



Reworked microfossils as palaeoenvironmental tool: an example from the Southern Upper Rhine Graben (Central Europe)

Pirkenseer Claudius, Spezzaferri Silvia & Berger Jean-Pierre

Dept. Geoscience-Geology, Univ. Fribourg, CH-1700 Fribourg, email:
claudiusmarius.pirkenseer@unifr.ch, silvia.spezzaferri@unifr.ch, jean-pierre.berger@unifr.ch

We present here the micropalaeontological study of two boreholes (Allschwil-2 and DP-202) drilled in the Rhinegraben (Western Paratethys) and we interpret the depositional environment and contribute to the reconstruction of the Paleogene palaeogeography of the Southern Upper Rhine Graben region.

In both boreholes, microfossils allow to trace the upper Rupelian transgression (i.e. “Série Grise”) spanning about 400 m of sediment. The lowest (“Marnes à foraminifères”) and the uppermost part of the “Serie Grise” (“Marnes à Cyrènes”) are particularly rich in microfossils.

The lowermost part of the “Série Grise” (“Marnes à foraminifères”) is especially rich in benthic foraminifers (e.g., *Spirorutilus carinatus*, *Textularia laevigata*, *Sabellovoluta humboldti*, *Reticulophragmium* sp.). *Sphaeroidina bulloides* is associated with the fully marine ostracod *Henryhowella asperrima*. These assemblages indicate the quick development of the second of the two Early Oligocene marine transgression into the Upper Rhine Graben.

On the top of the “Marnes à foraminifères” follow the finely laminated (sub mm) and dark colored “Shistes à poissons”. Their anoxic character is confirmed by the absence of ostracods and the occurrence of dysoxic benthic Foraminifera species such as *Bolivina beyrichi*.

In some levels of the subsequent “Couches à Mélettes” planktonic foraminifers such as *Zeaglobigerina ampliapertura*, *Globorotaloides*, *Catapsydrax* groups and the simultaneous absence of older species indicate Zone P20.

The top of the “Série Grise” and its transition to the lacustrine “Niederroedern Formation” is well represented. These sediments contain rich ostracod and foraminifer faunas (with planktonic forms such as *Paragloborotalia opima opima*, *Subbotina utilisin-dex*, *Catapsydrax* sp. and very abundant and small *Globigerina praebulloides*, probably indicating the “middle” Oligocene Zone P21). The ostracod assemblages indicate a transition from a fully marine to a brackish environment.

About 25 reworked planktonic Foraminifera species ranging from the Late Cretaceous (*Globotruncana*, *Heterohelix*, *Rosita*), Early and Middle Eocene (*Acarinina*, *Morozovella*, *Truncorotaloides*) have been found in both drillings. The reworking occurs in the Early Rupelian “Shistes à poissons” of the “Série Grise” to the Earliest Chat-tian lower “Niederroedern Formation”. No reworked ostracods or benthic foraminifers have been found.

There are no planktonic Foraminifera bearing Late Cretaceous to Late Eocene marine sediments documented for the Upper Rhine Graben. Therefore the source area of the aforementioned reworked faunas is most likely located in the alpine realm. This implies a South-North trending fluvial drainage system feeding the Southern Upper Rhinegraben in Early Oligocene times. According to this interpretation the regression of the Western Paratethys towards the East had to start earlier than previously assumed (BERGER et al. 2005a, b) to expose a sufficient area South to the developing Upper Rhine Graben to erosion.

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References:

BERGER, J.-P. et al., 2005a. Paleogeography of the Upper Rhine Graben (URG) and the Swiss Molasse Basin (SMB) from Eocene to Pliocene. *International Journal of Earth Sciences*, 94(4): 697-710.

BERGER, J.-P. et al., 2005b. Eocene-Pliocene time scale and stratigraphy of the Upper Rhine Graben (URG) and the Swiss Molasse Basin (SMB). *International Journal of Earth Sciences*, 94(4): 711-731.