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**Field Trip Guidebook
and Abstracts**



Edited by:

Tonći Grgasović & Igor Vlahović

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STOP 1 Paripov jarak

Jasenka SREMAC

Middle to Late Permian platform carbonate deposits are well exposed along the Gospic-Karlobag regional road. They represent a core and a SW limb of the Velebit anticline, and are in most cases steeply inclined towards the southwest. A particularly interesting outcrop was found at the Paripov jarak locality. A complex patch-reef structure of Middle Permian age (*Neoschwagerina craticulifera* Zone) is today part of the Educational Route of the Velebit Nature Park (SREMAC, 2003), and a proposal was sent to UNESCO to protect the outcrop as being of international geological heritage.

The outcrop is about 12 metres wide and 8 metres high (Fig. 1). Reef structures have been rotated through about 180° due to post sedimentary tectonics (Fig. 2). In the base of the reef body, dark grey mudstone was observed. Large fenestellid bryozoans were the first colonizers of the muddy substrate (SREMAC, 1991; MARJANAC & SREMAC, 2000). Their large fans represented a base for the growth of diverse sessile benthic biota - other bryozoans and small calcareous sponges (Fig. 3). The first colonizers probably lived in a very shallow, nearshore environment, where cyanobacteria played an important role in the community. Microbial crusts cover the whole basal part of the patch-reef. On this consolidated base, large calcisponges (*Colospongia*, *Waagenella*, *Sinocoelia*, *Guadalupia* and many others) started to produce the main part of the reef framework (Fig. 4). It may be concluded that the relative sea-level rose slightly, thus enabling the formation of the bioherm. Several taxa of invertebrates chose these patch-reefs for their favourite niches. The most common among them were the large endemic brachiopods *Martinia velebit-*

ica and *Enteleles salopeki*. Almost a hundred specimens of *M. velebitica* were found within a patch-reef (SREMAC, 1986). The reef structure of body A is partly covered with a bioclastic floatstone, probably representing a common form of reef decomposition. Sea-level oscillations, rather common in Middle and Late Permian, influenced these processes. At least three episodes of reef-growth can be observed at the outcrops (reef bodies A, B and C - Figs. 1-2). Reef growth was most probably interrupted by a sea-level drop, and again initialized when optimal conditions were restored. It is interesting that all three reef bodies (A-C) exhibit the same pattern of colonization, with fenestellids and incrustants at the base, and large calcisponges in the main part of the framework.

During storms, the surrounding sediment and biota were uplifted from the sea-bottom, transported over the reef, and filled cavities within the reef. These structures can be observed in the field, due to the different colour of the reef structure (grey) and infill (yellowish-grey). Among the biota, calcareous algae are very common (*Mizzia*, *Gymnocodium*, *Permocalculus*), together with ball-shaped *Neoschwagerina* which could be easily transported without damage to the test. During very strong storms, possibly hurricanes, even surrounding *Tanchintongia* settlements



Fig. 1 Outcrop with patch-reefs beside the road Gospic-Karlobag. Reef bodies are marked with letters A, B and C. Layers were tectonically rotated for almost 180° and are now almost vertical. Total width of the outcrop along the road is 16 m (SREMAC, 1991).

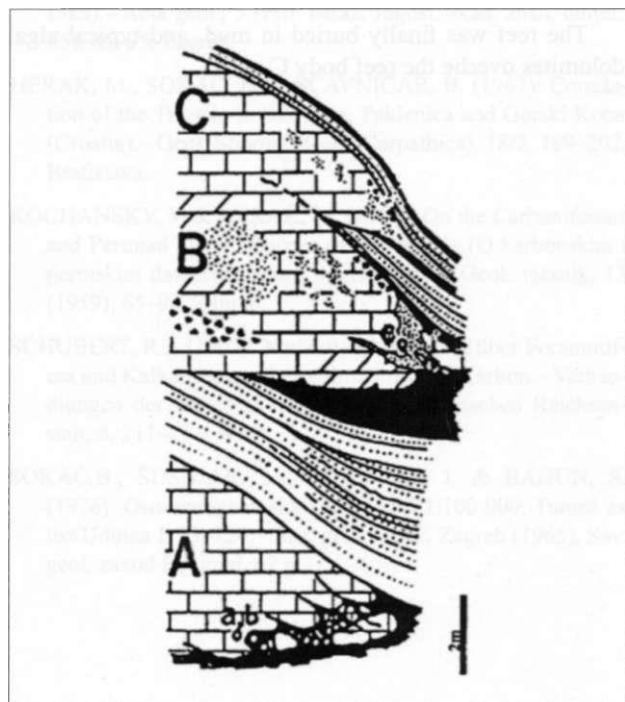


Fig. 2 Reconstruction of reef bodies in original position (after MARJANAC & SREMAC, 2000).

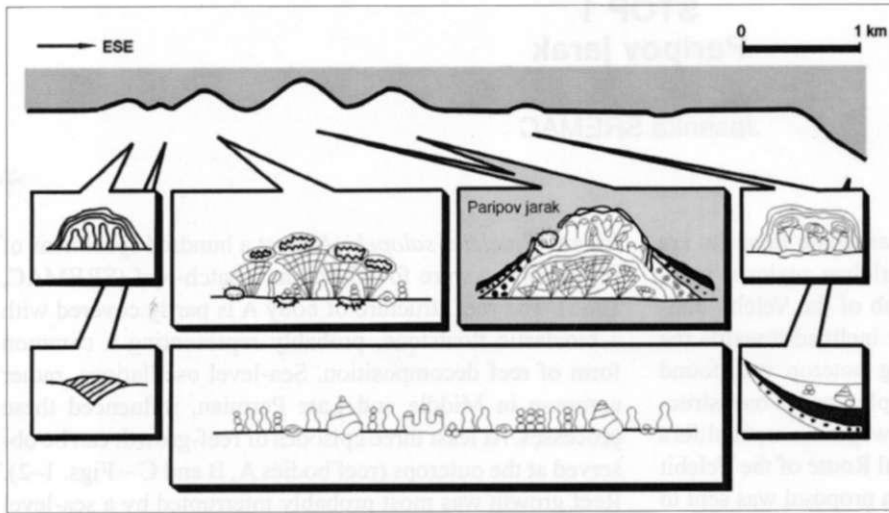


Fig. 3 Reconstruction of the Middle Permian platform in the area of Brušane-Bačke Oštarije, with position of the patch-reefs (shaded) (SREMAC, 1991).

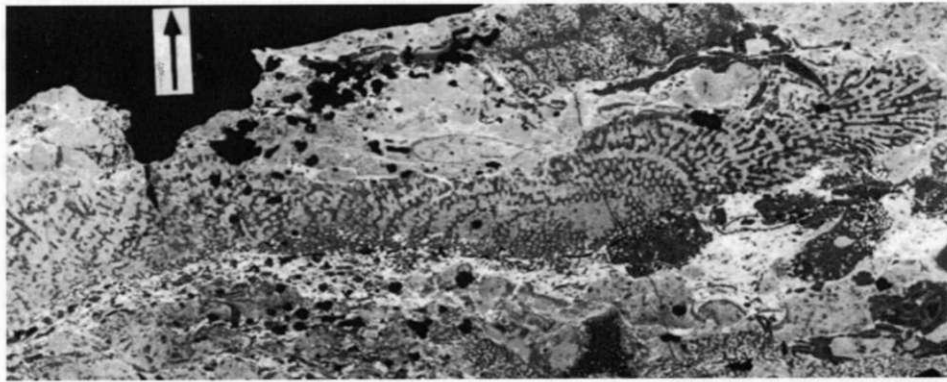


Fig. 4 A detail from the patch-reef B with cross section of a calcisponge (SREMAC, 1991).

were affected. These large, thick shells were destroyed and fragmented, and can be found in coquinas between the reef bodies.

The reef was finally buried in mud, and typical algal dolomites overlie the reef body C.

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