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HUMAN BIOLOGY
AND
RACIAL WELFARE

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PREFACE

Each one of us feels in his own experience an insistent urge to specialize in order that he may do, not a variety of things, but a few things better and more quickly. He must swim with the stream or he will not survive. It is true in business as in science. In one way this concentration is good, and in another it is bad. It is good since it is the essence of progress which makes the world a better place to live in, but the individual suffers. The more successful he is as a specialist, the more difficult it is for him to avoid becoming narrow-minded. Because he does not understand the hopes and aspirations of others he may also become intolerant. He may adopt a condescending attitude toward his fellows whom he regards as less favored.

The situation has not been helped by the action of educators in permitting specialization very early in the curriculum before the students can secure a broad grasp of the problems of human life and of the methods of attacking them. Indeed it grows worse because through specialization, advances in the sciences dealing with man have been so phenomenal that each has come almost to speak in a language of its own which is difficult to understand without much preliminary study. Thus, barriers are erected which prevent breadth of view and which breed intolerance. It is really a vicious cycle which hands out great benefits with one hand and iron-bound restrictions with the other.

The purpose of this book is to play a small part in breaking down these barriers in respect to the group of sciences which have a definite bearing on human welfare and are referred to collectively as "human biology." This will also make for progress because many of the real problems lie between the sciences and are not perceived without broad knowledge. To do so involves team work by many specialists with the idea of describing in simple language the goal which they are striving for. It is also a kind of return to the public for value received for research in the pure sciences is never self-supporting. There must be "give" as well as "take."

The book is written for two groups of readers. First, for students who are about to specialize and can do so more intelligently after they have seen in perspective what lies ahead. This applies particularly to medical students who in order to be good physicians must above all be good biologists. A knowledge of what is known of human life past, present and possible future, is for them essential. In the second place it is hoped that the book will be of interest to readers of mature years occupied both in science and in business who have an inquiring turn of mind and wish to look a little below the surface. In this way it may assist in the movement in favor of "adult education" which is gaining momentum within the United States and is destined to spread.

Valuable suggestions have been received from many quarters not only by the Editor, but by the individual contributors who have one and all entered enthusiastically into the spirit of the enterprise writing on their own responsibility and making acknowledgment when necessary. The editor, however, is particularly grateful to Dr. Conklin, Mr. Embree, Dr. Gregory and Mr. Hoeber for their continued interest and advice.

E. V. COWDRY.

WASHINGTON UNIVERSITY,
ST. LOUIS,
January 2, 1930.

INTRODUCTION

EDWIN R. EMBREE

IN an essay entitled "This Simian World" Clarence Day has considered what kind of planet this might be if some other species than the great apes had evolved into mastery. He plays with the idea of the dignity and wisdom that might have been displayed if children of elephants had developed into leadership instead of monkey-like animals; what cleanness and cunning would have marked a world ruled by super-cats; what poise and vision might have come with glorified descendants of eagles. But as a matter of fact animals akin to monkeys were the ones who did evolve; it is the children of that race who rule the earth today. The biology derived from this ancestry governs our potential development and marks its ultimate borders.

We inherit some very great liabilities from these animal forebears. Our bodies are weak and puny as compared with the magnificence of elephants. The grace and beauty of the great cats is lacking in our Simian civilization. We have little sense of personal dignity and no real regard for privacy. We congregate in hordes, live together crowded into tenements and hovels. We are unstable, constantly running after new toys and new ideas, rushing, often aimlessly, up and down the earth as our ancestors used to scuttle chattering among the trees.

But we inherited in common with our monkey cousins, one great talent, namely curiosity. And that single quality, probably more than all other things taken together, is responsible for the phenomenal progress of our race. We have an insatiable hunger to know all about everything. This appetite drives us to avid gossip about our fellows; to handling and tinkering with—"monkeying with"—every object or idea that crosses our path; to rushing hither and yon to glimpse a dog fight or view an aeroplane; and also to deep and profound study of intricate problems of medicine and physics.

Two other characteristics have helped us humans in our special type of progress. Our chattering forefathers have given us a love of talk. We are forever gabbling; we have invented great systems of language; we even pay men to talk to us in groups. We store up words in scrolls and books, and build huge temples called libraries in which to hoard this preserved chatter. We compel children to devote years to the study of talk of previous generations. We have invented devices whereby we can speak to our friends thousands of miles away, and machines which record our babble and reproduce it from black metal discs. This ability to talk and our devotion to it is a biological character of our species. It enables us to communicate ideas as well as gossip and to pass on to the whole race our accumulated research and experience.

We have also inherited a compulsion to action. We must always be busy; we rush about, we build and tear down and build again. We are not content simply to inquire and find out everything; but we are driven to *do* something about it all. And this again while it means a lot of aimless motion also results in turning our knowledge of physics, for example, into bridges and steam trains and aeroplanes, and our knowledge of chemistry and medicine into protection of health; into prolonging and making more robust our lives.

These are simply rather picturesque aspects of our biological make-up. Papers in the present volume discuss in fundamental terms various phases of the biology of man and his environment. Such presentation gives an approach to intelligent understanding of ourselves in our present state of development and in our present world.

Our inquiries about our bodies and habits have for many years been taking new directions. From passing curiosity we have turned to deep study of ourselves: our diseases and how these may be cured and prevented, our intellects and how from childhood they can be trained into ever more masterful tools, our emotions and how they may offer increasing pleasure and satisfaction and produce less distress and conflict and distraction. Being members of a group living together in a common world, we are also beginning to study

our group activities and relations. Students of the social sciences are attempting to discover and explain the causes of herd action and that of individuals with respect to the group and also to formulate suggestions of ways by which, if we wish, we may change or modify such conduct for the well-being and happiness both of the individual and of society.

A new factor is transforming world relations. Recent inventions are in effect causing the planet to shrink rapidly. Curtiss, Wright and Lindberg, and Marconi, Edison and Bell have between them practically murdered space. We have crossed the Atlantic in a day and may soon be flying from New York to Tokyo in less time than, a century ago, our fathers moved in ships from Boston to New Haven or in covered wagons from Kansas City to Topeka. Individuals are talking between Philadelphia and London and Berlin as readily as our forebears conversed about the village store. Each of us is using every day houses and clothes and machines and toys some part of which comes from Germany, France, England and Japan. Our whole world of 1929 in many ways is more closely packed together than a single province of France or county of England two or three centuries ago.

We have brilliantly (although not yet with consistent thoroughness) searched out the secrets of the world about us and we have turned this knowledge to very great practical service to ourselves. We have learned much about our own bodies and are now able to protect them against many insidious enemies: germs, harmful foods, improper balance in the action of glands, unwholesome emotions, unsocial acts. With these tentative findings in our possession in physics, medicine, biology, psychology and the social sciences and with more accurate knowledge increasing steadily (although in a spotty manner and along an irregular front), the question arises as to whether it may not now be possible to make another great push forward in human evolution.

It is beside the point to dispute as to the relative importance of inheritance and education, of nature vs. nurture; for any great advance must include attention to both the biological and the social. We must, for instance, find some way to avoid wars if the race is not to destroy itself with its

ever-increasing knowledge of physics and chemistry which may be used for mutual benefit or equally for world destruction. We must improve beyond recognition by present standards both the significance and the extent of our educational system; we must continue to protect our health and lives if we are not to lose irreparably in individual and group progress. But since after all we may assume that we have developed from a definite species and since the limits of our progress are involved in this ancestry and in the degree to which we have evolved from it, a fundamental question of the future is: Can we to some extent control the direction of the evolution of the race?

THE CONTROL OF NATURE

Human progress has been a series of triumphs over natural forces. But when anything new is proposed, certain people cry out that this is a perversion of nature. Of course it is. Man rules by bending the world to his will and to the service of his ends.

Man has progressed by mastery over other forces. He rules, insofar as he does, because he has turned nature to his service. Natural science is a series of victories over other animals and over inanimate forces. Coal, which in the normal "state of nature" lies in deep pockets underground, he has mined and burned to keep him warm and to run his engines; electricity, which naturally is jumping haphazard about the universe, he has harnessed into means for communication and power. He has exploited the tendency of bees to store up honey and has lured these busy little insects into building up great piles of this sweet food, not for themselves, but for man. Cows, that by nature furnish milk for their young, he has perverted into continuing their supply of milk long past the need of their calves so that it may be poured out for his nourishment. He has exploited the seed-bearing nature of fruits and grains and has used this super-abundance of seed for his food; he has crossed one species with another and produced such hybrid foods as the loganberry and the tangelo grapefruit to please his palate, and new varieties of flowers for his enjoyment. He has developed to a state of perversion the normal

tendencies of many vegetables so that larger, richer roots grow on Burbank potatoes, more profuse grain on many varieties of wheat and oats, larger and more succulent stalks on sugar cane. He has interfered with the natural reproduction of animals in order to breed cattle with greater quantities of muscle for him to eat, pigs with nutritious fat for his table, and hens with a penchant for laying eggs. He has produced abnormalities such as oxen and mules where these better serve some special purpose of his.

Man also interferes with nature when he kills parasites which might otherwise cause his illness or death, when he eradicates mosquitoes and so avoids malaria and yellow fever, or when he sets one virus to fight another as in vaccination against smallpox. He changes natural processes when he gives anesthetics to deaden pain and when he aids childbirth by mechanical means or by caesarian operation. The whole story of medicine is a history of triumphs over natural forces. Here again, man is beginning to take an interest in even more vital elements of control. He practices birth control; he makes it impossible for certain of the insane and feeble-minded to reproduce their kind. He is beginning to inquire about the possibility of breeding not only better horses and dogs, but even a finer race of men. Against such proposals many cry: "It is a perversion of nature." Certainly: but no more so than flying in aeroplanes, using milch cows, growing grapefruit or wiping out the cause of yellow fever.

What has been done is nothing compared to that which may be just ahead. It is highly important that in such fundamental matters we proceed wisely, cautiously and on the basis of well established facts. Any constructive activity in human biology must rest upon the carefully assembled findings of wise research and must be supported by intelligent public opinion.

THE CONTENTS OF THIS BOOK

The papers presented in this volume report the results of investigations in a great group of sciences vitally affecting man. They are intended not only to give a general background and perspective to students of special sciences, but also to give to the average intelligent layman some

knowledge of the present state of learning in these several branches of knowledge and to give him some idea of the bearing of the various specialties upon man and the possibilities of his further development. This book is one answer to the lament of H. G. Wells when he says "If only the scientists would tell us *less mumblingly* what it is all about!"

We live in a particular world. Our life and activities are hedged in and controlled by the nature of the earth and the universe of which it is a part. We have throughout the ages speculated about the form and composition of our world and have looked wonderingly at other spheres which seem to our unaided eyes but tiny specks sailing through the firmament of space. Great telescopes have been invented to enlarge the reach of our weak eyes. Through these we explore the heavens and in other ways we are getting slight tentative knowledge of our neighbor worlds. The story of these explorations into the far reaches of the universe is told in Part I, with special attention to conditions of possible life, somewhat similar to ours, upon the other spheres. The magnitude of space and the far stretch of time give perspective to any consideration of man and his world today and in the future.

The stream of life upon our planet leading up to the races of man, or the subdivisions of the human race, is discussed in Part II. By such a critical examination of how changes and new departures in organic life have come about we can look to the future with at least scraps of knowledge of nature's precedents.

In addition to glimpses of the past, for the whole record doubtless will never be unfolded, we need an understanding of the materials nature has to work with in man: the structure of the human body and the ways in which it performs its functions. This subject is presented in Part III.

As biological units we depend upon the world we live in for food, for air and water and light and warmth. We are on a planet teeming with multitudinous life in the form of animals both large and microscopic and of almost infinite varieties of plants, as well as of hundreds of millions of other human beings. We must snatch the means of living from this world; we are constantly influenced by heat and

cold, light and darkness. We are aided by certain animals and plants, which we have domesticated, that is, trained to tolerate and even enjoy being exploited for our food and service. Other species have not been tamed: lions and tigers are still fierce enemies; plants of the jungle and undomesticated herbs which we call weeds fight constantly with us for possession of the land. A notable enemy plant is the prickly pear which is conquering thousands of acres of previously fruitful land every month in Australia. The microscopic forms of life, bacteria and protozoa, threaten us today more than the fierce giants of old. Part iv is devoted to this large subject of environment.

Much of the exact knowledge in medicine and other sciences, reported in Parts iii and iv of this book, has been obtained through dissection of human bodies after death and by cautious experiments on living beings—scientists often experimenting on themselves as in yellow fever and typhus—and equally cautious work on animals. The information obtained from the latter source is usually applicable to human beings, since we have many similarities to other animals. Misguided people called “anti-vivisectionists” have attempted to tie the hands of investigators in the use of animals. Women, wearing furs taken from animals trapped and killed with great cruelty, have often expressed the most sentimental sympathy for animals used under merciful conditions for experimental work. Such people, even when consistent and actuated by the best of motives, are often unaware of the use of anesthetics in animal experiments and of the care with which the research is carried out, and also of the intensity of human suffering which such experiments tend to relieve or prevent. Dr. W. W. Keen has suggested that agitators against animal experimentation should be compelled to watch preventable death with all its grimness in hospitals and homes or be confronted with a dead guinea pig and the dead body of one of their friend’s children and be asked to choose between them.

In the final division, Part v, the future is discussed on the basis of facts presented earlier and of studies of the tendencies of evolution in man and other animals. In this section is included a tentative report on the inheritance of disease

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