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Abstracts

The Cassina beds (Middle Triassic, Monte San Giorgio, Switzerland): background and event sedimentation in an oxygen-depleted environment

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Cassina beds (Lower Meride Limestone, Ladinian) are one of the world-known vertebrate-bearing levels of the Middle Triassic Monte San Giorgio Lagerstätte (Canton Ticino, Switzerland, UNESCO WHL) and has been excavated since 1933, yielding excellently preserved reptile and fish fossils.

In 2006 the Museo Cantonale di Storia Naturale, Lugano, started a new bed-by-bed excavation and the upper third of the 3 m thick sequence has so far been excavated on a surface of around 40 m^2. The new excavation includes first a detailed cross-correlation of vertebrate taphonomical data with sedimentological features and microfacies analysis, which provides information to both seafloor palaeo-oxygenation and depositional setting.

The studied section records a continuous background sedimentation mirroring fluctuating but generally severely oxygen-depleted conditions on the bottom of an intra-platform basin adjacent to a shallow-water carbonate platform from which a recurrent carbonate supply reached the basin floor. The background sedimentation resulted in a finely laminated sequence of black shales and limestones, episodically bearing a monotypic foraminiferal meiofauna of a quasi-anaerobic biofacies which is documented first from the whole Monte San Giorgio sequence. Fluctuating anoxic to temporarily suboxic conditions are assumed to have fostered the transient colonization of the seafloor by the low-oxygen tolerant thin-shelled nodosariid foraminifers. However, either oxygen values were too low or the sufficiently oxygenated periods were too short to allow colonization by a more diverse benthic macrofauna, even including the opportunistic thin-shelled "paper-pecten" dysaerobic bivalves. The described oxygen-deficient conditions are also consistent with the growth of benthic microbial mats which may account for the common excellent preservation of fish skeletons ("microbial shroud" effect). On the one hand, holding skeletal elements together, sealing by biofilms may have protected the vertebrate carcasses against disintegration. On the other hand, limiting the diffusion in and out of the decaying carcasses and creating closed systems favourable to calcium phosphate precipitation, the sealing effect may account for the replication of labile tissue as observed in some fish specimens. Even preservation patterns resulting in bone dispersal may best be related to anaerobic decay under reduced bio-armouring of the carcasses rather than to scavenging activity.

The preliminary results emphasize that sediment microfabric and benthic macrofauna composition alone become an inadequate proxy for bottom-water palaeo-oxygenation in case that values of the latter approach anoxia, because of its insufficient resolution power in extremely oxygen-depleted regimes which exclude macrofauna and yet allow micro(meio)faunas to survive or even to thrive.

Widespread occurrence of scattered carbonate nodules suggests a pulsating input from the adjoining Salvatore platform, from which benthic taxa were swept into the basin during major storms. Platform-derived biota include, in addition to ostracod and dasycladalean remains, a characteristic foraminiferal assemblage (*Endotriadella*, *Endotriada, Hoyenella*, *"Trochammina"*, *Cornuspira*). This occurrence suggests a depositional setting close to the

basin margin and allows an insight into the shallow-waters of the adjacent time-equivalent Salvatore platform.

Episodic, short-lived depositional events occur randomly and are related to sediment supply from basin margins by turbidity currents (and maybe hyperpycnal flows) and to sedimentation through subaqueous suspension-fall of ash following important, however far-away, subaerial eruptions.