

On Ultimacy in the Life Sciences

Recent technological advances have permitted reduction-minded biologists to expand their science impressively at the molecular level. One consequence is the working out of the human genome and the subsequent rise of the "Life Sciences Initiative," as primarily molecular biology and medical drug development, most specifically in the interests of reducing human pain and discomfort, and lengthening human lifetimes. Aside from athletics, this initiative sometimes appears to be the biggest current adventure on the campuses of major universities. Life Sciences laboratories receive hundreds of millions of dollars to explore the ultimacy represented by molecular research, spinning off their most promising lines of research to start-up companies that seek profits primarily in developing and manufacturing medical drugs. As a prominent new connection between basic academic research in biology and practical applications, these companies contract to return some of their profits to the universities.

The analytical ultimacy in this enterprise is the taking of scientific reduction to the smallest relevant molecular level. From this beginning come two initiatives: (1) seeking to apply knowledge about molecules at the highest level – that is, leaping directly back with efforts to improve the "whole body" functioning of the human organism -- while also (2) starting (as with working out the array of proteins produced by the genes, the "proteome") the incredibly difficult proposition of climbing step by analytical step back up the ladder of development (ontogeny) and physiology toward the almost incomprehensibly prodigious goal of eventually understanding ourselves as wholes by knowing how all of our bodily components interact across the lifetime. Everyone recognizes these enterprises as admirable and highly promising. The point of this essay is that they are not the only admirable and highly promising enterprises in biology, and not the only kind of ultimacy in the life sciences ("the life sciences" once upon a time designated all of biology, not solely practical applications to human welfare). I will also argue that the understandably attractive and novel ultimacy of molecular biology is not the best or

quickest route to lengthening human lifetimes and reducing human suffering and misery.

First, there are other kinds of ultimacy when thinking of living creatures. For humans, one form is self-understanding, which is a behavioral proposition. Behavior is itself an ultimate study, because it is at the opposite end of the spectrum from preoccupation with molecules. In an analogy once used for a certain deodorant, behavior can be thought of as the ultimate shield – the first line of defense – against the hostile forces of nature. Efforts of humans at self-understanding are searches for meaning, including answers to "Why?" questions. The searches include identifying the ultimate reasons for the development and continued existence of traits, or their *evolved life functions*, as contrasted with the immediate or proximate lifetime guides such as pleasure and pain, which help cause the function to be realized.

Second, enlightened searches for ways to change human behavior carry promises for far greater alleviation of misery and premature death than any other enterprise. This is true not only because multiple forms of destructive behavior continue to be massively prevalent and horrifically destructive in the world -- from personal conflicts of interest to international strife, including war -- but also because all use of knowledge in all fields is necessarily mediated by human behavior. For example, as we all are aware, everything useful and effective about medical drugs is influenced by the behavior of manufacturers, medical advisors, vendors, and users, and by (behavioral) intervention or lack of intervention by courts, lobbyists, and governments.

Unfortunately, easy routes to important changes in human behavior do not present themselves as plainly as have the recent advances in technology that have fueled advances in molecular biology. Nevertheless there is an accessible and also essential ultimacy that we continue to ignore or downplay. It is the ultimacy of meaning that comes from surmounting our historical ignorance about evolved functions of human traits, and removing the consequent errors and self-deception in our necessarily contrived explanations. Such unavoidable contrivances have thwarted us so far in fully comprehending ourselves, as individuals, and also at all levels of human social and political organization from spousal

bonding, friendships, and nuclear families up to international alliances. Ultimacy of meaning has the possibility of being understood through working out the almost always surprising evolved functions of identifiable human traits. The ultimacy of the reasons for existence and persistence of traits, has been recognized as a useful goal for centuries by religious and philosophically minded thinkers. Until recently, such thinkers have been doomed to fall short because they had no way of understanding humanity via the cumulative effects of the evolutionary process. During approximately the last half century, however, our abilities in this regard have developed rapidly through a series of enlightening theories. Unfortunately, the kind of academic thinking and analysis that has been most productive in this biological enterprise does not typically require huge amounts of taxpayer money, with the accompanying generous overheads of federal grants on which large research universities have come to depend. Sizes of grants have increasingly become a comfortable criterion for judgment of the worth of science faculties and their research. As a result evolutionary biology has not been remotely competitive with molecular biology. During the last few decades, awareness of this fact seems to have generated the attitude among university administrators that an appropriate way of dealing with ever-more difficult budget problems is to downsize and replace biological enterprises that neither require huge research grants nor interface with patentable discoveries and profit-making corporations. As an example of the insufficiency of this attitude, consider one individual, the late William D. Hamilton. Sometimes regarded as the greatest 20th century student of the evolutionary process, he literally changed our entire view of biology, including our understanding of the evolutionary background and patterning of human social behavior, and the evolutionary reasons behind ease and speed in virtually all patterns of social learning. Yet he never received a penny from federal granting agencies.

Departments of biology traditionally do not hire faculty to study the human species, leaving this task almost entirely to the medical and social sciences. This situation has contributed to the medical and social sciences remaining almost devoid of knowledge or interest in the evolutionary process. For example, the 1957 theory of George C. Williams, accounting for senescence and the patterning of lifetimes in all organisms, was for decades almost totally ignored by gerontological investigators based in

medical and social science departments.. Similarly, cancer was studied across the same decades in a virtually non-evolutionary fashion, as if it were a disease that could be cured with a magic bullet approach, even though the basic components and predictions of current general theory were well understood decades ago by many evolutionary biologists. This current theory accounts for cancer as a consequence of mutations largely induced by radiation, combined with the ability of cells to multiply, an aspect of tissue repair that incidentally facilitates metastasis.

For obvious and appropriate reasons medical scientists, and to a lesser extent social scientists, tend to focus on injuries, deficiencies, and pathologies. As a consequence, however, perfectly normal distinctive and unique human traits essential to human self-understanding are often misinterpreted as non-functional or pathological, or as disadvantageous consequences of processes such as aging. Menopause, the cessation of ovulation approximately midway through the maximum average lifetimes of women, is an excellent example. Menopause is unique to humans, a species that doubled the length of individual lifetimes after separating from its closest relatives, the great apes. Astonishingly, it did so without adding significantly to the age span across which the ovulatory cycle – hence, fertility -- persists. How could this have happened if, in evolution, traits can succeed only by serving the reproduction of their bearers, or by being inevitable concomitants of other such traits? Many evolutionary biologists see menopause not as deleterious but as an evolved function, or adaptation, facilitating intensive and extensive parental care, altriciality (helplessness) of human babies, lengthened periods of juvenile life, the extraordinary importance of lifetime teaching and social learning, and involved in our history of prominent differential nepotism directed toward extended families or kin groups. All of the traits just described contribute to explaining the signature trait of humanity: our huge and calorically expensive human brain, currently regarded by many evolutionists as having evolved as primarily a social tool. Menopause evidently turns off the production of offspring in favor of assisting those already produced, and as well assisting grandchildren and the extended family or clan. This hypothesis accords with the fact that each new human offspring requires a very long period of parental attention, and, because of our complex and intense social behavior (which includes the great significance of

differential status of older adults with respect to access to resources), is able to benefit from significant help from parents across much of even its adult life.

Menopause thus appears to have evolved as a way of lengthening the lives of older women, and making them more important in reproduction, and not as a deleterious side effect of aging that shortens lives and reduces reproduction. It seems to turn women into increasingly astute political beings who pay attention to who gets what from whom, and when and why, and who become increasingly influential in the affairs of their extended families and clans. Treating menopause as a pathological or deleterious aging condition that needs to be reversed or "cured," using drugs likely to have life-shortening side effects, ignores the insights of biologists who specialize in how the evolutionary process causes cumulative changes in traits, and apparently does grave insult to the nature of womanhood. Yet identifying drugs to reverse the symptoms of menopause is probably the major grant-acquiring initiative in most medical programs devoted to menopause. Such attitudes illustrate the very broad consequences of ignoring the ultimacy of evolved functions in efforts at human self-understanding. Knowing what menopause is all about, and using such knowledge in our everyday lives, is a single example of how human self-understanding can reduce suffering and increase life length. How would human self-understanding be promoted by a similar understanding of, say, several hundred basic human traits, including the broad human tendency to create we-they confrontations at every social level within our species?

Religion is an enterprise, like philosophy, which, across centuries or millenia, has sought human self-understanding and ultimacy of meaning. Like philosophy, medicine, and the social sciences, religious thinkers have until recently proceeded without guidance from a deep understanding of the cumulative evolutionary process – indeed, most often while seeing evolutionists as adversaries in the seeking of ultimate explanations. This failure of cooperation is unfortunate, because evolutionary, philosophical, and religious thinkers presumably all share the goal of spreading happiness and harmony, and expanding the fullness of human existence. The persisting mutual aloofness or antagonism of these groups is, like others discussed earlier, a hindering

behavioral problem involving interpretations, motivations, special interests, and the reasons behind inattention or resistance to new information and arguments from others.

Improved human self-understanding is surely the most crucial of all research goals. Its scientific aspects would seem to call for the attention of armies of open-minded, competent, and cooperative analysts in a long overdue "life sciences" initiative devoted to problems of behavioral and evolutionary ultimacy. As new conceptual tools and perspectives continue to generate in evolutionary biology, such an initiative could serve the human species at least as fruitfully and immediately as nanotechnology. But, as a result of a recent profound change of direction in the philosophy of academia, the needed armies continue to diminish rather than grow, not because they have little likelihood of serving dire human needs around the world, but for two related reasons: (1) because humans tend to reject explanations of their behavior that involve unfamiliar agents such as genes, and unfamiliar interpretations of familiar behaviors with familiar, if flawed, explanations, and (2) because, unlike the most recent technological arrivals within biological science, the research of evolutionary biologists does not typically return large profits immediately and directly to the general funds of universities.

Maybe some day the major research universities, increasingly dependent on the government grants that began largely as a result of World War II, will nevertheless recognize that the cost or technological complexity of biological investigation does not always correlate with its likelihood of contributing to human life, liberty, and the pursuit of happiness. Our approach to this question is central to the entire mission of academia, which in human terms means nurturing the growth of basic knowledge critical to all our futures.

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