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Conodonts from the Silurian and Devonian of the Požáry Quarries

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Locality *- The Požary Quarries is one of the most famous localities in the Prague Synform for biostratigraphic studies. The locality lies E of Praha-Řeporyje, that belongs to WSW margin of Prague capital territory (GPS positioning of the Požár 1 Quarry: N 50°01'72' E 14°19'44") (Fig. 1). The locality consists of several quarries, outcrops and connecting tunnels (Fig. 2). The section above the entrance tunnel is the GSSP locality of the Přidoli Series (described in detail by Kříž et al. 1986) and is known as the Požary section. In literature the quarries are known as Požár 1, Požár 2. Few tens of meters E of Požár 1 and Požár 2 quarries lies an active unnamed quarry that arose by enlargement of former quarries (e.g., V rokli, Vokounka) and in literature is informally named as Požár 3 (Slavík, 2004a; Koptíková et al., 2010a, b, Slavík et al., 2012).*
Lithostratigraphic units *- Kopanina Fm., Požáry Fm., Lochkov Fm., Praha Fm. and Zlíchov Fm.*
Age *- Gorstian (Ludlow) to Zlichovian (Emsian). The conodont zones included:* ploeckensis, siluricus, Delotaxis faunal interval, plodowskii, latialatus, parasnajdri, crispa, zellmeri *(see Figure 3), several informal zonal units of the Přídolí, 14 zones of the Lochkovian, Pragian and Emsian (see Figure 4) in the sense of Slavík (2004a, b), Carls et al. (2007), Slavík et al. (2007), Slavík et al. (2010), Slavík et al. (2012) and Slavík & Carls (2012).*
What to see *- An extensive section across the complete succession of the Upper Silurian to the Lower Devonian with many sedimentological and structural fenomena and contrasting facies, some parts of the section are richly fossiliferous. The GSSP of the Přídolí Series, Silurian-Devonian boundary in the shallow-water carbonates with scyphocrinites horizon.*

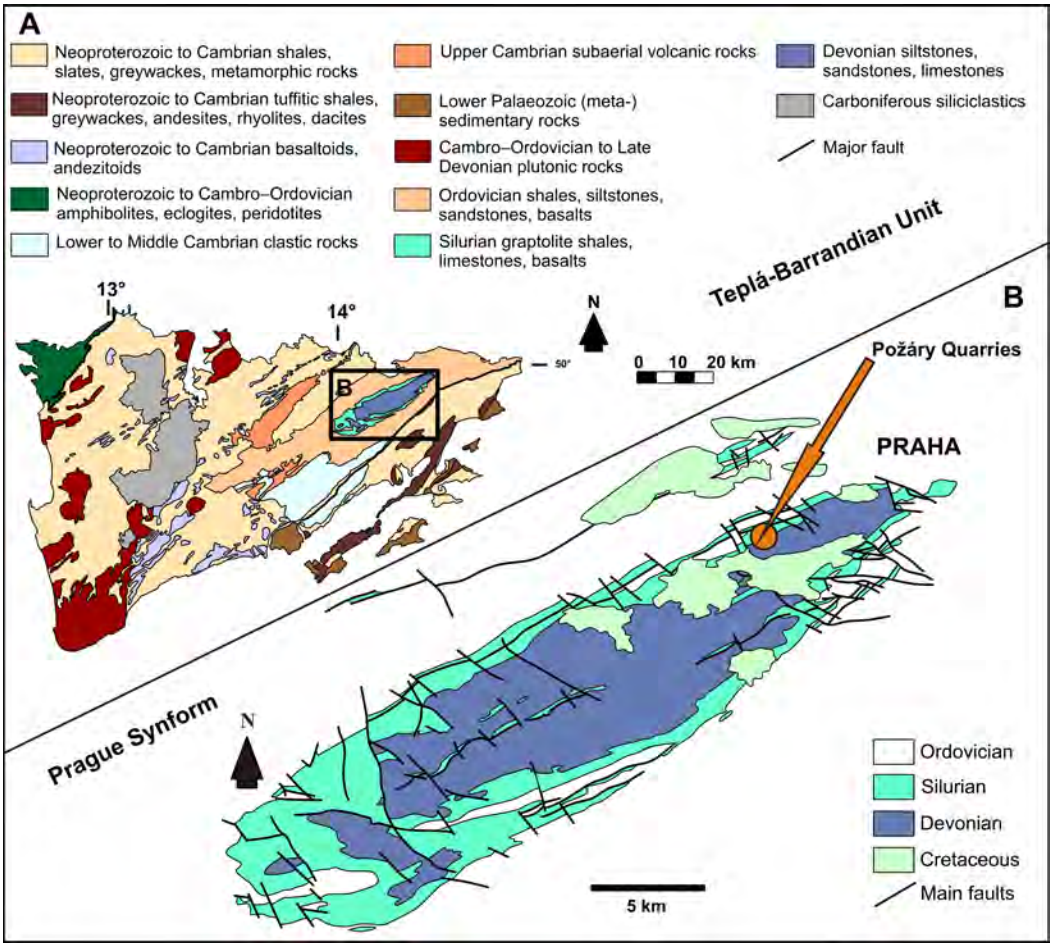

Figure 1. A location of the Pozáry Quarries in the Prague Synform (i.e a part of the Teplá-Barrandian Unit).

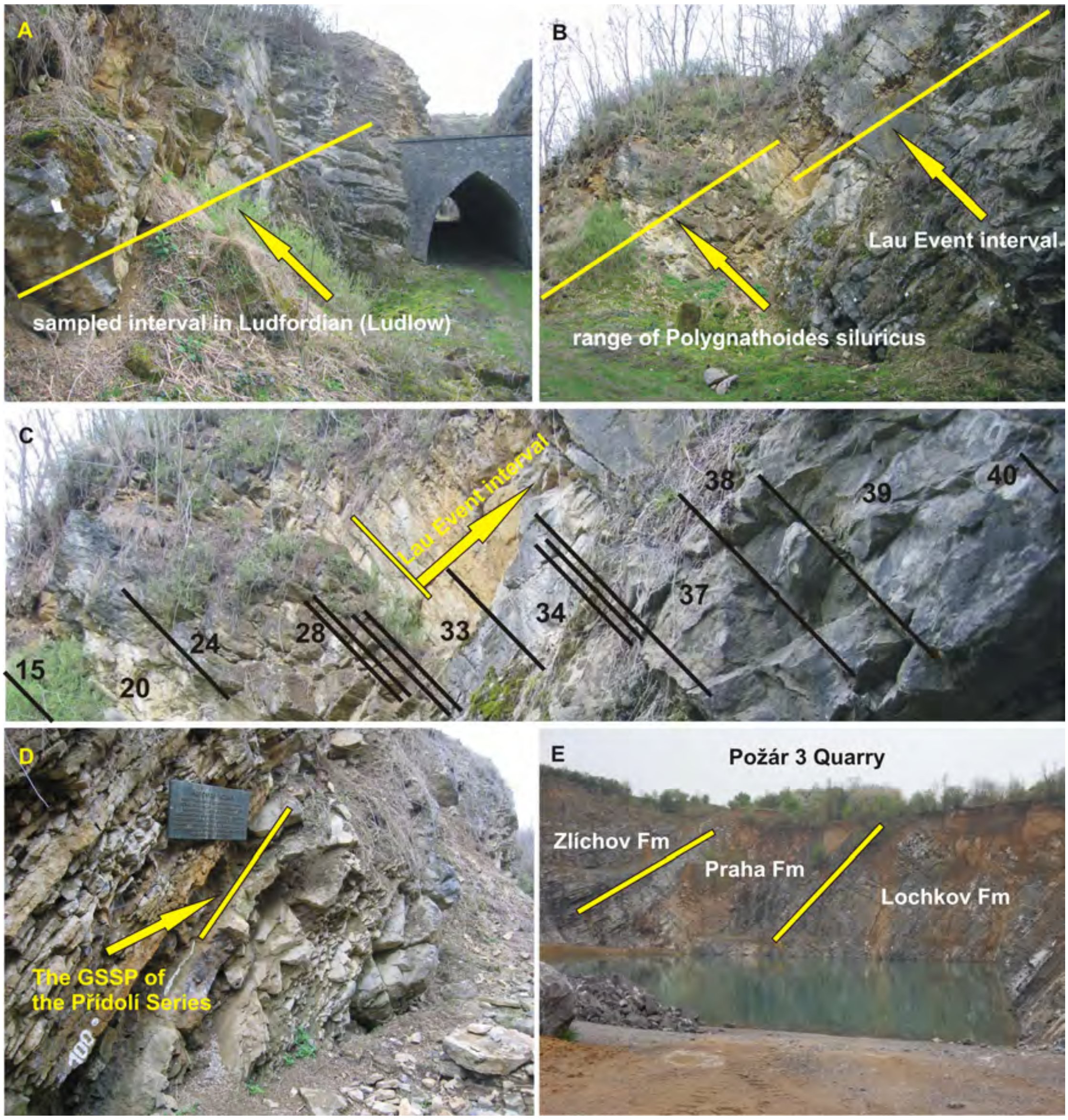

Figure 2. Different sections in the Požáry Quarries: **A-C.** Ludfordian section with detail of the Lau Event interval. **D.** The GSSP of the Přídolí Series in the Požáry section. **E.** Almost complete Lower Devonian section in the Požáry 3 Quarry.

How to get there

The Požáry Quarries can be easily reached from the K Holému vrchu and Na Požáru streets in Daleje Valley in the SE margin of Praha-Řeporyje.

Historical outline

Previous geological and paleontological studies of various stratigraphic intervals (Ludlow to Emsian) of the Požáry Quarries were undertaken by Bouček (1937), Chlupáč (1953, 1957), Chlupáč et al. (1972), Barnett (1972), Kříž et al. (1986), Vavrdová (1989), Manda (2003, 2008), Slavík (2004a, b), Manda & Kříž (2006), Slavík et al. (2007), Carls et al. (2007), Lehnert et al. (2007), Koptíková et al. (2010a, b), Vacek (2007), Vacek et al. (2010), Slavík (2012) among others. The first detailed (bed-by-bed) study of the Ludlow-Přídolí interval was made by Kříž (1965, unpublished data). His study including detailed descriptions and numbering of beds was the basis for the GSSP definition for the Přídolí (Kříž et al. 1981, 1986) and the lithological framework of the Ludlow and Přídolí intervals in the Požáry section by Kříž is used in this paper (Fig. 3).

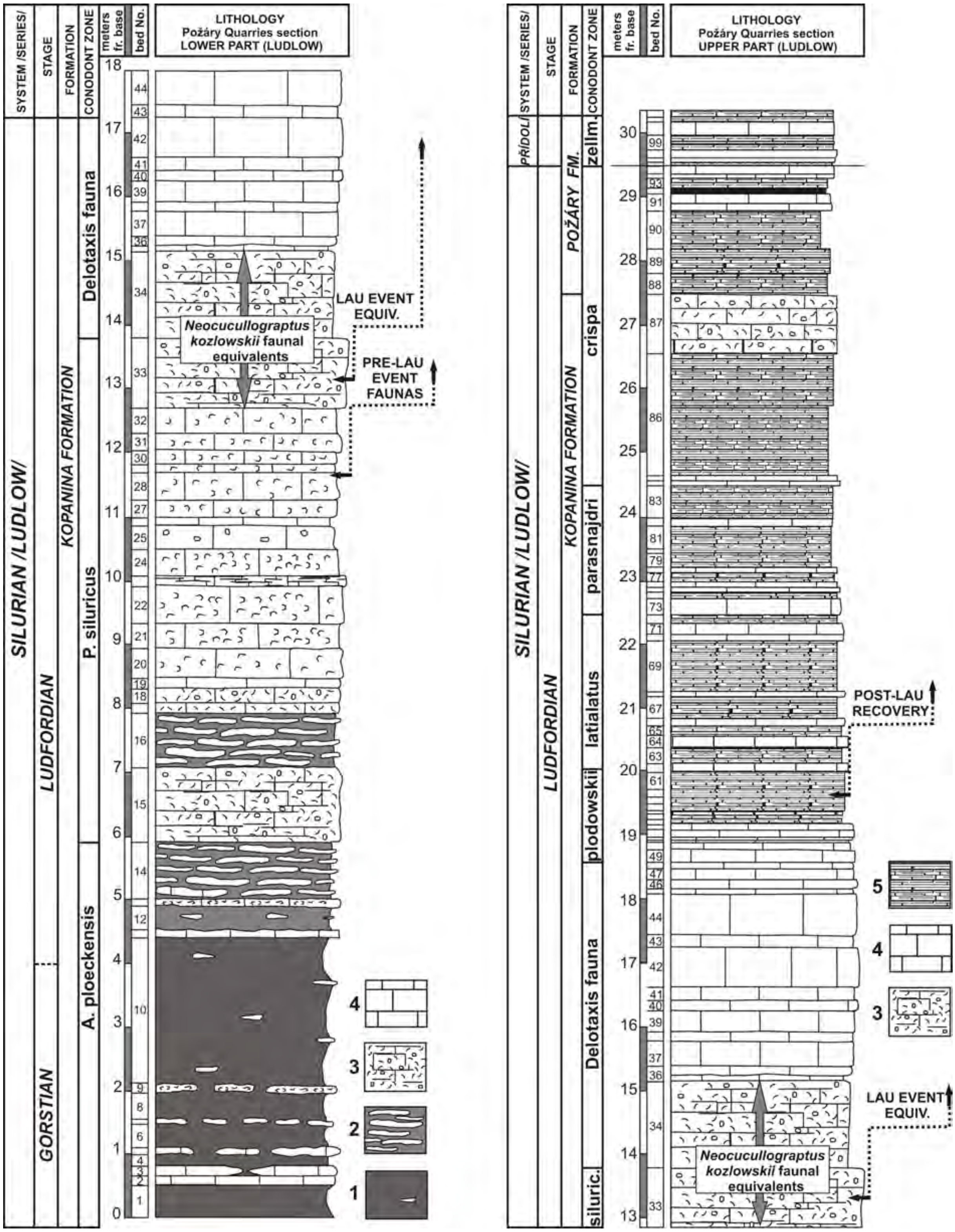

Figure 3. Conodont zonation of the uppermost Gorstian, Ludfordian (Ludlow) to the basal Přídolí. Modified after Slavík et al. (2010) and Slavík & Carls (2012). Lithology: 1. tuffitic shales and siltstones with lenses of lime-mudstones. 2. siltstones and calcerous shales with lenses of lime-mudstones – biodetritic limestones. 3. bioclastic grainstones with cephalopods, bivalves or brachiopopds. 4. lime-mudstones and biodetritic packstones. 5. thin-bedded packstones and subordinate siltstones and calcareous shales alternating with layers or lenses of grey lime-mudstones and packstones.

Conodonts from different stratigraphical intervals of the Požáry Quarries were studied by Barnett (1972), Mehrtens & Barnett (1976), Schönlaub (in Chlupáč et al. 1980 and in Kříž et al. 1986), Weddige (in Chlupáč et al., 1986), Slavík (2004a, 2004b), Slavík et al. (2007), Carls et al. (2005, 2007), Slavík et al. (2010), Slavík & Carls (2012) and Slavík et al. (2012).
The most important contribution to the conodont knowledge of the Ludlow and Ludlow-Přídolí boundary interval at the Požáry section was done by Schönlaub who studied conodonts also from the corresponding levels in several other sections (e.g., Marble Quarry, Mušlovka Quarry and Hvížďalka). According to Schönlaub (in Kříž et al., 1986, p. 336), the conodont zonation in the Silurian part of the Požáry section starts with the *ploeckensis* Zone and is followed by a succession including *siluricus, snajdri, latialatus, crispa* zones in the Ludlow, and by a rather problematic “*eosteinhornensis*” Zone in the Přídolí. Conodont studies on the Ludfordian of Bohemia have been summarized by Slavík et al. (2010), Slavík & Carls (2012) and Slavík et al. (2014). An extensive revision of the conodont stratigraphy of the Přídolí-Lochkovian conodont biostratigraphy based on data also from the Požáry section provided Carls et al. (2007). The progress on refined zonation of the Přídolí Series was then presented by Slavík et al. (2011) and the new Lochkovian and Pragian zonations largely based on the Požáry Quarries were published in Slavík (2004a, b), Slavík (2011) and Slavík et al. (2012).

Sedimentology, faunas and paleoenvironmental indicators

Ludlow

The Ludlow interval in the Požary section (Fig. 3) starts in tuffitic shales and siltstones with lenses of calcareous mudstones. The sampled interval starts from bed No. 15 consisting of bioclastic packstones with common trilobites, cephalopods, bivalves and brachiopods; this is followed by succession of mostly cephalopod wackstones and packstones (for more detailed description see e.g., Kříž, 1992; Lehnert et al., 2007). A shallowing upward trend can be observed above the deeper-water tuffitic shales (beds Nos. 1 to 14) and composed of bioclastic packstones with numerous brachiopods and cephalopods (beds Nos. 15 to 18). Graded grainstones interpreted as tempestites (Lehnert et al., 2007) are present from bed No. 18. Beds No. 33 and 34 are formed by massive grainstones and contain fauna coeval to the *N. kozlowskii* graptolite Zone and are followed by mostly crinoidal grainstones with the *Ananaspis fecunda* trilobite horizon. At the level of the bed No. 33 and above (up to bed No. 41) paleokarst indications were observed (Lehnert et al., 2007); accordingly, extreme shallowing or even stratigraphic gaps of various scale are expected in this interval. The Požary section and the nearby equivalent section at Mušlovka Quarry cover a part of the Řeporyje Volcanic Elevation, which is the WNW part of the Ludfordian isolated carbonate platform in the eastern part of the Prague Synform, as interpreted Manda & Kříž (2006). Thick-bedded biodetritic limestones (beds Nos. 42, 44), that represent a major part of the interval of the conodont Lau Event (of Jeppsson, 1998) in the Požáry section, are overlain by thinnner packstone beds with increasing contents of micrite. From the level of 19 m onward, the section consists of grey thin bedded packstones, subordinate siltstones and calcareous shales alternating with layers or lenses of grey lime-mudstones and packstones. Some limestone layers contain abundant trilobites (e.g., beds Nos. 60, 73, 75). Graptolites *Pristiograptus dubius* s.l. and “*Monograptus*” aff. *kallimorphus* are reported from calcareous shales in beds Nos. 86 and 88, *Pristiograptus fragmentalis*? was obtained only from the base of bed No. 93 (Kříž et al., 1986). According to Kříž (1992), the massive bed No. 87 (so-called “cephalopod bank”) is the top bed of the Kopanina Formation. It contains very rich fauna with cephalopods, bivalves, ostracods and chitinozoans. The Požáry Formation begins just above this bed in the final Ludlow with mainly unsorted grainstones, packstones and carbonate mudstones (Kříž et al., 1986). Sorting of bioclasts within the uppermost Ludfordian beds may indicate storm deposits. In the uppermost part of the Ludlow succession of the Kopanina Formation, limestones with dismicrites might indicate a shallowing of the environment up to peritidal conditions. As seen from the lithology (Fig. 3), the sampled part of the section reflects an intense fluctuation in depth that can be seen also in other Ludfordian sections in the Synform (see Manda & Kříž, 2006; text-fig. 2).

Přídolí

The base of the Přídolí Series is defined by the first occurrence of graptolite *Pseudomonoclimacis parultimus* within bed No. 96. The greater part of the Přídolí succession up to the base of bed No. 120 is formed of laminites which consist of a regular alternation of micrite-rich biomicrites and fine-grained bioclastic limestones. Several beds of coarse, unsorted bioclastic limestones are present (Nos 100, 106). According to Kukal (in Kříž et al., 1986) this part of the sequence represents rather quiet sedimentation influenced by climatic cycles and interrupted just by several major (probably storm) events. For most of the time, short-term climatic oscillations influenced the alternation of laminae. Long-term oscillations caused the alternation of limestone beds with clayey micrite interbeds. Beds No. 112 and 117 contain graptolites "*Monograptus*" *bouceki* and bed No. 110 yielded "*Monograptus" transgrediens*. Overlying beds comprise several units (bed Nos 120 - 126) of grey biomicritic to bioclastic limestones with calcareous shale intercalations and common trilobite *Apocalymene chica*. Higher beds are thin-bedded grey bioclastic limestones, again with shaly intercalations. Overlying thick limestone bed contains the cephalopod *Orthocycloceras fluminese* (bed 136). The massive limestone is overlain by thin-bedded brown-grey micritic to bioclastic limestones, at some levels with abundant disarticulated stem plates and loboliths of *Scyphocrinites elegans*. Several beds (Nos. 141, 143-146) contain almost monospecific communities of the brachiopod *Dubaria latisinuata* and rare cephalopod *Corbuloceras corbulatum*. From bed No. 150 the light grey biomicritic to bioclastic limestones with irregular bedding planes form massive banks which yielded fossils of the *Scyphocrinites-Dayia bohemica* Community, which was confined to shallow water whitin a Benthic Assemblage 2-3 life zone (Havlíček & Štorch, 1990). The community includes *Felinotoechia felina, Lanceomyonia tarda, Hebetoechia hebe* and *Hebetoechia compta*. At the boundary between beds No. 155 and 156 occurs the trilobite *Tetinia minuta*, which is characteristic of the upper Přídolí in the Barrandian area and elsewhere. At 153 cm below the top of bed No. 158 is the last recorded occurrence of *Tetinia minuta*. The uppermost part of bed No. 158 contains the brachiopods listed above plus disarticulated stem plates and loboliths of *Scyphocrinites elegans*. Most probably, somewhere between the level with *Tetinia minuta* and the upper bedding plane of bed No. 158 is the Silurian-devonian boundary. The succession continues by light grey massive biomicritic to bioclastic crinoidal limestone with disarticulated stems of *Scyphocrinites* and brachiopod *Hebetoechia hebe*. Index trilobite of the lowermost Lochkovian – *Warburgella rugosa* occurs in bed No. 162.

Lochkovian

Koptíková et al. (2010a) provided a detailed lithological analysis with basic biostratigraphic data on the Lower Devonian of the Požár 3 section. They characterized the microfacies of the carbonates and subdivided them into characteristic segments (G1–G7) based on gamma-ray spectrometry (GRS) and magnetic susceptibility (MS). The Lochkov Formation has two lithotypes: the Radotín Limestone (0–23 m) and the Kotýs Limestone (23–77.6 m). The Radotín Limestone (redefined by Chlupáč, 1953) consists of cyclic or quasicyclic alternations of dark to medium grey sets of calciturbidites (calcisiltites to fine-grained skeletal grainstone, with normal grading, sharp bed surfaces in the middle part with scarce cherts) with weak shaly bands. Basal part differs from the rest of the lithotype in the presence of reddish and pinkish facies (mostly grainstones to rudstones dominated by crinoids). In the Kotýs Limestone lithotype (redefined by Chlupáč, 1953; 1981) calciturbidite material also prevails but consists mostly of fine-grained skeletal grainstones with lighter colours than in the underlying Radotín Limestone (Fig. 4). The base of the Lochkovian is defined by the FAD of *Icriodus hesperius* in bed No. 159 (Carls et al., 2007). The Lochkovian beds of Požáry Quarries and the two parallel sections enabled development of a very fine conodont zonation of the Lochkovian (Slavík et al., 2012).

Pragian and Emsian

The overlying Praha Formation (77.65–118.1 m) is Pragian and mostly Emsian in age (Slavík et al., 2007; Carls et al., 2008) according to the current GSSP of the Emsian base in the Kitab State Geological Reserve in Zinzilban range, Uzbekistan (Yolkin et al., 1997) and does not correspond to the original concept of duration and definition of the Pragian Stage in the stratotype area (Barrandian).

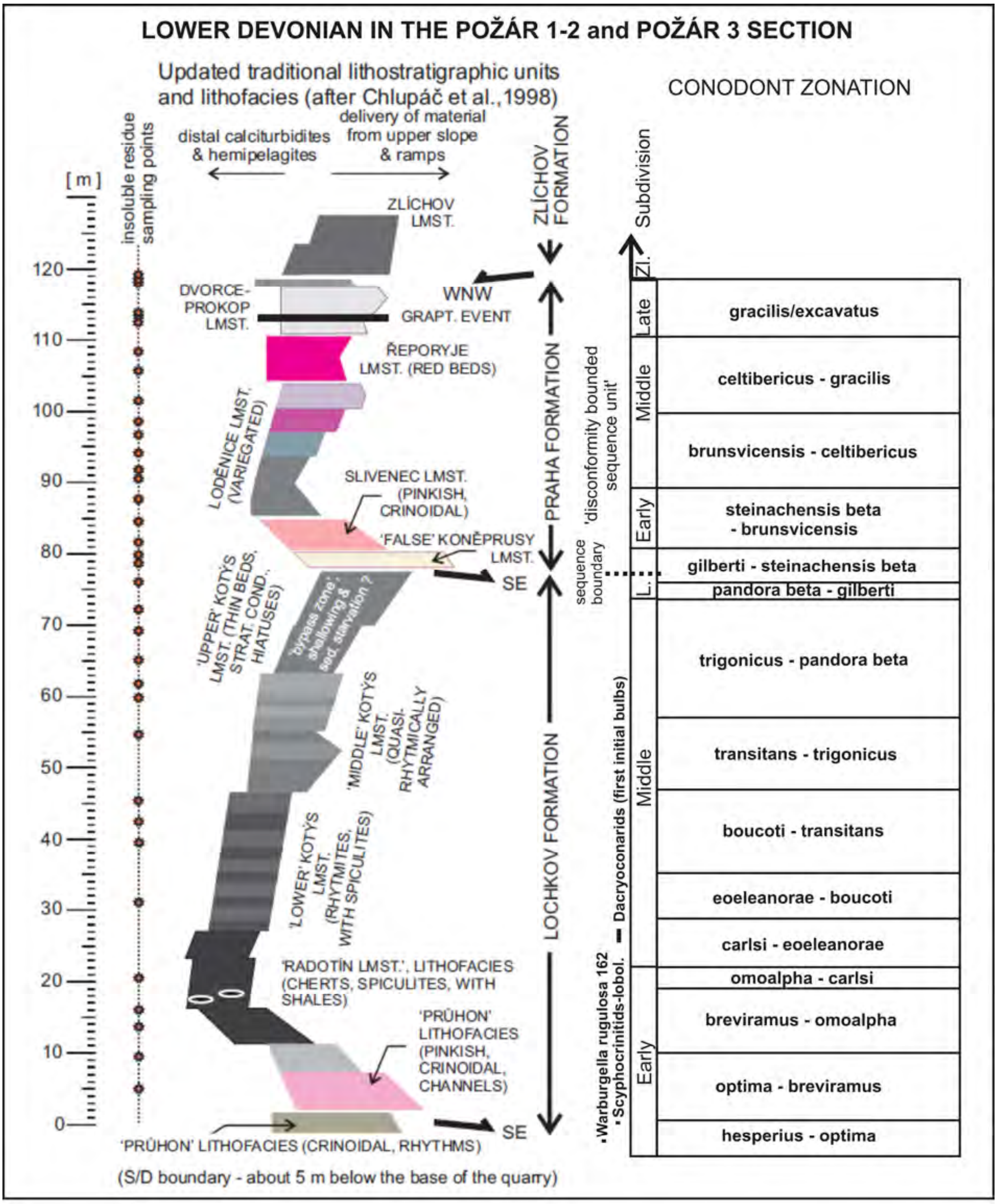

Figure 4. Lower Devonian of the Požáry Quarries and the conodont zonation of the Lochkovian, Pragian and early Emsian. The lithology and conodont zonation is based on the two parallel sections (Požár 1-2 and Požár 3) according to Koptíková et al. (2010a) and Slavík et al. (2012).

Most of the Pragian in the original sense belongs to the Emsian, and the Pragian is approximately reduced to the interval of 77.6–91.2 m (see the correlation in Slavík et al., 2007). The Pragian age is characterized by the FOD of conodont taxon *Icriodus steinachensis* beta (81.25 m), but the "true" beginning of the Pragian can be estimated at a lower level (~76.0 m); precise delimitation of the local basal Pragian boundary is, however, constricted by scarcity of conodont time marks. The Praha

Formation is the most diversified stratigraphic unit in the Prague Synform and is divided into five members (Chlupáč, 1981; Chlupáč et al., 1998): the Koněprusy Limestone, here called the "false" Koněprusy Limestone (77.6–80.25 m) because of slight differences from its definition as redefined by Chlupáč (1981), the Slivenec Limestone (80.25–85 m), Loděnice Limestone (85–104 m), Řeporyje Limestone (104–110 m) and Dvorce-Prokop Limestone (110–118.1 m). The thin blanket of the Koněprusy Limestone is represented by light grey to pinkish thick-bedded coarse, highly cemented bioclastic limestones dominated by altered crinoid fragments. The stratigraphically higher pinkish Slivenec Limestone is represented by thin-bedded amalgamated bioclastic limestone beds, mostly by crinoidal multimodal (up to tetramodal) limestones. Their grain-size distribution ranges from mud to sand and gravel. These are overlain by darker and variegated nodular calcisiltites with abundant dacryoconarids of the Loděnice Limestone. Above, they pass into red nodular calcisiltitic Řeporyje Limestone with abundant dacryoconarids. The Dvorce-Prokop Limestone, as the uppermost parts of the Praha Formation, consists of medium-grey thin-bedded calcisiltites and biomicrites with abundant ichnofabrics (*Zoophycos* isp. and *Chondrites* isp.). Slightly above the base of the Dvorce-Prokop Limestone, the so-called "Graptolite level" or "Graptolite horizon" (Hladil et al., 1996; Hladil & Kalvoda, 1997) occurs at 112.7–113.6 m. It is marked by a set of 8 dark shale graptolite-bearing turbidite beds with high amounts of glauconite and colonized hardgrounds. The presence of this interval is restricted to the NW flank of the Prague Synform. A trend of deepening was interrupted at the base of the Zlíchov Fm. (i.e. the Basal Zlichovian Event, Chlupáč & Kukal, 1986, 1988). The Zlichovian sequence starts at 118.1m in the Požár 3 section and is characterized by the dominance of grey to dark grey finely bioclastic to micritic limestones with common dark cherts, which indicate a medium to low-energy environment.
Da Silva et al. (2016) used the conodont data from the Požár 3 Quarry for bracketing of interval with high-resolution magnetic susceptibility and gamma ray spectrometry records. It was aligned with corresponding intervals from other two sections. Multiple spectral analysis and statistical techniques were used in concert to reach an optimal astronomical interpretation. The new age model results in durations of 7.7 ± 2.6 Myr for the Lochkov Fm., of 7.7 ±2.8 Myr for the Lochkovian Stage, 5.7 ± 0.6 Myr for the Praha Fm. and of 1.7 ± 0.7 Myr for the Pragian Stage.

Summary of conodont data and major bioevents

Conodont faunas from the lower Ludfordian are characterized by relatively high taxonomic diversity in the *Polygnathoides siluricus* Zone (see Figure 5) that reflects an interval with taxa thriving due to increased nutrient supply in rather stable environments during the pre-Lau Event time, as has been documented globally. Although the conodont faunas in strata with *P. siluricus* are more diversified and variable than those in the interval instantly following, the uninterrupted ranges of several taxa (of genera *Wurmiella*, *Ozarkodina* and *Delotaxis*) show that the change in conodont faunas in the sections is not as drastic in Bohemia as described on Gotland and that the extinction rate was rather moderate. A detailed correlation of conodont distribution in the sections indicates, however, that a large part of the Lau Event is not preserved in the shallow water environment of the former Řeporyje Volcanic Elevation where the present locality Požáry Quarries is now located. Only a short interval with considerably diminished conodont elements during the lower range of *Ozarkodina*? *snajdri* with random occurrences of *Pedavis latialatus*, corresponds to the part of the "Icriodontid Zone" on Gotland, i.e. the uppermost part of the Lau Event. This incompleteness in record confirms sedimentary starvation in the shallow environment on the former volcanic elevation in this part of the Prague Synform. The post-Lau Event diversity increase of conodont faunas in the Prague Synform starts with the appearance of slender spathognathodontid taxa in which the oldest is probably *Parazieglerodina plodowskii* Carls et al. The conodont faunal succession enabled a recognition of seven time intervals from the Ludfordian *siluricus* Zone to the *zellmeri* range in the Přídolí. The conodont faunas increased in diversity and abundance enable a refined conodont subdivision of the post-Lau Event interval in the Ludfordian. It includes the *plodowskii, latialatus, parasnajdri* and *crispa* biozones. The data from the Prague Synform show that the use of a *snajdri* Interval Zone is useless, because its index enters quite

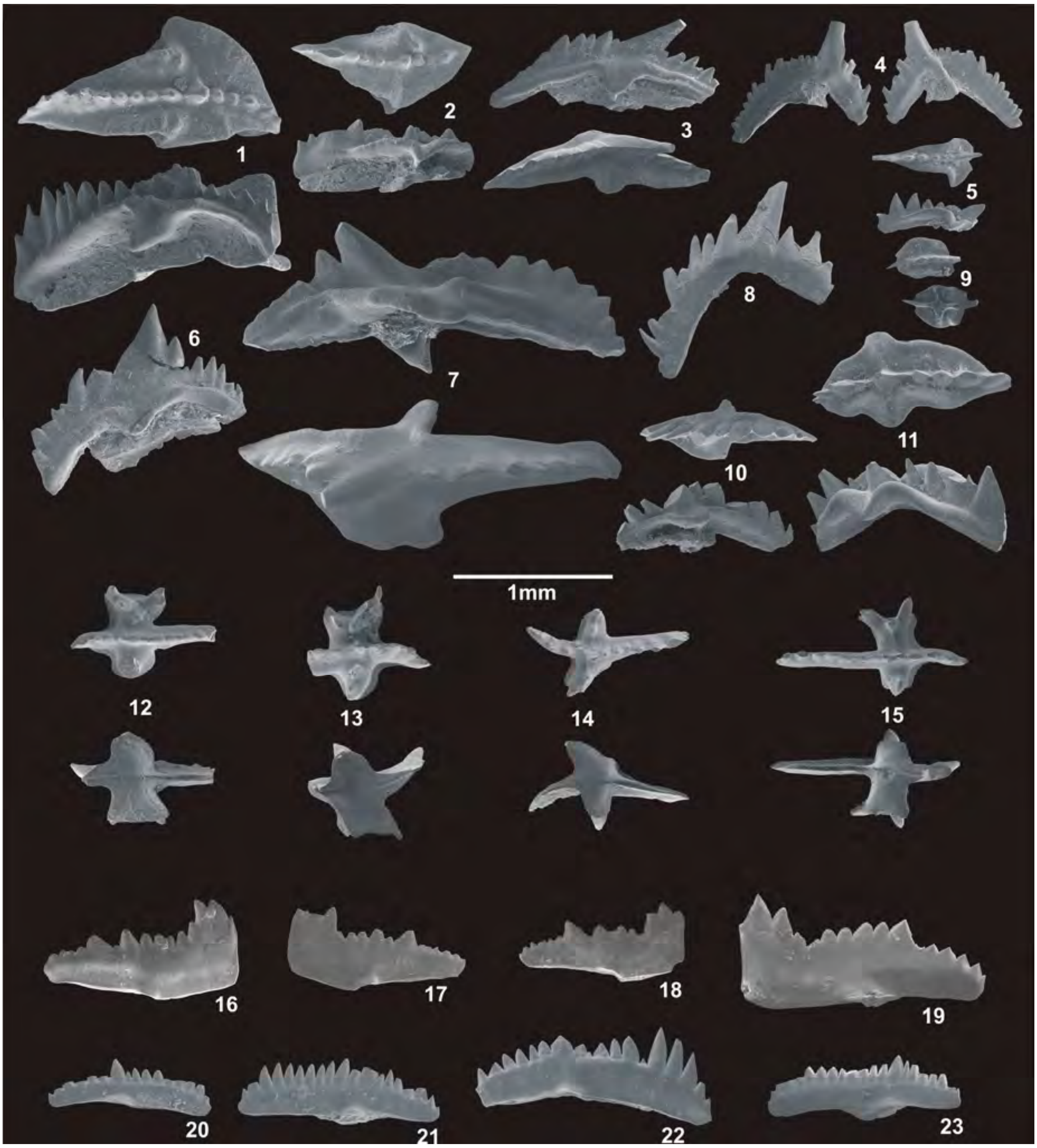

Figure 5. Selected conodont specimens from the Ludfordian of the Požáry Quarries.
1-11. *Polygnathoides siluricus* Branson & Mehl, **1, 2.** upper and lateral views of Pa elements with basal fillings, bed 15, sample 5Po15t, **3.** lateral and upper view of Pb element with basal filling, bed 15, sample 5Po15t, **4.** outer and inner lateral view of Sb? element, bed 15, sample 5Po15t, **5.** upper and lateral view of incomplete Pa element, bed 32, sample 5Po32, **6.** lateral view of Pb element with basal filling, bed 17, sample 5Po17, **7.** lateral and upper view of Pb element, bed 20, sample 5Po20, **8.** outer lateral view of Sb? element, bed 20, sample 5Po20, **9.** upper and lower view of Pa element, bed 33, bed 33, sample 5Po33, **10.** upper and lateral view of Pb element with basal filling, bed 32, sample 5Po32, **11.** upper and lateral view of Pa element, bed 32, sample 5Po32. **12, 15.** *Kockelella variabilis ichnusae* Serpagli & Corradini, upper and lower view of incomplete Pa elements, bed 15, sample 5Po15. **13.** *Kockelella variabilis variabilis* Walliser, upper and lower view of Pa element, bed 15, sample 5Po15. **14.** *Kockelella maenniki* Serpagli & Corradini, upper and lower view of Pa element, bed 15, sample 5Po15. **16-19.** *Ozarkodina typica* Branson & Mehl *sensu lato*, **16-18.** lateral views of Pa element, bed 15, sample 5Po15, **19.** lateral view of Pa element, bed 15, sample 5Po15t. **20-23.** *Wurmiella excavata* (Branson & Mehl, 1933) *sensu lato*. **20-22.** lateral views of Pa elements, bed 15, sample 5Po15t, **23.** lateral view of Pa element, bed 17, sample 5Po17.

shortly after *Ped. latialatus*. The sum of plodowskii, latialatus and parasnajdri zones roughly corresponds to the time of a moderate sea-level rise in the upper part of the *Pseudomonoclimacis latilobus-Slovinograptus balticus* graptolite Zone (cf. Manda & Kříž, 2006; Manda et al., 2012). The "Icriodontid" Zone of Jeppsson (2005) delimited on Gotland cannot be correlated with any of the regional zones in the Prague Synform because of extreme scarcity of icriodontids on Gotland.
The recognition of the Klev Event (of Jeppsson & Aldridge, 2000) near the beginning of the Přídolí is not possible in Bohemia, probably due to the more complete ranges of "*Oz.*" *crispa* and its associates in Bohemia, which were not affected by this rather local event. According to Carls et al. (2007), the current state of art of the conodont subdivision of the Přídolí can be summarized as follows: The *eosteinhornensis* Zone s.s. (i.e. with ornamented lobes) begins amid the Přídolí and it is not demonstrable in the Baltic outcrops regions (Scania-Gotland-Estonia). The *Delotaxis detorta* plexus begins before the *eosteinhornensis* Zone and it is not limited to the final Přídolí. In the Baltic and in the Požáry section its entry is closely associated to *Zieglerodina ivochlupaci*. Therefore the assumed limitation of a "*detorta* Zone" to the final Přídolí that was used in many conodont scales globally should be avoided. *Zieglerodina zellmeri* begins in the range of "*Oz.*" *crispa* close to the Ludlow-Přídolí boundary in the East Baltic, in the Armorican Massif and at Požáry. Several early reports of the *eosteinhornensis* Zone correspond to it.
The radiative development of the genus *Icriodus* s.l. near the beginning of the Devonian is intense but is still incompletely known. The type stratum of the very particular *Icriodus woschmidti* is much younger than the entry of *Icriodus postwoschmidti* in Podolia. Accordingly, a succession of a *woschmidti* Zone and a *postwoschmidti* Zone in the Early Lochkovian is not appropriate. The widespread *Icriodus hesperius* marks the beginning of the Devonian very closely; a corresponding zone near the beginning of the Devonian is suggested instead of the name "*woschmidti* Zone". The detailed correlation of conodont data from two parallel sections in the Požáry Quarries supplemented by additional data from parts of the Lochkov Formation from several other sections with different facies development have ensured a high standard of biostratigraphic control in the stratotype area of the Lochkovian Stage. The relatively rich faunas (see Figure 6) enable the proposal of a refined zonal scale for the Prague Synform. The Lochkovian time in the Prague Synform can be subdivided into three parts: early, middle and late Lochkovian. These correspond to the lower, middle and upper Lochkovian divisions according to the initial threefold subdivision proposed by Valenzuela-Ríos & Murphy (1997) and subsequently improved by Murphy & Valenzuela-Ríos (1999). The Lochkovian subdivision in the Prague Synform is further refined and subdivided into several small-scale units (Fig. 4) using the binominal system (Murphy, 1977). The lower part of the Lochkovian is characterized by the presence of substantial taxa that allow further subdivision in the Prague Synform: *Icriodus hesperius, Zieglerodina optima, Pedavis breviramus* and *Lanea omoalpha*. The middle part is characterized by entries of *Lanea carlsi*, *L. eoeleanorae*, '*Pandorinellina?*' *boucoti*, *Ancyrodelloides transitans* and *A. trigonicus*. Within the range of *L. carlsi* the origin of dacryoconarids is traced that corresponds to the lower part of the *Monograptus hercynicus* range (Slavík, 2011). The time proportion of the lower and middle Lochkovian seems to be well balanced. The upper Lochkovian (after *Ancyrodelloides*) is globally defined by the entry of *M. pandora* beta and subdivided only into two parts. The uppermost Lochkovian unit starts with the appearance of *Pedavis gilberti*. This is only 2m below the base of the Praha Fm. Thus, the upper Lochkovian in the Prague Synform is either of extremely low accumulation rate or globally the duration is rather short (low thickness is also documented in more distant areas). The duration of the presently practised lower, middle and upper Lochkovian should be further studied and discussed.
The trend of a gradual increase of energy and shallowing culminated at the base of the Praha Formation during the Basal Pragian Event (Chlupáč & Kukal, 1986, 1988) that is connected with broad positive δ13C excursion (Hladíková et al., 1997; Buggish & Mann, 2004) and with condensed sedimentation around the Lochkovian/Pragian boundary. As mentioned above, majority of the Pragian in the original sense belongs to the Emsian, and the Pragian is approximately reduced to the interval of less than 14 m. The Pragian age is characterized by the FOD of conodont taxon *Icriodus steinachensis* beta (81.25 m), but the "true" beginning of the Pragian can be estimated at a lower level

(~76.0 m); precise delimitation of the local basal Pragian boundary is, however, constricted by scarcity of conodont time marks. The base of the Emsian can be correlated in the Požár 3 section approximately at 88.9 m – at the base of *brunsvicensis-celtibericus* Zone (Fig. 4). The conodont faunas of the Praha Formation (see the selected specimens on Figure 6), especially in the Emsian part, are relatively scarce with large intervals without any reasonable conodont. Only few biostratigraphic units can be recognized, these are modified from Slavík (2004b) (Fig. 4). The so-called "Graptolite level"is characterized by the acme of dacryconarid *Guerichina strangulata* and conodont *Icriodus bilatericrescens gracilis* which enters closely below the interval in several Pragian/Zlíchovian sections (Slavík, 2004a). Following the correlation in Slavík et al. (2007) and Carls et al. (2008), this interval is close to the traditional Emsian base (Ulmen Gruppe) in Germany. Conodont faunas of the basal parts of the Zlíchov Formation (above 118.1 m) are not characterized by any marked change. Most of the taxa – e.g., *I. celtibericus*, *I. b. gracilis* and *Polygnathus excavatus* are continuing from the underlying Praha Fm.

Figure 6. Selected conodont specimens from the Lochkovian and Pragian of the Požáry Quarries.
1. *Masaraella pandora* alpha (Murphy et al.), upper view of Pa element, 76 m in Požár 3 section, sample 4Po76. **2.** Pa element with incipient terraces informally named 'pre-*Lanea*', upper view of Pa element, 10 m in Požár 3 section, sample 4Po10. **3.** *Pelekysgnathus elongata* Carls and Gandl, lateral view of I element, 68 m in Požár 3 section, sample PZ24. **4.** *Masaraella pandora* beta (Murphy et al.), upper view of Pa element, 74 m in Požár 3 section, sample 4Po74. **5.** '*Ozarkodina'* cf. *planilingua* Murphy & Valenzuela-Ríos, upper view of Pa element, 35 m in Požár 3 section, sample 4Po35. **6.** *Pedavis gilberti* Valenzuela-Ríos, upper view of I element, 80 m in Požár 3 section, sample 4Po80.**7.** *Ancyrodelloides kutscheri* Bischoff and Sannemann, upper view of Pa element, 68 m in Požár 3 section, sample 4Po68. **8.** *Lanea carlsi* (Boersma), upper view of Pa element, 22 m in Požár 3 section, sample 4Po22. **9.** *Kimognathus limbacarinatus* (Murphy & Matti), upper view of Pa element, 60 m in Požár 3 section, sample 4Po60. **10.** *Ancyrodelloides transitans* (Bischoff and Sannemann), upper view of Pa element, 63 m in Požár 3 section, sample 4Po 63. **11.** *Lanea eoeleanorae* Murphy & Valenzuela-Ríos, upper view of Pa element, 35 m in Požár 3 section, sample 4Po35. **12.** *Zieglerodina optima* (Moskalenko), lateral view of Pa element, 7 m in Požár 3 section, sample 4Po7. **13.** *Zieglerodina* cf. *remscheidensis* (Ziegler), lateral view of Pa element, 2 m in Požár 3 section, sample 4Po2. **14.** *Lanea* cf. *omoalpha* Murphy & Valenzuela-Ríos, upper view of Pa element, 13 m in Požár 3 section, sample 4Po13.**15.** *Icriodus angustoides* ssp. Carls & Gandl, upper view of I element, 6 m in Požár 3 section, sample 4Po6. **16.** *Icriodus angustoides alcoleae* Carls, upper view of I element, 69 m in Požár 3 section, sample 4Po69. **17.** *Icriodus rectangularis rectangularis* Carls & Gandl, upper view of I element, 4 m in Požár 3 section, sample 4Po4. **18.** *Icriodus transiens* (Carls & Gandl), upper view of I element, 11 m in Požár 3 section, sample 4Po11. **19.** *Pedavis breviramus* Murphy & Matti, upper view of I element, 10 m in Požár 3 section, sample 4Po10.

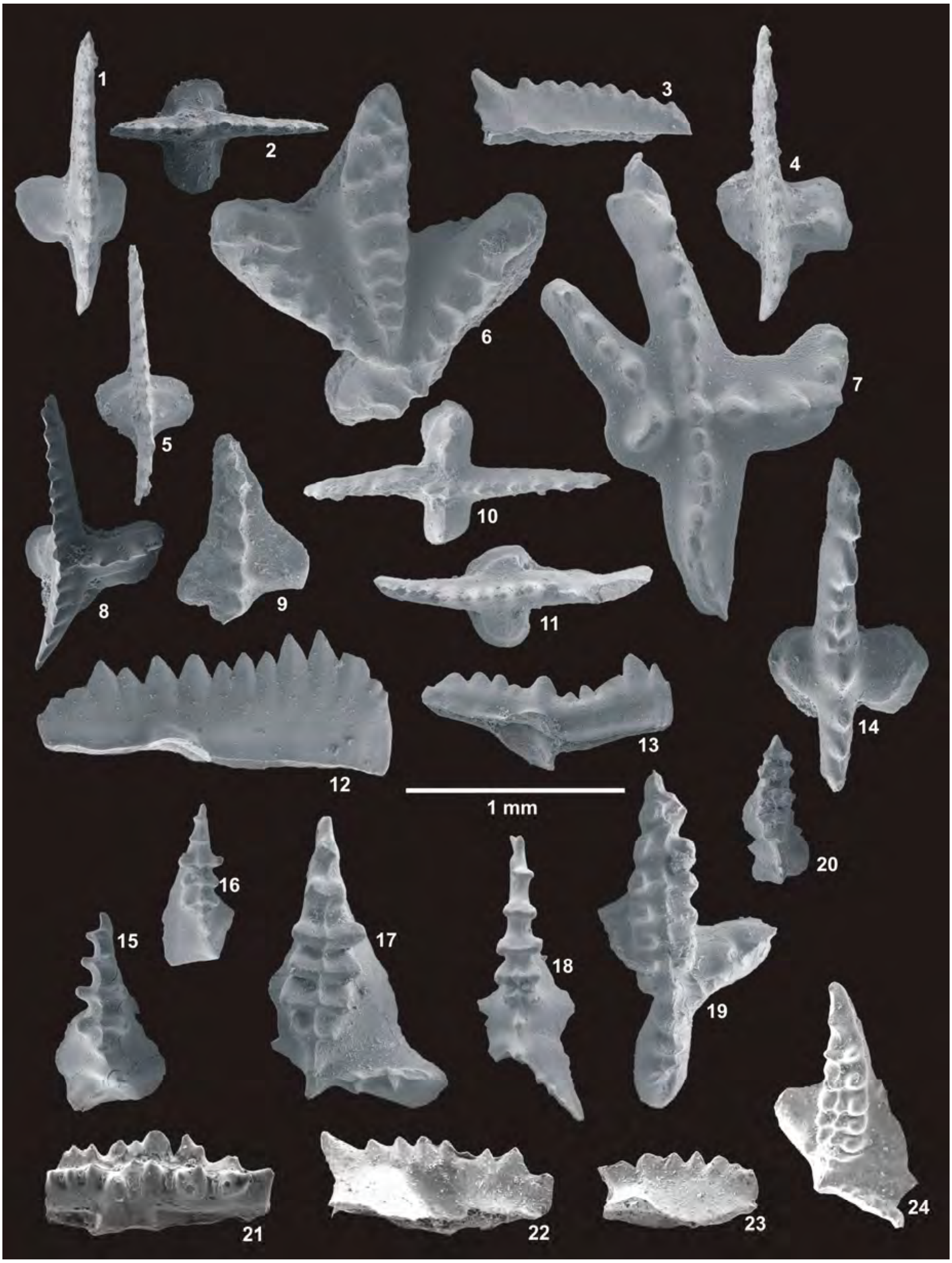

Figure 6. continued.
20. *Icriodus* ex gr. *woschmidti* Ziegler, upper view of I element, 0.5 m in Požár 3 section, sample 4Po05. **21.** *Gondwania profunda?* Murphy, upper-lateral view of sp.No: 115PO, 78 m in Požár 1-2 section, sample 6PO. **22-23.** *Pelekysgnathus serratus brunsvicensis* Valenzuela-Ríos, **22.** lateral view of Pa element, sp.No: 082PO, 98 m in Požár 1-2 section, sample 15PO, **23.** lateral view of sp. No: 086PO, 93 m in Požár 1-2 section, sample 14PO. **24.** *Caudicriodus simulator* ssp., upper view of I element, sp. No:113Po, 81 m in Požár 1-2 section, sample 8PO.

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