BADENIAN MARGINAL MARINE ENVIRONMENT IN THE MEDVEDNICA MT. (CROATIA)

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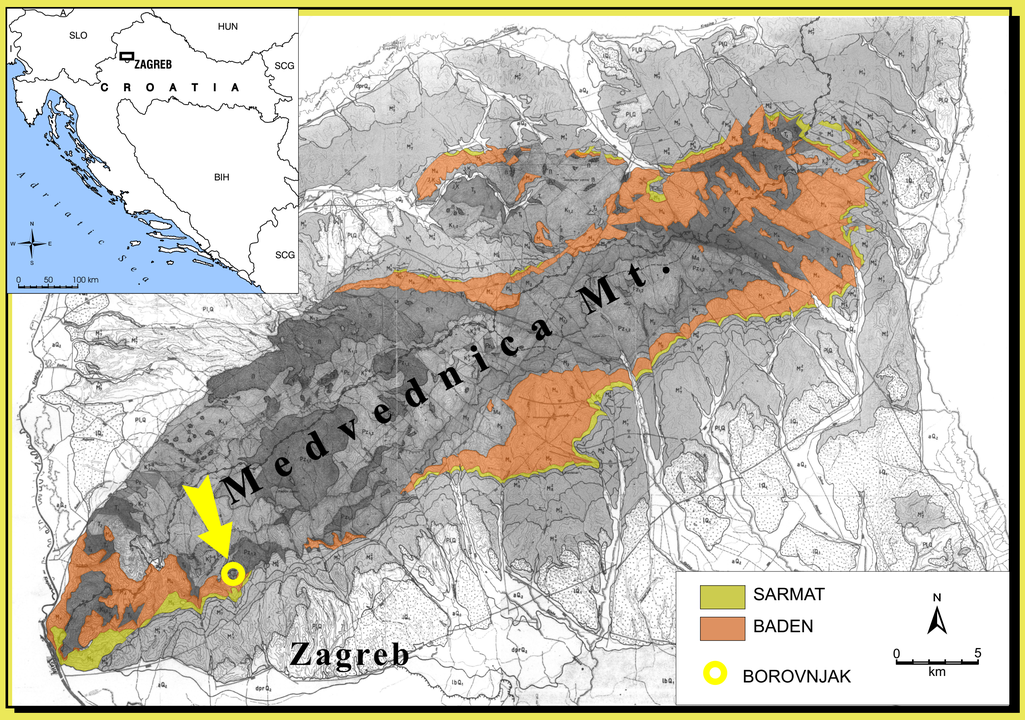

Figure 1. Simplified geological map of the Medvednica Mt. with geographic range of the Badenian sediments. Borovnjak locality is marked with ring and arrow (after Šikić, 1997; modified).

Middle Miocene deposits in NW Croatia are particularly well developed at Medvednica Mt., where they outcrop in a ring-like belt surrounding the mountain (Figure 1).

A section with Badenian clastic beds is exposed along the forest road at the locality Borovnjak (SW Medvednica). Basal part of the section is represented with conglomerates and weathered lithotamnion limestones. They are overlain with biocalcarenites and carbonate sands, containing scarce biocalcluthite intercalations (Figure 2).

Microfossil community is, in general, poorly preserved (abraded, often with broken tests) and scarce, except in marly sediments. A total of 14 species and 8 genera of benthic foraminifera and 10 species and genera of ostracods were identified.

	B2	B6	B7	B8	B9	B11
FORAMINIFERA						
P/B ratio (%)	0	0	0	0	0	0
Number of species	9	10	12	13	11	9
*BFN	53	121	352	269	57	42
Fisher α index	1.746	2.001	2.486	2.777	2.247	1.740
Shannon-Wiener index	1.830	1.796	2.104	2.052	1.987	1.723
Equitability	0.8331	0.7800	0.8467	0.8002	0.8284	0.7843
Dominance	0.1878	0.2069	0.1596	0.1894	0.1701	0.2247
BFOI	100	100	100	100	100	100
Oxic indicators (%)	100	100	95.13	98.99	95.30	95.74
Suboxic indicators (%)	0	0	4.87	1.01	4.70	4.26
Dysoxic indicators (%)	0	0	0	0	0	0
Infauna (%)	20.27	17.69	35.06	40.07	24.83	38.36
Epifanuna (%)	79.73	82.31	64.94	59.93	75.17	61.64
Aglutinated (%)	0	0	0	0	0	0
Porcellanous (%)	2.99	2.38	7.48	9.42	4.36	8.85
Calcareous (%)	97.01	97.62	92.52	90.58	95.64	91.15
OSTRACODA						
Number of species	3	4	7	5	2	4
*Ostracod number	23	21	39	28	15	18
Ostracoda/Foraminifera ratio (%)	7.64	7.14	12.66	9.43	5.03	5.90

* specimens p.g.

Table 1. Values of different palaeoecological indicators of benthic foraminifera for each standardized sample.

The biostratigraphy of the studied section is based on the standard Zonations for the Paratethys (BRESTENSKÁ & JIŘÍČEK,1978; CICHA et al., 1998).
Late Badenian age (*Ammonia beccarii* Zone) was proven on the basis of dominant presence of *Ammonia viennensis* (d'ORBIGNY, 1846), elphidiids and milioliids, as well as ostracod species *Phlyctenophora farkasi* (ZALÁNYI, 1913) and genus *Neocyprideis* (*Miocyprideis*).

Interpretation of paleoenvironment was based upon the quantitative analysis of fossil communities (Table 1).

Foraminiferal community is characterized with small number of species, low faunal diversity, strong dominance of a few taxa and small number of specimens. Dominant taxa *Asterigerinata planorbis* (d'ORBIGNY, 1846), *Elphidium macellum* (FICHTELL & MOLL, 1798), *Elphidium crispum* (LINNÉ, 1758) and *Ammonia viennensis* (d'ORBIGNY, 1846) are typical for shallow-marine environment, which is in accordance with the absence of planktonic foraminifera, high oxic conditions and dominance of oxic indicators and epifaunal taxa. Broken and abraded tests can indicate long-shore transport by littoral drift and tidal currents.

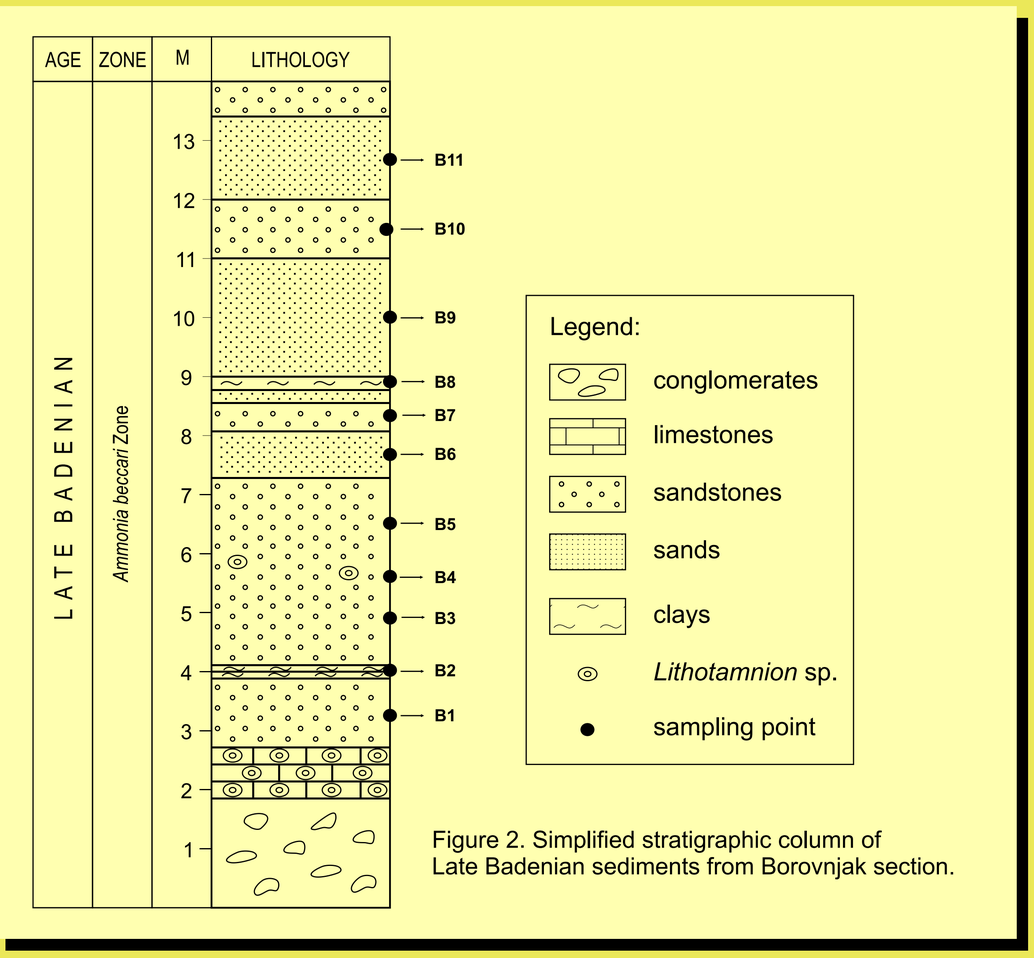

Figure 2. Simplified stratigraphic column of Late Badenian sediments from Borovnjak section.

The most common taxa in the lower and upper part of section are *E. macellum*, *E. crispum*, *Elphidium fichtellianum* (d'ORBIGNY, 1846) and *A. planorbis*, mostly typical for normal marine environments. Ostracod specimens generally participate with 7 % in the communities, and the most frequent taxa are *Phlyctenophora farkasi* (ZALÁNYI, 1913) and *Loxoconcha hastata* (REUSS, 1850).

Appearance of a brackish genus *Neocyprideis* (*Miocyprideis*) in fine-grained intercalations in the central part of the section, together with eurihaline ostracod taxa *Cytheridea pernota* OERTLY & KEY, 1955 and *Xestoleberis glabrescens* (REUSS, 1850), and high percentage (>30%) of an opportunistic species *A. viennensis* (Figure 3), indicate the temporary input of fresh water into the basin.

Micropaleontological features, together with sedimentological data indicate that the Late Badenian deposits of Borovnjak were deposited in relatively turbulent nearshore marine environment with temporary oscillations of salinity.

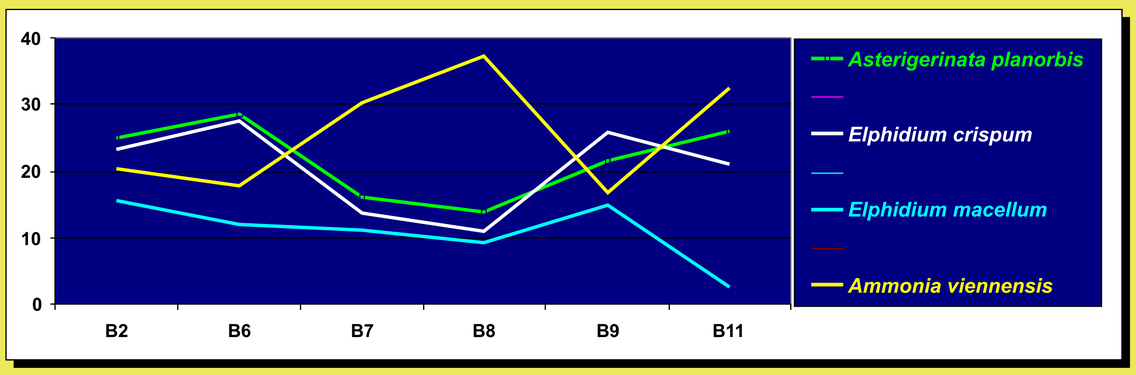

Figure 3. Graphic trends of dominant foraminiferal species.

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