

Comment to “The Devonian-Carboniferous boundary in the Graz Paleozoic (Eastern Alps, Austria) and its global significance” by Kaiser and Hubmann

Comentario a “El límite Devónico-Carbonífero en el Paleozoico de Graz (Alpes orientales, Austria) y su importancia global” de Kaiser y Hubmann

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In order to underline the importance of the Paleozoic of Graz deposits (Eastern Alps) for documenting the Devonian to Carboniferous events, Kaiser and Hubmann (2024) reworked and reinterpreted some of the contributions of predecessor and contemporaneous researchers.

The “Introduction” chapter states that “Graz Paleozoic has a structure consisting of a lower, tectonically, and metamorphically more stressed nappe system (Gasser et al., 2010)”. In fact, the nappe structure of Graz Paleozoic is well known from much earlier publications, for example Flügel and Neubauer (1984). The “Introduction” continues with “The slightly metamorphic and in places very fossiliferous sequence of the upper nappe system has been the subject of numerous paleontological and sedimentological studies (e.g., Histon et al., 2010; Ebner and Hubmann, 2012)”. It is well known among specialists that paleontological studies from the Paleozoic of Graz go back a while ago, starting not in 2010, but already with Anker (1835), Unger (1843), Flügel and Ziegler (1957), among others.

The paragraph “Worldwide the DCB is characterized by either transgressive Hangenberg black shales and regressive Hangenberg sandstone deposits, or by unconformities with stratigraphic gaps (Kaiser et al., 2016)” omits that over 90 years ago, Schmidt (1924), succeeded by Walliser (1984) or Caplan and Bustin (1999) defined the presence of the “Hangenberg shales” at the D/C transition, long ago before Kaiser et al. (2016).

In the “Overview of geology and facies development in the Graz Paleozoic” chapter, the authors rework the presence of a shale layer below the D/C transition at Steinberg/Tropl quarry, shale reinterpreted in their present study, as a tectonic zone. For comparison one can see Kaiser (2005), which described a ‘1 cm argillaceous layer’ situated c. 15 cm below the D/C boundary. Although there are no further geochemical data about this layer, in a later work, the same layer is assumed to represent a ‘Hangenberg Black Shale equivalent’ at the bottom of the Upper *praesulcata* Zone and insert into the lithological sequence as black shale (see Fig. 4, p. 249 in Kaiser et al. 2008). Without pictures added to the studies, the shale is explained in the Kaiser and Hubmann (2024) publication as a “tectonic disturbance”, and an early work by Flügel and Ziegler (1957) is cited for this purpose. It is true that Flügel and Ziegler (1957) depicted in their Fig. 3 (Abb. 3, p. 31) a steep fault zone, but this cannot be interpreted neither as a “black shale” nor as a “shale”.

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At the time Bojar et al. (2013) published their work concerning the geochemistry of the D/C transition at Steinberg/Trolp, the authors used the standard international stratigraphy where the position of the boundary is defined by the transition of *Siphonodella presulcata* to *Siphonodella sulcata* associated with a restart of micro- and macro- fauna biodiversity as determined at La Serre, Montagne Noir, France (Paproth and Streeb 1984; Paproth et al. 1991; Feist et al. 2000). For the local conodont occurrences and zonation at Steinberg/Trolp, details are given in Bojar et al. (2013), in their Fig. 3(a), where the D/C boundary position is correctly set according to Paproth et al., 1991. Moreover, Fig. 3(b) and Fig. 4 in Bojar et al. (2013) correlate their own profile and isotope data with those of Kaiser et al. (2008), the last one covering only c. 2 meters from the 10 meters of the entire profile. Kaiser and Hubmann (2024) also state that “*The authors [n.n. Bojar et al. 2013] ignore that the DCB was correctly fixed by Ebner (1980a) in his Bed 4 with the FO of Polygnathus purus subplanus as an index fossil for the DCB (Kaiser et al., 2009; Spalletta et al., 2017).*” We have to mention that neither in Gradstein et al. (2012; see Fig. 23.2, p. 611) nor in Gradstein et al. (2020; see Fig. 23.2, p. 814) *Polygnathus purus subplanus* is considered as a fossil index for the Devonian/Carboniferous transition, the mentioned conodont being recorded several meters below and above the boundary. Bojar et al. (2013) fixed the boundary at the bottom of Bed 7, as indicated in their Fig. 3(a) considering the FO occurrence of *Siphonodella sulcata*.

Further we can read that “*Bed 4 of Ebner is correlative with Bed 16 of Kaisers studies, according to thickness of the limestones and the FO's of Polygnathus purus subplanus, Protognathodus kuehni and Siphonodella sulcata (M5) in Bed 16*”. In a similar way, *Protognathodus kuehni* is not considered index fossil for the D/C boundary. Moreover, *Protognathodus kuehni* was not identified at Trolp by Ebner (1980). Kaiser and Hubmann (2024), in their Fig. 8, insert a stratigraphic column “after Ebner (1980)” where the base of D/C is given by *Siphonodella sulcata* and *Protognathodus kuehni*, even though *P. kuehni* was not

identified by Ebner (1980) at Steinerg (see. table 8, p. 120).

Long before Kaiser's studies (Kaiser, 2005; Kaiser et al., 2008), Nössing (1975) put in evidence for the Devonian/Carboniferous boundary the succession *P. kuehni* (which firstly was determined from older Devonian to younger Carboniferous in their sample 115), *Polygnathus purus subplanus* (samples 116-118), *Siphonodella sulcata* (sample 118). In fact, Ebner (1980) and Nössing (1975) agree, as firstly *Polygnathus purus subplanus* occurs, latter on *S. sulcata*.

Considering the discussions above, the occurrence of *Siphonodella sulcata* remains a reliable criterion for establishing the boundary at Steinberg/Trolp. Bojar et al. (2013) established it according to Ebner (1980) and Paproth et al. (1991). The position of the boundary is displayed in contribution of Davydov et al. (2012) published in Gradstein et al. (2012) and the contribution of Aretz et al. (2020) published by Gradstein et al. (2020), both versions considering the work of Paproth et al. (1991).

Even considering moving the boundary to Bed 4 instead of Bed 7 (as suggested by Kaiser and Hubmann 2024, without founded stratigraphic criteria), it would result in moving the boundary c. 10 cm below this as drawn in Bojar et al. (2013) (their Fig. 4), the negative excursion remaining in the same *Siphonodella sulcata/duplicata* Zones.

The importance of the Steinberg/Trolp sections in the succession of the D/C boundary events remains. Certainly, integrating previously done work and checking the original publications and the figures and tables therein remain viable criteria in conducting new research on interesting, long debated topics.

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