

ADVANCES ON SILURIAN-DEVONIAN CONODONT BIOSTRATIGRAPHY IN THE CENTRAL PRECORDILLERA, ARGENTINA

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INTRODUCTION

Hünicken (1975) provided the first mention of Silurian conodonts in the Precordillera. Then, Hünicken & Sarmiento (1988) recognised the *Polygnathoides siluricus* Zone and the basal part of the *Pedavis latialata* Zone from Los Espejos Formation at Sierra de Talacasto, defining the middle and upper Ludlow. Lehnert *et al.* (1999) described a Llandovery conodont association from La Chilca Formation at Cerro del Fuerte, this association represents the *Distomodus kentuckyensis* Zone. Later, Albanesi *et al.* (2006) recorded conodonts indicative of the *Kockelella v. variabilis* Zone at Sierra de Talacasto. Heredia *et al.* (2007) defined the conodont biostratigraphy of the Los Espejos Formation at Cerro del Fuerte locality. In addition, Mestre (2009) documented Pridoli conodont assemblages from the Tambolar (Facies Pachaco) Formation. Subsequently, Heredia *et al.* (2010) proposed the first biostratigraphical chart of Silurian Precordilleran conodonts.

Gómez (2015) and Garcías (2016) carried out detailed biostratigraphical studies on Silurian conodonts from the Los Espejos Formation at Ancha and Poblete creeks, Talacasto region. These studies are used as a baseline for proposing a new conodont biostratigraphical chart for the Silurian-Lower Devonian of the Precordillera, adding former information from several sections already published.

GEOLOGICAL CONTEXT

Los Espejos Formation crops out in the Central Precordillera; it is composed of marine siliciclastic strata, primarily green to brown sandstone and green siltstone, which vary in thickness to northwards from 25 to 510 m (Astini & Piovano 1992). Los Espejos Formation was deposited on middle to shallow platform setting including intercalations of storm deposits. Sinsedimentary deformation (convolute bedding) is frequent, mainly in the uppermost part of the unit (Astini & Maretto 1996). Brachiopods, trilobites, graptolites, tentaculitids, crinoids, acritarchs, edrioasteroids, conodonts, corals, eurypterids, nautiloids, gastropods and trace fossils are common fossils. Los Espejos Formation paraconformably overlies the La Chilca Formation and, in turn, is paraconformably overlain by the Lower Devonian shale of the Talacasto Formation.

MATERIAL AND METHODS

Conodont samples were collected from coquinoids beds of the Los Espejos Formation at several sections in the Central Precordillera. About 3 kg of each sample was processed following the laboratory procedures described by Stone (1987). The insoluble fraction of each sample was picked for conodonts resulting in recovery of nearly 5,000 identifiable conodont elements. The conodonts are housed in the collection of the INGEO at the Universidad Nacional de San Juan, under the code INGEO-MP.

System	Serie	Stage	Walliser (1964)	Jeppsson <i>et al.</i> (2006)	Corradini <i>et al.</i> (2015) Corradini and Corriga (2012)	This study		
Devonian	Lower	Lochkovian			<i>pandora</i> β			
					<i>trigonicus</i>			
					<i>eleanorae</i>			
					<i>transitans</i>			
					<i>carlsi</i>			
					<i>postwoschmidti</i> <i>hesperius</i>	<i>hesperius</i>		
Silurian	Pridoli		<i>Oz. steinhorn.</i> <i>eosteinhorn.</i>		Upper <i>O. e. det.</i>	Upper <i>O. e. det.</i>		
					Lower <i>O. e. detortus</i>	Lower <i>O. e. detortus</i>		
					<i>Oz. eosteinhorn.</i> IZ	<i>Oz. eosteinhorn.</i>		
	Ludlow	Ludfordian		<i>S. crispus</i>	<i>Oz. crispa</i>	<i>Oz. crispa</i>		
				<i>I. latialatus</i>	<i>Oz. snajdri</i>	<i>Pe. latialata-</i> <i>Oz. snajdri</i> IZ		
					" <i>Icriodontid</i> "			
				<i>P. siluricus</i>	<i>P. siluricus</i>	<i>P. siluricus</i>		<i>P. siluricus</i>
		Gorstian			<i>A. ploeckensis</i>	<i>A. ploeckensis</i>	<i>A. ploeckensis</i>	<i>K. v. variabilis</i>
						<i>K. v. variabilis</i>	<i>K. variabilis</i> IZ	
						<i>Oz. exc. hamata</i>		
<i>Oz. crassa</i>	<i>Oz. excavata</i> n.sp.S	<i>K. crassa</i>	<i>K. crassa</i>					

Fig. 1. Silurian-Lower Devonian conodont biostratigraphical chart for the Precordillera and comparison with selected previous schemes.

CONODONT BIOSTRATIGRAPHY

The conodont record allows the recognition of six biozones from the lower Ludlow (Gorstian) to the lower Lochkovian. The comparison of previous and newly obtained data enabled recognition of the following conodont zones (Fig. 1):

***K. v. variabilis* Interval Zone:** Apart from the *Kockelella variabilis variabilis* (Walliser), the following associated conodonts were identified: *Panderodus unicosatus* (Branson and Mehl), *Pseudoneotodus beckmanni* (Bischoff and Sannemann) and *Wurmiella excavata* (Branson and Mehl).

The zone is used herein in the sense of Cramer et al. (2011) as an interval zone above the last occurrence of *K. crassa* and below the entry of *Ancoradella ploeckensis*. Besides, this zone can only be indirectly documented by the presence of *K. v. variabilis* and absence of the index of the Zones above and below. The *K. v. variabilis* Interval Zone was documented in Poblete and Ancha creek sections.

***P. siluricus* Zone:** The conodont assemblage consists of *Coryssognathus dubius* (Rhodes), *Dapsilodus obliquicostatus* (Branson and Mehl), *K. o. absidata* (Barrick and Klapper), *K. maenniki* (Serpagli and Corradini), *K. v. ichnusae* (Serpagli and Corradini), *K. v. variabilis*, *Oulodus siluricus* (Branson and Mehl), *P. unicosatus*, *Ps. beckmanni*, *Ps. bicornis bicornis* (Drygant), *Ps. bicornis contiguus* (Corradini) and *W. excavata*. The index conodont is absent but the co-occurrence of *K. maenniki*, *K. v. ichnusae* and *K. v. variabilis*, indicates the basal part of *P. siluricus* Zone (Corradini et al., 2015) in the middle part of the Los Espejos Formation at Poblete section.

***Oz. eosteinhornensis* s.l. Interval Zone:** This zone is registered in the middle to upper part of the Los Espejos and Tambolar (Facies Pachaco) formations at Ancha creek and Pachaco sections. The conodont assemblages is composed by: *Belodella* sp., *C. dubius*, *D. obliquicostatus*, *O. e. elegans* (Walliser), *O. siluricus*, *Oz. eosteinhornensis* s.l. (Walliser), *P. unicosatus*, *Ps. beckmanni*, *Ps. b. bicornis*, *Ps. b. contiguus* and *W. excavata*.

Lower *O. e. detortus* Zone: The conodont fauna from this zone is: *C. dubius*, *D. obliquicostatus*, *O. e. elegans*, *O. elegans detortus* (Walliser), *Oulodus* sp., *Oz. eosteinhornensis* s.l., *Oz. eosteinhornensis* s.s. (Walliser), *Ozarkodina* sp., *P. unicosatus*, *Ps. beckmanni*, *Ps. bicornis bicornis*, *Ps. bicornis contiguus*, *W. excavata* and *Zieglerodina* sp. The occurrence of *Oz. eosteinhornensis* s.s. pointing out a well-defined horizon (Corradini and Corrigan, 2012). The Lower *O. e. detortus* Zone is recognized in the upper part of the Los Espejos Formation at Ancha and Poblete creek sections.

Upper *O. e. detortus* Zone: The conodont assemblage is composed by: *Ps. beckmanni*, *Ps. b. contiguus*, *Oulodus* sp., *Ozarkodina* sp., *Wurmiella* sp. and *Zieglerodina* sp. This zone is registered in the last meters of the Los Espejos Formation at Ancha creek section from coquinoid levels above the *Oz. eosteinhornensis* s.s. horizon. The absence of the latter key conodont and of *D. obliquicostatus* in the conodont assemblage allow us to recognize the Upper *O. e. detortus* Zone according to Corradini and Corrigan (2012).

***I. hesperius* Zone:** This zone is recorded in the upper part of the Los Espejos Formation at Poblete creek and the conodont assemblage is composed by: *Icriodus* cf. *hesperius* (Klapper and Murphy), *Oulodus* sp., *Ozarkodina* sp., *P. unicosatus*, *Ps. beckmanni*, *W. excavata* and *Zieglerodina* sp. The presence of *I. cf. hesperius* allow us recognize the basal Devonian for the first time in the Precordillera.

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