Micropaleontology

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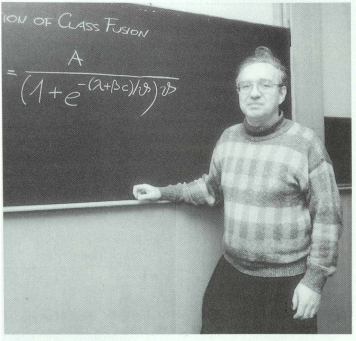
Systematics, morphometry, population dynamics, species concepts, evolutionary theory, paleoecology with special regard to Micropaleontology



Research

Morphometrics and morphogenetic programs

We investigate skeletal remains morphometrically. The acquisition of data on growth invariant variables, not only by considering quantitative, but also qualitative characters (e.g., shell ornamentation) is the main topic of this work. Special procedures based on analytical geometrical methods were used for a complete geometrical reconstruction of skeletal remains. By establishing the dependence of the form parameters of these functions on a character simulating age (e.g., shell size, chamber index) it is possible to estimate growth functions, which represent models of the complex morphogenetic programs. Several theories of evolution can be tested paleontologically using these methods.

Theory of classification and suprageneric systematics

This work is done in cooperation with colleagues interested in 'scientific theory' and 'philosophy'. 'Heuristic classification' is usually understood as the elementary process underlying the recognition of similar objects. Thus the criterion of character homogeneity is the fundamental principle of classification processes. Since character types differ according to the theory of measurement, homogeneity must be expressed in a universal form. The structuring of sets of organisms is performed by various methods, often declared to result in the 'natural system' of organisms. Whereas phenetic systems, including 'evolutionary systems' and 'transformed cladistics', are based on classification criteria resulting in class systems, 'phylogenetic' systems in a strict sense belong to a different type of connection systems. Various groups of Foraminifera were used as examples to demonstrate this at suprageneric levels by strictly applying these fundamental principles.

Estimation of paleogradients

New methods to estimate environmental gradients by considering proportions of species which permit the exact point estimation of the gradients are developed. Depth estimations in sublittoral coral reefs using large living foraminifers demonstrate the high precision of these methods. The transition from 'biocoenoclines' to 'taphocoenoclines' allows for the estimation of various gradients (e.g. temperature, light intensity, currents) in paleoenvironments. Field work is done in coral reef environments of the Western Pacific, especially the archipelago of the Ryukyus.