

EVOLUTION EMERGING 1

W. K. Gregory

EVOLUTION EMERGING

A Survey of Changing Patterns from Primeval Life to Man



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and

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PREFACE

THE BEGINNINGS of the present work date back to the decade of 1890–1900, when at Columbia University Professors Bashford Dean and Henry Fairfield Osborn gave their lecture courses on “Fishes, living and fossil,” “Mammals, living and fossil,” and “The Evolution of the Vertebrates.” Under the latter title Professor Osborn projected a general book to follow Dean’s “Fishes, living and fossil” (1895) in the Columbia University Biological Series. He and Doctor McGregor did indeed prepare notes and illustrations for the chapters on amphibians and reptiles but they soon became so much occupied with their special studies on fossil vertebrates at the American Museum of Natural History that the proposed general text gradually receded into the background.

Although the project of a single general textbook on the evolution of the vertebrates, with special reference to the skeleton, was put aside for several decades, the resulting efforts to clarify the main outlines led to Professor Osborn’s well known works, “The Reptilian Subclasses Diapsida and Synapsida” (1903), “The Evolution of the Mammalian Molar Teeth” (1907), “The Age of Mammals” (1910), “Men of the Old Stone Age” (1915), “The Origin and Evolution of Life” (1917), as well as to many of my own researches and publications and those of my graduate students.

Beginning in 1896, Professor Dean inspired me with an abiding curiosity as to the origin and evolution of the main groups of fishes; a little later, Professor Osborn opened to me the evolving orders of fossil and recent reptiles and mammals. Sitting reverently in the class of Professor E. B. Wilson, I beheld his amazing vision of the emergence of one great invertebrate phylum

after another, while Professors James Hyslop and Frederick J. E. Woodbridge showed me that a naturalist may profitably endeavor to look below the surface phenomena of evolution and try to generalize the ways in which reality behaves, or seems to behave, through the ages.

In 1931, Professor Osborn suggested that I should revive the projected general work on the evolution of the vertebrates and soon afterward I began to prepare preliminary outlines and manuscripts. But, as in the earlier effort, as the work progressed so did its scope. For example, it came to seem futile to introduce suddenly a review of the various theories of the origin of the vertebrates until earlier chapters had sketched, in a comparative way at least, a few characteristic samples of the vast world of invertebrates; for some invertebrates, whether known or unknown, supplied the source of the vertebrates, while others have served either as food, as competitors, or as enemies. Similar difficulties had to be met all along the branching lines.

In attempting to survey within practicable limits the age-long transformations of the vertebrates I have centered attention mainly upon the emergence of new skeletal patterns. The study of the skeleton as a whole, including not only the endoskeleton but the integumentary exoskeleton and its diverse derivatives, makes it possible to combine and integrate the knowledge of both fossil and still existing animals. Upon the skeleton is imprinted a legible record of the medium in which the animal lived, of the mode of locomotion, of the ways in which food was sought for, seized, divided, ingested; while the endocranial cast often affords a record of the form and pattern of the main parts of the

brain, of the location of the cranial nerves and in some cases of the main blood vessels of the head.

The geneticists deal largely with the crossing of individuals as representatives of strains, populations, varieties, subspecies and species, but in the present work individuals are considered as representatives of genera. Here we must, so far as possible, avoid descriptive detail as an end in itself and hold to the aim of a broad survey, which may indicate within each larger group the general range of adaptations in body form, locomotor system, and in the organs for seizing, subdividing and ingesting the food, as well as the most likely source of that group and the probable stages that led to its outstanding characteristics.

For a half century or more, Columbia University and the American Museum and their leaders have been building up the resources, assembling the opportunities and training the individuals that have made possible the present book and hosts of others. I have already spoken of the inspiration and training I received from my professors and predecessors at Columbia. With equal pleasure and gratitude I recall my close association at the Museum with Professor Osborn, Doctor Matthew and other members of his staff, as well as with my colleagues, Henry C. Raven, Dr. Milo Hellman, and many others. Nor do I forget the long line of my graduate students who contributed so much by their researches and publications to the material used in this book. An inspection of the bibliography will suggest to how great an extent this work is indebted to the authors listed, but I cannot forbear to mention especially Dr. Erik Stensiö, Professor D. M. S. Watson, Dr. Robert Broom, Dr. F. von Huene, Professor A. S. Romer and Professor George Gaylord Simpson.

To President Butler I am indebted for the opportunity to study living gorillas in Africa, in company with Messrs. Raven, McGregor, and Engel. I desire to thank Professor Dudley S. Morton both for his effective promotion of that expedition and for his illuminating studies on the evolution of the human foot.

To the late President Henry Fairfield Osborn and to his successors, President Trubee Davison and Acting President Perry Osborn, the Trustees of the American Museum, and Director Albert Eide Parr, I owe continued access to all the facilities and treasures of the Museum, opportunities for field studies in North America, Australia, the Sargasso Sea, Africa, New Zealand, the West Indies; as well as unfailing and generous support during more than five decades of education, research and publication.

In conclusion, I thank all my present colleagues, friends and assistants at the Museum for innumerable courtesies and much helpful discussion of problems connected with this work. For many years past, Mrs. Helen Ziska has made the excellent line drawings that bear her name or initials, and for the past eight years Miss D. F. Levett Bradley has skillfully prepared the comparative outlines and charts. During all the years in which this work has gone through its successive revisions and enlargements, Mrs. Clara Platt Meadowcroft has put into it an incalculable measure of constructive effort. Its development and completion indeed owe very much to her vision, her determination and her always generous spending of her time and effort.

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*The American Museum of Natural History,
New York*

A C K N O W L E D G M E N T S

THE ILLUSTRATIONS (Volume II) are arranged along comparative-systematic lines, to indicate the range and evolution of form in a given group, with the more primitive or generalized forms near the stem and the more specialized set out on diverging branches. Credit to the author or other source of the illustration is given in the legends and on the copyright page.

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