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Editorial
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Century of Laskarev's landmark contribution to Paratethys Science

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Abstract. Laskarev's seminal contribution to the recognition and elucidation of the Paratethys Sea within geological discourse stands as one of the pivotal milestones in our understanding of Neogene European paleogeography. Although the Neogene marine deposits of central and southeastern Europe were known before him, he greatly facilitated discourse and communication about them by giving them a paleogeographical name.
By officially introducing the term Paratethys and meticulously delineating its geographic extent and history, Laskarev unveiled profound insights into past climates, environments, and biotic evolution across Central and Eastern Europe. His work provided a solid foundation for subsequent investigations of the Paratethys region.
Moreover, beyond its scientific intrigue, the Paratethys Sea holds considerable economic importance due to its rich geological endowment. This reservoir of resources includes hydrocarbon reserves, mineral deposits, and a burgeoning potential for geotourism. While substantial strides have been made in unraveling its mysteries, the Paratethys Sea still beckons further exploration, promising untapped realms of knowledge and economic opportunity.

Scope

The term Paratethys as a unique biogeographic region distinct from the Neogene Mediterranean was first introduced by Laskarev in 1924. Through the meticulous examination of mollusk faunas, Laskarev found evidence for the existence of this ancient sea. His comprehensive faunistic studies across the Vienna, Styrian, Pannonian, Dacian, and Euxinian basins provided invaluable insights into the distinctive characteristics of the Paratethys. This recognition marked a significant milestone in understanding the geological and biological history of the region, shedding light on the complexities of its evolutionary past and contributing to our broader understanding of biogeography.

The marine deposits dating back to the Oligocene and Miocene epochs in Central Europe stand as remnants of the now-vanished Paratethys Sea. At its zenith, this expansive body of water stretched from the Rhône Basin in France to Inner Asia. Originating as a northern adjunct to the Western Tethys during the late Eocene and early Oligocene, the Paratethys developed in response to the emergent Alpine Island chains, which acted as increasingly effective geographical barriers (Rögl, 1998). These island chains comprised the Alps, Dinarids, Hellenids, Pontids, and Anatolian Massif.

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Subsequent geotectonic events and global sea-level fluctuations partitioned the Paratethys into two (three – according to Piller et al., 2007) distinct geotectonic units, each experiencing unique environmental trajectories (Popov et al., 2004). The smaller western unit encompasses the Western Paratethys in the Alpine Foreland Basins (Senes, 1961) and the Central Paratethys including the Eastern Alpine-Carpathian Foreland basins from Lower Austria to Moldavia and the Pannonian Basin System (Piller et al., 2007;Harzhauser & Piller, 2007). The Eastern Paratethys comprises the Euxinian (Black Sea), Caspian and Aral Sea basins (Nevesskaja et al., 1993). Towards the end of the Middle Miocene, the eastern Carpathian Foreland undergoes a transition, shifting from the geological and hydrodynamic environment of the Central Paratethys to that of the Eastern Paratethys (Piller et al., 2007). This transition is consistent with the fragmentation of the Central Paratethys, prompted by the formation of the Late Miocene Lake Pannon (Magyar et al., 1999), confined to the Pannonian Basin System.

This geological evolution gave rise to a complex interplay of shifting land bridges and seaways connecting the Paratethys with the Mediterranean and the western Indo-Pacific. This intricate connectivity fostered diverse biogeographic relationships among these paleobiogeographic units. Consequently, the geodynamic forces driving these biogeographic differentiations necessitated the development of distinct chronostratigraphic and geochronologic scales.

Contributions

The eight contributions in this volume are organized thematically, beginning with studies on the Central Paratethys, followed by those on the Eastern Paratethys. A historical outline of Laskarev's life and scientific work concludes the volume.

Bradić-Milinović & Vuković (this volume) discuss the identification of two Middle Miocene formations in the Despotovac area, determined through correlating sediments with those from type localities. Micropaleontological analysis of Badenian formation sediments suggests a mainly marginal to shallow marine environment with normal salinity. The second Sarmatian formation consists of sandstones and limestones characterized by a stable bottom-water temperature (~15°C) and variable salinity (20–32 ‰). Overall, the sedimentary processes and microfossil assemblages align with conditions in the Central Paratethys regional province during the Middle Miocene.

Đurić (this volume) describes the only remains of a blind snake discovered in the Middle Miocene sediments of the Vračević locality in western Serbia. This site has been known since the mid-20th century, with the first fossil remains described by Laskarev in 1948. Even though the significant differences between the families of *Scolecophidia* have been identified since the 19th century, the anatomy of the postcranial skeleton was initially neglected, and the author presented the study of vertebral morphology.

Jovanović et al. (this volume) examine the Badenian holoplanktonic mollusk communities from the Natural History Museum in Belgrade, focusing on the identification of pteropod taxa and the determination of sediment age. Pteropod fossils from three Serbian localities including a new finding in Radljevo, were analyzed. The research highlights the significance of Serbian pteropod faunas as the southernmost occurrence in the Pannonian Basin, aiming to contribute to future studies on the region's biostratigraphy, paleogeography, and paleoclimate during the Middle Miocene.

Sebe et al. (this volume) discuss the Pécsvárad sand pit's Late Miocene fossil sands (7.6–6.8 Ma) which reveal a diverse biota from the high-energy littoral environment of brackish Lake Pannon. The fossil assemblage includes aquatic mammals, rhinoceratids, sharks, and various fish species, suggesting a mix of contemporaneous and older Miocene deposits. The mixing of the fauna is attributed to a neotectonic basin inversion due to the Mecsek mountains uplift. Despite dating uncertainties, these mixed faunas provide crucial insights into the area's evolutionary history, highlighting the complexity of the ecosystem during the Middle-Late Miocene.

Golovina et al. (this volume) discuss the Lower Miocene regional stages of the Eastern Paratethys, specifically the Caucasian, Sakaraulian, and

Kozakhurian, which lack consistent criteria for defining their boundaries across different structural facies zones. Authors studied various fossils in Lower Miocene sections within Central Ciscaucasia and Kartli Depression of Georgia to characterize the sedimentary formations. New data on phytoplankton and benthos composition offer insights into potential correlations between these regional stages, paving the way for further detailed correlation studies.

Popov et al. (this volume) describe Paratethys alternating hydrological regimes which influenced aquatic and terrestrial life, facilitating migrations and fostering endemic species. River runoff enriched the basin, supporting massive biomass while the anoxic conditions facilitate hydrocarbon formations. Recent advancements in seismic stratigraphy now allow the reconstruction of paleogeography, crucial for understanding historical migrations and for practical purposes such as hydrocarbon exploration and groundwater management, utilizing sedimentary deposits as valuable resources.

Rostovtseva (this volume) examine aragonite sediments from the upper Sarmatian and lower Maeotian in the Zeleznyi Rog section of the Taman Peninsula, Eastern Paratethys. Using field observations and laboratory methods (SEM, X-ray diffraction, and isotope analyses), the research reveals the presence of aragonite at intervals within the section, forming thin layers with clays. These sediments consist mainly of aragonite crystals and aggregates, with isotopic values suggesting specific sedimentation conditions linked to reduced water salinity, increased bioproductivity, and arid periods. The study proposes that abiotic precipitation of aragonites, influenced by factors like planktonic algal blooms and geochemical variability, may have led to their formation, potentially indicating association with whiting events.

Malakhova et al. (this volume) provide a comprehensive historical account of the life and contributions of Vladimir Laskarev, a renowned Russian–Serbian scientist. It highlights Laskarev's significant scientific endeavors and his act of coining the term Paratethys, now widely used in geological literature. The article offers biographical insights and a critical analysis of Laskarev's work.

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