Solution of aragonite in a core from the south-eastern Adriatic Sea

by

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During a marine geological expedition in the Adriatic Sea in 1962 cores and grab samples were collected at 360 localities. Quantitative analysis of the mollusc shell material (0.5 - 2.5 mm particle size), contained in the cores, shows that during the late Pleistocene and the Holocene the mollusc fauna in this sea has strongly varied, under influence of changes in the physical and chemical conditions of the sea water (mainly temperature and oxygen content).

The variations are most distinct in the sediments of the bathyal parts of the southeastern Adriatic. Here a series of 7 stages can be distinguished, beginning in the Weichselian (probably the W II b) and ending up with the present Subatlantic stage. On account of this « malaco-stratigraphy » various conclusions can be drawn regarding sedimentation rates, times of turbidite deposition, ash falls etc. Among other things it appears that the thickness of the Holocene deposits in this area varies between a few cm and more than 6 m.

The (short) core dealt with in the present paper was taken at a locality on the lower part of the continental slope (circa 70 km NNE of Bari, 41°40.1' N - 17°16.8' E, depth 927 m.) It consists of a lower section (12-95 cm) of fine grained bathyal mud, formed during the Pleistocene by slow but continuous deposition of terrigenous and pelagic material, and of an upper part (0-12 cm, late Pleistocene and Holocene) which has a relatively coarse texture owing to the great quantities of biogenic carbonate remains. The mollusc shell assemblages in the lower section point to a soft muddy bottom, those in the upper layer to a firm substrate. The change of fauna probably resulted from a stage of submarine erosion; which removed the soft upper layers of the original bathyal mud deposits and laid bare their deeper, more compacted parts. Since this erosion stage the rate of bathyal mud deposition has been extremely low.

Interesting mollusc shell assemblages in this core are found in the filling mass of large burrows, extending from the erosion surface (at 12 cm) downwards. This material is almost entirely (15-38 cm) or exclusively (38-70 cm) composed of the remains of pelecypods living *on* the bottom. Shells of the other species represented in the upper layer (mostly pteropods, benthic gastropods and pelecypods living *in* the bottom) are lacking. The normal bathyal mud surrounding the burrows contains hardly any mollusc shells at all.

Apparently part of the mollusc shells have disappeared by solution. As a matter of fact a few negatives of shells were observed in this same part of the core, one of which could be identified as the imprint of a *Leda*. The selective solution of the shells of gastropods and endo-benthic pelecypods is obviously due to their aragonitic composition. The mollusc remains that have been left intact all belong to species with shells that consist partly or entirely of calcite.

The cause of the solution may be sought in the re-oxidation of iron-sulfides. The part of the core with the solution phenomena is characterized by an abnormal concentration of iron-hydroxides, which clearly originated by oxidation of pyritized micro-burrows. Presumably this oxidation led to the temporary and local formation of minute quantities of the H_2SO_4, which lowered the pH just enough for the selective removal of the relatively easily soluble aragonite. The oxidation of the pyrite must have been brought about by the erosion of the upper sediment layers and the formation of large burrows.

The core is abnormal in still another respect, viz. by the secondary precipitation of calcium carbonate in the uppermost few centimetres. This precipitation led to local cementation of the sediment. It preferably took place in the fillings of all kinds of shells or tests (gastropods, echinids, bivalves of bra-

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chiopods and pelecypods) and on the concave side of loose pelecypod valves. Probably it was the result of the contact between the slightly acid, carbonate-saturated pore water from below, and the normal, slightly alkaline sea water in the uppermost sediment layer. The cementation process may have started already a long time ago. The presence of lithified fillings of shells of the pteropod *Styliola subula* proves that it continued till at least the beginning of the Subatlantic stage.