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Forever young: upon reading Growing Young by Ashley Montagu

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UPON READING GROWING YOUNG BY ASHLEY MONTAGU

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Abstract

We argue that the evolutionary process of neoteny -- the natural selection of regulatory gene mutations that retain a youthful ontological system of physiological and behavioral characteristics, and thus never activates the full species-specific features of the ancestors' adulthood. The resulting new behavio-morph retains infant/young features throughout ontogeny and never displays the adult behavior or physiology of the adult ancestor. This kind of neotenic adulthood defines the human character. We not only inherit our ancestors' youthful anatomy and physiology but the ancestors' youthful motivations and proclivities such as docility and social dependency, curiosity and learning as well. We retain our ancestors' youthful small teeth, and we continue to play throughout adulthood. Like young, but unlike most adult mammals, humans continue throughout life to crave attention, play, learn and remain curious whether just for social gossip or for scientific research.

When William Wordsworth wrote, "The child is father of the man," he was expressing the eternality of youth. The line can be interpreted in at least one more way than he could have imagined, for Wordsworth was writing a half century before Darwin and almost two centuries before we have begun to understand human neoteny, a hypothesis that throughout our lives, all humans retain ancestrally youthful physical features—such as relatively larger brains, shorter arms and smaller teeth—more characteristic of the youth than of the adult primate. When a chimpanzee is born, its brain, compared to the diminutive size of its body, is large, and its arms, short, just like a human infant's. But as the chimp matures, its brain grows more slowly and its arms more quickly than the trunk. By the time the chimp is an adult, its brain is small compared to its body and its hands graze the ground. But in adult humans, the proportion of brain weight to body

weight is about the same as that proportion in one or two year old chimpanzees. Humans, of course, are much more than immature versions of our primate cousins, much more than apes that never grow up. But in a way, while the chimp grows out of its immature primate body, a human never does. The child of our ancestors is indeed the father of us all.

This phenomenon of differential growth rates for different body parts (called allometry) is characteristic of development in all mammals. A species developmental allometries , whether the adult of a species will have long arms or short ones, a large brow or a small one, is regulated by a genetic system that, together with the organism's activity in its environment, determines the time and degree of expression of structural genes that produce the proteins of tissues, hormones, and organs. Even a slight change in the system's regulation can produce a profound change in the design of the growing organism. A single gene mutation, for instance, can spell the difference between a human dwarf and an average adult. It seems so natural for puppies to grow into dogs, kittens into cats, and babies into adult humans that we often forget that development from fertilized egg to mature adult—ontogeny—is under strict genetic control.

Within mammalian populations, some individuals may follow a slightly different growth pattern than others due to variations in the regulatory genes, which control rates and degrees of structural development. If these differences help the animal to survive, they can be selected for and accumulate within a group, until the new population differs from its ancestors in appearance and behavior. The changed omtogenetic allometries in this new population could be the chief architect of the overall design (if not of every detail) of an emerging species. Depending on the adaptive success of these changes in the pattern of development, in a relatively short period of time a whole phase of ontogeny – including a number of behavioral as well as physiological features -- may be retained into a more youthful neo-adult phase. With minimal regulatory gene changes, a new species that matures sexually without ever developing the morphology and behavior of its adult ancestors can thus evolve. In successive stages over several million years the typical apelike maturation has been decelerated in Homo sapiens, who grow to adulthood with larger brains, smaller teeth, shorter arms, flatter faces, less-coarse body hair, and smaller brow ridges than our ape-like adult ancestors. This whole process, called systemic neoteny, reverses the old "biogenetic law" that "ontogeny of the individual recapitulates the phylogeny of its group"; in neoteny, phylogeny echoes an earlier stage of ancestral ontogeny. Not only humans but also domestic pigs, sheep, cattle, dogs, and (to a lesser extent) cats all resemble in both morphology and behavior the juvenile rather than the adult of the wild species..

The "young" structures retained throughout life, in the neotenic species such as hormonal balances, synapses, and brain tissues, also tend to retain youthful behavior into their adulthood. For instance, a larger brain, softer lips, a greater proportion of motor and sensory neurons governing the mouth, lips, and tongue, and more versatile hands -- all parts of the neotenic package -- made speech and tool-making more likely among evolving humans than among our primate cousins

adaptive youthful drives of our ancestors, such as investigativeness and attention-seeking, or care-soliciting, remain strong in human adults, while the adult drives of apelike ancestors, such as dominance-aggression or courtship behavior, were attenuated or never activated. Nature did not have to select for each feature of the neotenic package but could select a regulatory mutation that governed a whole bundle of changes -- just as the president vetoes or signs a bill from Congress without choosing the separate parts, or riders. In this way, for example, nature may not necessarily have favored nor foreseen the intellectual advantage of a larger brain -- the ability to invent languages, to make fire, to domesticate plants and animals, or to invent the wheel -- when the human brain grew larger as part of the human neotenic package. The pattern of youthful primate allometries retained into adulthood is an evolutionary rough draft, which natural selection continually edits and modifies. In time, less-adaptive neotenic characters of evolving humans are excised or amended, and new traits, perhaps having nothing to do with neoteny, were added. Longer legs and modified hip and foot bones, for instance, became adaptive once neoteny had paved the way for bipedalism.

Animal behaviorists have not yet produced a complete enough analysis of infant/youth primate behavior upon which to base a theory of neotenic human tendencies. For the most part, biologists generally regard youthful behavior as "practice" for adult behavior, giving, as yet, no convincing account of such typically youthful mammalian traits as "play." Adult mammalian drives, such as dominance-aggression, territoriality, and courtship, are easier to study because they are more stereotyped and less labile than youthful behavior that often seems non-functional. Also, whereas the behavior of young chimps metamorphoses during ontogeny and so can be studied only fleetingly, behaviorists can observe the social interactions of adults for perhaps several decades. But despite the difficulties in studying youthful mammalian behavior, some generalizations might be made, and these could provide a basis for a more accurate sociobioiogical account of humans as well as other neotenic mammals.

Just as adult drives help the adult survive, so too do youthful drives help infants survive. Investigativeness, for instance, can impel a young, or neotenic, animal to learn a new terrain rapidly. Puppies investigate by sniffing and licking at unfamiliar objects; young monkeys investigate not only with nose and mouth, but also with acute eyes, sensitive mouths and articulate hands. Care-soliciting can keep a young animal close to its protectors whether they be parents or peer group. Like investigativeness, care-soliciting is expressed in different ways as neonates develop into infancy and youth. Young primates seek first their mother's and then playmates' attention by making noises, hugging, touching, sucking, kissing, gazing intently, or walking and playing in novel ways, while young mammals lower on the phyletic scale, such as rhinoceroses, might simply nudge or nuzzle and follow after their mother or playmates.

Both investigativeness and care-soliciting better the odds that a young mammal will survive to adulthood. Less aggressive docility also protects the young

from being killed or maimed by bigger antagonists until they grow large enough to enter into serious competition during adolescence. Clearly these drives and the adaptive behavior they produce are not simply practice for adulthood; rather, they re-coordinate and readapt the metamorphosing youth to its own immediate survival needs. At adulthood, youthful mammalian behaviors are usually overridden by adult behaviors characteristic of the particular species. For instance, by late adolescence, the gorilla's aggressive displays make play with companions less and less likely, until in adulthood play is seen only occasionally. However, should the youthful drives that help young mammals through their metamorphic phase continue to be adaptive for adults -- if, for example, adult animals are faced with a "metamorphosing" environment, as they would be in the case of changes necessitating a more migratory way of life -- then the development toward formerly adult species-specific behavior could be inactivated and the whole system of youthful behavior be retained throughout adulthood. Neotenic evolution can extend youthful behavior to any adaptive degree, and at the same time attenuate or inactivate adult drives, provided there is some selective advantage in the resulting package of neotenic structures and behavior. If this system of inherited youthful behavior is indeed the biological basis of human nature, it is easy to understand how, with just a few mutations of our ancestors' regulatory genes, humans could be so different from our close primate relatives, despite the fact that our DNA seems very similar..

There are several advantages to the neotenic hypothesis of human evolution. For one, neoteny could explain how human speciation took several quantum leaps in the past several million years. Contrary to the conventional model of evolution, which assumes that a species is modified only very gradually, trait by selected trait, many biologists now believe that speciation can also be "punctuated," or relatively swift and radical, an idea proposed by Stephen Jay Gould, Niles Eldredge, and Stephen Stanley. Neoteny neatly explains how humans, for example, could look and behave so differently from other primates, like chimpanzees and gorillas, and yet be so similar genetically. The hypothesis of neoteny also allows- us to see many seemingly isolated adaptations as part of a single process. Lifelong human traits as disparate as erect posture, weeping, hairlessness, investigativeness, play, curiosity, learning, attention seeking, and small canine teeth, when seen as the result of neotenic evolution, no longer need separate adaptive explanations that are often contradictory.

Neoteny also questions human sociobiology, which may delay the acceptance of human neoteny. Most sociobiologists accept that human behavior has a biological basis but assume that we inherit behavior that is typically adult, such as dominance-aggression. We have seen popular books imputing adult animal drives to human behavior, such as Robert Ardrey's The Territorial Imperative. And we have seen more serious theories, such as Freud's idea that an aggressive and savagely selfish id underlies human nature, and that only by suppressing this nature can civilization be maintained. Is there no other way to view a biological base for human nature, or must those of us who do not feel compulsively motivated by dominance-aggression or territoriality be forced to deny, only in the case of humans, any inherited patterns of

behavior?