"UNTO ONE OF THE LEAST OF THESE"

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MANKIND is the dominant species of animal life in the modern world. In the course of a few thousand years—a fleeting moment from a geological point of view—he has beaten down all opposition and now occupies the position once held *seriatim* by fishes, dinosaurs and mammalian titanotheres of past epochs.

There is little resemblance between man's rise and, for example, the dinosaur supremacy. In each case, a parallelism exists in the fact of supremacy, as a perquisite following the unusually successful slacking of three basic appetites: hunger, protection and reproduction. Dominance of the dinosaurs was gradually established over millions of years, involved many species, was unconscious and relatively tenuous, and involved little more than physical strength and relative insensitivity. By comparison, man's rise has been meteoric, involved one species (*sapiens*), or, if the entire brief span of the genus *Homo* is included, only a very few species; has been progressively firmer and more conscious, and has brought to bear a steadily increasing array of psychological, sociological and material weapons to complete the mastery of the earth.

Now that we enjoy global supremacy, we may work backward in a general way and point out why in the past given groups of animals did not rise to power, or could not maintain their places, and note by what means our species has achieved such control.

We are less admirable when we work forward. Our efforts include two unanswered questions: What are we doing with our dominance? How long will this dominance last? Dinosaurs could not be expected to ask such questions, or find solutions for them. Man is accountable for his mistakes, and may not escape the consequences of cupidity by a plea of ignorance. Our plight is not so much a lack of ideas or imagination, as it is a consequence of hormones out of sociological control.

Our brief past is crammed with a rhythmic succession of relative war and relative peace. What one civilization built was largely destroyed by the next. Whereas the dinosaurs competed against each other for such essentials as food, shelter and mate, man has amplified this basic competition and is showing real progress in the destruction of his own kind.

With increase in technology, rooted in the less spectacular advance in basic science, two parallel tendencies emerge. These are to improve the methods of species destruction and to increase and ameliorate species longevity. Even now the paradox is clear. We wage war in vehicles which approach (or surpass) the speed of sound, which kill by jellied gasoline and which operate over great distances. On the day when the atomic bomb was discussed over the radio, the Rockefeller Foundation was appropriating money for the study of cancer. We increase the average span of life, ward off infection with sulfa derivatives and penicillin, and render living less arduous by all manner of labor-saving machines. In general, man is learning to kill or hurt more people in less time, and patch them up more efficiently than ever before.

Such a state of affairs is ridiculous when examined in the long-range aspect of biology. There is no ground for the supposition that this state of affairs can continue very long, considering time from the point of view of the life of the population. There is no intelligent reason why this paradoxical situation should be allowed to continue. Many have uttered warnings. Sir S. Radhakrishnam[1] states that "Man, as he exists to-day, is not capable of survival." Even on the material level of the will to survive, man should prevent species suicide, but the will to remain the dominant species requires much more. Dominance requires restoration of the soil and conservation of our physical and biological resources. Possibly these can be accomplished by cooperation.[2] The current United Nations effort, as a court in which intra-species differences can be examined and adjusted, may be a start in world-wide tolerance. We may be able to canalize our surplus time, brought about through the labor-saving machine-age, to achieve a more graceful leisure and a higher education. We may be able to keep pace with the rising density of population and longer life-span by a more scientific agriculture and animal husbandry and by really effective colonization of the tropics.[3]

This brings me, by a circuitous route, to the reason for writing this paper: suppose we fail. Suppose that we can not stop killing one another in ever-increasing numbers? That the mental defectives continue to interbreed freely, that venereal diseases and other widespread ailments increase, that our will to destroy overpowers our will to heal—then the decline will be much more rapid than the decline of the dinosaurs, and another species or group of species will inherit the earth.

If this human catastrophe should occur, the insects

[1] W. C. Ryan, "Mental Health through Education." New York: Commonwealth Fund. 1938.
[2] W. C. Allee, "The Social Life of Animals." New York: Norton. 1938.
[3] Orlando Park, *Ecology*, 26: 1–9, 1945.

are available as the inheritors.[4] The political scientist and the sociologist have concerned themselves almost entirely with the problem of internecine strife as between human groups, but the biologist is convinced that a greater danger is involved. All that we do toward our own destruction weakens our position in our struggle with insects. The insects may not assume dominance, even though the present climate prevail and the food supply is sufficient, but we can hardly kill all the insects before we have killed all the people, even though we use insecticides much more lethal than DDT. Furthermore, we are not yet in a position to live without the insects and their allies.

Granted that insects thrive on our increased agriculture, that in spite of the gain in insect control our losses continue to increase with advance of agriculture[5]; granted that they act as hosts to many dangerous pathogens.[6, 7] We must not forget that insects are agents of pollination for many flowers, and hence are responsible for many fruits and vegetables; that, still more basic, insects and their allies play a vital rôle in the formation of soil. Hence we must live with insects in general, while attempting to control or eradicate those dangerous to our food economy and public health. This may not be done with mass flights of aeroplanes spouting insecticides, unless we wish to kill all the insects and take the consequences.

Instead, this problem of insect-control becomes an increasingly important phase of biology, of economic entomology utilizing powerful insecticides applied specifically. This implies a more enlightened insecticide-chemistry and an exact knowledge of the species ecology of many insects. It is a realm of exact research rather than of shotgun methods.

So insects in general must live while we kill people, and when, or if, enough people are killed, a point will be reached where insect control weakens, and we are no longer strongest. It should be about here that man begins to fall as a world power, to enter the dusk of biological extinction, from which no previous species has been known to make a complete recovery. The act of species suicide, of course, will have been committed long ago and may pass more or less unnoticed at the time. Even now it may have occurred, but I do not think so. From the point of view of an academic biologist, there is still time to preserve the species, but not very much time is available for ensuring its dominance in the long future.

OBITUARY

CARLTON C. CURTIS

DR. CARLTON CLARENCE CURTIS, for many years a professor of botany at Columbia University, died at his home in Tryon, N. C., on April 10, 1945. In his passing the science of botany lost one of its most erudite scholars and one of its most eminent teachers.

Carlton Curtis was born near Syracuse, N. Y., in 1864. He attended Syracuse University, from which he received the A.B. degree in 1889 and the Ph.D. degree in 1893. He also studied at Columbia University, earning his A.M. in 1892. Dr. Curtis continued his training abroad, spending one term at the University of Cambridge in England, where he was associated with Francis Darwin, and another at the University of Leipzig in Germany, where he came under the stimulating influence of the plant physiologist, Pfeffer.

Dr. Curtis served as principal of Fayetteville Union School, N. Y., for two years, and as an instructor in natural science in Brooklyn Polytechnic Institute for two years, but his real life work was at Columbia University, with which he was connected as a staff member from 1892 until his retirement in 1934.

His earlier research interests were in the growing science of plant physiology. Careful studies of turgidity in the mycelia of fungi under controlled and varying environmental conditions were followed by a number of investigations on transpiration. In the latter, the work performed in transpiration was computed, the activity of stomata at various times of the day was analyzed, and variations in the daily transpiration curve were recorded and interpreted. Even in these earlier years the breadth of the man was manifest, for in addition to this more intensive physiological work he published a series of researches on diverse topics: the early development of the lichen thallus; algae of New York harbor; successive flowering of the tulip tree in one season; the effect of feeble light in inducing characteristics of etiolation in plants; a discussion of the pines of the northwest. In each of these studies the author was concerned not merely with the accumulation of data, but with underlying causes and significance.

In addition to this research work, Professor Curtis wrote three books. The first, "A Textbook of General Botany," was published in 1897; the second, "Nature and Development of Plants," appeared in 1907, and subsequently went through a large number of editions and printings. It had wide acceptance

[4] L. O. Howard, "The Insect Menace." Century Co. 1931.

[5] *Idem*, "The Needs of the World as to Entomology." *Ann. Ent. Soc. Am.*, 18, 1925.

[6] W. A. Riley and O. A. Johannsen, "Medical Entomology." New York: McGraw-Hill. 1938.

[7] W. B. Herms, "Medical Entomology." New York: Macmillan. 1939.