Evaluating the Series and Stages of the Silurian System

by

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The Stratigraphic Commission of Germany is preparing a Stratigraphic Table of Germany 2002 as a reference scale for the lithostratigraphical units found in Germany to be presented as a first draft at the Meeting of the German Geoscientific Societies in Wuerzburg, October 2002. For this purpose the international chronostratigraphic scheme used for correlation of the units was discussed in some detail. It was felt that the Silurian subdivision was exceedingly uneven and the German Subcommission of Silurian stratigraphy was asked whether there are any attempts to modify the scheme to attain a more even spacing of chronostratigraphic units in the Silurian.

The major points of concern is the high number of Series in the Silurian System (4) and that the Pridoli is not differentiated into stages, as well as the extremely unequal length of the individual Series. All Phanerozoic systems consist of two respectively three series and six to 12 stages and all series are differentiated into stages. This fundamental principle of hierarchical balance should have priority and also be attempted for the Silurian System. Moreover, the Silurian is one of the shortest systems with a length estimated at about less than 30 Ma and the Pridoli is by far the shortest series, generally estimated at about 2 Ma to less than 5 Ma.

According to the recent chronostratigraphic scale of Gradstein & Ogg (1996) the Llandovery (15 Ma) alone is longer than the rest of the Silurian (11 Ma) with the Pridoli representing only about 2 Million years. In this respect it was suggested to include the Pridoli as a stage within the Ludlow (with a length of 4 Ma also being of relatively short duration), a step that would considerably enlarge the Ludlow to about 6 Ma in length. Instead of being the only unit in the Phanerozoic time scale with four series, the Silurian would then include the three series Llandovery, Wenlock and Ludlow. The Pridoli would become a stage in the Ludlow Series. This also would be a better alignment with the overlying and underlying Devonian and Ordovician Systems, both including three series and six to seven stages. Consequently the change would serve the purpose of gaining a more even spacing for the series and stages in the Paleozoic.

The time scale of the International Commission on Stratigraphy (ICS 2002) shows the Silurian to range from 440 Ma to 417 Ma. It allocated 12 Ma to the Llandovery, 5 Ma to the Wenlock, 4 Ma to the Ludlow, and 2 Ma to the Pridoli. The International Stratigraphic Chart of the IUGS (2002) shows the Subdivision of the Silurian somewhat differently. The base of the Silurian is taken at

430 Ma and the top is at 410 Ma. In this chart the Llandovery and the Wenlock are only 5 Ma long, but the Ludlow is estimated to be 10 Ma and the Pridoli again 5 Ma long. This is certainly not in accordance with data in Gradstein & Ogg (1996), but it is not our intent to solve these detailed problems.

The time span of the Pridoli has been debated extensively and has been cited as long as 10 Ma (Kleffner 1989, 1995) and as short as 1.5 Ma (Fordham 1998), with a short age preferred in most newer references. Tucker & McKerrow (1995), Tucker et al. (1998) and McKerrow & van Staal (2000) suggest a length of 2 Ma for the Pridoli and Fordham (1998) allows only 1.5 Ma for this interval. As there is no stage shorter than 2 Ma in the entire Paleozoic, the Pridoli with a duration of around 2 Ma can conveniently be classified as a stage and hardly be kept as a stratigraphic unit of a higher rank. It appears to be too short to be recognized as a series in any international standard and its usefulness might be questioned. It also represents the only series in the whole Phanerozoic without a stage division. According to the roles of the ICS (Salvador 1994) a stage should be correlatable globally, which is undoubtedly the case with the Pridoli.

Surprisingly the graptolite biozonation has been very tight and the Pridoli has been subdivied locally into at least 9 biozones (Urbanek & Teller 1997). This is the finest biozonation available for the whole Silurian interval, but its applicability on a larger, international scale is not proven. Thus, these graptolite biozones must be regarded as local zones without any relevance for a worldwide differentiation within the Pridoli.

There might be an argument to keep the Pridoli as a series due to the attempt to stabilize the international chronostratigraphic time scale. This, however, is in our opinion, not based on sound scientific grounds, but on historical reasoning and might not be a convincing argument.

We here propose to include the Pridoli as a stage in the Ludlow Series, thus restricting the number of Series in the Silurian System to three. We ask the members of the Subcommission on Silurian Stratigraphy and all interested Silurian workers for their comments and discussion.

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