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Biostratigraphic framework of the Konkian-Sarmatian boundary based on microfossils from the well #20 Kerch Peninsula (Crimea)

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Abstract: The Konkian-Sarmatian transition represents a major interval of biotic turnover and paleoenvironmental change in the Eastern Paratethys. This study investigates the upper Konkian and Lower Sarmatian deposits penetrated by well #20 on the western Kerch Peninsula (Crimea) using integrated analyses of benthic foraminifera, calcareous nannoplankton, mollusks, ostracods and rare planktic foraminifera. Three successive benthic foraminiferal assemblages were distinguished. The lower Konkian interval is characterized by assemblages containing *Spiroloculina konkensis*, *Quinqueloculina minakovae* group, and *Elphidium kudakoense*, together with the mollusks *Limacina konkensis* and *L. andrussovi*. The upper Konkian interval is dominated by *Elphidium horridum* and associated with *Obsoletiformes lithopodolicus ruthenicus* and *Musculus sarmaticus*. Early Sarmatian interval is marked by the appearance and common occurrence of *Varidentella reussi*, *Articularia articulinoides*, *Articulina sarmatica*, and *Elphidium reginum*. The transitional phase, termed the Konkian-Sarmatian Conversion Time (KSCT), represents a process of gradual basin reorganization. It is characterized by an abrupt decline in stenohaline elements occurring concurrently with the emergence of transitional mollusc and benthic foraminiferal species that appear in the late Konkian and span into the early phase of the Early Sarmatian. Calcareous nannoplankton assemblages containing *Orthorhabdus rugosus*, *Cyclicargolithus floridanus*, and common *Reticulofenestra pseudoumbilicus*, together with the absence of *Sphenolithus heteromorphus*, support assignment of the Konkian deposits to the NN6 Zone. The Early Sarmatian interval is characterized by abundant *Braarudosphaera bigelowii*, *B. bigelowii* ssp. *parvula*, and *Holodiscolithus macroporus*. The integrated microfossil and mollusc record documents a distinct turnover in biotic assemblages across the Konkian-Sarmatian transition and enables reliable correlation of the studied succession with regional Eastern Paratethyan stratigraphic schemes. The results contribute to a better understanding of the timing and character of biotic changes preceding and accompanying the establishment of Sarmatian environments.

Key words: Paratethys, Biostratigraphy, Serravallian, Foraminifera, Calcareous nannoplankton, Ostracods

Introduction

The Paratethys Sea (Laskarev, 1924) was a vast basin during the Neogene whose dynamic paleogeography, including intermittent connections between the Central and Eastern domains, strongly influenced regional paleoceanography and biotic evolution (Rögl, 1998; Popov et al., 2004; Harzhauser & Piller, 2007; Holcová, 2008; Kováč et al., 2017). A key event occurred at ~12.65 Ma ago, when temporary reconnection led to the replacement of the Badenian and Konkian seas by the Sarmatian Sea (e.g., Barbot de Marny, 1862, 1866, 1867; Suess, 1866; Andrusov, 1899; Paramonova & Belokrys, 1972; Nevesskaya et al., 1986; Palcu et al., 2017; Raffi et al., 2020). This transition is associated with major faunal and ecological changes, including the Badenian-Sarmatian Extinction Event in the Central Paratethys (Harzhauser & Piller, 2004, 2007; Holcová, 2008; Ter Borgh et al., 2014) and comparable turnover at the Konkian-Sarmatian boundary in the Eastern Paratethys (Muratov & Nevesskaya, 1986; Nevesskaya et al., 1986).

However, evidence from multiple Eastern Paratethys regions indicates that significant biotic changes began earlier, during the late Konkian (Bogdanovich, 1965; Maissuradze, 1971; Nevesskaya et al., 1986; Maissuradze et al., 2014; Vernyhorova, 2014, 2018).

The Konkian and Sarmatian regional stages of the Eastern Paratethys were formally defined by Nevesskaya et al. (1975). While the Konkian lacks a consistent regional subdivision and is represented by local biofacies (Vernyhorova, 2015, 2018), the Sarmatian is subdivided into Lower, Middle, and Upper substages with regionally defined horizons (Nevesskaya et al., 1984; Muratov & Nevesskaya, 1986). Magnetostratigraphic data constrain the Konkian to ~13.40–12.65 Ma and the Sarmatian s.l. to ~12.65–7.60 Ma (Palcu et al., 2017; Raffi et al., 2020; Lazarev et al., 2025).

Despite extensive research, the synchrony of biotic and ecological changes across different groups remains unresolved. This study addresses this issue by integrating benthic and planktic assemblages from the Konkian and Lower Sarmatian (Kuzhorian Horizon) based on clay-rich sequences from a well #20 in the western Kerch Peninsula (Figs. 1–2).

Geology of the studied area

The study area is in the western Kerch Peninsula, which during the Neogene formed part of the tectonically active Kerch-Taman folded zone between the Crimea and Caucasus mountains, characterized by folding and mud volcanism (e.g. Andrusov, 1893; Arkhangelsky et al., 1930; Shnyukov et al., 2006) (Fig. 1). Konkian and Sarmatian (s.l.) deposits are distributed across the peninsula (e.g. Andrusov, 1893; Osipov, 1927; Arkhangelsky et al., 1930; Archangelsky, 1940; Barg & Stepaniak, 2003; Vernigorova et al., 2012; Vernyhorova, 2014).

The studied sequence starts with Petrovske Fm. of the Konkian age and is composed of relatively uniform clay sediments with minor portion of sand, siltstone, marl, and shell detritus, reaching thicknesses of 36–155 m (e.g. Arkhangelsky et al., 1930; Archangelsky, 1940; Vernigorova et al., 2012; Vernyhorova, 2014). These deposits are overlain by Lower Sarmatian strata without clear hiatus (Vernigorova et al., 2012; Vernyhorova, 2014).

Lower Sarmatian deposits belong to the Krasnoperekopsk Fm. consisting predominantly of dark grey to black clays, massive or laminated, with thickness of 31–230 m (e.g. Andrusov, 1893; Arkhangelsky et al., 1930; Kolesnikov, 1935; Archangelsky, 1940; Barg & Stepaniak,

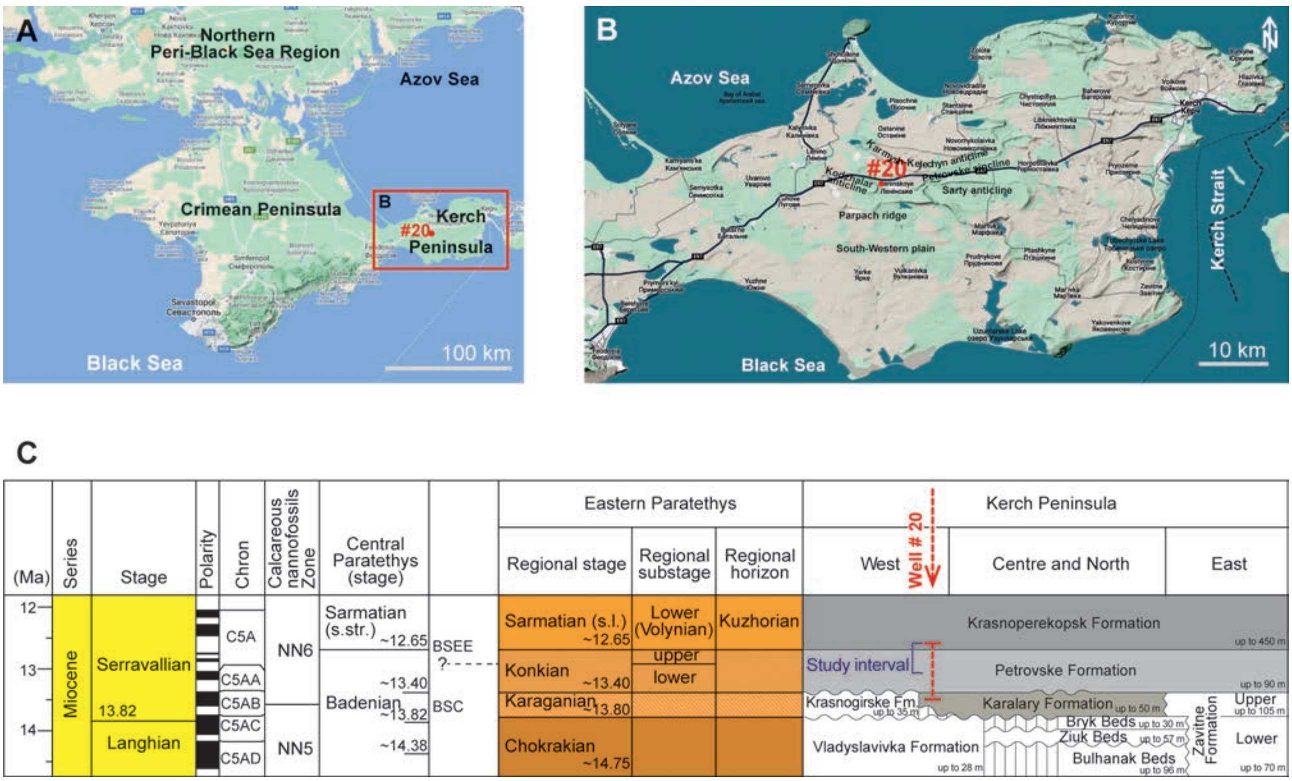

Fig. 1. Location map of the studied well #20 and explanation notes A – Crimean Peninsula and Kerch Peninsula B – Kerch Peninsula detailed map with well location. C – Miocene Chronostratigraphic framework of the Central Paratethys, Eastern Paratethys and Kerch Peninsula and position of the well, lithostratigraphy of the studied region (according to Arkhangelsky et al., 1930; Archangelsky, 1940; Vernigorova et al., 2012; Vernyhorova, 2014).

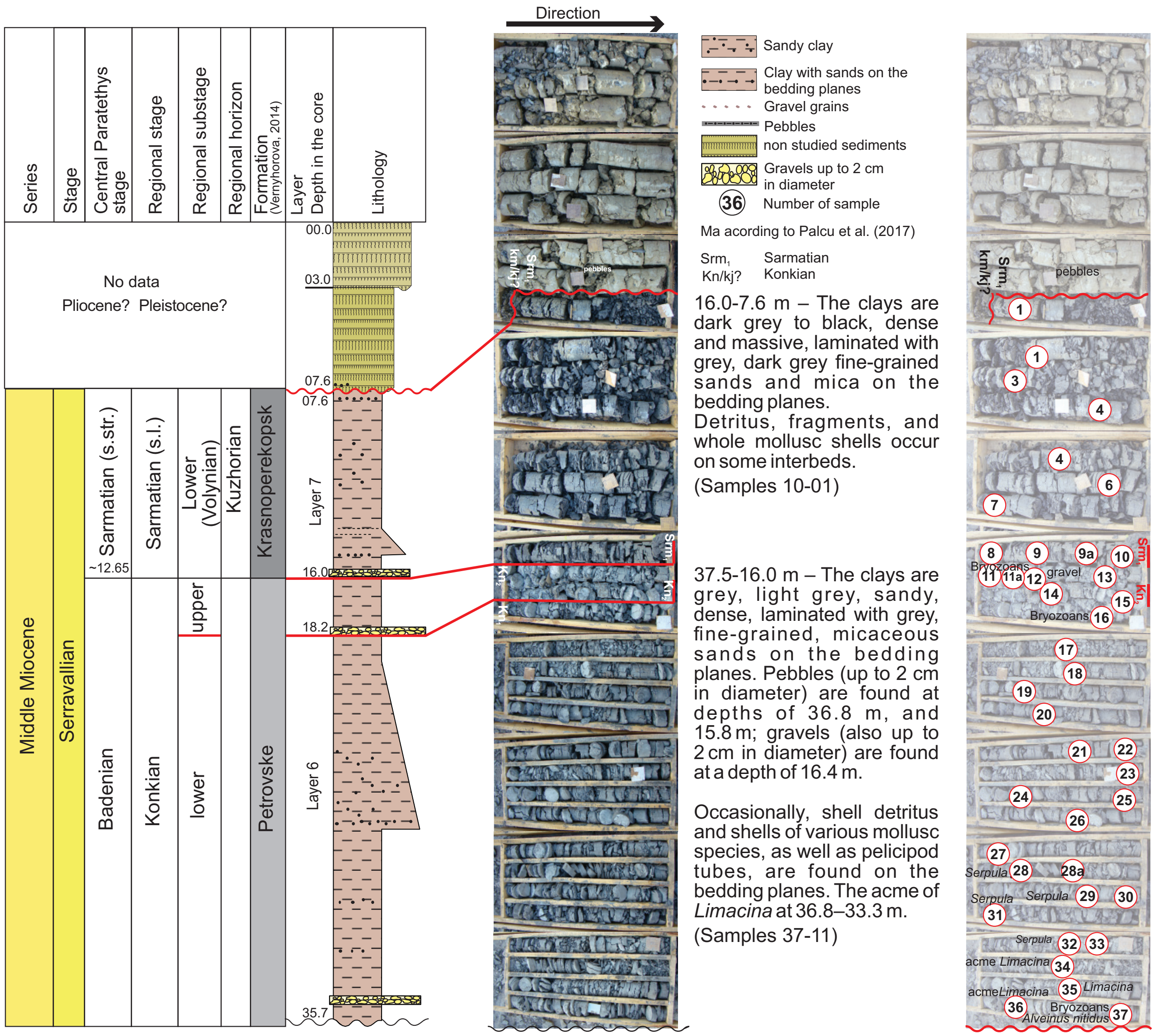

Fig. 2. Miocene Chrono/lithostratigraphic framework with horizons and formations of the discussed section with detailed well description.

2003; Vernigorova et al., 2012; Vernyhorova, 2014). This unit includes the Kuzhorian and Zbruchian horizons and part of the Middle Sarmatian and is overlain by younger Sarmatian deposits (Vernigorova et al., 2012; Vernyhorova, 2014).

Methods

Foraminifera, Ostracoda and Mollusca were obtained from 400 g of each well #20 sample, dried and washed through a 63 µm sieve, and all planktic and benthic specimens were picked separately. Identification and imaging were carried out using a Zeiss Stemi 750 stereomicroscope, a polarizing microscope (Comenius University in Bratislava), and a JEOL JSM-6390LV SEM (ESI, SAS). Taxonomic identification of benthic foraminifera followed Bogdanovich (1952), Krasheninnikov (1959), Didkovskiy (1961), Maissuradze (1971), Maissuradze & Koiava (2011), with generic revisions after Łuczkowska (1972, 1974) and Hayward et al. (2025). Planktic foraminifera were determined according to Cicha et al. (1998), Smart & Thomas (2007), Aze et al. (2011), Spezzaferri et al. (2015), and Wade et al. (2018). Poor preservation required some taxa to remain in open nomenclature (see Supplement 1).

Molluscs (mainly bivalves) were studied as a complementary group to determine the Konkian-Sarmatian stratigraphy. Molluscs were identified directly during sampling of the sections, as well as under a Zeiss Stemi 750 stereomicroscope (Comenius University in Bratislava). Traditional conchological methods were employed to identify species (Ilyina, 1993; Nevesskaya et al., 1993).

Calcareous nannofossils were observed in all 37 samples (Supplement S2). Calcareous nannofossils smear

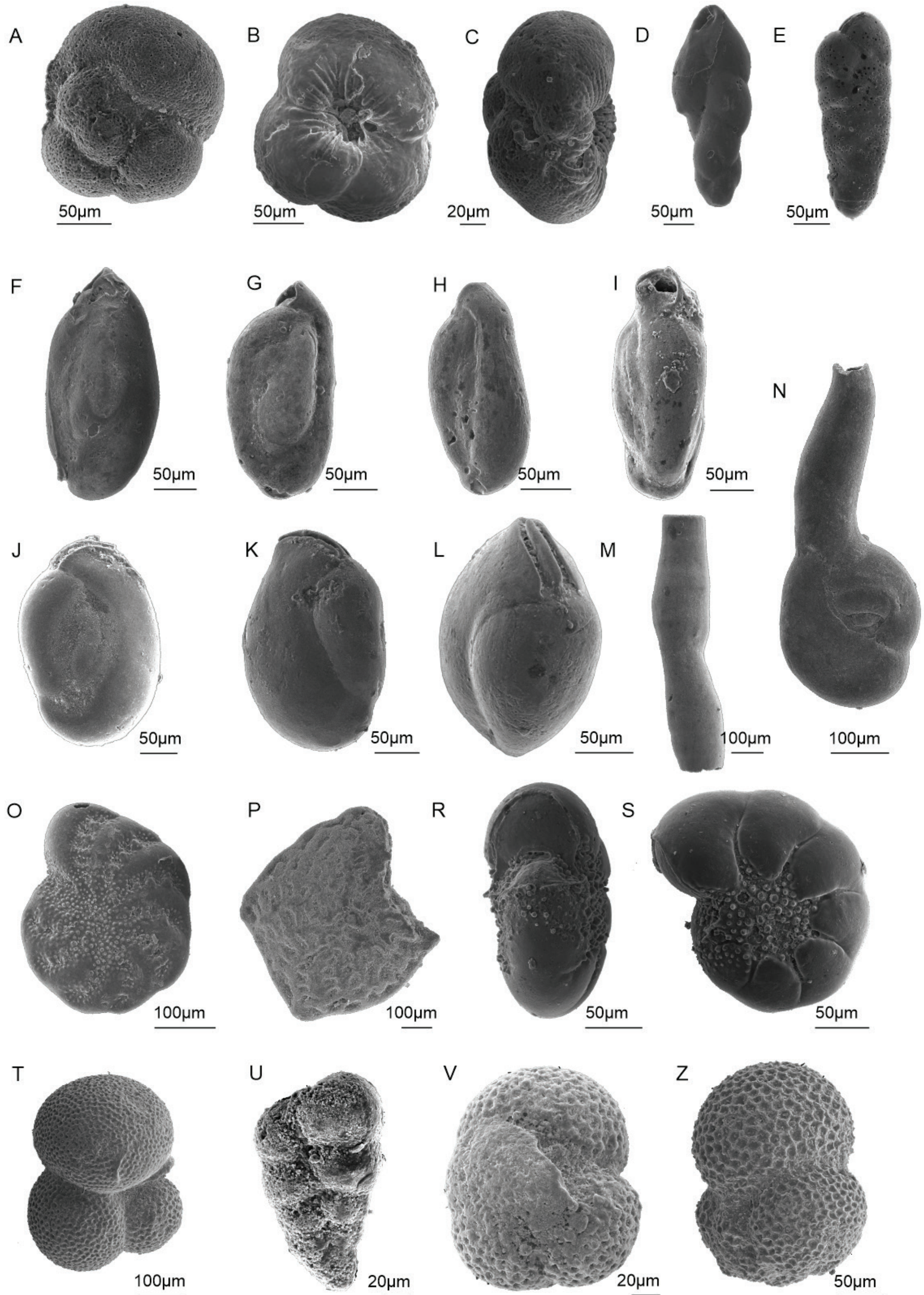

Fig. 3. The most important Foraminifera identified from the Kerch well #20.

A–B–C – *Glabratella kartvelicus* (Krasheninnikov) (sample 34); D – *Fursenkoina schreibersiana* Cžjžek (sample 34); E – *Bolivina sarmatica* Didkovskiy (sample 35); F–G–H–I – *Varidentella* ex gr. *latelacunata* (Venglinsky) (sample 34); J–K–L – *Affinetrina ucrainica* (Serova in Bogdanovich) (sample 32); M – *Articularia articulinoides* (Gerke & Issaeva) (uniserial part) (sample 9a); N – *A. articulinoides* (Gerke & Issaeva) (sample 9); O – *Elphidium horridum* Bogdanowicz (sample 11a); P – *Elphidium reginum* (d'Orbigny) (sample 2); R–S – *Elphidium granosum* (d'Orbigny); T – *Subbotina eocaena* (Guembel 1868) (sample 35); U – *Streptochilus subglobigerum* Resig, 1989 (sample 3); V – *Catapsydrax unicavus* Bolli, Loeblich & Tappan, 1957 (sample 8); Z – *Trilobatus trilobus* (Reuss, 1850) (sample 9a). Index species: (Konkian A – L); (Early Sarmatian M, N); (late Konkian – Early Sarmatian O); (Early Sarmatian P); (Konkian–Sarmatian R, S); (Planktic T – V, Z).

slides were prepared using the standard method of Bown and Young in Bown (1998) and were counted in 300 fields of view, using an Olympus BX 50, an objective with 100× magnification, and oil immersion. We used an Olympus Infinity 2 camera with QuickPHOTO CAMERA 2.3 software for photographic record. Systematic identification and taxonomy follow Young (1998) and Young et al. (2017). Standard NN zones are after Martini (1971).

Results

Foraminifera and Mollusca

A total of 97 species of benthic foraminifera belonging to 43 genera were identified in the studied interval (Supplement 1, Fig. 3). The assemblages are characterized by a marked difference between dominant and associated taxa. Dominant species constitute 10.00–95.34 % of the total assemblage in individual samples, corresponding to 7–961 tests per sample (Supplement 1, Fig. 4), whereas associated species account for 0.28–8.41 % and are generally represented by only a few specimens. The lower part of the studied section (samples 37–16; 35.7–18.8 m) is characterized by the occurrence of *Spiroloculina konkensis*, *Quinqueloculina minakovae minakovae*, *Q. minakovae ukrainica*, *Q. konkensis*, *Nodobaculariella* ex gr. *konkensis*, *Bolivina dilatata*, *Sigmoidella caucasica*, *Cassidulina* sp. 1, *Discorbis squamulus*, and *Elphidium kudakoense*. Mollusc assemblages in this interval include *Limacina konkensis* and *L. andrussovi*. In the middle part of the section (samples 15–11; 18.1–16.1 m), the foraminiferal assemblages are dominated by *Elphidium horridum*. The associated mollusc fauna comprises *Obsoletiformes*

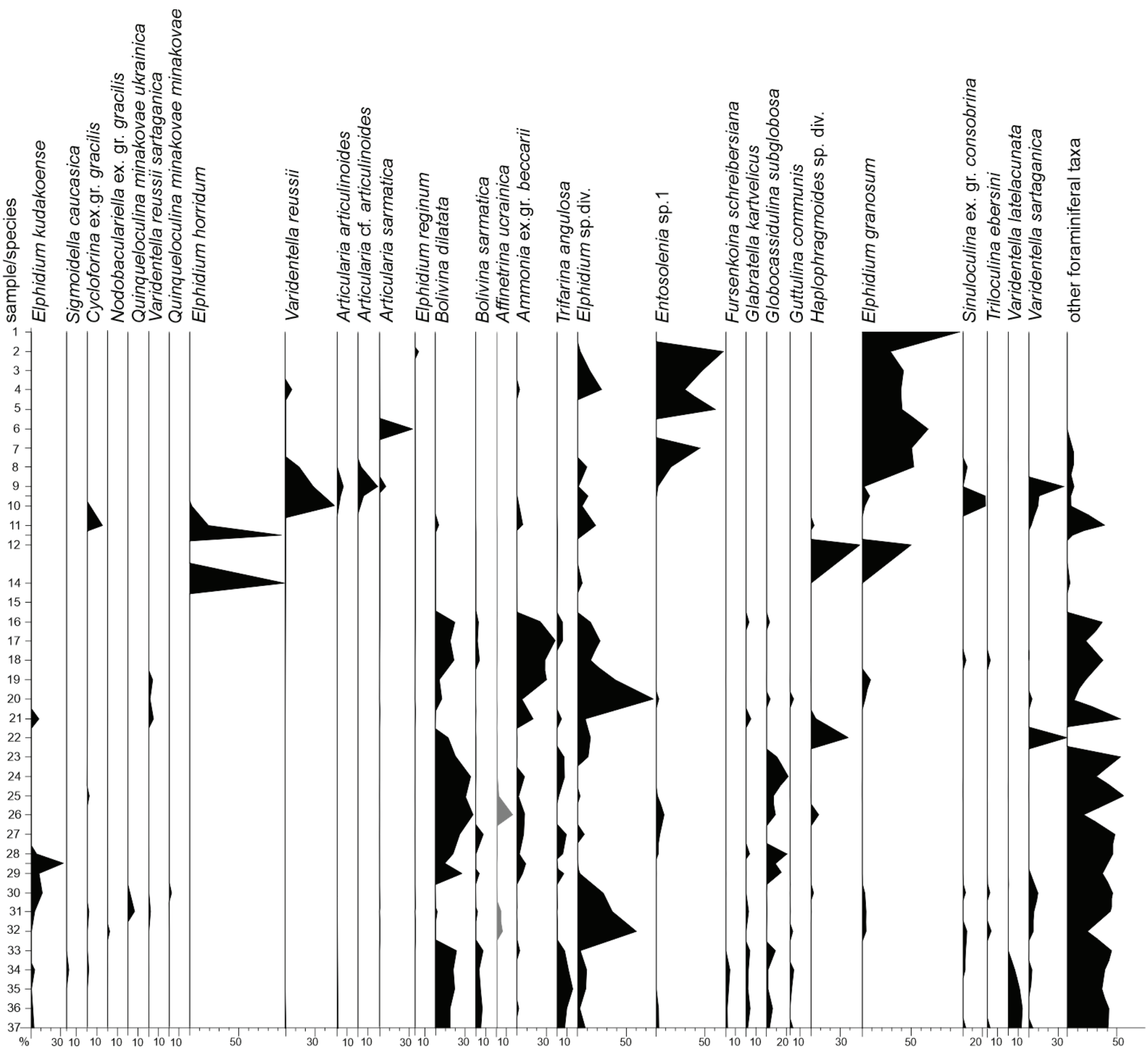

Fig. 4. Portion of stratigraphically important foraminifera in the samples studied from well #20 in the Kerch Peninsula.

lithopodolicus ruthenicus and *Musculus sarmaticus*. The upper part of the section (samples 10–01; 15.9–07.7 m) is characterized by the occurrence of *Varidentella reussi*, *Articularia articulinoides*, *Articulina sarmatica*, and *Elphidium reginum*. The mollusc assemblages continue to be represented by *Obsoletiformes lithopodolicus ruthenicus* and *Musculus sarmaticus*. This interval also contains abundant calcareous nannofossils, including *Holodiscolithus macroporus*, *Braarudosphaera bigelowii*, and *Braarudosphaera bigelowii* ssp. *parvula*.

Planktic foraminifera were identified in 11 samples; however, they were rare and poorly preserved. A total of 29 specimens representing 11 species were recorded (see Supplement 1). The majority of the assemblage is composed of reworked taxa exhibiting a broad stratigraphic range, spanning from the Eocene (e.g., *Pseudohastigerina* cf. *wilcoxensis*), through the Oligocene (*Subbotina gortanii*, *S. eocaena*), to the Miocene (*Catapsydrax unicavus*, *Paragloborotalia siakensis*, *Trilobatus trilobus*).

Ostracoda

Ostracod valves and complete carapaces constitute more than half of the collected specimens. The valves are translucent to opaque and display white, brown, and black coloration. Many specimens are infilled with authigenic minerals, probably pyrite and/or carbonate. Although the ornamentation is generally preserved, the observation of some taxonomically important features, particularly marginal pore canals, the inner lamella and muscle scars, are hindered by mineral infilling. This is especially problematic for the identification of leptocytherid taxa. The ornamentation is excellently preserved, but occasionally smoothed due to transport (sample 9). Both adults and juveniles are present, but due to the very low number of individuals in the samples, it is not possible to use the juvenile/adult ratio to consider post-mortem transport and autochthonism. However, the overall abundance of ostracods is low in most samples. Sixteen ostracod taxa were recognized, but none could be identified to the species level. *Cytheridea* sp. resembles *Cytheridea acuminata* Bosquet, 1852 in general outline but differs in its fine ornamentation. The remaining taxa are retained in open nomenclature. The assemblage comprises representatives of the genera *Aurila, Euxinocythere, Leptocythere, Callistocythere, Loxoconcha*, *Loxocauda*, *Cytheridea*, *Cytherura*, *Sclerochilus*, and *Xestoleberis*.

Calcareous nannoplankton

A total of 43 calcareous nannoplankton taxa were identified in the studied deposits. Preservation and abundance are generally moderate (Supplement 3). The highest abundances were recorded in samples 14, 19, 16, 13, 29, 35, 33, 37, and 32. The assemblages are dominated by reticulofenestrids in samples 4, 14, 19, 16, 13, and 29, where they comprise up to 97.9 % of the total assemblage. The highest abundances were recorded in samples 14 and 19, with *Reticulofenestra pseudoumbilicus* accounting for 50.5 % and *Reticulofenestra haqii* for 46.0% of the assemblage (Figs. 6, 7; Supplement 3). In contrast,

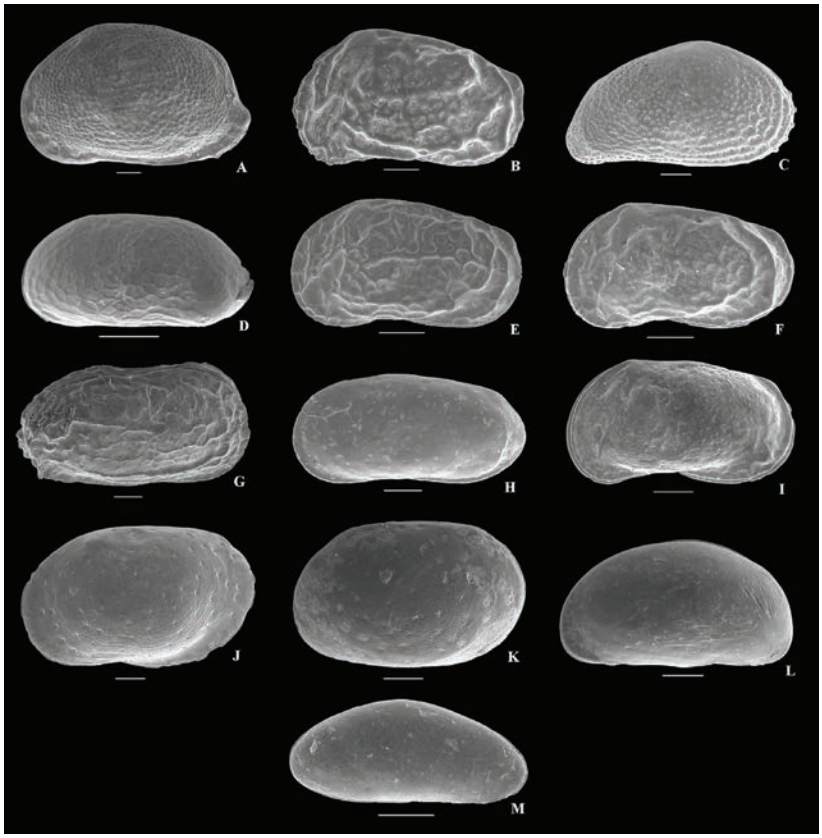

Fig. 5. Ostracoda from the samples of the well #20 Kerch.

A – *Aurila* sp., LV, sample 15; B – *Callistocythere* sp. 3, LV, sample 5; C – *Cytheridea* sp. aff. *Cytheridea acuminata* Bosquet, 1852, RV, sample 32; D – *Cytherura* sp., LV, sample 34; E – *Euxinocythere* sp. form A, LV, sample SV20 30; F – *Euxinocythere* sp. form B, LV, sample 9; G – *Hiltermannicythere* sp., RV, sample 32; H – *Leptocythere* sp. 1, LV, sample 32; I – *Leptocythere* sp. 2, LV, sample 9; J – *Loxoconcha* sp. 1, LV, sample 30; K – *Loxoconcha* sp. 2, LV, sample 31; L – *Xestoleberis* sp., 3, LV, sample 32; M – *Sclerochilus* sp. 2, RV, sample 36. LV – left valve; RV – right valve. All valves in external lateral view. Scale bar 100 µm.

samples 35, 33, 37, and 32 are dominated by *Coccolithus pelagicus*, which constitutes 85.7–90.7 % of the assemblage (Fig. 7; Supplement 3). Rare, reworked taxa were also observed throughout the section. These include Lower Miocene, Paleogene, and Cretaceous species represented by *Helicosphaera euphratis*, *Reticulofenestra lockeri*, *Triquetrorhabdulus carinatus*, *Watznaueria barnesiae*, *Micula staurophora*, *Prediscosphaera cretacea*, and *Cribrosphaerella ehrenbergii*. Samples in interval 37–11; (35.7–16.1 m) are characterized by the dominance of *Coccolithus pelagicus* in the lower part of the section (samples 37–30), accompanied by less abundant *Reticulofenestra haqii*, *R. pseudoumbilicus*, *Braarudosphaera bigelowii*, and *Helicosphaera car-teri*. Additional taxa recorded in this interval include *Cyclicargolithus floridanus*, *Rhabdosphaera sicca*, *Sphenolithus moriformis*, and *Syracosphaera pulchra*. In the samples 29–11, *Reticulofenestra pseudoumbilicus* becomes the dominant taxon, replacing *Coccolithus pelagicus*. Other commonly occurring taxa include *R. haqii*, *Braarudosphaera bigelowii*, *Rhabdosphaera sicca*, *Syracosphaera pulchra*, *Holodiscolithus macroporus*, *Umbilicosphaera jafari*, and *U. rotula*. The uppermost part of the well, samples 10-01; (15.9–07.7 m) is characterized by a marked decrease in assemblage diversity and abundance. *Reticulofenestra pseudoumbilicus* becomes rare or absent, whereas *Braarudosphaera bigelowii*, *B. bigelowii* ssp. *parvula*, and *Holodiscolithus macroporus* increase in abundance and become characteristic com-ponents of the assemblages. The uppermost sample yielded a poor nannoplankton assemblage and lacked characteristic taxa (Figs. 6, 7).

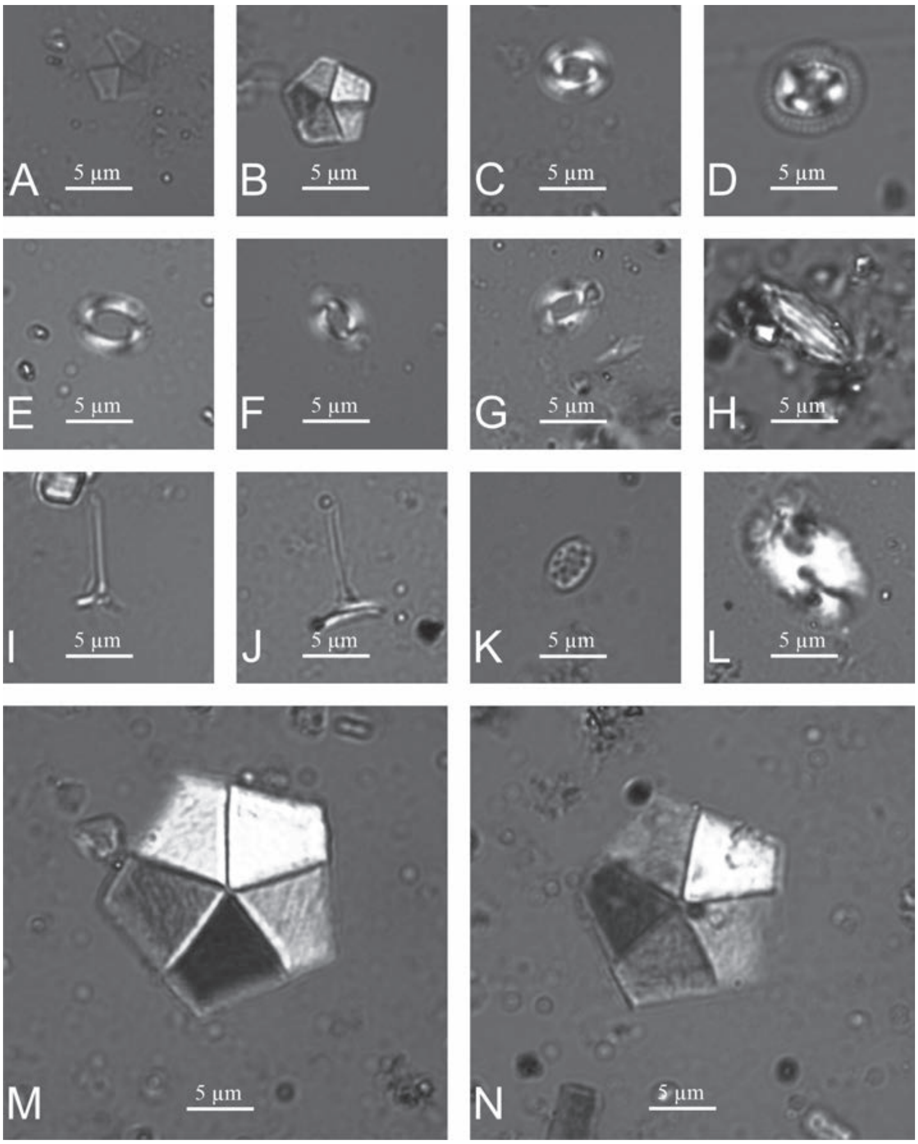

Fig. 6. Stratigraphically important calcareous nannoplankton in the samples studied.

A–B – *Braarudosphaera bigelowii* ssp. *parvula* Stradner, 1960 (samples 8, 37); C – *Cyclicargolithus floridanus* (Roth and Hay, in Hay et al., 1967) Bukry, 1971 (sample 36); D – *Coccolithus pelagicus* (Wallich, 1877) Schiller, 1930 (sample 16); E–F–G – *Reticulofenestra pseudoumbilicus* (Gartner, 1967) Gartner, 1969 (samples 11a, 12, 15); H – *Orthorhabdus rugosus* (Bramlette & Wilcoxon, 1967) Young & Bown 2014 (sample 27); I–J – *Rhabdosphaera sicca* (Stradner, 1963) Fuchs & Stradner 1977 (sample 18, 29); K – *Holodiscolithus macroporus* (Deflandre, in Deflandre and Fert, 1954) Roth, 1970 (sample 3); L – *Helicosphaera wallichii* (Lohmann, 1902) Okada and McIntyre, 1977 (sample 12); M–N – *Braarudosphaera bigelowii* (Gran and Braarud, 1935) Deflandre, 1947 (samples 4, 5).

Interpretation

The distribution of foraminifera, molluscs, and calcareous nannofossils reveals distinct changes in assemblage composition throughout the studied succession, particularly between the lower, middle, and upper intervals of the well. The high proportion of articulated carapaces (> 50 % of collected specimens) suggests limited post-mortem transport and relatively rapid burial. According to biostratigraphically important foraminifera species and calcareous nannoplankton (Figs. 3–7, Supplements 1–3), three stratigraphic units were identified in the studied material. The lower Konkian [samples 37–16, corresponding to 35.7–18.8 m, (Fig. 8)] is characterized by *Spiroloculina konkensis*, *Quinqueloculina minakovae minakovae*, *Q. minakovae ukrainica*, *Elphidium kudakoense*, and mollusc species *Limacina konkensis*, *L. andrussovi*. The upper Konkian [samples 15–11, corresponding to 18.1–16.1 m, (Fig. 8)] is characterized by benthic foraminifera *Elphidium horridum* and mollusc species *Obsoletiformes lithopodolicus ruthenicus* and *Musculus sarmaticus*. The Early Sarmatian [samples 10-01, corresponding to 15.9–07.7 m (Fig. 8)] is distinguished by the onset of foraminiferal species such as *Varidentella reussi*, *Articularia articulinoides*, *Articulina sarmatica*, and *Elphidium reginum* together with mollusc species including *Obsoletiformes lithopodolicus ruthenicus*,

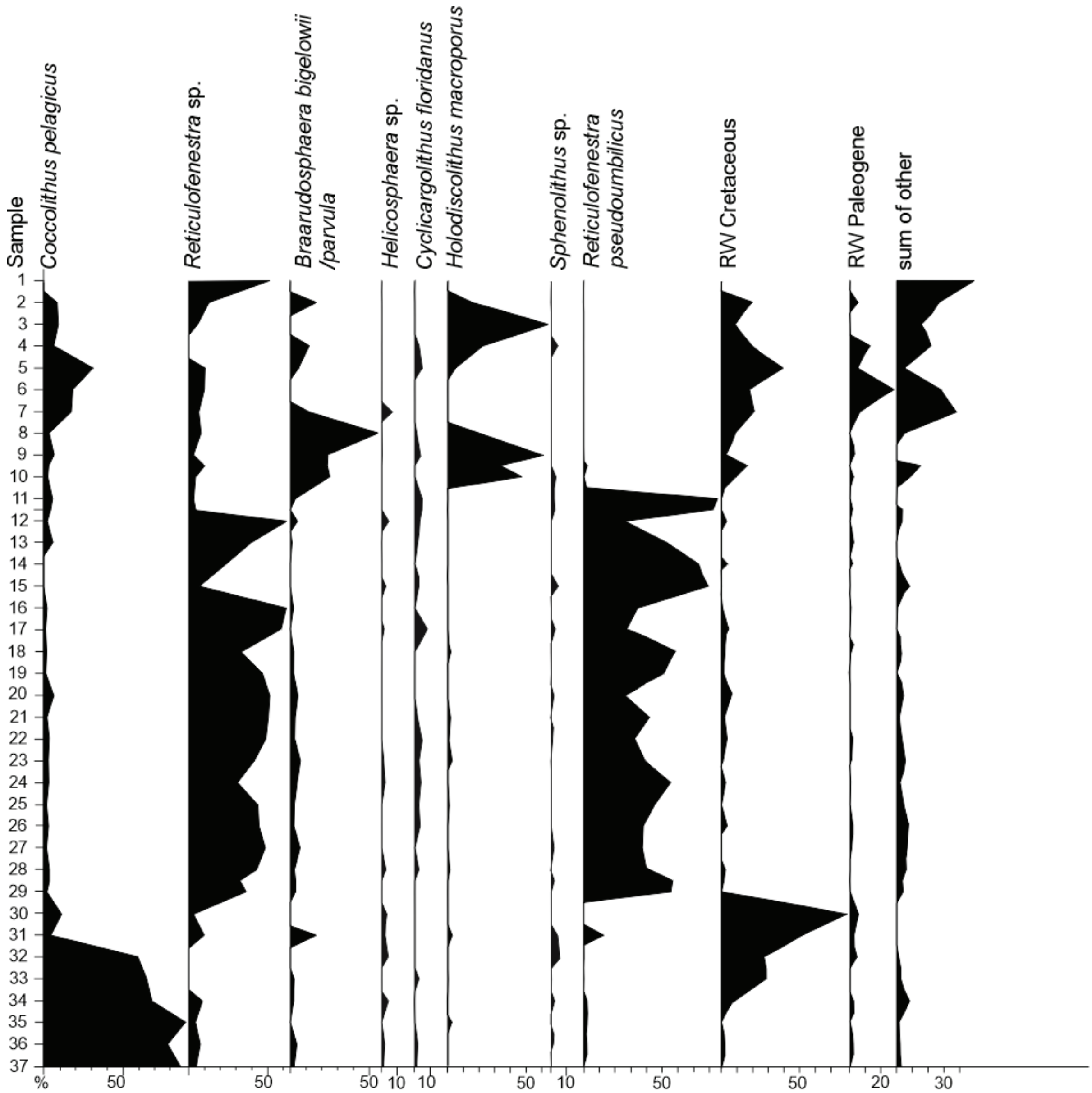

Fig. 7. Calcareous nannoplankton association with marked important and most abundant species.

and *Musculus sarmaticus*, as well as an abundance of calcareous nannofossils *Holodiscolithus macroporus*, *Braarudosphaera bigelowii*, *B. bigelowii* ssp. *parvula*. Planktic foraminifera are considered reworked. Only rare specimens of *Streptochilus subglobigerum*, *Catapsydrax unicavus* and *Trilobatus trilobus* can represent autochthonous planktic foraminifera of the Middle to Upper Miocene.

The ecological preferences of the identified ostracod genera indicate deposition in a shallow-water setting. *Aurila*, *Callistocythere*, *Loxoconcha*, *Loxocauda*, *Cytheridea*, *Cytherura*, *Sclerochilus*, and *Xestoleberis* are characteristic of littoral to shallow sublittoral marine environments, whereas *Euxinocythere* and *Leptocythere* are commonly associated with brackish conditions. The occurrence of two morphotypes of *Euxinocythere* may reflect either taxonomic differentiation or ecophenotypic variation related to environmental factors such as salinity, temperature, or carbonate availability.

The calcareous nannoplankton assemblages in lower and upper Konkian deposits contain common *Cyclicargolithus floridanus* and rare *Orthorhabdus rugosus*, whereas *Sphenolithus heteromorphus* is absent throughout the studied interval. The presence of *Orthorhabdus rugosus* together with the absence of *Sphenolithus heteromorphus* supports the assignment of the assemblages to the NN6 Zone of Martini (1971) (Young, 1998; Young et al., 2017). This interpretation is further supported by the occurrence of *Reticulofenestra pseudoumbilicus*, *Braarudosphaera bigelowii* ssp. *parvula*, *Helicosphaera wallichii*, *Holodiscolithus macroporus*, *Rhabdosphaera sicca*, *R. poculii*, *Syracosphaera pulchra*, *Umbilicosphaera jafari*, and *U. rotula*.

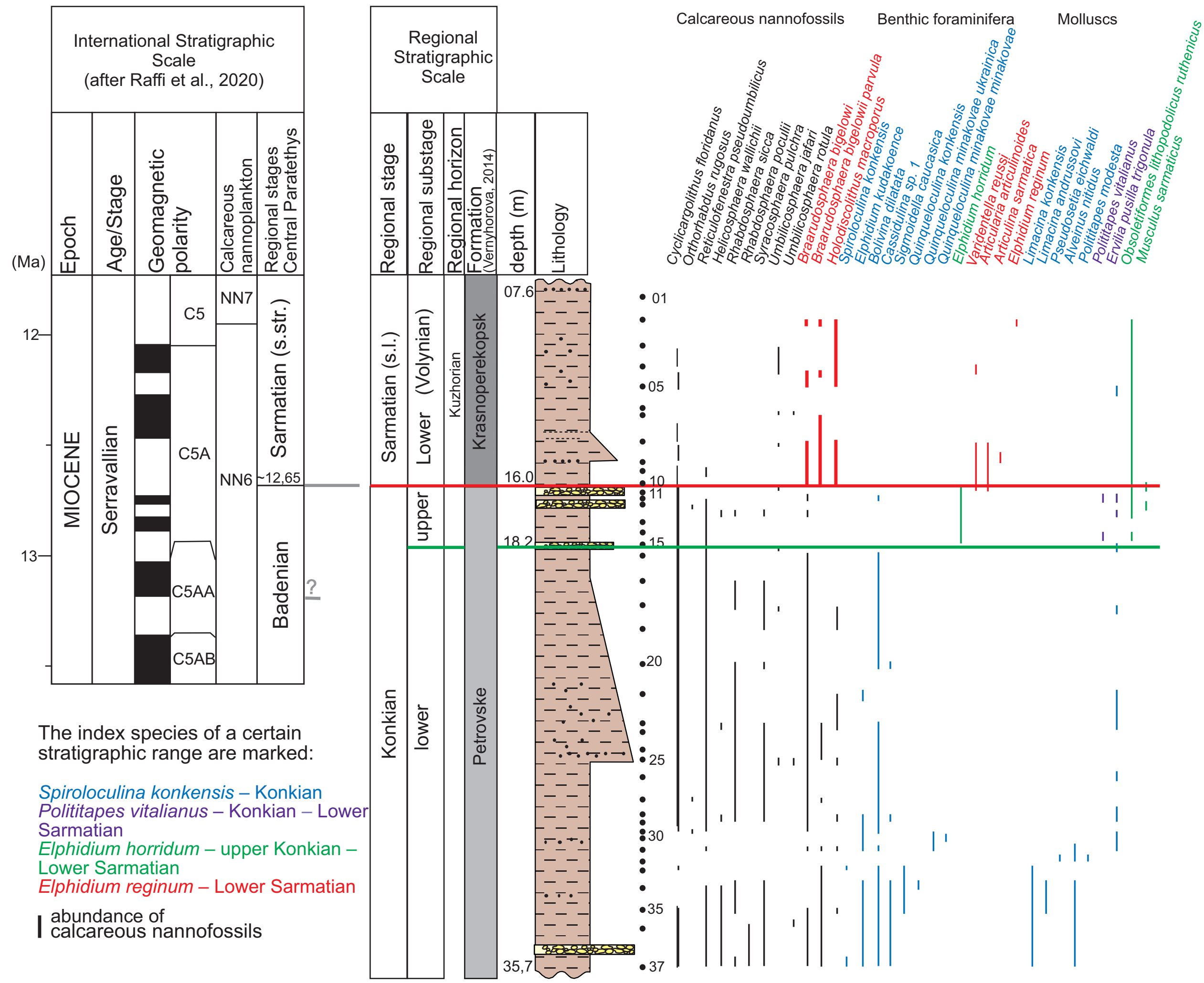

Fig. 8. Biostratigraphical synthesis of important biostratigraphical taxa with the position in the studied material from the well core samples.

The occurrence of common *Reticulofenestra pseudoumbilicus* (also > 7 μm) in the Konkian part of the section is consistent with an NN6 age and postdates its First Common Occurrence (FCO), calibrated at approximately 13.1 Ma (Abdul Aziz et al., 2008). Accordingly, the Konkian deposits penetrated by well #20 are assigned to the NN6 Zone and correlated with the middle Serravallian.

The upper Konkian is an important time interval, called the Konkian-Sarmatian Conversion Time (KSCT). It represents a key phase of the basin's gradual reorganization (Vernyhorova, 2015, 2018), during which mollusc and foraminiferal assemblages underwent a profound transformation from typically Konkian to Sarmatian types in the Eastern Paratethys. While earlier Konkian intervals also exhibit a sharp reduction or disappearance of stenohaline elements (e.g. Popov et al., 2016; Palcu et al., 2017), the late Konkian event is distinct. Here, the abrupt decline in stenohaline taxa occurs concurrently with the emergence of characteristic mollusc and benthic foraminiferal species whose stratigraphic ranges span from the late Konkian to the earliest Early Sarmatian (Sokolov, 1899; Liverovskaya, 1935, 1960; Bogdanovich, 1965; Nevesskaya et al., 1986; Krasheninnikov, 1959; Maissuradze, 1971; Bratishko et al., 2015). Nannoplankton data further constrain this interval, including the occurrence of *Reticulofenestra pseudoumbilicus* and correlation with calcareous nannoplankton zones CNM8–CNM11 (NN6–NN7) within the Serravallian (Andreyeva-Grigorovich & Nosovsky, 1976; Nevesskaya et al., 1986; Prisyazhnyuk et al., 2007; Radionova et al., 2012; Popov et al., 2016; Palcu et al., 2017; Raffi et al., 2020; Lazarev et al., 2025).

The overlying deposits are assigned to the early Sarmatian based on the presence and common occurrence of the foraminiferal species *Varidentella reussi*, *Articularia articulinoides*, *Articulina sarmatica*, and *Elphidium reginum* (Fig. 8), together with the mollusc assemblage containing *Obsoletiformes lithopodolicus ruthenicus* and *Musculus sarmaticus*. The marked reduction of *Reticulofenestra pseudoumbilicus* and the abundance of *Braarudosphaera bigelowii*, *B. bigelowii* ssp. *parvula*, and *Holodiscolithus macroporus* characterize the nannoplankton assemblages of this interval.

Conclusion

Integrated analyses of benthic foraminifera, calcareous nannoplankton, ostracods and molluscs from well #20 on the western Kerch Peninsula enabled recognition of the lower Konkian, upper Konkian and Lower Sarmatian deposits and refinement of the Konkian-Sarmatian transition.

Three successive assemblages were identified: (1) a lower Konkian assemblage characterized by *Spiroloculina konkensis*, *Quinqueloculina minakovae* group, *Elphidium kudakoense*, and the molluscs *Limacina konkensis* and *L. andrussovi*; (2) an upper Konkian assemblage dominated by *Elphidium horridum* and accompanied by *Obsoletiformes lithopodolicus ruthenicus* and *Musculus sarmaticus*; and (3) an Early Sarmatian assemblage marked by the appearance of *Varidentella reussi*, *Articularia articulinoides*, *Articulina sarmatica*, and *Elphidium reginum*.

Calcareous nannoplankton assemblages containing *Orthorhabdus rugosus*, *Cyclicargolithus floridanus*, and common *Reticulofenestra pseudoumbilicus*, together with the absence of *Sphenolithus heteromorphus*, indicate assignment of the Konkian deposits to the NN6 Zone of Martini (1971). The Early Sarmatian interval is characterized by abundant *Braarudosphaera bigelowii*, *B. bigelowii* ssp. *parvula*, and *Holodiscolithus macroporus*.

The Konkian-Sarmatian Conversion Time (KSCT) represents a transitional phase marked by a process of gradual basin reorganization during the late Konkian and the earliest Early Sarmatian in the Eastern Paratethys. This interval is characterized by a faunal turnover, where an abrupt decline in stenohaline elements occurs concurrently with the emergence of transitional mollusc and benthic foraminiferal species, which appear in the late Konkian and span into the early phase of the Early Sarmatian. Integrated nannoplankton data (*Reticulofenestra pseudoumbilicus*, zones CNM8–CNM11 or NN6–NN7) provide a robust biostratigraphic constraint for this event within the Serravallian.

The foraminifera and ostracod associations are typical of a shallow littoral environment with submerged macrophyte habitats and characterized by fluctuating salinity. Part of the association is probably transported from a very marginal, shallow water environment. The predominance of ostracod genera tolerant of brackish conditions supports this interpretation, while the occurrence of taxa typical of very shallow coastal settings suggests that part of the assemblage may have been transported over a short distance before burial.

The integrated microfossil and mollusc record documents a distinct faunal turnover across the Konkian-Sarmatian transition and provides a robust basis for regional stratigraphic correlation within the Eastern Paratethys.

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Benthic Foraminifera from the well #20

Benthic foraminifera species / samples	37	36	35	34	33	32	31	30	29	28a	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11a	11	10	9a	9	8	7	6	5	4	3	2	1
Bolivina dilatata Reuss	32	18	59	64	23		1		20	1	18	8	5	35	5	6	1		5	1	7	9	27					1												
Bolivina scalprata Schwager	2		1	3																								1												
Bolivina sarmatica Didkowsky	10	8	14	11	8				1		1	2									1	1	2																	
Bolivina sp. 1	1	1	1				1					2																												
Bulimina ex gr. *elongata* d'Orbigny	67	35	60	88	29	7	6	2	22	5	32	12	1	62	4	11			3	3	6	11	40																	
Bulimina sp.1	1																																							
Angulogerina angulosa (Williamson)	12	12	48	39	8				5		5	3		1	1	2		1				3	7																	
Angulogerina sp. 1	4																																							
Cassidulina sp. 1	7	3	1	2					1										1																					
Globocassidulina subglobosa (Brady)	5	7	1	1	9				11	1	22		1	7	3	3			1				2																	
Guttulina communis (d'Orbigny)	2		2	3		2													1																					
Fursenkoina schreibersiana Cžjžek	4	2	7	13	1																																			
Stilostomella pyrula (d'Orbigny)	1		3	1																																				
Entosolenia sp.1	2	1	2								1	1	1	1					1																					
Quinqueloculina angustissima Bogdanowicz	2		1				15																																	
Quinqueloculina sp. dif. (poorly preserved)	1		9	3		5										2		3					1		1				11	1	1		1	1						
Varidentella sartaganica (Krasheninnikov in Maisuradze, 1971)	5		3	8		8	7	7	1								3		1										1	21	17	48								
Varidentella ex gr. *latelacunata* (Venglinsky)	30	18	36	21	1																					1														
Sinuloculina consobrina (d'Orbigny)	1					7															1									56	36	1	3							
Sinuloculina ex gr. *consobrina* (d'Orbigny)	1			8	2	1		1																																
Triloculina ebersini Didkowsky	1					7		1																																
Spiroloculina konkensis Bogdanowicz	1				1																																			
Sigmoilina sp.1	1																																							
Glabratella kartvelicus (Krasheninnikov)	4	4	5	5	4		1											1																						
Discorbis supinus Krasheninnikov	1	1	1	1	1				1																															
Epistominella sp.1	1	1																																						
Haynesina depressula (Walker & Jacob)	4				6	3	5				3			4		3		7		2	7		2					4												
Elphidium advenum Cushman	3		9	13																					6	1		5	6											
Elphidium ex gr. *joukovi* Serova	3																													1										
Elphidium kudakoence Bogdanowicz	4	2	3	9		2	5	8	6	4	4							2																						
Elphidium sp.1	5	1		2								2		2		3	1	2	30	1		1	7																	
Elphidium sp.2	6		15	9															42	6	3	11																		
Bulimina subulata Cushman & Parker		4	17	9																																				
Buliminella sp.1		1																																						
Miliolinella bonatiana Iuczlowska		1					2																																	
Discorbis squamulus (Reuss)		1																																						
Ammonia ex gr. *beccarii* (Linnaeus)		1			2				2	1	2	1	1	2	1			4	2	8	10	24	32						2	4	1						1			
Nonion sp.1		1	4	5	1	5	11	4			1																													

Benthic Foraminifera from the well #20 – continue

Benthic foraminifera species / samples	37	36	35	34	33	32	31	30	29	28a	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11a	11	10	9a	9	8	7	6	5	4	3	2	1
Uvigerina sp. 1			2																																					
Uvigerina sp. 2			1																																					
Praeglobobulimina pupoides (d'Orbigny)			1																																					
Lotostomoides ex gr. *calomorpha* (Reuss)			1	2																																				
Sigmoidella caucasica Krasheninnikov			1	3	1																																			
Globulina gibba (d'Orbigny in Deshayes)			2	1	1																																			
Siphonodosaria sp.1			1																																					
Miliolinella selene (Karrer)			3	5	3						4												1						2											
Lenticulina inornata (d'Orbigny)			1	1	1																																			
Melonis pompilioides (Fitchtel & Moll)			1	2		1																																		
Bolivina plicatella Cushman				2																																				
Buliminella elegantissima (d'Orbigny)				1	1						1	1																												
Polymorphina sp.1				4																																				
Articulina sp. 1 (uniserial part)				2															1																					
Quinqueloculina sp. 1				1																																				
Quinqueloculina konkensis Bogdanowicz				1																																				
Quinqueloculina buchiana d'Orbigny				2		4		1			4																													
Cycloforina ex gr *gracilis* (Karrer)				2			1							2															6	5										
Nonoin commune (d'Orbigny)				3		1																																		
Elphidium ex gr. *macellum* (Fichtel & Moll)				9	2																																			
Quinqueloculina ex gr. *akneriana* d'Orbigny						7			1									4																						
Nodobaculariella ex gr. *konkemsis* Bogdanowicz						2																																		
Affinetrina ucrainica (Serova in Bogdanovich)						10	4						2	1																										
Porosononion granosum (D'Orbigny)						6	4	1											2	2					2		2			4	11	2	46	9	2	2	18	11	23	2
Nonion bogdanowiczi Voloshinova						3	16	23				1	1																											
Elphidium macellum (Fichtel & Moll)						111	47	19	1												1																10	1	2	
Elphidium sp.3						15																																		
Quinqueloculina fasseta Didkowski							1																																	
Quinqueloculina minakovae ukrainica Didkowski							9	1																																
Varidentella reussi sartaganica (Krasheninnikov)							1											1	1	1																				
Sigmoilina? sp.							4	5																																
Elphidium incertum (Williamson)							3													3	1	2																		
Haplophragmoides sp. 1								1					1				2	1							3				1											
Quinqueloculina minakovae minakovae Bogdanowicz								1																																
Ammonia tepida (Cushman)									2			1							2		1									1										
Cornuspira sp.1											1																													
Glabratella sp. 1											2												2																	
Nonion? exponense (Brady, Parker & Jones)											2																													
Haplophragmoides sp. 2																	1								2		2													

Benthic Foraminifera from the well #20 – continue

Benthic foraminifera species / samples	37	36	35	34	33	32	31	30	29	28a	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11a	11	10	9a	9	8	7	6	5	4	3	2	1
Haynesina sp. 1																							6																	
Elphidium ex gr. *articulatum* (d'Orbigny)																							10																	
Elphidium horridum Bogdanowicz																									961	7		118	7	2										
Elohidium ex gr. *horridum* Bogdanowich																									28															
Elphidium aculeatum (d'Orbigny)																									4	7														
Ephidium crispum (Linne)																									1															
Quinqueloculina? sp. (abnormal form)																													1	2										
Varidentella ex gr. *reussi* (Bogdanowicz)																													1											
Elphidium hauerinum (d'Orbigny)																													1											
Varidentella reussi (Bogdanowicz)																														123	63	37	11				3			
Articularia articulinoides (Gerke & Issaeva)																														1	5	7	1							
Articularia articulinoides (Gerke & Issaeva) (uniserial part)																														9	10	28	2							
Sigmoilina? sp.																														6	4	7								
Flintina? sp.																														1										
Cibicides ex gr. *refulgens* (Fitchtel & Moll)																														1										
Elphidium subcarinatum (Egger)																														9	19	1	8				1	2		
Entosolenia sp. diff.																															1	2	13	8		3	13	12	56	
Spiroloculina sp. 1																															3									
Articulina sarmatica (Karrer) (uniserial part)																																7			1					
Elphidium reginum (d'Orbigny)																																							1	

Nannoplankton taxa from the well #20

Taxa/sample	*Braarudosphaera bigelowi*	*Braarudosphaera bigelowii parvula*	*Calcidiscus leptoporus*	*Calcidiscus pataecus*	*Calcidiscus* sp.	*Calcidiscus tropicus*	*Calciosolenia fossilis*	*Coccolithus pelagicus*	*Coronocyclus nitescens*	*Cyclicargolithus floridanus*	*Discoaster* sp.	*Helicosphaera carteri*	*Helicosphaera perch-nielseniae*	*Helicosphaera* sp.	*Helicosphaera wallichii*	*Holodiscolithus macroporus*	*Lithostromation obscurum*	*Lithostromation* sp.	*Micrantholithus* sp.	*Micrantholithus vesper*	*Orthorhabdus rugosus*	*Orthorhabdus serratus*
1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2	1	3	0	0	0	0	0	2	0	0	0	0	0	0	0	4	0	0	0	0	0	0
3	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	39	0	0	0	0	0	0
4	3	1	2	0	0	0	0	2	0	1	0	0	0	0	0	7	0	0	1	0	0	0
5	1	0	0	0	0	0	0	7	0	1	0	0	0	0	0	1	0	0	0	0	0	0
6	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	2	0	0	2	0	0	3	0	0	0	0	0	1	0	0	2	0	0	0	0	0
8	49	26	0	2	0	0	1	4	0	1	0	0	0	0	0	26	0	0	0	0	0	0
9	3	5	0	0	0	0	0	2	0	1	0	0	0	0	0	20	0	0	0	0	0	0
9.5	6	3	0	1	0	0	0	1	0	0	0	0	0	0	0	13	0	0	0	0	0	0
10	10	10	0	0	0	0	0	1	0	1	0	0	0	0	0	36	0	0	0	0	0	0
11	1	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0
11.5	0	0	0	0	0	0	0	5	0	7	0	0	0	0	0	0	0	2	0	0	1	0
12	7	0	0	1	0	0	0	4	0	7	0	0	0	0	1	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
15	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
16	1	0	0	0	1	0	0	3	0	6	0	0	0	0	0	0	0	0	0	0	0	0
17	1	0	0	0	0	0	0	3	0	51	0	1	1	0	0	1	0	0	0	0	0	0
18	3	0	0	0	0	0	0	3	1	4	0	0	0	0	0	2	0	0	0	0	0	0
19	2	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0
20	4	0	0	0	0	0	0	5	0	4	1	0	0	0	0	0	0	0	0	0	0	0
21	5	0	0	0	0	0	0	1	0	3	0	0	0	0	0	1	0	0	0	0	0	0
22	3	1	0	0	0	0	0	4	0	8	0	0	0	0	0	1	0	0	0	0	0	0
23	12	1	0	1	0	0	0	6	0	6	1	0	0	0	1	4	0	0	0	0	0	0
24	11	2	0	0	0	0	0	6	0	13	0	4	0	0	0	0	0	0	0	0	0	0
25	6	2	0	0	0	1	0	4	0	11	0	2	0	0	0	1	0	0	0	0	0	0
26	5	0	0	0	0	0	0	3	0	7	1	0	0	1	0	0	0	0	0	0	0	0
27	15	1	0	3	0	0	0	4	0	3	1	0	0	0	0	0	0	0	0	0	1	0
28	6	0	0	2	0	0	0	6	0	5	0	0	0	0	1	1	0	0	0	0	0	0
28.5	5	0	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0
29	5	1	2	0	0	0	0	5	0	2	0	0	0	0	0	0	0	0	0	0	1	0
30	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0
31	8	0	0	0	0	0	0	2	0	0	0	1	0	0	0	1	0	0	0	0	0	0
32	0	0	0	0	0	0	0	36	0	0	0	2	0	0	0	0	0	0	0	0	0	0
33	0	1	0	0	0	0	0	29	0	1	0	0	0	0	0	0	0	0	0	1	0	0
34	0	1	0	0	1	0	0	46	1	0	0	0	0	0	2	0	0	0	0	0	0	0
35	3	5	0	0	0	0	0	1020	0	5	2	5	0	0	1	3	0	0	0	0	0	0
36	6	3	0	1	0	0	0	228	0	5	0	3	0	0	1	0	0	0	0	0	0	0
37	4	2	1	0	0	0	0	366	0	3	0	5	0	0	0	0	0	0	0	0	0	0

Taxa/sample	*Pontosphaera japonica*	*Pontosphaera multipora*	*Pontosphaera* sp.	*Reticulofenestra gelida*	*Reticulofenestra haqii*	*Reticulofenestra minuta*	*Reticulofenestra pseudoumbilicus*	*Reticulofenestra pseudoumbilicus* >7	*Reticulofenestra* sp.	*Rhabdosphaera poculii*	*Rhabdosphaera sicca*	*Rhabdosphaera* sp.	*Scyphosphaera*	*Sphenolithus moriformis*	*Sphenolithus* sp.	*Syracosphaera pulchra*	*Syracosphaera* sp.	*Triquetrorhabdulus milowii*	*Triquetrorhabdulus* sp.	*Umbilicosphaera jafari*	*Umbilicosphaera rotula*
1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	5	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	5	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0
4	0	1	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
5	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
7	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1
8	1	0	1	1	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
9	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.5	4	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
10	2	1	0	0	1	2	0	0	0	0	0	1	0	2	0	0	0	0	1	1	0
11	0	0	0	0	2	0	36	20	0	0	0	0	0	0	1	0	0	0	0	0	0
11.5	0	0	0	0	6	0	129	0	0	0	0	0	0	3	0	0	1	1	0	0	0
12	0	0	0	0	133	10	56	0	0	0	3	0	0	0	0	3	0	0	0	0	0
13	0	0	0	0	31	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	1	19	2	49	24	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	2	0	22	11	0	0	0	0	1	2	0	0	0	0	0	1	0
16	0	0	0	0	195	2	105	0	0	0	0	0	0	0	0	1	0	0	0	0	0
17	0	0	0	0	348	3	168	0	0	0	3	0	0	1	0	1	0	0	0	0	0
18	0	0	0	1	75	7	100	47	0	0	2	0	0	0	0	1	0	0	1	1	0
19	0	0	0	0	120	2	86	46	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	52	2	28	0	0	0	1	0	0	1	0	1	0	1	0	0	0
21	0	0	0	1	96	5	84	0	0	0	3	0	0	0	1	0	0	0	0	0	0
22	0	0	0	0	82	4	58	0	0	0	2	0	0	2	0	2	0	0	1	0	0
23	0	0	0	0	108	6	104	0	0	0	12	0	0	0	0	2	0	0	0	0	0
24	0	0	0	2	87	7	114	57	0	0	3	0	0	0	0	2	0	0	0	0	0
25	0	0	0	3	171	6	126	63	0	0	10	0	0	0	0	4	0	0	0	0	1
26	0	0	0	0	90	10	87	0	0	0	6	0	0	1	0	9	0	0	0	0	0
27	0	0	0	0	156	3	120	0	0	0	13	0	0	2	1	3	0	0	0	1	0
28	0	0	0	0	84	1	81	0	0	0	4	0	0	0	0	5	0	0	0	0	0
28.5	0	0	0	0	60	1	72	36	0	0	3	0	0	0	1	4	0	0	0	0	0
29	0	0	0	0	117	5	189	0	0	0	7	0	0	0	0	1	0	0	0	0	0
30	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	5	0	6	0	0	0	0	0	0	1	1	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	5	0	1	0	0	0	2	0	0	1	0	2	0	0	0	0	0
35	0	0	0	0	30	8	17	0	0	0	9	0	0	6	0	8	0	0	3	0	0
36	0	0	0	0	14	4	6	0	0	1	0	0	0	1	2	2	0	0	0	0	2
37	0	0	0	0	16	2	4	0	0	5	4	0	0	1	0	1	0	0	0	0	0

Ostracoda taxa from the well #20

	sample 1	sample 5	sample 9	sample 9a	sample 10	sample 11	sample 11a	sample 15	sample 17	sample 22	sample 28	sample 30	sample 31	sample 32	sample 34	sample 35	sample 36
Aurila sp.	1	0	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0
Callistocythere sp. 3	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cytheridea sp. aff. *Cytheridea acuminata* Bosquet, 1852	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0
Cytherura sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Euxinocythere sp. form A	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1
Euxinocythere sp. form B	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0
Euxinocythere sp. 2	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0
Hiltermanicythere sp.	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
Leptocythere sp. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Leptocythere sp. 2	0	0	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0
Leptocythere sp. 3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Loxocauda sp.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Loxoconcha sp. 1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
Loxoconcha sp. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Sclerochilus sp. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Xestoleberis sp. 3	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0

Biostratigrafický rámec konsko-sarmatského rozhrania na základe mikrofosílií z vrtu č. 20 Kerčský polostrov (Krym)

Táto práca sa zaoberá biostratigrafickým určením hranice stupňov konka a sarmat s. l. vo východnej Paratetýde na základe analýzy mikrofosílií z vrtu č. 20 (45° 15' 40,9" N, 35° 53' 49,2" E) na západnej časti Kerčského polostrova (Krym) (obr. 1, 2). Prechod medzi stupňom konka a sarmatským stupňom predstavuje obdobie významných paleoekologických zmien, sprevádzané výraznou prestavbou morských spoločenstiev (Harzhauser & Piller, 2004, 2007; Holcová, 2008; Ter Borgh et al., 2014). Cieľom štúdie bolo spresniť biostratigrafické členenie tejto hranice prostredníctvom integrovanej analýzy bentických dierkavcov, vápnitého nanoplanktónu, lastúrničiek, mäkkýšov a vzácnych planktonických dierkavcov (obr. 3 – 7).

Na základe výsledkov sme identifikovali tri po sebe nasledujúce spoločenstvá bentických dierkavcov, ktoré umožnili spoľahlivo rozlíšiť spodnú konku, vrchnú konku a spodný sarmat (obr. 2, 8). Spodná konka je charakterizovaná asociáciou s prevahou druhov *Spiroloculina konkensis, Quinqueloculina minakovae* a *Elphidium kudakoense* spolu s mäkkýšmi *Limacina konkensis* a *L. andrussovi*. Vrchná konka je typická dominanciou druhu *Elphidium horridum* a výskytom mäkkýšov *Obsoletiformes lithopodolicus ruthenicus* a *Musculus sarmaticus*. Spodný sarmat je definovaný prvým a početným výskytom druhov *Varidentella reussi, Articularia articulinoides, Articulina sarmatica* a *Elphidium reginum* (obr. 8). Analýza asociácie vápnitého nanoplanktónu potvrdila zaradenie sedimentov konky do biozóny NN6 na základe výskytu druhov *Orthorhabdus rugosus, Cyclicargolithus floridanus* a hojného *Reticulofenestra pseudoumbilicus* pri súčasnej absencii druhu *Sphenolithus heteromorphus*. Sedimenty spodného sarmatu sú charakterizované vysokým zastúpením druhov *Braarudosphaera bigelowii, B. bigelowii* ssp. *parvula* a *Holodiscolithus macroporus*. Planktonické dierkavce sa zistili len sporadicky a väčšina nájdených exemplárov predstavuje redeponované formy. Spoločenstvá lastúrničiek a bentických dierkavcov naznačujú sedimentáciu v plytkom prímorskom prostredí s premenlivou salinitou, pričom časť materiálu mohla byť transportovaná z veľmi plytkých pobrežných oblastí.

Výsledky mikropaleontologickej analýzy poukazujú na existenciu prechodného obdobia označovaného ako *Konkian-Sarmatian Conversion Time* (KSCT) (Vernyhorova, 2015, 2018), ktoré predstavuje postupnú reorganizáciu panvy počas neskorej konky a najstaršieho sarmatu. Pre toto obdobie je charakteristické prudké vymiznutie stenohalinných druhov (napr. Popov et al., 2016; Palcu et al., 2017) a súčasné objavenie sa euryhalinných foriem bentických dierkavcov a mäkkýšov (Sokolov, 1899; Liverovskaya, 1935, 1960; Bogdanovich, 1965; Nevesskaya et al., 1986; Krasheninnikov, 1959; Maisuradze, 1971; Bratishko et al., 2015), ktoré pretrvávajú aj v najstaršom sarmate. Naše výsledky potvrdzujú výsledky predchádzajúcich výskumov a identifikované zmeny asociácií dokumentujú postupnú adaptáciu spoločenstiev na meniace sa podmienky prostredia a kolísanie salinity.

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