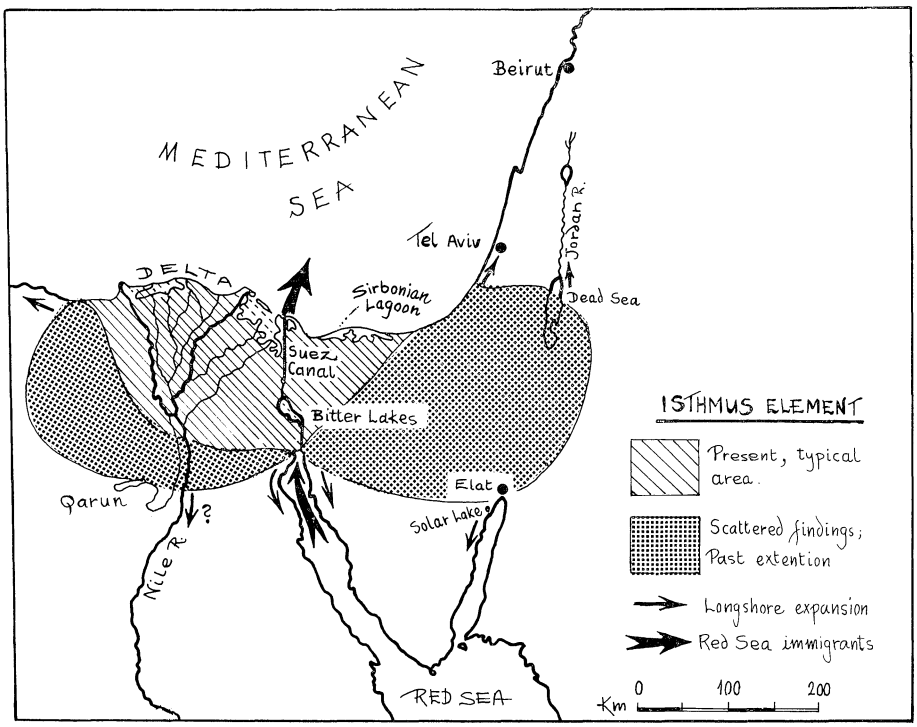
Discussion

Since no previous informations about the fauna of the Sirbonian lagoons were available, many hypotheses concerning their position and role in the Lessepsian migration (the immigration of Red Sea species into the Mediterranean) have been conjectured.

It appears now that the lagoons are inhabited by an autochthonous and more or less independent brackish-hypersaline fauna which is also known from different waterbodies along the Suez Canal. I propose to call this fauna (and flora?) the « Isthmus element » and it has to be considered as a local product of adaptation to the changing salinity environments of the isthmus during the pleistocene period. Examples of this fauna are the fish *Aphanius dispar*, the *Pirenella* species, the cyclopoid *Neocyclops salinarum* and the harpacticoid *Robertsonia salsa*.

In all the discussions concerning the Lessepsian migration, one has therefore to take into account the presence of a third zoogeographical element, the autochthonous, hypersaline Isthmus element, besides the Mediterranean and Red Sea elements.

The recognition of a local hypersaline element formed in the waters of the Suez Isthmus may throw also some light on the faunal connections of more distant water systems such as the Nile delta, lake Quarun or the Dead Sea and Jordan valley.



Acknowledgment

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