

Hofmann, R., Hautmann, M., Goudemand, N., Wasmer, M., and Bucher, H. 2010. Complex colonisation patterns of benthic communities in the immediate aftermath of the end-Permian mass extinction: New data from the Dolomites. In: Baud, A. and Bernecker, M. (eds): IGCP 572: Recovery of ecosystems after the Permian-Triassic mass extinction. Field workshop at GUTech, Muscat, Oman February 20-26, 2010, abstract book.

Complex colonisation patterns of benthic communities in the immediate aftermath of the end-Permian mass extinction: New data from the Dolomites

Richard Hofmann^{1*}, Michael Hautmann¹, Nicolas Goudemand¹, Martin Wasmer¹, and Hugo Bucher¹

¹Paläontologisches Institut und Museum, Karl Schmid-Strasse 4, 8006 Zürich, Schweiz

*richard.hofmann@pim.uzh.ch

The extensive exposures of the Lower Triassic Werfen Formation in South Tyrol (Italy) represent key localities in the study of the Early Triassic recovery interval. Fieldwork conducted in summer 2009 focused on a so far undocumented section at the Aferer Geisler and on a section at the Rosengarten/Catinaccio. Both outcrops expose a continuous and particularly fossiliferous succession of the lower Werfen Formation. The Werfen Formation at the investigated localities amounts to 110 meters thickness and includes the following lithostratigraphic units: Tesero Member, Mazzin Member, Andraz Horizon, Seis Member, Gastropod Oolith Member, and the lower part of the Campil Member. The depositional setting of the lower Werfen Formation is interpreted as a storm-dominated carbonate shelf environment with occasional siliciclastic input. Predominating lithotypes are laminated mudstones and tempestite beds. Regressive phases are recorded by supratidal dolomites and siltstones.

The initial fauna of the lower Mazzin Member (Griesbachian) is dominated by shallow-infaunal bivalves (*Unionites*), infaunal brachiopods (*Lingula*), and epifaunal gastropods (*Coelostylina*, “*Bellerophon*”). Rarely recorded are epifaunal (*Eumorphotis* and *Towapteria*) and semi-infaunal bivalves (*Bakevellia*). In the upper Mazzin Member (Griesbachian), the portion of epifaunal bivalves increases with the appearance and proliferation of the genus *Claraia*. Bioturbation is limited to a few burrows (*Planolites*) of vermiform deposit feeders. The fauna of the Seis Member (Griesbachian-Dienerian) remarkably differs from that of the Mazzin Member in spite of a comparable facies. Several taxa have disappeared from the fossil record, and epifaunal forms (*Claraia* and *Eumorphotis*) are now dominating in most assemblages. The faunal shift coincides with a significant increase in average shell size. Moreover, a diverse infaunal ichnofauna with *Thalassinoides*, *Spongeliomorpha*, *Rhizocorallium*, and *Taenideum* has been observed for the first time from this early recovery

stage in the Alps. However, overall diversity and the number of guilds in the body fossil record are slightly lower in the Seis Member than in the Mazzin Member. Towards the top of the section (lower Campil Member, Smithian), increased siliciclastic input coincides with a notable drop in diversity, leading to paucispecific assemblages dominated by *Claraia* and *Unionites*.

From these observations, we infer that the factors that controlled the ecological structure during the early recovery phase were more complex than previously assumed. The comparatively high diversity in the early Griesbachian and the presence of a diverse ichnofauna in the late Griesbachian indicate that relatively advanced recovery stages were reached fairly early after the mass extinction event. However, the fact that body fossil assemblages and ichnofaunal associations significantly fluctuated within a comparatively short time interval suggests that environmental conditions were rapidly changing during the early recovery phase. These finds contradict the scenario of globally persisting shallow water anoxia that delayed biotic recovery for most of the Griesbachian. Rather than a sole mechanism that delayed biotic recovery globally, the new data indicate that the Griesbachian was a time of volatile environmental conditions that allowed at least local ecological ameliorations punctuated by smaller crises that repeatedly replaced faunal associations at various stages of recovery.