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Lochkovian conodonts (Lower Devonian) from the Spanish Central Pyrenees and its potential for a standard subdivision

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After a successful definition and redefinition of Devonian Stages, including revision of GSSPs, the International Subcommission on Devonian Stratigraphy has started to formally define substages. Advances have mostly been produced on the upper part of the System (Givetian, Frasnian and Famennian) and, to some extend, on the Pragian. The subdivision of the Emsian is linked to its redefinition and only the intention to formally subdivide this Stage into two substages has been decided. Lochkovian and Eifelian have received less attention, although an informal three fold Lochkovian subdivision was already proposed by VALENZUELA-RÍOS & MURPHY (1997). The purpose of this report is to analyze the potential of this conodont-based subdivision from one of the key areas (the Pyrenees) and evaluate its correlation potential.

The initial subdivision of VALENZUELA-RÍOS & MURPHY (1997) subsequently improved in MURPHY & VALENZUELA-RÍOS (1999) was based on the consistent conodont sequences registered in Central Nevada and the Pyrenees that permitted an accurate correlation of the main boundaries. The selected taxa to define the boundaries of the middle part (and consequently the lower/middle and middle/upper boundaries) were *Lanea omoalpha* and *Masaraella pandora* beta respectively. Both are well characterized and globally distributed taxa that allow worldwide correlations. Inner subdivisions of these parts were also provided in several papers and summarized below in the context of the Pyrenean up-dated sequence.

The lower Lochkovian was initially subdivided into two zones, *hesperius* and *eurekaensis*, in the Cordillera area (KLAPPER 1977). Subsequently, it was demonstrated that the range of these two taxa largely overlap, and therefore, the interval was left open for global correlation on a zonal scale until new studies can provide tide worldwide correlatable markers. In the Pyrenees this interval is represented in three sections (Gerri 1.1, Compte-I and Baen). The conodont sequence prompted VALENZUELA-RÍOS (1990, 1994a) to establish a local subdivision of, at least, regional value. Afterwards, studies in the Pyrenees confirm the following conodont sequence: a lower part comprised between first appearances of *Icriodus woschmidti* and *I. transiens* (*woschmidti-transiens* Zone) that is followed by an interval between the lower entries of *I. transiens* and *I. angustoides bidentatus* (*transiens-bidentatus* Zone). In the upper part (*bidentatus-omoalpha* Zone) is remarkable the entry of *Ancyrodelloides carlsi* in all sections, and the *I. ang. angustoides* in the Compte-I section. This three-fold zonation for the lower Lochkovian is only of local value and any correlation with other areas is still precipitate. A remarkable datum is, however, the entry of *A. carlsi* in the lower part of the *bidentatus-omoalpha* Zone, certifying its entry below the beginning of the *Lanea* stock.

Contrasting with the lower Lochkovian, the middle Lochkovian seems to be a time of cosmopolitan conodonts, and their taxa are widespread allowing accurate global correlations for the interval. The interval was initially subdivided into five parts in the Pyrenees (VALENZUELA-RÍOS 1994a) which were largely based on the sequential occurrences of the genus *Ancyrodelloides*. Combining this subdivision with the globally presented in MURPHY & VALENZUELA-RÍOS (1999) and with new records from the Pyrenees a local subdivision into five zones can be presented. In ascending chronological order these zones are: *omoalpha-transitan*s, *transitans-trigonicus*, *trigonicus-kutscheri*, *kutscheri-sequeirosi* and *sequeirosi-pandora* beta. The number of zones can be increased when the ranges of *L. eoeleanorae* and *L. eleanorae* can precisely be established in the Pyrenean sections. Besides, the entries of some of the worldwide distributed species of the genus *Flajsella* permits accurate correlation within the zones. In brief, the net of worldwide distributed taxa recorded in the Pyrenees permits one of the finest subdivision and global correlation of the whole Devonian; some of these intervals having an estimated duration under 500 ky.

Based on sequences from Spain and Nevada, VALENZUELA-RÍOS (1994b) subdivided the upper Lochkovian into two zones, *pandora* beta-*gilbeti* and *gilberti-irregularis*. Due to relative scarce records in the upper Lochkovian, these two zones are not well characterized globally, but their indexes seem to have consistent stratigraphical worldwide distribution and, thus, can be used in a global scheme.

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