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EVOLUTIONARY ECOLOGY OF WATER ANIMALS: CONCEPT, SUBJECT, EXPERIENCE FOR APPLICATION IN THE ANALYSIS OF BREEDING SYSTEMS

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The basic concepts in the field of evolutionary ecology are presented. A brief historiography of the question is given, the prerequisites for the emergence of this section of biology are given. The definitions of the subject of the study of the discipline in question, as well as brief characteristics of the objects of study, basic concepts and methodological approaches are given. It is pointed out that evolutionary ecology is a section of evolutionary teaching focused on the study of the adaptation and evolution of communities of species, faunas and biogeocenoses. It is emphasized that the subjects of evolutionary ecology studying are species and their populations as well as communities, cenoses and ecosystems. The main idea of the work is reduced to an attempt to implement the epistemological synthesis of two basic methodological approaches: the ecosystem and population approaches. Two preferential methodological approaches in the field of evolutionary ecology are considered: firstly, it is genetic one, namely, population genetic (based on the dynamics of frequencies of polymorphic genes), molecular genetic (dynamics of pairs of nucleotides) and evolutionary genetic (phylogeography and molecular phylogeny); secondly, it is epigenetic one, in particular, the analysis of the developmental trajectories of morphological structures. The principal characteristics of the evolutionary ecology peculiarities of aquatic animals are postulated. An attempt has been made to justify the fact that the evolutionary ecology of aquatic organisms as a whole is of greater interest for studying the processes of adaptation and evolution than terrestrial. In the aquatic environment, all the factors of abiotics, the type of reproduction and the nature of isolation acquire a somewhat greater significance for evolution. The main items of the subject are provided with research materials, which served as the basis for developing their own ideas about evolutionary ecology. The work is significantly concentrated on the problems of evolutionary and ecological importance of interspecific hybridization, in particular on the effective co-adaptation of the genomes of the crossed species. The combination of heterogeneous genomes among remote hybrids can make the evolution of genomes go along to additional and multipolar orientation, which allows to consider hybrids as a living model for studying the problem of coordinating the work of different genomes in ontogenesis, especially during a critical period of early development. It is assumed that the success of hybridization is provided by the forming of a genetic program of a system response to structural transformations of the genome. The main result of our research in this field has not only been the discovery of a fundamentally new system of vertebrates reproduction, but also the evolutionary-ecological consequences of natural remote hybridization.

Keywords: evolution, ecology, epigenetics, genetics, biosphere, ecosystem, population, species, hydrobiont

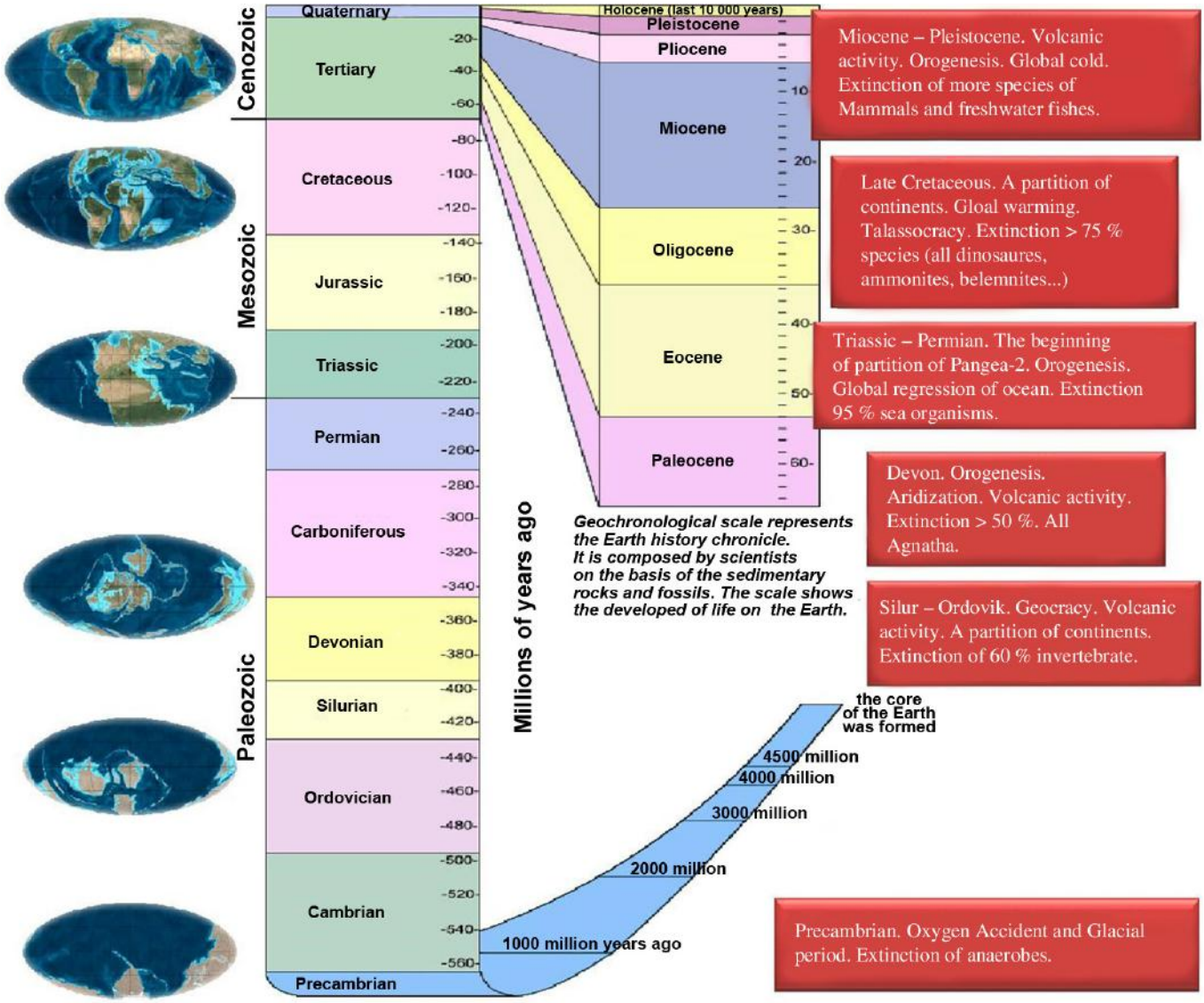

Fig. 1. Schematic representation of global biocenotic crises in the history of the Earth. On the left is the dynamics of continents and oceans change. In the center is a geological scale. On the right is information about geoclimatic

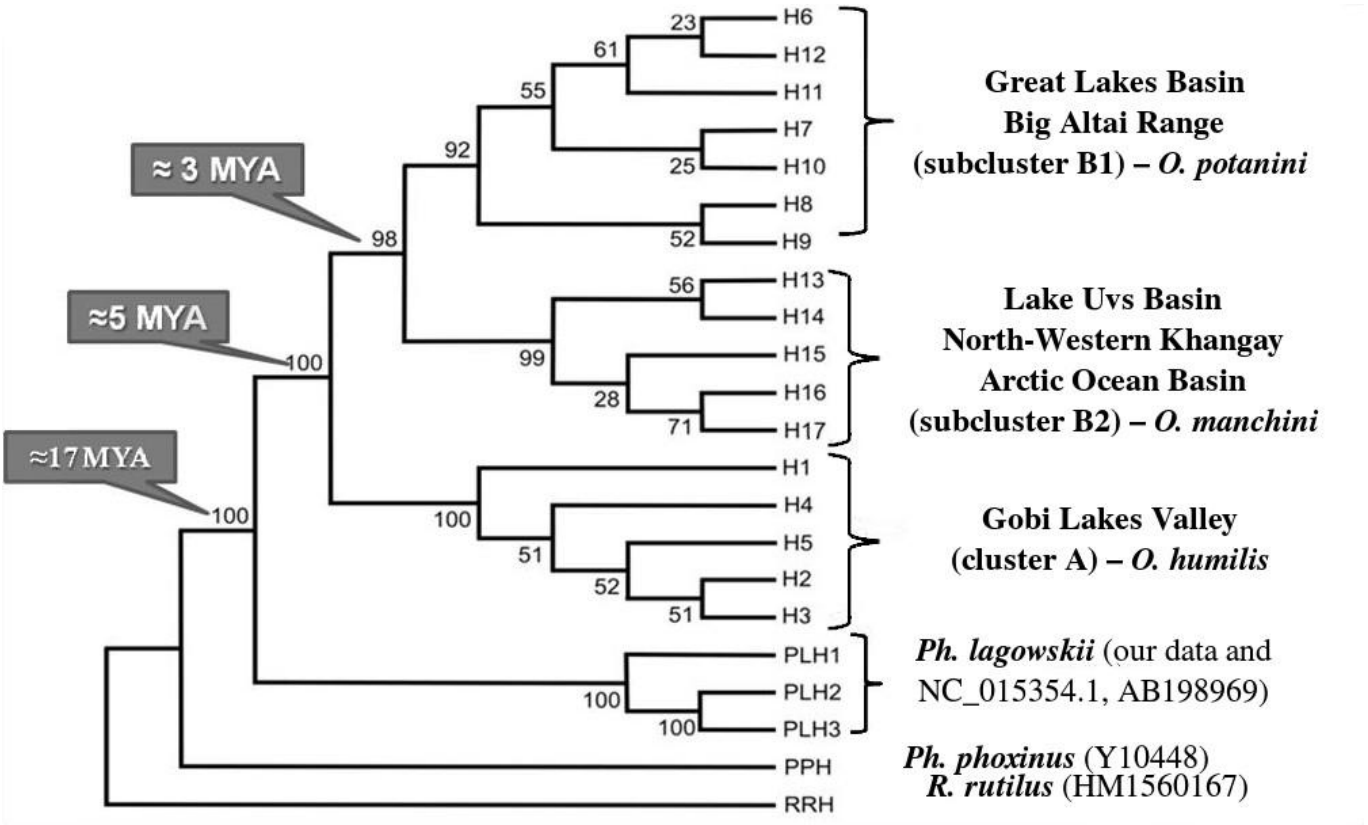

Fig. 7. A dendrogram reflecting the phylogenetic relationships between haplotypes of cytochrome *b* of the Altai osman on the territory of Mongolia (by [38])

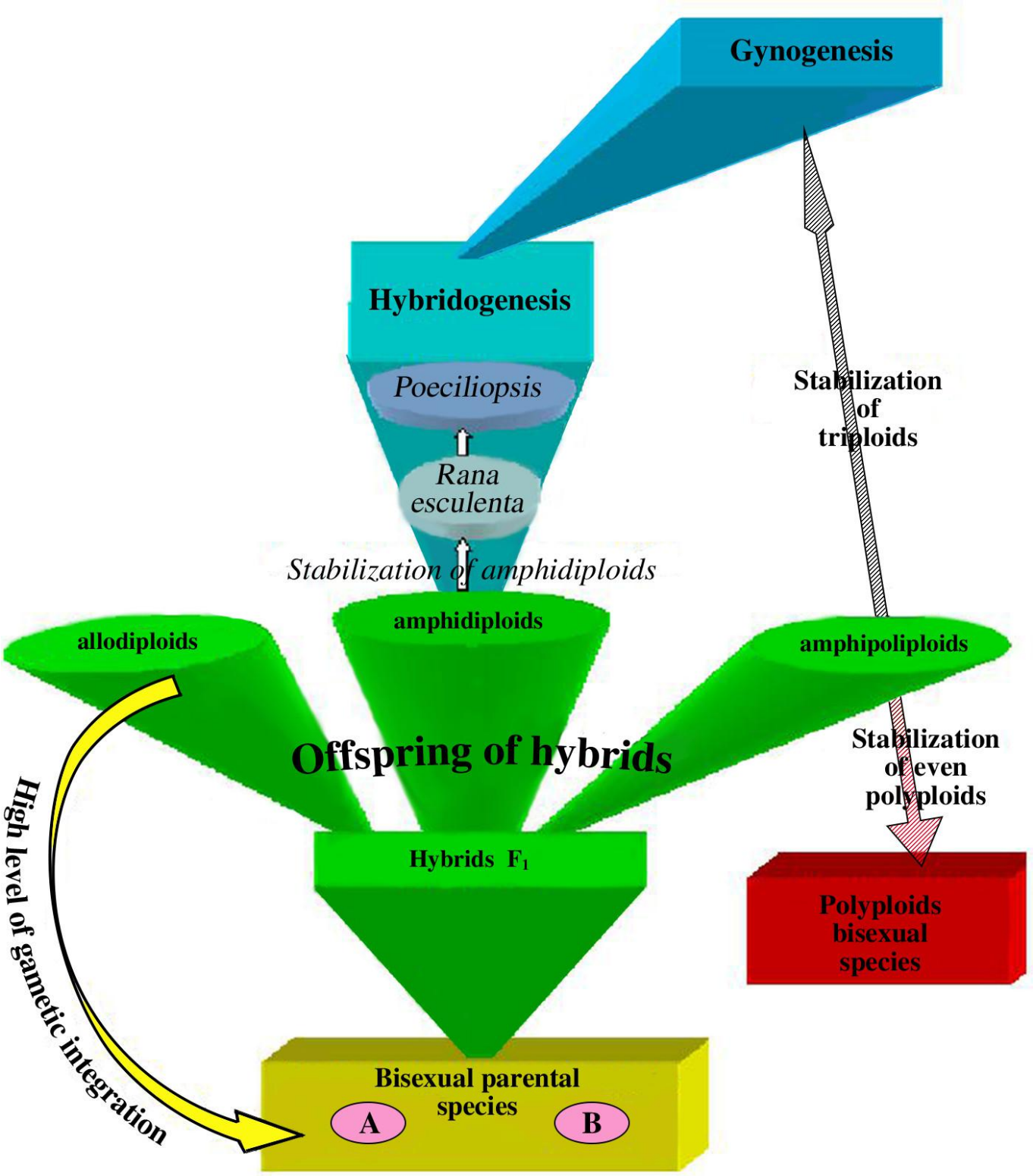

Fig. 12. The scheme of evolutionary consequences of proapomixis

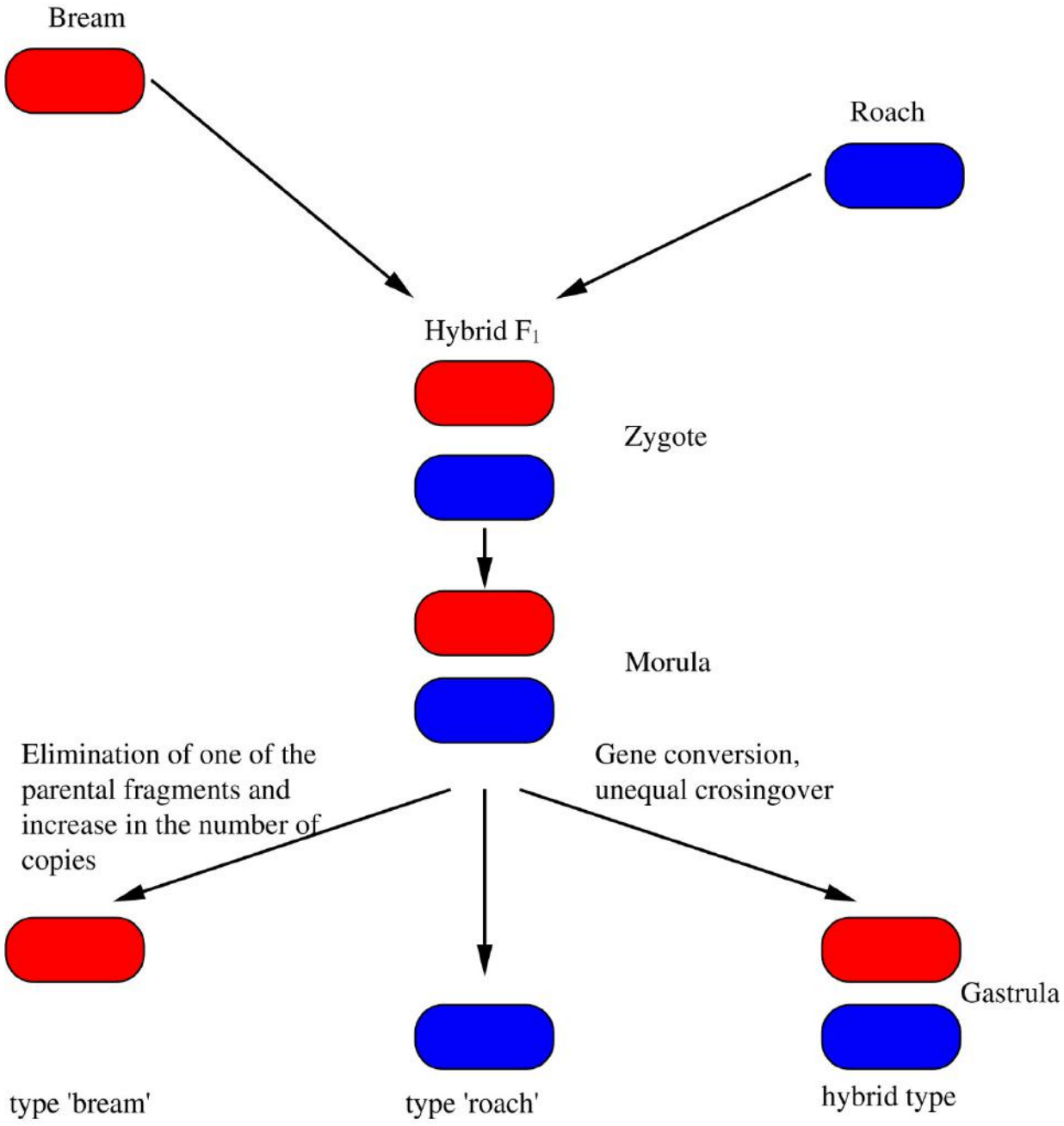

Fig. 13. Principal scheme of elimination of ITS1 fragment in interspecific hybrids of bream and roach of the first generation

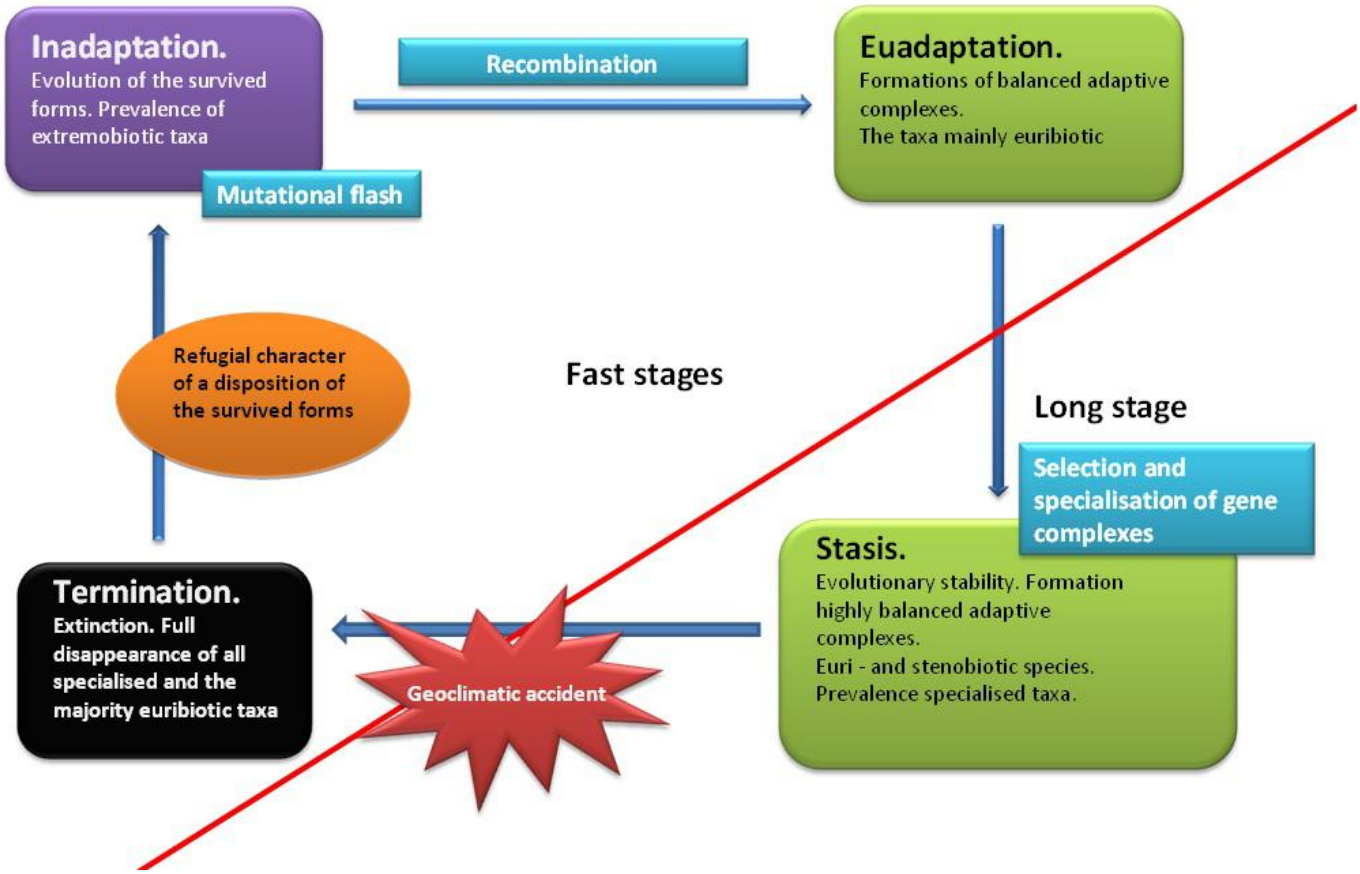

Fig. 14. A complex model of the cyclicity of evolution, its mechanisms and consequences, to the development of basic models of the uneven evolution according [29, 31, 61, 84]