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HUXLEY AND THE POPULARIZATION OF SCIENCE

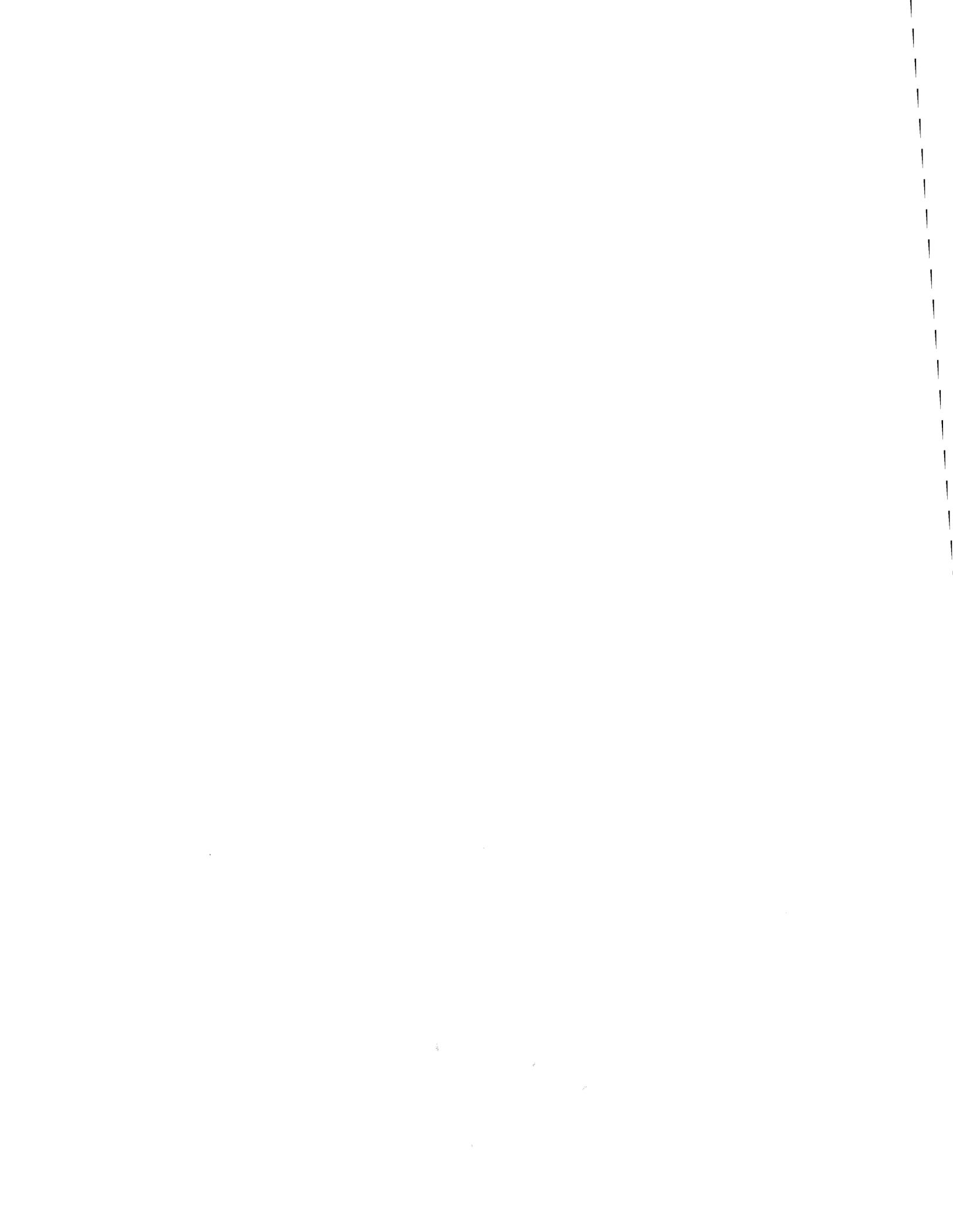
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Julian Huxley's career as a popularizer of science began with a salamander. Actually, the animal was an axolotl, a salamander-like amphibian that never metamorphoses into a land animal, retaining throughout its life its gills and dorsal fin. Huxley knew that the administration of mammalian thyroid extract could speed up the metamorphosis of a tadpole into a frog. He wondered what the application of thyroid extract to the axolotl would produce. At the end of November, 1919, Huxley and a colleague began feeding ox-thyroid to two five-inch-long axolotls. Within fifteen days, the animals began to change color and to absorb their fins and gills into their bodies. In a few more days, both animals were breathing air and one of them was walking on land.

Huxley published a note about the metamorphosis in *Nature*, on January 1, 1920. The British press took notice, proclaiming, among other things, that young Huxley had found "the Elixir of Life." Young Huxley had, of course, not found any such thing, and he went to the trouble to explain that fact to the press, stressing in a long letter that his experiments implied nothing about the chemical transformation of human beings. The letter, which offset damage to his reputation among scientists, was in effect, his first attempt to write about science for a general audience -- and, as such, it launched his career as a popularizer.¹

There was, one might easily say, a Huxley family predisposition to interpret science to laypeople. Huxley's grandfather, Thomas Henry Huxley, was, of course, one of the most famous evangelists of science in the English-speaking world of the late nineteenth century. Thomas Henry Huxley was not only Darwin's bulldog but an educator of science across the social structure, renowned for pioneering regular scientific lectures to groups of workingmen. He was a presence in the Huxley family even after his death, and Julian, who as a young child knew him briefly, felt his grandfather's intellectual and social legacy. While on the Rice faculty, Julian Huxley was frequently invited to lecture, not only in Houston but throughout Texas, partly because of the name he bore.²

Julian Huxley happened to come along as a popularizer of science when interest in science and technology was mushrooming, and when new means -- the broadcast medium especially -- to respond to that interest were at hand. The hunger for technical information stemmed to a considerable extent from the triumphs of twentieth-century science -- the advent of relativity, quantum mechanics, and genetics, the marvels of chemical products, the powers of scientific medicine, the fascinations of astrophysics. Yet the interest was tempered with ambivalence. Many of the issues raised by late-nineteenth-century science -- especially, the implications of biology for religion -- remained unsettling. Added to them were worries about whether science and technology were outrunning the capacity of their creators to control them, and whether -- in the wake of a brutal world war -- mankind was capable of moderating the behavior of its bestial self.³

Under the circumstances, Huxley felt no need to apologize for his popularizing. In the mid-1920s, he declared, "One of the duties of scientific men -- not necessarily of all of them, but certainly of some of them taken as a group -- is to make available to the lay public the facts and theories of their science. . . ." He saw "a danger, in these days of manifolded information and broadcast amusement, that the world will become divided into those who have to think for their living and those who never think at all," warning that the "possible isolation of science . . . is a real danger," and that "the more democratic the general civilisation . . . , the greater is the danger."⁴

Huxley was astonishingly prolific in the traditional medium of popular print. He published numerous articles in general-circulation magazines and he wrote some twenty books of popular science. The first -- *Essays of a Biologist* -- appeared in 1923; the last, a book on Charles Darwin, was published in 1965. One of them was monumental -- *The Science of Life*, which first appeared in 31 fortnightly parts, beginning in 1929, and was brought out between hardcovers in 1931. Written with H.G. Wells and his son, G.P. Wells, it was conceived as a sequel to *The Outline of History*, aimed at the ordinary man, and a great success. Huxley's popular writings, always illuminating, ranged from the intellectually demanding -- for example, *Evolution in Action* -- to instructive entertainments such as *Animal Language* or *Ants*, which was published in 1930 at the price of sixpence.⁵

Some of the books originated in magazine articles; others in lectures (for which Huxley was much in demand); still others as radio talks. Huxley was one of the first popularizers of science to exploit the broadcast medium. Beginning this phase of his career in the 1920s, he was highly successful at it -- perhaps, Ronald Clark has suggested, because of his experience as a university lecturer. In a series on bird-watching and bird behavior, he taught thousands of listeners about what they might see among the birds in the neighborhood of the front door step. During World War II, he was heard on the radio as the biology expert on the so-called "Brains Trust," whose members held forth during prime time, answering abstruse questions.⁶

Huxley infused his secretaryship of the London Zoo, from 1935 to 1941, with his commitment to popularization. He wanted, he said, to make the zoo "more than a menagerie," and proposed that "it might become the centre and focus of popular interest in every aspect of animals and animal-life." Huxley was especially concerned to reach children. He appointed a new cadre of assistant curators and encouraged them to give lectures to young people. He fenced off the Fellows' Lawn to establish Pets' Corner, where in good weather children could stroke and be photographed with a lion cub, Shetland pony, a small python, and young chimpanzee, among other animals. During the 1935 Christmas holidays, thousands of school children visited special zoo exhibitions that Huxley put on, one designed to illustrate evolution in animals -- his *At the Zoo* was suffused with a similar theme -- and another to demonstrate Mendelian heredity. He established a studio of animal art -- a building large enough to accommodate lions or tigers and also up to twenty-five students who could come to sketch or paint the beasts. News from the zoo often appeared in the papers, not least because during Huxley's regime a daily press conference was established. And Huxley helped initiate the publication of *Zoo Magazine*, which combined instruction with entertainment and quickly reached a monthly sale of 100,000 copies.⁷

By 1930, Huxley was famous. Readers of *The Spectator* ranked him ahead of James Jeans, Ernest Rutherford, and Bertrand Russell while including him in the lists of Britain's five best brains. One or another Huxley popularization always seemed to be in print. His prowess as a scientific popularizer remained high through World War II and afterward. In 1953, for his work in popularizing science, Huxley was awarded the Kalinga Prize, one thousand pounds, which had been established under the auspices of UNESCO by an Indian who believed that it might help to encourage the spread of scientific knowledge more widely among the people of his country.⁸

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Huxley's powers as a popularizer of science derived in no small part from a keen appreciation of the English language, an ability to use it well, and a sensitivity to the implications of science for fundamental human -- and humane -- concerns. A product of English public schools and Oxford, he was well and liberally educated. He read Homer and Horace and Catullus for pleasure, sometimes wrote verse in Latin and Greek. While an undergraduate at Oxford, he won the Newdigate Prize for English verse. (It must be added that he spent the prize sum of fifty pounds on a binocular microscope.) One of Huxley's books, popular for more than twenty-five years, was a small volume of poems entitled *The Captive Shrew*. He was a competent if undistinguished versifier, whose poetry was remarkable rather more for its ideas than for its music, reflecting, to quote his rhyme, man's capacity to "sit and look/ In quiet, privileged like Divinity/ To read the roaring world as in a book."⁹

Huxley's popular scientific prose was enriched here and there by the devotion to poetry. For example, he discussed a male hunting spider that offers the female a nice fly, neatly wrapped in silk -- adding that if the male found himself in a box from which the female had recently been removed, he would still wrap the fly, rather than eat it, and search, "like Shelley with his bouquet, 'That he might there present it! -- Oh, to whom?'"¹⁰ Yet the principal contribution of poetry to Huxley's prose, no doubt, was that it helped to make him a master of exposition, a writer of supple and limber style.

To be sure, at times he wrote about nature in a conventionally romantic manner, celebrating, for example, how evolution had realized wonderful possibilities such as "the flowers carpeting the soil, the great trees with the singing birds in their branches, the glistening fish among the reefs of coral . . ." and so on.¹¹ Yet even his romantic passages often involved unconventional, specific images, a number of them drawn from his own research. Among many examples that one might cite is his description of the recurrent behavior of a male and a female heron in each other's company:

Generally the hen sits on a lower branch, resting her head against the cock bird's flanks; they look for all the world like one of those inarticulate but happy couples upon a bench in the park in spring. Now and again, however, this passivity of sentiment gives place to wild excitement. . . . the two birds raise their necks and wings, and, with loud cries, intertwine their necks. . . . The long necks are so flexible that they can and do make a complete single turn around each other -- a real true-lover's-knot! This once accomplished, each bird then -- most wonderful of all -- runs its beak quickly and amorously through the just raised aigrettes of the other, again and again, nibbling and clapping them from base to tip. Of this I can only say that it seemed to bring such a pitch of emotion that I could have wished to be a Heron that I might experience it."¹²

Part of what makes Huxley's nature-writing compelling is its graphic punch. He explained that crustacea are limited in size by their habit of moulting, pointing out that "a crab as big as a cow would have to spend most of its life in retirement growing new armour-

plate." He could render the momentary apprehension of a young bird on the verge of its first flight by reporting the "fearful shrill chirping" that the fledgling gave out as it tottered on the edge of its nest, working up courage.¹³ He could make the reader not only see but hear the vital activities of nature. He wrote of his approach to a great cliff bastion of birds in Norway that the din of the birds could be detected two miles away and that a half mile away the noise they made "was like the parrot-house at the Zoo heard from just outside," adding, "The chattering and screaming of hundreds of birds blended into one continuous roar."¹⁴ He capsuled the self-transforming powers of developing organisms in a few sentences that reminded human beings that they were biological organisms, too:

"You, like me and every other human being, were once a microscopic spherical ovum, then in turn a double sheet of undifferentiated cells, an embryo with enormous outgrowths enabling you to obtain food and oxygen parasitically from your mother, a creature with an unjointed rod -- what biologists call the notochord -- in place of a jointed backbone; you once had gill clefts like a fish, you once had a tail, and once were covered with dense hair like a monkey; you were once a helpless infant which had to learn to distinguish objects and to talk; you underwent the transformation of your body and mind that we call puberty. . . ." ¹⁵

Huxley obviously delighted in the stuff of biological science and much of his writings are devoted to sharing with the public his wonder at the marvelous variety and comprehensible logic of life. Yet there was another -- and equally important -- side to Huxley's efforts at popularization: the implications of biological science for human affairs. He made no sharp distinction between the two categories. They were certainly joined in his mind in his well-known commitment to wild-life preservation, a subject that, not surprisingly, long occupied part of his writings. In a 1930s essay, he warned:

"the world's rhinos are being slaughtered because of the belief of Indians and Chinese in the aphrodisiac qualities of their horns; the whales are being dangerously reduced to make big profits for their slaughterers. . . ; fashionable women are still responsible for the death of some of the most beautiful winged creatures in the world . . . ; lizards and snakes are being killed out for shoes."¹⁶

To Huxley, such deprivations not only diminished the animal kingdom but diminished man, too, by involving him in the destruction of his natural environment. "Must we confine our knowledge of animals," he asked, "to dead specimens in museums instead of making the world a living museum?"¹⁷

Huxley often combined between the same hard covers his essays on biology with others on human affairs. For example, the Table of Contents of his *Man Stands Alone*, which was published in 1941 but which contains pieces written between 1926 and 1941, includes several essays on biology as such -- notably, "The Size of Living Things," "The Courtship of

Animals," "The Intelligence of Birds," "The Way of the Dodo" -- and several other essays on biology and man -- for instance, "Eugenics and Society," "Climate and Human History," "The Concept of Race," and "Scientific Humanism." His wonderful book *Ants* is not only a primer on the lives and habits of these remarkable creatures but also an insistent instruction that analogies made between them and man are false and misleading -- that there are many "radical differences between social insects and social man."¹⁸

As the fact of the essays on human affairs suggests, his popular scientific writings contained considerable social point. He was, of course, a well-connected man of the world, knowledgeable enough about its prominent inhabitants to write an appreciative, if somewhat tongue-in-cheek review of *Who's Who, 1935* ("Ernest Hemingway," he noted, "has had the courage to include *drinking*, [but] nowhere can I find either *gambling* or *women* as recreation").¹⁹ He was also much involved in the salient social issues of his day, especially those that were in some way connected to biology. Not surprisingly, a good deal of his writings on science and human affairs reflected his social and political commitments.

A feminist of sorts, Huxley discounted sweeping assertions that were often made regarding allegedly innate differences in the aptitudes of men and women. What was observed about these differences, he insisted, was a product of upbringing, citing in ironic authority the exclamation of the third-century Greek gossip writer Athenaeus, "Who ever heard of a woman cook?" He found in the courtship, ritual displays, and mating habits of birds not only affirmations of the family but demonstrations that "the family life of birds attains its highest development in these form which have, we may say, equal sex rights and duties."²⁰

Huxley held that sexual compatibility was essential to the happy marriage, that women deserved sexual satisfaction as much as men, that there was nothing wrong or degrading about sexual pleasure dissociated from procreation. He endorsed divorce and birth control. Huxley actively campaigned for contraception, earning the condemnation of Lord Reith for sullyng his BBC ether by discussing the subject on the airwaves. However, like his friend J.B.S. Haldane, Huxley was caught between the internalized morality of his Victorian upbringing and his rebellious codes of reasoned belief. He suffered repeated nervous breakdowns -- one occurred after his honeymoon -- which he attributed to "my unresolved conflicts about sex." In a courageous essay on "Sex Biology and Sex Psychology," he argued that "the bulk of men and women cannot treat sexual problems in a scientific spirit, because of the store of bottled up emotion in the wrong place that they have laid up for themselves by their failure to come to proper terms with their sexual instincts."²¹

Huxley's politics tended to a tepid middle-of-the-roadism until he was jolted to the left by the Depression and the threat of fascism. He was, of course, a eugenicist who proposed at the beginning of the Depression that unemployment relief be made contingent upon the male recipient's agreeing not to father any more children. At times he reached into animal biology to demonstrate the force of genetics in behavior, noting the power of, for example, the brooding instinct. He wrote, "Crows have been known to brood golf-balls, gulls to sit on tobacco-tins substituted for their eggs; and the majestic emperor penguin, if it loses its egg or chick, will even brood lumps of ice in its inhospitable Antarctic home."²² In his view, instinct could well overpower environmentally induced instruction. He called to mind Dr. Johnson's comment on the theory that the attraction that men found in the human

female's breast derived from the pleasure they had taken in suckling at it in infancy. Dr. Johnson had not noticed, Huxley noted, that "those who had been hand-fed when babies evinced any passionate fondness for bottles." (Dr. Johnson might have added, one is moved to say, that the grown human female, who also had suckled in infancy, did not show any passionate fondness for the breast either.)²³

However, Huxley never held to the position that nature invariably overwhelmed nurture, especially not in most human behavior. In *Essays of a Biologist* he said, "Environment plays not merely a large part, but a preponderating one, in [man's] development after the first year or so of life." Though he never really overcame the belief that, on average, members of the very lowest income groups were genetically less well-endowed than members of the upper -- especially professional -- classes, in the 1930s, he was soon persuaded that his views on compulsory sterilization of the unemployed merely aided and abetted Nazism. He came to stress the importance to both eugenics and society of adequate diet, health care, housing, and education. "Don't let's go on pretending it's all the dear old Edwardian Age!" he exclaimed to a friend. In his celebrated 1936 lecture to the Eugenics Society, Huxley said flatly that a system based on private capitalism and public nationalism was ipso facto dysgenic: it failed to utilize existing reservoirs of valuable genes and it led to the ultimate dysgenics -- war. He declared, "We can't do much practical eugenics until we have more or less equalized the environmental opportunities of all classes and types -- and this must be by levelling up."²⁴

Huxley had first been sensitized to issues of race during his years at Rice, when he was exposed in a way that he would not have been in the England of that day to relations between blacks and whites. He later said that his American sojourn had taught him that differences in cultural and social environment have a good deal to do with differences in group behavior. He became passionately engaged with racial issues during the 1930s, in the face of Nazi theory and practice. Huxley did believe, as he explained to the readers of *Harper's* magazine, in 1935, that though it had not been proved, different human groups must possess "innate genetic differences in regard to intelligence, temperament, and other psychological traits." However, he added "this need not mean that the mental differences are highly correlated with the physical -- that a dark skin, for instance, automatically connotes a tendency toward low intelligence or irresponsible temperament."²⁵

Huxley may have sometimes been patronizing in his attitudes towards blacks, but he was unalloyed in his rebuttal to claims of racial inferiority among different groups of Caucasians. In 1935, together with the anthropologist A.C. Haddon, he published *We Europeans: A Survey of 'Racial' Problems*. Huxley and Haddon advanced the emerging genetic and anthropological consensus that the concept of "race" made no biological sense. What seemed like a racial group actually consisted of the intermixture of many biological types, the product of successive migrations and intermarriages. The Nazis might claim that Jews constituted a racial type, but in fact in every country Jews overlapped with Gentiles in every conceivable physical characteristic. Jews of one area differed genetically from those of another; they were biologically no more uniform than any people of Europe -- including so-called pure Germans. The Nazis might celebrate a Teutonic type -- fair, long-headed, tall, and virile; Huxley and Haddon wondered how close a composite of the black-haired Hitler, the broad-faced Rosenberg, the slight Goebbels, and the rotund Goering would come to the

Teutonic ideal. Populations differed from each other, Huxley and Haddon stressed, only in the relative proportions of genes for given characters that they possessed. "For existing populations," they maintained, "the word *race* should be banished, and the descriptive and non-committal term *ethnic groups* should be substituted."²⁶

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Huxley was a man of the twentieth century, but in a sense he felt the hold of his grandfather's era. While his popular writings reveal his engagement in the immediate issues of his time, they also provide ample evidence that he was absorbed from the days of his young manhood but with increasing intensity in his later years with the longterm questions raised for human beings by Darwin's theory of evolution. Certain of the questions of concern to him -- notably about morals and religion -- had been spelled out in the nineteenth century, particularly by grandfather Thomas Henry Huxley in 1893, in his Romanes Lecture. Others were implicit in the experience of the twentieth century, notably the doubts raised about the idea of progress and the capacity of man for virtuous behavior. While Huxley dealt with one or more of these matters in a number of his essays and books, his most fully developed reflections upon them are contained in two volumes, *Touchstone for Ethics*, which was published in 1947, and *Evolution in Action*, which appeared in 1954.

In the 1920s, Huxley had posed the question: "Is it possible to speak of progress when at this present moment there are vast poverty-stricken and slum populations with all the great nations, and when these same great nations have just been engaged in the most appalling war in history?"²⁷ Huxley had argued then that it was possible, indeed, and he kept insisting upon that possibility, even after another world war had produced not only greater carnage but also the means of man's own self-destruction. By "progress," he meant the tendency of biological organisms to grow better equipped over evolutionary time to carry on the business of existence and survival. Evolution had taken the simplest organisms and out of them created organisms that were much more complex -- and, as such, ever more capable of dealing with the challenges found in their environment. "Biology," he wrote, "presents us with the spectacle of an evolution in which the main direction is the raising of the maximum level of certain qualities of living beings, such as efficiency of organs, co-ordination, size, accuracy and range of senses, capacity for knowledge, memory and educability, emotional intensity, -- qualities which in one way or another lead to a more efficient control by the organism over the external world, and to its greater independence."²⁸

By Huxley's measures, the "furthest step yet taken in evolutionary progress" was the human species. One might think this view mere anthropomorphic wish-fulfillment. Not so, Huxley insisted. Man had gone beyond all other forms of organic life when he acquired the capacity for language and cognition, for the organization, analysis, and recording of his experience, and for the transmittal to future generations of what he might learn. Furthermore, unlike ducks, or dogs, or ants, which possessed admirable tools for their particular jobs, man was endowed with infinitely variable capabilities. He could specialize, even though he was not born for one or another specialty, and if he came to specialize at one

function, he could -- unlike, for example, the worker ant -- change to another. In Huxley's summary of this argument, "Animal types have limited possibilities, and sooner or later exhaust them: man has an unlimited field of possibilities, and he can never realize all of them."²⁹

In these features of man, Huxley found profound long range consequences. Human beings, diverse in their capacities and self-awareness, were not compelled to pursue solely their individual self-interest, as crude Social Darwinists might have it. They could also cooperate to achieve the common needs of society. More important, man's self-consciousness made possible "not only innumerable single changes, but a change in the very method of change itself" -- a transition from evolution by blind processes operating on the opportunities provided by blind chance to evolution by mankind's deliberate choices.³⁰ Huxley conceded that man had so far not used his capacities very wisely to shape the world; and he allowed that savage qualities were to be found in a deplorably large number of human beings. "Our feet still drag in the biological mud," he wrote, "even when we lift our heads into the conscious air." Still, he found a certain comfort in the belief that evolution had continually raised the upper levels of biological organisms; and further comfort in the recognition that man, who had existed for only a moment in evolutionary time, still had generations more before him to work out his problems and realize his possibilities. Huxley summarily declared, "In the light of evolutionary biology man can now see himself as the sole agent of further evolutionary advance on this planet, and one of the few possible instruments of progress in the universe at large. He finds himself in the unexpected position of business manager for the cosmic process of evolution."³¹

Yet by what moral or ethical principles was man to be guided in this cosmic task. Huxley's answer: By the principles implicit in the process of evolution itself. It was here that he took issue with -- and departed from -- the position advanced by grandfather Huxley. Thomas Henry Huxley had argued in his Romanes Lecture that he could detect no moral purposes in nature. Moral purpose was exclusively a product of human fabrication. And he had declared, "Let us understand, once for all, that the ethical progress of society depends, not on imitating the cosmic process, still less in running away from it, but in combating it." Thus, moral man, although the product of the evolutionary process, had to take arms against it.³² To Julian Huxley, however, it was incumbent upon mankind to fight *for* it -- to struggle to see that evolution continued to flourish. Embracing that aim, man could forge an evolutionary ethics, which would start with the principle that it was right to realize ever new possibilities in evolution and which would consist of further principles extracted from what was necessary for the evolutionary process to proceed. "Anything which permits or promotes open development is right," Huxley held, "anything which restricts or frustrates development is wrong. It is a morality of evolutionary direction."³³

With evolutionary ethics, conventional religion was no longer necessary. Huxley was a self-proclaimed atheist. He took God to be "a product of biological evolution," a yearning built into the human psyche. But as a result of the advance of psychological and natural science, God, Huxley averred, in one of his delicious contentions, "was no longer a useful hypothesis."³⁴ He had become a mere vague first cause, not an immanent presence in human affairs. If man was to have a religion, it was to be a scientific humanism, a merging of humane values with the evolutionary process. The emergent religion of the near future, he

predicted, would not worship supernatural rulers. It would "sanctify the higher manifestations of human nature, in art and love, in intellectual comprehension and aspiring adoration, and will emphasize the fuller realization of life's possibilities as a sacred trust." Here Huxley found the resolution of his grandfather's antithesis between the ethical and the cosmic process. If man was to take charge of evolution, he could, Huxley said, "impose moral principles upon ever-widening areas of the cosmic process, in whose further slow unfolding he is now the protagonist. He can inject his ethics into the heart of evolution."³⁵

Huxley's ethics called for diversity rather than uniformity in human society, respect for human differences, social organization that fostered individual development. It was thus the function of the State to enhance the self-realizing opportunities of every individual in society. He condemned "Nazi ethics" -- if the term is not an oxymoron -- because it exalted a tribal group over universal mankind, the State over the individual. He rejected Marxist materialism because it wrongly reduced mind to mere matter. He warned against trusting the State to achieve a eugenic program by deciding what were good or bad hereditary qualities.³⁶

Yet he also recognized that a problem lay at the heart of his ethics -- recognized it enough to raise the question: Was the evolutionist not "merely dressing up in new terminology" what moral man had accepted for centuries? He answered the question emphatically in the negative. He claimed that the primacy of human personality was merely a "*postulate*" of Christianity and liberal democracy, but it was a "*fact*" of evolution." Traditional ethics were grounded in religion, and thus in authority or revelation. Evolutionary ethics was drawn from discoverable scientific principles.³⁷ Huxley here appeared to be deluding himself. The seemingly cosmic objectivity of his system was to a considerable extent shaped by the very values that he discounted as postulates -- and also by his resistance to that scourge of the twentieth century, totalitarianism. He may not actually have resolved the profound issue raised by his grandfather. He did address it with ability and imagination, kept it before the public during some of the cruelest decades of recent history, and did so with morally purposeful intent mixed with a rueful understanding of the human condition.

Julian Huxley was a visionary, but he was no fool. He recognized the enduring force of his grandfather's perception -- and in several poignant sentences, he provided a self-revealing coda to his struggle to find for himself and for mankind moral values in an amoral universe. A clearer ethical outlook would not, he cautioned, "prevent us from suffering what we feel as injustice at the hands of the cosmos -- . . . Man is the heir of evolution: but he is also its martyr. All living species provide their evolutionary sacrifice: only man knows that he is a victim."³⁸

ENDNOTES

1. Ronald W. Clark, *The Huxleys* (New York: McGraw-Hill, 1968), pp. 186-87; J. R. Baker, "Julian Sorrell Huxley," *Biographical Memoirs of Fellows of the Royal Society*, 22(1976), 211, 217.
2. Clark, *The Huxleys*, pp. 179, 162.
3. See, for example, Daniel J. Kevles, *The Physicists: the History of A Scientific Community in Modern America* (New York: Alfred A. Knopf, 1978), pp. 170-84.
4. Julian Huxley, *Essays in Science* (London: Chatto and Windus, 1926), pp. v., vii.
5. Baker, "Huxley," pp. 211-12, 235-38.
6. Clark, *The Huxleys*, pp. 204, 278-79
7. *Ibid.*, pp. 256-61; Julian Huxley, *At the Zoo* (London: Unwin, 1936), *passim*.
8. Clark, *The Huxleys*, p. 204; Baker, "Huxley," p. 212.
9. Clark, *The Huxleys*, pp. 145, 204-5; Baker, "Huxley," p. 232.
10. Julian S. Huxley, *Man Stands Alone* (2nd ed.; New York: Harper, 1941), pp. 192-93.
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13. Julian Huxley, *Man Stands Alone*, p. 148; Julian Huxley, *Bird Watching and Bird Behavior*, quoted in Clark, *The Huxleys*, pp. 171-72.
14. Quoted in Clark, *The Huxleys*, p. 189.
15. Julian Huxley, *Evolution in Action* (New York: Harper, 1953), pp. 11-12.
16. Huxley, *Man Stands Alone*, pp. 187-88.
17. *Ibid.*, pp. 184-85.
18. *Ibid.*, p. v; Julian Huxley, *Ants* (London: Dennis Dobson, 1930), p. 3.

19. Huxley, *Man Stands Alone*, pp. 254-55.
20. *Ibid*, pp. 111, 201-202.
21. Daniel J. Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (New York: Alfred A. Knopf, 1985), p. 125; Huxley, *Essays of A Biologist*, pp. 167-68.
22. Kevles, *In the Name of Eugenics*, pp. 123-126; Huxley, *Man Stands Alone*, pp. 211-12; Julian Huxley, *What Dare I Think? The Challenge of Modern Science to Human Action & Belief* (London: Chatto and Windus, 1931), pp. 86-88.
23. Huxley, *Man Stands Alone*, p. 211.
24. Huxley, *Essays of a Biologist*, p. 86; Kevles, *In the Name of Eugenics*, p. 174.
25. Clark, *The Huxleys*, pp. 172-73; Julian Huxley, "The Concept of Race," *Harper's*, 170(May 1935), 692.
26. Julian S. Huxley and A.C. Haddon, *We Europeans: A Survey of 'Racial' Problems* (London: Jonathan Cape, 1935), pp. 18, 261, 263, 103, 104, 107, 184, 68, 91, 96-97, 25-26, 267-68.
27. Huxley, *Essays of a Biologist*, pp. 55-57.
28. *Ibid.*, pp. 74-75.
29. Huxley, *Evolution in Action*, pp. 126, 147-49.
30. Huxley, *Essays of a Biologist*, pp. 45-46, x.
31. Julian Huxley, ed., *The Humanist Frame* (New York:Harper, 1961), p. 20; Huxley, *Evolution in Action*, pp. 149-50, 153.
32. Clark, *The Huxleys*, p. 118; Huxley, *Essays of a Biologist*, p. 71. T. H. Huxley's Romanes Lecture is reprinted in T.H. Huxley and Julian Huxley, *Touchstone for Ethics* (New York: Harper, 1947), pp. 67-112.
33. Huxley, *Evolution in Action*, p. 167; Huxley and Huxley, *Touchstone for Ethics*, p. 136.
34. Huxley, *Essays of a Biologist*, p. 208; Huxley, *Man Stands Alone*, pp. 277-78.

35. Huxley, *The Humanist Frame*, p. 26; Huxley and Huxley, *Touchstone for Ethics*, pp. 155-56.

36. Huxley and Huxley, *Touchstone for Ethics*, pp. 31-32, 140, 147-48; Huxley, *Evolution in Action*, pp. 36-37, 96-97, 173-75.

37. Huxley and Huxley, *Touchstone for Ethics*, p. 144; Huxley, *Evolution in Action*, pp. 164-66.

38. Huxley and Huxley, *Touchstone for Ethics*, p. 155.