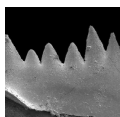


Lower Lochkovian (Lower Devonian) conodonts from Cellon section (Carnic Alps, Austria)

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The conodont stratigraphy of the lower Lochkovian part of the famous Cellon section is presented. The association includes twenty-two taxa belonging to nine genera, and allows discriminating the two biozones of the lower Lochkovian (*Icr. hesperius* and *Icr. postwoschmidti* zones). Three taxa (*Zieglerodina formosa*, *Z. mashkovae* and *Z. prosoplatys*) are reported for the first time from the Carnic Alps, and other two species of *Zieglerodina*, probably new, are described in open nomenclature. • Key words: conodonts, biostratigraphy, taxonomy, Lochkovian, Cellon section, Carnic Alps.

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The Cellon section, located in the central part of the Carnic Alps near Plöckenpass/Passo di Monte Croce Carnico, is one of the most famous sections of the world, exposing rocks from the Katian (Upper Ordovician) to the Lochkovian (Lower Devonian) and, further on along the eastern and western cliff of mountain Cellon to the Lower Carboniferous. It is the reference section for many Silurian studies and is the reference section for the Silurian in the Southern Alps. Many studies focused on the Ordovician and Silurian part of the section, whereas the Lower Devonian have never been investigated in detail, probably because problems of accessibility and the fact that the rocks in the upper part and their fossil content are less spectacular compared to those cropping out in the lower part of the section.

The conodont fauna from the Cellon section was studied and described by Walliser (1964), who illustrated the fauna from the base of the section to just above the Silurian/Devonian boundary. Recently Ferretti & Schönlaub (2001) revised the biostratigraphy of the Ordovician part of the section, whereas the Silurian part has been updated by Corradini *et al.* (2015a).

In this paper we describe the conodont fauna from the lowermost Devonian, integrating the younger samples from Walliser (1964) collection, that we studied during a research visit at Göttingen University, with new data from

samples picked in the uppermost part of the section, until a steep wall prevented any further sampling.

Geological settings

The Carnic Alps are located along the Italian-Austrian border (Fig. 1) and exposed rocks deposited between the Middle Ordovician and the Upper Triassic. Three sedimentary sequences are distinguished: the Pre-Variscan, the Permo-Carboniferous and the Alpine. The Pre-Variscan sequence includes rocks of Middle Ordovician to lowermost Pennsylvanian age, which represent one of the better-preserved and continuous sequences of the world. This sequence was affected by the Variscan orogeny during the late Bashkirian and early Moscovian (Schönlaub 1980, Venturini 1990, Schönlaub & Forke 2007) and by extensional as well as compressional and transpressional Alpine phases (Venturini 1990, Läufer 1996), which formed a fold and thrust belt. Despite the severe deformation, the succession is mostly non-metamorphic (Brime *et al.* 2008).

The lithostratigraphy of the Pre-Variscan sequence was recently revised (Corradini & Suttner 2015), and 36 formations have been discriminated. Seven of those are present in the Lochkovian: Alticola Fm., Seekopf Fm., Rauchkofel

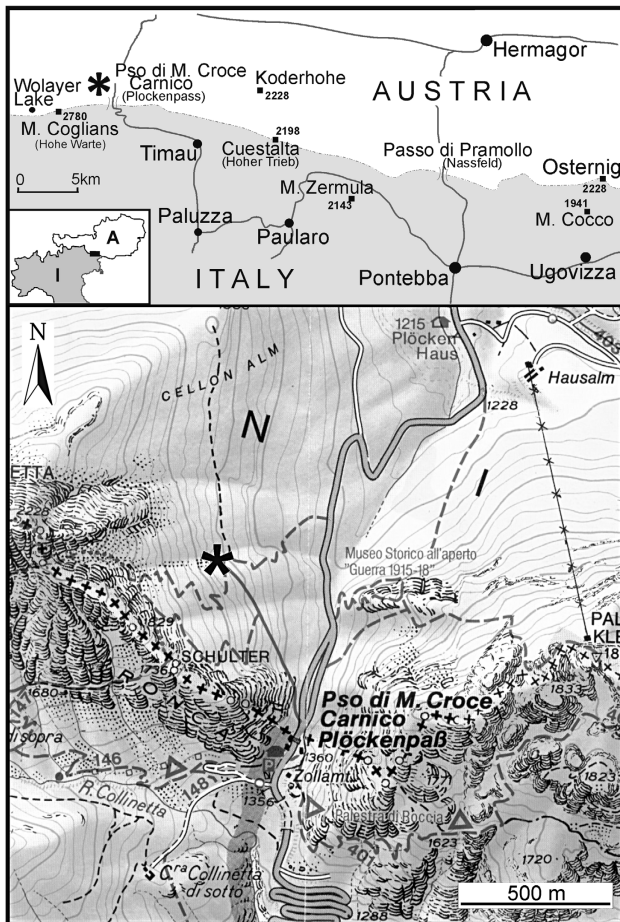


Figure 1. Location map of the Cella section (asterisk).

Fm., La Valute Fm., Findenig Fm., Nölbling Fm. and Bischofalm Fm. (Fig. 2). These units are here briefly introduced: for a detailed description refer to Corradini & Suttner (2015).

The Alticola Fm. (Ferretti *et al.* 2015c) consists of well-bedded cephalopod bearing wackestone to packstone of Ludlow–lowermost Lochkovian age. The Silurian/Devonian boundary lies in the uppermost part of the unit, very close to its top.

The Seekopf Fm. (Suttner *et al.* 2015) consists of a mostly greyish very shallow water lithoclastic limestone with abundant fossil debris, of Přídolí–early Pragian age.

The Rauchkofel Fm. (Corradini *et al.* 2015c) consists of mainly laminated dark grey well-bedded platy mudstone to wackestone with intercalation of black shales and marls, and locally conglomerates, of Lochkovian age.

The La Valute Fm. (Corradini *et al.* 2015b) consists of light grey/ocraceous cephalopod mudstone to wackestone, slightly nodular in the upper part. Its age is comprised between the upper part of the lower Lochkovian and the upper Lochkovian.

The Nölbling Fm. (Schönlaub *et al.* 2015a) consists

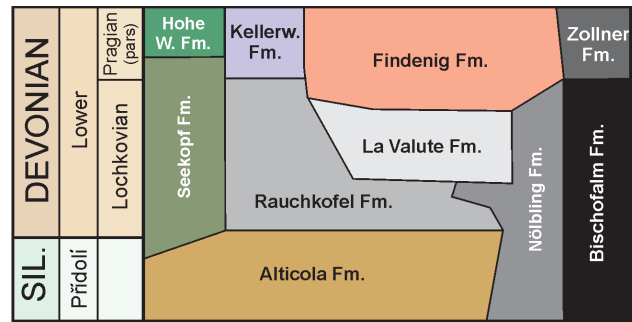


Figure 2. Stratigraphic scheme of the Lochkovian of the Carnic Alps. Abbreviations: Sil. – Silurian; Höhe W. – Höhe Warte; Kellerw. – Kellerwand.

mainly of black shales with nodules and layers of dark cephalopod wackestone to mudstone. Its age spans from lower Silurian to the end of Lochkovian.

The Bischofalm Fm. (Schönlaub *et al.* 2015b) consists of black siliceous and alum shale of Silurian to Lochkovian age.

The Findenig Fm. (Spalletta *et al.* 2015) consists of distinct reddish nodular mudstone to wackestone of late Lochkovian–Eifelian age.

The Cella section

The Cella section is located in a narrow avalanche gorge on the eastern flank of Mt. Cella, at an altitude of about 1500 m, at coordinates 46° 36' 32" N, 12° 56' 31" E, close to the Austrian/Italian border. It is accessible by a short walk from Plöcken Pass/Passo di Monte Croce Carnico (Figs 1, 3).

It probably represents the most famous Silurian section in the world, and is the reference section for many Ordovician and Silurian studies. The section has been famous since 1894, when Geyer (1894) first described the rock succession exposed here. The conodont fauna from the section was studied and described by Walliser (1957, 1964), whose pioneering work on the section included the first proposed Silurian conodont zonation (Walliser 1964). Subsequent studies on the Cella section have documented the composition and distribution of several fossil groups (bivalves, brachiopods, nautiloids, graptolites, foraminifers, ostracods, acritarchs, chitinozoans, trilobites and corals), microfacies, isotope signatures, taphonomic and palaeo-environmental indicators and eustatic sea-level changes (Schönlaub & Lammerhuber 2009). For a complete review of the previous studies on the Cella section, and a revision of the Silurian conodont biostratigraphy, refer to Corradini *et al.* (2015a).

The section exposes rocks from the Upper Ordovician to the Lower Devonian belonging to six lithostratigraphic

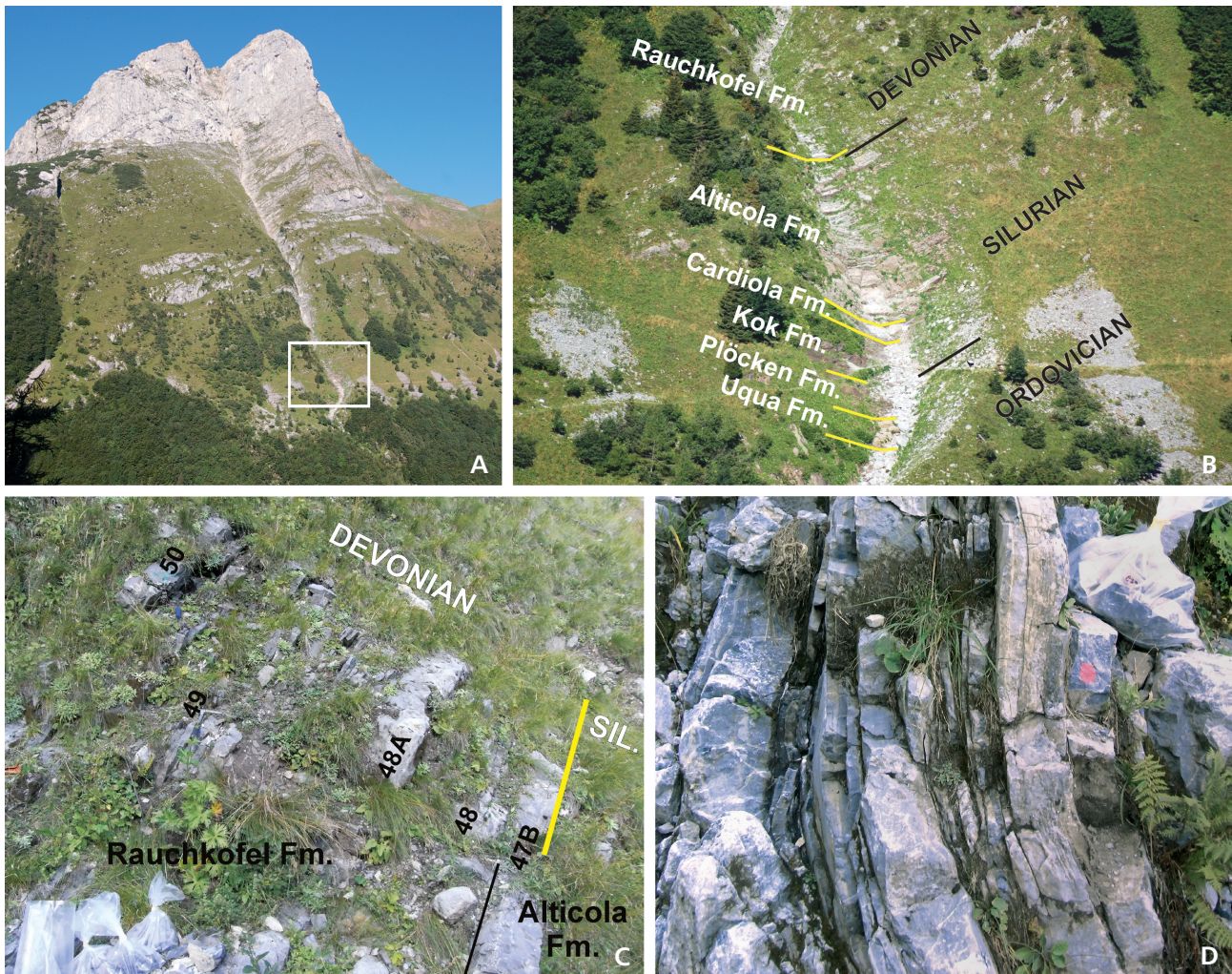


Figure 3. Views of the Cella section. • A – panoramic view to the west of Mt. Cella/Creta di Collinetta. • B – detail of the Cella section (box in fig. A), with indication of the lithostratigraphic and chronostratigraphic units. • C – detail across the Silurian/Devonian boundary, with indication of samples, and lithostratigraphic and chronostratigraphic units. • D – view of the Rauchkofel Fm. in the upper part of the measured section, close to sample 59.

units (Fig. 3B): Uqua Fm. (Schönlaub & Ferretti 2015a), Plöcken Fm. (Schönlaub & Ferretti 2015b), Kok Fm. (Ferretti *et al.* 2015a), Cardiola Fm. (Ferretti *et al.* 2015b), Alticola Fm. (Ferretti *et al.* 2015c) and Rauchkofel Fm. (Corradini *et al.* 2015c). For a detailed description of the Ordovician and Silurian parts of the section and the position of the documented chronostratigraphic boundaries refer to Histon *et al.* (1999) and Corradini *et al.* (2015a, d, and references therein).

The lower Lochkovian of Cella section

The Silurian/Devonian boundary in the Cella section (Fig. 4) is located in the uppermost part of the Alticola Fm., just below sample 47B (Walliser 1964, Schönlaub 1980), that yielded the first representatives of *Icr. hesperius* (Corradini *et al.* 2015a). It should be noted that the first

occurrence of diagnostic graptolites of the Lochkovian are recorded about 1.5 m above, where Jaeger (1975) recorded the occurrences of *Monograptus uniformis*, *M. cf. microdon* and *Linograptus posthumus* just below sample 50; however, no graptolites have been reported from the lowermost part of the Rauchkofel Fm., so the discrepancy between conodont and graptolite data can be explained by the difficulty to find graptolites in the limestones.

The Alticola Fm. is represented by a distinctly bedded cephalopod bearing wackestone-packstone. In the uppermost beds the occurrence of bryozoans and brachiopods suggests a shallower depositional environment than the lower part (Ferretti *et al.* 2015c).

The formational boundary between the Alticola Fm. and the Rauchkofel Fm. is located a few centimetres above the conodont based S/D boundary, between beds 47B and 47C. The Rauchkofel Fm. mainly consists of dark grey to black laminated and well-bedded wackestone to packstone

(and some minor thin grainstone laminae) with intercalation of black shales and marls. Chert nodules are present in a few levels. Hummocky cross stratification is observed in some thin-bedded limestone level. The packstone and grainstone beds and laminae consist of generally fine to medium grained clasts and are poorly sorted. A thick grainstone bed occurs about 4 m above the base of the unit. It consists of medium-grained, locally coarse grained, well-sorted material with no evidence, at the macro-scale, of sedimentary structures, and may represent a shallower depositional episode. Beside nautiloid cephalopods and graptolites, the Rauchkofel Fm. at Cellon section yields acritarchs (Priewalder 1987), chitinozoans (Priewalder 1999) and scyphocrinoid crinoids (R. Haude, pers. comm. in Histon *et al.* 1999).

Material

This paper is based on the revision of Walliser conodonts collection carried out during two research visits by MGC and CC to Göttingen University and some new samples.

The Walliser conodont collection from the Cellon section includes about 35,000 conodont elements from about 220 samples from the Upper Ordovician to the lowermost Devonian. It is archived in the Geoscience Centre of the Georg-August University of Göttingen, Germany, under repository number GZG 1613. The Lochkovian part of the collection is limited to a few samples, from 47B to 52. However, samples 51 and 52 were not included in Walliser (1964) monograph, but we found these unpublished samples together with indication of their precise position while studying the Walliser collection in Göttingen.

We integrate Walliser's data with several samples collected up to 18 meters above the Silurian/Devonian boundary, both resampling the some levels of Walliser and picking new ones. While sampling we continued the original numbering by Walliser (1964) above its published section. It results that numbers 51 and 52 were doubled: therefore in this paper the youngest samples by Walliser are renamed 51W and 52W, respectively. Our samples from Cellon section are stored in the Palaeontological and Geological museum "Domenico Lovisato" of Cagliari University (MDLCA).

Conodont fauna

Twenty-two conodont taxa (species and subspecies), belonging to nine genera have been recognized from the Lochkovian of the Cellon section (Fig. 4).

The conodont fauna is generally well preserved. The abundance is lower in the Devonian than in the Silurian part of the section. However we do not have precise infor-

mation on the weight of Walliser's samples stored in Göttingen, and therefore we cannot be more precise. In our samples the abundance is very variable from nothing (sample 57) to 37.3 conodonts per kg (sample 56), with an average of about 15 conodonts per kg. In general conodonts from the lower part of the Rauchkofel Fm. are more abundant than above.

Wurmiella, that is the most abundant genus in the Silurian, becomes rarer in the Lower Devonian part of the section. *Zieglerodina* increases its abundance and is the dominant genus in the upper part. *Icriodus* is present in the lowermost Lochkovian beds, up to sample 52W, beside the single occurrence of a specimen of *Icr. cf. transiens* in sample 56. Coniform elements, almost always present, represent a minor part of the association. Other genera are very rare.

Chronostratigraphy

The Přídolí–Lochkovian conodont zonation provided by Corradini & Corriga (2012) for the Carnic Alps is updated in this paper. Corradini & Corriga (2012) discriminated in the lower Lochkovian only the *Icr. hesperius* Zone, indicating in its upper part the *Icr. postwoschmidti* Subzone. In this paper the latter interval is considered at zonal rank. Therefore two zones are distinguished in the lower Lochkovian: the *Icr. hesperius* Zone and the *Icr. postwoschmidti* Zone.

The Silurian/Devonian boundary is located at the base of sample 47B, from where *Icr. hesperius* has been recovered (Corradini *et al.* 2015a). In the uppermost Silurian beds the well-known sequence of first and last occurrences of taxa documented in other sections from the Carnic Alps (Corradini & Corriga 2010, 2012) is present here as well: last occurrence of *Oz. confluens* (sample 46), immediately followed by the entry of *Z. remscheidensis* (sample 46A), and by the last occurrence of *Z. zellmeri* (sample 47A), just below the S/D boundary.

The lowermost Devonian beds are attributed to the *Icr. hesperius* Zone. *Icr. woschmidti* enters just above the base of the Zone, in sample 47C. Conodont abundance and diversity is higher in the lower part of the zone, than in the upper part.

The lower boundary of the succeeding *Icr. postwoschmidti* Zone can be tentatively traced below sample 55, where *Lanea omoalpha* and *Wurmiella wurmi* are present: according to Corradini & Corriga (2012) these species have their first appearance within this zone.

Systematic palaeontology

Systematic notes are limited to necessary taxonomic remarks and to taxa newly reported from the Carnic Alps. For

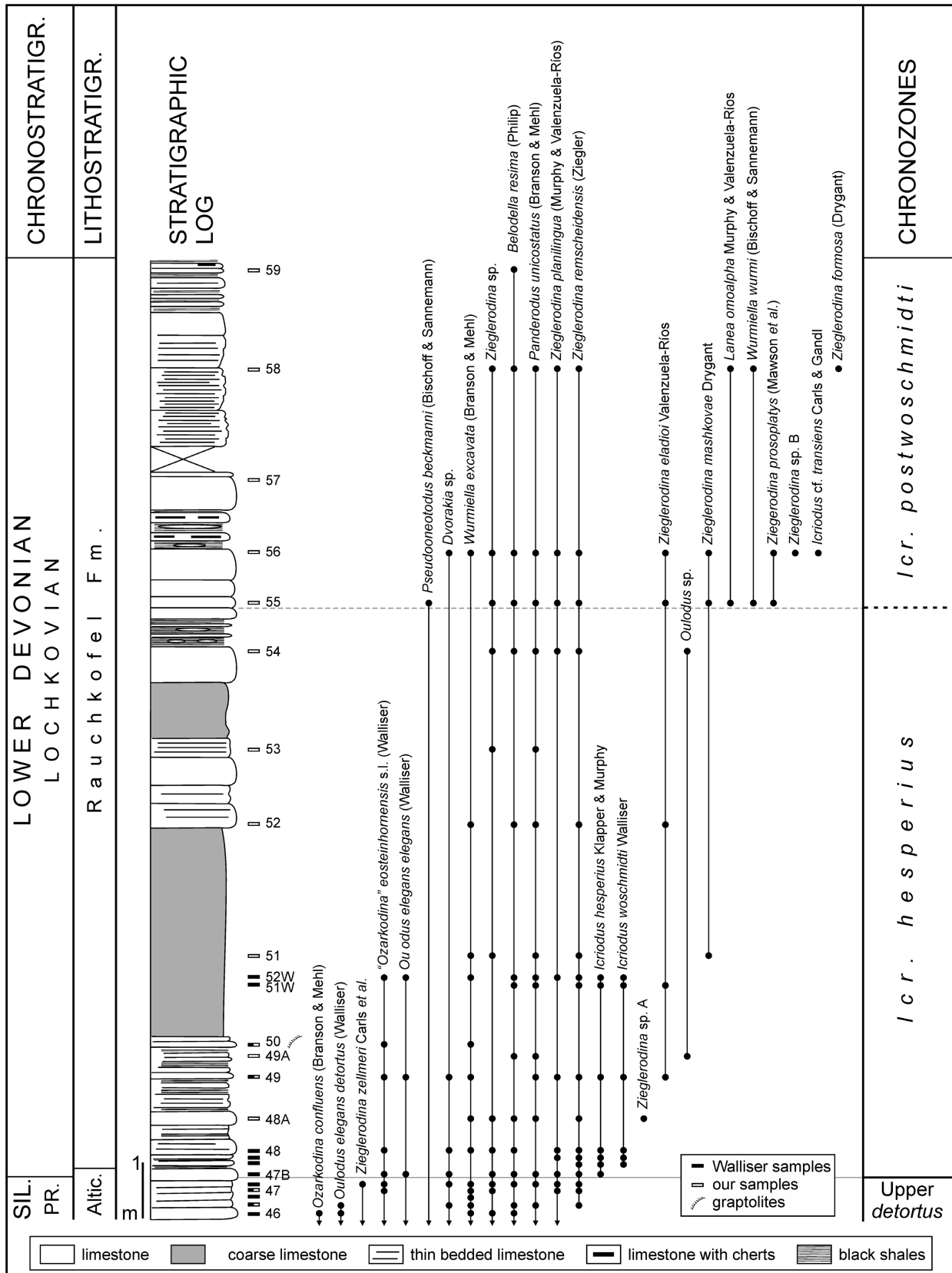


Figure 4. Stratigraphic log of the Lochkovian of the Cellon section and occurrences of conodonts. The uppermost Silurian beds (after Corradini *et al.* 2015a) are included to show the conodont distribution across the Silurian/Devonian boundary. Abbreviations: Sil. – Silurian; Pr. – Přídolí; Altic. – Alticola Fm.

suprageneric classification the scheme proposed by Sweet (1988) is followed. Synonymy lists are limited to main captions and previous illustrations from the Carnic Alps. Descriptions and remarks are restricted to P1 element.

Class Conodonta Pander, 1856

Order Ozarkodinida Dzik, 1976

Family Spathognathodontidae Hass, 1959

Genus *Zieglerodina* Murphy, Valenzuela-Ríos & Carls, 2004

Type species. – *Spathognathodus remscheidensis* Ziegler, 1960.

Remarks. – Genus *Zieglerodina* was established by Murphy *et al.* (2004) to include the ozarkodinids of the “*remscheidensis* Group”; it includes several different forms previously put together in only one species (*Ozarkodina remscheidensis* Ziegler). In their revision Murphy *et al.* (2004) restricted the diagnosis of *Z. remscheidensis* to morphs very similar to the holotype of Ziegler (1960, pl. 13, fig. 4).

Carls *et al.* (2007) introduced three new species to discriminate forms from the Přídolí (*Z. klonkensis*, *Z. ivochlupaci* and *Z. ? zellmeri*). Drygant (2010) described *Z. podolica*, and moved *Ozarkodina mashkovae* Drygant, *Oz. serrula* Drygant and “*Oz.*” *planilingua* Murphy & Valenzuela-Ríos to *Zieglerodina*. The assignment of the latter species to *Zieglerodina* has been confirmed by Corrigan *et al.* (2014) on the basis of the reconstruction of the apparatus. Corrigan (2011) considered *Ozarkodina eladioi* (Valenzuela-Ríos) as a species of *Zieglerodina*. Later, Drygant & Szaniawski (2012) moved *Oz. prosoplatys* Mawson *et al.* and *Oz. paucidentata* (Murphy & Matti) to the genus *Zieglerodina*. In the present manuscript we moved *Pandorinellina formosa* Drygant to the genus *Zieglerodina*. However, it should be noted that the generic attribution of all the species mentioned above would be confirmed only when the complete apparatuses are reconstructed.

Beside all these species, several other P1 elements show typical features of *Zieglerodina* but do not agree with any description. In Fig. 5N, P, R we figure some of these elements, that we leave in open nomenclature. As soon as we obtain enough material we may propose new species.

Taxa of the “*eosteinhornensis* Group”, that Murphy *et al.* (2004) placed in a different genus, still not defined according to the ICZN code, have a very similar morphology of all the apparatus elements. The opportunity to establish two different genera very similar, or to place the two groups together in the same genus should be carefully evaluated.

Zieglerodina eladioi (Valenzuela-Ríos, 1994)

Figure 5A, B

- 1980 *Ozarkodina remscheidensis remscheidensis* (Ziegler). – Schönlaub, pl. 1, fig. 20/29; pl. 3, fig. 20.
- 1980 *Ozarkodina remscheidensis eosteinhornensis* (Walliser). – Schönlaub, pl. 3, fig. 13.
- 1985 *Ozarkodina remscheidensis remscheidensis* (Ziegler). – Schönlaub, pl. 1, fig. 20.
- 1994 *Ozarkodina eladioi* n. sp.; Valenzuela-Ríos, pp. 59–63, pl. 5, figs 1–35.
- 2011 *Zieglerodina eladioi* (Valenzuela-Ríos). – Corrigan, p. 123, pl. 6, fig. 2; pl. 11, fig. 4.
- 2012 *Zieglerodina eladioi* (Valenzuela-Ríos). – Corrigan *et al.*, fig. 5.1.

Material. – Five specimens from samples 49, 52, 55 and 56.

Remarks. – *Zieglerodina eladioi* is characterized by a short blade bearing denticles of slightly variable size; the anterior part is longer than the posterior; the cusp may be slightly bigger than the other denticles.

The species differs from *Z. remscheidensis* by the generally smaller size and the shape of the denticles; it can be distinguished from *Z. mashkovae* by the smaller cusp and the irregular denticulation.

Occurrence. – From the uppermost Přídolí to the middle Lochkovian: from the upper part of the Upper *Oul. el. detortus* Zone to the *Ad. trigonicus* Zone (Corradini & Corrigan 2012).

Zieglerodina formosa (Drygant, 2010)

Figure 5M

- 2010 *Pandorinellina formosa* nov. sp.; Drygant, p. 54, pl. 1, fig. 25.
- 2012 ?*Pandorinellina formosa* Drygant. – Drygant & Szaniawski, p. 856, fig. 12k, m, n, p, r (cum syn.).

Material. – One specimen from sample 58.

Remarks. – *Zieglerodina formosa* is characterized by a sigmoidal lower margin of the element, that is curved upward in the anterior part, and downward in the posterior. Three or four denticles close to the anterior part of the element are higher than the others, while the cusp is only slightly larger than the adjacent denticles.

Drygant (2010) assigned the species to *Pandorinellina*, whereas Drygant & Szaniawski (2012) maintained the attribution, but dubitatively. However, they discussed similarity with *Z. remscheidensis*, and indicated the latter taxon

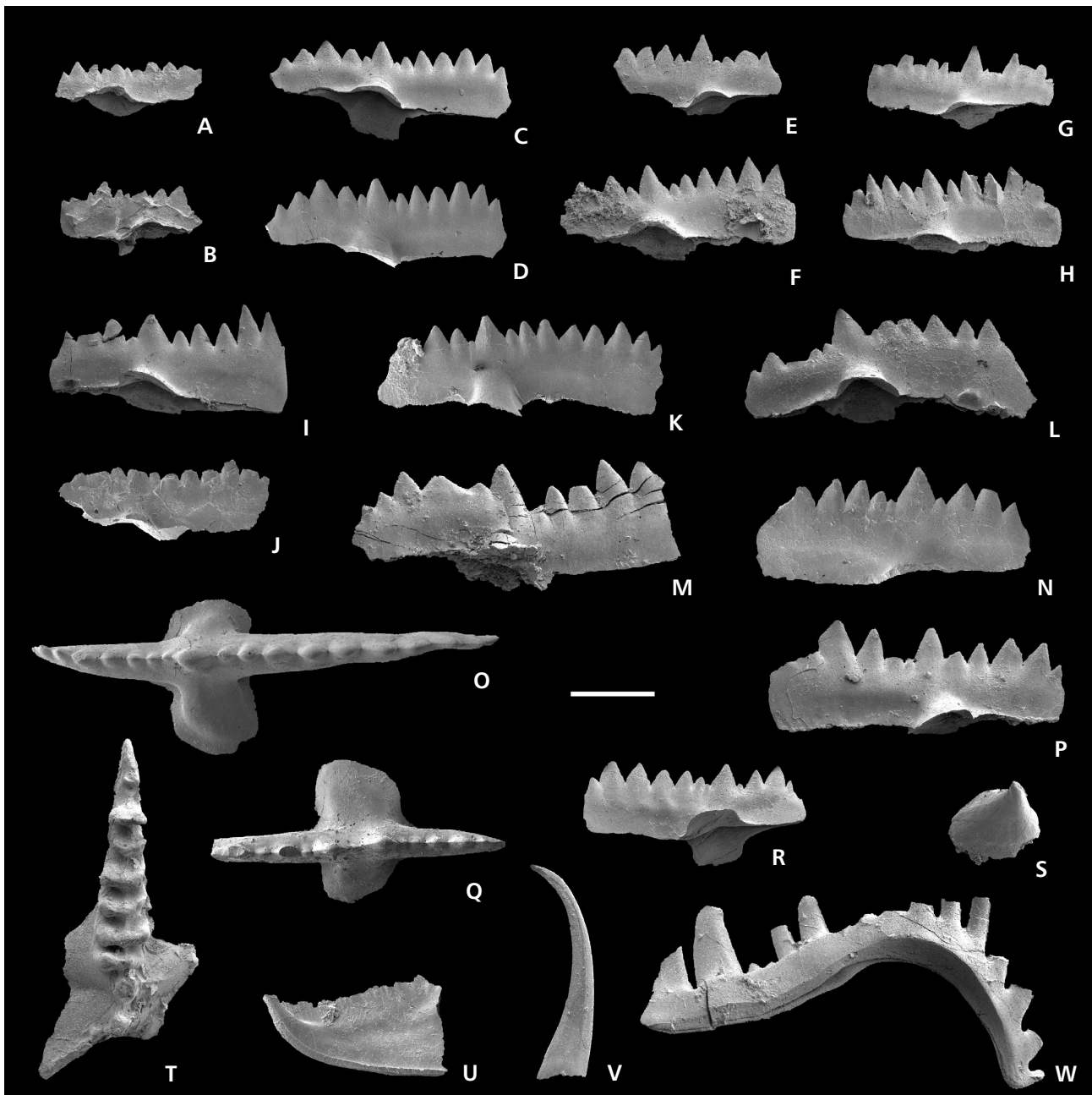


Figure 5. Conodonts from the Lochkovian of Cellaon section. • A – *Zieglerodina eladioi* (Valenzuela-Ríos, 1994), lateral view of P1 element MDLCA 30333, sample 52. • B – *Zieglerodina eladioi* (Valenzuela-Ríos, 1994), lateral view of P1 element MDLCA 30334, sample 52. • C, D – *Zieglerodina mashkovae* (Drygant, 1984), lower-lateral and lateral views of P1 element MDLCA 30335, sample 56. • E – *Zieglerodina mashkovae* (Drygant, 1984), lateral view of P1 element MDLCA 30336, sample 56. • F – *Zieglerodina* sp. B, lateral view of P1 element MDLCA 30337, sample 56. • G – *Zieglerodina* sp. A, lateral view of P1 element MDLCA 30338, sample 48A. • H – *Zieglerodina* sp. A, lateral view of P1 element MDLCA 30339, sample 48A. • I – *Zieglerodina remscheidensis* (Ziegler, 1960), lateral view of P1 element MDLCA 30340, sample 55. • J – *Zieglerodina remscheidensis* (Ziegler, 1960), lateral view of P1 element MDLCA 30341, sample 51. • K – *Zieglerodina prosoplatys* (Mawson et al., 2003), lateral view of P1 element MDLCA 30342, sample 56. • L – *Zieglerodina prosoplatys* (Mawson et al., 2003), lateral view of P1 element MDLCA 30343, sample 55. • M – *Zieglerodina formosa* (Drygant, 2010), lateral view of P1 element MDLCA 30344, sample 58. • N – *Zieglerodina* sp., lateral view of P1 element MDLCA 30345, sample 56. • O – *Zieglerodina planilingua* (Murphy & Valenzuela-Ríos, 1999), upper view of P1 element MDLCA 30348, sample 55. • P – *Zieglerodina* sp., lateral view of P1 element MDLCA 30346, sample 55. • Q – *Lanea omoalpha* Murphy & Valenzuela-Ríos, 1999, upper view of P1 element MDLCA 30349, sample 55. • R – *Zieglerodina* sp., lateral view of P1 element MDLCA 30347, sample 56. • S – *Pseudooneotodus beckmanni* (Bischoff & Sannemann, 1958), upper-lateral view of element MDLCA 30350, sample 55. • T – *Icriodus hesperius* Klapper & Murphy, 1975, upper view of P1 element MDLCA 30351, sample 49. • U – *Belodella resima* (Philip, 1965), lateral view of P1 element MDLCA 30352, sample 55. • V – *Panderodus unicostatus* (Branson & Mehl, 1933), lateral view of element MDLCA 30353, sample 55. • W – *Oulodus* sp., lateral view of S1 element MDLCA 30354, sample 54.

as related, differing only by the shape of the lower margin of the element. Considering this strong similarity, and awaiting the reconstruction of the apparatus, we prefer to consider this species belonging to *Zieglerodina*. In fact, differences between *Zieglerodina* and *Pandorinellina* are based on the morphology of ramiform elements.

Occurrence. – Lower and middle Lochkovian (Drygant & Szaniawski 2012).

***Zieglerodina mashkovae* (Drygant, 1984)**

Figure 5C–E

- 1984 *Spathognathodus mashkovae* sp. n.; Drygant, p. 125, pl. 14, fig. 10, 11, 13–21.
? 1980 *Ozarkodina remscheidensis remscheidensis* (Ziegler). – Schönlaub, pl. 1, fig. 10/20.
? 1985 *Ozarkodina remscheidensis remscheidensis* (Ziegler). – Schönlaub, pl. 1, fig. 10.
2010 *Zieglerodina mashkovae* (Drygant). – Drygant, p. 53, pl. 1, figs 18–20.
2012 *Zieglerodina mashkovae* (Drygant). – Drygant & Szaniawski, p. 854, fig. 12u, 13g, k.

Material. – Five specimens from sample 51, 55 and 56.

Remarks. – *Zieglerodina mashkovae* is characterized by straight upper and lower margins of the element, a high cusp definitely bigger than the other denticles that are more or less of equal height, and a symmetrical basal cavity approximately in central position.

Drygant (2010) suggested that *Z. eladioi* (Valenzuela-Ríos) could be a junior synonym of *Z. mashkovae*, but we disregard this assignment, because of distinct differences in the P1 element, and we consider *Z. eladioi* as a valid species. For description of the latter see above.

Occurrence. – According to Drygant & Szaniawski (2012) the species occurs in the whole Lochkovian, from the *Caud. hesperius* Zone to the *Caud. serus* Zone in Podolia, whereas in other regions it is limited to lower and middle Lochkovian.

***Zieglerodina prosoplatys* (Mawson et al., 2003)**

Figure 5K, L

- 2003 *Ozarkodina remscheidensis prosoplatys* Mawson et al., p. 92, pl. 1, figs 4–23.
2012 *Zieglerodina prosoplatys* (Mawson et al.). – Drygant & Szaniawski, p. 854, fig. 13e, f, j.

Material. – Two specimens from samples 55 and 56.

Remarks. – *Zieglerodina prosoplatys* is characterized by a slightly bowed concave basal margin and an anterior deepening of the blade.

Occurrence. – Lower Lochkovian. Mawson et al. (2003) reported the species from the *Icr. hesperius* Zone into the *Icr. eurekaensis* Zone in Pakistan. The latter Zone is more or less equivalent to the *Icr. postwoschmidti* Zone and the lower part of the *Ad. carlsi* Zone of present schemes (Corradini & Corrigan 2012). Our specimens from Cellon section come from the *Icr. postwoschmidti* Zone.

***Zieglerodina* sp. A**

Figure 5G, H

- 2010 *Zieglerodina remscheidensis* (Ziegler). – Drygant, pl. 1, fig. 3 (only).

Material. – Four specimens from sample 48A.

Description. – P1 element of *Zieglerodina* characterized by a short blade bearing closely spaced denticles of different size on both processes, with smaller denticles intercalated within larger ones. The cusp is slightly larger than the other denticles and is located in central position, above the small basal cavity.

Remarks. – The species differs from other taxa of *Zieglerodina* for the alternate denticulation pattern and the parallel lower and upper margin of the blade.

Occurrence. – Lower Lochkovian, *Icr. hesperius* Zone.

***Zieglerodina* sp. B**

Figure 5F

- 1980 *Ozarkodina remscheidensis remscheidensis* (Ziegler). – Schönlaub, pl. 2, fig. 1/32; pl. 6, fig. 7.
1985 *Ozarkodina remscheidensis remscheidensis* (Ziegler). – Schönlaub, pl. 2, fig. 1.

Material. – Three specimens from sample 56.

Description. – P1 element of *Zieglerodina* characterized by a strong blade, higher in the anterior part, that bears strong triangular denticles, that have an alternate pattern on the posterior part; in the anterior part the size of denticles decreases from the distal end towards the cusp, with the exception of the last denticle that is slightly smaller than the adjacent one. The cusp, triangular in lateral view, is larger than the denticles. The wide, asymmetrical, basal cavity is located about 1/3 of the length of the element.

Remarks. – The characteristic pattern of the denticles distinguishes this taxon from the other species of *Zieglerodina*.

Occurrence. – Lower Lochkovian, *Icr. postwoschmidti* Zone.

Conclusions

The main results of this study on the Lochkovian part of Cellon section can be summarized as follows:

(i) Twenty-two conodont taxa (species and subspecies) have been recognized, belonging to nine genera (*Belodella*, *Dvorakia*, *Icriodus*, *Lanea*, *Oulodus*, *Ozarkodina*, *Panderodus*, *Wurmiella* and *Zieglerodina*);

(ii) *Zieglerodina formosa*, *Z. mashkovae* and *Z. prosoplatis* are reported for the first time from the Carnic Alps; two other species of *Zieglerodina*, probably new, are described in open nomenclature.

(iii) The investigated part of the section can be assigned to the lower Lochkovian (*Icriodus hesperius* and *Icr. postwoschmidti* conodont zones).

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