BIOLOGICAL BASES

A special issue of *Engineering and Science* devoted to representative selections from a conference on the "Biological Bases of Human Behavior," held at Caltech March 16-18, 1970.

Our concepts of the origins and the determinants, of the potentials and the far boundaries, of human behavior underlie the implicit assumptions that form our civilization and charter all of its institutions. Yet, only recently have the methods of experimental science been adapted to the examination of those assumptions—to the analysis of origins and the definition of boundaries—to the test and clarification of both issues long moot and tenets long unchallenged. Out of this effort, now embryonic and tentative, may come the bases for a more coherent and more satisfying social order, built upon a deeper understanding of the biological nature of man.

In different perspectives the biological nature of each human individual can be seen as a consequence in varied degree of his phylogeny, or his genetics, or his physiology, or his environment. In the conference at Caltech on the biological bases of human behavior we focused principally upon the first two of these determinants. Historically these have been the least accessible and hence the least understood; psychologically they are the least malleable, and hence the least socially palatable, and hence the most ignored. We are only beginning to comprehend their pervasive influence on the character of human perception and thought and the range of human variation.

Biochemical evidence at the deepest level of DNA structure now supports and quantitates the phylogenetic relationship of man to varied primate species. Recent studies, in the field and in the laboratory, of our closest biological relations have revealed that they too are past that evolutionary Rubicon at which the choice was made in favor of transmitted knowledge (by observation of experience and by imitative trial) over rigid inherited instinct—the prerequisite to civilization. The multitude of forms such civilizations can take, the variety of their styles and emphases (as illustrated in the panoply of cultures of New Guinea and Melanesia) demonstrate the range of possible balanced solutions to the human imperatives and

OF HUMAN BEHAVIOR

An Introduction by
Robert L. Sinsheimer

also the influence of the chance event or the rare individual upon the development of prehistoric societies.

Concealed behind curtains of seemingly universal custom lie unexpected and profound patterns of transmitted knowledge. The deep psychological consequences of motherless rearing of primates surely have major relevance to the subtle consequences of varied modes of human child rearing; likewise the persistent consequences of early environment upon the abilities of primates to perceive and adapt to later situations bear strong pertinence to the ways in which human children learn to perceive and formulate their universe.

The evidence for the major role of genetic factors in the determination of intellectual and psychic human characteristics continues to mount despite considerable antagonism, both objective and subjective. The conference heard of a recently discovered syndrome, leading to severe psychic disturbance, attributable to a clearly defined, inherited enzymatic defect in a somewhat obscure metabolic pathway. It learned of the profound consequences, in opposed directions, of an abnormal chromosome constitution upon the capacities of the affected individuals for verbal performance and for perceptual and motor performance. The impressive body of data leading to the conclusion that inherited factors play a dominant role in the determination of individual performance on IQ tests was critically examined. It is an important secondary consequence of this conclusion that, by accepted evolutionary theory, the existence of such a large genetic component for IQ variance can only mean that there has been relatively little selection in human history for those factors that govern IQ performance.

Sufficient valid data are now available to demonstrate that individuals with a certain abnormal chromosomal complement are significantly more likely to be unable to adopt socially acceptable roles than are persons with a normal chromosome complement. The implications of such findings, and their likely extension to yet undetermined genetic combinations, for the concepts underlying our judicial system are major and as yet only dimly realized.

While the statistical indicators of genetic determination provide most convincing tables of evidence, we are as yet profoundly ignorant of the biochemistry and physiology which must accompany the abnormal or pathological psychic states. Early research forays into this field are promising, but they are as yet primarily exploratory.

The subject matter of this conference touched deeply held beliefs; that it could be held calmly at Caltech is a tribute to the maturity of our community. Behind the technical language and the scholarly objectivity one could often sense the unstated yet implicit questioning challenge to long-established, unquestioned dogmas, and one could glimpse the origins of new and disturbing concepts, with factual base and wide frame of reference.

The conference has enriched and encouraged those at Caltech and elsewhere who will seek to comprehend the true nature of man.