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## Ontogeny and Phylogeny

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By Stephen Jay Gould  
*The Belknap Press of Harvard University Press, Cambridge, Mass.*  
 501 p., 1977.  
 U.S. \$18.50

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Although the author denies it, this book is a courageous defence of a theory rejected by most 20th century English speaking biologists and paleontologists, i.e., the development of the individual reflects the evolution of the group. Long after the concept was discarded by British and American scientists, it was vigorously defended in Germany by the distinguished late O. H. Schindewolf, with whom I studied. A dozen years ago, I had the experience of a published attack by a well known British colleague, on the grounds that concluding the existence of recapitulation was obviously absurd. Consequently, I welcome Gould's arguments supporting the phylogenetic significance of ontogeny for their outstanding depth and conviction.

Gould is well qualified as a biologist and palaeontologist to analyse the complex subject matter at the interface of the two disciplines and to review critically the long historic and often philosophic background. In particular, his understanding and enjoyment of the extensive German writings of the *Naturphilosophen* is evident (who can forget Gould's convincing performance of Herr Professor Haeckel emotionally defending his "Law of Recapitulation" at the Denver Meeting of the Paleontological Society?). However, I suspect most readers may consider this historical review, taking up half the book, overextended; the inclusion of Freudian psychoanalysis, primary education, racism and criminal anthropology is certainly not essential to the main thesis of the book. Yet, Schindewolf's theory of "proterogenesis" linking macroevolution with ontogeny, is only briefly mentioned.

The meat of the book is found in Chapter 7. Gould sorts out the existing

confused and confusing terminology by reducing De Beer's eight categories of supposed heterochrony to only two processes, i.e., ontogenetic acceleration and retardation - of either somatic or sexual development. The morphologic results of these varying relative growth rates are by no means easily distinguished. Thus ontogenetic recapitulation of phylogeny may be due to accelerated somatic development (acceleration) or to retarded sexual development usually with larger body size (*hypermorphosis*); *paedomorphosis* (the retention of ancestral juvenile characters by later ontogenetic stages of descendants) may result from either accelerated sexual (*progenesis*) or retarded somatic development (*neoteny*). Gould uses an ingenious "clock model" to illustrate and differentiate particular types of heterochrony for a variety of phylogenies.

In chapter 8 and 9, Gould discusses in detail the modes of paedomorphosis with reference to evolution using examples from the Recent animal world. He attempts here to explain the ecologic significance of progenesis and neoteny with the *K* and *r* selection modes.

The final chapter places humans into the proper perspective. In particular, the reproduction of an old pair of portraits of chimpanzees provides uncomfortable support that we are neotenuous apes, after all. If we are neotenuous, then who among us would deny the phylogenetic success of the process?

Finally, there are an epilogue, extensive additional historical notes, a large bibliography of about 900 entries, and - last but not least - a glossary and index.

This book is well set, illustrated and hard-bound, contains almost no printing errors, and above all, has an attractive price tag. It is certainly of excellent value for the private collection of any biologist and palaeontologist with broader interests; and a must for every university library.

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## Paleocurrents and Basin Analysis

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By P. E. Potter and F. J. Pettijohn  
*Second, corrected and updated edition  
 Springer Verlag, New York. 425 p., 1977.*  
 US \$24.50

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The phrase 'paleocurrent analysis', meaning simply the study of old, or former currents, does not adequately convey an impression of what this subject has become in the last two dozen years. The primary aim of investigating paleocurrents in sedimentary rocks is to permit a reconstruction of paleoslope which, in turn, yields information regarding sediment sources and dispersal trends. However, studies of paleocurrent variance can, in addition, provide useful clues as to depositional environment and, on a local scale, variations in mean current direction can be used to reconstruct the morphology and orientation of landform elements such as shoreline bars and barriers, submarine and subaerial fans, rivers and deltas. Analyses of this type are an integral part of any sophisticated basin study if its paleogeography, depositional environments and sediment dispersal dynamics are to be properly understood and, it is fair to say, anyone nowadays who neglects this aspect of the work is simply not doing his job.

If you still need convincing, or if you want some fresh inspiration, this is the book for you. Its authors (and their students) were at the forefront in the development of the techniques of basin analysis over 20 years ago, and this book demonstrates that they are still right up there. Although little of the material used in the books is strictly their own, their grasp of the subject and the scope of their synthesis would be hard to improve on.

The first edition, published in 1963, contained a chapter on the history of paleocurrent investigations, four chapters describing, with examples and case studies, the use of the various directional elements such as fabric, crossbedding, linear features and deformational struc-