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The Standard Zonation concept – examples from the Silurian conodont zonation

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The primary goal of biostratigraphy is to correlate distant bodies of rocks on the basis of their fossil content. Zonation schemes have been prepared for this purpose by numerous authors based on different fossil groups for the various Periods of geological time. Such zonation schemes are commonly named "Standard Zonations", but not all of them possess the characteristics that a standard zonation should have:

- a. The zones should be widely recognized and applicable across as broad as geographic region as possible.
- b. Zones should be based on described and named taxa only.
- c. Index taxa should be easy to recognize unequivocally and have a broad geographic distribution
- d. The basic biostratigraphic unit is the "zone". Superzones and subzones are not used.
- e. The definition of the zones should be clearly stated in scientific journals of wide accessibility.

Zonation schemes can be developed for limited geographic areas only. These regional zonations can be based on endemic taxa and may allow more detailed correlation within the region than the standard zonation. When regional zonations are presented, though, these should be compared to the standard scheme. The history of the Silurian conodont zonations offers some examples to illustrate these points and to show the difficulties that may arise when developing a Standard Zonation.

The first conodont zonation for the Silurian was proposed by WALLISER (1964), who based his scheme primarily on the Cellon Section (Carnic Alps, Austria), taking in account also data from Bohemia and Spain. The author defined twelve successive appearance zones spanning the Silurian and the lowermost Devonian. Several of these zones have been widely recognized, but the difficulties of applying the complete scheme in other parts of the world have led to the development of many local zonations, mainly for the Llandovery, which is not completely exposed in Cellon. ALDRIDGE & SCHÖNLAUB (1989), considering all the data available at that time, provided a new scheme, which was a "step on the path to the development of a reference biozonation" (p. 275). Their global zonation was reported also in the Newsletter of the Subcommittee of Silurian Stratigraphy (Silurian Times n°1; 1993). Two years later, a new Conodont Global Zonation chart appeared (Silurian Times n°3; NOWLAN 1995) that was significantly different from previous zonations, but this new zonation was never fully justified or discussed.

CORRADINI & SERPAGLI (1998, 1999) proposed a new scheme, based on Sardinian data. The authors demonstrated that the Sardinian conodont zonation is usable worldwide and claimed that it is "of practical use for Silurian biostratigraphy, and therefore more generally useful than extremely detailed schemes, sometimes based on not yet defined or endemic taxa" (CORRADINI & SERPAGLI 1999: p. 270). Following these considerations, the same authors (CORRADINI & SERPAGLI 2000) proposed their scheme as a Standard Silurian Conodont Zonation for the Wenlock-Pridoli time span. A totally different approach to the Standard conodont zonation was presented by JEPSSON (1997, 2006), who provided a detailed scheme of zones based on the Silurian succession exposed on Gotland. Unfortunately, many

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zones are not applicable in other regions, either because they reflect the local environmental conditions on Gotland, or because some zonal markers are extremely rare taxa (<0.1% of the fauna) or endemic taxa. Finally, OGG *et al.* (2008) published a zonation intermediate between those introduced by NOWLAN (1995) and CORRADINI & SERPAGLI (1999), but some problems still remain, mainly the occurrence of a "not zoned" interval in the lower Ludlow.

Other unresolved problems arose recently from the taxonomic revision of some ozarkodinids started by a few authors in the last five years (MURPHY *et al.* 2004, CARLS *et al.* 2005 and 2007), who left without a taxonomic home several morphotypes previously identified as *Oz. remscheidensis*. We agree that these taxa may represent several different species within the Genus *Zieglerodina*, but it is necessary to complete soon the revision of these forms at a species level (and not at genus level), in order to avoid the taxonomic and nomenclatural chaos that we observe now. The proposal by CORRIGA & CORRADINI (2009) and CORRIGA *et al.* (2009) to rename the former "*remscheidensis* interval Zone" as "*eosteinhornensis* s.l. interval Zone" without changing the meaning of the zone and the definition of its boundaries is a temporary solution and can be accepted only until that taxonomic work is concluded.

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