Final report on the project "Comparative study of Late Jurassic faunas from the Bakony Mountains: their palaeobiology and bearing on the Jurassic/Cretaceous boundary"

Project number: K_123762
Project leader: István Főzy
Project duration: 01/09/2017–31/08/2022
Receiving Institution: Hungarian Natural History Museum

Participants: All researchers originally included in the application (István Szente, Ottilia Szives, Balázs Szinger, Attila Vörös) participated in the research. However, with the expansion of the subject of the research, a several other – Hungarian and foreign – researchers joined the project. All of them appear as authors in the articles summarizing the results of the project and in the finally published monograph.

The originally defined goal of the project

The proposed project targeted on the comparative study of the most representative Upper Jurassic–lowermost Cretaceous sections and fauna of the Bakony Mountains (Transdanubian Range, Hungary) i.e. Lókút Hill, Páskom Hill, Szilas Ravine, Közöskút Ravine and Eperkés Hill. The large fauna contains mainly cephalopods, ammonites and also belemnites. In the fauna of the Páskom Hill, Szilas and Közöskút ravines and Eperkés Hill besides nektonic elements, benthic fossils, such as bivalves, brachiopods, and corals are also frequent. On the basis of cephalopods, a precise biostratigraphic subdivision of the sections was planned, while the study of the benthic fauna was projected in order towards the better understanding of the paleoenvironment.

Besides palaeontological and biostratigraphical studies, stable isotope analysis of the carbonate successions and the fossil shells were also projected within the frame of an international cooperation.

It was believed that as a result of our integrated stratigraphical approach, the studied sections would serve as reference sections for the Jurassic/Cretaceous (J/K) boundary within the Tethyan Realm.

The planned final output of the project was a monograph in English, which sums up all the results on stratigraphy, paleoenvironment, and Late Jurassic basin evolution of the Bakony Mountains, and which contains the detailed palaeontological documentation of the complete fauna.

Project results

Biostratigraphic results

During the project, the following 18 sections were analysed: Mogyorós Hill (Sümeg), Tobánypuszta and Kisnyerges Ravine (Szentgál), Rend-kő, Édesvíz Key Section, Édesvízmajor, Édesvízkút–1, HK–II, HK–12 and HK–12/a (all around Hárskút), Szilas Ravine, and Páskom Hill (Borzavár), Som Hill (Bakonybél), Borzavár Road Quarry and Márvány Quarry (Zirc), Lókút Hill (Lókút), Eperkés Hill Long Trench and Stripe Pit (Olaszfalu). Section-by-section we considered the changes in lithology, the fossil content and stratigraphy, and interpreted the paleoenvironment. As a result of our integrated biostratigraphic approach, based on cephalopods (with ammonites on the first place), nannofossils and microfacies analysis, a detailed account on stratigraphic position of the investigated sections was given. The correlation of the highly condensed sequences with repeated non-deposition vs. relatively complete and thicker sections is given on *Figure 1*.

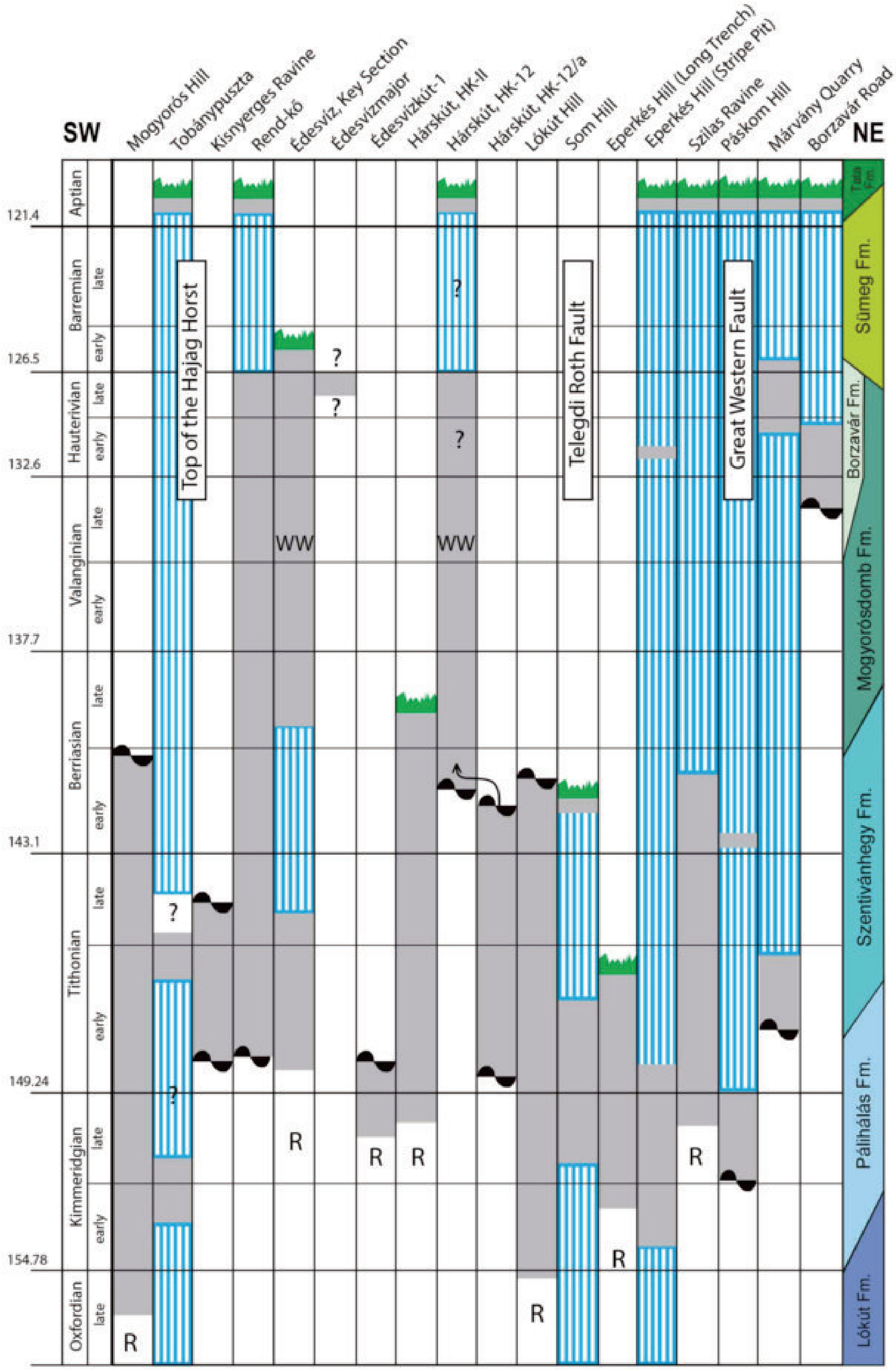


Figure 1 – The biostratigraphic position of the studied sections in the Bakony Mountains

The radiolarite is indicated by "R". WW marks the global oceanic Weissert Event, which is linked to a carbon cycle perturbation. Green signs mark the top of the sections, blue, stripped units suggest larger gaps and question marks suggest uncertainty. Black waves indicate the beginning of covered continuation of the sections (after Főzy et al. 2022)

Magnetostratigraphic results

Polish participants of the project (J. GRABOWSKI and D. LODOWSKI) performed high-resolution magnetostratigraphic analysis in the Lókút and Hárskút sections. As a result, magnetochrons were calibrated against biostratigraphy (*Figure 2*), hiati and condensation levels within the sections were documented (*Figure 3*). Since magnetostratigraphy is treated as an important marker of the hitherto undefined J/K boundary, the results of the Bakony studies (LODOWSKI et al. 2022 and references therein) are of international interest.

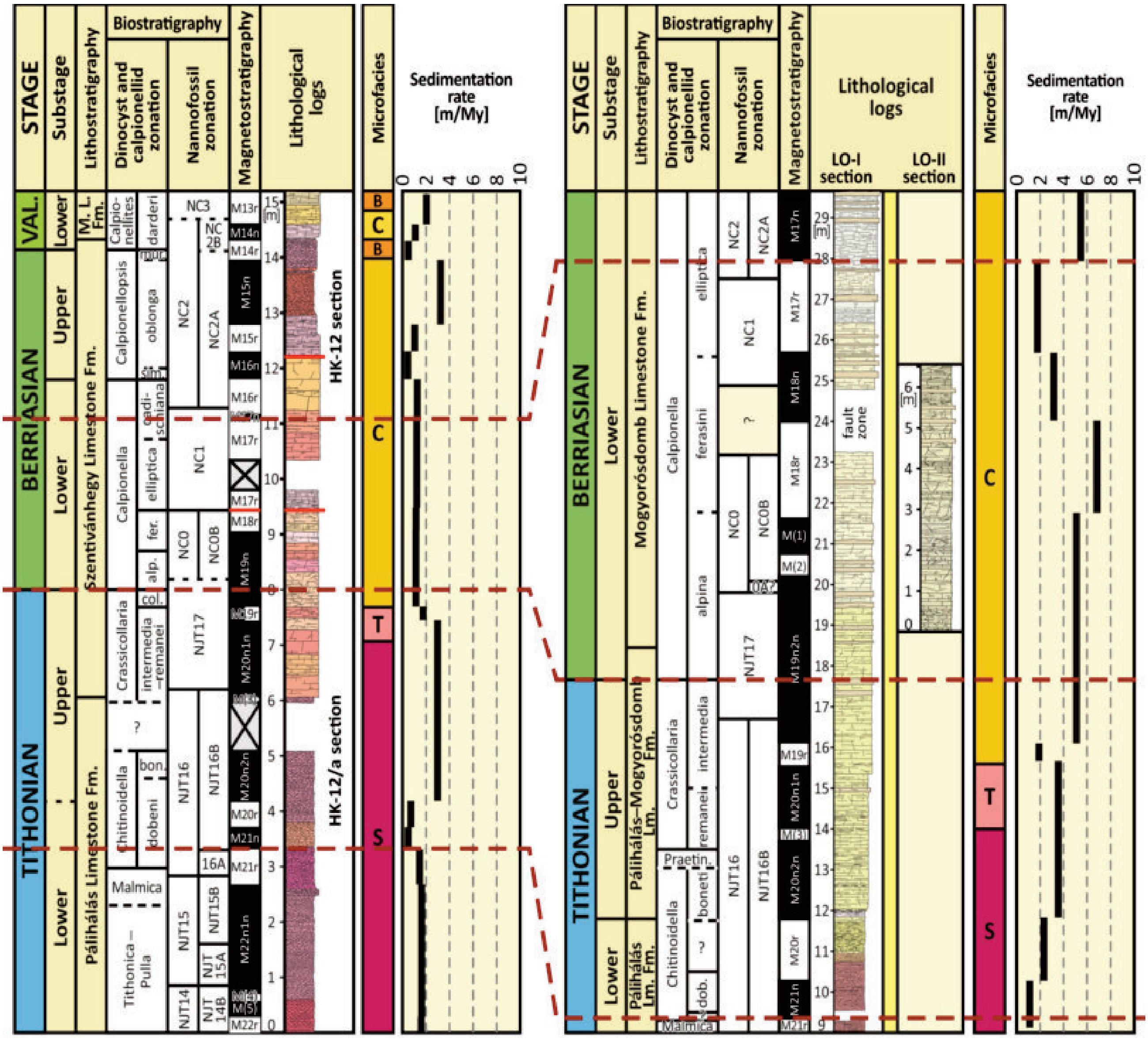


Figure 2 – Lithological logs, stratigraphy (dinocyst, calpionellid, nannofossil, magnetostratigraphy), microfacies succession and sedimentation rates of the Hárskút (left) and Lókút (right) successions

Abbreviations: VAL. –Valanginian, M. L. Fm. – Mogyorósdomb Limestone Fm.; dob. – dobeni; bon. – boneti; col – colomi; alp. – alpina; fer. – ferasini; sim. – simplex; mur. – murgeanui. Explanations for magnetostratigraphy: in Lókút: M(1) – M19n1n; M(2) – M19n1r; M(3) – M20n1r; in Hárskút: M(4) – M22n1r; M(5) – M22n2n. Explanations (microfacies): S – Saccocoma-dominated microfacies; T – transitional microfacies; C – calpionellid-dominated microfacies; B – bioclastic packstones. Dashed red lines indicate correlation levels. (after LODOWSKI et al. 2022)

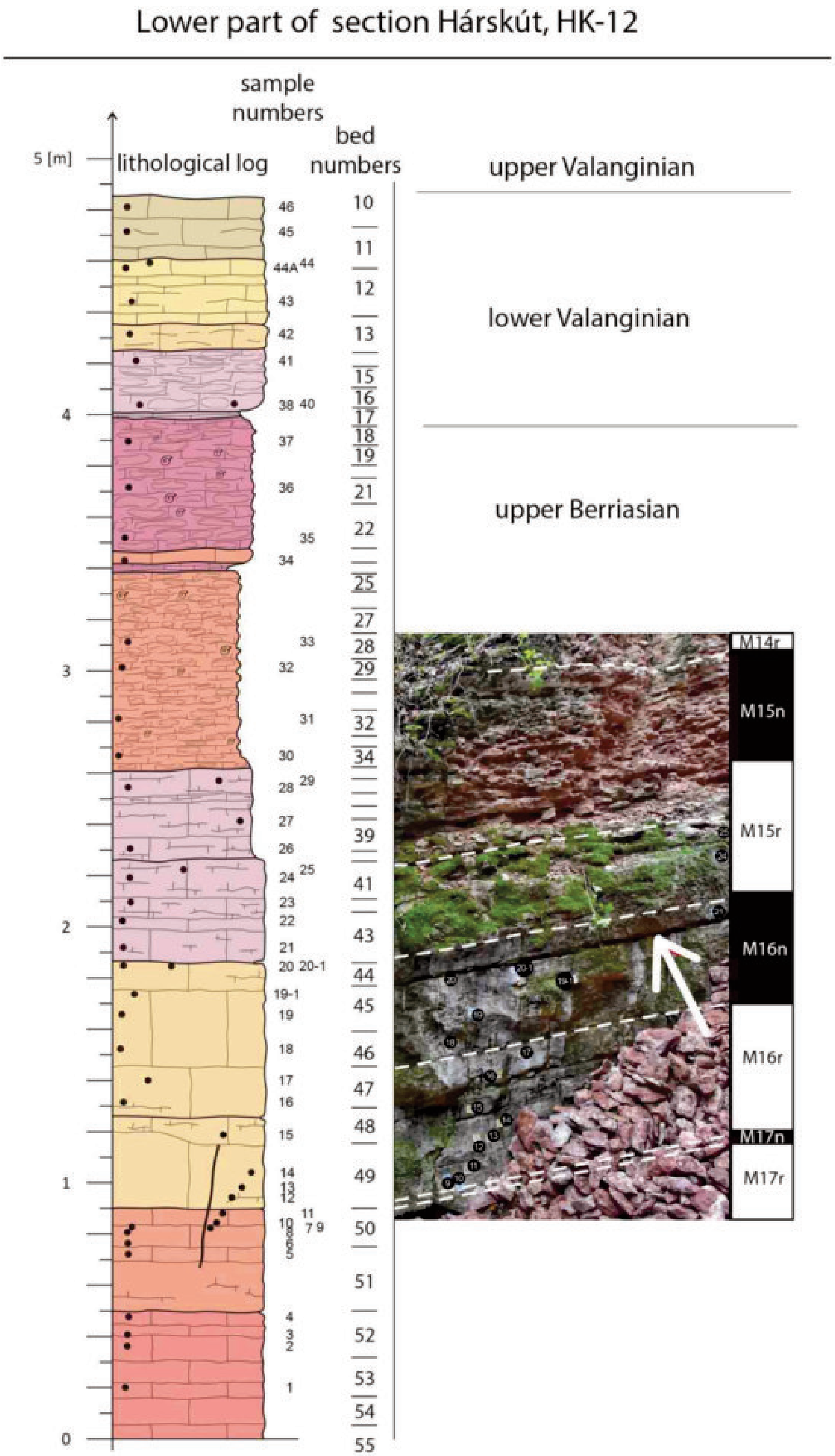


Figure 3 – Bio- and magnetostratigraphy of the lower part of the Hárskút, HK-12 section

Bed numbers refer to ammonite collecting, while sample numbers refer to the oriented magnetostratigraphic samples in the section. A supposed condensation level within the magnetozone M16n indicated by an arrow. The Berriasian/Valanginian boundary is located between samples HK-17 and HK-18 on the basis of LODOWSKI et al. (2022). Dashed white lines indicate correlation levels; black dots on the lithostratigraphic column indicate magnetostratigraphic sample points. (after FŐZY et al. 2022a)

Geochemical results

In accordance with what was planned in the project application, geochemical analysis was carried out in some sections. Bulk carbonate and oxygen stable isotope measurements were performed in the Lókút and Hárskút sections and also in the Szilas Ravine and Hárskút Édesvíz Key Section (Lodowski at al. 2022, Price in Főzy et al. 2022a). In the J/K sections we documented the uniformly decreasing values of ^{13}C curve without any major events (*Figure 4.*).

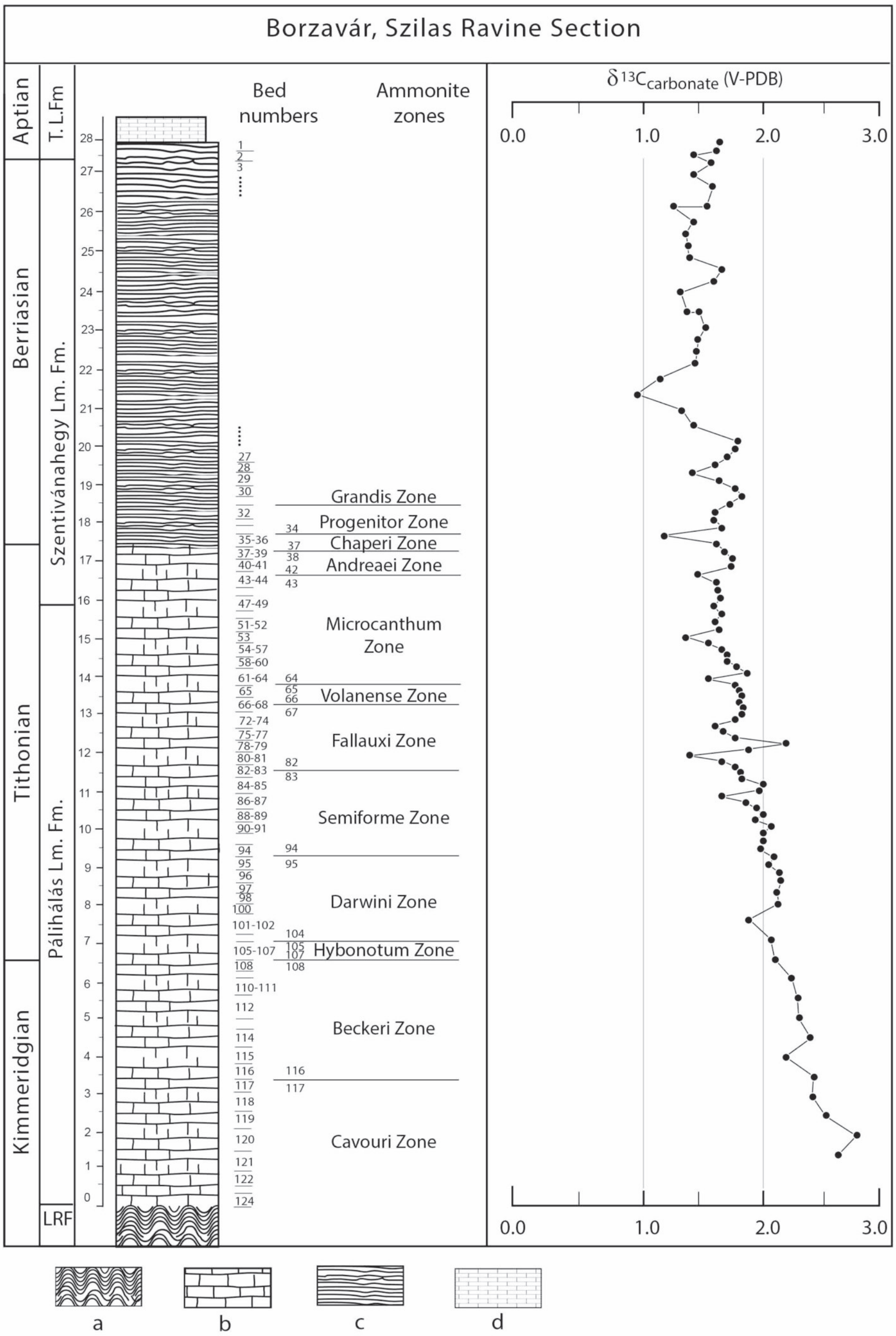


Figure 4 – Ammonite stratigraphy of the Upper Jurassic–Lower Cretaceous section of Szilas Ravine, near Borzavár

Lithologic log, chronostratigraphy, carbon isotope stratigraphy and the recognised ammonite zones of the section. Legend: a: radiolarite, b: red, nodular limestone, c: well-bedded, light rose-coloured limestone, d: crinoidal limestone, T.L.Fm: Tata Limestone Formation. (after Főzy et al. 2022a)

In turn, during the early late Valanginian, the global oceanic Weissert event (WW on *Figure 1*) marks a significant ^{13}C-enrichment in sedimentary carbonates. This event has already been documented from the HK–12 succession, but now we observed it also in the Édesvízkút Key Section (*Figure 5*) where the presence of the Weissert event was predicted on the basis of the change of the brachiopod fauna, and its exact stratigraphic position was inferred from the nannofossil assemblage (VÖRÖS et al. 2020).

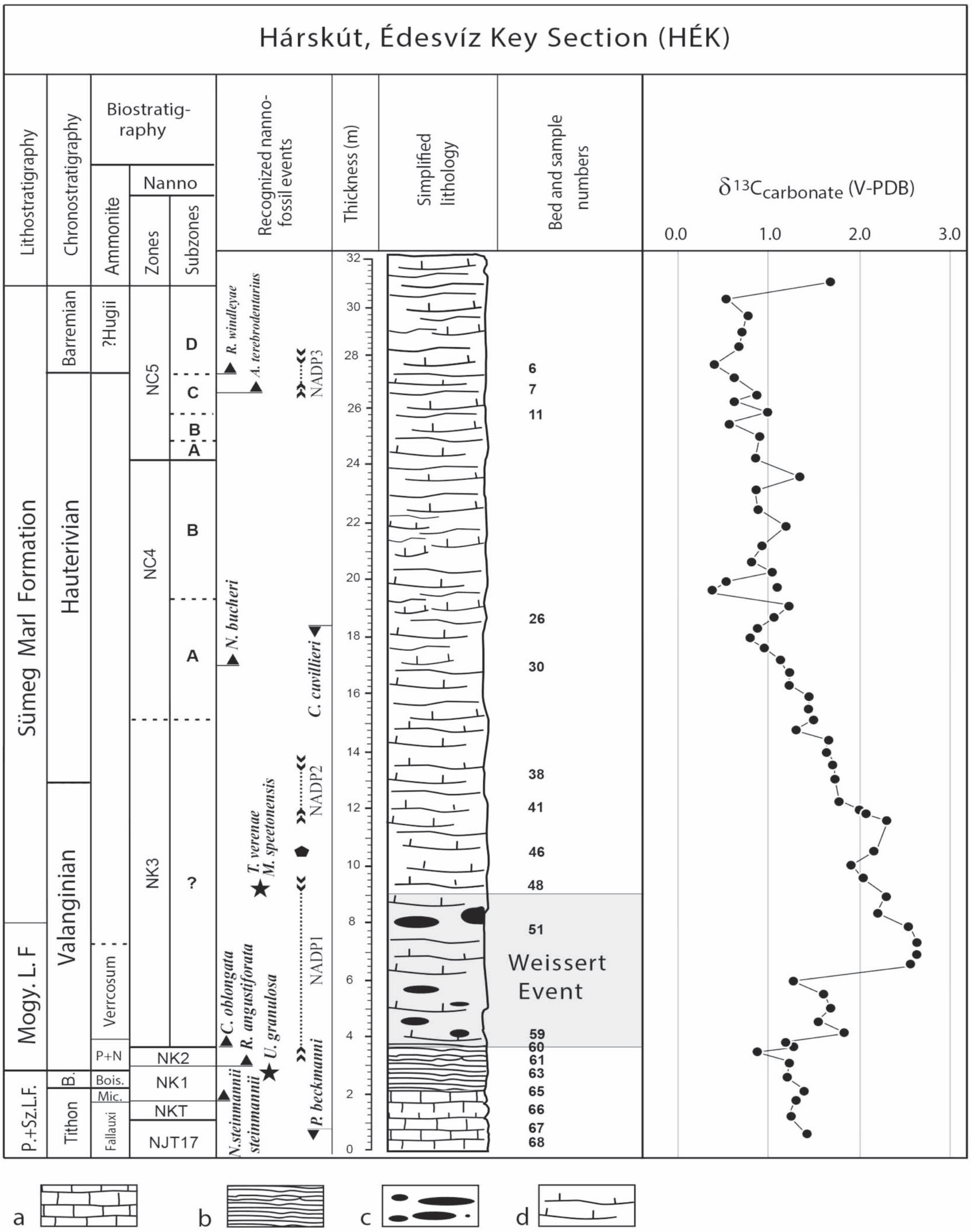


Figure 5 – Integrated stratigraphy of the Édesvíz Key Section

Simplified litho- and chronostratigraphy, lithologic log, ammonite and nannofossil biostratigraphy as well as carbon isotope stratigraphy and recorded nannofossil events of the section. The inferred interval of the Weissert Event is shaded. Legend: a: red or white, mostly nodular limestone, b: well-bedded siliceous and marly limestone, c: chert nodules, d: marl. Abbreviations: P.+ Sz. L. F.: Pálihálás + Szentivánhegy Limestone Formations, Mogy. L. F.: Mogyorósdomb Limestone Formation, B.: Berriasian, NADP 1, 2, 3: Nannofossil abundance and diversity peak intervals. (after FŐZY et al. 2022a)

Geochemistry of elements (Al, authigenic U, P and Ba) were used as proxies for estimating clastic input, paleoredox conditions and paleoproductivity, respectively. Such analysis was made in the Hárskút and Lókút J/K sections (Szives et al. 2022). Aluminum and authigenic uranium concentrations at Hárskút and Lókút are shown of *Figure 6*.

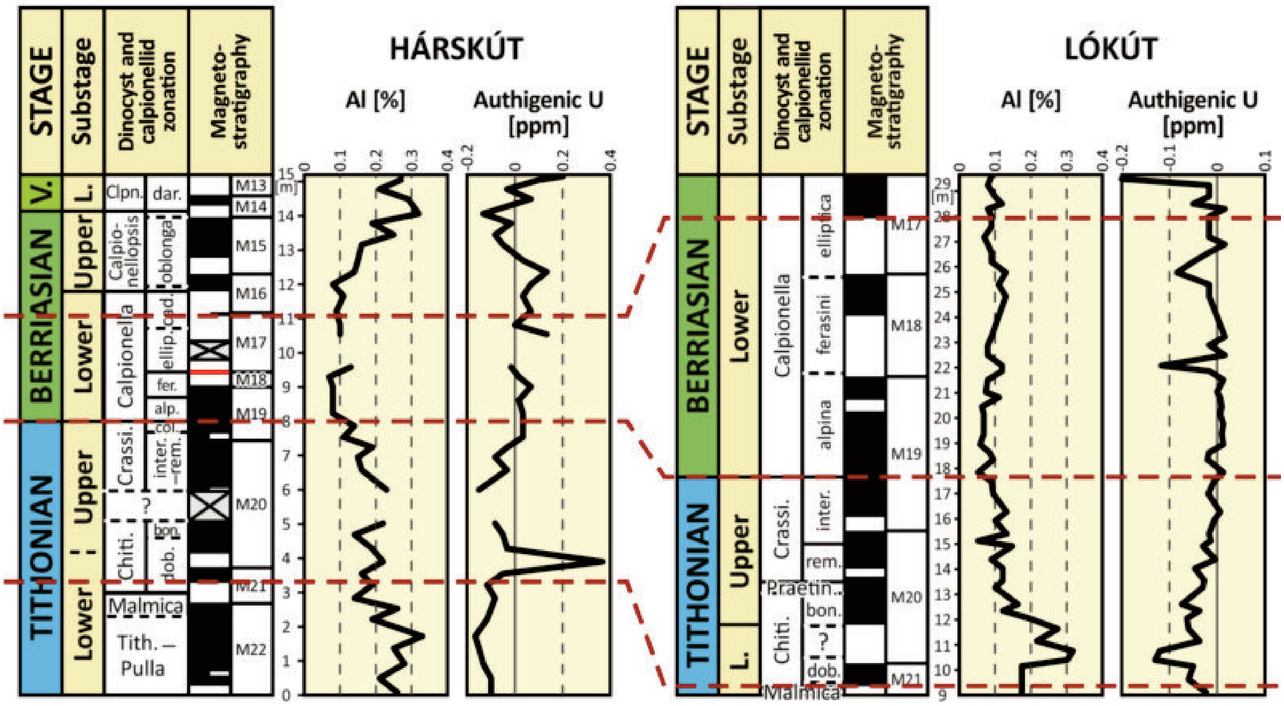


Figure 6 – Aluminum and authigenic uranium concentrations in the Hárskút and Lókút successions

Dashed red lines indicate correlation levels. Abbreviations: K. – Kimmeridgian; V. – Valanginian; L. – lower; U. – upper; Tith. – Tithonica; Chiti. – Chitinoidella; Praetin. – Praetintinnopsella; Crassi. – Crassicollaria; Clpn. – Calpionellites; dob. – dobeni; bon. – boneti; rem. – remanei; inter. – intermedia; col. – colomi; alp. – alpina; fer. – ferasini; ellip. – elliptica; cad. – cadischiana; dar – darderi. (after Szives et al. 2022)

Conclusions on the J/K boundary

From the very beginning of the project, a special attention was dedicated to J/K boundary profiles, i.e. Hárskút 12/a, Lókút and Szilas Ravine sections. Ammonites provided a useful tool for subdivision and correlation of the sections. Nevertheless, it seemed necessary to revise and partially modify the previous zonation which were completed during the project by Szives & Főzy (2022). Belemnites had a slower evolutionary rate than ammonites, but in spite of this, belemnite associations were recognized around the J/K boundary (Janssen 2022 and references therein). Occasionally, cephalopod biostratigraphy was integrated with microfacies analysis and nannofossil investigations. From Sümeg, Ozsvárt et al. (2022) recognized a rich radiolarian assemblage around the J/K boundary where 142 taxa were ranged into 64 genera; however it was documented, that the J/K boundary cannot be drawn on the basis of radiolarians.

Calibration of biostratigraphic results against magnetostratigraphic logs resulted an integrated stratigraphical scheme for the Tithonian/Berriasian boundary shown on *Figure 7*. As the position of J/K boundary is still pending, our results may contribute towards the selection of the last missing system boundary in the global geochronological table.

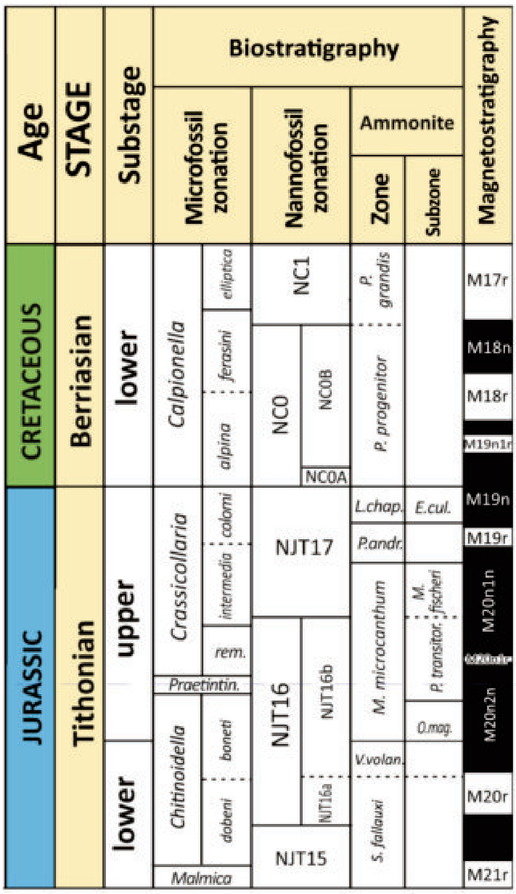


Figure 7 – Integrated stratigraphical scheme of the Tithonian/Berriasian interval (after SZIVES & FŐZY 2022)

Palaeontological results

As part of the project, many thousands of fossils were handled from different Bakony sections. In each examined fossil group, several taxa new to the area were identified. In addition, among the crinoids, belemnites and brachiopods, genera and/or species new for the science have also been described.

Ammonites were the far most abundant macrofaunal elements in the fossils material. The Mediterranean character of the fauna was assured and nearly all of the Kimmeridgian–early Barremian Tethyan ammonite zones were documented. The hundreds of identified species represent 130 genera, the most important specimens of the huge ammonite fauna were illustrated on 65 photographic plates (FŐZY et al. 2022b).

Brachiopods – mainly pygopids –, are most abundant in the Tithonian and in the Berriasian, but no faunal break or turnover of species appears at the J/K boundary (VÖRÖS et al. 2019). In turn, there is a late Valanginian extinction and species turnover which is was interpreted as a signal of the Weissert event (VÖRÖS et al. 2020). The uniquely large and diverse brachiopod fauna served a solid base for a book chapter and also for a separate taxonomic monograph (VÖRÖS 2022,a,b).

Documentation of new fossils findings and also the revision of earlier results on corals, bivalves, gastropods, belemnites, crinoids, fish were given by LÖSER & FŐZY (2022), SZENTE (2022a, b), JANSSEN (2022), SALAMON (2022) and SZABÓ (2022), respectively. Contribution on calpionellids, radiolarians and ostracods were published by Görög (2022), OZSVÁRT et al. (2022) and TÓTH (2022). KOČI & FŐZY (2022) illustrated calcareous tube dwelling polychaete worms, hitherto unknown from the Bakony.

New types of epizoans, grazing traces of molluscs and echinoids were illustrated by FŐZY (2019) and FŐZY & SZENTE (2022). These results give a new insight into complexity of the Late Jurassic–Early Cretaceous sea-life and the identification of trace makers shed light on the unknown aspects of the permanent Mesozoic evolution. Also the bioerosional significance of certain animals was documented.

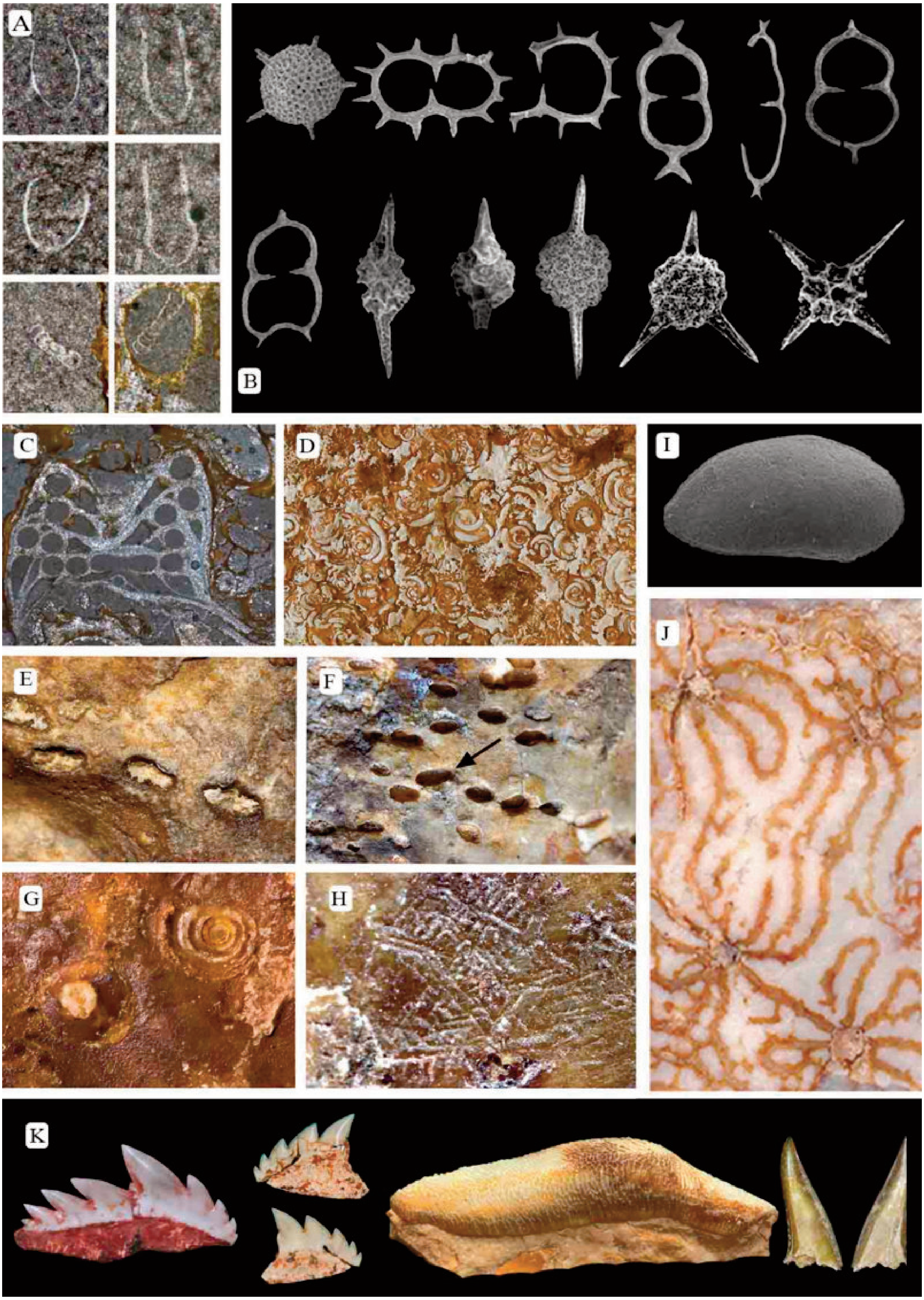
Some typical Upper Jurassic Lower Cretaceous fossils are shown in *Plate 1* and *2*.

→Plate 1 – Iconography of Late Jurassic–Early Cretaceous fossils of the Bakony Mountains (The illustrated fossils are not to scale.)

A: Calpionellids from the Lower Cretaceous of Páskom Hill (after GÖRÖG 2022), B: Upper Jurassic–Lower Cretaceous radiolarians from Sümeg, from the Süt-17 borehole (after OZSVÁRT et al. 2022), C–D: Accumulation of calcareous worm tubes from the Lower Cretaceous of Páskom Hill (figure C is a thin section). (after KOČI & FŐZY 2022), E–H: Traces and epizoans on Kimmeridgian ammonites from Páskom Hill (after FŐZY & SZENTE 2022), I: Kimmeridgian ostracod from Páskom Hill (after TÓTH 2022), J: Kimmeridgian colonial coral from Páskom Hill (after LÖSER & FŐZY 2022), K: Upper Jurassic chondrichthyan fish remains from different localities (after SZABÓ 2022)

→→Plate 2 – Iconography of Late Jurassic–Early Cretaceous fossils of the Bakony Mountains (The illustrated fossils are not to scale.)

A: Kimmeridgian aspidoceratid ammonites from Páskom Hill (after FŐZY et al. 2022b), B: Early Cretaceous belemnites from Hárskút (after JANSSEN 2022), C: Upper Jurassic gastropods from different localities (after SZENTE 2022b), D: Upper Jurassic and Lower Cretaceous bivalves from different localities (after SZENTE 2022a), E: Late Berriasian to early Valanginian brachiopods from Hárskút (after VÖRÖS 2022b), F: Kimmeridgian crinoids from the Eperkés Hill (after SALAMON 2022)


A
B
C
D
E
F
G
H
I
J
K


A
B
C
D
E
F

Creating a basin evolution model

All the studied sequences were deposited under pelagic circumstances but the dissected sea bottom topography resulted ephemeral sedimentation and as a consequence, varied rock successions. Through the correlation of the sections, and by revealing their tectonic connections, we were able to outline a more accurate picture of the paleoenvironment for the studied area and period than ever before (Fodor & Főzy 2022). By using earlier models and putting field observations into a wider context, we illustrated basin evolution through time slices. As an example, a model for the Kimmeridgian–early Berriasian paleogeography is given on *Figure 8*.

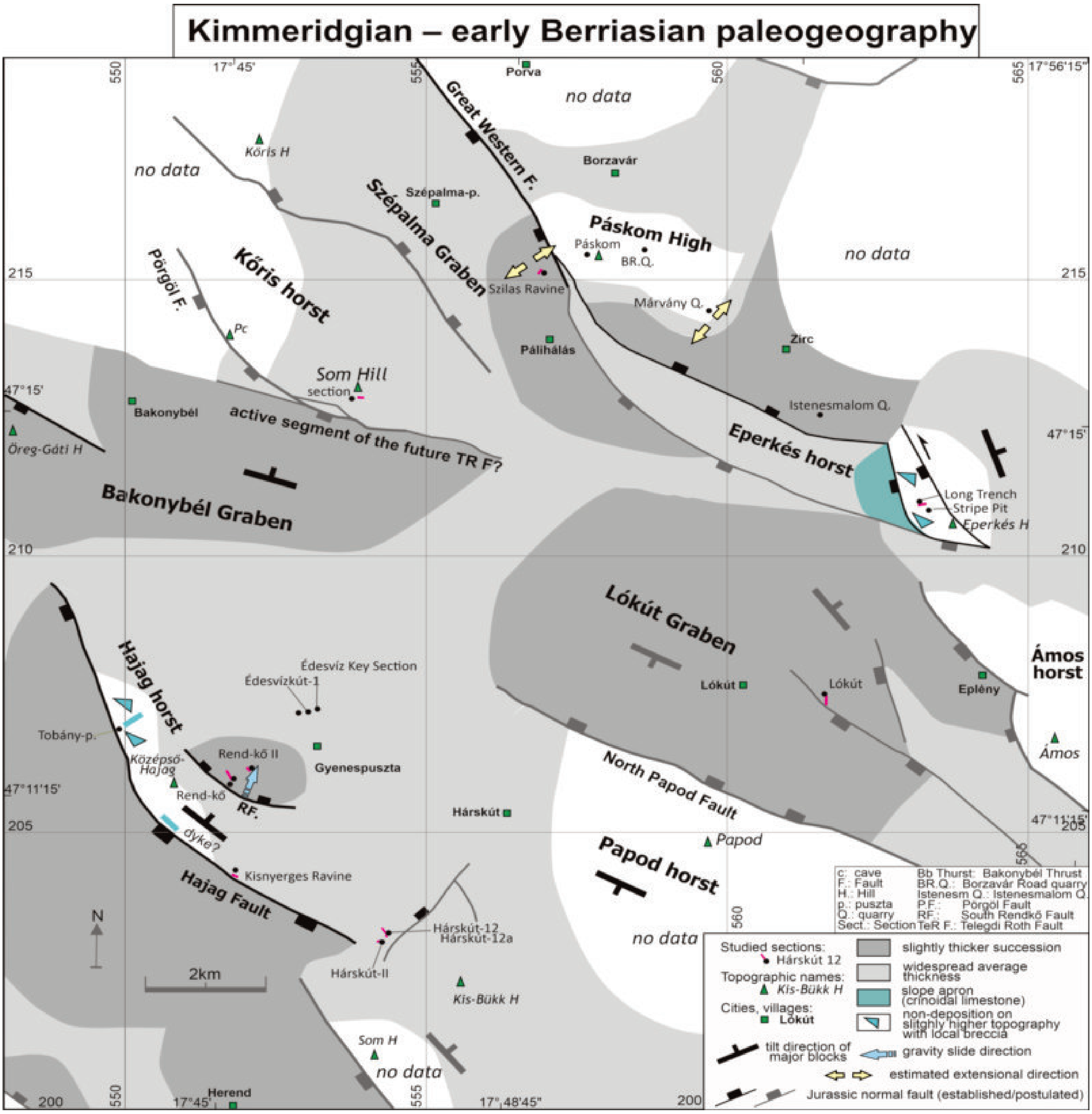


Figure 8 – Late Jurassic to Early Cretaceous (Kimmeridgian–early Berriasian) palaeogeography and structures of the northern Bakony Mountains
Base map is from Fodor 2022a, and references therein. (from Fodor & Főzy 2022)

Paleoenvironmental implications of our results – based on stable isotope and elemental geochemical study –, is given by Lodowski et al. (2022). A consistently decreasing lithogenic influx throughout the Tithonian–lower Berriasian was correlated with a Tithonian trend of climate aridization, while elevated upper Berriasian influxes primarily correspond to a revitalized tectonic activity within the Neotethyan Collision Belt.

Summary of results

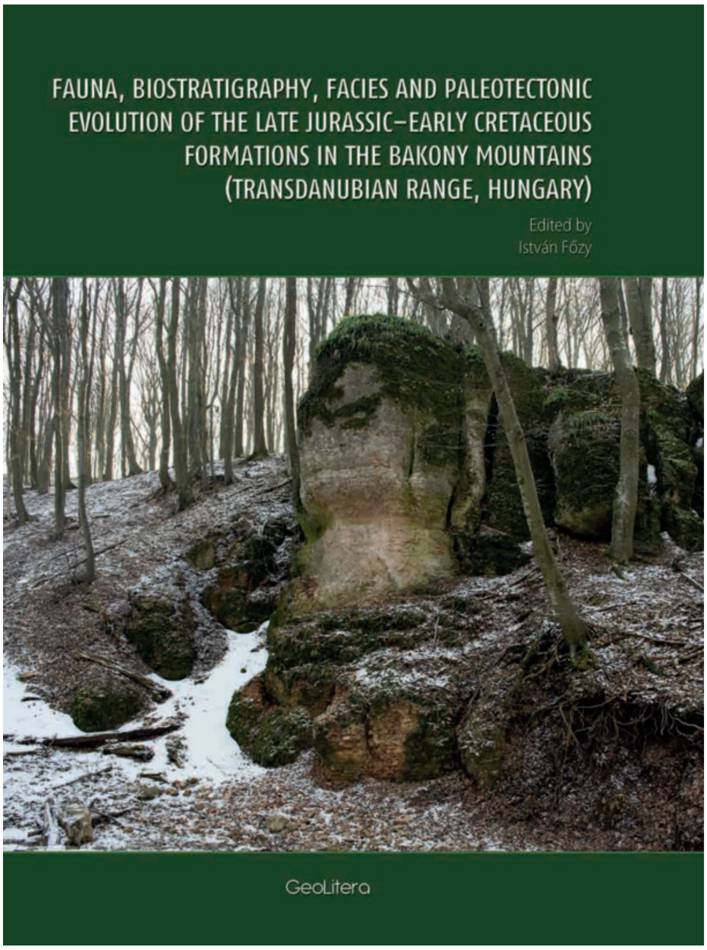


Figure 9 – The cover of the edited monograph

This volume summarizes our current knowledge on the richly fossiliferous Upper Jurassic–Lower Cretaceous formations of the Bakony through the work of 22 authors from seven countries. The first part of the volume is about the geology and stratigraphy of the studied 18 sections, and the second part comprises the palaeontological descriptions of the main fossil groups studied

Our project resulted six published research papers in peer reviewed Q1 and Q2 journals, two books and also an edited monograph in English, which summarizes our current knowledge on the richly fossiliferous Upper Jurassic–Lower Cretaceous formations of the Bakony Mountains.

Studies of the macro- and microfauna and the nannofossil assemblage provided a basis for revised, high-resolution biostratigraphic framework. Biostratigraphic data were integrated with outcrop-scale structural geological observations, magnetostratigraphic results and geochemical analysis, including stable isotope and elemental geochemistry. These achievments were leading towards a comprehensive model of Late Jurassic to Early Cretaceous paleoenvironment and basin evolution of the region.

Since the base of the Cretaceous still lacks the Golden Spike, i.e. the formal designation of the Global Boundary Stratotype Section and Point (GSSP), our results contribute also towards the definition of the last missing system boundary of the global geochronological table.

Acknowledgements

The support of Hungarian National Research Fund, the kind help of the staff of the museum of the former Hungarian Geological Institute (Budapest), and also the professional assistance of the GeoLitera Publishing House (Szeged) are highly appreciated and acknowledged.

Publications produced during the project (excluding abstracts)

BOOKS

FŐZY, I. (2017): A Dunántúli-középhegység oxfordi–barremi (felső-jura–alsó-kréta) rétegsora: cephalopoda-fauna, biosztratigráfia, őskörnyezet és medencefejlődés, Institute of Geosciences, University of Szeged, GeoLitera Publishing House, Szeged, 205 pp.

FŐZY, I. (ed.) (2022): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary), Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 475 pp.

VÖRÖS, A. (2022a): The Late Jurassic and Early Cretaceous (Kimmeridgian to Barremian) brachiopods of the Bakony Mountains (Hungary), Magyarhoni Földtani Társulat, 156 pp.

BOOK CHAPTERS

FODOR, L. (2022a): The place of the Bakony Mountains and the Transdanubian Range in plate tectonic configurations during the Late Jurassic to Early Cretaceous. In: FŐZY, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 17–23

FODOR, L. (2022b): Outcrop-scale structures observed in Upper Jurassic–Early Cretaceous sections of the Bakony Mountains (Transdanubian Range, Hungary). In: FŐZY, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 101–110.

FODOR, L. & FŐZY, I. (2022): Fault geometry, basin topography and evolution of the Middle Jurassic to Early Cretaceous basins of the northern Bakony Mountains and their tectonic connections. In: FŐZY, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 139–152.

FŐZY, I., FODOR, L., GRABOWSKI, J., LODOWSKI, G. D., PRICE, G., SCHERZINGER, A., SZENTE, I., VÖRÖS, A. & SZIVES, O. (2022a): Late Jurassic–Early Cretaceous fossil localities of the Bakony Mountains, Hungary – Rocks, fossils and stratigraphy. In: FŐZY, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 45–99.

FŐZY, I., SCHERZINGER, A. & SZIVES, O. (2022b): Late Jurassic–Early Cretaceous (Kimmeridgian–Barremian) ammonites of the Bakony Mountains (Transdanubian Range, Hungary). In: FŐZY, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences University of Szeged, GeoLitera Publishing House, 243–360.

FŐZY, I. & SZENTE, I. (2022): Evidence for epizoan activity on Upper Jurassic (Kimmeridgian) ammonites from Páskom Hill (Bakony Mountains, Hungary). In: FŐZY, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary), Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 361–370.

GÖRÖG, Á. (2022): Uppermost Berriasian–lowermost Valanginian microfossils trapped in aggregated worm tubes in Páskom Hill (Bakony Mountains, Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 157–164.

Janssen, M. N. M. (2022): Late Jurassic–Early Cretaceous (chiefly Kimmeridgian–Hauterivian) belemnites from the Bakony Mountains (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 371–396.

Kočí, T. & Főzy, I. (2022): Late Jurassic–Early Cretaceous tube-dwelling worms (Sabellidae, Serpulidae) from the Bakony Mountains. In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary), Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 191–199.

Löser, H. & Főzy, I. (2022): Late Jurassic corals from the Bakony Mountains (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 201–214.

Ozsvárt, P., Haas, J.,Makádi, L., Kozur, H. & Dosztály, L. (2022): The Jurassic/Cretaceous boundary in terms of radiolarians from the Sümeg area (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 165–186.

Salamon, M. (2022): Kimmeridgian–Hauterivian crinoidal assemblages from the Bakony Mountains (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 433–453.

Szabó, M. (2022): Late Jurassic–Early Cretaceous (Kimmeridgian–Hauterivian) chondrichthyan and osteichthyan fishes from the Bakony Mountains (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 455–466.

Szente, I. (2022a): Late Jurassic and Early Cretaceous (Kimmeridgian–Barremian) bivalves from the Bakony Mountains (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 215–233.

Szente, I (2022b): Late Jurassic and Early Cretaceous gastropods from the Bakony Mountains, Hungary (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 235–242.

Szinger, B. & Főzy, I. (2022): Upper Jurassic and Lower Cretaceous formations of the Bakony Mountains (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary), Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 25–43.

Szives, O., Lodowski, G. D., Grabowski, J., Vörös, A., Szinger, B., Price, G. & Főzy, I. (2022): The Jurassic/Cretaceous transition in the Bakony Mountains. In: Főzy, I. (ed.) Late Jurassic–Early Cretaceous fauna, biostratigraphy and paleotectonic evolution in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 111–137.

Tóth, E. (2022): Late Jurassic ostracods from the Bakony Mountains, Hungary: unique occurrence from the Tethyan Province. In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 187–190.

Vörös, A. (2022b): Late Jurassic to Early Cretaceous (Kimmeridgian–Barremian) brachiopods of the Bakony Mountains (Transdanubian Range, Hungary). In: Főzy, I. (ed.): Fauna, biostratigraphy, facies and paleotectonic evolution of the Late Jurassic–Early Cretaceous formations in the Bakony Mountains (Transdanubian Range, Hungary). Institute of Geosciences, University of Szeged, GeoLitera Publishing House, 397–431.

Research papers

Főzy, I. (2019): First record of bioeroding barnacles (Cirripedia: Acrothoracica) on ammonite shells – Neues Jahrbuch für Paläontolgie, Abhandlungen, 294/2, 1–13.

Lodowski, D. G., Pszczółkowski, A., Szives, O., Főzy, I., Grabowski, J. (2022): Jurassic–Cretaceous transition in the Transdanubian Range (Hungary): integrated stratigraphy and paleomagnetic study of the Hárskút and Lókút sections – Newsletters on Stratigraphy, 1–37, DOI: 10.1127/nos/2021/0656

Szabó, M. (2019): A Late Jurassic (Kimmeridgian–early Tithonian) fish fauna of the Eperkés-hegy (Olaszfalu, Bakony Mts., Hungary): the oldest record of Notidanodon Cappetta, 1975 and a short revision of Mesozoic Hexanchidae – Palaeobiodiversity and Palaeoenvironments, https://doi.org/10.1007/s12549-019-00382-7

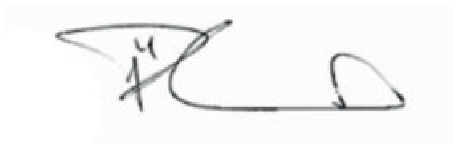
Szabó, M. & Főzy, I. (2020): Asteracanthus (Hybodontiformes: Acrodontidae) remains from the Jurassic of Hungary, with the description of a new species and with remarks on the taxonomy and paleobiolog, – Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, 297/3, 1295–309.

Szives, O. & Főzy, I. (2022). Towards the ammonite zonation of the Jurassic/Cretaceous transition: new data from ammonitico rosso/biancone sections of the Transdanubian Range (Hungary). – Newsletters on Stratigraphy, https://doi.org/10.1127/nos/2022/0679

Vörös, A., Főzy, I., Dulai, A. & Szives, O. (2020): Late Valanginian extinction and turnover of Tethyan brachiopods: A signal of the Weissert Event (Bakony Mountains, Hungary) – Palaeogeography, Palaeoclimatology, Palaeoecology, 555, 1–15.

Vörös, A., Főzy, I. & Szives, O. (2019): Brachiopod distribution through the Jurassic Cretaceous transition in the western Tethyan pelagic realm: Example from the Bakony Mountains, Hungary – Cretaceous Research, 104, 1–9.

Budapest, 25/09/2022.



Főzy István