

Lochkovian conodont succession in the Požáry Quarries: prospects for refinement of global zonation of the Lochkovian Stage

SLAVÍK, L.¹, CARLS, P.², KOPTÍKOVÁ, L.¹ & HLADIL, J.¹

(1) Institute of Geology of the ASCR, v. v. i., Rozvojová 269, 16500 Praha 6, Czech Republic; slavik@gli.cas.cz, koptikova@gli.cas.cz, hladil@gli.cas.cz

(2) Institute of Environmental Geology, Technical University of Braunschweig, Pockelsstrasse 3, D-38023 Braunschweig, Germany

The conodont faunas were studied in past years in several stratigraphic sections including Požár 1-2 and Požár-3 sections in the locality of Požáry Quarries. The Požáry Quarries represent one of the most prominent localities for biostratigraphy in the Prague Synform (Barrandian area) which is also famous for the GSSP of the lower boundary of the Přídolí Series (KŘÍŽ et al. 1986). Fundamental biostratigraphic information in the Devonian provided conodonts, dacryoconarids and partly graptolites. Previous conodont studies in the Ludlow-Zlíchovian interval of the Požáry Quarries (e.g. SLAVÍK 2004; CARLS et al. 2007a) revealed, that conodont faunas are relatively abundant with a great potential for refinement of global conodont time scales. In past years an intensive biostratigraphic research was carried out and provided extensive conodont data-sets from the basal Lochkovian to the basal Zlíchovian (almost 100 conodont samples were taken in past 7 years from the Lochkovian alone).

The major part (0-77.6 m) of the carbonate succession at the Požár-3 section belongs to the Kotýs Limestone of the Lochkov Formation (CHLUPÁČ et al. 1998). The rocks are mostly thin bedded with some intercalations of nodular calcarenites and calcisiltites; cherts are very scarce occurring at few horizons only. Echinoderms, bryozoans, brachiopods, molluscs, trilobites, corals, algae, ostracods, sponge spicules, tentaculites and scolecodonts dominate among bioclasts. In order to have multiple controls and better constraints of time in the location, Lochkovian conodonts were obtained from two parallel sections (Požár 1-2 and Požár-3, both are ca 100 m apart from each other). Detailed comparison of conodont data from the parallel sections showed that Lochkovian in the Požár 3 section starts approximately 5 m above the Silurian-Devonian boundary, that is well exposed in the neighboring section Požár 1-2, where the basal Devonian index *Icriodus hesperius* marks the first Devonian bed (CARLS et al. 2007a). Advanced development and radiation in icriodid faunas can be seen in the first 4 m in the section Požár-3. In general, conodont faunas in the middle and upper part of the Lochkov Formation include a number of index taxa and other important guiding conodonts supporting (still only partly developed) global Lochkovian zonation suggested by VALENZUELA-RÍOS & MURPHY (1997). Their concept covers the formal subdivision of the Lochkovian Stage into the three parts (lower, middle and upper). The middle Lochkovian zonation is based mostly on evolution of conspicuous members of the genera *Lanea* and *Ancyrodelloides*, and the upper Lochkovian zonation which is “basically without *Ancyrodelloides*” is characterized by *Masaraella pandora* beta and evolution of late Lochkovian *Pedavis* clade. The faunas obtained from the Lochkovian of the Požáry Quarries have a great potential for even more detailed subdivision of the Lochkovian Stage, but it still depends on prospective increase of density of data by repeated samplings. The lower part (0 - 22 m) is characterized by several important taxa – *Icriodus* e.g. *woschmidti*, *Zieglerodina* cf. *remscheidensis*, *Pedavis* cf. *breviramus* and the first possible representatives of *Lanea* with incipient terraces (herein named tentatively as “pre-*Lanea*”). The middle part of the Lochkov Formation (22 - 73 m) starts with typically developed *Lanea omoalpha* and *Lanea carlsi*. The latter taxon in its upper range (at 32 m above the base of the section) co-occurs with embryonal bulbs of the oldest dacryoconarids (*Homoctenowakia senex*). At 35 m above the base, *Lanea eoeleanorae* starts, at 47.2 m, *Ancyrodelloides transitans* appears, followed by *Anc. trigonicus*, higher up (at 60 m). In the uppermost part of the Lochkov Formation several morphotypes of *Masaraella pandora* and *Pedavis gilberti* occur. The total thickness of the Lochkov Formation (i.e., the original Lochkovian) at the Požár-3 section is 77.6 m. The overlying Praha Formation starts with a marked lithological change (lightening) and contains already

characteristic Pragian benthic and pelagic faunal elements. A roughly similar succession of conodont faunas on corresponding positions can be seen also in the neighbouring section (Požár 1-2).

The collation and detailed correlation of Lochkovian conodont data from the two parallel sections in the Požár Quarries with biostratigraphic control of additional data from four (incomplete) sections with different facies development (Černá rokle near Kosoř, VČS – Čertovy schody Quarries, Klonk and U topolů) enables a proposal for a formal subdivision of the Lochkovian in the Prague Synform into the three parts: the lower, the middle and the upper, which are further refined and subdivided into (three or four) small-scale units using the binominal system (it is not an ancestor-descendent sequence). The boundaries between units of both orders correspond well to the boundaries between distinct parts of depositional sequences in the Požár sections. We partly follow the initial three-fold subdivision of the Lochkovian proposed by VALENZUELA-RÍOS & MURPHY (1997) that was subsequently modified by MURPHY & VALENZUELA-RÍOS (1999). The proportional discrepancy is, however, seen in the upper parts of the proposed scale. The upper interval, characterized by the entry of *Masaraella pandora* beta, is proportionally very short and forms less than 10% of thickness of the Lochkovian succession.

To conclude, the conodont faunas from the Požár Quarries include a number of indexes and other important guiding conodonts that can be correlated with other regions, especially with Nevada, Spanish Central Pyrenees and Carnic Alps. The data from the Prague synform correspond well to the original global Lochkovian conodont correlation, especially for the middle Lochkovian. They indicate, however, a possibly significant discrepancy in the latest Lochkovian in comparison with the global concept. The conodont time-marks (CARLS et al. 2007b) and the introduced regional conodont scale together with sections from other regions with so desired high density of biostratigraphic data can be a good base for future elaboration of the Lochkovian Composite Standard by means of graphic correlation.

Acknowledgements

The project was supported by the Grant Agency AS CR (KJB300130613), with contributions by the Institute of Geology AS CR, v.v.i., general project (AV0Z30130516) and the Alexander von Humboldt Foundation.

References:

- CARLS, P., SLAVÍK, L. & VALENZUELA-RÍOS, J.I. (2007a): Revisions of conodont biostratigraphy across the Silurian-Devonian boundary. - *Bulletin of Geosciences*, 82: 145-164.
- CARLS, P., SLAVÍK, L. & VALENZUELA-RÍOS, J.I. (2007b): Pridolian to mid-Lochkovian biostratigraphic time marks in Bohemia. - *In: OVER, D.J. & MORROW, J. (Eds.): Subcommission on Devonian Stratigraphy and IGCP 499 Devonian Land Sea Interaction, Eureka, NV, San Diego State University & SUNY-Geneseo, Eureka, NV 2007 Program and Abstracts (Geneseo): 24-25.*
- CHLUPÁČ, I., HAVLÍČEK, V., KRÍŽ, J., KUKAL, Z. & ŠTORCH, P. (1998): Palaeozoic of the Barrandian. - *Czech Geological Survey Publication: 1-183.*
- KRÍŽ, J., JAEGER, H., PARIS, F. & SCHÖNLAUB, H.P. (1986): Přídolí – the fourth subdivision of the Silurian. - *Jahrbuch der Geologischen Bundesanstalt*, 129: 291-360.
- MURPHY, M.A. & VALENZUELA-RÍOS, J.I. (1999): *Lanea* new genus, lineage of Early Devonian conodonts. - *Bolletino della Societa Paleontologica Italiana*, 37: 321-334.
- SLAVÍK, L. (2004): A new conodont zonation of the Pragian in the Stratotype area (Barrandian, central Bohemia). - *Newsletters on Stratigraphy*, 40(1,2): 39-71.
- VALENZUELA-RÍOS, J.I. & MURPHY, M.A. (1997): A new zonation of middle Lochkovian (Lower Devonian) conodonts and evolution of *Flajsella* n. gen. (Conodonts). - *In: KLAPPER, G., MURPHY, M.A. & TALENT, J.A. (Eds.): Paleozoic Sequence Stratigraphy, Biostratigraphy and Biogeography, Studies in Honor of J. Granville ("Jess") Johnson. Geological Society of America, Special Papers, 321: 131-144.*