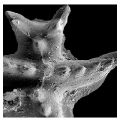
Upper Silurian and Lower Devonian conodonts from Tafilalt, southeastern Morocco

MARIA G. CORRIGA, CARLO CORRADINI & OTTO H. WALLISER†



The conodont association from three Silurian-Lower Devonian sections (Bou Tchrafine N2, Atrous 3 and Atrous 7) in the Tafilalt (southeast Morocco) are presented. The sections are constituted by cephalopod rich limestones ("*Orthoceras* limestones") and by crinoidal limestones ("*Scyphocrinites* limestones") cropping out within thick shaley sequences. The association includes 29 taxa belonging to 13 genera (*Ancyrodelloides*, *Belodella*, *Dvorakia*, *Icriodus*, *Kockelella*, *Lanea*, *Oulodus*, *Ozarkodina*, *Pelekysgnathus*, *Polygnathoides*, *Pseudooneotodus*, *Wurmiella*, *Zieglerodina*). The conodont fauna allows the recognition of seven conodont zones: *ploeckensis* and *siluricus* in the Ludlow, *eosteinhornensis* s.l., Lower *detortus* and Upper *detortus* in the Přídolí, and *hesperius* and *transitans* in the Lochkovian. The age of the "*Orthoceras* limestones" is confirmed as middle Ludfordian (*ploeckensis-siluricus* zones), whereas it is stated that the "*Scyphocrinites* limestones" spans the Silurian/Devonian boundary. Some elements of the apparatus of *Zieglerodina planilingua* and the P2 element of *Lanea omus* are described. The phylogenetic relationships between genera *Lanea* and *Ancyrodelloides* are discussed. • Key words: conodonts, biostratigraphy, taxonomy, Silurian, Lower Devonian, Morocco.

CORRIGA, M.G., CORRADINI, C. & WALLISER, O.H. 2014. Upper Silurian and Lower Devonian conodonts from Tafilalt, southeastern Morocco. *Bulletin of Geosciences 89(1)*, 183–200 (7 figures, 3 tables). Czech Geological Survey, Prague. ISSN 1214-1119. Manuscript received July 29, 2013; accepted in revised form October 5, 2013; published online January 21, 2014; issued January 21, 2014.

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In the Tafilalt region, southeastern Morocco, rocks from Ordovician to Carboniferous are widely exposed. Among this sequence the Silurian and lowermost Devonian terms are the less investigated, being represented mainly by pelitic and marly sediments cropping out at the base of ridges constituted by Devonian limestones and sandstones (Hollard 1977). Carbonatic beds and lenses occur within the shales: in first approximation they are represented by cephalopod rich limestones ("*Orthoceras* limestones") and by crinoidal limestones ("*Scyphocrinites* limestones"). These beds are well known mainly for the perfectly preserved fossils, and for mining activities with commercial background that increased since the late 1970s.

Only a few stratigraphic data are available from these limestones: in first approximation the *Orthoceras* limestones are reported from the Ludlow to the Lochkovian, whereas the *Scyphocrinites* limestones occur across the Silurian/Devonian boundary, but their precise age is still disputed on the basis of scarce data. Hollard (1977) placed the Silurian/Devonian boundary in the upper part of the *Scyphocrinites* limestones on the basis of the occurrence of *Monograptus uniformis* in the Taouz section, in southern Tafilalt. This datum is confirmed by Haude & Walliser (1998). In the same area Becker *et al.* (2013) found only basal Devonian conodonts from this unit at El Khraouia, whereas Kröger (2008) draw the boundary on the upper part of the *Scyphocrinites* limestones at Filon Douze, on the basis of similitude of this section with the nearby localities studied by Hollard (1977) and Haude & Walliser (1998). More to the east, at Ouidane Chebbi, Belka *et al.* (1999) referred the *Scyphocrinites* beds to the Lochkovian only.

Finally, a precise age of the *Scyphocrinites* Limestone in the Tafilalt was defined as spanning the Silurian/Devonian boundary in a preliminary note by Corriga *et al.* (2013, 2014). These author also demonstrated the stratigraphic range of the two types of lobolites and of the crinoidal crowns associated: the more primitive cirrus loboliths and genera *Scyphocrinites* and *Carolicrinus* occur in the whole Přídolí, whereas the advanced plate loboliths and genera *Camarocrinus* and *Marhoumacrinus* are present in the top Přídolí beds (Upper *detortus* conodont Zone) and in the basal Lochkovian (Corriga *et al*. 2014).

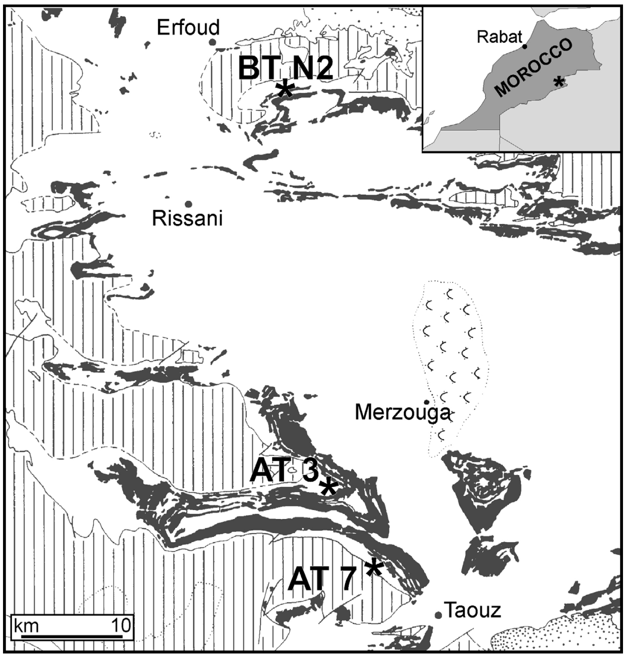


Figure 1. Location map.

Corriga *et al.* (2013, 2014) limited their investigation to the biostratigraphy of *Scyphocrinites* beds. In this paper the conodont association from the same three sections, from the *Orthoceras* limestones of Ludlow to the middle Lochkovian, is presented and discussed.

Geological settings

In the Tafilalt Silurian and lower–middle Lochkovian limestones are represented by carbonatic beds and lenses interbedded within thick shaley sequences, and forms more or less recognizable ridges (Haude & Walliser 1998). These limestones mainly crop out in three distinct parts of the sequence.

The older limestones are represented by the classical "*Orthoceras* limestones" of Ludfordian age (Hollard 1977). They are mainly represented by a dark pelagic mudstone rich in orthoceratid cephalopods, with bivalves (*Cardiola*) and gastropods. Kröger (2008) named these limestones "*Temperoceras* Limestone", after the name of the more common cephalopod genus.

The "*Scyphocrinites* limestones" (Hollard 1977) occur across the Silurian-Devonian transition and are represented by several beds and lenses of centimetric to decimetric thickness. The majority of the limestone levels consists of crinoidal detritus, whereas others are micritic with parallely arranged nautiloids. In some layers larger parts of scyphocrinoids are present, locally with excellently preserved crowns on the lower surface (Haude & Walliser 1998). Loboliths are always abundant.

A third group of limestones occur around the middle Lochkovian, and are mainly represented by orthoceratid limestones. However, if compared with the "*Orthoceras* limestones" and the "*Scyphocrinites* limestones" these middle Lochkovian beds are by far less widespread and documented. According to Rytina *et al.* (2013), these limestones can be correlated with bed PK of Kröger (2008).

The studied sections

Three sections, respectively named Bou Tchrafine N2 (loc. 474 of Walliser's locality catalogue), Atrous 3 (loc. 477) and Atrous 7 (loc. 540C) have been investigated (Fig. 1). Since the sections are very long and only the limestone beds are clearly visible in the field within long not exposed intervals, the thickness of the section is interpolated from the general inclination of exposed beds related to their horizontal distances, which were measured.

The Bou Tchrafine N2 section is located in the northern Tafilalt at the base of the northern side of Bou Tchrafine ridge, a few km southeast of Erfoud. The section is about 140 m thick (Fig. 2) and starts with a few *Orthoceras* Limestone beds and lenses cropping out along the plain. The *Scyphocrinites* beds here form evident small ridges and have a total thickness of about 21 m.

The Atrous 3 and Atrous 7 sections are located in southern Tafilalt, northwest of Taouz. Atrous 3 is located slightly west of Chaib-er-Ras. Here about 70 m of *Scyphocrinites* beds have been sampled (Fig. 3). In the lower part the limestones are scattered within the shales, whereas several beds crop out in the upper part of the section.

The Atrous 7 section (Fig. 4) is located SE of Bou Faddouz. According to Walliser notes, the section is probably very close to the section named "coupe de Taouz" by Hollard (1977). It starts with some beds of *Orthoceras* limestones, which yielded a rich fauna of middle Ludlow age. Following a long interval without exposures, the *Scyphocrinites* beds have a thickness limited to about 7 meters, definitely less than in the other sections studied. According to Walliser's sketch drawing of the section, sample AT 7 16 or AT 7 20 is equivalent to sample TM 720 by Hollard (1977). After a covered interval more than 100 m thick where only some dolerites are clearly visible, two beds of *Orthoceras* Limestone crop out: these beds yielded a mid-Lochkovian fauna.

Conodont fauna

More than fifty conodont samples, each between 2–3 kg, were collected and processed with conventional acetic and/or formic acid technique, yielding about 2000 conodont elements (Tables 1–3). In general the state of preser-

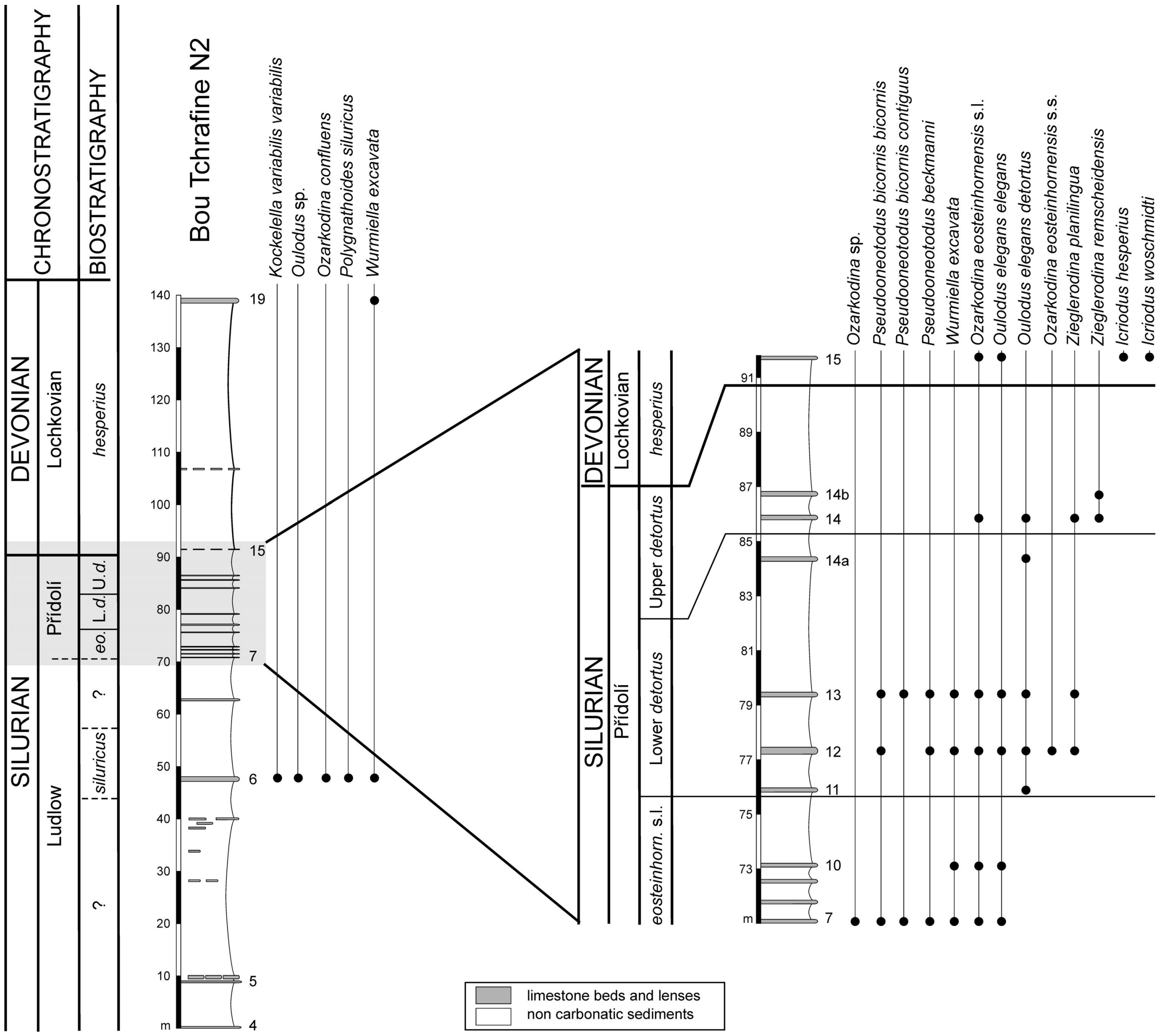


Figure 2. Stratigraphic log of the Bou Tchrafine N2 section, with occurrence of conodont species.

vation is quite good, even if better in Atrous 3 and Atrous 7, than in Bou Tchrafine N2 section. The abundance is higher in the Silurian than in the Devonian part of the sections, but differences in abundance may occur from bed to bed, and a few levels resulted barren. Color of conodonts is dark brown (Color Alteration Index = 3–4), and is slightly darker in Bou Tchrafine than in Atrous sections.

The association includes 29 taxa belonging to 13 genera (*Ancyrodelloides*, *Belodella*, *Dvorakia*, *Icriodus*, *Kockelella*, *Lanea*, *Oulodus*, *Ozarkodina*, *Pelekysgnathus*, *Polygnathoides*, *Pseudooneotodus*, *Wurmiella*, *Zieglerodina*).

In the Ludlow the association is dominated by *Kockelella variabilis variabilis*, *Polygnathoides siluricus* and *Wurmiella excavata*. In Přídolí and lower Lochkovian strata *Oulodus* and ozarkodinids (mainly *Zieglerodina* and "*Ozarkodina*") are dominant, whereas other genera are always scarce. Middle Lochkovian associations of Atrous 7 section are dominated by *Pelekysgnathus* and *Ancyrodelloides*. In general coniforms are always rare and present only in some levels with genera *Dvorakia* and *Pseudooneotodus*.

Anomalous elements

A few anomalous elements have been collected throughout the sections. They are mainly represented by ramiform elements with an unusually branched process. In literature such forms have been documented from several Silurian levels, and are particularly common in the *siluricus* Zone

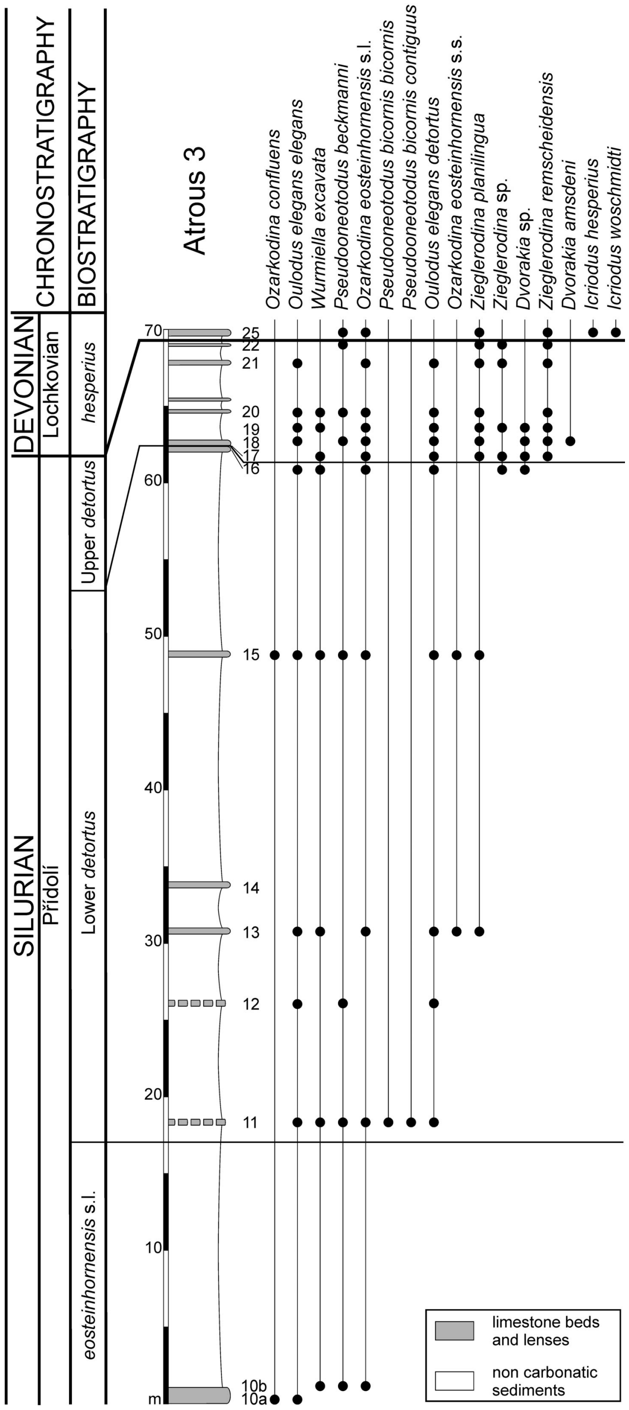


Figure 3. Stratigraphic log of the Atrous 3 section, with occurrence of conodont species.

(Klapper & Murphy 1975; Corradini *et al.* 1996, 2009a, 2009b; Corriga *et al.* 2009; Slavík *et al.* 2010); beside, have been reported also from the top Llandovery *amorphognathoides* Zone (Walliser 1964, Helfrich 1980) and around the Silurian/Devonian boundary (Walliser 1964, Corradini & Corriga 2010).

In the collections from Tafilalt, anomalously branched elements have been reported from the *siluricus* Zone (Fig. 5N) and from the Lochkovian *transitans* Zone (Fig. 5M). As far as we know, this is the first report of such forms from the Lower Devonian.

Beside these branched forms, in bed AT 3 10b (*eosteinhornensis* s.l. i.Z.) a deformed S0 element of *Oulodus* sp. has been found (Fig. 6R): on the left side the normal denticulation is present, whereas on the right process a few small denticles looks to have been grown above an older fracture surface.

Biostratigraphy

The biozonation schemes followed in this paper are those proposed by Cramer *et al.* (2011), for the Ludlow, and by Corradini & Corriga (2012) for the Přídolí and Lochkovian.

The conodont faunas allow recognition of seven conodont zones in the studied sections: *ploeckensis* and *siluricus* zones in the Ludlow; *eosteinhornensis* s.l., Lower *detortus* and Upper *detortus* zones in the Přídolí; *hesperius* and *transitans* zones in the Lochkovian. A few intervals have not been documented, probably corresponding to the long shaley intervals, mostly covered, above and below the *Scyphocrinites* beds. In fact, the upper Ludlow *snajdri* interval Zone and *crispa* Zone, and the Lochkovian *postwoschmidti* and *carlsi* zones are missing.

The *ploeckensis* Zone

The *ploeckensis* Zone is possibly present at the base of the Atrous 7 section, in bed 11. The marker is missing, but the association of various species of *Kockelella* (with *K. v. variabilis* very abundant), *Pseudooonetodus* and *Wurmiella excavata* suggests a "pre-*siluricus*" interval. The biostratigraphic attribution is confirmed by the entry of *Polygnathoides siluricus* immediately above. However, a slightly older age (*i.e. variabilis* interval Zone) cannot be excluded.

The *siluricus* Zone

The occurrence of the marker *Polygnathoides siluricus* allows to discriminate the *siluricus* Zone in Bou Tchrafine (bed 6) and Atrous 7 (beds 12–13) sections. *Pol. siluricus* and *Wurmiella excavata* are dominant; *Kockelella v. variabilis* and *K. v. ichnusae* are present only in the lower part of the zone, confirming their known range from other part of the world (Serpagli & Corradini 1999; Slavík *et al.* 2010, 2013).

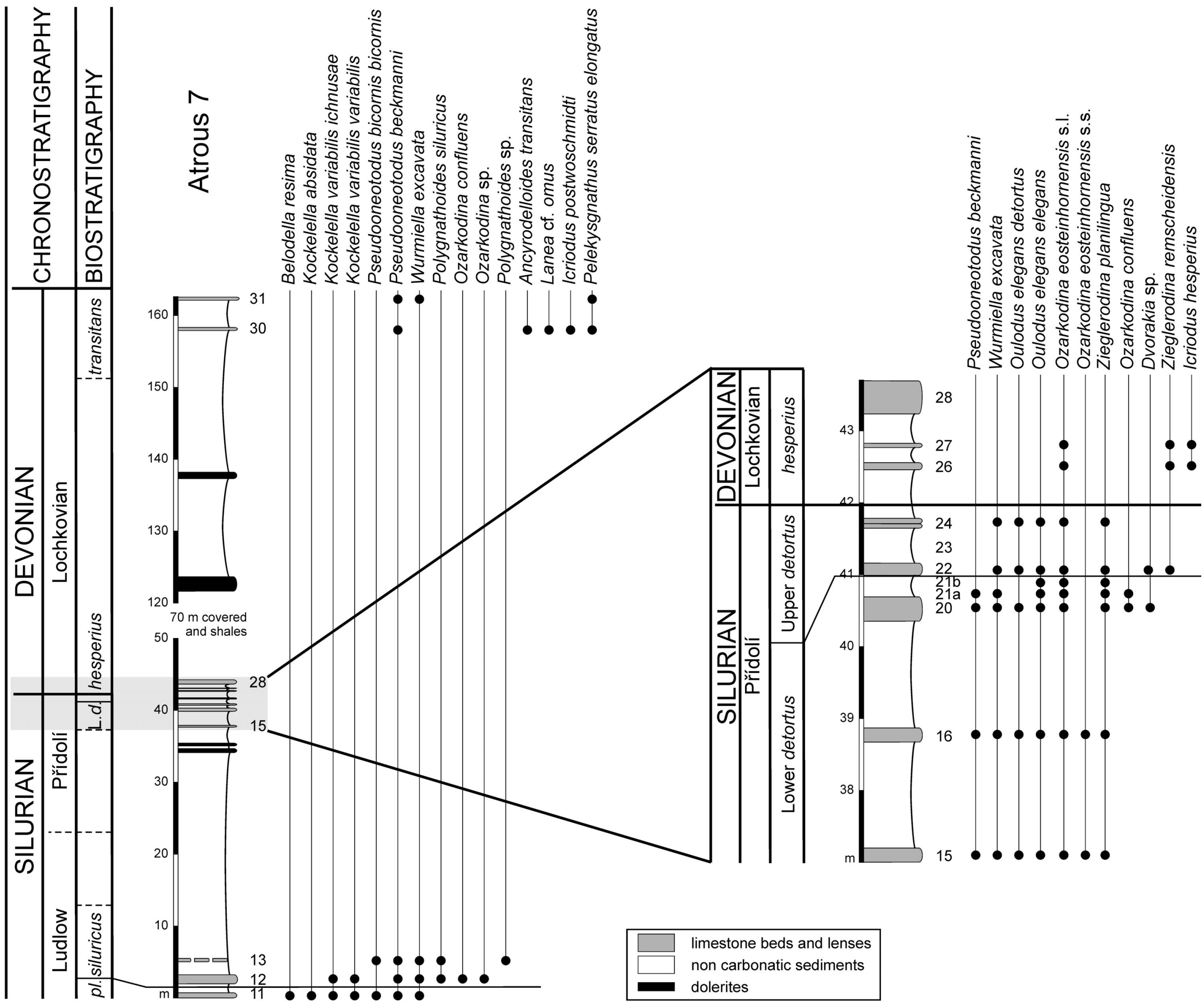


Figure 4. Stratigraphic log of the Atrous 7 section, with occurrence of conodont species.

The *eosteinhornensis* s.l. interval Zone

We attribute to this zone beds 7–10 of Bou Tchrafine N2 section and beds 10a–10b of Atrous 3 section, due to the occurrence of a typical lower Přídolí association, below the entry of *Oulodus el. detortus*. In general, conodonts are not abundant in this interval; the association is dominated by *Pseudooneotodus*, whereas *Oulodus elegans elegans* is common.

The Lower *detortus* Zone

The Lower *detortus* Zone is discriminated by the entry of the marker *Oulodus el. detortus* in the three sections: Bou Tchrafine (beds 11–14a), Atrous 3 (beds 11–16) and Atrous 7 (beds 15–21b) sections. The "*Ozarkodina*" *eosteinhornensis* s.s. horizon is present in all the sections, and *Zieglerodina planilingua* enters within this horizon. *Oulodus el. detortus*, *Oul. el. elegans* and "*Ozarkodina*" *eosteinhornensis* s.l. are dominant in this interval.

The Upper *detortus* Zone

The Upper *detortus* Zone is recognized in Bou Tchrafine (beds 14–14b), Atrous 3 (beds 17–22) and Atrous 7 (beds 22–24) sections by the first occurrence of *Zieglerodina remscheidensis* that enters within this zone (Corradini & Corriga 2012). In fact, the lower boundary of the zone is defined by the extinction of *Dapsilodus obliquicostatus*, but neither this taxon, nor *Coryssognathus dubius* or *Panderodus recuvatus* that have the same last occurrence (Corradini & Corriga 2012) have been found in the studied section. Therefore, the lower boundary of this zone can be in a slightly lower position in all the three sections.

Table 1. Distribution of conodonts in the Bou Tchrafine N2 section.

	bed	1	2	3	5	6	7	10	11	12	12	12	12	13	14a	14	14b	15	15a	19	total
	sample	3738	3739	3740	3741	3742	3742	3790	3791	3792	3744	3745	3746	3747	3793	3748	3798	3794	3749	3750	
Icriodus hesperius	P1																	3			3
	M																	3			3
Icriodus woschmidti	P1																		4		4
	M																		2		2
Kockelella variabilis variabilis	P1					2															2
	S0					1															1
	S1					1															1
	S2					4															4
Oulodus elegans detortus	P1													9							9
	P2													3							3
	M										3	1	22	3							29
	S0								1				3								4
	S1												2	1							3
	S2								1		7	3	36	4		1					52
Oulodus elegans elegans	P2							3			5		11								19
	M							1				1	14		1						17
	S0										3		2	1							6
	S1										1		5	1					2		9
	S2						1	2					1	4							8
Oulodus sp.	S1					1															1
	S2					4															4
Ozarkodina confluens	P1					1															1
Ozarkodina eosteinhornensis s.s.	P1										1		5								6
Ozarkodina eosteinhornensis s.l.	P1						2	1			2	2	14	1		1		5	1		29
	P2										2	2	5					1	1		11
	M											1	1								2
	S0												1								1
	S1										1										1
	S2							1				1	2					1			5
Ozarkodina sp.	P1						2														2
Polygnathoides siluricus	P1					2															2
	M					1															1
	S1					1															1
Pseudooneotodus beckmanni							4						16	6					8		34
Pseudooneotodus bicornis contiguus							9							2							11
Pseudooneotodus bicornis bicornis							38						1	1							40
Wurmiella excavata	P1					7	1	1			1	2	2	1							15
	P2					1							2							1	4
	S0										1										1
	S1						1						1								2
	S2					2	1														3
Zieglerodina planilingua	P1											3	2	5		2					12
Zieglerodina remscheidensis	P1															1					1
	P2															1					1
	S2															1					1
Indetermined and fragments						8	3	3				3	32	5							54
Total		0	0	0	0	36	62	12	2	0	27	19	180	47	1	7	0	13	18	1	425

Table 2. Distribution of conodonts in the Atrous 3 section.

	bed	10a	10b	11	12	13	14	15	16	17	17b	17c	18	19	19	20	20	21	22	25	total
	sample	3707	3708	3709	3710	3711	3712	3713	3714	3787	3716	3717	3718	3788	3719	3720	3789	3721	3722	3723	
Dvorakia amsdeni	S3												1								1
Dvorakia sp.									2	4	3		1	1	5						16
Icriodus hesperius	P1																			3	3
	M																			4	4
Icriodus woschmidti	P1																			6	6
	M																			1	1
Oulodus elegans detortus	P1				1				2												3
	P2				1			2			1		1			4	1				10
	M					5		30		9		2	1		1	4		1			53
	S0					1		1	1			1	5	1	1						11
	S1				3			7					3		4	1		8			26
	S2			1	1	6		11	7	5	2	2	8	1	8		9	5			66
Oulodus elegans elegans	P1	1	5		1	1					2	1									11
	P2		5		2	4		3	15	3					1	2		1			36
	M	2	9	2	3	1		8		3	3	2	2			1	1	1			38
	S0	1	2	3	2	2			1		4	1	4		1		1	1			23
	S1		1					2		3		1			1		2	2			12
	S2		6	1		3		1	10	3		2				2					28
Ozarkodina confluens	P1	1						1													2
	P2	1																			1
Ozarkodina eosteinhornensis s.s.	P1					8		1													9
Ozarkodina eosteinhornensis s.l.	P1		4	2		3		31	7	9	8	8	21		12	33	13	6	1	2	160
	P2		1			4		11		15		3	3		6	20	1	3	1	1	69
	M					1		2			1	1			1			1			7
	S0		1					2		3	2		1			1		1			11
	S1					1		1							9				1		12
	S2					2		2		3	2		3		6	3	1		4		26
Ozarkodina sp.	P1											3									3
Pseudooneotodus beckmanni			12	11	3	1		4					1			1			2	5	40
Pseudooneotodus bicornis bicornis				1																	1
Pseudooneotodus bicornis contiguus				1																	1
Wurmiella excavata	P1		1	1		1		1	24	1					1	9	1				40
	P2															10					10
	M															1					1
	S0								1							5					6
	S1															4					4
	S2								1							2					3
Zieglerodina planilingua	P1					2		2		2	4	5	7		13	2	7	13	7	1	65
	P2									1			3		2			1			7
	M												1		1				2		4
	S1												1		2						3
Zieglerodina remscheidensis	P1										2	2	10		4	3		2	2	2	27
	P2												4								4
	S1															1					1
Zieglerodina sp.	P1								1		1				2			1	1		6
Fragments		2	3	4	3	2	1	4	5	2	2	1	2	1	3	2	2	1	1	2	43
Total		8	50	27	20	48	1	127	77	66	37	35	83	4	84	111	39	48	22	27	914

Table 3. Distribution of conodonts in the Atrous 7 section.

bed		11	12	13	15	16	20	21a	21b	22	23	24	26	27	28	30	31	total
sample		3724	3725	3726	3727	3728	3729	3796	3795	3730	3797	3731	3732	3733	3734	3735	3736	
Ancyrodelloides transitans	P1															5		5
Belodella resima	Sa	1																1
Dvorakia sp.							1			4								5
Icriodus hesperius	P1												4	34				38
	M													8				8
Icriodus postwoschmidti	P1															1		1
Kockelella ortus absidata	P1	2																2
Kockelella variabilis ichnusae	P1	2	3															5
Kockelella variabilis variabilis	P1	6	2															8
	P2	3	2															5
	S0		5															5
	S1	3	4															7
	S2	1	4															5
Lanea cf. *omus*	P1															1		1
	P2															1		1
Oulodus elegans detortus	P1									1								1
	P2				4	2	1			3								10
	M				3	1	3			2								9
	S0				1		2			2		2						7
	S1				1		2											3
	S2				10	2	8			4		2						26
Oulodus elegans elegans	P1				1				1									2
	P2				1	1	1											3
	M					1	1	1		1		2						6
	S0				5		1	1		1								8
	S1						4			1		1						6
	S2				3		3		1									7
Ozarkodina confluens	P1		2				10	2										14
	S2		1															1
Ozarkodina eosteinhornensis s.s.	P1				1	2												3
Ozarkodina eosteinhornensis s.l.	P1				13	3	9	2	2	6		18	2	5				60
	P2				1	1	1	1		1		2						7
	M											1						1
	S0						1			1		1						3
	S1									1								1
	S2				1		2	2										5
Ozarkodina sp.	P1		1															1
	P2		1															1
Pelekysgnatus serratus elongatus	P1															19	1	20
	M															2	2	4
Polygnathoides siluricus	P1		12	8														20
	P2		9	3														12
	M		3															3
	S0			1														1
	S1		1															1
	S2		2	2														4
Polygnathoides sp.	P1			1														1
Pseudooneotodus beckmanni		1	1	7	1	1	1									1	6	19

	bed	11	12	13	15	16	20	21a	21b	22	23	24	26	27	28	30	31	total
	sample	3724	3725	3726	3727	3728	3729	3796	3795	3730	3797	3731	3732	3733	3734	3735	3736	
Pseudooneotodus bicornis bicornis		1		12														13
Wurmiella excavata	P1	3	28	3	1	1	10	2		1		1					1	51
	P2		2	3														5
	M		2	3								1						6
	S0		1	1								1						3
	S1		2	2								1						5
	S2		8	8								1						17
Zieglerodina planilingua	P1				1	4	1	8	3	20		3						40
	P2					1		1										2
Zieglerodina remscheidensis	P1									3			1	9				13
	P2									1								1
Zieglerodina sp.	P1							1				1					1	3
Anomalous elements			3													1		4
Indetermined and fragments		6	15	17	4	8	2	4	1	5		2	4	6		5	2	81
Total		28	114	71	52	28	64	25	8	58	0	40	11	62	0	28	13	602

In the Bou Tchrafine section conodonts are very rare in this interval. *Oulodus* (*Oul. el. elegans* and *Oul. el. detortus*) and "*Ozarkodina*" *eosteinhornensis* s.l. are always abundant, as well as *Zieglerodina planilingua* in some levels (*i.e.*: AT 3 19b, AT 7 22).

The *hesperius* Zone

The entry of the marker *Icriodus hesperius* allows discriminating the *hesperius* Zone in Atrous 3 (beds 25) and Atrous 7 (beds 26–18) sections. *Icriodus* is the dominant genus in this interval.

The *transitans* Zone

The *transitans* Zone is discriminated in the uppermost part of the Atrous 7 section (beds 30–31) by the occurrence of the marker *Ancyrodelloides transitans* and of *Pelekysgnathus serratus elongatus*. These forms are the only taxa abundant in these beds, while the other species collected are rare.

Phylogenesis of genera *Lanea* and *Ancyrodelloides*

Genus *Lanea* has been established by Murphy & Valenzuela-Ríos (1999), subdividing species previously included in *Ancyrodelloides* and moving a few other taxa from other genera (*i.e.* "*Spathognathodus*" *telleri*). According the original diagnosis, *Lanea* is characterized by the evident "terrace", the unrestricted basal cavity and the normally unornamented basal platform. Representatives of "*Ancyrodelloides* have ridges or tubercles above one or both the basal platform lobes, whereas only rare variants of some of the derived members of *Lanea* have ridges or tubercles" and "the processes found in the Pa elements of *Lanea* are lobate, whereas those in *Ancyrodelloides* are extensiform" (Murphy & Valenzuela-Ríos 1999, p. 327).

In the same paper Murphy & Valenzuela-Ríos (1999) also erected three new species: "*Ozarkodina*" *planilingua* (now *Zieglerodina planilingua*), *Lanea eoeleanorae* and *Lanea omoalpha*. The first is considered as the ancestor of *Lanea*, having a small terrace. The latter, that is the former morphotype α of *Ancyrodelloides omus* Murphy & Matti, 1983, is the older species of *Lanea*. Additionally, Murphy & Valenzuela-Ríos (1999) assigned the species *L. eleanorae* (Lane & Ormiston, 1979) and *L. telleri* (Schulze, 1968) to their new genus *Lanea*.

Murphy & Valenzuela-Ríos (1999) published also a list of taxa left to *Ancyrodelloides*: *A. trigonicus* Bischoff & Sannemann, 1958, *A. transitans* (Bischoff & Sannemann, 1958), *A. kutscheri* Bischoff & Sannemann, 1958, *A. asymmetricus* (Bischoff & Sannemann, 1958), *A. carlsi* (Boersma, 1973), *A. omus* Murphy & Matti, 1983, *A. orcula* Wilson, 1989, *A. secus* Barrick & Klapper, 1992, *A. cruzae* Valenzuela-Ríos, 1994 and *A. murphyi* Valenzuela-Ríos, 1994. Later, *A. sequeirosi* Valenzuela-Ríos, 1999 has been established.

Recently Slavík (2011) moved *A. carlsi* to *Lanea* and suggested that also *A. omus* β morph Murphy & Matti, 1983 should be attributed to *Lanea* on the basis of the shape of the basal cavity and the presence of some ornamentation on the platform. We agree that *A. omus* should be attributed to *Lanea* for the strong affinity with *L. omoalpha*, from which it differs mainly by the occurrence of denticles on the platform terraces: the shape of the lobes, the wide terraces and the lacking of strong ornamentation on the platform are characteristic more close to *Lanea*, than to *Ancyrodelloides*. Therefore the taxon should be named *L. omus* (Murphy & Matti 1983).

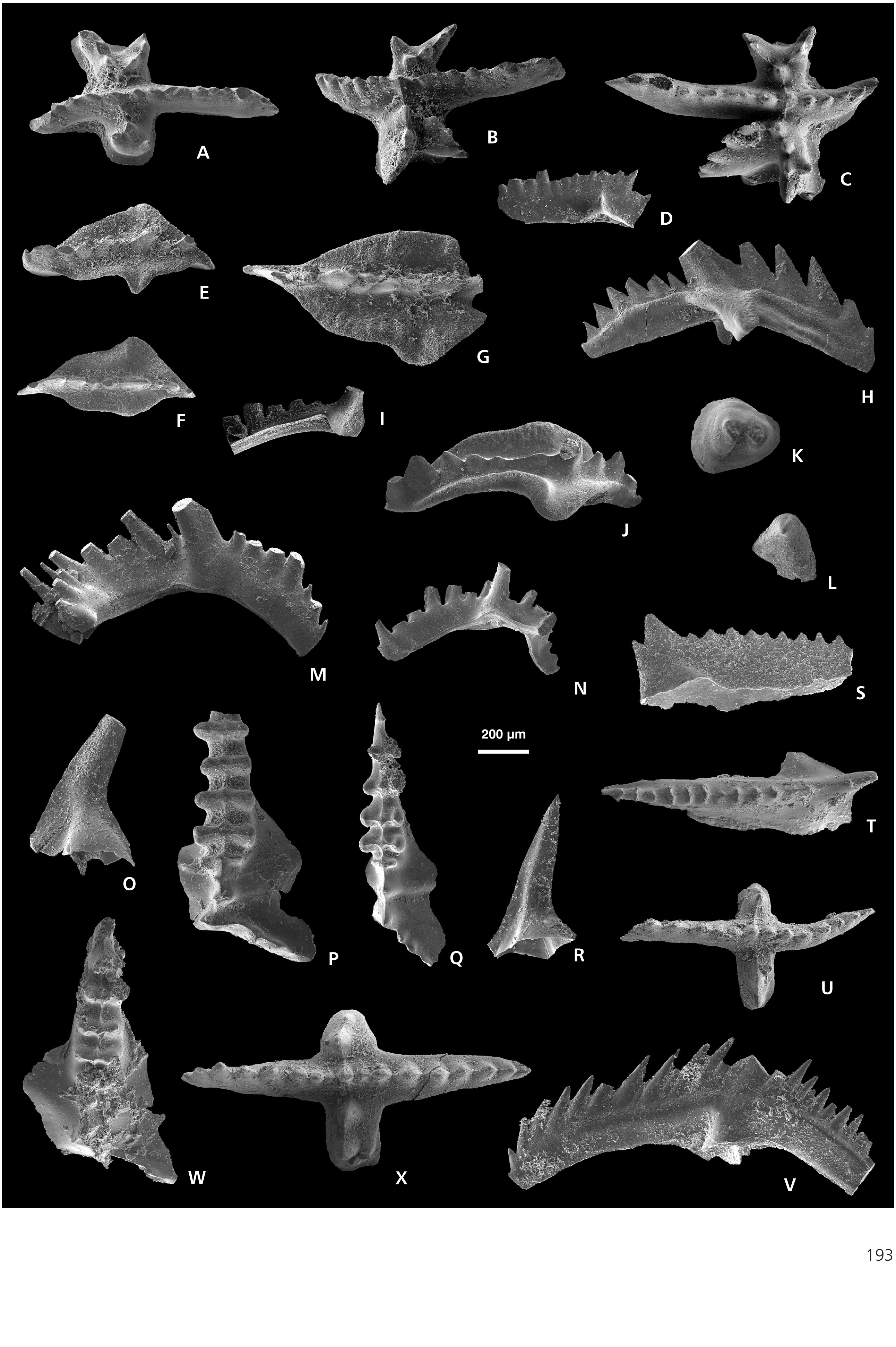
On the other hand, we disagree on the new attribution of *A. carlsi* to *Lanea*: the species was described as *Spathognathodus carlsi* by Boersma (1973) and moved to *Ancyrodelloides* by Klapper (*in* Ziegler 1991). In our opinion the well-developed asymmetrical lateral process, without a well evident terrace, bearing strong denticles, or even nodes, is a characteristic of *Ancyrodelloides*, and therefore it looks more appropriate leave it in this genus. However, other characteristics, like the wide-open basal cavity are more typical and fit better in *Lanea*. It should be pointed out that the diagnoses of *Ancyrodelloides* and *Lanea* are not clear and overlap each other: the correct attribution of species to one or the other genus shall be defined only after a revision of the diagnoses based not only on the P1 element, but also on the complete apparatus. Up to now the only complete known apparatus (Slavík 2011) belongs to *A. carlsi* (named by the author *L. carlsi*), and the species shall be attributed certainly to one or the other genus only when the apparatuses of other species of *Ancyrodelloides* and *Lanea* will be reconstructed.

In the last years, several papers on Lochkovian conodonts have been published (*i.e.* Barrick *et al.* 2005; Corriga 2011; Corriga *et al.* 2011, 2012; Corradini & Corriga 2012; Slavík *et al.* 2012; Drygant & Szaniawski 2012; Mavrinskaya & Slavík 2013), presenting data that can help in the reconstruction of the phylogenesis of *Lanea* and *Ancyrodelloides* (Fig. 7).

As already proposed by Murphy & Valenzuela-Ríos (1999), genus *Lanea* originated from *Zieglerodina planilingua* around the base of the *postwoschmidti* Zone, when the first occurrence of *L. omoalpha* is recorded (see discussion in Corradini & Corriga, 2012, p. 647). The phylogenesis of *Lanea* is simple and the lineage *omoalpha-eoeleanorae-eleanorae-telleri* has been described by Murphy & Valenzuela-Ríos (1999). *Lanea omus* (= *Ancyrodelloides omus* morph. β Murphy & Matti, 1983) originated from *L. omoalpha* by the development of tubercles on the platform at the base of the *transitans* Zone.

The older *Ancyrodelloides*, *A. carlsi*, branched from *Lanea omoalpha*, by the development of a strong, denticulated lateral process. *A. carlsi* gave rise to *A. transitans*, characterized by denticulated lateral processes on both sides of the element (Slavík 2011). *A. secus* is a short ranging species within the *transitans* Zone that originated from *A. transitans* by development of a "V-shaped pattern" of nodes on the outer platform (Barrick & Klapper 1992). *Ancyrodelloides* has a large radiation in the upper part of the middle Lochkovian, when two main lineages, branched from *A. transitans* can be recognized (Valenzuela-Ríos 1994, 1999). The first, more developed and represented mainly by taxa with a wide geographical distribution, is represented by *A. trigonicus* – *A. kutscheri* – *A. sequeirosi*. The second, that up to now looks limited to part of North Gondwana, includes *A. cruzae* – *A. murphy*. Slavík *et al.* (2012) observed the increased number of different morphologies with various branching patterns of lateral processes. They considered it as radiation in terminal range

Figure 5. A – *Kockelella variabilis ichnusae* Serpagli & Corradini, 1998; upper view of P1 element GZG 1612-540C-3724-1, sample AT 7 11, *ploeckensis* Zone. • B – *Kockelella variabilis variabilis* Walliser, 1957; upper view of P1 element GZG 1612-540C-3724-2, sample AT 7 11, *ploeckensis* Zone. • C – *Kockelella variabilis variabilis* Walliser, 1957; upper view of P1 element GZG 1612-540C-3724-3, sample AT 7 11, *ploeckensis* Zone. • D – *Kockelella absidata absidata* Barrick & Klapper, 1976; lateral view of P1 element GZG 1612-540C-3724-4, sample AT 7 11, *ploeckensis* Zone. • E – *Polygnathoides siluricus* Branson & Mehl, 1933; upper view of P1 element GZG 1612-540C-3725-1, sample AT 7 12, *siluricus* Zone. • F – *Polygnathoides siluricus* Branson & Mehl, 1933; upper view of P1 element GZG 1612-540C-3726-2, sample AT 7 13, *siluricus* Zone. • G – *Polygnathoides siluricus* Branson & Mehl, 1933; upper view of P1 element GZG 1612-540C-3726-1, sample AT 7 13, *siluricus* Zone. • H – *Polygnathoides siluricus* Branson & Mehl, 1933; lateral view of P2 element GZG 1612-540C-3725-2, sample AT 7 12, *siluricus* Zone. • I – *Polygnathoides siluricus* Branson & Mehl, 1933; lateral view of M element GZG 1612-540C-3725-3, sample AT 7 12, *siluricus* Zone. • J – *Polygnathoides* sp.; upper-lateral view of P1 element GZG 1612-540C-3726-3, sample AT 7 13, *siluricus* Zone. • K – *Pseudooneotodus bicornis bicornis* Drygant, 1974; upper view GZG 1612-474-3742-1, sample BT 7, *eosteinhornensis* s.l. Zone. • L – *Pseudooneotodus beckmanni* (Bischoff & Sannemann, 1958); lateral view GZG 1612-474-3742-2, sample BT 7, *eosteinhornensis* s.l. Zone. • M – anomalous element; lateral view of S1 element GZG 1612-540C-3735-6, sample AT 7 30, *transitans* Zone. • N – anomalous element; lateral view of S1 element GZG 1612-540C-3725-4, sample AT 7 12, *siluricus* Zone. • O – *Icriodus woschmidti* Ziegler, 1960; lateral view of M element GZG 1612-477-3723-1, sample AT 3 25, *hesperius* Zone. • P – *Icriodus woschmidti* Ziegler, 1960; upper view of P1 element GZG 1612-477-3723-2, sample AT 3 25, *hesperius* Zone. • Q – *Icriodus hesperius* Klapper & Murphy, 1975; upper view of P1 element GZG 1612-540C-3733-1, sample AT 7 27, *hesperius* Zone. • R – *Icriodus hesperius* Klapper & Murphy, 1975; lateral view of M element GZG 1612-540C-3733-2, sample AT 7 27, *hesperius* Zone. • S – *Pelekysgnathus serratus elongatus* Carls & Gandl, 1969; lateral view of P1 element GZG 1612-540C-3735-1; sample AT 7 30, *transitans* Zone. • T – *Pelekysgnathus serratus elongatus* Carls & Gandl, 1969; upper view of P1 element GZG 1612-540C-3735-2; sample AT 7 30, *transitans* Zone. • U – *Lanea* cf. *omus* (Murphy & Matti, 1983); upper view of P1 element GZG 1612-540C-3735-3, sample AT 7 30, *transitans* Zone. • V – *Lanea* cf. *omus* (Murphy & Matti, 1983); lateral view of P2 element GZG 1612-540C-3735-4, sample AT 7 30, *transitans* Zone. • W – *Icriodus postwoschmidti* Mashkova, 1968; upper view GZG 1612-540C-3735-5 sample AT 7 30, *transitans* Zone. • X – *Ancyrodelloides transitans* (Bischoff & Sannemann, 1958); upper view of P1 element GZG 1612-540C-3735-6, sample AT 7 30, *transitans* Zone.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of *Ancyrodelloides* because ranges of these undescribed or formally described (but based on a very small number of specimens) forms are coeval.

More problematic is the connection of *A. asymmetricus* – *A. orcula* with a defined species of the *Ancyrodelloides* stock. On the basis of the stratigraphical distribution of known taxa, *A. asymmetricus* can be originated only from *A. transitans*, by the loss of the outer lateral process. This relation was already suggested by Murphy & Cebecioglu (1987). However, the shape of P1 elements of the two species is quite different, and intermediate forms are not known. Another possibility, more likely, is that *A. asymmetricus* originated from *A. carlsi*, that has a more similar shape, by a greater development of the lateral process, but there is a short gap between the last known occurrence of *A. carlsi* and the first occurrence of *A. asymmetricus*. In fact, *A. carlsi* is reported up to the top of the *transitans* Zone (Corradini & Corriga 2012), whereas *A. asymmetricus* enters within the lower part of the *eleanorae* Zone, before the first occurrence of *Flajsella* (Murphy & Matti 1983).

It should be pointed out that these phylogenetical reconstructions are based on the P1 element only, because the complete apparatuses of almost all the species of *Lanea* and *Ancyrodelloides*, with the exception of *A. carlsi*, are still not known. Therefore the relationships between the various species, and also between the two genera, shall be precisely defined only when all the apparatuses will be reconstructed.

Systematic palaeontology

Systematic notes are restricted to necessary taxonomic remarks. For suprageneric classification the scheme proposed by Sweet (1988) is followed. Synonymy lists are limited to main and more recent captions. The entire fauna is housed in the "Walliser conodont collection" at the Geoscience Centre, Georg-August University Göttingen, under reference collection number GZG 1612. Horizon and catalogue numbers of figured specimens are given in the figure captions.

Phylum Chordata Bateson, 1886
Class Conodonta Pander, 1856
Order Ozarkodinida Dzik, 1976
Family Spathognathodontidae Hass, 1959

Genus *Lanea* Murphy & Valenzuela-Ríos, 1999

Type species. – *Ozarkodina eleanorae* Lane & Ormiston, 1979.

Remarks. – Genus *Lanea* has been established by Murphy & Valenzuela-Ríos (1999), grouping some species of *Ancyrodelloides* characterized by terraced, normally unornamented basal platform lobes. The authors assigned four taxa to genus *Lanea*: *L. eleanorae* (Lane & Ormiston, 1979), *L. eoeleanorae* Murphy & Valenzuela-Ríos, 1999, *Lanea omoalpha* Murphy & Valenzuela-Ríos, 1999 and *L. telleri* (Schulze, 1968). In our opinion also *A. omus* (= *A. omus* morph β Murphy & Matti, 1983) is a species of *Lanea*.

Genus *Kockelella* Walliser, 1957

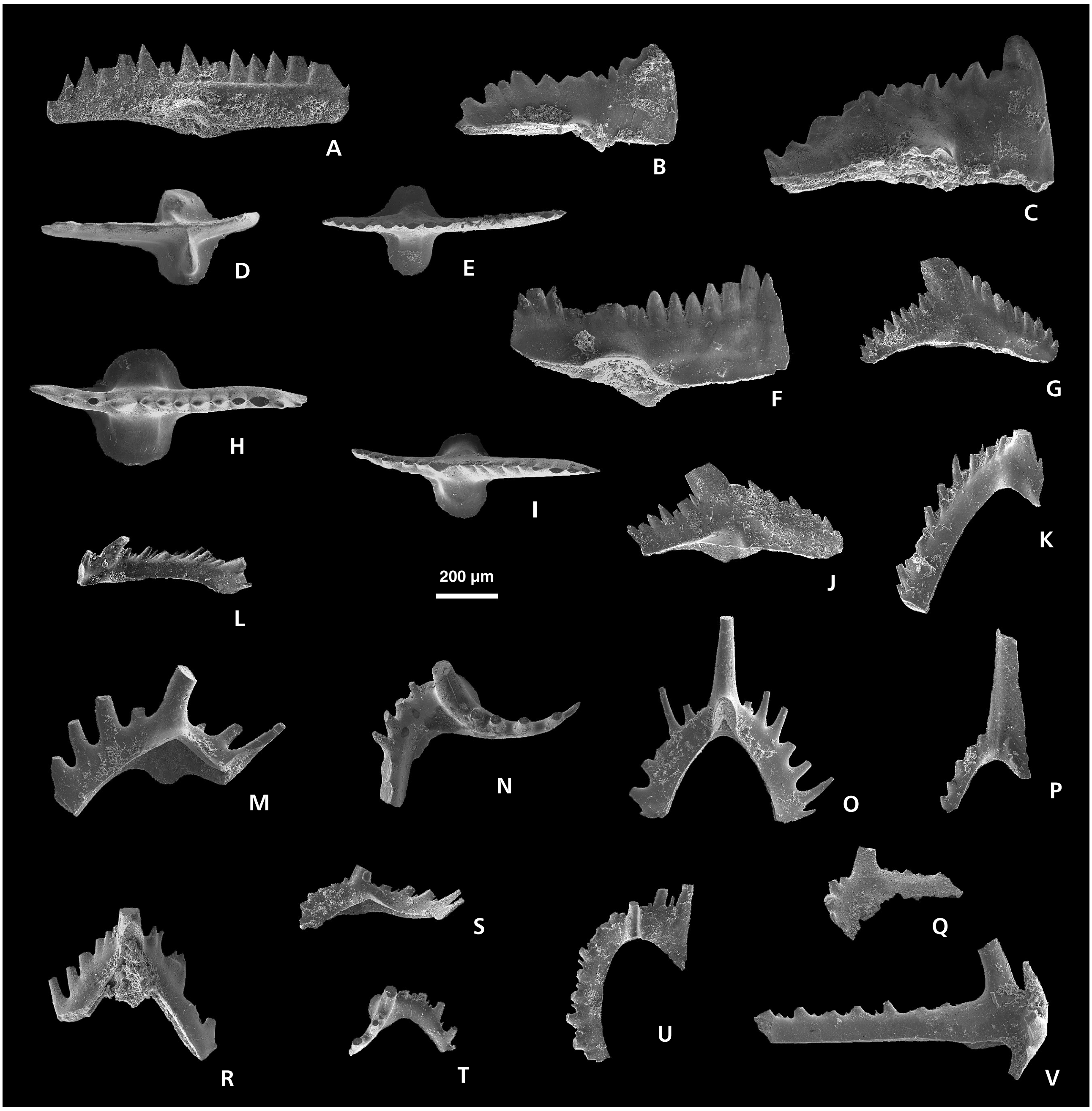
Type species. – *Kockelella variabilis* Walliser, 1957.

***Kockelella variabilis variabilis* Walliser, 1957**
Figure 5B, C

1957 *Kockelella variabilis* Walliser, p. 35, pl. 1, figs 3–10.
1964 *Kockelella variabilis* Walliser; Walliser, p. 40, pl. 16, figs 3, 4, 6, 9, 10, 14, 15 (only).
1976 *Kockelella variabilis variabilis* Walliser. – Barrick & Klapper, pp. 77–78, pl. 3, figs 12–17.
1999 *Kockelella variabilis variabilis* Walliser. – Serpagli & Corradini, pp. 288–293, pl. 5, figs 1–13; pl. 6, figs 1–9; pl. 7, figs 1–7 (*cum syn*.).

Remarks. – P1 elements of *Kockelella variabilis variabilis* are distinguished from *K. v. ichnusae* by the characteristically branched lateral processes on both sides of the platform, and by the absence of the rim that borders the platform of *K. v. ichnusae*. In contrast with the stratigraphic distribution provided by Serpagli & Corradini (1999) in their revision of genus *Kockelella*, that limited the species from the *crassa* to the *ploeckensis* zones, in Morocco *K. v. variabilis* ranges into the lower part of the *siluricus* Zone. A similar longer distribution have been documented also in Bohemia (Slavík *et al*. 2010) and in the Carnic Alps (Cellon section, our personal observation).

Figure 6. A – *Wurmiella excavata* (Branson & Mehl, 1933); lateral view of P1 element GZG 1612-540C-3736-1, sample AT 7 31, *transitans* Zone. • B – *Ozarkodina confluens* (Branson & Mehl, 1933); lateral view of P1 element GZG 1612-540C-3729-1, sample AT 7 20, Lower *detortus* Zone. • C – *Ozarkodina confluens* (Branson & Mehl, 1933); lateral view of P1 element GZG 1612-540C-3729-2, sample AT 7 20, Lower *detortus* Zone. • D – *Ozarkodina eosteinhornensis* s.s. (Walliser, 1964); upper view of P1 element GZG 1612-477-3713-2, sample AT 3 15, Lower *detortus* Zone. • E – *Ozarkodina eosteinhornensis* s.l. (Walliser, 1964); upper view of P1 element GZG 1612-540C-3727-1, sample AT 7 15, Lower *detortus* Zone. • F – *Zieglerodina remscheidensis* (Ziegler, 1960); lateral view of P1 element GZG 1612-540C-3730-1, sample AT 7 22, Upper *detortus* Zone. • G – *Zieglerodina remscheidensis* (Ziegler, 1960); lateral view of P2 element GZG 1612-477-3718-2, sample AT 3 18, Upper *detortus* Zone. • H – *Zieglerodina planilingua* (Murphy & Valenzuela-Ríos, 1999); upper view of P1 element GZG 1612-540C-3795-1, sample AT 7 21b, Lower



detortus Zone. • I – *Zieglerodina planilingua* (Murphy & Valenzuela-Ríos, 1999); upper view of P1 element GZG 1612-540C-3720-1, sample AT 7 22, Upper *detortus* Zone. • J – *Zieglerodina planilingua* (Murphy & Valenzuela-Ríos, 1999); lateral view of P2 element GZG 1612-477-3788-1, sample AT 3 19, Upper *detortus* Zone. • K – *Zieglerodina planilingua* (Murphy & Valenzuela-Ríos, 1999); lateral view of M element GZG 1612-477-3718-3, sample AT 3 18, Upper *detortus* Zone. • L – *Zieglerodina planilingua* (Murphy & Valenzuela-Ríos, 1999); lateral view of S1 element GZG 1612-477-3718-4, sample AT 3 18, Upper *detortus* Zone. • M – *Oulodus elegans elegans* (Walliser, 1964); lateral view of P1 element GZG 1612-540C-3727-3, sample AT 7 15, Lower *detortus* Zone. • N – *Oulodus elegans elegans* (Walliser, 1964); upper view of P2 element GZG 1612-540C-3727-4, sample AT 7 15, Lower *detortus* Zone. • O – *Oulodus elegans elegans* (Walliser, 1964); lateral view of S0 element GZG 1612-540C-3727-5, sample AT 7 15, Lower *detortus* Zone. • P – *Oulodus elegans elegans* (Walliser, 1964); lateral view of M element GZG 1612-477-3718-3, sample AT 3 18, Upper *detortus* Zone. • Q – *Oulodus elegans elegans* (Walliser, 1964); lateral view of S2 element GZG 1612-477-3708-2, sample AT 3 10b, *eosteinhornensis* s.l. Zone. • R – *Oulodus* sp.; lateral view of S0 element GZG 1612-477-3708-1 with anomalous development of the right process, sample AT 3 10b *eosteinhornensis* s.l. Zone. • S – *Oulodus elegans detortus* (Walliser, 1964); lateral view of P1 element GZG 1612-477-3710-1, sample AT 3 12, Lower *detortus* Zone. • T – *Oulodus elegans detortus* (Walliser, 1964); upper view of P2 element GZG 1612-477-3710-2, sample AT 3 12, Lower *detortus* Zone. • U – *Oulodus elegans detortus* (Walliser, 1964); lateral view of S1 element GZG 1612-477-3710-3, sample AT 3 12, Lower *detortus* Zone. • V – *Oulodus elegans detortus* (Walliser, 1964); lateral view of S2 element GZG 1612-540C-3727-6, sample AT 7 15, Lower *detortus* Zone.

Stratigraphic range. – Ludlow, from within the *crassa* Zone (Serpagli & Corradini 1999) to the lower part of the *siluricus* Zone (Slavík *et al*. 2010; and this paper).

Material. – 10 P1, 5 P2, 6 S0, 8 S1 and 9 S2 elements.

***Lanea* cf. *omus* (Murphy & Matti, 1983)**
Figure 5U, V

1983 *Ancyrodelloides omus* morph β Murphy & Matti, pl. 2, fig. 14, 21–29.
2012 *Ancyrodelloides omus* Murphy & Matti. – Drygant & Szaniawski, p. 858, fig.11N.

Description. – For P1 element see the description of *Ancyrodelloides omus* morph β by Murphy & Matti (1983).

P2 element strong and laterally compressed. The blade is more robust at the base of the denticles. In lateral view is arched with and angle between the processes of about 130°. Cusp well differentiated and oval in cross sections. Both processes bears alternate denticulation; denticles are thin and circular on the posterior process, and larger and subtriangular on the anterior one. Basal cavity wide under the cusp, where is laterally limited by a lip.

Remarks. – The P1 element fit well in the description of *Lanea omus* morph β by Murphy & Matti (1983), but differs by the less expanded platform lobes: in fact, in our specimens these are narrow, resembling those of *L. telleri*, whereas in typical *L. omus* the platform lobes are wider and occupied by an evident terrace (*i.e*. Murphy & Matti 1983, pl. 2, figs 24–29).

The P2 element here attributed to *L.* cf. *omus* is in general similar to the elements figured by Lane & Ormiston (1979, pl. 1, fig. 47) and Murphy & Matti (1983, pl. 4, figs 1–3) as P2 element of *L. eleanorae*, but differs by the less developed ledge along the processes below the denticles. However the similitude with these P2 elements of *Lanea eleanorae* confirms the attribution of our specimens to genus *Lanea*: the only species of *Lanea* in bed AT 7 is *L. omus*.

Ancyrodelloides omus was left in genus *Ancyrodelloides* by Murphy & Valenzuela-Ríos (1999) when they erected the genus *Lanea*. However, as already suggested by Slavík (2011), the species should be moved to *Lanea* due to the shape of the lobes, the wide terraces and the lacking of strong ornamentation on the platform.

Stratigraphic range. – Middle Lochkovian, *transitans* Zone.

Material. – 1 P1 and 1 P2 elements from bed AT7 30.

Genus *Ozarkodina* Branson & Mehl, 1933

Type species. – *Ozarkodina confluens* Branson & Mehl, 1933.

***Ozarkodina confluens* (Branson & Mehl, 1933)**
Figure 6B, C

1975 *Ozarkodina confluens* (Branson & Mehl). – Klapper & Murphy, pp. 30–33, pl. 3, figs 1–23; pl. 4, figs 1–27; pl. 8, figs 11–15 (cum syn).
2009 *Ozarkodina confluens* (Branson & Mehl). – Corriga & Corradini, p. 163, fig. 4M, N.
2012 *Ozarkodina confluens* (Branson & Mehl). – Corradini & Corriga, pp. 644–645, fig. 6.

Remarks. – As evidenced by Walliser (1964, fig. 8) and by Klapper & Murphy (1975, pp. 30–33), *Ozarkodina confluens* shows a wide variability of P1 element. Such variability is present also in the studied collection from Tafilalt. However, it seems that there is a very low stratigraphic value for the various morphotypes. For example, extreme forms with a strong, subtriangular shape of the blade and a large denticle at the anterior end (Fig. 6C) have been reported in literature from various levels of Ludlow and Přídolí (see discussion in Corriga & Corradini 2009, Slavík *et al*. 2010).

Stratigraphic range. – Ludlow–Přídolí, from the *siluricus* Zone (Corradini & Serpagli 1999) to the upper part of the Upper *detortus* Zone (Corradini & Corriga 2012).

Material. – 17 P1, 2 P2 and 1 S2 elements.

Genus *Polygnathoides* Branson & Mehl, 1933

Type species. – *Polygnathoides siluricus* Branson & Mehl, 1933.

***Polygnathoides siluricus* Branson & Mehl, 1933**
Figure 5E–I

1933 *Polygnathoides siluricus* Branson & Mehl, p. 50, pl. 3, figs 39–42.
1964 *Polygnathoides siluricus* Branson & Mehl. – Walliser, p. 66, pl. 17, figs 1–11.
1975 *Polygnathoides siluricus* Branson & Mehl. – Klapper & Murphy, p. 56, pl. 8, figs 16–21.
1983 *Polygnathoides siluricus* Branson & Mehl. – Jeppsson, fig. 1A–E.
2010 *Polygnathoides siluricus* Branson & Mehl. – Slavík *et al*., fig. 3.
2012 *Polygnathoides siluricus* Branson & Mehl. – Manda *et al*., fig. 4.9.

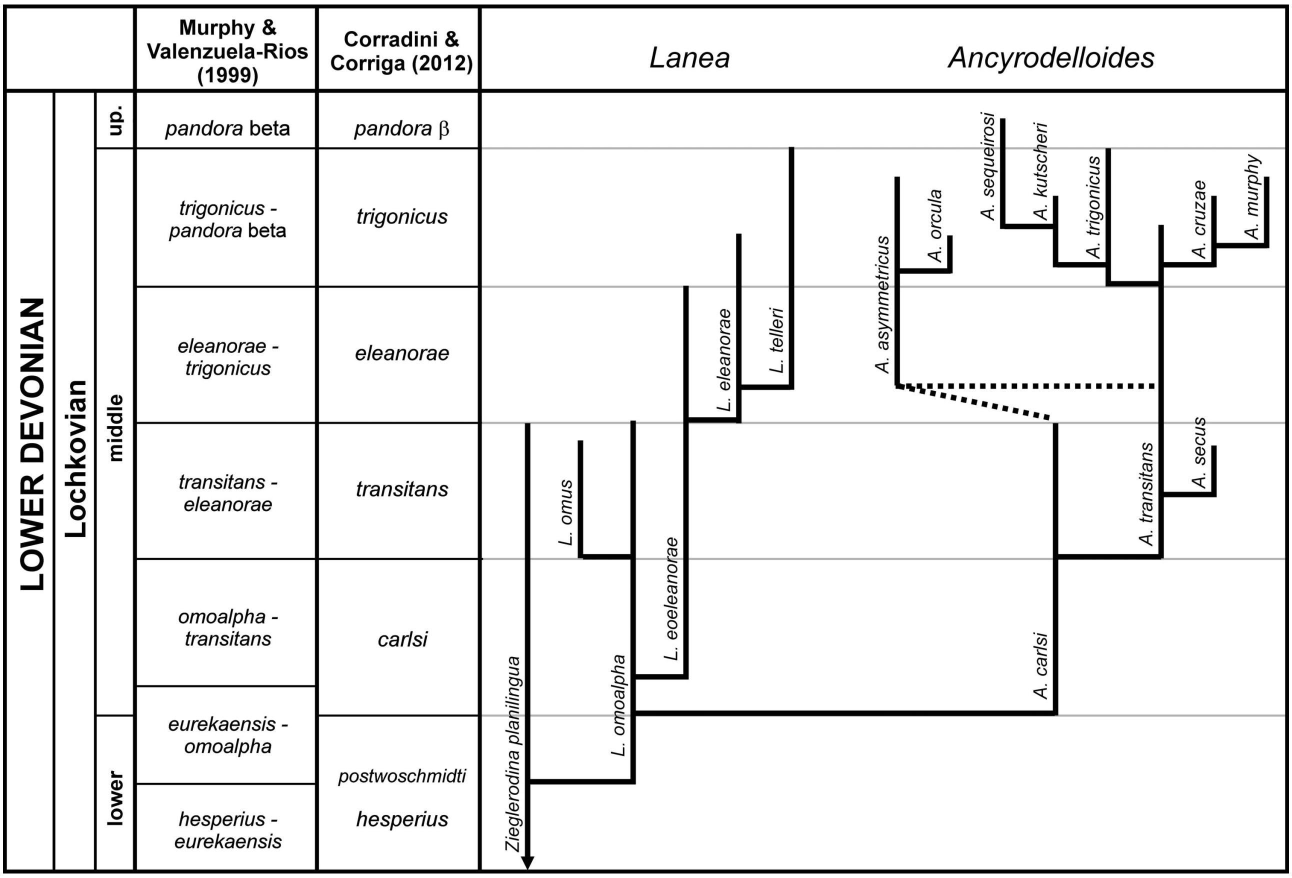


Figure 7. Reconstruction of the origin and phylogenetic relationships of genera *Lanea* and *Ancyrodelloides*.

Remarks. – The P1 element of *Polygnathoides siluricus* shows a wide variability in the shape of the platform. In upper view it has a more or less rhomboidal shape, with the minor axis variable in length. The upper surface can be more or less flat, or with differences of height in the central part, where a distinct crease may occur, often more pronounced on one side.

In the studied material one specimen, left in open nomenclature (Fig. 5J), has the platform limited to the anterior and central part of the element, and tapers abruptly posteriorly, where a short free blade is present. Platform margins are raised and turned upward.

Stratigraphic range. – Ludlow, *siluricus* Zone.

Material. – 22 P1, 12 P2, 4 M, 1 S0, 2 S1 and 4 S2 elements.

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

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

Remarks. – Genus *Zieglerodina* was proposed by Murphy *et al*. (2004) to include the ozarkodinids of the "*remscheidensis* Group". 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 each other, or to place the two groups together in the same genus should be carefully evaluated and is not the topic of this paper.

Zieglerodina planilingua (Murphy & Valenzuela-Ríos, 1999)

Figure 6H–L

1964 *Spathognathodus steinhornensis remscheidensis* (Ziegler). – Walliser, pl. 20, fig. 26, 27.

1999 *Ozarkodina planilingua* Murphy & Valenzuela-Ríos, p. 326, pl. 1, figs 1, 9.

2009 *Ozarkodina planilingua* Murphy & Valenzuela-Ríos. – Corriga & Corradini, fig. J, K.

2012 *Zieglerodina planilingua* (Murphy & Valenzuela-Ríos). – Drygant & Szaniawski, pp. 856–857, fig. 13A–D.

Description. – For P1 element see Murphy & Valenzuela-Ríos (1999).

P2 element "ozarkodiniform" with a strong cusp posteriorly reclined. The processes bears denticles discrete, with differences in size between adjacent denticles; in general denticles of anterior process are smaller than those on posterior process. Basal cavity large under the cusp, where is limited by wide lips.

M element "neoprioniodiform" with a strong cusp, oval in cross section, with a small keel on its anterior and posterior edges. Porterior process directed downward, slightly arched, bearing thin alternate denticles. Large basal cavity under the cusp, limited by a wide lip. A small single denticle is present anteriorly of the cusp.

S1 element "plectospathodiform", laterally compressed with two asymmetrical processes. Cusp, larger than adjacent denticles, posteriorly directed. Posterior process bears denticles of different size, stronger in the distal part. Small basal cavity, surrounded by a lip under the cusp.

Remarks. – The attribution of this species to genus *Zieglerodina* was recently proposed by Drygant & Szaniawski (2012). We confirm this attribution, on the basis of similitudes both in the P1 and the P2 elements with other species of *Zieglerodina*.

The M and S1 elements here tentatively assigned to *Z. planilingua* (fig 6K, L) are characterized by an evident lip that limits the basal cavity. Even if incomplete, they show characteristics of *Zieglerodina*, such as the alternate denticulation. These elements are different from those of *Z. remscheidensis* and of other ozarkodinids present in these samples, and therefore their attribution to *Z. planilingua* is very likely.

Having *Z. planilingua* a wide geographic distribution in Europe, North America and Australia, the first occurrence of the species can be a good stratigraphic marker in the middle Přídolí.

Stratigraphic range. – From the Lower *detortus* Zone (*eosteinhornensis* s.s. horizon) to the *transitans* Zone (Corradini & Corriga, 2012).

Material. – 117 P1, 9 P2, 2 M and 3 S1 elements.

Conclusions

The main results of this study on Silurian and Devonian conodonts from three section in the Tafilalt can be summarized as follows. In terms of stratigraphy several conodont zones from Ludlow to Lochkovian have been documented, allowing stating that:

– the age of the "*Orthoceras* limestones" in Tafilalt is confirmed as middle Ludlow (*ploeckensis* and *siluricus* zones);

– the "*Scyphocrinites* limestones" spans the Silurian/Devonian boundary, from the Přídolí to lower Lochkovian (*eosteinhornensis* s.l.-*hesperius* zones);

– a couple of beds of *Orthoceras* Limestone occur also within the middle Lochkovian (*transitans* Zone), only in the Atrous 7 section.

In terms of conodont taxonomy

– some elements possibly belonging to the apparatus of *Zieglerodina planilingua* (Murhpy & Valenzuela-Ríos, 1999) are described;

– the species *Ancyrodelloides omus* Murphy & Matti, 1983 has been moved to genus *Lanea*, and a P2 element has been tentatively assigned to the species;

– the phylogenetic relationships between genera *Lanea* and *Ancyrodelloides* are suggested.

Acknowledgements

This paper is dedicated to our good friend Mena Schemm-Gregory. This study would not have been possible without the detailed work of Otto H. Walliser, who examined the sections and collected the conodont samples. Helga Groos-Uffenorde (Göttingen) is deeply acknowledged for help in the preparation of the manuscript by examination of maps, field notes and manuscripts in the asset of O.H. Walliser. Reimund Haude (Göttingen) provided useful information on the sections and the occurrence of crinoids. Gabriele Cruciani (Cagliari) took SEM photos of figured specimens. Ladislav Slavík (Prague) and Thomas Suttner (Graz) reviewed the manuscript providing useful comments. This research was partly supported by grants RAS (resp. C. Corradini). This paper is a contribution to IGCP projects No. 591 (The Early to Middle Paleozoic revolution) and 596 (Climate change and biodiversity patterns in the Mid-Paleozoic).

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