

"During the past century, the German biologist Ernst Haeckel proposed that developing embryos retrace the evolutionary history of their species. For example, say that a reptile represents a third major stage in evolutionary development and that a bird represents a fourth, more advanced stage. Haeckel proposed that an embryonic bird would retrace all three earlier stages and then proceed to the fourth stage. Likewise, human embryos were thought to pass through all of the stages representing less sophisticated creatures and to add to their development a fifth or sixth stage. This idea, called the 'principle of recapitulation' and later the 'law of biogenesis', was extremely popular until well into the twentieth century. Textbooks commonly expressed this principle by saying that 'ontogeny recapitulates phylogeny' or, in simpler terms, that 'the development of an individual (ontogeny) retraces the evolutionary descent of the entire species (phylogeny).' The concept is an over-simplification, however; and today it is only historically significant. Today, the important point about recapitulation is that all vertebrate embryos pass through similar developmental phases, which suggests a strong evolutionary relationship."

-- Jack A. Ward & Howard R. Hetzel, *Biology Today & Tomorrow* (St. Paul, Minnesota: West Publishing Company, 1980) p. 214.

"Drawing parallels between development and evolution was much in vogue a century ago -- as captured in the tongue-twisting slogan still memorized by students, 'Ontogeny recapitulates phylogeny.' But interest shifted away from development in the period following the widespread acceptance of Darwin's theory of evolution. To scientists who viewed an adult organism as a set of optimized parts comprising the best possible design, development was irrelevant, explains Stephen J. Gould of Harvard's Museum of Comparative Zoology.

"Now, a rebirth of interest in embryology has occurred among biologists who think about evolution, and many of them are beginning to believe once again that important clues to the evolution of a living organism lie in its development. While scientists are not readapting the exact rule that a developing organism works its way through ancestral forms, biologists armed with new analytic methods are resurrecting the spirit underlying the ontogeny-phylogeny motto.

"The philosophical shift that has renewed interest in embryology is a concern for large and relatively sudden changes that take place in evolution. Darwin and his followers occasionally admitted that major, discontinuous changes occur, but the emphasis was squarely on natural selection among small changes and thus gradual evolution. Now many scientists believe that a species spends most of its existence in a steady state; the small changes are generally fluctuations that don't build into a trend. And the major changes which can create a new species, all crowd into a relatively short period. Then the discontinuous change creates a 'hopeful monster,' which can adapt to a new mode of life.

"Both modes of evolution occur in nature; there is a full continuum from gradual to punctuated,' says Tony Hoffman, a paleontologist from Warsaw. While most of the scientists at the meeting agreed, each holds a strong opinion about which end of the spectrum is the most important, and that opinion influences his or her choice of research topic.

"'Embryology is now mainline biology again,' says Gould, who was one of the originators of the evolutionary mode) called 'punctuated equilibrium'.