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The Late Triassic Fossillagerstätte of San Cassian – its meaning for the evolution of diversity and complexity

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The question whether and how global diversity and community diversity (alpha or sample level diversity) changed during the Phanerozoic is crucial for our understanding of fossil and modern biota. The Late Triassic (Carnian) Cassian Formation yields by far the most diverse marine invertebrate fauna of the early Mesozoic. More than one thousand species have been described from various localities in the area near San Cassiano and Cortina d'Ampezzo (South Tyrol, N Italy). No other early Mesozoic strata have such an outstanding fossil record and excellent preservation of shells and other biogenic hardparts. The low grade of diagenetic alteration and the fact that the fossils can be washed out from the poorly lithified marls facilitate the quantitative extraction of well preserved material (commonly with aragonite preservation). Therefore, meaningful comparisons with modern faunas are possible. Preliminary studies based on quantitative sampling and sample standardization show that Early Mesozoic tropical diversity was probably in the same magnitude as that of modern tropical biotas. Faunas from comparable environmental settings were structured and complex now and then. Mollusk and especially gastropod dominance seem to be old evolutionary traits. However, the outstanding preservation and diversity of the Cassian Formation also renders a major monographic bias. The diversity is probably artificially high when compared with that of other Triassic stages. The case study of the Cassian fauna suggests that taphonomic processes such as aragonite dissolution and lithification lower the apparent diversity of most other fossil faunas with a relatively high geological age.