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Book reviews

Hecht, M.K.; Wallace, B.; Prance, Gh.T. (eds): Evolutionary Biology, vol. 15. New York London: Plenum Press 1982. xiv + 442 pp., several figs. and tabs. Hard bound $ 49.50.

The main aim of this stimulating and well-known series 'Evolutionary Biology' is to publish extensive critical review articles, original papers and commentaries on controversial topics, which are primarily of greater length and depth than those normally published by society journals. The present volume 15 agrees with these general guiding principles of 'Evolutionary Biology'.

Volume 15 presents nine papers – each a detailed examination of a wide-ranging subject from the field of evolutionary biology.

Paper No. 1: "Patterns of Neotropical Plant Species Diversity" by A. H. Gentry documents the relationship between plant species diversities and precipitation for a series of eleven neotropical plant communities, including lianas and all trees and large shrubs over 2.5 cm dbh. Implications of these data for species-area analyses and for the community equilibrium/nonequilibrium debate are also discussed.

Paper No. 2: "Evolution on a Petri Dish. The Evolved β-Galactosidase System as a Model for Studying Acquisitive Evolution in the Laboratory" by B. G. Hall represents the first attempt to apply the approach of experimental evolution to a complex community.

One of the most interesting results of this study can be summarized as follows: In contrary to other studies in which evolution of a new metabolic function required only constitutive enzyme synthesis, evolution of the ability to use β-galactoside sugars required mutations in both regulatory and structural genes.

The purpose of Paper No. 3: "A Comparative Summary of Genetic Distances in the Vertebrates. Patterns and Correlations" by J. C. Avise and C. F. Aquadro is to review specifically the literature of genetic distances between vertebrate species based on conventional electrophoretic analyses of proteins. To be included in this review, a study had to satisfy the following criteria: a) calculated genetic distances must be based on information from 14 or more genetic loci, and b) at least three species from a genus must have been examined (or, in comparisons among genera, at least three genera per family). Studies on a total of 44 vertebrate genera and 16 families, representing over 3,800 pairwise comparisons of species, satisfy these criteria. Under neutral mutation pressure, low and intermediate values of NEI's D statistic are linearly related to time of divergence of two populations. These concepts and results have been intensively discussed using the above mentioned data of 44 genera and 16 families.

Finally, two characteristics of vertebrates, roughly correlated with D, are briefly discussed with reference to the

following hypotheses: 1. Mean level of heterozygosity within species is functionally related to level of divergence between closely related species and 2. The temperature regimes in which proteins function and evolve causally influence magnitudes of protein variation and divergence.

Paper No. 4: "The Alcohol Dehydrogenase Polymorphism in *Drosophila melanogaster.* Selection at an Enzyme Locus" by W. van Delden is a review article concerning the present state of knowledge of the alcohol dehydrogenase polymorphism in *D. melanogaster,* with emphasis on its biologic significance. In conclusion, the author states that in the case of the ADH polymorphism the neutrality hypothesis appears highly unlikely.

Paper No. 5: "Developmental Changes in the Orientation of the Anuran Jaw Suspension. A Preliminary Exploration into the Evolution of Anuran Metamorphosis" by R. J. Wassersug and K. Hoff deals with the determination between primitive and advanced metamorphosis within the Anura. The primitive condition is taken as one in which there is little difference between larvae and adults. In this study the authors quantify the change associated with metamorphosis of the jaw suspension for 38 frog species. The species used were selected to represent as many genera as possible with special reference to those genera considered archaic by systematic herpetologists.

It has been shown that there is an inverse relationship between the palatoquadrate orientation, relative to the base of the braincase, in larval anurans and orientation in the adult. Additionally, the anuran families recognized by others as archaic have the least change in palatoquadrate orientation with metamorphosis.

Paper No. 6: "Regulatory Genes and Adaptation. Past, Present, and Future" by R. J. MacIntyre attempts to make a case for studying the regulation of specific structural genes. The available results indicate that there are abundant regulatory gene variants in populations, when there are 1) clear reasons for a separate (=separate from the structural gene) genetic basis for any regulatory phenotype and where 2) evidence that the regulatory gene is directly involved in the control of the structural gene is demonstrated.

Finally, the extent of intraspecific and interspecific variation in regulatory genes and its role in adaptation-processes has been critically examined.

Paper No. 7: "Evolution of Dermal Skeleton and Dentition in Vertebrates" by W. E. Reif deals with a proposed model of the evolution of the dermal skeleton based on phylogenetic, morphogenetic, histologic and functional data and considerations. One of the main conclusions is that the spectrum of dermal elements in vertebrates can be derived by a small number of morphogenetic and regulatory processes from a simple microsquamose skeleton consisting of isolated odontodes. In contrary to a widespread hypothesis in the literature (assumption of two components in the dermal skeleton, which have independent evolutionary origins) the author assumes that the dermal skeleton consists of one component only and had only one evolutionary origin.

Paper No. 8 "Evolution of Chesapecten (Mollusca: Bivalvia, Miocene – Pliocene) and the Biogenetic Law" by J. M. Miyazaki and M. F. Mickevich covers studies to test whether phylogenetic change occurs along a developmental axis and to test whether developmental modifications are useful in discriminating primitive character states from derived character states. This had been done by comparing a phylogenetic (cladistic) network of a fossil pectinid lineage of the genus Chesapecten to ontogenetic changes in characters which occur in all the included taxa. The cladistic network is obtained independent of developmental information. This study serves also as a test of Newell's statement as applied to Chesapecten.

Paper No. 9 "Punctuated versus Gradual Mode of Evolution. A Reconsideration" by A. Hoffman comes to the following main conclusions: 1. The model of punctuated equilibria claims that a large majority of morphologic changes in evolution take place very rapidly in populations that are so small that their discovery in the fossil record is virtually impossible. The opposite model of phyletic gradualism claims that morphologic change is accomplished by a gradual shift of the range of intraspecific variation. 2. It's impossible to decide which of the two ideal models is more commonly fitted by real evolutionary lineages. 3. The question of why some lineages undergo gradual morphologic evolution while others display punctuations has thus far been answered in terms of developmental homeostasis of individuals, genetic homeostasis of populations and ecological homeostasis of communities. These explanations, however, have failed. 4. The variation in patterns of morphologic evolution can be explained in terms of developmental canalization versus developmental plasticity. 5. Developmental canalization and plasticity may be adaptive and genetically determined.

After reviewing the main contents of this Volume 15 of 'Evolutionary Biology' some critical remarks shall be added: Here I can repeat word by word the criticism mentioned in my book review of Volume 14 of 'Evolutionary Biology' published some time ago in this journal:

First, a minor and formal comment: Some of the articles are written without any summary, which is a great disadvantage in several aspects.

Secondly, all the articles are extremely specialized in such a way that only a relatively small number of experts working in just the same specific field would be able to follow them completely. These critical comments, however, should in no way narrow the value of this recommendable collection of relevant papers from evolutionary biology. It is greatly welcome for all specialists working in just the same specific fields of research. But in my opinion all other readers with a general interest in evolutionary problems would hardly profit by studying this volume.

M. Huehn, Kiel