DÁVID ÁRPÁD

PALAEO-OECOLOGICAL AND PALAEO-PATHOLOGICAL OBSERVATIONS ON UPPER OLIGOCENE MOLLUSCS (EGER, HUNGARY)

ABSTRACT: The most noteworthy geological exposure in North-Hungary can be found in Eger (Hungary). The Upper-Oligocene beds in the claypit of the former "Wind" brickworks have an abundant fossil content.

On the basis of scientific investigations of remains of molluscs, the author has made a series of palaeoecological and palaeopathological observations. The quantity and preservation of the shells, the various forms of symbiosis, the bio-erosive activity of caustic sponges, the presence of Bryozoan-colonies, the traces of boring-bivalves, the perforation-marks of predatory snails, cicactries caused by crabs all refer to a former shallow-water marine environment.

INTRODUCTION

A famous geological outcrop in North-Hungary can be found in Eger, in a brickyard's clay-pit situated at the south-east part of the town. The 120 m thick deposits are mentioned as the "Wind factory" beds in the special literature.

Four stratigraphic units can be distinquished in this section: 1. Glauconitic-tuffitic sandstone and marl. 2. The glauconitic-tuffitic series is overlain by Molluscan Clay. 3. Alternating beds of sandstone and clay of shallow-sublittoral origin. 4. Series of littoral and lagoonal coarse sand and clay.

In associate with these layers, rich flora and fauna can be found here in a good preservation. The strata, that were deposited during the regression of the Upper Oligocene sea, through T. BÁLDI's and his colleauges' activity got into the palaeontological literature as the "Egerian stage" (BÁLDI, T. 1973.)

TREATMENT OF THE SUBJECT

During the scientific investigations of the comparatively well preserved Molluscan fossils the author has won numerous palaeoecological and palaeopathological observations /DÁVID, Á. 1987., 1991/. The Molluscan remains had been collected mainly from the "x" layer /Silty fine molluscan sand/ and the "k" layer /Limonitic friable sandstone/.

Palaeoecological observations

The fact that there are a lot of abraded, deficient, or broken shells and valves among the collected remains indicates a seashore environment. Owing to the surf, the shells of dead or living creatures were knocked to each other and fell to pieces. In this case, the burial was preceeded by transportation. The embedding was allochtonous. The proximity of the shore is proved by the presence of plant remains, too.

Dentalium simplex (Michelotti) remains belonging to the Scaphopoda class also refer to an allochtonous embedding. They lie parallel with the laminae of the covering stone.
After the animals' destruction. the tests must have been drifted into the lower parts of the sublittoral zone by the streaming water.

The author has collected shell-fishes in large quantities, which were embedded intact into the sand of the former bottom. It signs that they were buried rapidly by the deposition of sand. The animals' decay was caused by the burial, or they were buried immediately after their death at the place where they dwelt. I have studied the same phenomenon in the case of *Anadara*, *Crassatella*, *Pitar* and *Polymesoda* species.

The author could observe oyster-beds which mark littoral and shallow sublittoral environment. The single oysters formed banks by

growing to one another (epoechia) (BOGSCH. L. 1968.). Because of the favourable conditions they were crowded in great masses and it affected frame deformation in a number of cases. The disfigurement of the oyster-shells might cause the animal's destruction in extreme circumstances.

The author studied another type of symbiosis in the case an *Athleta rarispina (Lamarck)* specimen and alittle oyster-colony. One of the oysters has both valves. The mouth of the Athleta is not covered by the oysters' shell. So, presumably, the oysters were carried by the snail. The Athleta was a large-figured, thick-shelled gastropod, which followed predatory way of life. It might have been not too difficult for it to carry the oysters. And the oysters, however could participate in the residues of the gastropod's nutriment. This type of symbiosis is called commensalism.

The author have found oyster-shells on an *Egerea collectiva (Gábor)* specimen, too. Its aperture was covered by the oyster-colony. This proves that the Egerea had become extinct before the oysters settled on it.

The symbiosis of the *Ostrea sp.* is not limited to one, or two species only. I could observe similar occurrences in case of other gastropods, too. These are the following: *Turricula regularis (Koninck, Polinices josephinia olla (De Serres), Turritella beyrichi percarinata (Telegdi-Roth), Galeodes basilica (Bellardi), Globularia gibberosa callosa (Noszky)*

The oysters live attached in one place on the solid sea-bottom (cementation). In the present case, mainly shells of died gastropods served as a bottom for its larvae. The mostly broken, deficient and rolled shells indicate that the decay of the snails didn't take place locally.

The streaming water caused them to get to the place where the oyster larvae settled on them. It explains how the shell of the Turritella, which otherwise lives within the bottom sediments could get among the tests of the other gastropods. Owing to the flowing water the sedimentation was paused, or was not significant. It was favourable for the sessile habitude oysters. Conclusion can be drawn from the form of the bivalves for the changes or peridicity of the current. The rounded forms are characteristic of such simple organisms that live in a relatively undisturbed envrionment.

The greatest part of the valves of the large-statured oysters are densely pierced. the small borings indicate the activity of caustic-sponges which belong to the Family Clionidae. These borings are not only signs of liaerosion but of dwelling structures (domichnia), too. Openings limited to the surface of the valve indicate that the borings were mode in the shell of a living animal, reducing its solidity. Bored valves having pore openings on the inner surface or on both sides were empty. The larvae of the sponge settled onto the internal part of the shell after the oyster's death. The persence of these marine borers refers shallow-water enviroment (WARME, E. J. 1975).

The author has, also studied another type of overgrowth (epoechia), on a shell of *Babylonia eburnoides umbilicosiformis (T.-Roth)*. I could observe a small worm-colony forming crust on the surface of the shell. The tubes of the worm-colony were filled and affixed to the snail-horn with limonite. The aperture of the shell was not covered by the worms. It seems possible that the colony was carried by the snail until its destruction. As a consequence of the displacement the worms, which otherwise led a sessile a way of life, they had more chance to obtain their food. Overgrowth produces synoechia among the associated two species.

In the course of my investigations I have found shells with borings of cirriped larvae in many cases: *Babylonia eburnoides umbilicosiformis (T.-Roth), Athleta rarispina (Lamarck), Turricula regularis (Koninck), Egerea collectiva (Gábor), Hadriana egerensis (Gábor).*

On the surface of the shells openings of various numbers can be seen, but neither of them are perforated by the larvae.

Cirripeds belonging to Genus Balanus compose solid skeleton and live attached in one place. In our case the cirriped is settled on the valve of an *Ostrea cyathula (Lamarck)*. There is a small cone-frustum type specimen on the Balanus. The presence of Ostrea indicates a rather strongly agitated water and a very slow and frequently interrupted sedimentation. Here the rock barnacle could find the suitable living conditions: nutriment, oxygen, protection from burying. After all, the decay of the two associated species might be caused by the fast coverage with limonitic sandy silt. It refers to the well preservation of the cirriped's test.

The author could also observe Bryozoa remains on two Mollusc species. In the first case the thin Bryozoa-colony encrusted

the shell of an *Athleta rarispina (Lamarck)*. The zoarium is around the aperture of the gastropod. Presumably after the animal's destruction, the shell lay upwards with its mouth on the sea-bottom. It functioned as a firm basis for the Bryozoa larvae so that the colony could develop. The other side of the shell is bare and eroded. I have found a small Bryozoa-colony on the valve of an *Ostrea cyathula (Lamarck)*, too. The occurrence of Bryozoas indicate shallow-water region. The encrusting species refer to agitated water (GÉCZY, B. 1985.) In my opinion, the Bryozoa-colonies in both cases, by reason of the colony's structure, and the thick walls and rounded aperture of the zoecia, belong to the Genus Electra.

The author managed to observe charasteristic traces of boring-bivalve *(Teredo sp.)*. Teredo is especially adapted for wood boring. In this case drift wood were exavated by them. During the fossilization the organisms did not endure. But their borings were filled in and cemented by limonitic sand. The tubes are approximately 0,5 cm in diameter. Since the tubes wound by fits and starts in the former driftwood, presumably, great number of borers could be in it. It signs that the bivalves often had to go round each other. The driftwood itself mouldered and vanished already, only some coalified pieces remind us of the feeding and dwelling place of the former borer-bivalves. These organisms may occur in most of the fossil communities because of the transportation of the currents.

Palaeopathological observations

While investigating fossils I could observe traces of predatory snails. The activity of these gastropods can be qualified in two different ways: it can be a palaeopathological symptom form the viewpoint of the prey, and on the part of the gastropod it can be a feeding trace (TASNÁDI-KUBACSKA, A. 1960.). I could study borings of predatory snails in case of species belonging to the Class Gastropoda, Scaphopoda, Bivalvia.
The species are as follows:

Gastropoda: *Polinices catena helicina (Brocchi), Polinices josephinia olla (De Serres), Athleta rarispina (Lamarck), Turritella beyrichi (Hofmann s. str.) Turritella beyrichi percarinata (T.-Roth), Turritella venus margarethae (Gaál), Natica millepunctata tigrina (Defrance), Turris duchasteli (Nyst), Hadriana egerensis (Gábor),*

Hinia schlotheimi (Beyrich), Ringicula auriculata paulicciae (Morlet),

Scaphopoda: Dentalium simplex (Michelotti),

Bivalvia: *Corbula basteroti (Hörnes), Corbula gibba (Olivi), Pitar polytropa (Anderson), Nucula mayeri (Hörnes), Ostrea cyathula (Lamarck).*

There are two kinds of borings. According to the scientific investigations this indicates the activity of two different species.

1. The cylindriform and cone-shaped boreholes are made by muricid gastropods.
2. The borings which converge toward the center of the inner opening sign the activity of naticid gastropods (BISHOP, G.A. 1975).

The author could collect numerous fossil claws. I supposed that I could discover the feeding traces of crabs, too. I have found two gastropod shells with signs of crab's activity. The shells belong to the next species: *Ampullina crassatina (Lamarck), Turricula regularis (Koninck).* In case of both specimen we can see the characteristic damage, the extreme opening, which begins at the mouth of the gastropod and extends over several whorls. Such damage to the snail is caused by crabs to reach the soft parts of the body. The dimensions of the openings show that the meeting with the crabs was fateful for both gastropods.

These observations refer to a former shallow-water marine enviroment.

Similar phenomenon can be studied under recent conditions in the coastal regions of subtropical and mediterranean seas.

LITERATURE CITED

1. BÁLDI, T. (1973): Mollusc fauna of the Hungarian Upper Oligocene (Egerian). Akadémiai Kiadó, Budapest, 511 p.
2. BISHOP, G. A.: Trace of predation. in: Frey, E.W.(ed.), The Study of Trace Fossils. Springer Verlag, Berlin-Heidelbert-New-York, pp. 261–281.
3. BOGSCH, L. (1968): General Palaeontology Tankönyvkiadó, Budapest, 281 p. (in Hungarian)
4. DÁVID, Á. (1987): Paleo-oecological and Palaeo-pathological Observations on Upper Oligocene Molluscs Malakologiai Tájékoztató, 7:5–10. The Natural Science Section of Matra Museum, Gyöngyös (in Hungarian)
5. DÁVID, Á. (1991): New Palaeo-oecological observations on Upper-Oligocene Molluscs Malakológiai Tájékoztató, 11:12–14 (in Hungarian)
6. GÉCZY, B. (1985): Palaeontology Tankönyvkiadó, Budapest, 453 p. (in Hungarian)
7. TASNÁDI-KUBACSKA, A. (1960): Palaeopathologia Medicina Kiadó, Budapest. 230 p. (in Hungarian)
8. WARME, E. J. (1975): Borings as trace fossils and the process of marine bioerosion. In: Frey, E. W. (ed.) The Study of Trace Fossils. Springer Verlag, Berlin–Heidelberg–New York, pp. 181–227.