

THEORETICAL BIOLOGY AND THE ORGANISM CONCEPT: A HISTORICAL PERSPECTIVE

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ABSTRACT

The rise of molecular biology went hand in hand with a marginalization of the integrative unit in biology – the organism. Although the new methods contributed to progress in many fields, the often assumed sufficiency of restricting the focus to molecules is problematic. This was already clear to the founders of theoretical biology (Schaxel, Bertalanffy, and others). Although theories have long played a role in biology and can be traced back to antiquity, the field of theoretical biology was first established in the early 20th century. Theoretical biology needs to take into account the specific features in living nature that are not tackled by other disciplines. Unsurprisingly, the organization of parts and processes together with the organism concept play a central role for such theoretical considerations. The phenomena shown by living beings cannot be traced back – in a mere “atomistic” way – to the behaviour of molecules alone. There are different kinds of interactions among all levels of organization in an organism, and they have to be grasped practically and theoretically. Microdeterminism, which refers to the idea that macroscopic phenomena are determined solely by events on the micro- or molecular level, must be complemented by macrodeterminacy (Weiss), which works in the diametrically opposite direction. The present talk demonstrates the relevance of theoretical biology and its connection to the organism concept by examining their common historical development.