

The Form of Evolution

by Stephen Talbott

A Review of ***Developmental Dynamics in Humans and Other Primates: Discovering Evolutionary Principles Through Comparative Morphology***, by Jos Verhulst (translation by Catherine E. Creeger).

Jos Verhulst could hardly have startled modern sensitivities more when he wrote:

“Movement toward the human form is present in animal evolution from the outset.... In this sense, the emergence of humanity can be seen as the fulfillment of evolution’s longstanding promise.”
(p. 362)

It is too startling, I suppose, for many to endure. Those evolutionary biologists who do manage to read the book all the way through will, I suspect, be those who realize that Verhulst has abandoned as fruitless the century-old battle between Darwinists and creationists. He is not concerned with organisms as mechanisms or with the question whether the “designer” of these mechanisms is natural selection or God. He appears to believe neither in that sort of design nor in the mechanisms it might produce.

Rather, he brings to his work in comparative morphology an overriding concern for organic form—not just the shape of the individual organism, but the coherent form of the overall evolutionary thrust. He sees this form as essential to an understanding of the dynamic principles of evolution. In other words, he is concerned with form in the older sense of formal cause, whereby the particulars of a process are understood through their relations to the larger, expressive pattern of development. That is, they are explained in terms of the observable unity of form, the productive gestalt, of the process as a whole.

So the assessment of Verhulst's thesis—a thesis he presents through a vast array of morphological data—requires only that one observe the relevant forms and note their relationships. This should cause no difficulty for any scientist. Either the relations Verhulst claims to recognize between forms (including the human form) are there to be seen, or they are not. If they are, the implications may be profound—and Verhulst's take on the implications may not be accepted by all readers—but this is no more a reason to reject what one can see with one's own eyes than the profound implications of Galileo's observations were a reason to reject sunspots and the moons of Jupiter.

Beyond Specialization

Verhulst sees two contrary movements at work within evolution. One is the “tendency toward anthropogenesis”—the tendency toward human form. This non-specialized form is not a late-arrival on the evolutionary scene, but is basic to the entire story. And so, regarding the primates, “the human form represents the original primate endowment to a very great extent.” Homo sapiens is, in a sense, “the most primitive primate.”

One of various ways to look at this is through the phenomenon known as “fetalization.” For example, the skull of the newborn chimpanzee is remarkably humanlike (see figure), whereas the adult chimpanzee departs strikingly from the human form. Similarly, the hair on a chimpanzee fetus is, in humanlike fashion, restricted to the head, whereas the adult chimpanzee (like all other mammals except humans) is fully covered with hair. You could say, then, that humans tend to retain certain fetal traits.

Looking at such patterns of development, the anatomist Louis Bolk (1866-1930) asked himself how a humanlike trait that has not previously shown up in evolution could be “prefigured” in a non-human fetus. Clearly it is not a matter of adaptation to outer circumstances in the usual Darwinian sense because, Bolk wrote, “no chimpanzees or their ancestors have ever had naked bodies with hair limited to the head.” There was no opportunity for the trait to come under selection pressure.

Bolk therefore suggested that “an intrinsic evolutionary factor must exist, a factor that is already active in principle in anthropoid apes but manifests fully only in humans” (p. 46). Much of Verhulst’s book is devoted to the detailed analysis of countless traits pointing in the same direction.

A second evolutionary movement is the tendency toward animal specialization. It is seen, for example, in the brow ridges and extended muzzle of the chimpanzee adult. Likewise, the “hand” and “arm” can specialize into the remarkable capabilities of the salmon’s fin, the hawk’s wing, the mole’s digging limb, the orangutan’s arm for swinging, and so on. Such specialization is always a departure from the central, more open-ended pattern, and leads in the direction of a highly tuned adaptation to a particular environmental niche. In this adaptation, Verhulst suggests, there is room for Darwinian natural selection to play a significant role.

In general, “as evolution progresses, the anthropogenetic tendency breaks through to a greater extent and specialization becomes less dramatic. In higher animals, the human gestalt is expressed to a considerable extent, especially during fetal development, until ultimately the anthropogenetic tendency emerges at its strongest in human beings” (p. 95). New traits commonly appear in the juvenile stages of higher animals, but are then overtaken by specializations during the adult stages. But when, in the course of evolution, the juvenile traits persist more and more into later stages of development, childlike qualities manifest in the adult. In this sense you could say that retaining a certain childlikeness is an essential feature of the human being.

Coordinated Development

This is scarcely to gesture toward the richness of Verhulst’s book. He is concerned to sketch in great detail the dynamic processes at work in morphological development among primates. These processes include not only fetalization but also retardation, compression, hypermorphosis, and so on. A great virtue of his work is the evident lack of any desire to

impose a neat schema upon the data. The complex, interweaving factors affecting development are allowed their unique play in each individual case. This can make for considerable complexity; the book is not always an easy read.

Regarding complexity, Verhulst points to a principle of “synergistic composition” evident in the way numerous movements toward the human form develop in coordinated, mutual dependence. Thus, the juvenile shape of the human skull is inseparable from the enlarged brain and descended larynx. These in turn are connected with the capacity for speech—but this last makes no sense without a more highly developed nervous system as a vehicle for thinking. To make speech possible, the structure of the mouth also had to change, and it had to be freed from its prehensile (grasping) function, which meant that the hands needed to become prehensile, which meant that we needed an upright posture, which demands that almost everything changes throughout the organism. Some of these changes helped to free respiration from the constraints of locomotion—a freedom necessary for speech. This same end was served by the development of eccrine sweat glands to form a cooling system no longer dependent on respiration. (You could hardly speak while rapidly panting to cool yourself!)

The fact that a single dynamic principle (“retardation,” which is closely related to fetalization) is involved in producing all these and many other developments in a unified pattern suggests to Verhulst that the developments were “already prefigured in the prototypic structural plan for the animal body. Because the physical appearance of these effects occurs only at the end of primate evolution, when the retardation has asserted itself fully, they cannot be explained as the result of a physical process of natural selection” (p. 347).

Verhulst sees himself extending an interpretive tradition that goes back to Goethe and Bolk. This reviewer is unable to assess Verhulst’s extensive and detailed discussions of morphological features, ranging from fingernails and hair distribution patterns to the position of the

larynx. But the attempt by the author of *Developmental Dynamics* to explore new territory beyond the ideological constraints of conventional evolutionary thought and debate could not be more welcome.

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