Invertebrate Paleontology and Biostratigraphy

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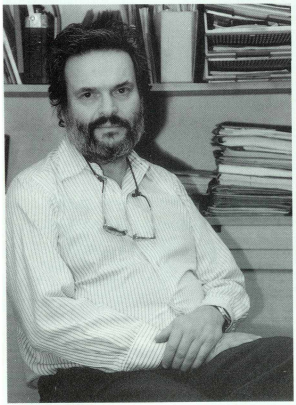
Principles in stratigraphy, cenozoic chrono- and biostratigraphy, cenozoic paleogeography and biogeography, taxonomy and systematics of molluscs, taphonomy of molluscs, archeozoology, trace fossils and taphonomy (Sirenia, Molluscs)

In collaboration with: Assistant Professor Dr. Peter Pervesler and Dr. Karl Kleemann.



Research

(1) Principles in Stratigraphy are the backbone of any work related to questions of timing of biologic and / or geologic events in the earth history. These principles must be evaluated with the new methodologies developed in stratigraphy such as evolutionary biostratigraphy and biochronology, magnetostratigraphy and magnetochronology, stable isotope stratigraphy, and sequence stratigraphy. Research conducted under the auspices of the International Commission on Stratigraphy has helped in revising the International Code of Stratigraphy and aims at defining the boundaries of geologic periods, e.g. the Paleogene/Neogene Boundary at 23.800 Mill. years.

(2) Special attention is currently devoted to cenozoic stratigraphy and the integration of different biostratigraphic zonations, e.g. Neogene marine and continental biozonations and their correlation with magnetostratigraphy to develop a sound basis for a Neogene biochronology. Among the larger projects are the correlation of the Neogene deposits of circum Mediterranean basins. We are also currently developing a marine strontium seawater time scale for the molasse basins north of the Alps and the Neogene basins from Austria towards the East.

(3) With this revised stratigraphic framework in which the time correlation problems have been solved, we attempt to reconstruct the paleogeography of these areas using facies developments through time in the various basins and palinspastic reconstructions for time slices 2 million years apart. We test our results by analysing the paleobiogeographic relations of various groups of organisms within the reconstructed regions.

(4) Systematic and taxonomic studies on various groups and faunas of Cenozoic molluscs, echinozoa and barnacles are currently performed by a

number of my students. The studies on Neogene faunal associations and taphonomic processes are compared with our most recent studies of various modern environments of mollusc faunas from the Red Sea coast of Egypt and the Adriatic Sea. Together with our students we are also involved in large scale excavation projects of Neogene mollusc faunas in Austria to determine (a) processes which result in shell concentrations and (b) the impact of predation by shell-boring organisms on mollusc faunas.

(5) Together with archaeologists we work mainly on food webs in relation to maritime cultures, e.g., of the Caribbean. Another topic are the questions regarding the "fossil collections" and imports of biological products by the paleolithic and neolithic populations of Austria and Czechia.

(6) Comparison of recent and fossil Lebensspuren. 3 D reconstructions of fossil crustacean-, annelid- and bivalve burrows are compared with resincasts of recent burrows. Orientationstatistics help to differentiate burrowing strategies.

Taphonomy of fossil Sirenia. (Reconstruction of a mass stranding 20 million years ago). Skeletal remains of several seacows (*Metaxytherium krahuletzi*) were discovered in a sandpit near Eggenburg (Lower Austria). The shallow marine sediments are of Lower Miocene age (Eggenburgian). The skeletons of 4 adult and 3 juvenile seacows were deposited onto the coarse clastic sediments of a debris flow. The animals probably died within a short time period after a storm. This event may have also damaged extensive seagrass areas, the main food source of the Sirenia. The carcasses were deposited near the coastline and were more or less reworked by wave and current action depending on the position of stranding. The growth of oysters on the bones shows that this period lasted for several years.

Teaching

A basic course on principles of the geological evolution of the lithosphere and the biosphere is delivered to biologists. Advanced courses and laboratories are tought in all fields of Invertebrate Systematics. Courses on Principles in Paleobiogeograpy as well as in Trace Fossils which include laboratories and fiel trips are another main aspect of my teaching. Principles in Stratigraphy are followed by lectures and laboratory sessions on Cenozoic Stratigraphy and a course with field trips on the Cenozoic Evolution of Austria. In winter semesters basic laboratory classes are given in the field of Paleontological Laboratory Techniques whereas during summer semesters we teach field as well as Excavation Techniques. Field trips to prominent "Fossillagerstätten" are organised all over Europe and abroad.

International Cooperations

International Commission on Stratigraphy, International Correlation Program (Projects 326 and 329); Universities of Milano, Parma and Bologna; Woods Hole Oceanographic Institution; Smithsonian Institution, Washington; US Geological Survey, Menlo Park; Geological Survey of Hungary.

Selected References

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