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Pannonian and Pontian ostracode fauna of the South-eastern slopes of Orlica and Krško polje



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This study reports the results of investigations of the Pannonian and Pontian deposits of the South-eastern slopes of Orlica and Krško polje and describes the associations of ostracode fauna. Comparison with other ostracode faunas investigated so far points to similarities with the analogous deposits in Austria and Czechoslovakia.

INTRODUCTION

Several geological studies have been made earlier by authors listed in the Guide to Basic Geological Map by Šikić, Basch & Šimunić (1979). In the description of tectonic units of the western part of the Zagreb region (Šikić & Basch, 1975), this region is marked by the syncline Brezina — V. Trgovišće, which belongs to the tectonic unit of Zagorje Tertiary Basin. For purposes of the Basic Geological Map ostracode fauna was described by Sokač. The study of the western part of the Pannonian Basin (Sokač, 1967) presents the main characteristics of Pontian microfauna.

The data concerning the spread, lithological composition and relations of the Pannonian and Pontian deposits were taken from the Guide mentioned above.

I would like to express my thanks to my colleagues K. Šikić and O. Basch for very useful discussion.

BIOSTRATIGRAPHIC DESCRIPTION

Lower Pannonian

The deposits of the Lower Pannonian are of limited spread. They have been found at Videm Krško, and they lie continuously on the Lower Sarmatian. They are represented by white platy marl and marly limestone with rare thin intercalations of limestone-conglomerates. In the upper levels calcareous marls pass into grey poorly layered marls or massive marls.

Deposits of the Lower Pannonian near Videm Krško are represented by sandy or clayey marls, and marly, fine grained sands, in which melanopside fauna found suggests disturbed marginal zones of a markedly fresh water basin.

Ostracode fauna of the Lower Pannonian is not well preserved. Specimens are filled out, damaged and deformed, so that in most cases it was possible to determine only the generic presence of the *Candona*, *Amplocypris* and *Hungarocypris*, and rarely *Leptocythere*, *Cyprideis* and *Hemicytheria*. The association is characterized by the presence of the species *Hungarocypris auriculata* (Reuss), *Amplocypris villosa* Zalányi, *A. cf. acuta* Krstić, *Candona (Propontoniella) croatica* (Sokač), *C. (Propontoniella) candeo* Krstić, and *Candona (Lineocypris) minuta* (Zalányi).

Upper Pannonian

Sediments of the Upper Pannonian are found on the south-western slopes of Orlica; in places they form a covered zone between Gaj and Suhodol. Along the rim of Krško polje there are boreholes below the alluvial deposit. Sediments of the Upper Pannonian lie continuously on the Lower Pannonian and consist mainly of marls. In the lower parts marls form thick layers or massives, similar to the calcareous marls of the Lower Pannonian. Upwards, the marls become clayey with rare layers.

Ostracode fauna of the Upper Pannonian is generally well preserved and is represented by a variety of species. The forms *Hungarocypris hieroglyphica* (Méhes) and *H. marginata* (Zalányi) are quite numerous, then *Amplocypris abscissa* (Reuss), *A. recta* (Reuss), *A. sincera* Zalányi, *A. acuta* Krstić, and *A. major* Krstić (pl. I, fig. 1). There are also various Candonic forms in Upper Pannonian deposits: *Candona (Lineocypris) hodonensis* Pokorný, *C. (Lineocypris) reticulata* (Méhes), *C. (Lineocypris) nonreticulata* Sokač, *C. (Lineocypris) sp.*, *Candona (Propontoniella) candeo* Krstić, and *Candona (Propontoniella) sagittosa* Krstić. The species of the genus *Cyprideis* are typical of some associations, including *Cyprideis heterostigma obessa* (Reuss), *C. macrostigma spinosa* Sokač. The common forms are those of the genus *Hemicytheria* — *H. folliculosa* (Reuss), *H. incerta* Sokač, *H. brunensis* (Reuss), *H. reticulata* Sokač, *H. marginata* Sokač, *H. ex gr. folliculosa* (Reuss) and *Hemicytheria* sp. In addition to this species, the following other forms appear in the fauna: *Cypris* sp., *Leptocythere lacunosa* (Reuss), *L. moravica* Pokorný, *L. naca* (Méhes), *L. cf. parallela* (Méhes), *L. cf. bituberculata* (Scheremeta), *Leptocythere* sp., *Loxoconcha granifera* (Reuss), *L. subrugosa* (Zalányi), *L. hodonica* Pokorný, *L. rhombovalis* Pokorný, *Loxoconcha* sp., *Pontoleberis attilata* (Stancheva), and *Pontoleberis* sp. These genera complete the composition of the Ostracode fauna in the Upper Pannonian, which has thus been shown to be very rich in species.

Lower Pontian

Sediments of the Lower Pontian lie uninterrupted on the Upper Pannonian, and ingressions are rather infrequent (south-eastern slopes of Orlica). They are most frequently represented by grey marls, clayey marls and marly clays. Disconnected or poorly connected intercalations of clayey sands, 10 to 20 cm — rarely 0.5 m thick, have also been noticed. They are well stratified and in places finely laminated.

A significant feature of the association of the Lower Pontian in this region is that it is rich in the species of the genera *Cyprideis* and *Hemicytheria* (pl. I, fig. 2). We note the presence of the species: *Cyprideis heterostigma sublittoralis* Pokorný, *C. macrostigma spinosa* Sokač, *C. ex gr. macrostigma* Kollmann, *C. heterostigma obessa* (Reuss), *Hemicytheria marginata* Sokač, *H. croatica* Sokač, *H. pannonica* Sokač, *H. prisca* Sokač, *H. dubokensis* Krstić, and *H. ex gr. croatica* Sokač. In a typically Lower Pontian ostracode association, we find forms of the genus *Candona* — *C. (Lineocypris) inflexa* Sokač, *C. (Lineocypris) zagradiensis* Sokač, *C. (Lineocypris) ex gr. hodonensis* Pokorný, *Candona (Lineocypris) sp.*, *Candona (Caspiocypris) sp.*, *Candona (Caspiolla) acuta* Sokač and *Candona (Pontoniella) sagittosa* Krstić. The presence of the species *Paracandona kochanaskae* Sokač should be mentioned as significant in the Lower Pontian. As for other forms in the Lower Pontian associations, the following have been found: *Amplocypris reticulata* (Zalányi), *Cypria* sp., *Loxoconcha petasus* Liventál, *L. cf. spinosa* Sokač, and *Loxoconcha* sp.

Upper Pontian

Sediments of the Upper Pontian are situated in the south-eastern slopes of Orlica. Ingressions of the Upper Pontian occur east of Videm Krško (Pleterje). Here they cover Lower Pontian deposits and are in direct contact with the Upper Pannonian. Elsewhere the deposits of the Upper Pontian continue above the sediments of the Lower Pontian. Most frequently they are represented by sands or sandy and clayey marls. Clayey intercalations are infrequent, and so are sandy intercalations and rare sandy gravel.

The ostracode fauna of the Upper Pontian is rich in forms. Generally speaking, three distinct associations can be identified: 1. *Cyprideis*-association, 2. *Hemicytheria*-association, and 3. *Caspiolla*-association.

The *Cyprideis*-association (pl. I, fig. 3) is characterized in the first place by the species *Cyprideis triangulata* Krstić, then *Hemicytheria pejinovicensis* (Zalányi), *Candona (Lineocypris) inflexa* Sokač, *C. (Pontinella) acuminata* (Zalányi), *Candona (Caspiolla) alta* (Zalányi), *Bacunella dorsoarcuata* (Zalányi), and *Loxoconcha* sp. The *Hemicytheria*-association (pl. I, fig. 4) also includes the forms *Cyprideis triangulata* Krstić and *Candona (Caspiocypris) alta* (Zalányi), but their presence is limited to a small number of specimens. A more numerous form is *Hemicytheria josephinae* (Zalányi). The fauna includes also the following species: *Amplocypris reticulata* (Zalányi), *Candona (Lineocypris) granulosa* (Zalányi), *Cyprideis ex gr. macrostigma* Kollmann, and *Leptocythere naca* (Méhés). *Caspiolla*-association

contains the species *Candona (Caspiolla) brusinai* Sokač, *Cyprideis seminulum* (Reuss), *Candona (Lineocypris) trapezoidea* (Zalányi), *Bacunella dorsoarcurata* (Zalányi), and *Cypria* sp.

The entire microfaunistic content of the Upper Pontian includes the following forms: *Amplocypris dorsobrevis* Sokač, *Candona (Caspiocypris) labiata* (Zalányi), *C. (Caspiocypris) symmetrica* (Krstić), *Candona (Caspiolla) lobata* (Zalányi), *C. (Caspiolla) balcanica* (Zalányi), *C. (Caspiolla) acronasuta* (Liventan), *C. (Caspiolla) flectimarginata* Sokač, *Candona (Pontoniella) truncata* Sokač, *Cyprideis macrostigma ventricosa* Kollmann, *Hemicythera* sp. i *Leptocythere* sp.

DISCUSSION AND CONCLUSION

An analysis of the ostracode fauna of the south-eastern slopes of Orlica and Krško polje shows specific features especially in the development of the *Cyprideis* and *Hemicytheria*. A similar type of fauna was described by Kollmann (1958, 1965) and Pokorný (1952) for the Neogene of Austria and Czechoslovakia. In comparison to the fauna described by Sokač (1972) of the central part of the Pannonian Basin in Croatia, the difference appears to be in the less significant presence of Candonic forms in the deposits of the Pontian age. The development of fauna suggests a continuous sedimentation of Pannonian and Pontian beds. The fauna described lived in shallow coastal water of the Neogene sea, and it populated sandy and muddy bottoms. In addition to ostracods, remains of molluscs, fish teeth and incrustated plant roots have also been found.

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Panonska i pontska fauna ostrakoda jugoistočnih obronaka Orlice i Krškog Polja

A. Sokač

U okviru radova za potrebe Osnovne geološke karte SFRJ prikupljen je materijal za mikropaleontološke analize iz sedimenata panona i ponta jugoistočnih obronaka Orlice i Krškog polja. Sikić & Basch (1975) u prikazu tektonskih jedinica zapadnog dijela Zagrebačke regije ovo područje označuju sinklinalom Brezina—V. Trgovišće koja pripada tektonskoj jedinici Zagorski tercijarni basen.

Biostratigrafskim pregledom obuhvaćene su naslage donjeg panona, gornjeg panona, donjeg pontu i gornjeg pontu. U mikrofosilnom sadržaju nađeni su ostrakodi, mikromoluska, riblji zubići i inkrustirano biljno korijenje. Specifično obilježje ostrakodske faune očituje se u brojno zastupanim cipridejsima i hemiciterijama po kojem se ove naslage mogu porediti s razvojem u Austriji i Cehoslovačkoj.

Pannonian i pontijska fauna ostrakodih jugoistočnih obronaka
Obala i Krško Polje

A. Jovan

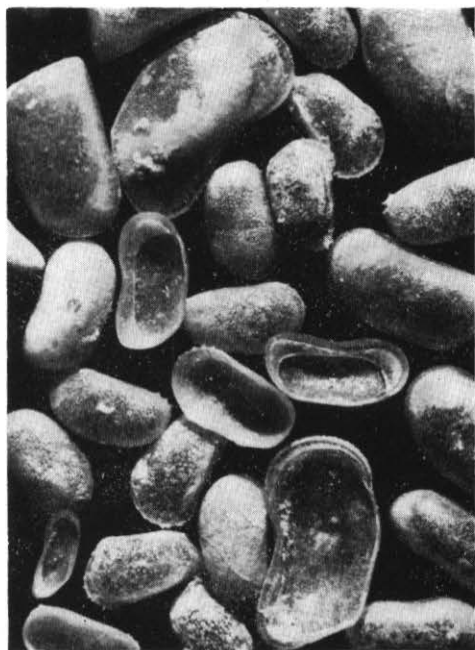
U ovom radu su prikazane faune ostrakodih iz dva područja: gornje panonske i donje pontijske. Ostrakodna fauna gornje panonske je sastavljena od vrsta koje su karakteristične za srednju i donju panonsku faunu. Ostrakodna fauna donje pontijske je sastavljena od vrsta koje su karakteristične za donju pontijsku faunu. Ostrakodna fauna gornje panonske je sastavljena od vrsta koje su karakteristične za srednju i donju panonsku faunu. Ostrakodna fauna donje pontijske je sastavljena od vrsta koje su karakteristične za donju pontijsku faunu.

PLATE — TABLA I

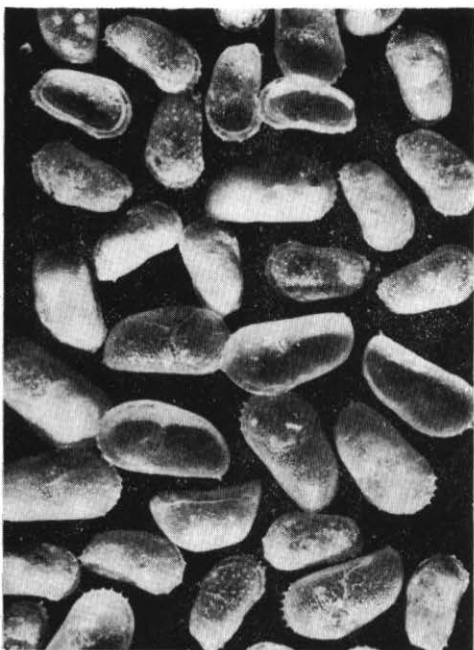
1. Microfaunistic association of the Upper Pannonian
(Asocijacija gornjeg panona); Gornje Libno, east of Krško.
2. Microfaunistic association of the Lower Pontian
(Asocijacija donjeg pontia); Pleterje, north-east of Krško.
3. Microfaunistic association of the Upper Pontian
(Asocijacija gornjeg pontia); Dednja Vas.
4. Microfaunistic association of the Upper Pontian
(Asocijacija gornjeg pontia); Brežice.

Photomicrographs enlarged: 14x
(Mikrofotografije povećane)

Microphotographs by: N. Rendulić



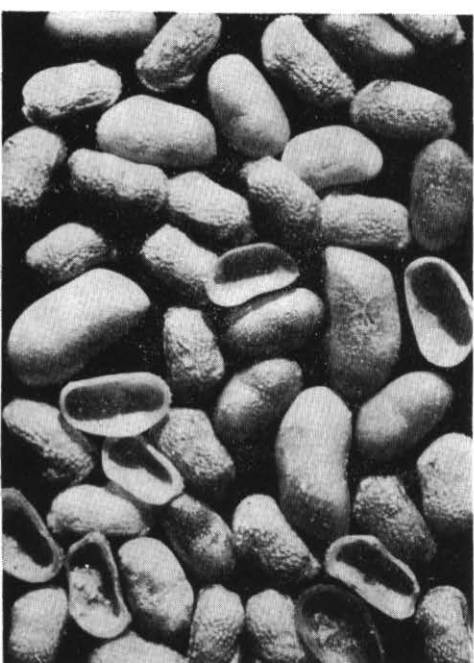
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