

HEALTH AND SOCIAL PROGRESS

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A NON-MEDICAL BOOK

Dedicated to the Medical Profession

The only one which has never used its knowledge for inflicting wounds on Mankind, but always for healing them; and is now to an ever-increasing extent applying that knowledge to the prevention of disease and the promotion of Health and Happiness.

Man's rise from the level of the animal to that of a civilized human being has been due chiefly to his own efforts. While he depended on nature at first, owing to his limited intelligence, he rose higher in proportion as he used his mind in making it his servant. Proofs to this effect are accumulating every day. Climates which were deadly once, are now becoming fruitful places for his enterprise. Fears which once terrorized him have been relegated into the realm of superstition. Diseases which once were deemed unavoidable now yield to scientific treatment. In the air and in the water, from the Arctic to the Antarctic, from the cradle to the grave, he becomes increasingly the master of nature and of his own fate.

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PREFACE

THE population of the earth in 1800 was approximately 600,000,000; in 1900, it was about 1,600,000,000—an increase of nearly 270 per cent. If, during the twentieth century, there should be a similar increase—and the indications are all in that direction—the population in the year 2000 will be about 4,320,000,000. The question arising then will be, Where shall we get food?

The time will not even then have arrived when, according to Fourier, our scientists will be able to turn the rocks of our mountains into bread and cakes, or the brine of the oceans into most delicious lemonade. The question will have to be faced in a matter-of-fact way instead of dreaming about it in a romantic fashion.

Roughly speaking, two forms of answers have been given—that of the pessimist and that of the optimist. Among the pessimists we may reckon all those whose profession or attitude compels or inclines them to look backward. They have paid a heavy price for doing so, since no one can look into the past constantly without getting a wry neck and having his thought twisted. These people gloomily predict an increasingly more severe struggle, since, if it is only with the utmost difficulty that the present population maintains itself, what must happen if the population is nearly three times as large? Civilization will be doomed, or be confined to a few favored spots; anarchy will prevail, and the second state of mankind will be infinitely worse than the first, because men have learned how to do more harm than ever before.

The optimist believes in human nature. He, too, looks

backward, but his eye is not glued to the past. True, things are bad; but the study of the past has taught him that they were worse before.

Man has not only evolved, he has developed. His struggles in the past have taught him the all-important lesson of coöperation. He is not dismayed by a growing population, because he finds that men in 1900 are better fed and clad, more sympathetic and helpful to each other than they were in 1800. Density of population is a purely relative term. There were never more than 1,000,000 Indians in the territory now occupied by the United States. Yet, the few Indians found the land too small, and waged constant wars for hunting grounds. The hundred million Americans are on the whole satisfied, and engage only in wars of words about the best methods of improving things.

The optimist believes with good reason that with increasing intelligence and good will, problems will be solved as they arise. But more than that. He tries to shape events in such a manner that they shall produce certain results. And he points to the achievements of man in the past and present, and confidently hopes that more will be accomplished in the future.

In other words, the difference is that between the believer in the supremacy of natural law and the student of it for the purpose of utilizing it. The animal and the savage are subject to natural law, civilized man has liberated himself from it to a considerable extent by studying it. And he hopes that with a more intimate knowledge of nature he will construct a social system and build up a civilization, which will be able to support a very much larger population in a better manner than at present.

Man has always conquered when he has gone to work

intelligently and persistently about a problem. Only when he believed that some natural force was superior to him, was he defeated. Our whole civilization is unnatural in the sense that it has been wrung from parsimonious nature by the persistent application of human intelligence. To believe that with increasing knowledge we should be less capable of solving our problems, would mean to despair of ourselves and condemn our whole development.

The scientist may say with justice that he is not concerned with the *whither* of his findings, that the facts alone matter, irrespective of whether they are encouraging or discouraging. That is true! But he must then take a sufficiently large number of facts into consideration. Psychic experiences are facts as much as rain and sunshine. The will to conquer is as important as the natural fertility of a valley. Just because civilization has been largely determined in the past by natural conditions, is no reason why it should always be so. If the tropics have been uninhabitable in previous ages owing to certain diseases or climatic conditions, we need not despair of making them serviceable to the teeming millions of the future.

This brings us back to our original question. Where are the billions of the future to get their food? We have pushed north nearly as far as we can go. Ice-clad Siberia and snow-bound Alaska are giving us their products in food and minerals. But we shall soon have to turn south to the tropics, where nature rewards even the most inefficient labor with rich harvests. And the problem will arise, how are we going to conquer that vast territory from whence a large amount of our food must come? In the past man had no solution, because he was both ignorant and cowardly. And his ignorance has exerted a vast influence upon the history of civilization.

It was chiefly in the line of protecting himself against certain diseases that he was deficient. We have just begun to master these, and with this mastery the conquest of the tropics is certain. Health, in other words, has been the most important factor in the development and extension of civilization.

In looking beneath the surface of historic events we find that only those nations which enjoyed at least fair health, have been able to make some permanent contribution to the welfare and enlightenment of their contemporaries and of future generations, because they alone had sufficient energy to procure more than the immediate necessities for themselves. Other nations merely existed; and in many cases we know of them only through their contact with the healthy and vigorous peoples who usually had no difficulty in enslaving them.

It would be impossible to treat the effects of every disease known to modern medicine upon the nations of the past. An interesting book might be written about the influence of tuberculosis on civilization, especially since people began to gather in cities. The so-called "social diseases" have undoubtedly played a large rôle in the fall of Egypt, Greece, and Rome. But these diseases, widespread as they were, affected after all only individuals, and not whole populations. They could, moreover, be guarded against by living in the open air and by living a moral life.

Two diseases—malaria and hookworm—have accordingly been selected for showing the influence of poor health upon many races. They have always existed in historic times at least, and have been a drawback to by far the majority of the people living in the tropics, subtropics and the lower latitudes of the temperate zones. Estimates place the number of people living today in the

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malaria and hookworm zones at approximately one billion. These diseases have been endemic in this large area from times immemorial, and are responsible for the low vitality prevailing in those regions. Being endemic, there was but little chance for anyone in that territory to escape their ravages. Three factors favored the practically unchecked course of these diseases.

In the first place, but few people died directly as a result of contracting one or both of them; thus little was done by men to protect themselves against an attack, as they did, however inadequately, against epidemics. In the second place, there was the general religious and philosophical tendency of the people to look upon diseases of any kind as a visitation from some deity whose wrath had been provoked by their disobedience. In the third place, these people had in the vast majority of cases no idea of the true nature of disease and, consequently, no conception of how to cure and prevent it. The specific for malaria—quinine—has been known to Europeans only since the seventeenth century, and the knowledge of its curative properties is even now confined to civilized peoples. There was, therefore, no escape for individuals and races living in the infested territories.

With the beginning of the twentieth century an entirely new page opened in the history of mankind, for we not only know now the nature of these and other diseases, but also the remedies to cure and the means to prevent them. We have learned, moreover, that health and long life, which were looked upon as gifts of the gods, are matters having a relation to cause and effect, and are dependent on the proper observance of hygienic rules and on the establishment of sanitary precautions. There is no longer any excuse now why there are probably at all times 3,000,000 people ill in the United States, making

an average of thirteen days of illness per annum for each inhabitant, or why 600,000 persons should die prematurely from preventable diseases. This means not only a tremendous economic loss, but much needless suffering for both the patients and their families.

Of other bearings on good health, mention need only be made of the fact that any other gift or talent we may have, loses much of its power to make us happy if our health is below normal. A man may have the wisdom of Solomon, but with poor health his usefulness is reduced one-half. A few men of exceptional ability have done valuable work notwithstanding poor health; they were, however, surrounded and assisted by others who took every burden off their shoulders. This was the case with Herbert Spencer and Charles Darwin. Of what value good health would have been to these men, they themselves have repeatedly and emphatically expressed.

The view that there is generally a close connection between poor health and low morals is becoming more permanently established on the basis of scientific investigations. A better and more intelligent pursuit of health would, consequently, assist in solving some of our moral problems.

Another case may be mentioned. During the winter of 1913-14 New York and other large cities had many unemployed men and women. A careful examination of 2,000 of these men in the Municipal Lodging House of New York brought out the fact that about seventy-five per cent of them were below the normal in health, not as a result of exposure or chronic starvation, but of poor constitution. During the winter of 1914-15 an estimated number of unemployed of 400,000 resulted in the creation of a committee on unemployment, headed by the Mayor and some of the most influential business men. Very

little has been heard of its efficiency in procuring jobs for these people. But if the total percentage of low-vitality men among these "out-of-works" should be only fifty per cent—reckoning those in the municipal lodging house to have constituted the lower strata of the unemployed—it would seem rather useless to provide jobs for people who cannot hold them. Many men are unemployable not because they are unwilling to work but simply because their vitality is too low to stand the strain of regular application to work. It would seem that an investigation into the physical fitness of these people would be getting nearer the root of the trouble than more or less futile attempts to procure work for them which after a few brave but vain efforts they cannot perform. There is always a large amount of unemployment during the winter, owing to season work and other causes. But the healthy worker will save a little during employment, his lodge and his friends will help him out, and under normal conditions he is able to tide over the winter. Only when abnormal industrial conditions swell the number of the unemployables by large numbers of healthy employables, does the situation become acute. If the low-vitality men and women should number only 200,000 in New York City, the inference seems justified that they are supported by their families all the time, and are thus responsible for the depressed financial condition of these families. This inference is borne out by a study of the One Hundred Neediest Cases of New York, published by the *Times* for several years. An analysis of these cases shows that fully fifty per cent of them are due either directly to disease or to low vitality. Better attention to health and sanitation would tend to solve this problem to a considerable extent.

Our educational systems are failing to meet the ex-

pectations of the more advanced members of the community, especially those of physicians, because they attempt to convey much useless information to children whose prime need is better health. The British government spends about £15,000,000 a year on education. In many of the colonial schools colored children, suffering from malarial enlargement of the spleen, are taught the dates of the succession of the Plantagenet Kings, while little or nothing is done for their health. Other countries are doing more in this direction, notably Sweden, Germany, and the large cities of America. The culture of health has, however, nowhere been given the central position which it should occupy in a rational educational system. Yet that is necessary for a wholesome national development.

That this statement is true may be inferred from the facts presented herewith.

Dr. S. Josephine Baker published the following statistics in *The Ladies' Home Journal*, for May, 1918 (page 89).

"There are in the schools of the United States today approximately 20,000,000 pupils. It is estimated that:

"300,000 to 400,000 of these have organic heart disease.

"1,000,000 at least have now, or have had, tuberculous disease of the lungs.

"1,000,000 have spinal curvature, or are flatfooted, or have some other deformity serious enough to interfere to some degree with health.

"1,000,000 have defective hearing.

"5,000,000 have defective vision.

"5,000,000 are suffering from malnutrition, in many cases due in part at least to one or more of the other defects enumerated.

"6,000,000 have enlarged tonsils, adenoids, or enlarged cervical glands which need attention.

"10,000,000 (in some schools as high as 98 per cent) have

defective teeth which are potentially if not actually detrimental to health.

“Several millions of the children possess, each, two or more of the handicapping defects.

“15,000,000 of the school children in this country are in need of attention today for physical defects which are partially or completely remediable.”

For New York City, we have the following data:—In 1917, 247,735 children were examined by school physicians; 86,311 of these were found to suffer from various defects; 104,587 were found to suffer from defective teeth exclusively. This makes a total of 190,898,—certainly a very high percentage of the children examined.

The cost of health supervision of the children in the schools of New York was 42 cents per child in 1915. This is a very small amount of the total per capita cost of educating a child, which is \$40 per year.

These few figures show that we are not spending nearly as much on health in our schools as we should.

Much of the perverse thinking and acting both among children and among adults is undoubtedly due to low vitality, or actual physical defects. A brain that is poorly nourished readily becomes the host of all kinds of wild ideas and the country has to pay for it in various forms of expenditure for these misfits in society.

The importance of one of the diseases considered in this book has been brought home to our generation by two facts of the present world war—the Allied Army in Macedonia, and the building of the cantonments of the American National Army.

Considerable surprise, if not annoyance, has been expressed at the comparative inactivity of the army in Macedonia, consisting of approximately 750,000 men.

Measured by what has happened on other fronts of the world war, this army has done practically nothing. Surmises of every possible nature have been advanced as an explanation for this lack of activity. Those who were in that field knew the reason, but it seemed hardly credible to people not familiar with the ravages of malaria. Lest the author be accused of exaggerating, a quotation from a man who has studied these conditions will be given in order to show that the most dangerous enemy of that army was neither the Turk nor the Bulgar, but the malaria-bearing mosquito. Herbert Corey gives the following description of the effects of this endemic disease in the *National Geographic Magazine for May, 1917*.

“—the malaria-bearing mosquito is a really dangerous enemy. Last year the Allied troops did not realize what the Macedonian mosquito can do, apparently. They were not prepared. In consequence fully one-half of their strength was out of action because of malaria.

“During one period more men were invalided home than arrived on ships. I heard of battalions with 75 per cent of their men on their backs, and of companies in which only five men were fit for duty.”

It will take time and skill to remove this enemy, because Macedonia is malaria-ridden, just as Greece is today and has always been since the time of Pericles.

For the cantonments of our National Army the best sites available from the point of view of health and sanitation were selected in 1917. It was, nevertheless, necessary in all cases to spend large sums of money in perfecting such arrangements, and in all the cantonments located in the Southern States to pay special attention to malaria. Around Camp Pike, near Little Rock, Arkansas, an area of about seventy miles had to be rendered mosquito free, although it is located approximately 200

feet above the river plane. This great care shows that our experience in the Panama Zone has not been forgotten, and that our army surgeons are fully aware of the danger lurking in malaria against the efficiency of an army.

Whatever aspect of society we may consider, whether it be the arts of peaceful civilization, or the clashing arms of war, or the depressing problems of social inefficiency or the future of the nation, we are always led back to health as a fundamental factor in social progress.

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PART I

**GENERAL RELATION OF HEALTH TO
SOCIETY**

CHAPTER I

INTRODUCTION

HEALTH has been the greatest factor in the history of man, since it is the strong and healthy nations which have in the end conquered their richer and, perhaps, more civilized neighbors. For man had to contend not only with man in the struggle for existence, but with beasts and parasites. The battle against the beasts was decided long before the historic period, but that with man and parasites still continues. In his fight against disease germs man has frequently succumbed. Whole tribes and even nations have been wiped out by the plague, cholera, and even less virulent diseases. And even to this day, in his battle with man, the parasites play an important rôle, since the nation which knows how to control, or at least, change the activity of dangerous micro-organisms has an advantage of great importance over its enemy. In times past, when no such knowledge existed, the nation which lived in regions comparatively free from parasites, was always able in the course of time to defeat its more numerous, richer, and more civilized enemy. History is hardly more than an endless repetition of victories by peoples coming from the north or the mountains—localities less infested with disease germs—over peoples living in rich and fertile plains, where these germs found more favorable conditions for breeding.

From another point of view health has been of the utmost importance,—that of civilization. Why have the

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tropical and sub-tropical countries never attained to a permanent civilization? In almost every part of the world have civilizations sprung up around the latitudes of the Cancer and of the Capricorn, only to flourish for a short time, and perish when conditions were apparently propitious for a higher development. Reasons of various kinds have been assigned for this short life,—immorality, luxury, infidelity, degeneracy, political oppression, and almost everything else which the fertile imagination of past and present day writers could conjure up. All these reasons undoubtedly had something to do with the ruin of ancient civilizations, but they operated only indirectly, and were themselves results rather than causes. It is only recently that medicine, with its study of tropical diseases, has revealed the true cause,—ill-health owing to the inability of former generations to combat disease-breeding parasites. For without physical health, no high and no permanent civilization is possible. If ill-health attends a people day after day, it lacks the ability to build up strong and vigorous bodies and large, sound brains. It is, consequently, compelled to reduce its activities to the absolutely necessary minimum, since a sick man does not act or think any more than he is compelled to in order to preserve life. No civilization can be built up, however, in that way. It requires great physical activity, and, above everything else, a clear and vigorous brain to invent schemes for freeing man from the thralldom of physical toil. For only in proportion as man succeeds in making nature do his work, is he able to attain leisure and to save time and energy for the development of art, science, philosophy, and literature. Civilization has, consequently, a mental basis even in its material aspects of machinery and other labor-saving devices, and consists essentially in the ability to

enjoy free mental activities along lines which give men pleasure, just because they are not needed for physical maintenance. These activities are, however, wholesome in proportion as the body is sound and vigorous, since out of the poorly nourished brain of a chronic dyspeptic or the disordered brain of a maniac all kinds of strange fancies proceed, which are neither sound nor sane. Physical health is, therefore, an essential element in the origination and maintenance of civilization.

This fact has been almost entirely overlooked by historians, theologians, philosophers, and even some sociologists. Human beings have been treated as if they were minds without bodies. Writings dealing with the history of man in its various aspects contain almost no references to health or disease except occasionally in very detailed biographies or when a war or an epidemic carried off thousands of people. This silence is, of course, due to the supposed independence of mental states from bodily conditions, survivals of which we have in the various forms of mental or faith healings of modern times, and in our attitude toward morality.

Moralists and theologians require conformity and obedience to rules which are plainly intended only for well men. Kant's dictum, "Thou canst, because thou must!" is evidently teaching of this kind, because, by implication at least, the person who recognizes a duty is able to impose his will upon even a weak and diseased body, and make it do the work of one that is well and strong. This attitude has passed over into our legal codes, and we often punish a man by confinement in jail or prison, when we ought to send him to the hospital or to a colony for the feeble-minded.

Health seems to be either assumed or to be ignored in the treatment of man. The Puritan considered a

reference to his physical condition as sinful or at least indelicate, while most historians were either silent about the body or treated it with more or less open contempt. Some writers openly expressed their views regarding the body as an obstacle to the mind's progress. "O wretched man that I am! Who shall deliver me from this body of death?" says St. Paul (Romans 7:24). In Schiller's "Ideale und das Leben" the body is depicted as "sinking, sinking, sinking," as the mind—now freed from its heavy encumbrance—rises higher and higher. This neglect and contempt of the body goes back to ancient times, and it will be necessary to treat the attitude of past generations in regard to this problem at least briefly.

It is certainly strange that such an important fact as physical health should not only have been neglected, but in many cases distinctly discouraged. Religion and philosophy have been the greatest sinners in this respect through their mistaken notion that the body was the seat of sin and hence an obstacle to the development of the spirit, while science has always taken a lively and sympathetic interest in fine, healthy physiques.

Savages have, as a rule, paid more attention to the body than civilized peoples, because the exigencies of their condition always called for whatever physical strength, skill, prowess, and endurance they could muster; hence the great pains taken with the physical education of boys, and the care taken by the warrior of his health that he might either attain the chieftancy or retain it. Since efficiency was measured in warlike qualities, it was necessary that the body should be made chiefly an instrument for fighting; this involved, however, incidentally an all-round development and a certain amount of hygiene. The comparatively few children who survived the hard

conditions of life were the most vigorous, and perpetuated their strength through their own offspring.

The Hebrews are conspicuous from this point of view chiefly for their laws concerning physical cleanliness and purification—the effects of which are noticeable to this day, since a race has been created with strong physical tenacity and a high vitality, notwithstanding the confining life of the Ghetto.

Among the Greeks, the Spartans stand out prominently in this respect, since they trained both men and women with the greatest care; the former to be efficient warriors, the latter efficient mothers.

The Athenians undertook physical training primarily for the sake of enjoyment; it was a disgrace for a gentleman to be sick, since he must be at least secondarily a good soldier. It may be said that health-culture was raised to the level of a fine art among the Greeks, which partook—as did all arts with them—of the nature of religion. They emphasized the element of health for the sake of proper enjoyment in conformity with the ideal of their gods, as the Hebrews insisted on cleanliness and purity in obedience to the ideal of Jehovah.

Later Greek development was a decidedly retrograde movement. Platonism introduced the idea of the opposition of mind and matter—mind being conceived as the formative principle, matter as the chaotic and unformed. This doctrine placed matter in a position of inferiority, since it hindered the development of mind. When this idea was added to the Hebrew conception of sin, and both were intensified by Christianity—the result showed itself in a deprecation of the body in every respect, especially since it came to be looked upon definitely as the seat of sin and the obstacle to the free development of the spirit. It took but a short time to

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develop the "unwashed saints," Simon Stylites, and other exponents of perverted views of life.

" I die here
Today, and whole years long, a life of death.
Bear witness, if I could have found a way—
And heedfully I sifted all my thought—
More slowly-painful to subdue this home
Of sin, my flesh, which I despise and hate,
I had not stinted practice, O my God!"

Modern Christianity has not taken a definite attitude in this respect. Its advance agents exhibit a progressive tendency, chiefly for the sake of interesting young men and women. It may be said, however, that religion—whether Jewish, Christian or otherwise—can never render the service it should render, unless it adopts the scientific view of matter as spiritual, and returns to the primitive Christian ideal of the body as "the temple of the Holy Ghost." This view is, moreover, decidedly in favor of viewing God as immanent rather than transcendent—a movement which is gaining a firm foothold in the churches owing to the influence of science. The neglect of the body and the conception of a transcendent kingdom of God have retarded a true civilizational movement considerably, since physical health, which is the only basis for mental wholesomeness, was deprecated, and the "other-worldliness" of the Kingdom kept men from exerting themselves to improve conditions in this world.

Science, especially medicine as the science of health, has always favored a proper view of the body. Owing to the imperfect development of its auxiliary sciences, *e.g.*, chemistry, physiology, and bacteriology, medicine was until recent times more or less haphazard guesswork at curing diseases, but has now developed to a remarkable

extent, and is gaining new knowledge almost daily concerning the nature of diseases. With this knowledge has come the conception of prevention as the true sphere of medicine, rather than mere cure. The prophylactic work of hygiene in its different aspects has produced remarkable results. Medicine has, moreover, joined hands with the engineer and the physical culturist in various successful attempts at sewage disposal, sanitation, ventilation, and a more systematic development of the body.

Biology and psychology deal chiefly with life as it is actually found, but work indirectly for betterment of health, because only normal and healthy individuals insure, as a rule, progress.

Sociology is concerned with the causes of the progress and decline of nations. It is *par excellence* the advocate of health—physical, psychical, political, social, and industrial—since the efficiency of nations and races depends on the maintenance of health.

Eugenics, finally, is a new branch of biology and sociology, and attempts to solve the problem of racial health by proper mating of the physically and mentally fit, and by the elimination of the unfit through prohibition of mating.

These various efforts have produced many important results in lessening the amount of sickness, improving health, and chiefly in changing our whole attitude toward the body as the instrument of the mind.

In no period of history was health considered of such great importance as it is in our own times. In practically every sphere of life, people take the greatest interest in their physical and mental well-being. Individuals, schools, voluntary associations of various kinds, even governments have taken up this question with a zest

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that augurs well for the future. The number of books which have been written on this topic, is literally more than the proverbial legion. From the platform, in lectures and pamphlets, in newspaper and magazine articles, we are told how to keep well. The numerous health-resorts, sanatoria, and similar institutions which promise to build up broken-down constitutions are filled to their utmost capacity and new ones are established every year.

What is the reason for this great interest in health? Are we more ill than our ancestors, or are there special causes in our times, which demand greater consideration of health?

Whether we are in better health than our ancestors is a much debated question among sociologists and need not be entered into here. Data will be given in a later chapter (see page 28) to answer the question in the affirmative. The reasons, however, for our great interest in health are plain, and they may be divided into social and scientific.

Whatever the ultimate relation of mind and body may be, no person denies the tremendous importance of a sound body as an instrument of the mind, especially in relation to social life in its various aspects. Our industrial life has created conditions which make a close interdependence of one man upon another an absolute necessity. Formerly when a man was ill, his work could wait until he was well, and no one else was inconvenienced; but if an employee in a factory is unable to perform his duty, hundreds if not thousands of other employees have to stop work owing to the dependence of one operation upon every other. The financial loss is, of course, too great to do that, and the sick employee must be replaced by another. Again, if a farmer while driving to town gets dizzy and falls from the wagon, his horses may run away and he may break his neck, but the damage is con-

fined to himself and family. If a locomotive engineer suffers from a similar affliction and runs his train at full speed into an open switch, hundreds of people may be killed or maimed for life. These are but two out of many cases in which modern conditions differ fundamentally from those of former days or from those in our own times where a man still works singly. Hence the importance of health in modern industry.

Briefly stated, health in relation to modern conditions may be viewed from five aspects: (1) The proper performance of one's work and duty is impossible without at least fair health. A man may force himself, but in that case his work will be done poorly, or the wear and tear on the constitution will be so enormous as to bring about a considerable weakening, thus predisposing the worker to disease, or at least lowering the power of resistance. (2) Apart from the mere performance of work is that of exactness and accuracy. A man enjoying good health is less apt to make mistakes than one who is below normal. That means an immense saving in time, money, friction, mental wear and tear to himself and to the establishment, since such work needs less supervision and scarcely ever a doing-over. (3) Ease and cheerfulness at work is another important aspect. There is a tremendous difference between a worker whose body is ready to perform, craving an outlet for its abundance of energy, and one whose body protests almost at every step taken, and still more against the continuous exertion during work. The former will work with ease, sing and joke; the latter will watch the hand of the clock and sigh with relief when it strikes six. (4) When the two leave the shop, the difference between them still continues in their recreation. The present tendency is everywhere for shorter hours so as to give the worker more leisure. But what can a man

do with his leisure when he is so tired out that he is scarcely able to drag himself up the steps of his house. He is unable to use it for reading or social intercourse; the chances are that he will seek a stimulant to create an artificial cheerfulness. The other man has at least the opportunity to improve his mind by reading, going to a lecture, or through social intercourse. (5) The purely social value of good health is, perhaps, more important than any other. Exuberant spirits and robust health are distinct social assets. We all feel instinctively drawn toward a cheerful, pleasant-spoken person; his very presence is a blessing, his smile contagious, and he is welcome wherever he goes. The father returning from work with a cheerful smile and a pleasant word for wife and children, is anxiously looked for, because he spreads sunshine in the house. The man who is wearied through work, owing to low vitality, is inclined to find fault with everyone and everything, and is shunned, because he spreads gloom by his very presence. From a dramatic and literary point of view "Rebecca of Sunnybrook Farm" may be inferior, but from the social point it is a distinct asset, because it proves the value of good health and a cheerful disposition.

The scientific reasons for fostering health are somewhat more remote, but none the less real. The rapid expansion of the natural sciences, especially of biology, during the nineteenth century, contributed many elements toward a change in our attitude toward the body, since the doctrine of evolution depends primarily on the good health of the various species. The survival of the fittest meant in the animal realm and for a long time in human history, the survival of the physically fit, because only the organism endowed with strength, fleetness, or other physical characteristics insuring superiority had a

chance to survive and propagate. These qualities are, however, reducible to health, since without that they could not be developed; nor are they, if developed, of much use without it, since the swiftest wing or foot, the strongest jaw or claw would be incapacitated by disease. An animal might react promptly and efficiently hundreds of times in escaping its enemies, but the parasites in its own system it could never escape. Hence there is no natural death among the majority of animal species, because when the bacteria have lowered vitality, even the swiftest and the strongest fall a prey to their enemies.

The interest in biology led in its turn to the various attempts to explain man's nature on the basis of his environment, and as a result of this new view of life, Buckle wrote his *History of the Civilization of England*, and Ratzel his *Anthropo-Geographie*. "Man can no more be scientifically studied apart from the ground which he tills, or the lands over which he travels, or the seas over which he trades, than the polar bear or the desert cactus can be understood apart from its habitat. Man's relations to his environment are infinitely more numerous and complex than those of the most highly organized plant or animal. So complex are they, that they constitute a legitimate and necessary object of special study. The investigation which they receive in anthropology, ethnology, sociology, and history is piecemeal and partial, limited as to race, cultural development, epoch, country, or variety of geographic conditions taken into account. Hence all these sciences, together with history, so far as history undertakes to explain the causes of events, fail to reach a satisfactory solution of their problems largely because the geographic factor which enters into them all has not been thoroughly analyzed. Man has been so noisy about the way he has conquered nature, and nature has

been so silent in her persistent influence over man, that the geographic factor in the human equation has been overlooked." ¹

These studies led to an investigation of the disappearance of nature-peoples, and it was found that their decay and extinction was due not so much to the cruelty of the "white man," as to various endemic diseases, some of which had existed among them for many generations and became more virulent under new conditions of life, while others were introduced by civilized man on his advent in new countries. It is no exaggeration to say that the fate of many nations and innumerable tribes has depended on various diseases; and chiefly the endemic, because epidemics caused as a rule great mortality, and thus by attracting attention, produced measures to combat them, while endemics worked insidiously and more injuriously, leaving the people in ignorance of their danger. The Greeks and the Romans, for instance, were never aware of the danger which threatened them through malaria, and took no measures to counteract its ravages. The study of the disappearance of nature-peoples through disease created a new interest in health among civilized peoples, especially among physicians who had worked in tropical countries.

CHAPTER II

MEANING OF HEALTH

WHAT is health? In defining or even describing health much depends on the point of view. The average man considers himself healthy when he is not ill, and many a person who is suffering from an endemic disease, *e.g.*, malaria or hookworm, considers himself well, just because he is not seriously sick. The physiologist would consider health as a normal functioning of the cell, because he takes that as the unit of his investigation. The sociologist, on the other hand, looks upon the body from the point of view of action, and he must describe health in terms of the whole man as he reacts upon the various stimuli which come either from within or from without. These reactions are, however, ultimately mediated in the brain or in the mind, and they will be the more perfect and economical, the less friction there is in the physical organism. Hence we may say that *a person is healthy when he is, except incidentally, unconscious of his body.* The definition may seem strange at first sight, but it implies all the elements which enter into a full description of health. It means the state of body which enables it to perform every function which can reasonably be expected of it, to accommodate itself to each ordinary task, and to be equal to some exertion without painful sense of fatigue. This implies as external signs erectness and firmness; as internal requisites, good construction, ability to adapt itself to widely divergent conditions of life or of climate without deterioration of energy; endurance, re-

sistance to morbid influences; and finally, it means self-control—mental, emotional, and sexual; briefly, a balance between organs and organism, so as to produce a coördinated whole, well equipped for action.

This description does not refer to robust health, but merely to a person who is well. It may be illustrated briefly as follows: The healthy man wakes in the morning without any recollection of what happened since he went to bed, since he has had a continuous, unbroken, refreshing sleep. He is ready to get up and has no desire to linger in bed; his toilet is performed without delay, for he is hungry, and has visions of breakfast. When this is over, he proceeds to the business of the day at once, whatever that may be, since he loves his work. This he does with all diligence and dispatch, because his body answers to the summons of the mind with ease and accuracy. Hence he will not be exhausted when the day's work is done, but will have some energy left over for exercise, friendly intercourse, or mental improvement. Then he goes to bed, and is soon asleep. This man has scarcely been conscious of his body either by night or by day except incidentally when washing, dressing, and eating. If he had any sensations at all about it, they were pleasant, at least mildly so, since the sense of organic well-being is one of diffused pleasure. He enjoys his meals, but never has to care what becomes of the food afterward, since his digestive organs perform their work automatically; he may perhaps remember his meals again through an increase of strength and well-being.

Perhaps the best thing about good health is the fact that work does not weary us, but helps to develop our various faculties. Hence the day's work always leaves us in better condition than it found us; it has opened new possibilities before us, has given us opportunities

for exercising our various powers and for spending our surplus energy. The healthy man is able to make every movement graceful, effective, and adaptive; and the profit from the day's experience will enable him to do tomorrow's work better. He re-creates himself constantly.

It is not necessary to point out that good health is not identical with athletic strength or endurance. The tasks of life differ, and each task requires a slightly different physique, as Aristotle observed in his *Politics* (Book I, Chapter VI). The health and strength of a hod-carrier must be different from that of a professional man; the former needs a well-developed muscular system, the latter an especially fine brain and nervous system. If each is able to perform his particular work well and without exhaustion, he fulfills his destiny, and renders not only a social service but gets profit and pleasure from it.

Health may be identified with good vitality, or surplus energy. Good vitality means simply a reserve fund beyond what is immediately needed. The greater this reserve, the better prepared is the organism to meet all kinds of exigencies with ease, and to stand shocks without serious injury.

"Two men undergo operations of the same character in a hospital. The same surgeon does the work. The conditions are identical. Equal care is exercised in each operation, and each is successfully performed. Yet one man recovers, the other dies.

"There is a tremendous business pressure which does not let up for months. It puts men under terrible strain. One man goes to pieces and his business is wrecked. He cannot keep the pace; he loses control of himself. His rival has no better brains than he—perhaps not so good—yet he pulls through successfully.

"We say that there is a difference in vitality; that one man has more of it than the other.

"I once saw a man in a hospital who was suffering from five fatal diseases; and yet he would not die. He kept on living year after year in spite of everything. He refused to succumb.

"We find the same thing illustrated every day. In a shipwreck there are many who seem to give up their lives without a struggle, without any power to resist. Others cling to an open raft for days without food, almost frozen, constantly whipped by the waves, but for some reason they survive. The vitality in them is strong.

"Notice how rapidly and surely one man recovers himself after a nervous breakdown, while another drags along through years of semi-invalidism. Notice the results upon two men of a long, cold drench of rain. One of them comes down with pneumonia; the other suffers no ill effects. How is it to be explained?

"He has a reserve somewhere, an inner power of resistance, an aggressive something that will not be downed—and we call it vitality. A man cannot have a more valuable asset than that. It means joy instead of dumps, success instead of failure, life, perhaps, instead of death." ²

No one will contend that under the circumstances just quoted, a healthy man is unconscious of his body; but these men were sick for the time being, and their cases are cited merely to show that men who enjoy good health store up surplus energy or vitality which stands them in good stead in an emergency. At such times there is still a vast difference between the man in good health and the one in poor condition. When special stress is to be borne calling for great exertion, the man in poor condition will dread the necessity, become apprehensive, and thus spend his energy ineffectively; while the well man will look forward with confidence to the trial of strength and react efficiently. He is able to do this because when he becomes clearly conscious of his body, he is aware of his strength and power; his whole organism seeks

relief from the tension of stored-up energy; while the other, always more or less conscious of its existence, now becomes more than ever aware of its weakness and slender resources. Under normal conditions the well man is, however, as a rule unconscious of his body, unless it be an awareness of diffused organic well-being.

This fact may be illustrated in other ways. A healthy child who laughs and runs and romps, acts spontaneously, not deliberately. When he has to be urged and coaxed to do these things, he is not well; he is conscious of an effort, he must exert himself, and the more he does so, the more conscious he becomes of his weakness. A young dog who for no reason whatever will run up and down the avenue as fast as he possibly can is unconscious of his body. Only after he has spent his surplus energy and needs rest and food is he aware of his legs and stomach.

Health means, then, spontaneity and freedom of action. "It is as 'the outward sign of freedom, the realization of the universal will' that health may be set at once as sign and goal of the harmonious operation of the whole system—as sign and goal of the realization of life." ⁸

A healthy man is able to turn his energy in any direction desired, because his body responds promptly and efficiently; its energy is always ready to be expended. It is usually the man in poor health who has to "make up his mind"; the one in good health is able to decide quickly, because with a clear brain and efficient nervous system he can instantly "feel the situation," devise a plan immediately, and say "yes" or "no." The other man must in reality get his body ready; he has too little energy to meet the new situation at once, and asks for delay in order to "think it over" when he is not otherwise occupied. To conclude, then, *health means freedom*

of action because it implies being unconscious of the body—owing to surplus energy.

This principle may be proved by a reference to the meaning of disease. In health all life-functions proceed without any friction and self-assertion on the part of the organs, hence the individual is normally unaware of his body. But let some organ get out of order, and we soon become aware of its existence. The very fact that pain is a danger signal implies that generally the operations of a well-ordered body proceed smoothly and unconsciously. Pain means, therefore, that a particular part of the organism is unable to carry on its work unconsciously; while usually so contented to serve the organism in obscurity and oblivion, it asserts itself vigorously the moment it can no longer do so, and notice is given to the whole body through the nervous system that help is needed. For pain is merely the cry of nerves that are either starved, poisoned, or throttled. And the finer the organism is constructed, and the more delicately balanced the various parts are, the better is the signal service of danger organized. Hence the higher species of animals and the more finely grained human beings are more susceptible to the slightest disturbances. The ox-cart of a Montenegro peasant will render fair service after many parts are out of repair and some even broken; but the automobile of fine construction will "go out of commission" the moment one small screw is loose or lost. So the savage will bear a fracture of an arm or even a slight one of the skull with comparative equanimity after the first shock; he usually recovers quickly without medical attendance: the finely grained European may suffer intensely and take considerable time for recovery; he cannot even witness pain in other men or animals without *sympathy*, or suffering with the other. Homer un-

consciously intimated that the Greeks were more highly civilized than the Trojans when he said that the former felt pain more keenly as witnessed by their outcries, while the latter were mute even when wounded severely. The same principle applies to Mars, of whom we are told that he roared with pain when struck by the spear of Diomedes, for as a divine being his nervous system would naturally be more highly organized.*

In the anxiety to avoid injury, *i.e.*, to disturb the balance between the various parts, nature has devised innumerable schemes through division of labor in order to scent danger before it actually reaches us. This principle is most ingeniously elaborated in the case of the curious antennæ, or feelers, which are thrust out from the surface of the body in animals of all sorts, especially in insects. Its most striking development is the well-known whiskers of the cat, and the less familiar, but much more highly developed, tactile hairs about the head of the bat. These feelers extend from half an inch to an inch from the body in order to warn it of approaching danger through the sense of touch. In more highly organized animals the senses of sight, hearing, and smell are, in part at least, intended to be guards against danger, extending their sphere over much larger areas. The reason for this extraordinary sensitiveness to pain and these precautions against danger is the extreme care which the organism takes in preserving its integrity or wholeness. For if the danger signal is to be of any value, it must be accurate so as to report the slightest deviation from the normal, and must be placed as far in

* *Iliad* 5: 855 ff: "Bellowed brazen-throated Mars, loud as nine thousand warriors, or as ten joined in close combat. Grecians, Trojans, shook, appalled alike at the tremendous voice of Mars, insatiable with deeds of blood."

the foreground of the battle as possible so as to give time for measures of avoidance.

Accuracy in interpreting danger signals is, however, possible only in good health, whether the danger is from within or from without. An organ which is in poor condition asserts itself so peremptorily and constantly, that other organs may be neglected or are made to suffer, and thus become unable to do their work properly. The nose is a useful organ and performs valuable services to the organism all more or less unconsciously to ourselves; for while it is in a sound condition we act promptly on the information it gives us, and are hardly aware of its existence for weeks at a time. A cold in the head very quickly changes this relation. Our sense of smell suffers almost instantly and we are less able to judge accurately of the information received from that quarter. But that is not all. This organ asserts itself so vigorously at such a time that we are but little able to do anything else than attend to it. Neighboring organs are likewise affected, *e.g.*, the eye, which becomes watery, and the ear, which becomes less acute and discriminating—we hear noises rather than distinct sounds, and fewer of them. The three main sentinels against external danger are thus invalidated. And what happens to the organism? It is more or less out of working order, less aggressive, less capable, perhaps incapacitated. Why? Because the nose asserts itself so vigorously that most of the energy produced by the organism is drawn into service for repairing the breach made in its wholeness. For the system must be whole if it is to function properly in the various exigencies of life. If a more important organ is hurt, we call ourselves sick and go to bed, so as to give the organism an opportunity to attend to its repair work exclusively for at least some time.

Health means, moreover, economy of expenditure. While there is much friction in the organism during sickness in performing even the most elementary work, there is hardly any during health. We simply go ahead, unmindful of our body. It is a ready instrument of the mind, and we realize its existence only at night when tired out. That feeling of lassitude is simply a signal to stop and rest. It is not an unpleasant, but rather an agreeable feeling to relax and go to sleep. A few hours of rest are sufficient to restore our energy, and we wake up automatically, ready to go to work again. Comparatively little food is needed to keep a healthy person in good condition, because no repair work is needed and the power of assimilating all nutrient elements is strong. A physician said a few years ago concerning a patient who suffered from consumption of the throat, that her food had sufficient nutrient values to keep seven ditch-diggers in good health. Still, that young woman could hardly move in bed without severe pain. We are surprised when we read of the black bread, a piece of cheese, and the small amount of sour wine, which keep many European peasants not only in good health, but literally in good working condition. There is no secret about it, though; the system does not waste anything, and new energy is quickly supplied by simple food and sleep. The Chinaman with his handful of half-cooked rice is even a better example. He works hard and continuously on this scanty food, and seems to be untiring. Such energy can be explained only on the basis of good assimilative power and high vitality, as seems to be indicated also by his resistance to high fevers and by his bluntness of nerve which enable him to recover rapidly from terrible injuries.

This economy of expenditure has a very important

effect upon the development of the higher faculties. When there is little or no friction in the organism and assimilative powers are good and work is not too exhausting, a surplus of energy is easily produced. This energy can be used for experimentation along various lines, either through play or through more serious attempts at invention in abstract thinking, imagination, and actual recombination of mechanical contrivances. There is no need to discuss the theory of play here; ⁴ suffice it to say that a certain amount of unused energy must exist in the organism if play is to be indulged in. No doubt instinct directs play along certain lines, and nature selects only animals which play efficiently and which thus prepare themselves better for the more serious duties of adult life—but no animal or human being will play when fully exhausted. He may fight his teasing friends with his last ounce of strength for the right to rest or sleep, but he will not play. He may change his occupation from reading to walking, and thus rest his tired eyes and brain while exercising his unused legs, but when he is tired all over, he will rest if he possibly can. If he attempts to force himself, the result is as a rule pitiful. We are familiar with the official smile and joke at the President's reception—and elsewhere—with its mirthless laugh and forced friendliness. It deceives only the gushing girl who cannot distinguish between spontaneous humor as the result of abundant vitality and the make-believe interest of a tired man who wants and ought to be in bed.

This surplus energy enables those who direct it properly to develop both mentally and physically, and leads thus to an enrichment of life with the possibility of arriving at new and possibly useful variations. The theory of the leisure class in social science is based on such a surplus. It is, however, not so much a greater supply

of goods than is needed for the maintenance of life, as it is a greater amount of vitality for the ordinary duties of life, that is of real importance. It is, in other words, not so much a question of wealth as the economists and sociologists would maintain, as it is a question of health. This may be proved briefly in two ways. A rich patient confined to bed more or less all his life consumes, but rarely creates wealth, while a poor man with surplus energy will study, write, experiment, and produce something beneficial for society. Again, the fact that many inventors have come from the better class mechanics and that many discoveries have been made by teachers in colleges and universities is explained better on the theory of health than on that of wealth. For after all, there is nothing that interests the man of low vitality except his own condition, and he could not as a rule make use of extant knowledge as a basis for extending it, even if he would. Why not? Because such men do not develop any surplus energy. A brief consideration will make this clear.

We have seen that even a less serious defect in one or another organ causes the whole organism to divert its energy toward the ailing part and interferes thus with its general functions of being a good working machine for the mind. To give one more illustration. Adenoids are not a serious defect in themselves. Yet this slight derangement of normal breathing may have serious effects upon the mentality of a child, because it diverts the functions of the body from their usual and mutually helpful character to a particular organ in order to remove the obstruction. The organism becomes thus self-centered, so to say, instead of being an unconscious agent of the mind. That means that no surplus energy can be developed while the obstruction lasts, since whatever

energy is developed goes first of all into the maintenance of the vegetative functions, and secondly into the removal of the obstruction. The body as a whole is thus not properly nourished. This explains on the one hand the proverbial fertility of the poorly nourished part of the population, since nature is bent on the continuation of life at all costs and every ounce of surplus energy is turned into reproductive activities; on the other, the many cures which the organism effects without medical aid, since it must work with the least friction possible and as a whole, if it is to work well. But some parts must suffer from this under-nutrition. The nervous system and the brain are the ones which do not receive proper nourishment under these conditions. They are kept at the lowest minimum possible for regulating the organism; but they cannot be alert, accurate, and aggressive: neither can they be finely wrought and sensitive. The associative centers or the cortex suffer most from this lack of proper nutrition, hence they cannot exercise the necessary control over the body, and the latter acts in an erratic manner; that is, without properly valuing its actions in proportion to their importance to the organism as a whole. Lack of unity of action is the result, and mentality remains at a comparatively low level. It is evident that a person in that condition is unable even to organize new information received, or much less to originate anything new by recombining the elements of knowledge already in his possession.

It is different with people in good health. Just because they are well nourished, the brain has at least an opportunity to be kept in proper condition owing to the surplus energy of the organism. Whether an individual will use that energy for building up his brain or his muscle, is, of course, a different question. He may prefer to exercise

his muscles and build up an athletic body, or to use his brain more and perfect its functions. Whichever he does, the law of the growth of the most used part holds, and that part will develop correspondingly in power. If it is the brain he exercises most, its ability to form new adaptations and combinations quickly and accurately will increase, and the individual may contribute something new to society. The question whether there is an increase in the mass of the brain through exercise is not yet definitely settled; the increase in power by means of more numerous and better organized association-paths is, however, undisputed. It seems a natural inference that a higher brain power draws more nutrition from the body as a whole. Whether that is true, is still unsettled; experience seems to point that way, since people with massive brains—finely organized and capable of much hard work—rarely belong to the high vitality class, but usually to the medium, according to Professor Giddings.⁵ The body of the great thinker is, in other words, organized for action along a particular line—that of mental exertion in poetry, art, philosophy, science, statesmanship, administration, or similar vocations where facts have to be seen from a new angle or to be classified under new generalizations.

We have thus far considered chiefly the lack of proper power of action of the organism due to more or less serious illness or defect. In each case the body was deficient through the self-assertion of some organ. Malnutrition has the same effect, but more continuously. The body in that case is unable to supply the various parts, particularly the brain, with proper power, and hence the whole organism suffers from inability to act properly and efficiently. And just as the sick man becomes self-centered, so does the man of low vitality.

He is continually conscious of his inability to adapt himself to new conditions and is reminded of his failures. His mental attitude is self-centered; he looks inward, not outward; he is always concerned with himself, and must of necessity be so, as long as his body is an inapt agent of the mind. A healthy man is as a rule a social man; a sick one is usually unsocial. If a well man is self-centered, he is so deliberately; but one in poor health is so by necessity, since he is always conscious of the limitations of his body.

Sickness or malnutrition may, however, happen to a whole race. Many savage tribes and many poor classes among civilized nations suffer from the latter defect and are unable to rise to a higher mental life because of poorly nourished brains, or to a higher social level owing to the inherent social limitations of men of low vitality. The larger part of mankind has, however, suffered from diseases of various kinds. If these were malignant or epidemic, men died, and only the strongest remained. If they were benign and endemic, a gradual deterioration took place, since just as in a serious illness the energy of the organism is diverted from its proper uses to the repairing of "broken down ramparts," so in endemic diseases there is a constant endeavor merely to ward off danger and to build fortifications against invading enemies. Among nature-peoples malnutrition and endemic diseases often combine, and the organism is unable to resist the double strain. Hence hundreds of tribes have succumbed, and only a few have survived. These were generally so exhausted from the struggle that their power of resistance was very small, and any new disease that might be introduced would kill them. Whether as individuals or as a race, people with low vitality have poorly nourished brains, small power of adaptation and any new

strain or exigency will upset them completely; hence they either perish or spend proportionately so much energy, that a more serious exhaustion results, and this prepares the way for a further loss of power of resistance, since there is no way to create surplus energy. Whether in the case of the individual or in that of a race, low vitality produces an attitude which centers in the individual rather than in society.

High vitality produces, as a rule, social action. "The natural glowing fire of health—superb health—is seen and felt. It is magnetic. It makes for itself place and following. It is constructive. It is initiative. It is happy. It is humane. It is beautiful. It radiates strength and brightness. It agitates for the good of others. It compels pleasantly to be and do one's best."⁶ There is an expansive quality about good health which we realize only when in the presence of a man abounding in vitality—good-natured and buoyant. Such a man is always master of himself, because he is unconscious of his body. Not having any ills of his own, he is happy, and his happiness is contagious, because it is spontaneous. He not only radiates peace and contentment, but wants to see others happy and cheerful. Being always master of himself, he is tactful and spares the feelings of others. If he has the gift of humor—as he usually does—it is good-natured and not sarcastic or sardonic like that of the dyspeptic who trusts nobody because he is not sure of his own power. The healthy man wants a well-ordered environment, since his own mind and body make a harmonious whole. He generally succeeds, too. For he who is master of himself is best able to bring order out of chaos among those around him. He has few, or no, troubles of his own, and his abounding energy seeks an outlet in helping others. His whole activity is directed outward

toward conquering difficulties which he attacks with zest and vigor because they furnish good practice for his various powers. He is, in other words, not merely moral, but social, for sociality rises above morality.

“Objectively viewed, morality consists of that ‘walk and conversation’ which the community as a whole approves. It includes not only acts, well adapted to the achieving of those ends that on the whole are held to be good, but also outward expressions of thought and feeling, so far as these are approved. Subjectively, morality is self-respect, and that desire for the good opinion of others, and that endeavor to deserve it, which Mr. Spencer has called ego-altruism. . . .

“As the name itself implies, sociality comprises those qualities of mind and character, of disposition and conduct, which are eminently and characteristically social.

“Objectively viewed, sociality is a cheerful and efficient participation in the normal comradeship and coöperation of society.

“Subjectively viewed, sociality is altruism—thoughtfulness for others, sympathy with others, kindness and helpfulness toward others, even at some cost of self-sacrifice, and happiness in the companionship of one’s kind.”⁷

A person with low vitality may be moral; by precept and training he may be able to overcome the tendencies toward self-centering activities to which he is naturally inclined; but it takes a positive, and sometimes a strong, effort to do so. This fact is well and frequently illustrated by numerous people who, cursed with a low vitality, sometimes make herculean efforts to reform, only to backslide after many failures. They may be charged with moral delinquency or even depravity; but the blame for their failures should be laid at the door of low bodily vigor or some physical defect. Where vitality is somewhat higher, we still have only a limited morality. A rich person may refrain from definitely unsocial or immoral acts; he may even give from the abundance of his

possessions to poorer people out of self-respect or to maintain the good opinion of others; but he cannot give cheer, hope, buoyancy, and efficient service, because he needs whatever strength he has for himself. The sour-faced man may solemnly declare in a prayer meeting that he loves his fellowman with his whole soul, but the fulfillment of his promise is not in his power, since in his case the spirit may be willing but the flesh is literally weak; and no man can give what he does not have. It is the same way in larger matters. A person of low vitality may be willing to lay down his life for his country; he will not go far before he is in need of Red Cross nurses. The Athenian of the times of Philip of Macedon avowed his patriotism in the strongest possible terms, but Demosthenes informs us that Athens talked about *hiring* 10,000 or 20,000 soldiers; for this malaria-ridden Athenian could not take the field like his ancestor of the previous century. He was not a hypocrite in protesting his love for Athens, while preferring to stay at home; he simply could not take the field owing to low vitality. Lack of health always confines one's good intentions within narrow limits.

CHAPTER III

HEALTH AND RELIGION

WHETHER the origin of religion is to be attributed to fear as with Lucretius, to a feeling of dependence as with Schleiermacher, to the dread of ghosts as with Spencer, to awe before the Great Dreadful as with Giddings, or to other less definite qualities of modern theorists, there is ultimately just one thing back of them all—an attitude of helplessness on the part of man to do what is necessary or desirable. This goes back to low vitality, if not to poor health. A man may be ignorant and not trouble himself about the explanation of things. But if he is well, he will be able to satisfy the few wants which primitive man feels. Fear is apt to grip the weak man who is left behind and is unable to provide for himself, but not the hunter or the warrior who delights in action. It was the "squaw man," roughly speaking, who had time, and, maybe, good reason to begin crude speculations on how to escape his often intolerable position, and who has expressed his attitude in all the earlier or negative religions.

The limitations imposed by poor health have been the cause of our slow advance in civilization. We have progressed only in a self-centered manner. Our religious and our moral codes are all self-centered, and could not be otherwise under past and present conditions. In the past man has always sought merely relief from evil. This has given our morality an almost purely negative character, and to our civilization one of pessimism. For

civilization was dominated by religion, and we have not yet fully escaped from its negative ideal.

What, then, is the ideal of religion? Relief! Whichever way we turn, the various forms of religion always have to do with that. It is either relief from physical dangers, or from spiritual enemies, or from ourselves, that is sought. Whether we are told that sickness is a visitation from God, or that evil power may tempt us, or that individuality itself is evil and that we must seek coalescence with the infinite in Nirvana, it is always relief that is held up before us, *i.e.*, a purely negative ideal—an ideal in other words, which was conceived by and intended for sick people, or at least those of low vitality. Such an ideal is essentially self-centered. The religious man whose chief concern is to save himself, is still acting only morally and not socially, for he is occupied principally with himself. This fact is strikingly illustrated in the various monastic ideals which plainly inculcate as the first duty salvation of oneself—expressed, however, in the more euphemistic terms of love and service toward God. The Golden Rule, whether in the negative form of Confucianism or in the positive of Christianity, is a self-centered principle, since action is based on self-regard, one might almost say, of personal advantage. The chief virtue of Christianity is charity—relief from distress; and its principal form is almsgiving—“laying up treasures for yourself in heaven.”

Is, then, the religious or charitable man selfish? Not at all. He has a finely organized nervous system for feeling pain and suffering, and is therefore often more sympathetic in the literal sense than well people sometimes are. This is significantly expressed by the fact that the older form of charity almost confined itself to the relief of pain and suffering. That gives it a certain social value

and ethical character. It does not, however, relieve sympathy from its fundamental character of being self-centered, since the *sympathetic* pain experienced by the almsgiver, or the possible reward of almsgiving, are at least subconsciously motives to action. This could hardly be different under a civilization whose characteristic feature was suffering—politically, from oppression, hence submission to duty; economically, from constant deficits as proved by numerous famines, hence the worship of various deities, like Ceres, who were supposed to give bountiful harvests; physically, from almost constant diseases and under-feeding, hence the low tone of morality based chiefly on utilitarianism of a narrow type. The whole object of life was one continuous attempt on the part of the individual and society to escape from intolerable conditions. Is it any wonder that morality was not and could not be buoyant and social, but had to be negative and self-centered? Uncertainty what the day might bring forth politically, economically, or for personal well-being, kept the people in constant turmoil and made them think of themselves and their safety of life and property. At such a time the relief of suffering was of necessity a great virtue, since the individual was unable to think of others, even though reminded that he himself might soon need help. Take as an illustration the treatment of slaves. It was on the whole good, not primarily for economic reasons, but chiefly for sympathetic reasons, since in the constant political changes no one knew who might be a slave tomorrow even though he be a master today. In the constant political changes, empires were often overthrown during a few days, and the ruler of today might be dragged behind the chariot of a victorious enemy tomorrow, irrespective of whether he came from within or from without. Even the proudest nations of

antiquity were sooner or later reduced to a condition of servitude, and some of the greatest men suffered the humiliation of being made the butt of vulgar remarks on the part of the victorious mob.

A few words may, perhaps, be necessary here to avoid misunderstanding in regard to the moral ideals of Christianity. The statement has just been made that its morality was self-centered. This is true as far as its *de facto* statements are concerned. The Golden Rule, while a good principle for a narrow morality, is nevertheless self-centered and only incidentally social, since the individual is asked to act or refrain from action on the basis of the effect it would have on him; this rule involves, consequently, a calculation of ultimate effects. But this is exactly what a man of low vitality always does and has to do. Being always conscious of his limitations, he must ask himself what the ultimate effects of his actions will be. And he does that even while his vitality is still fair. A man like Cassius with his "lean and hungry look" always thinks too much about himself, and never rises above that level in his ethical motives; neither does the average man who is firmly convinced that "honesty is the best policy." When a man's vitality has sunk lower still and he has become more self-conscious, he acts from more narrowly selfish motives; *i.e.*, he schemes with great cunning to get what he wants; or in a blind rage, when a particular organ has become the center of his gravitation and is uncontrolled by the brain, he goes ahead and takes what he wants. This man of lower vitality acts in a decidedly unethical manner, while the other, still able to calculate, may keep within the limits of the permissible. This is, however, not social action, because it is too largely self-centered. True social action can come only from an abundance of vitality, plenitude

of power, and the happiness of high tension. Such a man must act because he has a desire for function; and he must act socially, because his actions are not self-centered; he is usually unconscious of his body. He is full of joy and confidence, and imparts these to others—not deliberately, but because these qualities are contagious. When he becomes clearly conscious of these powers, he recognizes that they involve a responsibility, and he deliberately controls his actions in such a manner as not only to avoid harm, but to increase joy and happiness among his fellowmen. He inverts Kant's categorical imperative, and says to himself: Thou must, because thou canst! no matter what others may do.

It seems to me that the true ideals of Christianity are identical with those of the healthy man. When Christ said: "For this purpose have I come into the world that they might have life, and have it more abundantly," or when we are admonished to become "co-workers with God" (I Cor. 3:9), we have a positive ideal placed before us; an ideal not only moral because such action is best, but social because the abundance of life and power within us seeks an outlet in action which is wholesome and implies coöperation with God—the source of all beneficent power according to Christian teaching.

Unfortunately this positive ideal has never had much sway in Christian ethics, and could not have under the universally prevailing conditions of low vitality. When everybody has less vitality than his own needs demand, individuals as well as societies must form ethical codes of a negative character or a narrow morality, based primarily on utilitarian principles, such as the Golden Rule. With increasing health through better food and better control of germ diseases, such a code proves increasingly less satisfactory. Men in good physical and

mental health want positive action, not merely escape from evil or from illness, since they are not conscious of any lack of power as the ill or underfed man always is. They are confident and self-reliant, and feel capable of coping with the difficulties in their path; indeed, they rejoice in matching their physical and mental strength against obstacles. If this theory is true, it ought to explain three facts in the modern world—declining church attendance among more vigorous men, continued attendance among the less vigorous, and the separation of philanthropic movements from the churches.

That church attendance is declining, is almost a universal complaint among the clergy, and the fact that various devices are adopted to attract men, furnishes the proof for its truth. These absentees are, however, no longer considered wicked, or even atheistic, for many good and capable citizens belong to this class. They will, moreover, send their wives and children to church or Sunday-school, give money toward its maintenance, and perhaps admit its necessity. What, then, is the reason for their non-attendance? It is not hostility, but simply a lack of interest in what the church offers. It offers them help, but they do not feel any need of it; it proffers relief, but they are whole; it promises forgiveness, but they have no sense of sin. In short, the church proposes to give them what they believe they already have. They are, or think they are, able to look after themselves, and are confident that if they do all in their power to make the world better, they will be taken care of in the hereafter. They favor church attendance for others, but feel no need for it themselves. All the various attempts to interest them seriously and personally fail, because no positive action is demanded of them. Hence many churches have adopted the device of giving these men

something specific to do—to organize a boys' club, teach a class of unmanageable boys, look after some weaker brothers, and other things; but the interest lasts only as long as the task is unfinished, since they feel that religion as constituted in the past and largely at present, is based on the acceptance of something which they claim to possess—wholeness. Fortunately the church begins to realize that these most valuable men have to be treated differently and a field for positive action is now offered to them along various lines.

Church attendance is still good on the part of less vigorous men who feel the need of every possible assistance in their effort to become strong. It is this particular class which is intensely religious at times, just because it is aware of its own instability and lack of self-mastery, due to low vitality. In his discussion of the religious temperament Sir Francis Galton says:

“The result of all these considerations is to show that the chief peculiarity in the moral nature of the pious man is its conscious instability. He is liable to extremes—now swinging forward into regions of enthusiasm, adoration, and self-sacrifice; now backward into those of sensuality and selfishness. Very devout people are apt to style themselves the most miserable of sinners, and I think they may be taken to a considerable extent at their word. It would appear that their disposition is to sin more frequently and to repent more fervently than those whose constitutions are stoical and therefore of a more symmetrical and orderly character. The *amplitude* of the moral oscillations of religious men is greater than that of others whose *average* moral position is the same.”⁸

It is in harmony with this reasoning to find that the most orthodox churches are the only ones that grow, because they promise the weak man every possible help. When seeking relief from his own instability, a man will

not stop to inquire into the ability to make valid the claim of assistance, but grasp at any proffered aid. The incantations of the medicine man are as good for this purpose as the unintelligible philosophy of so-called Christian Science, which owes its rapid extension primarily to its ability to cure people from imaginary ills and has received into its membership chiefly, if not exclusively, those who sought relief from some ailment. Many articles have been written on church attendance; but the fact remains that the denominations which promise most in the way of relief are increasing more rapidly than others which demand work.⁹

The separation of philanthropic movements from the churches is increasing constantly. Not so very long ago the church was the only agency which administered relief to the various kinds of afflicted people. Now the State has taken up that function to a large extent, and numerous semi-public organizations look after every possible need. It may be said, with good reason, that the church initiated most of these movements, that they are still managed chiefly by religious people, and that it is not her function to do the work of the community. All this is true. Yet it is significant that the church has failed to keep these men and movements within her borders in all countries except Belgium and the Roman Catholic part of Germany, where the work is chiefly that of relief. Under the guidance of modern philanthropy, assistance to those in "need, sorrow, sickness, or any other adversity," has not only passed from the church, but has changed in character; it aims primarily at prevention instead of cure, hence the innumerable movements to make people more intelligent, more moral, and—more healthy. The public baths, the play-grounds, the medical attention for school children, the school luncheons, the shorter hours

for factory employees, the improved sanitary conditions in the factories, the larger wages—all tend to better health, although perhaps unconsciously on the part of those who promote them, since health has not yet been recognized in all its bearings. The reason for this change in philanthropy is not far to seek.

Well-doing does not come to the social man as a duty, but rather as an opportunity to exercise his powers, which he delights to do; hence he is not satisfied with the relief which has to be repeated tomorrow. He looks into the future, because his abundant vitality prompts him to devise ways and means for increasing joy in the world; and this attitude leads inevitably to prophylactic measures. The older civilization was characterized by the saying: "Sufficient unto the day is the evil thereof," because it could not possibly cope with other than immediate needs; the newer joyfully takes up the fight for the future.

This is truly a new civilization, since in every direction we see prophylaxis taking the place of cure—in medicine, in conservation of natural resources as well as the health of human beings, in the lessening of human toil through machinery, in the attempt of the various "Sunshine Societies" to spread joy in the world. It is perhaps this attitude of modern man which explains the strong socialistic tendencies both among the rich and the educated in England and America, since socialism offers the most complete program of any party for prophylaxis along every line, and—oh, how a healthy man hates patch work; he would rather cut out of the whole cloth.

This new attitude is possible only on the basis of better health, *i.e.*, freedom of action through surplus energy, which expresses itself in all kinds of experimentation.

The old attitude was conditioned by low vitality, because people were, and perhaps had to be, self-centered, since they were always conscious of their bodies; hence they had to content themselves with preserving what they had, and to ward off evils or seek relief from them. They lacked, in other words, aggressive health, and consequently aggressive mentality. For the two are, to a certain extent at least, identical. The modern world has generally adopted the saying of the classical world, *mens sana, in corpore sano*; but what was formerly only an inference from observation has been established as a scientific truth by modern medicine. Almost every day produces new proofs to the effect that a poorly nourished or a diseased body is the host of low or erratic mentality. The mind of a healthy man need not be that of a genius; it is, however, balanced and open to all good influences, because based on aggressive vitality which seeks an outlet for action. But an active, circumspect, clear-visioned mind is more important from a social and economic point of view than the acerbities and vituperations of a great intellect, clad in pompous and often unintelligible sentences. As a rule, the best work of the world in philosophy and science has been done by men in good health. An attempt will be made to prove this statement in a later chapter. The theory of *mens sana, in corpore sano* is, moreover, independent of any particular metaphysical doctrine. If, according to the theory of parallelism, body and mind are independent, the body is still the medium through which the mind must express itself; if the materialists should be right, the mind would be merely a special product of matter, and would be dependent on the proper functioning of the organism; if the idealists are correct, the body would be a special form of mind, but still its only known agent for manifesting itself. Even

the idealist Emerson said: "Give me health and a day, and I will make the pomp of emperors ridiculous." *

Lack of aggressive, or even good health, has had an important bearing on civilization, since man has nowhere risen much higher than savagery where conditions were unfavorable to the development of at least medium vitality. What then are the factors of good health?

* The change from the old to the new religious attitude is strikingly illustrated in the history of the Young Men's Christian Association. Not long since its diluted evangelism was looked upon with mild tolerance by the more vigorous men and women. Then a genius, discerning the signs of the times, brought about a change to an active and aggressive Christianity. At once the Y. M. C. A. leaped into the respect and admiration of the community, as is shown by the two campaigns for money in 1917. One of the wealthiest church organizations in the U. S. finished a year's active campaign for a pension fund for ministers, and raised \$8,000,000 instead of \$5,000,000. The Y. M. C. A. got \$53,000,000 in a week, and \$7,000,000 more in the weeks following. Business men were enthusiastic about its positive and practical religion, and subscribed liberally.

CHAPTER IV

FACTORS OF HEALTH

THE first factor of health is food. Nature-peoples are, as a rule, poorly fed. Their meals are irregular, generally poor in quality, and often insufficient in quantity. The roots, berries, and other foods which nature furnishes, are usually poor in nutritive qualities. Hence the savage is habitually underfed, since the system is starved even though large quantities of coarse food be taken. This simply means that the digestive organs are burdened with material which does not nourish, and causes a distension of the abdomen, as may be witnessed almost anywhere among the poorer classes of China, India, Turkey, Rumania, Russia, and some parts of Austria-Hungary, not to speak of countries in which savagery still prevails. When a good meal can be had, as after a successful hunt, the savage eats voraciously and without proper mastication; hence digestion is interfered with in a different way. The system is in a chronic state of starvation, and no proper vitality can be built up. This is true even in civilized countries among the poorer classes whose food supply is deficient in quality and quantity.

The second factor is housing; that is, anything that is necessary for protection against the inclemencies of nature. Little clothing may be needed in the tropics owing to the heat, but protection is necessary against the numerous disease-carrying insects. The Eskimo is well provided in regard to clothing, but his igloo or snow-hut compels him to live in vitiated air a great part of his

life, similar to the overcrowding in the tenements of large cities.

The third factor is salubrity of climate. Where endemic diseases exist, the good effects of food and housing are often nullified. A region may be fertile and produce all kinds of food, the climate may be mild, but endemic diseases, *e.g.*, malaria and hookworm, will keep vitality at a low ebb.

The fourth factor is heredity. With the inheritance of a good constitution a man may often be able to overcome the adverse conditions of the other factors, although he is likely to keep merely alive and refuse to succumb. With low hereditary vitality, a man is always handicapped, even though the other three factors be favorable. This is proved by the fact that life insurance companies will refuse policies to people in whose families certain diseases have occurred. When the other three factors are unfavorable, heredity is likely to be very poor.

The question concerning the relative importance of these factors is not decided, and is, perhaps, of more academic than practical interest. Biology is apt to lay stress on heredity, geography on environment, including food, climate, and housing. These two factors have been on the whole the chief agencies in developing man. Heredity has been the variable factor—shifting, plastic, progressive, or retrogressive; environment has been the constant factor—persistent, continuous, omnipresent, immutable. Man is always under the influence of his environment; it never sleeps. Yet all the influences of environment will not explain the difference between the Greeks of today and those of antiquity. The human factor surely claims attention, even though it be only a variable influence over against the immutable one

of nature. The French had to give up digging the Panama Canal, because malaria and other tropical diseases killed about one-quarter of their employees every year. When the Americans went there in 1905, the Canal Zone was still the area of pest-ridden seaports, jungles, and marshes which it had been from time immemorial. Yet we have built the Canal by reducing the death rate to that of the healthiest cities in the United States. The variable human factor has triumphed over the immutable one of nature. It is in vain, then, to deny the efficacy of either factor. Each plays its rôle in the making of human history. But each enters into the problem of health, since that depends on both heredity and environment.

Suppose that environment be granted all that its advocates claim! Wherein does its influence ultimately consist? A valley may abound in the most varied and nourishing foods and in perennial sunshine; it will yet be uninhabitable for human beings if its soil sends forth all kinds of poisonous germs. A country may be bleak and cold, still people will live there if they are able to provide the minimum of food. The geographical factor resolves itself ultimately into one of health; and this has been the most important factor in man's rise above the state of nature.

The effects of vitality on civilization are both numerous and significant. Whatever the causes may be, low vitality means either low or erratic mentality. We are concerned here only with the former; the latter will be considered in the chapter on Health and Originality. Low vitality always means inability to adjust oneself to one's environment, or to control it. Even adjustment to unfavorable conditions implies, however, low mentality; the animal and the savage are ruled by their en-

vironment, civilized man controls it. Why this difference?

Animals have perfected certain instincts which are, as a rule, sufficient guides to their actions, and keep them, when in a normal condition, in fair health. They act with almost automatic precision, and thus save the animal a vast amount of useless expenditure of energy in mere trials to do something in a new way. But just because the reactions of animals are fixed, progress is barred and further development practically impossible. The honey bee is a good illustration in this respect. It has perfected the division of labor and everything is provided for the welfare of the hive. The arrangements for a communal life excite our admiration owing to their efficiency. Yet, there is no progress, because the various impulses which form the series of which each instinct consists are so fixed in their order that the bee cannot act differently without disaster. In other words, the bee has become a sort of living machine to do a certain kind of work; it functions without choice, hence there is very little power of adaptation or chance for variation. This is strikingly proved by the facts that the workers stultify themselves to feed the queen and the drones; that they rear hundreds of males instead of a dozen or two—ample for the function they are to perform—and that they have repeated the same actions without any material changes since time immemorial. They are slaves to their instincts, subject to the food which a comparatively small environment provides, and progress is barred. It is similar with higher animals, although the instincts are a little more elastic, giving a slightly larger sphere for choice and individual satisfaction. With this greater elasticity of the instincts was given the possibility of mind, and in proportion as we advance in the animal scale, mind be-

comes more prominent, until we come to man with his very much larger mentality. Just when and where this transition took place, is an unsolved problem, and may always remain so. Suffice it to say, that under unusually favorable circumstances the transition was made, and mind became for the first time an important item in evolution. For man, being equipped with but few and comparatively inefficient natural weapons, had to depend on the development of his mind if he was to live. This was the more necessary, since the gain he had made was dearly bought—it cost him the inerrancy of his instincts. Being no longer compelled to react in certain prescribed ways, he had to think, plan, and scheme. But that required relatively greater vitality or a surplus of energy, since the loss of the inerrancy of his instincts had deprived him of the more economical and frictionless expenditure of energy. Thinking in its early stages involves more or less useless expenditure, since it must proceed by the wasteful method of trial and error; this is the case even today, a good illustration being furnished by a new medicine, salvarsan, also called “606” by its inventor because the previous 605 experiments had failed to yield the desired results. High vitality could not be developed, however, in the tropics where endemic diseases were constantly counteracting the favorable factors of an ample food supply and mild climate. Hence only one course was left open—migration northward into more salubrious regions. In these migrations, only those who had the relatively highest vitality could engage. They were, like the pioneers of later times, the strongest and most active and most intelligent. (See chapter on Health and the Tropics.) This was the first and most primitive method of controlling nature—by migration—a method which animals share in to a certain extent. These migra-

tions opened up new possibilities to man. He had to meet new situations in the way of enemies, adapt himself to new conditions of food, cross mountains and rivers, and in a hundred different ways develop new aptitudes. Every successful attempt opened up new vistas before him, and every new contact with nature or other men suggested new developments. In proportion as he proceeded into higher latitudes, his vitality rose, and he was thus better able to meet the demands involved in getting a living under the less prodigal climate of the temperate zone. He increased his control over nature, and became through increasing civilization less dependent on his immediate environment. The peoples who were unable or unwilling to migrate north, continued to live, but were hardly able to develop, and have remained in a stage of savagery or barbarism until today. And they are still almost entirely dependent on nature for all necessities of life.

Along with this control of nature through the development of the intellect went a liberation of himself from the thralldom of instincts which still survive in him, *e.g.*, for food and sex. These are practically inerrant in animals living in the state of nature, and are thus contributory to individual and social welfare. When, with the origin of man, mind assumed a more prominent part in evolution, it was at first primarily an abundance of feeling and imagination, controlled but little by reasoning; hence the numerous and often revolting orgies engaged in by savage and barbarous peoples. Occasional abundance of food, due to success in war or in the chase, always led to extraordinary exhibitions of excesses in both of these instincts, and were frequently continued even in higher civilizations, *e.g.*, among Phoenicians and in India, when the food supply was regular. The poor nutrition

of the savage produces an unstable mentality which inclines to extremes of excitement and joy, or of depression and melancholy. With an increasingly regular and better food supply, the physical organism becomes more stable and more capable of self-control, and at least the worst irregularities in the satisfaction of these instincts disappear. This statement is borne out by the fact that modern medicine looks upon too pronounced irregularities along these lines as due to malnutrition, if not disease. A brief consideration of morality will bring further corroboration of this reasoning.

As his intelligence increased, man soon recognized the injurious effects of excesses both upon himself, and upon those surrounding him. He formed, consequently, a crude code of ethics, put chiefly in the form of prohibitions, and enforced conformance to them by various punishments. But there were always those who could not be prevented by any kind of penalty—even the most severe—from acting contrary to ethical demands. Were they unwilling or unable to obey? The punishment meted out to them clearly shows the attitude of older civilizations in regarding them unwilling and therefore responsible; the modern attitude on the part of the enlightened just as plainly indicates that their shortcomings are considered due to physical defects.

“At the end of the best part of a life spent among prisoners, a prison surgeon declares himself to be mainly impressed with their extreme deficiency or perversion of moral feeling, the strength of the evil propensities of their nature, and their utter impracticability; neither kindness nor severity availing to prevent them from devising and doing wrong day by day, although their conduct brought upon them further privations. Their evil propensities are veritable instincts of their defective nature, acting, like instincts, in spite of reason, and producing, when not gratified, a restlessness which becomes at times uncontroll-

able. Hence occur the so-called 'breakings out' of prisoners, when, without apparent cause, they fall into paroxysms of excitement, tear their clothing and bedding, assault the officers, and altogether behave for a time like furious madmen."¹⁰

The criminal is not necessarily endowed with bad qualities, but he lacks the coördinating power of a well-functioning brain. The defect may be due to some specific malformation, disease, or to malnutrition. Poor functioning in the case of the two former is so evident to any observer, that it need not be discussed. Concerning malnutrition, a few words are needed. The brain grows at a much smaller ratio than the other organs; this seems to indicate that the vegetative functions demand an increasingly larger share of the nutrition furnished.¹¹ The organism must, first of all, live; whether its life is to be well-directed and efficient, is a secondary consideration. This is well illustrated by the fact that idiots, if protected against adversities, may live to middle age; and that after the stage of active thinking and reasoning is passed in the case of some old people, the vegetative functions continue sometimes for a number of years. Hence the inference would seem justified, that the brain receives only such nutrition as is not absolutely needed for the maintenance of life. In other words, where general vitality is low, the brain is likely to suffer first and most; and the cortex is likely to suffer most severely, since both the sensory and motor centers are needed for the mere maintenance of life. The power of coördination must, consequently, be small in persons of low vitality. And it is this particular ability which the immoral classes lack. They are unable to coördinate their actions to each other, hence the more or less pronounced impulsiveness of their behavior; they generally react on the stimuli of a particular organ, rather than on the demands of the system as a whole, *i.e.*, they

are under the sway of an organ which demands and receives more attention than it would receive in a well-balanced healthy organism; *e.g.*, in the drunkard and dyspeptic, the stomach; in the nymphomaniac, the sexual appetite. These people lack, consequently, the power of coördination, and act in a self-centered manner. And from that condition to selfish action, there is only one step. In the case of those suffering from malnutrition with its consequent low vitality, it is either a special organ that is at fault, or a general lack of vigor on the part of all organs, making impossible a proper nourishment of the brain; hence a general lack of coördination, or hasty reaction on some external stimulus, due to the small inhibitory powers of the brain. For the unity of the organism not only suggests that the improper functioning of one organ affects all others, but also the special part of the brain with which it is in sympathy. "The internal organs are plainly not the agents of their special functions only, but, by reason of the intimate consent or sympathy of functions, they are essential constituents of our mutual life."¹²

Summing up, then, we may say, that the moral element is an essential part of a complete and sound character, and is based on a sound body; it is the ability to coördinate one's actions to each other, and to those of other people.

When this ability is of a high order, we have sociality. For sociality demands not only that the individual should correlate his actions to those of other people, but that he should do so in a vigorous and efficient manner. Negative morality is still too frequent, and is the only possible thing for people of low vitality, as was shown above. Positive morality or sociality is possible only to those who, owing to large surplus energy, are able to coördinate in

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a comprehensive manner, accurately and quickly; and who have sufficient energy to infuse enthusiasm into others, and make them coöperate. A moral man may suggest new plans of action; the social man alone can unite the many in coöperation by virtue of his energy, which enables him to plan, scheme, and work for those whose vitality requires them to confine themselves to the most necessary activities. It is the vocation of these men to procure more goods than needed for immediate consumption, to provide some leisure for at least a small portion of the community, and eventually for all.

CHAPTER V

HEALTH AND CIVILIZATION

IN the course of history, the problem of leisure was solved through the warriors at first, or through the institutions of militarism and slavery. It was a crude and barbarous solution, but the only one that could be resorted to at that time. It is not a part of this discussion to show how slavery produced a leisure class and accustomed the vast majority of men to give up their wild and roaming life for that of continuous toil and labor under the lash of task-masters.¹³ Our only concern is the fact that the most vigorous men physically were the agents of progress along this line. Whatever one may think about mere physical strength in modern times, it played a distinctly beneficial rôle in antiquity; and even Aristotle admits "that the conqueror is always superior in respect of some good or other; hence it appears as though force were never dissociated from virtue."¹⁴ It is, of course, not to be expected that the savage who was physically strong, would work for others, since he was not sufficiently advanced in morality and sociality to do that. He made others work, and profited by their labor. This gave him some leisure. In many cases this was ill used; in a few, well used. The chief results were an increase in the number of the leisure class and a consequent division of mental work among its two principal sections—the warriors and the thinkers.

The warriors, generally the physically strongest and most active, devoted themselves not to war only, but to

the development of industry and politics. They wanted military pomp and splendor, rich feasts and large establishments; in order to procure them, they had to develop whatever industrial resources were at their command, or call them into existence. King Solomon is a good illustration of this class, with the building of the temple and palaces at Jerusalem and summer cottages in the country. This industrial expansion necessitated political alliances, and so he formed a treaty with King Hiram, and established friendly relations with the kings of Egypt, Arabia, and other rulers to procure the products of their countries and protect his fleets and caravans. He is one of the few kings noted for his wisdom—if that is not merely attributed to him by the historians and courtiers who credited him with other men's wise achievements; for apart from the seventy-second psalm which bears his name, we have nothing direct from his pen; and the authorship of that is denied him by Biblical scholars.

The chief work in mental development devolved, however, upon the priests and upon the scholars—the latter being for a long time associated with religious institutions and having gained their independence only lately and only in the most civilized countries. These men made the art, poetry, philosophy, and science of those times. They were always a leisure class and in comparatively affluent circumstances, but rarely as strong and vigorous as the warriors. According to Professor Giddings, the scholars have as a rule medium vitality, while the warriors generally belong to the high vitality class.¹⁵ The vast majority of the people, being slaves and toilers, poorly fed and housed, had low vitality. This fact explains such victories as those at Marathon, where a handful of intelligent and vigorous Greeks defeated a large army of ignorant slaves with low vitality, since one hundred slaves,

with systems habitually on the defensive and without energy to strike a vigorous blow, were no match for even one Greek. The health and intelligence of the latter created confidence and a circumspect attitude, the low vitality of the former a craven spirit which was ready to yield at the first onslaught.

This division of mental work produced other results. With the low vitality of primitive groups due to poor food, there could be no great enterprise. They merely wandered about to find food and avoid, as far as possible, encounters with other groups. When, owing to slavery, the warriors were better fed, their enterprise increased; they began to love exploits and battles; they deliberately set out on far journeys into unknown regions, because their surplus energy gave them confidence and self-reliance in any circumstances. These war-like expeditions, whether they resulted in permanent settlements or were only of a temporary nature, became the means of mixing and amalgamating various peoples. It gave the kings and leaders larger visions, and the conception of world-empires arose in the minds of the boldest. Very nearly every one of the conquerors of antiquity had the ambition to include all peoples under his sway. The numerous failures at last suggested the idea of international law, the *jus gentium* of the Romans, and, consequently, that empire enjoyed a greater stability than any of its predecessors. This law was the direct result of conquests and of the endeavor to retain the fruits of victory as far as land and other possessions were concerned. A more important, because more permanent, result was the mixing of peoples which took place in the Roman empire. In this process of assimilation various new traits were formed, most of which were good when not too divergent types mingled—as was the case until approximately the

beginning of the Christian era; later, when types of all kinds mixed, they were socially bad, because the lower people infused their low vitality into the already depleted stock of the Romans, who had lost their ablest men on various battlefields. This has been the case with every nation that has engaged in too protracted warfare. On the whole, the effects of mixture were, however, good, since more vigorous races resulted, and the mind of man was tremendously stimulated. It was through this process that means were eventually found for liberating a larger number of people from the hardships of manual toil. This was through the invention of machinery.

Modern industry is possible only through the invention of machinery, and this was dependent upon the leisure of the few procured through slavery. It is not necessary to go into any details about the successive and wonderful inventions and discoveries in science and industry; suffice it to say that whatever objections may be raised against machinery, it has procured comparative leisure for a much larger number of the population, has been the means of improving health, and has thus made civilization possible on a much wider scale. For civilization has always been threatened chiefly by poor health.

What, then, is civilization? Civilization means the translation of the subjective good into the objective good; or, to be more exact, it is the process of transforming the subjective conception of the good into objective practical good. This means simply that civilization is the attempt to ameliorate hardships, improve conditions, and eventually eliminate the worst evils, so that every man may live a life worthy of a human being. Or, to use Professor Patten's phrase: "It is the transition from a pain economy to a pleasure economy."

Two things only need special notice in this definition: the conception of the good, and its translation into objective good. The first depends largely on the mental state of the individual. If he is ill, or at least in poor health, relief will seem the greatest, if not the only, boon to him, and he will conceive civilization as a process of relief or redemption from evil. Again, if his mentality is narrow, he will conceive it as applicable only to his clan, tribe, or nation. Finally, if his mind is of a low type, civilization will mean to him only creature comforts. The second item, *i.e.*, the translation of whatever conception of civilization one may have into objective good, is primarily a matter of economic and industrial conditions, based on science. A few words concerning these points may be appropriate here.

There could be no true civilization in the past, since at best only a few of these conditions existed in any nation. As has been mentioned before, the history of the past has been largely dominated by the conception of relief or redemption from evil, because the health of the people was generally poor, and they lacked therefore a sense of confidence and self-reliance. Civilization was conceived in negative terms. This is evident when we look at the Hebrew and older Christian ideals. The Jewish theocracy pictured the Hebrews as utterly dependent on Jehovah; hence any misfortune coming to them was attributed to Him as a punishment for their sins, while any good fortune was looked upon as a reward for obedience to His laws. The two dominant notes of the Old Testament are, consequently, a sense of sin and one of gratitude. "Hear the prayers of Thy people, O Lord! and when Thou hearest, forgive." "Oh, give thanks unto the Lord, for His mercy endureth forever!" The Christian ideal has been dominated in the

past chiefly by the spirit of the Litany: "Good Lord, deliver us!"

The religion of the Greeks was the only one which was comparatively free from this negative conception. They had many gods, and if one or two of them were hostile, others would be friendly. None had the monopoly, and if any serious difficulty arose about Achilles or Odysseus, the matter had to come before the council of gods. It is true, these deities were not models of purity and holiness, and were prone to pursue the lives of gentlemanly loafers, but they were at least whole and healthy, and represented to the Greeks beings of fairly unified characters. They were full of the joy of life, and gave men the means of enjoyment through arts and sciences. May this not be the reason for the positive development of Greek culture? A healthy and, therefore, active race conceived civilization not merely as relief from evils, but as a positive joy, full of achievement and daring action, as the myths of Hercules and Prometheus amply prove. That health was the predominant cause in this blossoming of art and science may be shown by a reference to the later Greeks. With the introduction of malaria, health began to decline; productiveness ceased, and the character of their deities changed almost at once. The Greek no longer looked to Olympus and its gods endowed with perpetual youth, and no longer hoped for his own possible endowment with that quality as a demi-god; he exchanged the mountain of the gods for implacable Fate, and the joyous wholeness and unity of the human being for the dualism of Plato's "spirit and matter."

This conception of Plato was introduced into Christianity, and, after being assimilated with the Hebrew sense of sin, has dominated western civilization until now. It is from this negative ideal that strong and healthy men

are turning away at present; the reason of their indifference to the churches is not antipathy to the moral and spiritual teachings of Christianity, but rather apathy to a life of comparative inaction. For the man who is accustomed to depend on himself and to cultivate self-reliance for six days of the week in nearly every sphere of his life, finds it irksome on the seventh day to submit meekly without the right of cross-questioning, to the teaching of another. He finds, moreover, that the sciences, and medicine in particular, are working for a positive civilization, containing joy and happiness—a condition of things which will enable him to realize that he is not here merely to prepare for a future existence, but that this life is worth living for its own sake and ought to be improved as far as possible for everyone, instead of being made merely endurable. To this end he endeavors to introduce prophylactic measures into every department of life; to improve conditions in accordance with an ideal to be attained in the future and not with that of some “golden age,” irrevocably lost in the distant past; to do and to achieve something that is worth while—not because he is bidden to do so, but because action of a wholesome social nature is what he craves and best expresses his desire for an expansion of life.

The narrowness of mental ideals has played a large rôle in the past. Whatever the best thinkers of any people pictured as a desideratum in national ideals, was always reserved for their own people, and others were excluded, unless it was for the purpose of serving their masters. “It is meet that Greeks rule over barbarians,” are the words of Aristotle. Other nations were more narrow even than the Greeks. Such a conception of civilization was, however, not only narrow, but moribund, because no country is sufficiently equipped with all the

necessaries or comforts of life, or a full equipment of mental resources, to enable at least the majority of its inhabitants to develop their faculties. Hence, intercourse with other nations is imperatively necessary; it is, however, impossible without the recognition of other people's rights, and a narrow national ideal always implies a denial of those rights. But people whose economic and emotional resources are small owing to poor health, are apt to be narrow in their political conceptions. We thus come back to the question of health from another point of view.

Finally, if a man's mind is of a low type, civilization will mean primarily creature comforts. We have seen that a sickly or an undervalued man cannot produce an active and vigorous brain, that he is self-centered and must confine himself to the most necessary activities. This means that such a person must of necessity seek creature comforts; owing to his inability to gain pleasure from vigorous and wholesome action, he must seek relief from his pains, or at least discomforts. For instance, lacking the good appetite of a healthy man, he must seek, if not delicacies, at least more choice and better prepared food. In regard to clothing, he must be more warmly dressed in winter, and must expose himself less to the inclemencies of the weather, than the well man. All this leads inevitably toward a self-centered disposition and the seeking of comforts. It is true that we read occasionally of persons who even during illness do not forget the rights of others and are considerate of others' comfort. This is, however, always looked upon as an extraordinary exhibition of fortitude, due to an exceptionally well-trained will, or to social conventions. Just as the Indian under torture does not cry out owing to his training, so the sick lady or gentleman will be most anxious to avoid

laying any extra work on the nurse. We are nevertheless certain that they suffer, and we double our attention to spare them any pains and tactfully avoid even the semblance of making efforts for their comfort. The very fact that we praise such persons for their restraint and fortitude proves that the normal thing under suffering is the seeking of relief and comfort through others, and that a self-centered mental attitude is unavoidable. The headaches, the nervous irritability of those in poor health are all continuous witnesses of this self-centered attitude. The pioneers, whether as scientists or missionaries or as pathfinders in new countries, prove this contention from a different point of view. They are usually men in good health, and seek, either through love of truth or of their fellowmen, or out of sheer abundance of vitality, to increase the world's useful knowledge and good will, and are rarely self-centered as far as their attitude is concerned. They act on the maxim, "It is more blessed to give than to receive," not because they are bidden, but owing to an inherent need and desire to express themselves in socially useful action. A well man does not call on others for services; he considers it a glory to be independent and a privilege to help others. The conception of what good means, is thus necessarily dependent on one's health.

In regard to the second point, the translation of this good into practical, objective good,—a few words will have to be said. This depends, as was said above, on science as the basis of a higher industrial and economic system. The philosopher and the poet may tell us in glowing pictures what they conceive to be a social ideal of beauty and of perfection along every line, and they may stir our imagination with a desire to realize it; but it is the scientist who makes possible its translation into

objective reality. He needs, however, good health, since his senses must be keen and he must have a fine sense of balance and coordination. He cannot shape his system according to *a priori* principles and proceed to erect a structure of logic and plausibility upon it; he has to "check up" his ideas constantly by reference to new facts, and keep his mind open for other facts still to be discovered. His attitude has to be that of open-mindedness, patience, ability to balance, willingness to change his conclusions and to retrace his steps. All these qualities demand good health. The irritable and "inspired" poet may, with a few strokes of his pen, give us a most entrancing ideal of what the future will bring forth in the way of beauty, truth, and goodness—the scientist alone, with his ability to stand shocks and disappointments, to begin all over again, and to labor for years at a single small problem, is able to help us realize them, because he helps furnish the material basis for all cultural accomplishment and civilizational achievements. That such careful, patient, and often tedious work demands not only a fine nervous system but general fair health, will be discussed more fully in the chapter on Health and Originality.

This attitude of the healthy man toward objective social action indicates the transition from a pain economy to a pleasure economy. Nature demands the satisfaction of certain physical wants, because these are necessary for the fulfillment of the functions of life. It is true that this furnishes a certain amount of physical pleasure, but it is very elementary and is more on the level of the animal than of man. When, for instance, the savage—half starved and more or less exhausted—succeeds in getting an ample food supply by killing a deer, he does not observe any niceties about eating, but swallows the meat

half raw and without much attention as to mastication. Nature imperatively demands food, and the savage meets that demand and so fulfills a natural function. The pleasure is rudimentary and animal, just as in the case of a hungry dog. Compare with that eating the feasting of a modern man—the elaborate preparations, the clean table linen, the attractive china, the flowers, the cheerful company, perhaps music, the dishes gathered from almost every corner of the globe—and you have a natural function satisfied plus a purely human pleasure, because the physical has been raised through the accompanying mental satisfaction to a higher level which the animal can never attain. It is the same way with other things. Most men need shelter and clothing for protection against inclemencies of weather; but what a difference between the cave or the rude hut of the savage and the mansion of civilized man, or between the dried and hard skin of animals used by the barbarian, and the artistic clothing of a woman of fashion serving the purpose of protection much more successfully while at the same time satisfying an æsthetic demand. The savage may dream about feasting and whatever he considers fine clothing or a pretentious abode, but he is bound down to fulfilling nature's demands in the most primitive manner. It is civilization that has enabled mankind to advance from that stage of a pain economy to one of pleasure. And civilization is the result of health.

We saw above that a man of low vitality can do but little more than take care of himself, *i.e.*, provide for his most elementary needs, because there is no energy left for any attempt to improve his condition by planning, or experimentation. It was the leisure class, the vigorous, well-nourished individuals who had enough energy left after their daily work to scheme, plan, and experiment in

order to husband and increase nature's provisions and to raise life to a higher level through the development of art, science, and philosophy that produced civilization. The sick man even today is largely in the position of the savage; he eats, because he has to and takes no pleasure in meeting nature's demand. And he cannot contribute anything toward improving either his own or other people's condition; he consumes but does not produce. Where there is, however, a large number of people who consume without producing, civilization is impossible; and where only little more is produced than necessary, it is in a precarious condition; because the translation of the conception of the subjective good into objective good means in terms of economics a greater production than is necessary for immediate wants, and thus the procuring of leisure or exemption from too exhausting toil. It is plain that the sick man cannot do that, and it takes but little reasoning to see that the undervitalized man cannot do it either. The latter works uneconomically, because he has to force himself, and is thus soon exhausted, and mighty glad to stop when his immediate wants are met. The advance of civilization is, thus, always dependent on the health of the people.

This may be illustrated by a few references to nature-peoples. They are seldom regularly and sufficiently fed; it is usually a case of starvation or of over-indulgence when plenty is to be had; the Igorots of the Island of Luzon consider it bad manners to leave any eatables for tomorrow. Under these circumstances no higher or even medium vitality can be developed, and consequently no surplus energy for an advance socially or mentally. Endemic diseases are another cause of keeping vitality down to its lowest level, and nature-peoples are, as a result, condemned to a pain economy. Being constantly faced

with starvation, and therefore always more or less surly and morose owing to poor health, it is small wonder that many nature-peoples have invented barbarous methods of getting rid of the aged or of superfluous children. Their morals are merely a result of their poor health. A hungry man knows no mercy, and a sick one no compassion. Whatever of song and of poetry, art and sociality existed among nature-peoples, was produced at the rare times of plenty when men were happy because the craving for food had been satisfied and when, consequently, a slight excess of energy had been produced. *No people has ever succeeded in rising above the level of savages unless it possessed at least fair health; where either economic or climatic conditions prevented health, no civilization could arise; and where it had arisen it was doomed whenever new conditions arose which undermined health.*

Health is, thus, the principal index to civilization, because it shows control over nature by society as a whole, and ability on the part of the individual to utilize these means of control for his own benefit. This control implies the ability to secure a suitable supply of food as regards quantity and quality, to counteract or avoid the effects of endemic diseases, and thus to lay up a store of surplus energy.

This control of nature demands work, *i.e.*, the persistent and intelligent application of physical and mental energy toward a clearly conceived social end. Where human energy is not applied persistently but by "fits and starts," we have the wasteful expenditure of the savage who will dance for two or three days with but few intermissions until the point of utter exhaustion is reached. If he is not engaged in warfare at the time, well and good; he can sleep and rest for a week or **two**,

until restored to his normal condition. If he has enemies, they will watch for just such an opportunity and overcome him easily. It seems to me that this is the explanation of the numerous cases where often a handful of men defeated a large army, generally after a period of orgies and carousals when energy had been fully exhausted, so that new emergencies could not be met. Such orgies preceding an attack are directly mentioned as a cause of defeat in a number of cases, *e.g.*, Belshazzar's fall, and the victory of Frederick the Great at Rossbach. Where the application of energy is not intelligent, we have mere toil which exhausts but produces very small returns; slave labor and so-called "unskilled" labor is of that nature. It gives very little mental satisfaction. Where, finally, the end is not clearly conceived as *social*, we have either misdirected energy, as in the case of the older Japanese craftsmen who wasted several years on the production of an intricate toy, or the well-directed energy of the selfish exploiter who seeks satisfaction in domination over others. Another case is possible, namely, that of the pleasure seeker in abnormal excitement. A few words concerning each of these cases will be necessary.

The persistent application of energy requires a good stock of vitality, since it is the continuous although less strenuous application that is tiring. Even such easy work as bookkeeping demands more energy than the average savage possesses. Such well-distributed expenditure over a long period of time requires an excellent control over one's whole body, and that is possible only with good vitality. The savage neither has the vitality owing to undernutrition or malnutrition, nor has he a sufficient control over his body, owing to his poorly constructed nervous system. Hence savages, barbarians, and even

semi-civilized peoples have never been able to work, and wherever they were forced to do so by stronger men, they succumbed in a short time. This is the primary reason for the rapid disappearance of nature-peoples when coming in contact with civilization, since, being deprived of their former means and methods of living through the chase, and unable to create a sufficient amount of energy suddenly, they were unable to adapt themselves to new conditions and rapidly fell victims to exhaustion or diseases. Volumes have been written by well-meaning persons on the deliberate cruelty of civilized nations in killing off those on lower levels of civilization. The process of extinction is, however, inevitable, unless nature-peoples succeed in creating a larger amount of vitality which will fit them for work. It is not the gun of the white man which has exterminated the red and many of the brown races, but their inability to work, as may be seen by a comparison with the Mongols who, although not particularly well fed, have long ago acquired the habit of work, and are now becoming the competitors of the white man—successfully, too, wherever they are able to get better food owing to higher wages.

The unintelligent application of mere physical energy is toil, and gives but little satisfaction to a human being, besides being unremunerative. We find, therefore, that countries like the Balkans and Russia in Europe, and large parts of China do not produce any high type of men among their peasantry; because there is no satisfaction in merely meeting the demands of nature to live. A man must have something more than mere animal pleasures if he is to rise to a higher level of civilization; he must take pleasure in his work, and express himself through it. That cannot be done through mere toil; hence the absence of inventions for the amelioration of

economic conditions and the proverbial poverty of those countries. In England, Germany, France, America, and in Australia, men enjoy their work because there is a keen pleasure in mastering an intricate problem which taxes one's ingenuity; these countries have succeeded in relieving their people from mere toil by having it performed through machinery. True, there is a new danger lurking here, since many working men have become annexes to the machines which they attend. The remedy has, however, already been found in shorter hours and more varied means of enjoying leisure, both made possible by the greater production of *machinofacture* over *manufacture*. The man who works only with his hands, rarely produces more than he needs; it is the machine which helps us to produce a surplus, and thus to create leisure. We are already meeting this problem of the possible deterioration of our working classes through the monotony of their employment by encouraging them to follow an avocation during their leisure hours, and thus developing those qualities which are not exercised in their occupation. Ideally, vocation and avocation should coincide, and man should find his greatest satisfaction in his work, and his keenest joy in making it more effective for himself and others. As yet, we are far from that goal; but we have at least come to recognize it as attainable.

The more or less useless work of the Japanese craftsman is a thing of the past even in his own country, and it has rarely existed in modern Europe or in America. We are, however, threatened with a similarly useless, if not unsocial, form of expending energy. Many women and some men among our rich people are seeking pleasure in more or less abnormal excitement, and some men and women among the poorer classes imitate them. That

such expenditure is harmful, is obvious; that it is based on an insufficient state of health, is more difficult to prove. The attempt will, nevertheless, be made.

In introducing the subject of health above, it was stated that the human body is a machine for action in order to preserve and improve life, and that the mind is the guide of actions along those lines. Hence, "as a matter of necessity, man is an agent. He is, in his own apprehension, a creature of unfolding impulsive activity—'teleological' activity. He is an agent seeking in every act the accomplishment of some concrete, objective, impersonal end. By force of being such an agent he is possessed of a taste for effective work, and a distaste for futile efforts. He has a sense of the merit of serviceability of efficacy and of the demerit of futility, waste, or incapacity. This aptitude or propensity may be called the instinct of workmanship."¹⁶ Wherever man violates this law of effective and useful action, and wastes his energies in futile effort his faculties will decline in power and the wrongfully used organs will deteriorate. And that is exactly what has happened to our American "idle" class, more particularly to the newly and ultra rich women. They are supplied by their husbands with everything that money can provide; they have no responsibility, no inducement for useful effort of any kind, and nothing to occupy their ample leisure except amusement. Is it any wonder that their nervous systems deteriorate, and that more exciting pleasures are being sought by them so as to remove that sense of *tedium vitæ* and of vacuity with which they are oppressed? Having refused in many cases to become mothers in order not to interfere with their bridge and opera parties, they have at last become unable to bear children, as Mrs. Olive Schreiner so ably argues in her *Woman and Labor*. The result is an

increased nervousness and restlessness, since no one can violate nature's laws with impunity, and the sense of having failed to fulfill any mission in life leads to still further cravings for excitements which violate the ordinary social laws. Hence an increasing number of indiscretions and scandals as reported by the daily press.

At the other end of the social scale we have a similar nervousness for different reasons. Working girls get over-fatigued, and instead of seeking rest for their aching nerves, they attempt to drown their weariness in amusements for which they are unable to pay. The result is increased excitability, depression, and eventually degeneration. The only desire which these women—both rich and poor—have, is to out-do somebody else in extravagance, no matter what the cost. They must, consequently, be failures as wives and mothers, and this must eventually affect the husbands who, unable to pay the ever increasing bills, take to drink or run away. And the cause of it all is refusal to do useful work.

The rich are beginning to recognize the danger threatening them, and are commencing to take a more vital interest in life, as the book of Townsend Martin on the *Passing of the Idle Rich* shows. The increased political activity of these women is to be welcomed from this point of view, because it gives them a new sphere of activities more wholesome than mere amusements. The more energetic women of this class, while single, are talking of definite work either in settlement or religious occupations, because they do not want to degenerate in the vacuities of so-called social life. Work is, thus, both the basis and the preserver of civilization.

There remains one more type to consider briefly, *i.e.*, the man who applies his energy both persistently and intelligently, but unsocially and for the exploitation of

others. If what has been said above is true, not much need be said about him. The healthy man we found to be social in his activities, due to his abundant vitality. Just because his body is a well organized and efficient unity, he organizes his work intelligently; he has to work persistently owing to the necessity of giving a proper outlet to his surplus energy. There is, consequently, no wasteful expenditure of energy in his case, but well-directed and effective activities along lines which seem worth while to him. His social nature impels him, however, to assist others, and his abundance of energy enables him to do so; he will never resort, consequently, to the exploitation of others; that would not be in harmony with his nature and contrary to everything that gives him joy. If this be true—and it can be verified by observation every day—there is only one conclusion possible concerning the selfish exploiter—that he is not a healthy man. He may display tremendous energy in varied and feverish activities, but the balance of good health is lacking. There is a peace and contentment, a joy and happiness about the healthy man, which the selfish and feverishly active man does not possess. It seems as if he wants to get something which he lacks, not knowing exactly what it is; hence his incessant and carefully planned activity. The goal of his ambition is usually power, in whatever form that may exist in a particular society. Since he lacks the balanced harmony within himself, he seeks it in the control of others. The means for power and control vary in different societies, but the type is always the same, although the same type may be esteemed differently at different periods. Take the miser, for instance. In olden times Midas represents the type—the grasping, greedy king who would turn everything into gold to satisfy his lust for power. But it was deemed a

vice in a king in those times to lust for power in the form of gold; power through the feat of arms was the socially accepted means for power, and a king who sought it that way was never caricatured as was Midas. Antiquity has only praise for the Hannibals, the Alexanders, and the Cæsars. During the Middle Ages the socially accepted means of seeking power was the church, and anyone seeking it through warlike exploits was censured unless it was in the service of religion; the man who sought it in gold, was held up to public scorn at least, if he was not persecuted. Shylock is the picture of the selfish man of this period. In our own country the accepted means of power is gold; and lo and behold! what a change in popular esteem. The financier is no Midas, much less a Shylock; but the man who saves the country in times of panic, barely escapes a public funeral, and certainly has many encomia written after his death. The type of the selfish man is always the same, *i.e.*, he is the man who seeks power through well-planned action by exploiting others; if they are incidentally benefited by serving as his tools, he does not object. The point is that he seeks a balance and harmony in dominating over others, because he lacks these qualities. The interesting thing from our point of view is that in some way the *Volksmund* always caricatured these men by ascribing to them some physical defect. Midas is thin, haggard, poorly fed, and certainly mad. Shylock is old, almost doubled over from weakness, and certainly obsessed by money-madness. The financier of today, being the man who has chosen the accepted means of wielding power, is supposed to be sleek, well groomed, and the gentleman *par excellence* who favors kings and emperors with his visits. It is the warrior and the priest who are ill-favored by popular opinion. Anyone familiar with the popular

press of Europe will recall the numerous and varied forms of ridicule to which they are subjected and the caricatures which almost invariably intimate some more or less hidden physical defect. The type has not changed psychically. As Alexander used the soldiers as tools to satisfy his selfish ambition for power, Napoleon used the French people for the same purpose; and it is rumored that certain war-lords of Europe would do the same if the means of seeking power had not changed from the mailed fist to the hand that signs checks.* If the type is psychically unchanged, may there not be some truth in the popular opinion that there is some physical defect lurking somewhere in the makeup of selfish men, indicating lack of health and balance? Health is, consequently, the basis of true social work.

Civilization is, then, possible only on the basis of work—well planned, persistent, and intelligent. Only where work is recognized as the proper activity of every man, can there be true civilization. This work need not be manual labor, nor industrial or commercial pursuits. Any activity which is intelligent, and is directed toward raising society to a higher level, is work. And any society and individuals who recognize the necessity of work for the fulfillment of man's destiny here on earth, should be called civilized, no matter how poor they may be. The motive for work must not come, however, from the recognition of its necessity only; it must be an impulse from within urging man to exert himself intelligently and persistently. Where man works only because necessity compels him, he will never do more than meet that de-

* This passage was written before the recent war broke out in Europe. It would be interesting to study the health of the leaders in this movement. Concerning one it is definitely known that he has a poor heredity, is very excitable and erratic, and suffers from megalomania.

mand, and will remain on a low level of civilization. Where he seeks an outlet for his surplus energy in well directed activity for social ends, and where he finds his joy and satisfaction in work, a surplus of goods will soon be produced, and the leisure which that makes possible will soon enable him to create means of culture through art, science, and philosophy. Such activity is possible, however, only on the basis of good health.

The sick man can evidently not engage in work. The undervitalized man may try hard and perhaps wear himself out in his endeavor, but his work will be inefficient. As a matter of fact, the so-called incompetents consist largely of this class. Only healthy men have the true impulse for work; only they work efficiently, and only they produce more than is necessary for their own needs. And only such workers can enjoy a true self-respect. The man who lives on other people's work is a parasite, whether he is a tramp or a millionaire; he is, consequently, dependent on the exertions of others, and that deprives him of the ability to be self-respecting. The man who does not "pay his board to the world" must get someone else to pay it for him. That means that the wheels of progress are retarded to that extent, because that board must be paid. The parsimony of nature must be overcome, and it can be overcome only by paying a price in human effort with physical and mental energy. If a community has many parasites, it loses that much in actual work and puts a heavier burden on the others than they ought to bear. Worst of all, though, is the lack of development on the part of the idlers, since effort is necessary for development—direct, personal effort alone will unfold our powers, since this cannot be done vicariously. Our development is, moreover, the only thing worth while in life, and everything worth while must be

paid for, and the price in this case is exertion. Where the energy for work is lacking, there may be exertion, but it will either be ineffective or so costly to the individual that development becomes impossible. Hence we come back to the necessity of health from another point of view.

What do we mean by development? The development of an individual means, briefly stated, his growth into a social person. Professor Giddings says:

“The true social nature is susceptible to suggestion, and imitative and thereby capable of learning from fellow-beings. This capacity is sufficient to make the social individual desirous to live at least as well as the fairly successful members of his community. He desires to enjoy what others enjoy, to do what others do, and to act as others act.

“The social nature, however, is to some extent originative. It not only learns from others; it also teaches others. It makes new combinations of imitations; it makes inventions in the sphere of thought and conduct, and sets new examples. This it is enabled to do, because, by varied contact with many phases of life, made possible by wide association, it enjoys many different experiences which inevitably combine in peculiar ways with peculiar results in the life of each separate individual.

“The social nature is judicious. It is satisfied that, on the whole, the average judgments of mankind are justified by experience. It cannot, to be sure, be perfectly satisfied with any judgment, much less with all judgments. It is at all times ready to criticize, to direct, or to devise; but this it does in no cranky, captious, or quixotic way. It assumes that, for the purposes of social unity and coöperation, men must respect one another's judgments; and that new beliefs can be made practically available only as large numbers of men are converted to them. The individual, protesting alone against the opinions of his fellow-members of society, may possibly be right, and they may be wrong; but not until they are convinced of error can he wisely or rightly undertake to put his views into practical operation.

“The social nature is tolerant. It has learned through social experience to give the same opportunities, immunities, and en-

joyments to others that it claims for itself. And not only as a matter of judgment has the social individual decided that toleration is wise, he has learned also to feel as an experience of his emotional nature that it is desirable and agreeable.

"The social nature, however, is not merely tolerant in the negative sense of being non-aggressive; it is positively sympathetic, companionable, and helpful. It enjoys comradeship, communication, social pleasure, and coöperation. It would be unhappy in isolation and dissatisfied if at work in an absolutely individual way, without relation to the industry and patriotism of other men."¹⁷

The only persons who can meet these descriptions are healthy men and women, since only these engage in spontaneous activity, enjoy the expansion of opportunity, and experience a keen pleasure in the increase of their power. This activity is not self-centered, just because their abundance of vitality enables them to share with others their own joy and happiness; they would, indeed, be made miserable if they had to live in an atmosphere of gloom. Hence by virtue of their own nature they cheerfully scatter sunshine wherever they go. Their surplus energy enables them to associate with many people, enter many and varied activities, and everywhere to learn something new, because of their receptivity. The devitalized man must conserve his energy, is more or less concerned about himself, and he cannot with the best intentions "get away from himself." If under special cases of excitement he forgets himself, he manifests that somewhat boisterous hilarity which with women borders on and usually precedes hysteria. The friends of such people are not deceived, since they know that such expenditure of energy is sure to bring about exhaustion and collapse. The healthy man increases in power as he associates with an ever larger number of people; since growth of personality is possible only

through exchange of views with others and through the polishing off of the sharp corners and edges of our individual nature. Applied to civilization this means interdependence of peoples; for, as individuals must learn to abide with each other by the circular movement of "give and take" in order to grow, so must nations enter into relations with each other on the basis of fair exchange of their mental achievements as well as industrial. But travel, whether for commercial purposes or scientific investigation or for the pleasure it affords, is ultimately dependent not so much on the means of communication as on the health of the travelers and on that of countries. Persons of low vitality cannot risk many journeys, because they depend too much on the comforts of home; healthy people do not visit regions infested with typhoid, malaria, or yellow fever. The Panama district was never visited by pleasure tourists until the last few years when the Zone had been made salubrious by Dr. Gorgas. Unhealthy regions prevent, moreover, the production of anything else than raw material, and thus even the commercial traveler is not attracted to them. Finally, owing to their dependence on others, devitalized people never develop that sturdy belief and confidence in themselves, which are so characteristic of the healthy man and which are so necessary for new exploits as well as the undismayed pursuit of more usual activities.

From whatever point of view we look, consequently, at the individual or society, the problem of health always confronts us; and we may now sum up our results in a few principles.

1. *Law of Progress*: Progress is possible only with a surplus of vitality over the immediately necessary activities of life.

2. *Law of Work*: Work in the sense of telic endeavor

and of the wisely controlled expenditure of energy is possible only with good health.

3. *Law of Social Personality:* The individual can grow into a social personality only in proportion as his health permits him to enter into mutually helpful and sympathetic relations with others.

4. *Law of Civilization:* Civilization progresses in direct ratio to the interdependence of persons and peoples; *i.e.*, on the interchange of mental and industrial products which result from a healthy individual and social life.

5. *Law of General Development:* Individuals and societies develop in proportion to their growth in self-reliance; and this depends upon their ability to attain health with the resultant confidence in their ability to control nature and their own destiny.

PART II

SPECIFIC CASES OF HEALTH IN RELATION TO SOCIETY

CHAPTER VI

HEALTH AND ANCIENT GREECE

MAN is bound to earth. Like Antæus of old, he gains strength every time he touches her; and like Brutus, he must recognize her as the mother of us all. In proportion as she is kind and liberal with her gifts, he prospers and develops, and in proportion as she is niggardly, he becomes stunted in mind and body. Some mothers give too much, and spoil their children; others give too little, and hinder their development; others again give enough but not too much, and thus favor the development of initiative through mental and physical activity. So nature is a "lady bountiful" in some places, in others a hard step-mother, in others again a wise and kindly mother who knows that over-indulgence is evil and that niggardliness may prove disastrous to the welfare of her children. But however nature may treat her children, they are always her offspring, and bear the marks of her different attitudes in the tropics as much as in the arctics; for they can never completely free themselves from the influences which she is constantly impressing upon them.

This dependence upon natural influences has led social scientists to the conclusion that happenings in the social and political sphere are not the result of chance, of individual impulse or caprice, nor of the direct interference of an infinite, and often arbitrary power. History in our times is not written as that of Herodotus, or of the Chronicler among the ancient Hebrews, who ascribed every happening to the good or ill will of God. We

have learned that nature is orderly because ruled by law; and so we are learning that social happenings occur in an orderly and law-abiding manner, just because man is nature's offspring. We have not yet proceeded far enough in this new field to foretell with the exactness of astronomy the future of social events, but we know that the origin, growth, decay, or retardation of institutions may be aided or hindered by man according to his knowledge of nature's laws. In proportion as we realize this fact, shall we succeed in shaping our own destiny,—“to see in order to foresee” as Comte said, to avoid harmful things and provide for advantageous ones.

Man's dependence on nature might be illustrated from many points of view, as Buckle, Ratzel, and Huntington have done. The only point with which we are concerned is that of health, and the Greeks and Romans will serve as a sufficient proof of its importance for national welfare. This statement should, of course, be understood just as it stands—importance for national welfare—since no attempt will be made to explain Greek and Roman genius from geographical conditions, because explanations of that kind are, to say the least, one-sided and forced, as the theories of Buckle and Ratzel prove. With our present imperfect knowledge of the relation of body and mind, it is premature to attempt an explanation of civilization on the basis of any one factor. Life is, after all, not a theory, but a bundle of facts. Until we know at least the majority of these facts scientifically, our theories will always be colored by our philosophies, and these represent distinctly individual views and not generally accepted theories of life.

That health is necessary for civilization, the Greeks and Romans prove abundantly since no other peoples believed so strongly in the theory of *Mens sana in*

corpore sano. Their training aimed at the best possible development of the body, and for a long time they succeeded. Then a disease entered their countries, and attacked them, and as they were unable to cope with it, they lost virility and buoyancy of body and mind; the surplus of energy which had been stored up was soon exhausted, and the decadence of their civilization commenced almost immediately. This disease was malaria. There were undoubtedly other diseases, both individual and social, which contributed to this result; but we are unable to lay our finger as definitely upon them as on this particular disease.

In an attempt to prove this theory, six questions must be answered: (1) Does malaria produce such deleterious results as the theory calls for? (2) Was there any marked deterioration of the Greek character at a particular time? (3) Is there any specific cause that can be assigned as a reason for such a result? (4) If malaria was the cause, when was it introduced? (5) How did it affect the Greeks? (6) Why were the effects so disastrous? The first of these questions has a general application, and the answer of modern medicine covers any people.

(1) Does malaria produce such deleterious results as the theory calls for?

A full statement by a physician, William H. Deaderick, who has been engaged in private practice in country districts, in the home of the severer forms of the disease in Arkansas, will serve the purpose of proving the disastrous character of malaria better than a discussion by a layman.

“Malaria has been one of civilization’s greatest foes, both in time of war and in peace. Where shot and shell have slain their thousands, malaria has slain its tens of thousands. Malaria is the chieftain of the army of disease. Even Napoleon acknowl-

edged its supremacy when he wrote his minister of war on the occasion of the disastrous English Walcheren expedition: 'We are rejoiced to see that the English themselves are in the morasses of Zealand. Let them be kept only in check, and the bad airs and fevers peculiar to the climate will soon destroy their army.' It is said that the French crowed over the expedition 'with the force of reason, the bitterness of sarcasm, and the playfulness of ridicule.' How accurately Napoleon's prediction was verified is well known.

"In the tropics, the man who works the soil digs his own grave. Gigantic commercial enterprises have been undertaken and then abandoned on account of the havoc wrought by this scourge. Only recently has it been recognized that the medical man must precede and prepare the way for the engineer and the laborer.

"But warring and canal digging are not the only conditions under which the malarial tragedy is enacted. Within the family, at home, the disease appears in a varied succession of forms, rapidly fatal or slowly sapping the vitality, influencing the birth rate, longevity, and even the intelligence and morality of entire countries.

"In highly malarial regions, as the mortality increases, natality diminishes on account of abortions and sterility. Premature senility is frequent and advanced age is not so commonly attained.

"Malaria, leaving its subjects anæmic and neurotic, is responsible for inertia, loss of will power, intemperance, and general mental and moral degradation. Jones, who maintains that malaria was a potent factor in the decline of Greece and Rome, concludes that 'malaria made the Greek weak and inefficient; it turned the sturdy Roman into a bloodthirsty brute.' Monfalcon attributed abortion, infanticide, universal libertinism, drunkenness, want of religion, gross superstition, assassination, and other crimes to the direct influence of malaria.

"Malaria costs the South incalculable wealth. Besides loss through untilled acres, diminished earning capacity, loss of time, and death, it produces in its victims a disinclination for work whose influence cannot be estimated in money. A conservative computation of the loss to the Southern States through malaria is fifty million of dollars, annually.

"The importance to the world at large of the subject of

malaria is evidenced by the fact that two of the seven Nobel prizes in medicine which have been awarded have been granted for discoveries in malaria, to Ross in 1902, and to Laveran in 1907." 18

A third Nobel prize was awarded to a malaria specialist in 1906, namely Golgi.

This general description of the effects of malaria may be supplemented by its special effects. These vary somewhat according to climate, physical susceptibility, and type of fever. Quotations from Sir Patrick Manson will again best serve the purpose of showing the nefarious character of malaria.

"But, as there may be an infinite variety as regards the number of parasites present, individual susceptibility, concurrence of several species (mixed infection being far from common), or of several generations of the same species of parasite maturing at different times, there may be a corresponding variety in the clinical manifestations." 19

Of the "bilious remittent" form of malaria he says:

"These bilious remittents are very common in the more highly malarious districts of Africa, America, the West Indies, India, and, in fact, in all malarious countries. They are not specially nor directly dangerous in themselves, but they result usually in profound anæmia, and are often but the prelude to chronic malarial saturation, bad health, and invaliding." 20

Concerning "adynamic remittent" our author says that there are:

"Cases which are characterized by fatuousness, restlessness, nervous depression, intense muscular and cardiac debility, profound and rapid blood deterioration . . . and a marked tendency to local gangrene." 21

Among the "pernicious attacks" there are various "cerebral forms" which are generally dangerous.

"Seizures of this description, if not fatal, may eventuate in *permanent psychical disturbances*. Temporary debility or even complete *loss of memory* may succeed severe malarial infection." ²²

Similar statements are made about other types of malaria. The blood is attacked by the parasite and we have a deterioration and diminution of the red corpuscles. Among the results of malaria Sir Patrick Manson mentions enlargement of the spleen and liver, degeneration of the heart, and other after-effects.

Dr. Deaderick thus describes persons suffering from malarial cachexia.

"The cachectic usually presents a singular appearance. The emaciated limbs are in marked contrast to the big belly, and the features are aged beyond the years. The most pronounced phenomena are the anæmia and the enlarged spleen. The red blood-cells may be reduced to seven or eight hundred thousand per c.mm." ²³

The true mortality from malaria is difficult to estimate, because of the variety of forms which malaria assumes and its complications with other diseases. Dr. Deaderick states that out of 5,109,001 cases, 148,055 or 2.89 per cent ended fatally. These figures report evidently light cases, since according to other figures given by him there were 7,205 fatalities out of 27,039 cases, or over 26 per cent; while different writers whom he quotes state the mortality from some forms of malaria to be as high as 50 per cent, and even higher.²⁴ Concerning mortality from malarial cachexia; he says:

"The mortality varies unaccountably from year to year, some seasons evincing a series of mild cases, others an appalling mortality. In a certain parish of Louisiana in 1867, many cases are said to have occurred, of which not less than 95 per cent

died. Fisch, who placed the mortality on the Gold Coast at 20 per cent, states that until two or three decades previously nearly all who were attacked died." 25

Another dangerous characteristic of malaria is the impossibility of acquiring immunity from it, since very few individuals even among the negroes in Africa are absolutely immune, and this freedom from the disease is not hereditary. The negroes, the Chinese, the Malays, and other dark-skinned races enjoy comparative immunity, while

"The inhabitants of the malarious districts of Italy, Corsica, Greece, Turkey, and other South European countries have inherited no marked immunity from malaria in virtue of the thousands of years during which their ancestors lived in malarious districts." 26

Children up to three or four years harbor almost without exception malaria parasites. The proportion of infected children gradually becomes smaller until adolescence is approached, when the blood becomes practically free from parasites and partial immunity is established. This process is, however, bought dearly, since the mortality in children native to highly malarious countries is very great. Concerning the health of the immunes authorities differ. Manson says:

"It has often been remarked that these dark-skinned children, with enormous spleens and a rich stock of malaria parasites in the blood, run about fever-free, and apparently in rude health." 27

Major Ross, however, says:

"An intensely malarious locality cannot thrive. The children are wretched, the adults frequently racked with fever, and the whole place shunned whenever possible by the neighbors. The

landowner, the traveler, the innkeeper, the trader fly from it. Gradually it becomes depopulated and untilled, the home only of the most wretched persons.”²⁸

Even if immune children enjoy rude health, their enormous spleens indicate a serious disturbance in the physical system, sufficient, perhaps, to prevent the building up of a fine-grained nervous system which is necessary for the creation of a higher civilization.

Of greater significance is local immunity, since these islands of malaria-free localities are important, as will appear later. Bermuda, Argentina, New Zealand, and the Sandwich Islands are remarkably exempt from this disease. Even in malarial countries such as India, immune localities are found, *e.g.*, Kherwara in Rajputana. Generally speaking, high altitudes are relatively exempt even though surrounded by malarial lowlands. A few hundred feet in altitude may show a more marked difference in the prevalence of malaria than as many miles in latitude. In the tropics where even high elevations do not have a low temperature, malaria may be found at elevations of 6,000 or 7,000 feet, and other circumstances may annul the advantages of elevation.

“In Italy there are many malarious spots high up among the hills; the same is the case in India, and elsewhere in these elevated valleys which are also narrow, imperfectly ventilated and imperfectly drained.”²⁹

With the exception of these few localities, malaria is prevalent all over the tropics and in most parts of the temperate zones. Its debilitating influences have, in other words, been spread over the larger part of the habitable globe, as will be seen from the geographic distribution given by Dr. Deaderick.³⁰ Summarizing this report, we find malaria to be very prevalent in the southeastern por-

tion of the United States, less prevalent along the Atlantic coast south of New York with increasing frequency as we go south. The Mississippi valley along both shores to the extent of hundreds of miles, is very malarious, as are all the Gulf States.* In New York, Pennsylvania, and New England autochthonous cases are found, while the shores of the Great Lakes and the Central States are comparatively free, with the exception of the lowlands. On the Pacific coast malaria is not frequent, but all the river valleys harbor numerous infected mosquitos. In Mexico severe forms of malaria occur, particularly in the low coast regions. The Atlantic side of Central America is most unhealthy owing to malaria, and the Pacific coast is only slightly less so.

In South America the larger part of Brazil, Venezuela, Guiana, are highly malarious; Bolivia, Paraguay, and Uruguay are less infected, while Argentina is almost entirely free. The deep valleys of Peru, Ecuador, and of some portions of Chile are malarious centers. All of the islands in the Greater and Lesser Antilles are malarious, while Bermuda is practically free from this disease.

In Europe, Great Britain is now free from malaria, and Germany has infrequent cases along the Rhine and Danube valleys; but Holland has many cases, both in its northern and southern portions, particularly on the island of Zealand. The valley of the Danube in Austria and Hungary has many cases of malaria, and many other portions of Hungary are heavily infected. In France, malaria is found chiefly in the marshy land along the west coast and in the south; Spain and Portugal have

* The State of Mississippi reported 158,000 cases in 1917. But this is only a small part of those occurring, since only about ten per cent of the physicians answered the questionnaire of the United States Public Health Service, and many more cases were not attended by physicians.

numerous cases in the coast regions and the larger river valleys. In Russia, malaria is encountered along the coasts of the Black Sea and the rivers which issue into it. Bulgaria is very malarious in its southern part, along the Danube and coast regions. Practically all parts of Italy, Sicily, and Sardinia are afflicted with this disease, and some portions of southwestern Switzerland. Greece is severely scourged with malaria, and in some parts scarcely any inhabitants escape.

Few countries of Asia are free from this disease; Asia Minor, Arabia, and Persia, the swampy regions of Afghanistan and Beloochistan have many and severe cases of malaria. The presidencies of Bengal and Bombay, the foothills of the Himalayas, and other parts of India are intensely malarial. Ceylon is endemic territory, and so are Burmah, Siam, the Malay Peninsula, and French Indo-China. Some parts of China are intensely infected; Japan, Formosa, and the Philippines give rise to malaria.

In Africa, the territory between the Senegal and Congo rivers is headquarters for a malignant type of this disease, while further south the cases become less frequent and severe. All along the east coast from Delagoa Bay to Eritrea is malarial country, including the larger part of Madagascar and Mauritius. The interior of Central Africa, excepting the high plateaus, is all malarious country. In the Nile valley the inundated portions are very malarious, and the disease abounds along the coast and in the marshes of Algeria.

In Australia, malaria occurs all along the coasts, diminishing towards the south.

The whole of Canada, Norway, and Sweden, are practically free from the disease. These localities are always looked upon as healthy, and are frequented by

many visitors; and the inhabitants are usually energetic and well advanced in education.

The zone of malaria is almost coincident with the tropics and the larger portion of the temperate zones; it has, consequently, been a danger and enemy of man since early times. The relief felt by physicians when this obstacle to good health was removed by the epoch-making discovery of Ross, and when the possibility of exterminating the disease was in sight, is perhaps best expressed by a quotation from Dr. Deaderick.

“Undertaking the work at Manson’s suggestion, and after several years (1895-1898) of toil and discouragement, Ross proved conclusively that certain species of mosquitos are concerned in the dissemination of malaria. The debt owed him by mankind was acknowledged by the gift of a Nobel prize; his own feelings over the discovery are expressed in these lines which he wrote:

““This day relenting God
Hath placed within my hand
A wondrous thing, and God
Be praised. At His command

““Seeking His secret deeds
With tears and toiling breath,
I find thy cunning seeds,
Oh million-murdering death.

““I know this little thing
A myriad men will save;
Oh, death, where is thy sting,
Thy victory, O grave?”⁸¹

The first question having been answered, we may now proceed to the second in regard to the deterioration of Greek character at a particular time.

(2) Was there a deterioration of Greek character at a particular time?

In order to simplify the discussion of this question, a caution should be inserted at the very beginning. Whether malaria existed in other parts of Greece prior to 500 B.C. is still a problem waiting for solution. That it did not exist in Attica is fairly certain, owing partly to its location and partly to the absence of references to this disease by Athenian writers. The testimony of the latter will be taken up later, but a brief statement must be made here about the location of Attica as favoring the theory that it was free from malaria.

Attica was most probably one of those favored localities just mentioned, which, owing to its situation, was free from this disease. The advantageous features of this situation are from the present point of view, two: a comparatively dry climate, and a location off the main road of travel between north and south. The former feature would be unfavorable to the development of indigenous malaria, the latter to its introduction from other regions.

“In ancient Greece the fruitful plains of Thessaly, Bœotia, Elis, and Laconia had a fatal attraction for every migrating horde; Attica’s rugged surface, poor soil, and side-tracked location off the main line of travel between Hellas and the Peloponnesus saved it from many a rough visitant, and hence left the Athenians, according to Thucydides, an indigenous race.⁸²”

Athens will consequently be the only part considered in this discussion, since it is to her that we owe practically all the arts and philosophy, which have survived into modern times.

Galton states that Athens built up, by a system of unconscious but judicious selection, a magnificent breed of men, which produced in the space of a century—530 to 430 B.C.—the following fourteen illustrious men.

"Statesmen and Commanders.—Themistocles (mother an alien), Miltiades, Aristides, Cimon (son of Miltiades), Pericles (son of Xanthippus, the victor at Mycale).

"Literary and Scientific Men.—Thucydides, Socrates, Xenophon.

"Poets.—Æschylus, Sophocles, Euripides, Aristophanes.

"Sculptor.—Phidias." ³³

His argument is that a free-born population of about 90,000 persons, within a century, produced an exceedingly large proportion of prominent men. This is certainly true. But it is interesting to note that not a single man is included in that list after 430 B.C. He might, of course, have added Aristotle, Demosthenes, and a few others who lived later. In his mind he sees, however, a sudden drop in the production of great Athenians about this time. And he proceeds to give his reasons for this result.

"We know, and may guess something more, of the reason why this marvelously-gifted race declined. Social morality grew exceedingly lax; marriage became unfashionable, and was avoided, many of the more ambitious and accomplished women were avowed courtesans, and consequently infertile, and the mothers of the incoming population were of a heterogeneous class. In a small sea-bordered country where emigration and immigration are constantly going on, and where the manners are so dissolute as were those of Greece in the period of which I speak, the purity of a race would necessarily fail." ³⁴

This quotation assigns two reasons as the cause of Greek degeneration: moral laxity and loss of social purity. The first reason has generally been employed by historians and moralists, and yet it is not true to the facts. Mental and moral degeneracy is an effect rather than a cause. People become mentally and morally unstable through loss of physical balance by means of illness and

disease, and immorality simply hastens dissolution already begun. Lack of physical health is always the primary and principal cause, if we are to trust modern scientific investigations.*

The second reason is more true to the facts, but the cause assigned for it is wrong. It is a sociological principle that men of a superior race do not marry women of an inferior race, unless women of their own race are not available; only inferior men marry women of an inferior race when women of their own race are available. It may be granted that a number of Athenian women preferred the free life of hetæraë, but their number must have been small. The very fact, moreover, that they preferred that life, is an indication of their lack of physical and, consequently, moral balance. Breeding from them would only have hastened the process of degeneration. We have to fall back, therefore, on the argument from lack of physical balance or low vitality which resulted from a disease newly introduced into Athens.

It was the inability to account for the decay of Athenian genius on any other basis, which induced Mr. Jones and Major Ross to seek for some specific disease, introduced about this time, that might explain the decline of Athens. Mr. Jones found that immorality did not increase between 500 and 300 B.C., but that the character of the people changed—home-life taking precedence over civic life, sentimentalism replacing robust feeling in art, and pessimism supplanting optimism in philosophy.

*The grave injury of sexual immorality is due chiefly to venereal diseases, and of these syphilis is the more injurious owing to its hereditary and pervasive character. It was, however, unknown in Europe before 1495 and cannot be charged with the extensive deterioration among the Greeks and Romans, although both were, at least in their later history, grossly immoral. (See *The Nation's Health*, by Sir Malcolm Morris, M.D., New York, 1917, pp. 12-15.)

“There does not appear to have been any increase of immorality between, say, 500-300 B.C. But, nevertheless, morality changed. Home life took precedence of city life, patriotism decayed, and lofty aspirations almost ceased to stir the hearts of men. In art there appeared a tendency to sentimentalism; philosophy in many quarters became distinctly pessimistic. Some schools of thought actually regarded ‘absence of feelings’ or ‘absence of care’ as the highest goal of human endeavor. Dissatisfaction and querulousness are marked characteristics of the age. By 300 B.C. the Greeks had lost much of their manly vigor and intellectual strength.

“The cause of this change appeared to the present writer to be partly the decay of religious feeling, and partly the growth of the human intelligence, which resulted in dissatisfaction with existing institutions. Doubtless both of these tendencies were factors in the change, but they did not seem at the time of writing the earlier essay, and they do not seem now, to be sufficient by themselves.”³⁵

Whatever one may think of the reasons assigned for the decay of Greek genius, degeneration is admitted to have begun about the year 400 B.C. This fact is, moreover, borne out by evidence of contemporaries, of whom Demosthenes may serve as a good example. In the first Philippic, delivered in 352 B.C. he thus addresses his fellow-citizens. “When, then, O Athenians, will you be about your duty? Will you always roam about the public places asking one of another: What is the news? Ah! How can there be anything newer than the sight of a Macedonian conquering Athens and dominating Greece? I say, then, that you ought to equip fifty galleys and resolve, if necessary, to man them yourselves. Do not talk to me of an army of 10,000 or of 20,000 aliens that exist only on paper. I would have only citizen soldiers.”

In the third Philippic (341 B.C.), Demosthenes had reason to chide the Athenians for their continued inaction. “When the Greeks once abused their power to

oppress others, all Greece rose to prevent this injustice; and yet today we suffer an unworthy Macedonian, a barbarian of a hated race, to destroy cities, celebrate the Pythian games, or have them celebrated by his slaves. And the Greeks look on without doing anything, just as one sees hail falling while he prays that it may not touch him. You let him increase his power without taking a step to stop it, each regarding it as so much time gained when he is destroying another, instead of working and planning for the safety of Greece, when everybody knows that the disaster will end with the inclusion of the most remote."

An address of this kind would have been impossible in 490 B.C., when 10,000 Athenian citizen soldiers routed the much more numerous Persians at Marathon; or even in 400 B.C. when 10,000 Greeks marched through the whole Persian empire and lost only 2,000 men within a year of constant fighting against treacherous enemies and hostile elements. In about 50 years the character of the Greeks had deteriorated sufficiently to call for the sharp rebuke of Demosthenes.

(3) Is there any specific cause that may explain this result?

Modern times have witnessed the wholesale destruction of many nature-peoples, *e.g.*, the Caribbeans and the Indians. Their extinction was due not so much to the arms of the white men, as to the introduction of new diseases, which, although comparatively mild ordinarily among the whites, assumed the character of a plague among people whose constitutions were unprepared for these particular forms of disease.

"I have heard that not so long ago a third of the Andamanese Islanders were swept away by measles. Whole populations have disappeared before smallpox and syphilis; and I suspect that

tuberculosis has had a marked, but as yet undetermined, effect on the world's history." ³⁶

Malaria is not considered a virulent disease in modern times, because we have a specific in cinchona. Among nature-peoples, it often proves very disastrous, especially when newly introduced.

"A fever visitation about the year 1830 was officially estimated to have killed 70,000 Indians in California, while at about the same time a malarial fever epidemic in Oregon and on the Columbia river, ravaged the tribes of the region and practically exterminated those of Chinookan stock." ³⁷

Dr. G. Archdall Reid attributes the disappearance of most nature-peoples to the epidemic effect of diseases, introduced among them by civilized men, among whom they are endemic. The virulence of a disease among a people is in inverse ratio to its racial training for it. ³⁸

From the facts cited it is evident that diseases like malaria, which are newly introduced into a population are epidemic in character, and therefore virulent, causing great mortality. They become endemic in the course of time and, while not responsible for many deaths directly, gradually undermine vitality and produce degeneracy. It is necessary now to prove that these conditions existed in ancient Greece.

(4) When was malaria introduced into Greece, or rather Athens?

Modern Greece is exceedingly malarious; the percentage of infected persons varies from almost zero in a few localities to almost 100 in others; in the Greek army the lowest percentage was 27.8 in 1902 and the highest 44.8 in 1898 during the decade 1896 to 1905. ³⁹

"Modern Greece is intensely malarious. In the Copaic Plain, examined by me last year, I estimated that quite half the children

were infected, even in June before the annual malaria season had commenced. The Attic Plain is, and probably always was, much healthier owing to its dry climate; but numbers of other plains and valleys are certainly as bad as the one I studied. The Grecian Anti-Malaria League has collected excellent statistics on the subject, and these have been published by Drs. Savas, Cardamitis, and others. For instance it has been estimated that in the unhealthy year 1905, out of a total population of only about two and a half millions, nearly a million people were attacked with malaria, and nearly six thousand died. Blackwater fever, the worst form of malaria, is exceedingly common. I have never seen, even in India and Africa, villages more badly infected than Moulki and Skipou in the Copaic District. The Greek Army is as heavily infected as was the Indian Army until the last few years." ⁴⁰

The malarious character of modern Greece does not, of course, prove that ancient Greece was likewise infected. Two conditions are necessary to make a country malarious, the presence of mosquitos of the species anophelines, and the existence of malarial parasites in human beings. Without either of these conditions malaria is impossible. Sir Patrick Manson describes the introduction of this disease picturesquely.

"Imagine an island in mid-ocean, far away from any malarial continent. It has its own special insect pests, mosquito among them, but there are no anopheles. Malaria therefore is unknown. On an evil day for the island a fast-steaming ship arrives and introduces—perhaps as larva in a water-tank, or in a neglected water-bottle in some unoccupied passenger cabin, or otherwise—the cursed insect. The hydraulic and climatic conditions are favorable and the anopheles multiply apace. Presently in some coolie laborer from India or China, or in some native returned from service in a foreign country, or in a sailor, or traveler, malarial gametes come on the scene. The anopheles, now numerous, become infected, the inhabitants get malaria, and the island, formerly noted for its salubrity, becomes a byword for unhealthiness.

This is no fancy picture. For centuries after its discovery and colonization Mauritius was noted for its beauty, its delightful climate, and for its salubrity. There were no anopheles there in the days of Paul and Virginia. Situated in the middle of the Indian Ocean, far away from continental influences, it enjoyed an equable climate well suited to recruit the broken-down, anæmic constitution of the victim of tropical disease. So high was its reputation for salubrity that up to the early sixties, in times when Europe was not so accessible as it is at the present day, it was used as a sanitarium by the British in India. Of course many of the invalid soldiers and civilians who visited the island and many of the imported Indians who labored on the extensive sugar plantations for which Mauritius was famous, must have introduced, since without number, malarial parasites. In those happier days, there being no anopheles present, any imported parasites did not spread, they died out. But about the time I mention, that is to say, in the early sixties, anopheles were introduced; how, is not known. Gradually they spread over the island, carrying the malarial germ with them. A big epidemic was the consequence, and now malaria is endemic in Mauritius, and large areas of this former sanitarium are extremely unhealthy.

“With the increasing opportunities of these modern days for rapid travel and communication, many islands and isolated districts at present healthy will at no distant date share the fate of Mauritius unless, before it is too late, effective measures are taken to prevent the introduction of anopheles.”⁴¹

The island of Mauritius proves that a definite date may be fixed for the introduction of this disease; the specific year as given by Major Ross is 1866.⁴² Can an equally definite, or at least approximate, date be given for the entrance of malaria into Attica? Opinions are divided on this point. Deaderick seems to incline toward a belief of the early existence of the disease in Greece.⁴³ Manson, too, is of that opinion, since “The history of malaria goes back to times of remotest antiquity. Already in the fifth century B.C., Hippocrates recognized the existence of periodic fevers, and divided them into quotidian, tertian,

sub-tertian, and quartan. Galen, Celsus, and other Roman writers also gave accurate descriptions of these fevers." 44 Jones, who has worked particularly on this problem, inclines toward the introduction of malaria into Athens about the year 425 B.C. But, suppose the disease had existed from early times; that would not necessarily prevent good health of the Athenians, since the cases might be few and mild owing to particular circumstances. Major Ross argues this point as follows:

"Suppose that the anophelines have been present from the first, but that the number of infected immigrants has been few. Then, possibly, some of these people have happened to take up abode in places where the mosquitos are rare, others may have recovered quickly; others may not have chanced to possess parasites in suitable stages when they were bitten. Thus the probability of their spreading the infection would be very small. Or, supposing even that some few new cases, infections, have been caused, yet by our rough calculations in section 12, unless the mosquitos are sufficiently numerous in the locality, the little epidemic may die out after a while . . . for instance, during the cold season. And, if the number of infected persons introduced from outside remains small, *this state of things may continue for years or centuries . . . the disease will fail to make headway* and will die out. Now, suppose that the number of infected immigrants is suddenly greatly increased. Then much larger numbers of mosquitos will become infected, and may in their turn infect more healthy people than the recovery rate will compensate for. Endemic cases will begin, will increase; at first slowly, then rapidly, until suddenly there will be a widespread epidemic." 45

Mr. Jones bases his argument for the comparatively late introduction of malaria as a prevailing disease on four facts. I. The absence of references to malaria by non-medical writers prior to 500 B.C., excepting two doubtful cases. One of these occurs in the *Iliad*, XXII. 31 under the name of "fever," and may be explained

by a reference to the coast of Asia Minor.⁴⁶ The other is found in Theognis (550 B.C.), under the name of "ague." This may refer to Megara, where the poet lived as a supporter of the oligarchical party, or to Asia Minor.⁴⁷ II. On the increasingly frequent references to malaria by both medical and non-medical writers after 425 B.C. The first of these is made by Aristophanes in the *Acharnians* (425 B.C.), and the second in his *Wasps* (422 B.C.).⁴⁸ Plato in the *Timæus* (between 380-360 B.C.) speaks of quotidian, tertian, and the quartan fevers. Aristotle's works contain numerous references to malarial fevers. Hippocrates (born about 460 B.C.), treats of malaria both in the *Corpus*, and in the *Airs, Waters, Places*, and gives the division of malaria quoted previously by Manson. III. The introduction of the cult of Æsculapius in 420 B.C. at Epidaurus, which, by the way, is very malarious today, having in some parts nearly 100 per cent of its population infected.⁴⁹ This certainly implies that ill-health was common. The suggestion that it was caused largely by malaria is strengthened by the frequency with which the votive offerings of the Greeks, after illness, took the form of a representation of the abdomen, since the malarial spleen, which not infrequently reaches the weight of 70 or 80 ounces, over against 5 to 7 ounces for the normal, would be very noticeable, and the consequent enlargement of the abdomen would certainly make a great impression on the non-medical mind.⁵⁰ IV. The more numerous points of contact of the Athenians, both through war and commerce, with other nations. They undertook the disastrous expedition into Egypt—one of the ancient malaria plague-spots—in 450 B.C. During the first Peloponnesian War (431-404 B.C.) their armies and navies were to be found in nearly every part of Greece and of the Ægean Sea.

In 425, they were in the island of Sphacteria which, at least at present, is one of the worst malaria centers in the Mediterranean. From 415-413 they were at Syracuse, where this disease existed, and sickness and want caused them much distress. In 399 the Ten Thousand—reduced to 8,000—returned after their march through many malaria infected parts of the Persian Empire. The case of Mauritius, cited above, illustrates how easily this disease may be introduced into a hitherto healthy community, although the contacts with the outside world were not nearly as varied and numerous in this case as those of Athens during these fifty years. Hence the conclusion that malaria was introduced into Athens during this period as a prevalent disease, seems very probable. Once introduced, it would have its baneful effects. General Gorgas also holds that Greece was free from malaria prior to 500 B.C. for reasons similar to those of Mr. Jones.*

(5) How did malaria affect the Greeks?

Under the first question a number of injurious effects from malaria were cited; these may now be supplemented in the case of the Greeks.

“The degradation of those who inhabit malarious places was carefully recorded by Hippocrates. He states that those who live in low, moist, hot districts, and drink the stagnant water, of necessity suffer from enlarged spleen. They are stunted and ill-shaped, fleshy and dark, bilious rather than phlegmatic. Their nature is to be cowardly and averse to hardship, but good discipline can improve their character in this respect.”⁵¹

Plato, in the *Timæus*, declares “that the humors of acid and salt phlegms, and such as are bitter and bilious, when no outlet for them from the body can be found,

* *The Scientific Monthly*, August, 1916, p. 133, “Ronald Ross and the Prevention of Malarial Fever.”

befog the soul and produce manifold vices—peevishness, melancholy, rashness, cowardice, forgetfulness, and stupidity.”⁵²

Jones makes this statement about Greece after the fourth century before Christ:

“Gradually the Greeks lost their brilliance, which had been as the bright freshness of healthy youth. This is painfully obvious in their literature, if not in other forms of art. Their initiative vanished; they ceased to create and began to comment. Patriotism, with rare exceptions, became an empty name, for few had the high spirit and energy to translate into action man’s duty to the state. Vacillation, indecision, fitful outbursts of unhealthy activity followed by cowardly depression, selfish cruelty, and criminal weakness, are characteristic of the public life of Greece from the struggle with Macedonia to the final conquest by the arms of Rome.”⁵³

The children are the worst sufferers from malaria until at least the age of adolescence, when they become partially immune. The effect which these repeated attacks of an everlasting and ubiquitous incubus must have on a people is well described by Ellett.

“It would seem that this disease with its constant drain upon the resources of the growing body, must put a check upon the development, physical and mental, of each successive rising generation. Viewed from an entirely medical standpoint, the question can admit of no doubt. The succession of febrile attacks would alone be a serious tax upon the growing child; while the consequent anæmia, which so soon makes its appearance, must make the child incapable of prolonged application, and rob him to a large extent of his powers of mental receptivity. It is only too evident that in a few generations a type of man possessing extraordinary mental and physical powers, may become under this scourge of malaria greatly altered and debased. If it be that the malarial parasite was introduced into Greece during the fifth century B.C., it is quite possible for the disease, running a practically unchecked course, to have

produced the profound deterioration which occurred in the Greek character during the next century and a half."⁵⁴

(6) Why were the effects so disastrous?

The pernicious effects of a newly introduced disease have been explained previously under the third question. In the case of the Greeks there were special and additional reasons why malaria should assume such a virulent character. The great plague of 429-427 B.C. was an indication that sanitary measures in Athens were inadequate. These conditions were favorable for the breeding of mosquitos, and all that was needed was a number of infected persons coming from infected regions to spread the disease rapidly. During the Peloponnesian War, Attica was invaded and laid waste almost constantly, and the country-people had to take refuge in the city; food had to be imported from abroad. These facts brought about a crowding of the population, and a few infected persons would suffice to spread malaria quickly. This was especially the case during the latter part of the war, when the Spartans had permanently occupied Decelea in 413 B.C., and the country people had to live not only in the Piræus where they were constantly subjected to new infections, but between the long walls. The food supply must often have been scanty, and this may have been a predisposing factor to cause a greater virulence of the disease, since the power of resistance would be less.

Another factor was the absence of a specific. *Cinchona* is absolutely necessary in the treatment of malaria; and this was introduced into Europe in 1640. It was prized very highly, since Louis XIV, who was attacked with a rebellious and severe intermittent malarial fever in 1679 and cured by Talbot with a concentrated vinous tincture of the bark, paid 48,000 pounds sterling for the secret and gave a life annuity of 2,000 pounds to Talbot.⁵⁵

The Greek peasant of today values quinine almost as much as his bread, and the government has formed a monopoly to insure its purity at a moderate price.⁵⁶

Without this specific the ancient Athenians had but little chance to combat the disease, since they did not apply the only other possible remedy—the draining of swamps and the elimination of small pools—sufficiently, because they, while being aware in a general way of the relation between malaria and swamps, had no idea of the rôle of the mosquito in the transmission of the disease. Hence they were not only in both these respects handicapped, but also unable even to know what to do to fight the disease effectively.

CHAPTER VII

HEALTH AND ANCIENT ROME

It is not as easy to fix the date of the introduction of malaria into Rome as it was in the case of Athens. Jones⁵⁷ gives the second Punic War (218-204 B.C.) as a possible date. Thomas Ashby, the Director of the British School of Archæology at Rome seems inclined to an earlier date.

“What had previously, it seems, been a well-peopled region, with peasant proprietors, kept healthy by careful drainage, became in the fourth and third centuries B.C. a district consisting in large measure of huge estates (*latifundia*) owned by the Roman aristocracy, cultivated by gangs of slaves. This led to the disappearance of the agricultural population, to a decline in public safety, and to the spread of malaria in many parts; indeed it is quite possible that it was not introduced into Latium before the fourth century B.C. The evil increased in the later period of the Republic, and many of the old towns of Latium sunk into a very decayed condition . . . Cicero speaks of Gabii and Fidenæ as mere ‘deserted villages,’ and Strabo as ‘once fortified towns, but now villages, belonging to private individuals.’ Many of the smaller places mentioned in the list of Dionysius, or the early wars of the Romans, had altogether ceased to exist, but the statement of Pliny that fifty-three communities (*populi*) had thus perished within the boundaries of Old Latium is perhaps exaggerated. By the end of the Republic a good many parts of Latium were infected, and Rome itself was highly malarious in the warm months.”⁵⁸

Evidence from contemporary writers is, however, sufficiently plain to make the existence of malaria certain.

Plautus (died 184 B.C.) in the *Curculio* refers to it with the question: Did a fever leave you yesterday or the day before? And Terence (died 159 B.C.) refers to *quotidian fever* in the *Hecyra*. M. Porcius Cato (died 149 B.C.) has left a treatise "on agriculture" and speaks in Chapter CLVII of what to do "In cases of black bile and swollen spleen." The conjunction of black bile and enlarged spleen are fairly clear symptoms of malarial cachexia.

"From Cato to Cicero (106-43 B.C.) is a long interval, and one which has left us but a few fragments of literature. It may, however, be noticed that Q. Fabius Maximus, who was consul in B.C. 121, suffered from malaria, if we may trust the story told by the Elder Pliny. But in Cicero is found frequent mention of tertians and quartans, and his contemporary, Varro (118-29 B.C.) declares that in marshy places 'créscunt animalia quaedam minuta, quae non possunt oculi consequi,' and that these minute creatures, entering the body by the mouth and nostrils, produce 'difficiles morbos.' From the time of Cicero most writers mention malaria in unmistakable language, and it certainly had become, by the Christian Era, a disease with which the Romans were perfectly familiar. The physician Celsus (about 50 A.D.) almost confines his discussion of fevers to the intermittents, so that in his book, *febris* is practically equivalent to malaria."⁵⁹

The prevalence as well as the existence of malaria in ancient Latium is, then, an indubitable fact. Even if it existed there prior to 200 B.C., there are many features in Roman history, which point to an accentuation of the disease after that time. Rome commenced her permanent expansion beyond the borders of Italy with the second Punic War; she sent her armies into Africa, Carthage, Egypt, and various parts of Asia, and occupied Greece and Sicily. But all these countries were malarious; some of them were badly infected. The armies would

return home with the disease, spread it, and in a short time it would become endemic. The prisoners, too, coming from many infested districts, would help in spreading the disease, especially in the country districts where many of them went as slaves. It was, perhaps, in this manner that the large estates of the Roman gentry became so thoroughly infected that many parts of Latium became uninhabitable.

Economic and political causes assisted in the spread of malaria. The creation of the large estates brought many small landowners to Rome, where they helped in increasing the ranks of the plebeians. The result was that the city became constantly more congested, and the country districts depopulated. The colonists who were sent out into the newly conquered provinces were the more energetic and enterprising farmers, and that deprived the country districts of the best elements. The remainder went to the city and increased the rabble in the metropolis. Without occupation and without regular means of support, these malaria-stricken people sank lower and lower still; they became the followers of every demagogue who promised *panem et circenses*, or rich booty from the slaughter of the patricians and the conquered peoples. In the course of time the upper classes were infected, and a general deterioration of Roman character commenced.

A debased vitality is the only explanation of the atrocities of the continuous civil wars, of the butchering of conquered peoples during the first century B.C., the crucifixion of slaves for seeking even a semblance of human rights, and the shamelessness of the women at and around the court of the first emperors.

“Every now and then the modern world is shocked by atrocities committed by white men in tropical regions. Humanity and

justice seem to be forgotten; civilization and education are powerless to prevent furious outbursts of savagery. How much of this is due to the baneful influence of malaria is known only to those who have an intimate acquaintance with the disease. Something of the same kind happened in Rome. Malaria made the Greek weak and inefficient; it turned the sterner Roman into a bloodthirsty brute. The terrible pictures of life in the first century A.D., as painted by Tacitus and Juvenal, show that Roman society was not only wicked but diseased. The extravagant cruelty, the wild desire for excitement, the absence of soberness and self-control, all point clearly to the same physical defect." 60

A change in the fundamental characteristics of a people is much more serious than any other, and such a change is exactly what malaria will produce. Just because it is a disease only occasionally fatal when endemic, it is neglected, and exerts its harmful effects insidiously upon many individuals, and through them upon the life of society and of future generations by reason of poor heredity through lowered vitality. Continued through a number of generations, this process must bring about extinction. A disease of this kind slowly saps the energy and vitality of a people, until there are none left to continue the struggle. For while other diseases, like the plague or acute attacks on single organs, brace a people by weeding out the unfit, a slow disease like malaria seizes all, fit and unfit alike, until a greatly depleted vitality must end in extermination.

NOTE: Just as this manuscript was going into the printer's hand, a new book by Ellsworth Huntington, *World Power and Evolution* (New Haven, 1919), appeared. While its author tries to establish the climatic theory—to be discussed in Chapter X—as the chief cause of the rise and fall of nations, he admits on pages 200 and 201 that malaria was a serious contributory factor in the change of the Roman character, accepting the theory first propounded by W. H. S. Jones. It is of interest to notice that he places the climatic change which started the decline of Rome at about 225 B.C., which would coincide

with Dr. Ashby's date and precede that of Jones by seven years.

In discussing the backwardness of Turkey he likewise admits the importance of malaria as a cause and suggests the elimination of it as a remedy (pp. 223-6). This seems to be inconsistent with the climatic theory as the chief cause since climate is beyond our control, while malaria is not.

CHAPTER VIII

EFFECTS OF ILL HEALTH ON THE CLASSICAL WORLD

THE effects upon the classical world of this sapping of vitality are fairly clear, even though the argument be not strictly conclusive in every respect. There were certainly other factors which contributed to the downfall of Greece and Rome. These were, however, secondary rather than primary. For as long as a people preserves its vitality and abounds in health, it will not accept its doom at the hands of others without an attempt at resistance. It is the sick man who resigns himself to his fate; it is the defeated party that invents a theory to account for the result. The well man will struggle to preserve his ideals and his individual and political identity; he will, if he philosophizes at all, think out a course of action to deflect the blow and to avert the evil, and, perhaps, later, return thanks to the gods for his deliverance.

It is only on the basis of a greatly depleted vitality and of greatly diminished numbers, that we can explain the attitude of the Greeks toward their misfortunes. To take up the last point first.

The internecine conflicts of the Greek communities, the deadly struggles of the various factions in the majority of the cities, and the numerous wars with foreign powers, had obliterated vast numbers of the old race of free citizens by the beginning of the Roman period. The extermination of the Platæans by the Spartans and of the Melians by the Athenians during the Peloponnesian War,

the proscription of Athenian citizens after the war and the massacre of the Corcyræan oligarchs by the democratic party, the slaughter of the Thebans by Alexander and of the Corinthians by Mummius, are only a few of the more familiar instances of the catastrophes which overtook the civic element in the Greek cities. Just how greatly the free citizens had diminished in numbers by the close of the first century after Christ, may be judged from the estimate of Plutarch that all Greece could not furnish more than 3,000 hoplites. All this must be admitted; it is nevertheless not the true, at least, not the full explanation. The strife of factions in cities and internecine wars had existed before, and been perhaps more sanguinary, if we may judge from the razing of conquered cities; yet the number of free citizens did not diminish, but rather increased from the time of Homer to that of Pericles, if comparisons of military strength are to be trusted. Homer credits the united Greek forces with 100,000 men; in 415 B.C., the Athenians alone were able to send—after losing, according to Grote, 4,400 hoplites in the plague of 430 B.C., and after sixteen years of almost continuous fighting in the Peloponnesian War—36,000 men, including 5,100 hoplites to Syracuse, and reënforce this army with 5,000 hoplites two years later. This force was almost completely lost, yet Athens continued the struggle; and even after the slaughter of 3,000 of her soldiers by Lysander in 405, she resisted Sparta for another six months, and only a few years later Xenophon had no difficulty in collecting 10,000 men for an expedition into Asia at the invitation of Cyrus. All these losses through war were heavy, but they are not the full explanation of the later submissive attitude of the Greeks toward their conquerors.

We must, then, look for another cause to explain the

decay of Athens. A people that had blended the ideals of manhood and of national renown, and of national and personal integrity; that had produced the greatest number of famous men in every field within so short a time with such a small population; that had taught the lessons of restraint and imbued its members with a sense of willingness to surrender for the sake of these ideals so many opportunities and pleasures, according to the funeral oration of Pericles—a people, in short, that had conceived a clear ideal of what a man and a State ought to be and had proved its validity on many a battlefield, must have been healthy both physically and mentally. The average Athenian was joyous, but did not abandon himself to pleasure, because a healthy body enabled him to keep the balance which his philosophy taught him to constitute true manhood. This man knew how to combine action with contemplation; how to use the facts of life for enriching his personality and becoming a more useful citizen. He had leisure, but he used it for the State and not for self-indulgence. It was this combination of a proper amount of action and contemplation, or of the Dionysian and Apollonian ideal as Nietzsche called it—each enriching the other—that gave the Athenian of Pericles' age the self-control and harmony, which enabled him to become highly efficient in all lines both as an individual and a citizen.

Yet, but a hundred years later the "Philippics" of Demosthenes went unheeded by the Athenians who were justly stigmatized as consisting in great measure of salaried paupers. They talked about what they were going to do, but preferred to dwell in contemplation of the glory of their ancestors. Apollo had completely replaced Dionysius in the affections of the Greeks.

Such a radical change could not have taken place

within so short a time unless for physiological reasons. The policy of paying small salaries to the citizens to enable them to give their time to public affairs, may have been instrumental in producing a deterioration of character. A healthy man will, however, render some service for such salary. The very fact that he is content to take something without rendering a *quid pro quo* is an indication that he is a *pauper*—a physically and mentally diseased person who has lost his self-respect and is content to live on the labor of others. It is evidently a case of physical degeneration. How was that brought about?

Major Charles E. Woodruff has expounded an interesting theory in his book *The Effects of Tropical Light on White Men*. It is briefly stated as follows: Every animal and race of men has a *zoölogical zone*, in which they develop and prosper, but which they may not leave with impunity. The actinic or short rays of the sunlight destroy living protoplasm; these short or violet rays are more numerous in strong or tropical light; hence skin pigmentation was evolved for the purpose of excluding these rays. The zoölogical zone of the blonde, tall, long-headed type is northwestern Europe, chiefly Scandinavia, where the conditions were most favorable for its development—a dark, cold, severe climate. Coldness and severity taxed the ingenuity of the early inhabitants of these regions, and developed brain-power; the darkness and cloudiness made superfluous the development of pigmentation. This highly intellectual people is responsible for all the civilizations from India to England, since it spread in every direction owing to the pressure of sustenance, and became the ruling class everywhere by subjecting the native races. But they could not survive in lower latitudes owing to the lack of pigmentation, and died out before they could acquire it. The ideas upon

which their civilization was based, survived, however, at least for a time; but soon became mere dead formulæ in the hands of the darker indigenous peoples, and civilization decayed. The Greeks and the Romans were both of this stock, coming from the north at different times, and creating the respective civilizations on the basis of slavery. They were unable to acquire sufficient pigmentation and became literally extinct, since the modern Greeks and Italians are, according to Major Woodruff, the descendants of the older, brunette type of man which was unable even to continue the civilization created for him by his fair-haired and blue-eyed northern masters.

The problem of Greek and Roman degeneration would, according to this theory, be solved by complete extinction, owing to inevitable decay out of one's zoölogical zone. It would take too much time to criticise this theory in detail. Two questions only need be asked. Why was it, that Scandinavia, the original home of these peoples, was the last country in Europe to be reached by modern civilization, if this Scandinavian or Teutonic type of man was the only creative genius of mankind? Again: how was it possible for this hardy race to survive the southern climate for at least a thousand years in Greece and about seven hundred years in Italy, and then suddenly collapse within a century? For Major Woodruff places the earliest Teutonic migration about 2000 B.C., that of the Dorians about 1200 B.C.,⁶¹ and that of the Romans about 800 to 700 B.C.⁶² That both people degenerated rather rapidly, the Greeks after 400 B.C. and the Romans after 200 B.C., seems to admit of little doubt after the proofs which have been furnished. Even admitting Woodruff's theory, there must have been another cause at work to explain the rapidity of degeneration, or perhaps extinction.

The introduction of a new disease, epidemic at first and then endemic, which gradually undermined the vitality of the people, seems to be the only explanation. Malaria has that effect and was introduced into Athens about 75 years before the decline of Greek character becomes noticeable. If this theory is accepted, the decline of Greek civilization can be readily explained.

Greek civilization was built on slavery. There was the numerically small but physically and mentally strong class of free Greeks, who devoted themselves to intellectual and warlike pursuits, and were of a superior race. This was evident from the fact that in Sparta the ruling class consisted of only about 9,000 families who held in check and exploited the Helots numbering about 200,000, and drew tribute from the Perioeci numbering about 120,000. A Spartan must, therefore, as a fighter, be as good as ten slaves. In Athens we have a similar situation. During the time of Pericles there were in Attica about 90,000 free-born Athenians, 300,000 slaves, and 40,000 Metics or resident foreigners who paid for the privilege of residence. A census taken in 309 B.C. by Demetrius of Phalerum gave the numbers as 21,000 citizens, 10,000 Metics, and 400,000 slaves.* The significant feature in this change is the reduction in the number of Metics. What had become of them? Had they departed with the decline of Athens, or had they replaced native Athenians? The latter alternative seems the more probable, because the number of free Athenians had not changed appreciably, since 21,000 citizens in 309 B.C. is approximately equal to the 90,000 free-born population of the time of Pericles. The explanation may be found in the fact that

* The number of slaves cannot be ascertained definitely, since the state was not interested in them, but only in citizens and taxpaying Metics. Hence there are only estimates, which run all the way from the figures given to as low as 180,000.

a larger number of Metics had received citizenship than was provided for by the reforms of Cleisthenes in 509 B.C. Owing to the large mortality of Athenians in war and through disease, the number of citizens had become very small, and the depleted ranks could be filled only from the Metics and to some extent from the slaves. That means a considerable change in the constituency of citizens, although it need not surprise those who are accustomed to similar changes in New York, Boston, and Chicago through immigration. In each case an older population was supplanted by a new, and in the case of Athens, by an inferior, race. Whereas formerly citizenship was conferred only in rare cases on foreigners who were exceptional individuals, and the high standard of civic efficiency was thus maintained, the new situation called for naturalization on a large scale. The question is still to be answered, however, why the ranks of the native Athenians were depleted and not those of the Metics and slaves. Two answers should be given.

The citizens were drawn into military service and suffered heavily during the numerous wars as has been indicated before. The Metics and slaves suffered hardly at all from this source. The more important factor is, however, that which concerns disease. The Metics were mostly Asiatics, and the slaves were mostly Asiatics or Africans and only to a small extent of Hellenic origin. The Asiatics and Africans came from regions where malaria had long been prevalent, and were at least to some extent immune; they suffered, consequently, much less from this disease than the native Athenians. A disease, as explained before, always causes more sickness and greater mortality in a population which is not accustomed to it. This is well illustrated in Mauritius, where malaria was responsible for 30,000 deaths in 1867—out

of a population of about 310,000 in 1861—whereas cholera, a more mortal but more usual disease in that island, killed only 17,000 persons in 1854 in a slightly smaller population.⁶³ There is no record, of course, of a similar mortality in Athens, but the ravages of malaria must have been severe and the ultimate effects far-reaching, if one may judge from what is known about that disease. In order to fill up the depleted ranks of citizens, Athens became less discriminating in conferring citizenship and admitted many Metics and slaves to its rights. The citizens of the time of Demosthenes were, consequently, a largely non-Hellenic body; or, if Hellenic, so weakened by malaria that they had lost the buoyancy and confidence which were such marked characteristics of their forbears.

The situation about the third century B.C. was, consequently, very different from that of the end of the fifth. The citizens of Athens consisted largely of foreign, that is, of inferior stocks. The more energetic Greeks had emigrated to other parts along the Mediterranean where they spread their culture. It is remarkable that so many Greeks flocked to Alexandria in the third century and that this city became famous for its culture in so short a time. An explanation may, perhaps, be found in the fact that it was a healthy city and that Greek emigrants found here a climate not too radically different from their own. For Strabo (63 B.C. to 24 A.D.) tells us that, notwithstanding its location, it was free from marsh-fever even in his time.⁶⁴ The radical change in the character of the population, brought about by disease, explains to a large extent the shallow productions of the later Greeks. Menander (342-291 B.C.) wrote not only immoral, but stupid and insipid plays. "If there be any moral lesson conveyed by the picture we have here of

Attic society, it is this: that the slave and the prostitute were not only more intelligent, but less immoral than their masters." ⁶⁵ This stricture would certainly apply more to Asiatics, such as the Athenians had largely become, than to the descendants of the victors of Marathon and Salamis. The Asiatics were the fittest to survive in this particular environment; but the best under conditions of this kind was but poor material. The crab apple lives and thrives in Siberia; it is, however, a poor substitute for the luscious pippin of the Mohawk valley where the climate is better. The more serious Greeks were driven into anti-social philosophies at home, the more active men into mercenary service abroad, while the most energetic men had emigrated to Alexandria. A mob, recruited partly from the Metics and partly from the slaves, ruled Athens; and the follies and violences of stupid and corrupt demagogues were directly responsible for the disastrous conquest by Mummius. Small wonder, that this new type of Greeks was held in contempt by the Romans. It was a race of degenerates. It could not produce, so it began to comment. It could not originate, so it began to traffic in the knowledge of Plato and the poetry of Homer. The *homines* still lived but the *viri* were dead.

The case was somewhat different with the Romans. They have always been more coarse, physically and mentally. Their decline was, therefore, less rapid, but not less certain. An important feature in their longer life as a nation was the larger extent of their country, and the consequent greater number of malaria-free spots. Greece has even today some of these. But they were of no help to the Athenian, since he could not leave his own little City-State without trespassing on foreign and hostile ground. Owing to the size of his country, the

Roman could go north and south ; he could, in any case, go into the mountains and escape the most dangerous attacks of malaria. Thus the custom arose among the wealthy Romans of having villas in the Apennines, whither they would retreat during the summer and autumn. This was, however, only a temporary relief confined to the rich. The vast majority had to stay in the valleys and in Rome, where the air was not only hot and humid, but full of mosquitos, carrying the malaria parasites from person to person. The infection soon produced its effect upon the Romans. They became a tainted and debased folk, penned up within the walls of the city. The average Roman deteriorated physically to such an extent, that, as Strabo tells us, the legions had to be recruited from Liguria because of the massive physique of these people.⁶⁶ When these were infected and had deteriorated, the Romans looked beyond the borders of Italy, and Gauls, Spaniards, Istrians, and Germans were enrolled in the legions. A number of prominent men of letters were foreigners ; during the first century A.D., there were, for instance, four Spaniards, Lucan, Martial, Seneca, and Quintilian. The foreign-born emperors increased in number. This new blood from malaria-free countries, was infected in time, and every new infusion shared the same fate, till the Roman Empire fell to pieces. Again, as in Greece, there were other factors ; but this disease was the original reason of Roman decay and gave fuller scope to other disintegrating factors.—The frequency with which German conquerors were attacked and killed by fevers in Italy during the Middle Ages needs merely to be mentioned here as a well-known fact. Time and again important events were decided by an attack of fever which either killed or caused the hasty removal of the leader to Germany.

The final result was that the builders of the Roman Empire either died out, or degenerated, and were replaced by foreigners. In subsequent centuries the population grouped itself chiefly with respect to its power of resistance to malaria. The southern parts were settled chiefly by the Mediterranean races which came from regions where malaria was endemic, and who were, owing to their partial immunity, able to maintain fair health in these highly infected regions. The northern parts—less infected—were settled chiefly by various Alpine races and to some extent by the Teutonic race, and were able to maintain good health. In between these were representatives of both races, health depending partly on the particular locality, and partly on the degree of civilization. The point which these facts bring out is the necessity of good health, especially freedom from endemic diseases, for a progressive civilization. In the north of Italy, certain cities, *e.g.*, Turin, Milan, Genoa, Venice, Bologna, Florence, and Pisa, have for centuries stood for art, science, literature, advanced agriculture, and manufacture. From here have come during the nineteenth century, the greatest Italians—Cavour from Turin, Garibaldi from Nice, Mazzini from Genoa, and Victor Emmanuel from Savoy.

Rome owes its importance largely to artificial factors, historical, administrative, and ecclesiastical; it has, however, become practically free from malaria owing to better drainage and sanitation, and to more efficient medical supervision. Southern Italy is, as far as anything pertaining to progress is concerned, practically unknown. This backwardness may, of course, be due to racial factors. If so, it is the more important that these races should be liberated from the endemic diseases which have in all probability made them what they are.

The Greeks and the Romans degenerated through malaria. If more highly gifted races lose their creative power, or even their health through malaria, it is evident, that those who have always been subjected to its influence, can never rise to the full power of either of those races. It is impossible that a race whose children are infected regularly every one or two years after birth, and are subjected to the drain of this insidious disease, its long succession of febrile attacks and constantly increasing anæmia, should develop well-balanced individuals. They may be immune to malaria after adolescence, but the drain on the growing body is, as a rule, too heavy to permit of full, buoyant, joyous health, which is needed for higher mental pursuits. A weakness, making the nervous system highly sensitive, will always remain; persons afflicted in this way may become very receptive, but they cannot become creative because there is not a sufficient surplus of vitality stored up. Only those who have closely watched or experienced the ravages of malaria can possibly know the lack of freedom from which the patients suffer. They vary constantly between elation and depression, hence are always under the sway of physiological conditions and emotions. They cannot be self-controlled, because they have no surplus energy; hence the particular feeling always controls, whether it is elating or depressing. It could indeed hardly be otherwise. When the system is constantly on the defensive, and is attempting, so to say, to fill in a bottomless hole, it cannot develop that surplus of vitality, so necessary for control by the whole organism. The chief function of such a system must be to stop leakage, and that means inability to develop poise and balance. In Plato's terms, the particular organs claim too much attention in proportion to the importance of their function. This is the

chief damage which malaria and other low fevers inflict upon the race and the individual, and consequently upon civilization; since races, thus handicapped, can never be creative or progressive.

CHAPTER IX

HEALTH AND THE TROPICS

AFTER viewing the effects of malaria, particularly on the classical world, it will be necessary to consider another endemic disease in a larger field,—hookworm in the tropics and sub-tropics. This will enable us to get a better idea of the devastating effects of such a disease, since we can study them in a much larger field.

The tropics have always been unhealthy, and the Germans have succinctly expressed this fact in the statement: "Unter Palmen wandelt niemand ungestraft." Formerly these unhealthy conditions were attributed chiefly to the heat and, more recently, to the actinic rays of the sun.⁸⁷ Physicians, studying conditions on the spot, have found, however, that endemic diseases are chiefly responsible for the unsanitary character of the tropics. The hookworm is, in addition to malaria, one of these, and its discovery is one of the most important events not only in the annals of medicine but in the world at large.

The hookworm disease (anchylostomiasis or uncinariasis) has been definitely known as to symptoms for three centuries. As early as 1648 Piso spoke about it in Brazil, Father Labat in Guadeloupe, 1748, and Bryon Edwards in Jamaica, 1799. But not until 1838 were the worms found by Dubini in Milan and their connection with the disease suggested, although similar worms had been found in the badger by Goeze in 1782 and named hookworms or uncinaria by Froehlich in 1789. Since then the disease has been extensively studied by many

physicians, among whom may be mentioned as the most prominent: von Siebold, 1845; Bilharz and Griesinger in Egypt, 1853; Wucherer, supported by Brazilian physicians in Bahia, 1866; Paletti and Maliverria in Italy, 1877-78, also Grassi and Parona, 1877. In America the disease was referred to as early as 1808 by Joseph Pitt, and by J. L. Chabert in 1821, both of whom described the desire for dirt eating on the part of whites and blacks, although neither was aware of the hookworm. In 1834 Geddings noticed similar symptoms in the anæmic and cachectic "sand-lappers" of Carolina. The dirt eaters of Florida were described by Little in 1845, and similar cases in Alabama by Sir Charles Lyall in 1849. James B. Duncan gave a fuller description of cases in Louisiana in 1849. None of these men were aware that they were dealing with an extensive disorder.

In 1866 the worms were noticed by Dr. Joseph Leidy who thought they might infect man and cause anæmia. In 1891 Dolley called the attention of physicians to the fact that the disease was prevalent in the South, and other physicians reported several cases from 1894 to 1901, notably Allen J. Smith in Galveston who studied the ova in 1901. On May 10, 1902, Dr. Charles Wardell Stiles discovered a new species of the worm, *Uncinaria Americana* or *Necator Americanus*. Major Bailey R. Ashford suspected and proved the disease in Porto Rico in November, 1899 and published, with Dr. Walter W. King, a report of 100 cases in *American Medicine*, Sept. 5th and 12th, 1903. In 1904 a government commission was appointed for the study and treatment of the disease in Porto Rico. Meanwhile Looss, through investigations carried on in Cairo, Egypt, had proved in 1898 that the larvæ penetrated the skin of human beings, and thus pathology and treatment were made much easier.⁶⁸

The range of this disease is very extensive. The infection is rather prevalent in a zone about 66 degrees wide, extending from parallel 36 degrees north to parallel 30 degrees south; it occurs less frequently in higher latitudes, the extremes being 51 degrees north, and nearly 40 degrees south. Practically all countries lying within the zone of the 66 degrees mentioned, are heavily infected, while north and south of it cases are found chiefly among miners, for instance, in Hungary where 95 per cent of them were infected, or in Belgium where 10,000 miners near Liége had the disease in 1903. The Rockefeller Sanitary Commission received reports from 54 foreign countries stating the presence of the disease; in Wales, Germany, Netherlands, Belgium, France, and Spain, it is confined to miners and is found in few localities; but in 46 countries the infection is general and widespread. The more important of these countries are: Egypt with about 90 per cent of hospital cases in Cairo due to hookworm and about 50 per cent general infection among the laboring population; Algeria, where there is a considerable amount, although the percentage is unknown; and along the east and the west coast down to the Cape, in Uganda, Mombasa, Mozambique, Zanzibar, Madagascar, and Mauritius. In Cameroon 70 per cent of the population are infected. In the interior, Natal and other parts are seriously infected, although figures are not available.

Asia has many seriously infected areas; in Ceylon about 90 per cent of the people suffer from the disease; in India, between 60 and 80 per cent are infected; in China, the infection is variously estimated from 25 per cent for the city population to 75 per cent for the country population. In Cochin China the disease is extremely prevalent, and in the Malay states at least 60 per cent of the people

have hookworm. In Korea, about 70 per cent of the farmers and 50 per cent of the entire population suffer from the disease; in Japan cases of hookworm are frequent, but of a mild character. Burmah, Siam, Borneo, and Java have numerous and severe cases; according to some estimates the percentage in Java runs as high as 90 per cent in some localities. In the Pacific the disease occurs in many islands, on Samoa 70 per cent are suffering. In the Straits Settlements about 10 per cent, and on the island of Sumatra as high as 95 per cent have hookworm. In Australia the disease is found chiefly in the Johnstone River district of Queensland, where in one school 90 per cent of the children were infected.

Going over to South America, Argentina has but few cases; in Paraguay they become more numerous; and in Brazil hookworm is exceedingly prevalent. In the Guianas the estimate of the infected is about 50 per cent of the population. In British Honduras the percentage runs as high as 70. The Central American republics are severe sufferers from the disease—Panama, for instance, having 20 per cent of infected people. Concerning Colombia, the Rockefeller Commission reports as follows:

“In general, it may be stated that, with the exception of that portion of Colombia situated at a greater altitude than 3,000 feet, the entire country is infected with hookworm, and that within the infected areas about 90 per cent of the inhabitants are victims of the pest.”⁶⁹

In Mexico the disease is very prevalent, especially in the mining districts.

Coming to the United States and its outlying territories, we find that the Philippine Islands are seriously infected, the percentages in different provinces varying from 15 to 74 of the population. Porto Rico with a

population of about one million in 1904 had about 800,000 cases, while among the workers on the coffee plantations, the infection runs about 90 per cent. In Continental United States, all the states from Virginia to Florida and Texas, and as far west as California, are sufferers from this disease, particularly Alabama, Arkansas, Georgia, Louisiana, Mississippi, North and South Carolina, Tennessee, and Virginia; but cases are found in Kentucky, and other states along the Mississippi River.

The 46 foreign countries in which the infection is widespread, comprise 14,464,158 square miles, with 919,858,243 people. To this should be added 11 of our own states with an area of 510,149 square miles and a population of 20,785,777. This means that about 940,000,000 out of the 1,600,000,000 people on the globe live in countries where hookworm disease is prevalent.⁷⁰ These figures are, perhaps, too high; but even if they should prove to be somewhat lower, they would, nevertheless, be sufficiently high to act as a serious menace to the inhabitants of those countries, especially since in most of them, malaria is likewise very prevalent. These people live and multiply, but they lead miserable lives, and are unable to develop high vitality and fine brains.

The physical effects of hookworm disease are both numerous and serious. In moderate infections a lowering of physical and mental strength occurs. School children are seriously retarded by the disease, and are rarely able to accomplish more than 60 per cent of the required work.

“The worst cases are those in which there is a heavy infection. . . . Even well-to-do subjects become severely infected, but among the underfed the results are most serious. Either the patient becomes rapidly anæmic with digestive disorders, sometimes severe diarrhœa with hemorrhages, anasarca [dropsy],

and extreme debility, or the conditions may be more chronic. Indolence and weakness lead to careless habits, reinfection occurs from time to time, often the whole family becomes affected more or less seriously." ⁷¹

Dr. Charles W. Stiles says:

"The injury to patients results from the following factors, (1) Sucking of blood by the parasites, which is a constant drain on the system; (2) Loss of blood into the intestines through the minute wounds made by the parasites, the factor which also tends to deplete the system; (3) The wounds form points of attack for bacteria, hence increase of the chance of bacterial infection as well as toxic infection from poorly digested and decomposed food; (4) The wall of the duodenum and jejunum becomes thickened and degenerated, and its function is thus decidedly interfered with; (5) The parasite in all probability produces a poisonous substance which acts upon the patient." ⁷²

The drain upon the system is so severe in many instances that in cases of long standing, the patient is undeveloped physically and mentally. Physical growth may be retarded to such an extent that a boy or girl between the ages of 12 to 14 may present the appearance of a child 6 to 8; even young men or women of 18 to 22 years old may have the development of children from 12 to 16 years; and the appearance may be either childlike or senile, especially like that of elderly dwarfs. The reproductive powers are seriously interfered with and their development is very much delayed, especially in the case of women.

The mental effects are naturally more serious. Dr. Ashford says:

"Over all the various symptoms with which the unfortunate jibaro (peon) infected by uncinaria, is plagued, hangs a pall of drowsy intellect, of a mind that has received a stunning blow. There is, to us, no one symptom at once so characteristic and

so pitiable. A benumbing influence seems to be exerted on the mental faculties, even before anæmia and heart changes are noted. There is a hypochondriacal, melancholy, hopeless expression, which in severe cases deepens to apparent dense stupidity, with indifference to surroundings and lack of ambition." 73

In some cases the disease leads to insanity; in many, for instance in Australia, a prevalent craving for dirt eating and severe moral degeneration is reported.⁷⁴

The moral effects of hookworm disease are more serious still, although less easily pointed out. Not much can be expected of a people whose vitality is so low that it averages only 40 per cent of hemoglobin and runs in some cases as low as 8 per cent, whose red blood cells number less than 2,000,000 in many cases, and in a few even less than 1,000,000, instead of the normal 5,000,000 per cubic millimeter. There is a vicious circle of disease, inefficiency, and poverty; a lack of ambition and of buoyancy. The patient has only one intense desire—that of deliverance. Unable to help himself, he turns eagerly to anyone or anything promising relief. He loses his feeling of independence and responsibility, simply because he is unable to locate and cure this trouble, and his mind is filled with the wildest fancies. Under these conditions he falls an easy prey to "medicine men," charlatans, patent cure-alls, and old women who pose as medical oracles and whose ignorance is exceeded only by their temerity. He is subject to all kinds of superstitions—the more weird and grotesque, the more acceptable. Witchcraft and voodooism are the natural product of such an unregulated imagination. Lack of control is a characteristic of the hookworm victims, and any stimulus from within or without is acted upon unrestrainedly. Mentally and morally he rarely passes the stage of the moron. The vegetative, self-preservative, and reproduc-

tive functions are the only ones which have any interest for him.

The economic effects are more readily and accurately gaged. One illustration will, perhaps, best serve the purpose. California has only light infections, yet Dr. Herbert Gunn, the special inspector for the State Board of Health, reports:

"There is no question that the general efficiency of the men is noticeably impaired. At one mine, employing about 300 laborers, it was stated that a reserve of about 25 men had to be available to replace those who, on account of sickness, did not appear for work. Quite a few of the men have to lay off every now and again to recuperate. Several who were unable to work stated that when they arrived in Jackson, they were perfectly strong and well. A large number of these men were encountered on the streets, some of them presenting marked degrees of anæmia. The greatest loss to mine operators is occasioned by the large number of those moderately affected. . . . A loss of 20 per cent in efficiency of those infected would be a conservative estimate. That would mean in Mine No. 2, for instance, where over 300 men are employed at an average of about \$2.50 per day, and estimating the number of those infected as low as 50 per cent, a loss of over \$20,000 a year." 75

The general social effects of the disease are best described by Wickliffe Rose, the Administrative Secretary of the Rockefeller Commission.

"The sharp contrast between heavily infected communities and communities practically free from infection affords the most striking illustration that I have seen of the physical, intellectual, moral, social, and economic results of hookworm disease on a community.

"Such a contrast we saw near Dr. Fisher's home. Lying a few miles northeast from Emerton in Richmond County and extending over the border into Northumberland and Westmoreland Counties is a large scope of country which for generations has been inhabited by a people set apart by marked characteris-

tics from the people surrounding them on every side. The people are called 'Forkemites,' . . . and for generations the name has been a byword. Lack of energy and thrift has brought to the Forkemites extreme poverty with the inevitable mental and moral results." 78

This quotation not only illustrates what havoc the disease may work, but shows that it alone is responsible for such results. These people live under the same climatic conditions, they belong to the same stock of Virginia, and are of the same faith as those who live nearby but are more fortunate in living in areas comparatively free from uncinariasis. Just as in the case of malaria, so in that of this disease there are numerous "islands" which are free from the infection, owing to conditions of soil, water, and sanitary conditions established by the inhabitants. It will be necessary to establish this point a little more firmly by details.

Both the Rockefeller Commission and the Porto Rican Commission found a remarkable improvement in the people who had been cured. Dr. Fisher reports one school at Totus Key, Va., where 38 out of 40 children were infected. It was a hard school and could not keep its teachers. After a year's treatment the children had been transformed—those who were dull and listless were active and alert; and those who could not study, found joy in learning. Coming from anæmic parents, they were infected in infancy, and after being cured their cheeks showed the glow of health for the first time in their lives. The transformation also manifests itself by a new light in the eye, an elastic step, and a hopeful outlook on life. External conditions had not changed with these children, excepting that a few sanitary measures had been introduced into the school and community; the victims had been cured of the disease, and this meant a tremendous

change. Or when we read of case after case in which dull, hopeless, anæmic, thriftless, illiterate people have been changed into bright, alert, active, and industrious persons during a few months—living in the same houses, on the same farms, without any changes except being cured of this disease—we must come to the conclusion that the only drawback from which they suffered was ill health.⁷⁷ If the cases were not well attested by competent physicians and scientists, one would imagine that an advertisement of “a patent cure” was being read.

These rapid changes in improvement have their obverse in rapid deterioration. The report of Dr. Gunn, quoted previously, states that several of the sick men were perfectly strong before they entered the infected mines. Dr. Dock confirms this statement from his own observation.

“If we were to select the strongest people in the country and place them in conditions under which these patients are now living it would be only a generation or two before even a race of athletes would be in the same condition as the people under discussion.”⁷⁸

We have here cases of rapid deterioration analogous to those discussed in previous chapters (6, 7, and 8) as due to malaria; and these cases furnish corroborative evidence for what may have happened to the Greeks and Romans after the introduction of malaria.

In order to prove the disastrous effects of uncinariasis in a particular country—as we showed those of malaria in Greece and Rome—it may be best to select Porto Rico as an illustration, because the disease has been studied there extensively from its various aspects. The island has an area of 3,606 square miles, with a population of about 1,120,000. The chief products are sugar, tobacco, coffee, and fruit. There is little manufacturing,

and about 75 per cent of the labor is agricultural. This means that the welfare of the whole island is largely dependent on the labor capacity of those engaged in tilling the soil, that is, on the health of the jibaro or peon. Formerly coffee was the principal crop, having a value of \$7,492,453 in American gold in 1897; sugar in that year was valued at \$2,456,898, and tobacco at \$732,117. In 1910 the values had changed to \$23,545,922 for sugar, \$5,664,128 for tobacco, and \$5,669,602 for coffee. During the years 1895-97 the coffee crop formed 70 per cent of the value of all exports, in 1910 it had dropped to about 14.5 per cent. Whence this change? A few words on hookworm disease will be sufficient to explain it.

The disease seems to have been introduced from Africa with the slaves about 1530, since Columbus reported of the original inhabitants that they possessed fine stature, and were "people of beautiful presence."⁷⁹ In all later reports the common white people are characterized as lazy, and indifferent to all improvements. In a description of Porto Rico in 1834 we read:

"Most of these colonists are inconceivably lazy and indifferent. Lying back in their hammocks, the entire day is passed praying or smoking. Their children, isolated from the city, without education, live in social equality with the young negroes of both sexes, acquiring perverted customs, only later to become cruel with their slaves."⁸⁰

But the more accurate observers state that these people were anæmic with a dead white, yellow, or greenish hue; that the negroes and mestizos, when sick, were of an ashen gray color. These descriptions fit those suffering from uncinariasis, both as to complexion and supposed moral turpitude. The latter was, of course, nothing but

the result of physical lassitude and low vitality, owing either to hookworm, malaria, or to both. Writers of former centuries in describing the whites in the tropics and sub-tropics laid the blame for this lassitude on moral grounds, because they did not know enough about the effects of endemic diseases upon the body. Dr. Ashford refutes this charge in these words:

“We cannot believe that vicious idleness comes natural to the Spanish colonist, even in the tropics, for the very reason that we have seen these descendants at their very worst, after the neglect of four centuries of their mother country and after the laborious increase of an anæmic population in the face of a deadly disease, whose nature was neither known nor studied, work from sunrise to sunset and seek medical attention, not because they felt sick, but because they could no longer work.”⁸¹

These men were sick and could not work, and this fact explains the change in the decline of coffee values.

Coffee is usually planted on small farms on the hill-sides, and requires much shade and moisture—thus affording ideal breeding-grounds for the parasites of this disease. Sugar, on the other hand, requires a dry soil, sun-baked, and bereft of shade—a rather poor culture ground for hookworm. After the American occupation capitalists opened up large sugar plantations equipped with modern machinery, paid fair wages, provided better housing conditions, and introduced various sanitary measures among their laborers, who were chiefly negroes and relatively immune to uncinariasis. Under these conditions the sugar crop increased rapidly, while that of coffee decreased because the laborers were not so well protected. That is, however, not the whole story. The coffee planters are much more numerous, and are the most exposed to the hookworm disease. Sugar and tobacco can be planted only in the coast regions, and by

far the larger part of Porto Rico must be given up to coffee. Thus the majority of the population is exposed to the dangers of the hookworm disease.

“The picking of coffee is all too frequently done in the pouring rain, for the harvest coincides, as we have seen before, with the wet weather. The vast majority of the pickers now, and all before the campaign against anæmia began, are barefooted. They work from a little after dawn to near dark, and are thus employed for about three months, the number of almudes picked getting scarcer as the ripened berries are gathered in. These plantations are heavily shaded, indeed doubly so, for the coffee bush, itself affording a dense shade, is further shaded by light guavas or trees about the size of a maple. Here in this shade the sopping wet ground is befouled by the multitude of sick each day, and the ripening ova give rise to an infinity of nests of active larvæ into which several days thereafter the same or other workers must tread. The result is that uncinariasis has its great breeding place in the coffee plantations of Porto Rico, and here a barefooted people pollute the soil and are infected and reinfected by it until the life of every man, woman, and child is punctuated by a vast number of re-infections, casual yet common in the nine months of ordinary work, certain and continuous during the coffee harvest when no worker escapes who is without shoes. Therefore it is small wonder, with constantly arriving reinforcements to the little army of parasites that thrive at the expense of the laborer, that we find a sick workingman in the country.”⁸²

Previous to the American occupation a still larger percentage than at present were engaged in coffee growing, and the infection was correspondingly more prevalent. How much this disease must have affected the condition of the Porto Ricans we can only surmise when we read that “It cripples industrial effort, limits mental expansion, weakens the body and depresses the spirit, until many laborers in a country where agriculture is the chief source of revenue, are enervated, despondent, with-

out hope of betterment, and without the power to save themselves. Sometimes a man cannot earn enough to feed his family, and he is driven to eat the crudest gifts of a bountiful nature in the wild fruits of Porto Rico." ⁸⁸ It cuts down man, woman, and child of every age, and causes diminution in earning capacity of 50 per cent or even more. In light cases, having over 60 per cent hemoglobin, a previously vigorous individual finds his strength and energy waning, becomes dyspeptic, disinclined to work, and generally "run down," and has a faint pallor. In moderate cases, averaging between 30 and 60 per cent of hemoglobin, the individual becomes anæmic, with low mental and physical activity. The patient looks and feels definitely sick. Mere disinclination to work has changed to partial inability, since any exertion brings on palpitation of the heart, and sudden changes of position cause dizziness. He is pale and half narcotized. In intense cases, with hemoglobin below 30 per cent, the patient has dilation of the heart, extreme pallor, and a fatal termination of the disease may occur at any time. When we remember that the population of this island was about 1,000,000 in 1904, that about 800,000 of these were estimated to be infected, and that the infection would run as high as 90 per cent on the coffee plantations, we must conclude that no high state of mental, moral, and social conditions was possible with people who suffered from a disease, the symptoms of which have just been described, especially if we find that about 30 per cent of the cases coming under the observation of physicians were "intense," 45 per cent "moderate," and only 25 per cent "light."

Hookworm is, however, not the only curse of this island. Porto Rico has also suffered from malaria. No definite figures are available in regard to this disease, as

they are for uncinariasis, which was made a matter of several special reports. The "Report of the Governor of Porto Rico for 1913" contains, however, some significant figures, which will enable us to draw some conclusions in regard to the prevalence of malaria. On page 113, about 60 per cent of all deaths are listed as possibly due to malaria. This is certainly an exaggeration, since out of the total number of deaths, (26,034 during the fiscal year 1913) all cases of diarrhoea and enteritis claimed 5,372, tuberculosis of the lungs 1,536, hookworm 1,347, *i.e.*, anchylostomiasis 383 and anæmia chlorosis 964, and malaria 1,073.⁸⁴ This comparatively small number of deaths does not, however, argue a rare occurrence of malaria, since Colonel Gorgas explains the infrequency of deaths from this cause as perfectly compatible with its prevalence. He says:

"The best measure of the working efficiency of a force, as far as health is concerned, is the daily number of sick. For instance, in a force such as we have at present, we might have 1,500 cases of pneumonia, which would average ten days each in hospital, and give us 500 deaths. Fifteen hundred cases of malaria would average seven days in hospital, and give us not more than thirty deaths. The deaths from malaria, therefore, represent a very much larger nonefficiency from disease than do the deaths from pneumonia. Two deaths from malaria would mean that 100 men had been sick for seven days; that is, that 700 days had been lost from malaria during the year. Two deaths from pneumonia would only mean that 6 men had been sick for ten days, and, therefore, represent only sixty days lost from pneumonia."⁸⁵

The 1,073 deaths attributed to malaria would on this basis represent at least 53,650 cases of seven days' duration. This is, of course, too low a figure, since Colonel Gorgas argues from conditions as they exist in the Canal Zone where the employees are carefully watched and

instantly taken to the hospital when they show any symptoms of disease. In the larger part of Porto Rico, that is impossible, owing to the scarcity of properly trained physicians; and many cases of malaria are not diagnosed correctly so that the cases linger on for weeks and months, and deaths are attributed to other causes. It seems therefore safe at least to double the number of cases of malaria in this island, and to sextuple the number of days of illness. This would give approximately one malaria case in ten of the inhabitants, and a loss of 42 working days per patient. That would give us with a population of over a million at a conservative estimate 100,000 cases of malaria with a loss of 4,200,000 working days per year. The small number of deaths from malaria during 1913 is, however, only a part of those which occurred previous to the sanitary work which was inaugurated after the American occupation, since very little was done in a scientific way to combat the disease. Just how many cases there were, it is impossible even to estimate, as, due to the illiteracy of 80 per cent of the people and to the scarcity of competent physicians, no accurate records could be kept. That there was much sickness and mortality is certain, as may be shown from the retardation of increase in the population after 1765 to 1775, when the decennial rate of increase was 57 per cent, which dropped to 16 per cent in 1887-89, and rose only to 17.3 per cent from 1899-1910, notwithstanding the great work of sanitation and medical supervision introduced by the government during the latter part of this period. This increase has taken place in the face of a very high death rate in a dense population—approximately 300 to the square mile. The year 1899 may serve as an example of these high rates, because the birth rate exceeded a death rate of 40 per

1,000. Another fact points likewise in the direction of a decreased vitality. The population of this island below 10 years of age has a percentage of 30.9, a greater percentage than that of any civilized country, *e.g.*, 22.2 per cent in the United States; yet in the latter country 13.8 per cent are 50 years of age or over, against 9 per cent in Porto Rico. The decreased birth rate and the shorter span of life point toward lowered vitality—a condition which could not be overcome by the various ameliorative and preventive efforts of the government in a few years. The enormous number of deaths from tuberculosis and from diarrhoea, as well as the 13,441 deaths from all diseases of those under age in a total mortality of 26,034 merely corroborates this statement, since low vitality alone can explain such mortality. Even if we should take the lowest estimate of 300,000 for those who suffer from uncinariasis, and figure only 100,000 for malaria patients, we are nevertheless face to face with a serious condition, since we have over one-third of the population ill as the effect of two diseases; the other diseases combined would add at least 17, and this would make at least 50 per cent of the total population patients more or less constantly ill as against about 4 per cent of permanent sickness in the United States.

The relation of malaria and uncinariasis is interesting from another point of view. The former attacks principally children before and up to the age of puberty, and then gradually releases its hold; the latter attacks children comparatively seldom, but is most virulent after puberty. Out of a total of 29,219 patients treated for hookworm in 1906-07 we have 1.09 per cent less than 5 years of age; 8.90 per cent from 5 to 9; 20.80 per cent from 10 to 14; 37.45 per cent from 15 to 29; 24.15 per cent from 30 to 49; 7.49 per cent over 50.⁸⁶ It seems,

therefore, that no sooner does the jibaro get over the age when Scylla threatens his life, than Charybdis is almost sure to attack and kill him.

In this brief discussion of the case of Porto Rico, stress has been laid on hookworm disease, with a brief mention of malaria. There was no intention of claiming these to be the only diseases in the island, but simply the endeavor to show that of the 152 diseases enumerated as the causes of one or more deaths, these two were responsible for a high percentage, and were the predisposing cause of many more by depleting and devitalizing the body. Tuberculosis of the lungs and diarrhoea with enteritis were mentioned as the cause of more deaths than malaria and uncinariasis; neither of these diseases, however, kill people in vigorous health, but more usually those with low vitality. Malaria and uncinariasis undermine the constitution, and thus predispose toward other diseases. They are responsible, moreover, for that low mentality, small initiative, and lack of ambition, which are reported by observers. This should cause small surprise if the meaning of health (see chapter two) consists essentially in a natural and irresistible desire for activity owing to surplus vitality. Healthy men can strive, plan, devise ways and means to improve their condition; ill men are content to leave things as they are, because they have no energy to spare for the new exertion required for experiments. Their principal desire is for relief; and the whole attitude of mind becomes plaintive, passive, and negative. The inevitable result is a static civilization.

CHAPTER X

HEALTH AND WORLD-PROGRESS

THE facts brought out in the last chapter have a significance which cannot be over-estimated. For what is true concerning Porto Rico applies to the tropics and subtropics, and, if malaria be included, to a very much wider area—indeed to the larger part of the temperate zone. If the facts as to disease and its bearings have been correctly explained, they ought to elucidate conditions as to progress in the past, and to throw some light on the future movements of mankind. An attempt will be made in this chapter to explain some of these problems.

I. THEORIES ADVANCED TO ACCOUNT FOR PROGRESS

Explanations of the progress of man from the stage of his primitive ancestors may be roughly divided into five classes.

1, the transcendental; 2, the historical or accidental; 3, the natural or geographical; 4, the anthropological; 5, the actinic ray theory of Major Woodruff.

1. The transcendental theories of various kinds, *e.g.*, the mythological, theological, and philosophical, which have determined the thinking of past ages until recent times, are, of course, unscientific. The philosophy which looked upon Cyrus the Great as the executive of Jehovah to punish disobedient people, is no more taken seriously as an explanation of the movement of mankind toward a certain goal, *e.g.*, of universal peace, than are the defeats and victories of Israel as results of disobedience

or of obedience, respectively, to Jehovah. This view has dominated the whole of Christendom, and whether true or not is not open to objective proof. The so-called "principle of the dialectics of history" propounded by Hegel is not more satisfactory from a scientific point of view. "Reason is the innermost substance of history, which is logic in action."—"The victorious State is truer, nearer to the ideal State, better, in a word, than the vanquished State. The very fact that it has triumphed proves this; its triumph is the condemnation of the principle represented by the vanquished; it is the judgment of God. Thus interpreted, history resembles a series of divine reprisals directed against everything that is finite, one-sided, and incomplete; it is an eternal *dies iræ*, which nothing earthly can escape."⁸⁷

All that needs to be done by a nation in order to be successful is to become a true embodiment of the State-Idea, and it becomes that in proportion as it defeats its enemies, since its victories are a perpetual proof of its approach to the true purpose of the world-spirit. This brings us back to the theory of Aristotle that victorious people always represent more virtue than the vanquished. Neither of these philosophers tells us, though, why one conqueror has approximated the true idea of the State more than another, except that the God of history has successively chosen the Egyptians, Assyrians, Greeks, Romans, French, and the Germans as temporary and privileged organs. Whether these respective nations were literally "chosen" and later on rejected as was Cyrus the Great, or whether they gradually evolved a truer idea of the State and then lost it, we are not told. Victory is the proof of superiority in ideas, defeat of inferiority; but why or how either victory or defeat can be thus explained is an impenetrable mystery which the God of his-

tory has not chosen to reveal; and all we can do is to stand in awe and worship the Hegelian idol.

2. The historical or accidental explanation of the progress of mankind does little more than put its seal on facts. Professor Boas claims that there is no essential difference in the ability of various peoples and that the earlier civilization of certain races was an accident. To quote his own conclusion:

“Several races have developed a civilization of a type similar to the one from which our own had its origin. A number of favorable conditions facilitated the rapid spread of this civilization in Europe. Among these, common physical appearance, contiguity of habitat, and moderate differences in modes of manufacture, were the most potent. When, later on, civilization began to spread over the continents, the races with which modern civilization came in contact were not equally favorably situated. Striking differences of racial types, the preceding isolation which caused devastating epidemics in the newly discovered countries, and the greater advance in civilization, made assimilation much more difficult. The rapid dissemination of Europeans over the whole world destroyed all promising beginnings which had arisen in various regions. Thus no race except that of Eastern Asia was given a chance to develop an independent civilization. The spread of the European race cut short the growth of the existing independent germs without regard to the mental aptitude of the people among whom it was developing. On the other hand, we have seen that no great weight can be attributed to the earlier rise of civilization in the Old World, which is satisfactorily explained as a chance. In short, historical events appear to have been much more potent in leading races to civilization than their faculty, and it follows that achievements of races do not warrant us in assuming that one race is more highly gifted than the other.”⁸⁸

If the earlier development of European civilization is an accident or a chance, no attempt at an explanation can or need be made, and we are where we were before—

facts are facts and all that we can do is to accept them and put our seal of approval on them. This is what Hegel did, and found this world the best of all possible worlds.

3. The natural or geographical theories try to explain the progress of certain races as a result of topography, climate, and other factors of nature. The Ratzel-Semple theory—the latest in this field—distinguishes four fundamental effects. I. direct physical effects of environment; II. psychical effects; III. economic and social effects; IV. effects upon movements of people.

(I.) Physical effects. Under this head are enumerated: stature, dominant activities, and pigmentation. After giving numerous examples under each sub-division, Miss Semple admits the inadequacy of geographical conditions to account in full for the effects cited:

“The geographer must investigate the questions when and where deeper shades develop in the skins of fair races; what is the significance of dark skins in the cold zones and of fair ones in hot zones. His answer must be based largely on the conclusions of physiologists and physicists, and only when these have reached a satisfactory solution of each detail of the problem can the geographer summarize the influence of environment upon pigmentation. The rule can therefore safely be laid down that in all investigations of geographic influences upon the permanent physical characteristics of races, the geographic distribution of these should be left out of consideration till the last, since it so easily misleads.”⁸⁹

It is not our purpose to explain the origin of pigment of the skin, but the physiologist referred to by Miss Semple might get some hint from the physician who in case after case describes the complexion of hookworm victims as “very pale,” “extreme pallor,” or an “extreme pallor of a dirty, waxy color”; or when we read that pel-

lagra causes the skin to thicken and become pigmented. And so might the anthropologist in attempting to account for stature when he finds that these victims at 12 or 14 years of age present the appearance of children of 6 to 8; or young men and women of 18 to 22 that of children of 12 to 16 years. Or when he reads of brothers, one with light infection, 17 years of age, weight 156 pounds; the other with heavy infection, age 18, weight 74. Or when he finds that a boy of 16 years with very heavy infection and ill for 8 years, weighed $62\frac{1}{2}$ pounds on July 29, 1911, and 79 pounds on September 16, 1911—a change due solely to an improvement in his blood after the expulsion of the hookworms, since on August 3, his hemoglobin was 14 per cent and his red corpuscles numbered 1,050,000; while on September 16, after the expulsion of the last parasites on the 9th of that month, the figures stood 55 per cent and 4,572,000, respectively.⁹⁰

Definite facts like these should outweigh general theories of what nature tends to do or what the influence of this or that hazy factor is supposed to do. For they should be taken in their full bearing. If certain endemic diseases have been acting for untold generations upon certain peoples, the effects become cumulative, and it may well be that an explanation of "the significance of dark skins in the cold zones and of fair ones in hot zones" can be found. Or if a people is habitually subject to such a disease, the average stature must of necessity become low in the course of time through heredity. Illustrations of the effect upon complexion and stature of only one disease have just been given. Malaria has, however, similar effects. And it was shown in chapter 9 that at the lowest estimates about 50 per cent of the people of Porto Rico were more or less constantly ill from the effects of these two diseases. There are others

with even more disastrous results, *e.g.*, venereal; and new ones may be discovered, which, if local, may account for many peculiarities now vaguely attributed to "race" or "climate." If the influence of food and occupations should, moreover, be studied by physiologists, a further explanation could, perhaps, be made concerning these peculiarities.

(II.) *Psychical effects.* Among the influences of geography upon the mental life Miss Semple mentions the direct and indirect; among the former chiefly the enrichment of the vocabulary owing to local environment, *e.g.*, of mountain, valley, river, sea, and dependent occupations, as the chase, herding, navigating and a broader effect upon the religion and mythology of peoples. Among the indirect influences mentioned are the general trend of thought given to man's mind by the conditions which affect him as an active agent, challenge his will by furnishing motives for its exercise, give purpose and direction to his activities—conditions which mold his mind and character through the media of economic and social life.

All this is sufficiently vague to be alluring, although Miss Semple does not see that richness of vocabulary is but another name for poverty in power of generalization, since a more civilized man expresses the same ideas by qualifying adjectives and modifying adverbs instead of having, for instance, four different terms for various kinds of mountain passes. She also overlooks the fact that this richness in vocabulary is due rather to occupations than geographic conditions; *e.g.*, the Samoyedes, who have eleven or twelve different terms to designate the various grays and browns of their reindeer, are nomads. A golf or hockey player going to that country would most likely continue to use his vocabulary acquired

in Scotland or America notwithstanding the difference in geography, and an engineer would continue using English, German, or French terms in his work and not trouble himself about the different words for grays and browns of reindeer. Occupation determines the mental life more than environment, as is well illustrated by the fact that the nation which excels in any one line of activity creates a vocabulary for the whole world, since language is only the outward form of ideas. We still think in terms of Greek philosophy, and try to cast our scientific terms in Greek or Latin vocabularies simply because these peoples excelled us in creating a rich treasure of words owing to their varied activities. France was preëminent in automobile manufacture, and the terms invented in that country in connection with all that this vehicle implies, have gone around the globe with the machine. An Arab, accustomed to the fleetness of his steed, might at first liken the speed of an automobile to that of his favorite horse, but he would soon find out the inadequacy of his comparison owing to the ability of the machine to maintain a high speed all day, and so he would be reduced to the necessity of speaking in terms of the speedometer. When travel on foot was the general method of locomotion, the Germans expressed distance in terms of time, *e.g.*, two hours, ten hours; now that trains and automobiles have made travel more varied, they express it in kilometers. The next town may still be four hours away to the villager, but the distance to Berlin is 300 kilometers. Examples might be multiplied *ad infinitum* to show that geographical environments merely gave figures of speech to describe activity or express ideas, but did not influence mental life any further. The hell of the Eskimo may be a place of darkness, storm, and intense cold, that of the Jew one of

eternal fire; in both cases the description of the future place of punishment is borrowed from local conditions; but the idea of punishment—both present and future—is independent of them, and will arise simultaneously in the tropics and in the arctics because it is an expression of social needs. In proportion as numerous and varied activities create more individual and social needs, they have to be expressed in terms of language, and naturally enough in words and similes of the environment, because mentality is insufficiently developed in lower civilizations to coin a new general or specific term. Activity depends, however, on health, and only the direction it takes will be somewhat influenced by the environment. The South Sea islander will naturally be a seafarer, because that is the only way he can find an outlet for his energy; the Kirghis will be a hunter or a shepherd, because that occupation alone is open to him to make a living. But whether Samoan or Samoyede, a sick man wants to be disturbed as little as possible, and hence develops only the language of the sickroom—moans and groans; neither the broadness of the sea nor the beauty of the mountains can stir his preoccupied mind to invent anything else, unless it be maledictions,—at least while still an unsophisticated heathen.

This inadequacy of accounting for man's mentality by geographic factors may be seen better by Miss Semple's reference to "The great man in history" where she mentions Daniel Boone, "that picturesque figure leading the van of the westward movement over the Allegheny Mountains, who was born of his frontier environment and found a multitude of his kind in that region of backwoods farms to follow him into the wilderness."⁹¹ Not a word here about the intense vitality of this man who, notwithstanding all his hardships and privations, lived to

the age of eighty-five years; nor any word about those who owing to poor vitality had to lag behind, but who were just as certainly the result of their "frontier environment" as Boone. The men who left New England villages for the Middle West and the Far West had been just as much exposed to the geographic environment of New England as had those who stayed behind; they had been brought up under the same climatic conditions. Yet, there was a difference between the two. Wherein does it consist? The difference is one in health. The pioneers of every kind have almost always enjoyed good health, and they sought an outlet for their abounding vitality in new fields and under difficult conditions, because they felt confident that they could master any circumstances. This confidence is always bred by fine, abounding health, as anyone may witness for himself if he compares his own hesitancy and timidity in times of indigestion or general low vitality with his courage and determination when he is well and strong.

(III and IV.) The economic and social effects, and effects upon movements of peoples owing to geographic environment, mentioned by Miss Semple, do not call for special comment, since the purpose of our remarks was not to prove those theories to be untrue, but rather to be inadequate and vague. That natural barriers, like mountains and the sea, affect the economic systems of peoples, is undoubtedly true; but that they are the determining influence, is just as undoubtedly false. If some islands are barren and support a scant population, others equally barren, *e.g.*, Malta and the rocks of Tyre and Sidon, may support a compact and teeming population whose influence may be felt all along the Mediterranean and down the ages of history to the present time. If mountains are an obstacle to travel for a primitive people, this is so

only for those of low vitality; since from the mountains have come the conquerors of the world from immemorial times, at least as far as history records them. Rivers and other favorable conditions may help, but do not determine the migrations of peoples. Those of low vitality stay home no matter how favorable circumstances may be; no river will tempt them to leave, and every hilltop becomes a Himalaya.

Peschel refers to the influence of physical environment upon man's religion. This is exercised through the terrors of nature, influence of food and of the desert. He points to the fact that the founders of the great monotheistic religions of the world, Zoroaster, Moses, Buddha, Christ, and Mohammed, belong to the sub-tropical zone. This zone is one which contains many vast deserts. "Every traveler who has crossed the deserts of Arabia and Asia Minor speaks enthusiastically of their beauties; all praise their atmosphere and brightness, and tell of a feeling of invigoration and a perceptible increase of intellectual elasticity; hence between the arched heavens and the unbounded expanse of plain, a monotheistic frame of mind necessarily steals upon the children of the desert."¹²

On the other hand, "Buckle believes that the sublime and terrible aspects of nature in India, exerting their depressing influence upon the minds of the inhabitants for many centuries, have been a considerable factor in the development of all that is inconsistent and superstitious in the Hindoo culture. The threatening aspects of the external world have filled the minds of the people with images of the grand and the terrible which they have striven to reproduce in the dogmas of their theology, in the character of their gods, and even in the forms of their temples. The ancient literature of India shows evidence

of the most remarkable ascendancy of the imagination. Most of their works on grammar, on law, on medicine, on geography, on mathematics, and on metaphysics are in the form of poetry. There is an excessive reverence for antiquity." ⁹⁸ He believes that man is affected by four classes of physical agents—climate, food, soil, and the general aspect of nature.

The dryness and brightness of the atmosphere of the deserts mentioned, the consequent comparative freedom from disease germs, and the resulting feeling of invigoration and perceptible increase of intellectual elasticity, are likely to have more to do with a monotheistic conception than the arched heavens and the unbounded expanse of plain. Else, why did peoples in other plains, such as the prairies, steppes, and pampas, not develop monotheistic conceptions? And why did sea-faring nations, like the Phœnicians and the Greeks who had a more broadly arched heaven and a wider expanse to deal with, develop the polytheistic systems of religion with the greatest diversity of gods? The possible objection that the Greeks had a variegated landscape to live in, does not hold, since that objection could be raised against Zoroaster, and all the other founders of monotheistic religions, because all of them were living in countries where plains and mountains changed the landscape. Of Moses we are told, moreover, that he was fond of mountains, since he "saw God on Mount Sinai" and received the Ten Commandments there; and before he died he "went up from the plains of Moab unto the mountain of Nebo, to the top of Pisgah," evidently because the much broader expanse from a high elevation with the varied scenery of all the land of Judah unto the utmost sea, seemed to him more like the dwelling place of Jehovah than the hot, sandy, and dusty plain. Neither

was Jesus averse to mountains, since He preached His first sermon there, was transfigured there, and captured there. The fact that both lived in the desert for a while as did Elijah—who by the way “went to Horeb, the Mount of God”—and others, like Mohammed, need disturb no one, since such a short time would not suffice to turn polytheists into monotheists, unless Peschel is willing to concede miraculous powers to the “arched heavens and the unbounded expanse of plain” in some particular parts of the globe.

Concerning Buckle’s statement about the mind of the Hindoo, it may be more profitable to refer to the humble mosquito and the hookworm, as the causes of malaria and uncinariasis, respectively, than to the “sublime and terrible aspects of nature in India.” In a country where between 60 and 80 per cent of the people are infected with anchylostomiasis and perhaps an equal number with malaria—the blood thus never being normal—the imagination is apt to become rather lively and unrestrained, so that the following tale may not appear incredible to the average Hindoo. An eminent man “lived in a pure and virtuous age, and his days were indeed long in the land, since when he was made king he was a million years old; he then reigned six million three hundred thousand years; having done which, he resigned his empire, and lingered on for one hundred thousand years more.”⁹⁴ This man was the first king, anchorite, and saint. But even common mortals lived on an average 80,000 to 100,000 years.

We found that the jibaro of Porto Rico is equally superstitious and unrestrained in his imagination, and that voodooism may be on the same level as the juggernaut or sacrifice of children to crocodiles, for in such countries life is made almost unendurable owing to en-

demic diseases and occasional epidemics, so that relief from such a condition would be welcomed at any price. Buddha,—born in the Himalayan piedmont where anopheles and uncinaria flourish, and fighting the lassitude induced not so much by heat and humidity, against both of which there is protection through shade and rest, but by endemic diseases against which there is no protection except quinine and thymol,—may well have pictured his heaven as Nirvana, the cessation of all activity and individual life. For low vitality produces aversion to activity and begets veneration for the past, since all progress has to be bought with the outlay of energy which must be abundant if new ventures are to be entered upon. Diseases of the kind discussed are more important as a cause of low vitality and enervation than heat, as is proved by the fact that the sufferers from hookworm in Tennessee and the neighboring States with their mild and salubrious climate are undergoing the same process of degeneration as the Hindoos, although in the one case the trouble was formerly laid to the heat, in the other to laziness and shiftlessness. We know now that this disease is one of the principal causes of decadence. “Is it ‘laziness’ or disease that is this very day attracting the attention of the United States to the descendant of the pure-blooded English stock in the Southern Appalachian Range, in the mountains of Carolina and Tennessee, the section of our country where the greatest predominance of ‘pure American blood’ occurs, despised by the negro who calls him ‘po’ white trash’?”⁹⁵

If results of this kind are found in a temperate climate, in States which are fast filling up with health resorts, and among a stalwart population which left England less than 300 years ago, one can easily figure out what they must be where this disease—usually connected with

malaria and most likely with other forms of sickness—has been exerting its noxious influence upon untold generations under less favorable climatic and civilizing conditions. While it would be wrong to exclude the heat of India as a factor in the mental and physical degeneracy of the Hindoos, it can certainly no longer be looked upon as the principal cause when similar results are noticed on a superior people under really favorable climatic conditions.

There has been a strong tendency to lay the blame for all the shortcomings of white men in the tropics and sub-tropics upon the heat, instead of looking for exact causes. Among the latter we find social and moral causes as well as those of climate. It has not been taken into consideration that many a supposedly moral man is kept from wrong-doing in his old home by all the props which civilization, family history, association with better men, and the whole social system, provide. When this man is sent to a people on a lower plain of civilization, perhaps in a position of authority with all the temptations implied, and all props removed, the inevitable result is the revelation of his true nature. He will commit deeds for which at home he lacked power and opportunity; but we sympathetically lay the blame on the climate, especially in the tropics. When a Sicilian, well-behaved at home, turns "black hander" in New York, the climate is not blamed, since we lay the cause to poor moral training at home, poor police service, or economic conditions. Only when the Italian tries to make an honest living by hard work but fails to do so and goes insane, is the climate of New York or New Jersey held responsible; whereas we ought to look for the cause in his poor physical and mental condition, which makes it impossible for him to cope with a new and complex social environ-

ment. In the past Providence was looked upon as the ultimate cause of our failings; now we are inclined to make climate the scapegoat. That is neither fair nor scientific. We should look for individual causes. Lord Clive gathered treasures for himself in India, Lord Kitchener did not; many men have given the general low moral tone in African communities as an excuse for their failings; Livingstone, fever-stricken and gaunt from exhaustion, but still in possession of a good Scotch constitution and conscience, maintained a high moral standard. If we try to blame the climate, definiteness of statement is necessary; but that is generally lacking, and a vague term is used to cover a multitude of sins. We know that in the case of disease certain forms of physical and, inferentially at least, mental derangements take place; repeated, as in the case of endemic diseases, in hundreds of generations they must produce at least grave enfeeblement of body and mind. Would it not be better to blame diseases, local or general in the tropics, rather than climate?

Two books by Ellsworth Huntington have appeared recently, which have a special claim for more extensive remarks in this connection.* While Buckle and Peschel never adduce any but the most general arguments in support of their theses about the influence of geographical and climatical conditions, Dr. Huntington is, at least in the first part of his book, very specific. It may be best to have the author speak for himself. He says, (pp. 9 and 10):

“The hypothesis, briefly stated, is this: Today a cer-

* *Civilization and Climate*, by Ellsworth Huntington, Ph.D., Yale University Press, 1915; also *World Power and Evolution*, *ibid.*, 1919. References are to the first work only, since the second contains no new principle.

tain peculiar type of climate prevails wherever civilization is high. In the past the same type seems to have prevailed wherever a great civilization arose. Therefore, such a climate seems to be a necessary condition of great progress. It is not the cause of civilization, for that lies infinitely deeper. Nor is it the only, or the most important condition. It is merely one of several, just as an abundant supply of pure water is one of the primary conditions of health. Good water will not make people healthy, nor will a favorable climate cause a stupid and degenerate race to rise to a high level. Nevertheless, if the water is bad, people cannot retain their health and strength, and similarly when the climate becomes unfit, no race can apparently retain its energy and progressiveness. This does not mean that we are hopelessly at the mercy of the changes of climate which any century may bring forth. On the contrary, if our diagnosis is correct, we may at last hope to be free from the withering blight which has overtaken every race from which the stimulus of a good climate has been removed. Here, again, the case is like that of a water supply. Suppose that a community had for generations been subject to repeated visitations of a dread disease which decimated the population. Suppose that it should be discovered that the disease arose from the drinking water. Finally, let the community learn that the water is infested with the bacteria which cause typhoid fever. If no other water supply were available, would there be reason for despair? The disease would be no worse than before, and there would be hope of finding some way of protecting the water from contamination. So it is with climate. For ages the world appears to have been suffering because one of the many conditions of progress has changed repeatedly from century to century. The disease has been

clear enough, and we have devised many helpful ways of treating the patients, although none has as yet proved highly satisfactory. This does not mean that the treatment has been wrong, or that we cannot ultimately succeed. It merely means that the neglect of one particular phase of the matter has prevented the other helpful measures from producing their full effect. If nature does not provide the stimulus which seems so effective elsewhere, man must himself provide it."

The case for endemic diseases as the cause of the retardation of civilization could not have been stated more clearly than by Dr. Huntington. We have discovered the "bacteria which cause typhoid," malaria, and hookworm disease, and have made formerly unhealthy regions inhabitable by man, and intolerable climates endurable. The uncertain factor of "climate" has been brought down to something specific, and has been conquered, and will be subjected to an ever greater degree of control in proportion as we let generalities go and search for details. That is the whole thesis of this book. Man has progressed in exact proportion as he has made himself independent of certain factors in his environment. Disease is one of these, and the most important. For not even Dr. Huntington claims that we shall be able to change the heat of the tropics or the cold of the arctics. He admits (p. 285) that the climatic hypothesis seems depressing, because to the dweller in less favored regions the death knell seems to have sounded for any progress, while to the inhabitant of present centers of great activity a most disquieting vision of possible retrogression is disclosed. He proceeds, however, to dispel these fears.

In our factories we may introduce changes in temperature to imitate those of nature where she does not provide

them. Work ought to be regulated according to the "seasonal curve of energy," and machines should be made to run slowly in winter, faster in the spring, less fast in summer, very fast in the autumn. We should each one of us go to Florida or Southern California in the winter; the Russian peasants might be transported to Mesopotamia for a sojourn between October and May to help the Turk till his fields, and in the tropics houses might be cooled just as we heat our houses in winter, or people might have one house in the lowlands and another in the uplands, varying their residence between the two seasonally or even weekly. The thought of the expense does not deter the author in the least, since the farmers in the tropics will be two or three times as productive as European peasants are at present (pages 289-293).

This may be possible some time; at least, we may hope so. But how about the disease germs? Are they going to disappear with these changes in residence and in variation of the temperature? Or are tropical diseases likely to affect a larger number of people than now? There is only one thing to do—to make the tropics healthy by eliminating the diseases as far as possible. Wherever modern methods have been applied the three most prevalent and pernicious of them have been conquered—yellow fever, malaria, and uncinariasis. It has been done in places as far apart as Ismailia, and Stephansort, New Guinea; Port Said and the Federated Malay States; Khartoum and Italy; Greece and Panama; Cairo and Porto Rico; Hong Kong and Sierra Leone. There is no need to wait; we have the means, and we shall soon have more. The testimony of physicians of the reputation of Major General William C. Gorgas and Sir Ronald Ross cannot be gainsaid. One of the worst

regions on the whole globe has always been the West Coast of Africa. Ross reports * that statistics covering the period 1881 to 1897 showed a death rate of 75.8 per 1,000 among the European officials on the Gold Coast, and 53.6 for Lagos. In 1911 it was 13.9 for the whole of the British West African Colonies; and the invaliding rate was only 25.2 per 1,000.

No one will claim that changes in temperature are not beneficial, nor that too protracted heat or cold are not injurious; and Dr. Huntington is evidently right in calling our attention to them. But if it is in our power to improve health in the tropics now, why wait for that golden day when the dwellers in Mesopotamia will be glad to entertain ten or fifteen millions of Russian peasants during the winter in order to give them a necessary change of air? Healthy men make their own arrangements; it is the sick who need to be told what to do.

It is only fair to state that Dr. Huntington puts forth his hypothesis with hesitation, and freely admits that other factors have been important as promoters of civilization. The theory itself concerns us only indirectly. It is briefly as follows: Climate—temperature, humidity, and storminess—either promotes or retards health. If there is a proper temperature—"mental optimum of 38 degrees F. and physical optimum of 60 or possibly 65 degrees F." (p. 129)—with a certain amount of humidity suitable to different localities, and a fair amount of storminess to insure sufficient daily and seasonal changes, we have an ideal climate. Variations from this desideratum are possible, but not too far in either direction, if the best, or even good, results are to be obtained. On the basis of these three features the author constructs a

* *Health Preservation in West Africa*, by J. Charles Ryan, with preface by Sir Ronald Ross, London, 1914.

map of human energy with different degrees of intensity, (p. 142). The "very high" areas cover the British Isles, Germany, France, Austria, the Baltic provinces, Denmark, Southern Sweden and Norway, Northern and Central Italy, and the larger part of the United States. These areas are surrounded by others of "high" intensity, to which are added a few isolated regions, *e.g.*, Japan, New Zealand, Patagonia, Tasmania, and some smaller ones. The "medium" areas include most of Asia, the southern coast of Australia, Mexico, the larger part of Canada, the southern part of South America, the northern part of Africa, the eastern and southern coast of Africa; and a few other smaller areas. The "low" areas include the northern and southern parts of Asia, the larger part of Australia, the northern part of Canada, and the islands of the Indian Archipelago. The "very low" areas take in most of South America and Africa, and a few other small regions.

He claims that only in the "very high" areas does a high civilization exist at present, because only there are climatic conditions favorable. Perhaps no exception can be taken as to the actual present conditions. His inference is that similarly favorable conditions must have existed in the past wherever a high civilization arose, and in order to prove its correctness, he has originated a theory called "pulsations of climate," covering from one to several centuries each. He admits it to be only an hypothesis, not accepted as yet by meteorologists for historic times, at least. Yet he proceeds to apply it to history. Whether there were changes of climate in prehistoric times does not concern us here, because we are interested only in historic man. Of the Neanderthal man we know nothing except that he lived and that his intelligence was comparatively low. Our civilization has

not benefited from him in the least. It may be best to take up some of Dr. Huntington's historical illustrations.

Mesopotamia, (p. 257 ff.) the author claims, had a high civilization, and was invaded successively by various peoples, each of whom became civilized. According to his hypothesis they owed this power at least in part to the favorably stimulating climate. But how can that be? If these peoples were living in a healthier climate, had better food and houses, and more advanced means of offense and defense, and were generally stronger and more intelligent owing to their higher civilization—how could another people, inferior in all these respects, permanently conquer them? And how, in turn, after acquiring all the advantages of their subjects, could they be reduced to the condition of slaves or vassals by another inferior people? It would be a unique phenomenon in the annals of history, since according to hypothesis the climate did not change from around 3000 B.C. to approximately 500 B.C.—the period in which we have these successive invasions. Nowhere in history do we find an analogous case. The Huns, the Mongols, and the Avars invaded Europe, but they were thrust back after a short occupation of parts of it, and perhaps few of them remained in the conquered territories. The Moors, it is true, occupied Spain for approximately 600 years. It is, however, a question whether their energy and civilization were inferior to those enjoyed by the various tribes inhabiting Spain during that period. Everywhere we find that a physically healthy and mentally capable people succeeds in subjugating a disease-ridden, although perhaps more civilized, nation. Mesopotamia was no exception to the rule. There, as elsewhere, the people from the mountains and highlands, after having acquired strong

vitality in comparatively disease-free regions, swooped down upon the cities and villages in the germ-laden plains, and easily subjected the inhabitants. An efflorescence of a higher mental and civilizational life was inevitable in a healthy and gifted but undeveloped people under the stimulus of contact with a higher civilization, and a life of leisure based on slavery. The subsequent infection and low vitality in the course of time was just as inevitable. No theory of a change of climate is necessary to account for the civilization of Mesopotamia or Egypt, which has been similarly ruled by outsiders in historic times.

Another interesting illustration of the hypothesis of Dr. Huntington is that of the civilization of the Mayas in Yucatan (p. 239 ff.). These remarkable people attained many achievements of high degree in a tropical country. How is it to be explained? Only by a "climatic change such that the dry conditions which prevail a little farther north prevailed in the Maya region when these people attained eminence" (p. 242). In the drier parts of Yucatan where some of the ruins of the Mayas are located, there lives even today a fairly prosperous agricultural people; fevers prevail, but are comparatively mild. The Guatemalan highlands with fairly favorable conditions are only a hundred miles away. Does this not suggest a solution which is almost world-wide in application—the migrations from the highlands to the lowlands by a strong and energetic people? What happened in Mesopotamia and Egypt would naturally happen here, too, and successive invasions would account for the different periods in Maya history.

Dr. Huntington admits that the civilizations of Peru, Southern Arabia, Rhodesia, Ceylon, Java, and Indo-China cannot be explained on the basis of a shifting of climatic

zones, and admits that those of Ceylon and Indo-China may be due to migrations from higher latitudes.

The strongest objection to his theory, Dr. Huntington states himself (p. 276 ff.). The North American Indians lived mostly in the very high or high energy area, and yet never passed beyond the lower stages of semi-civilization. He frankly admits the insolubility of this particular case, and falls back on the absence of other factors contributory to civilization—chiefly the lack of iron and of great men with inventive ability.

This is a candid acknowledgment of the failure of his own theory. Other peoples started out with a similar lack of both, and were climatically less favorably situated, *e.g.*, the Incas and Aztecs, who were, moreover, of the same racial stock. The only explanation is that which we have found to apply elsewhere. Most of these Indians lived in the belt which includes both malaria and uncinariasis. If these diseases can work so much havoc today in the Appalachian Mountains among a formerly sturdy people, the inference suggests itself that the aborigines must have suffered more. The most highly developed tribes were the Five Nations who suffered from malaria only; just how severely no one can tell. They were, moreover, handicapped in another way. As will be shown later, local civilizations can never rise very high, because the contacts between individuals are too few and too similar to stimulate the mind by divergent suggestions. In other words, the areas that are comparatively free from endemic diseases must be fairly large, or must permit intercourse with many nations by the use of the sea. The Five Nations were an inland people, and while they occupied a very much larger area than the Greeks, they were shut off from contact with other nations. The prevalence of malaria not only kept vitality low, but

prevented an increase of population to a point of density where contacts might be fairly varied and numerous even among themselves. Contact with the sea is no longer necessary in a world-wide civilization, because we have the railroads and other means of communication. Hence this handicap has been removed, and the hinterlands of continents have already been developed, and are likely to see a higher civilization in the future. The idea of geographers that, just because plateaus are removed from the sea, they are incapable of sustaining a fairly high civilization, has already been corrected by our artificial means of communication. In the past they were isolated; now they are brought into contact with the rest of the world.*

One point more must be mentioned. Dr. Huntington testifies (p. 39) to the ravages of malaria on mind and body in torrid countries, and claims that tropical diseases will always prevail there, owing to the prohibitive ex-

* It is risky to be a prophet, and it is difficult to foretell what will happen in the plateaus and other areas removed from the sea. In America we have succeeded in overcoming the natural handicaps of isolation. Similar success is likely to be attained elsewhere, *e.g.*, in the plateaus of China and in the plains of Siberia. Huntington (p. 145) puts the blame of the backwardness of Siberia on climate, yet admits (p. 201) that the isolation and newness of the country has much to do with it. Professor E. A. Ross in a report of a six months' trip through Russia and Siberia claims that social factors are responsible for the mental inertness of Russian exiles. They have no stimulating intercourse, no large libraries, and above all no incentive for action and exertion owing to their more or less strict confinement. They have no opportunity to study facts at first hand, and rotate around the adolescent formulæ which they took with them ("Studies in Social Progress," June 1918). Other regions now densely populated and highly civilized were once similarly looked upon as given over to barbarism. Cæsar and Tacitus certainly never imagined what civilization there would be in Gaul, England, and Germany in the twentieth century. Human factors are not omnipotent, but they are powerful agencies for overcoming natural handicaps, and are becoming increasingly more so every day.

pense of extirpating them. This point will be taken up in detail in chapters 12 and 14. In his latest work he admits malaria to have been a factor in the decadence of ancient Rome and in modern Turkey, as explained in the Note to chapter 7.

4. The anthropological attempts to explain progress are based (a) on the weight of the brain, (b) on the form of the skull, (c) on other physical characteristics.

The weight of the brain is no longer considered of fundamental importance, since we find that some men of genius have had smaller brains than the average of their nation. The brain of Helmholtz weighed only 45 ounces, and that of Doellinger only 37.7. While the white race has a generally higher brain weight than the black, the differences among the lowest and highest Europeans are greater than the average between the white and black. After an examination of 2,100 male and 1,034 female adults, there is, according to Karl Pearson, "no evidence that brain weight is sensibly correlated with intellectual ability. Of the five races investigated by the biometricians, the English have the smallest brain weight. The mean of the adult Englishman is 27 grams less than the Bavarian mean, 57 grams less than the Hessian mean, 65 grams less than the Swedish mean, and 120 grams less than the Bohemian mean."⁹⁶ Other brain specialists and anthropologists concur in this verdict, *e.g.*, Boas in his discussion of "The Mind of Primitive Man," where he quotes (p. 24) another passage from Pearson to the same effect. Donaldson says: "Size, therefore, has a meaning, but it is by no means entitled to dominate the whole interpretation of the central system."⁹⁷ There is no need of carrying the argument further, since the burden of proof rests on those who *a priori* regard an

association of brain weight and high intelligence inseparable.

The form of the skull is considered still less fundamental, since the same head form is found among the most backward and the most advanced peoples. The cephalic index of the Bushmen is 75.9, that of the Swedes of the central provinces is 76.0, both being sub-dolichocephalic; both the natives of New Ireland and the Dutch of the province of Groeningen have a cephalic index of 81.0 on the living subject. Similar comparisons might be multiplied indefinitely, but would only prove the untenability of the theory more fully. Other measurements have likewise yielded unsatisfactory results. "I think all the investigations that have been made up to the present time compel us to assume that the characteristics of the osseous, muscular, visceral, or circulatory system, have practically no direct relation to the mental ability of man."⁹⁸

5. Major Woodruff's theory of the actinic rays is an attempt to explain the progress of civilization on the basis of a high type of man developed in the Baltic provinces. In regard to the various attempts to explain high mentality on anthropological grounds he says: "It should be remarked in passing that there is absolutely no relation between complexion or skull shape and intelligence. We have wonderfully high types of man of every conceivable complexion and every head form. It is only where we take huge numbers and compare types that we find the average of the blond type of white men to be so much more intelligent than all others as to have been the ruling element in Europe since historic times, and even long before."⁹⁹ He advocates a theory propounded by Schmaedel at Munich in 1895. The theory maintains that there is a definite relation between the distribu-

tion of light and color of man and animals. If we distinguish in the sun's rays those of heat, light, and actinic power, we find that coloration is intended to protect the organism against the dangerous short rays, also called actinic and ultra-violet, because these have the power to destroy protoplasm and to obstruct metabolism. The coloring is, consequently, in proportion to the amount of light—dark, brown, brunette, blond; and he claims that the human races are distributed according to this principle—the dark races living in the tropics where the sun rays are direct and burning; the brown in the sub-tropics where they are pretty direct, and in the arctics where light is strong by reflection; brunette in the lower latitudes of the temperate zones; and blond in the higher latitudes, provided there is sufficient protection from the light by forests, moisture or other agencies. The “evolution of blondness required, then, a cold, dark, northern country—probably a cloudy, rainy, misty, forest country—the exact conditions needed for the evolution of the brain by natural selection and the exact conditions of the countries where we have placed the origin of the Aryan or Teuton. What a strange outcome that these three words should become synonyms—Aryan—Teuton—Blond.”¹⁰⁰ The law is deduced that “the blondness of a European nation is proportional to the cloudiness of its country.”¹⁰¹ The Baltic people spread from their original home in different directions and were the originators of all civilizations, *e.g.*, Greek, Roman, even Egyptian and others; since other races could develop civilizations only to a certain degree, and needed the contact with and guidance of the brainy blonds to rise higher. But in each case they died sooner or later, because they had wandered out of their zoölogical zone.

This is the briefest possible statement of Major Woodruff's theory. In criticism I should like to offer the following considerations.

In the first place, Woodruff admits the existence of high intelligence among other peoples than blonds, as is evident from his own quotation given above. Teutonism or blondness is, therefore, not responsible for intelligence. In the second place, the severe struggle for existence does not necessarily evolve high brain power, as Woodruff constantly maintains, else this ought to have developed elsewhere under similar conditions. In order to show how emphatic he is on this point, one quotation may be given from his later work on *Expansion of Races*, "Cold and severe climates are the best for this evolution (of the nervous system), because they cause a more intense struggle for existence, and the survival of the fittest is here the survival of the most active and intelligent, just as in the terribly severe glacial times only the most intelligent survived, and there occurred a rapid evolution of brain."¹⁰² That this struggle should have developed a high brain power only in the Baltic area, not elsewhere, is imposing too much upon our credulity, unless we fall back on blondness as an additional reason—an argument rejected by himself. In the third place, it would be difficult to prove that this race of men was the only one to develop a high type of civilization in historic times. How can, for instance, the history of Peru and of Mexico with their Incas and Aztecs be explained on that theory? There was certainly no blondness of Teuton origin there.

What Major Woodruff's theory really means is this. The actinic rays are destructive of protoplasm; hence all organisms living in light countries have to protect themselves against these rays by graded pigmentation; but

some of these rays will always penetrate the skin notwithstanding coloration, and a high vitality is, consequently, impossible; the permanent necessity of avoiding the direct or reflected light makes, moreover, continuous work and with it civilization, impossible. Thus stated—and it seems to me the only logical interpretation—his theory reduces itself to a question of health. Whether the actinic rays have the injurious influence ascribed to them, is, of course, another question; the evidence pro and con not being sufficient to decide the matter. Major Woodruff's proofs taken from the decadence of blonds in southern climates and in light northern countries like Colorado are susceptible of a different interpretation, as we shall see later; and the experiments carried on in the Philippine Islands are insufficient both as to number of men and length of time, to confirm or to refute the actinic theory. It may be well to quote the conclusion of the commission appointed to investigate this problem. After stating the number of men under observation—500 blond and 500 brunette soldiers with at least 20 months' service, and 568 officers of Philippine Scouts, Constabulary, and Manila police force, with an average of 5.5 years' continuous tropical service—the results are stated under five heads: relative amount of sickness, symptomatology and dietetic habits, invalidism to United States, character and behavior, and relative frequency of insolation.

General summary. It is well known that heat and humidity in an experimental chamber, and in the absence of light, can produce symptoms similar to those occurring in a milder degree among residents of the tropics. We think it probable that these two factors, combined with infections, nostalgia and monotony, account for most if not all of the injurious effects seen in tropical lands. To explain the conditions met with in the Philippines

there seems to be no need for invoking the aid of the actinic rays of the solar spectrum. Protection against these rays by orange-red clothing was found to be of no benefit. It is by no means proved that pigmentation *per se* is beneficial in the tropics. In our investigation of blonds and brunettes the evidence was conflicting, some facts being in favor of the fair and others in favor of the dark-complexioned men. This is what would be expected if there were actually no difference between the two types as regards their resistance to tropical influences. From a consideration of all the data it appears that blonds are quite as well able as brunettes to withstand the influences of the Philippine climate for a period of two years and probably for a period of five and one-half years. In case of residence beyond the latter period we are not in a position to express an opinion based on extensive personal observation."¹⁰³ In his refutation of this criticism Major Woodruff calls attention to the fact that he had advised brown and not orange-red clothing as a protection against actinic rays, dwells on the admitted inadequacy of the experiments particularly as to time, and refers to the invalidism of the commissioners themselves shortly after having signed the report.¹⁰⁴

The final objection to the actinic theory, or rather to the application which Woodruff makes of his theory, may be stated as follows: If true, then civilizations of the past were always the resultant of the forces of decay and degeneration; and civilization would always depend on the men from the Baltic region, and could never spread far beyond that region for any length of time. True, he admits that the source of stalwart men from that region will never cease flowing, and civilization is therefore not in danger of ever disappearing. But what would happen if the climate of the Baltic region should change

as that of Iceland has done within recent years? This may be a groundless fear, but it should nevertheless be taken into consideration. Whether every civilization is the result of decay is an entirely different question, which will be discussed more fully later. Suffice it to say here that Woodruff is fully convinced of that fact. "Historians are now pretty well agreed that at the period of the greatest literary glory of Greece, 500 B.C., the decadence of the Greeks was already evident, and it is even said that it was complete. It is possible for such neurotics to be possessed of great literary, artistic, or military skill, as at the present day, and the decadence of the Greeks was probably the cause of their art. A wonderful confirmation of this view is afforded by a study of ancient Greek statuary which faithfully copies the stigmata of degeneration found in modern degenerates, just as though their best models from the aristocracy were defective. A famous head of Juno has arrested development of the lower jaw of marked degree and is the head of a dying race. It confirms what we know from all sources, that the climate of Greece, practically in the latitude of Maryland, required but seven centuries, or thereabouts to destroy its blonds." ¹⁰⁵

Since Major Woodruff does not quote any historians to support his claim, it is rather difficult to find out who they are. One historian may be quoted, though, to show that Greek degeneracy began later than 500 B.C. Mahaffy, in speaking of the numerous plots and revolutions started by exiled Greeks in their native city-states, ends the discussion with these words: "These scenes of violence play so large a part in our Greek histories that you will wonder how any such people could be a model to others in methods of politics, and it is for that reason that I think it necessary to notice the matter. When

we look below the surface we shall find that there were elements of order never eradicated, and that the crimes of the leaders of society did not infect the common sense, or destroy the safety of the mass of people, until the general decadence in the days of Polybius and the Roman interference."¹⁰⁶ This happened fully three centuries later, since Polybius was born 204 and died 123 B.C.

In regard to the degeneracy of the famous Juno, no date is given, and it is consequently impossible to decide whether it is from the fourth or second century B.C. or even later. The degeneracy of Socrates, Antisthenes, and Diogenes—even if real—need not be an indication of Greek decadence, since no one would judge Germany of today by Nietzsche, or England by Oscar Wilde. The men who fought at Marathon, Thermopylæ, and Salamis were certainly not degenerates, but men of high physical and mental attainments. In a previous chapter, specific and sufficient reasons have been given for the decadence of Greece, even granting now that these men were of the blond Baltic type as Major Woodruff claims.

This is, however, not by any means certain, since Ripley is of a different opinion. Speaking of the one hundred or more well-authenticated crania left to us, he says: "The testimony of these ancient Greek crania is perfectly harmonious. All authorities agree that the ancient Hellenes were decidedly long-headed, betraying in this respect their affinity to the Mediterranean race, which we have already traced throughout Southern Europe and Africa.—As we shall see, every characteristic in their modern descendants and every analogy with the neighboring populations, lead us to the conclusion that the classical Hellenes were distinctly of the Mediterranean racial type, little different from the Phœnicians, the Romans, or the Iberians."¹⁰⁷

One more statement should be made before proceeding

to our own theory. The effects of heat and humidity, if coincident, are disastrous; one without the other not nearly so. As illustrations we may cite the dry heat of some deserts where, notwithstanding a high temperature, people are healthy, *e.g.*, some parts of the Sahara and of Arabia; while the west coast of Ireland, the lake regions of England, and the northwestern coast of the United States are likewise healthy, although they are rather wet. It is excessive heat, together with great humidity, that forms a most deadly combination for people not acclimated to it, as the mortality on the west coast of Africa proves. This mortality is generally ascribed to climate, or more particularly to the combination of heat and humidity. But it seems that a different interpretation is possible. If heat without humidity is not necessarily injurious, nor humidity without heat, the combination is deadly because it is only in such a medium that certain disease germs can live. Neither the parasites of malaria nor those of uncinariasis can live without both heat and moisture; hence people living in places where either of these features is absent, are healthy and strong, other conditions being equal. It is, therefore, not so much the combination that seems to be disastrous to man, as the fact that it provides the necessary conditions for the growth of these parasites; and if man can protect himself against them—as he is now able to do—the prospects of even these most deadly regions becoming inhabitable to people from higher latitudes, seem at least fairly bright. As an illustration of what can be done, yellow fever may be cited. This disease was for a long time considered to be due to climate, because it occurred chiefly in the tropics. But since the demonstration in 1900 by Major Walter Reed, of the United States Army, showing that the mosquito *stegomyia* is the carrier of the yellow

fever parasite, and the cleaning of Havana by Colonel Waring, we have come to the conclusion that it is amenable to treatment by human beings, and its eradication by all civilized communities has proved once more the speciousness of reasoning which vaguely attributes certain effects to climate instead of to specific causes. As long as persons wander into the tropics and are stupid enough to expose themselves to a hot, glaring sun while the natives shun and avoid all work during the hours of noon, they are like the proverbial man who doesn't know enough to get out of the rain; since exposure of that kind is equal to the folly of trying to sleep outdoors in the Adirondacks during the winter—unless one be specially protected. It may not kill, but it is certainly injurious. In looking for causes of breakdowns in the tropics, individual and social habits are as often responsible as certain diseases; the two combined will explain the vast majority of physical and mental breakdowns; and the "climate," if given as a cause, should be reduced to specific terms, or not mentioned at all. Man is sufficiently inclined, as it is, to shift responsibility; and the climate has served in too many cases as an excuse for individual predisposition and inclination to evil. Only by looking for specific causes will it be possible to determine whether the tropics and sub-tropics are habitable for white men. "The question as to the ability of races to thrive under conditions of temperature other than those of their ancestors is one which has received considerable attention. It has long been held that the tropics could never become a field of conquest for the nations of the temperate zones, since the climate rendered occupation by them impossible. Notwithstanding the fact that distinguished observers maintain this, experience seems to demonstrate that acclimatization depends very largely upon a rigid observance of

sanitary and hygienic rules, and many places which were once considered fatal to the white man are being proved comparatively healthful. When we consider that they have lost their bad name solely by an exercise of local and personal hygiene, we must not despair of the power of man to reduce the unhealthfulness of even large areas in tropical climates." ¹⁰⁸

In order to illustrate from another point of view how necessary it is to look for specific instead of general reasons, we will refer to geophagy or dirt-eating. Deniker ¹⁰⁹ states that the custom is widespread, occurring in Senegal, Persia, especially the Asiatic Archipelago, India, South America, Java; and gives as reasons the desire for a beautiful complexion, and the necessity of supplying the deficiency of mineral substances among vegetarian nations. It does not seem to have occurred to him that in all of the countries mentioned, uncinariasis is very prevalent, and may possibly be a cause of geophagy. Reading of the "sand-lappers" in South Carolina being hookworm victims, I wrote Dr. Charles W. Stiles asking whether this custom was not a result rather than a cause of the disease. In reply he states that it seems quite clear to him that dirt-eating is a result, and not the cause of the infection with hookworm; and refers to the fact that this habit is known to occur among elephants, dogs, and sheep when infested with various intestinal parasites.

It may be well to say a few words in conclusion. It has not been our intention to deny the validity of certain factors as means to progress, but to insist upon the statement of specific reasons instead of being satisfied with attributing civilization to general causes, *e.g.*, head form, brain weight, climate, or actinic rays. These factors have undoubtedly some influence, but they are all beyond our control at present, and we are likely to make little

headway as long as we are content to take them as the principal causes. If we try, however, to look for specific causes, and find that they produce definite effects, we are more likely to attack certain problems in a definite manner, and arrive at results; and that is the only way to make progress. It may seem as if we had over-emphasized the importance of the two diseases mentioned. We have stated, however, that they are not the only ones, for there are many others which infest the tropics and sub-tropics. None of these is, however, as widespread or generally and specifically as injurious to whole populations as malaria and uncinariasis; neither have they been studied so extensively and intensively, nor have such definite results been attained in combating them as with these two. The purpose has been throughout to call attention to results both of the disease and of the cure, and to show that we can advance only in this manner. Just as I write this, the daily papers report that an interesting investigation is to be made by Dr. E. L. Atkinson, the parasitologist of the Scott Antarctic Expedition. He purposes to find the parasite in the Yang-tse River which causes a serious, and even deadly, disease among those who work in and about rivers, and if successful, to discover a remedy. In view of what has been already achieved with typhoid and yellow fever, malaria, hook-worm, the bubonic plague, and other diseases, it is very probable that Dr. Atkinson will succeed, and we shall have important results, hitherto attributed to climate or something else, assigned to a specific cause with which we know how to deal. An intelligent society should be telic; that is, attack its problems in a scientific and definite manner, otherwise it relapses into the condition of the semi-civilization of Mohametanism which charges its shortcomings to Allah.

CHAPTER XI

HEALTH AND WORLD-PROGRESS (*Continued*)

IN the last chapter an attempt was made to explain the inadequacy of various theories to account for European civilization. It becomes necessary to present a different view which is more in accord with the facts.

II. PROGRESS EXPLAINED ON THE BASIS OF HEALTH

In order to account for progress on the basis of health it may be advisable to keep in mind the five laws stated at the end of the fifth chapter. Briefly stated, they dealt with progress—possible only with surplus energy; with work—possible only with wisely controlled energy; with social personality—possible only through mutually helpful and sympathetic relations with others; with civilization—possible only through interdependence of persons and peoples resulting in exchange of mental and industrial products; with general development—possible only through increased self-reliance. In each case we found health to be the necessary foundation for these various forms of expansion. Civilization is in its ultimate essence a form of expansion, passing from physical buoyancy through intellectual, emotional, and volitional depth and breadth to self-reliance, and thus to confidence to control nature and man's destiny. We believe that these laws will be illustrated directly or indirectly in the following pages.

Man must have begun his career as a human being in a warm country, since such a locality alone could furnish

sufficient food to him whom nature had failed to supply with any effective weapons for defense or offense. Whether this place was near the equator or near the poles, and whether there was only one progenitor or several for the various races, are questions which do not concern us. The only problem which interests us is the relation of health to progress.

We have seen that neither head form, nor brain weight can fully account for intelligence—the only weapon which man developed in the course of time. How did he accomplish that? Wherever man had enough food to generate surplus energy over his immediate needs, this opportunity was provided. Generally speaking, any tropical or subtropical region will furnish an abundance of coarse food in the form of fruits, berries, roots, nuts, and other plants. There are likewise small animals on land and in the sea which supply at least occasional changes in the regimen of vegetable food. Man was thus able to live and multiply almost in any warm climate. *But while food was to be had anywhere in those regions, health was not.* The very climate in which it is easiest for man to subsist, is likewise most abounding in disease germs of various kinds. Manson enumerates about 30 diseases as “tropical” in the meteorological rather than geographical sense. All other diseases may, of course, occur in those regions; *e.g.*, in Porto Rico there are at least one hundred and fifty-two. We have seen what havoc two of these diseases may work, and it is easy to conjecture that life in a locality where practically every person suffers from at least one of them, many from two—since uncinariasis and malaria at least may be simultaneous—must have been what Victor Hugo describes in the words: “It is nothing to die; but it is frightful not to live,” that is, not to live healthily, or to live with constant pains and aches,

With the vast majority of people affected by disease, with food coarse, innutritious, and often irregular—it was practically impossible to store up any surplus energy to improve one's lot, for all innovations require extra effort, and that is impossible to those of low vitality. Man in those regions has made but little advance to this day, owing to the permanence of tropical diseases. A hook-worm or malaria victim may have enough energy to toil and slave for the simple food he eats, when the pangs of hunger drive him, but beyond that he is unable to go, simply because much of the time he must rest and sleep from sheer weariness. The jibaro of Porto Rico toils long hours sometimes, but in a mechanical way. The inhabitants of hot climates are, as a rule, listless, uninventive, apathetic, and improvident, not so much because of the heat, against which there is protection through shade, but owing to the various parasites which infest their blood and digestive organs, from which in lower civilizations there is no escape. Whatever energy is generated from food, is consumed in the performance of mere physiological functions; any possible surplus goes to feed the myriads of parasites, and none is left for activities which make leaders and inventors. If by any chance some chieftains or warriors escape the worst effects of low vitality, owing to better food and more rest, their energy will expend itself in acts of cruelty and vice, since the balance of good health is missing and thus no control is exercised over the purely physical instincts. No progress is possible in those regions where disease germs abound, unchecked by the science of man.

We have given the percentage of people suffering from uncinariasis in many countries. Malaria is spread over even a wider area of the globe, since it extends farther south and farther north. The so-called, "deadly

climates" always mean malarious countries. And this disease parallels ancylostomiasis in its power to make people anæmic, since the malaria parasites attack the red corpuscles and cause a reduction of hemoglobin, of the latter, often by 40 per cent in a few days and of the former by 60 or even 80 per cent. It stands to reason that where the whole population is afflicted with even one of the numerous tropical diseases, no energy is left for any but the absolutely necessary activities—physiological functions imperatively demanding satisfaction. Every inhabitant of those regions is in a pathologic condition owing to one or another disease peculiar to the country. Even slight affections are not without significance; for, in a stock of low vitality, attacked by malaria in childhood and by uncinariasis after puberty, but little is needed to shake the constitution to its very foundations. While mortality from malaria is estimated to be only 1,130,000 in an ordinary year all over the world, this number represents an enormous amount of suffering and loss of labor, often when the latter is most valuable. The aftermath is frightful, since the drain on the constitution is heavy, and various other diseases, *e.g.*, neurasthenia, vascular or cardiac troubles, find ready victims owing to the excessive calls on the energy of these organs due to the exhaustion of the whole body. As a result of the poor quality and large quantity of coarse, bulky, in-nutritious food, many, if not the majority of people in the tropics and sub-tropics are in a state of chronic starvation. They live, consequently, on the borderland between health and disease, and a number of parasites of any disease may prove the last straw to break the camel's back. And the chronic character of these diseases permits hardly anyone to escape. How can any surplus energy be generated under these conditions? They are a most

miserable people. "The dwellers in a malarious region like the Terai at the foot of the (Himalayas) are miserable, listless, and ugly, with large heads and particularly prominent ears, flat noses, tumid bellies, slender limbs and sallow complexions; the children are impregnated with malaria from their birth, and their growth is attended with aberrations from the normal which practically amount to the disease of the rickets. The malarial cachexia that follows definite attacks of ague consists in a state of ill-defined suffering, associated with a sallow skin, enlarged spleen and liver, and sometimes with dropsy."¹¹⁰ If as many as 60 to 80 per cent of the population are victims of malaria, and about 75 per cent of uncinariasis—equally disastrous in its consequences—it is not difficult to see that such a people cannot generate sufficient energy for any but the absolutely necessary activities for sustenance. So miserable is the condition of most people in warm climates that intoxicants and narcotics are generally resorted to to find a little relief from the continuous feeling of depression and lethargy. This is most probably the explanation of the almost universal use of artificial stimulants, especially when we find that those of low vitality among civilized peoples resort almost without exception to some kind of exhilarating drink or drug.

The condition of all countries in the tropics and subtropics has been similar to the one described in the case of Porto Rico, with variations in some localities for better, in others for worse. The debilitating influences of endemic diseases have played an incalculable part in the history of all warm countries. The present condition of southern and central China, India, Central America, and very large parts of South America, the West Indies, practically of all Africa and other parts of the tropics and

sub-tropics, is accounted for to a large extent by the ravages of these diseases, unchecked for many centuries, and therefore cumulative in their effects on succeeding generations. If even in the Southern States of the Union with their numerous healthy localities, the subjects of malaria and hookworm are almost branded by their appearance and low social character as beings of a different race, the results in a generally lower civilization, with worse sanitary conditions, must have been much worse. Men cannot live generation after generation on a low vitality plane without physical, mental, moral, and social deterioration. People whose amount of energy is so small that they cannot perform any but the most necessary activities, and these only by forcing themselves because of constant aches and pains, soon become self-centered and unsocial, lose control over themselves and with it self-respect and moral sense. Their attitude is one of carelessness, listlessness, and general apathy. The indulgence of the physical appetites is their only concern, since the nervous system is disintegrated, and the instincts are no longer under the control of a well-balanced, healthy constitution.

We have an analogy here to what happens in old age with the breaking up of the nervous and digestive systems. Because of the lowering of vitality many old people become pessimistic, irritable, contentious, and even moral perverts. The control of the whole over the parts is lacking, and small incidents will disturb whatever balancing elements are left. Under these conditions wild ideas easily find admission. A healthy man has a standard in his own ability of performance for whatever can be done, and is therefore in a position to judge the performances of others. If anyone promises too much or anything that passes the range of his comprehension, he will

become cautious and skeptical. It is difficult to deceive him more than once. The sick man has his fancies, and in acute cases, his delirium, just because the diseased part no longer serves the whole in an unobtrusive and effective manner, but asserts itself and throws the entire system out of order. What happens, however, in his case in an acute form, happens in that of devitalized persons constantly in a milder degree. The one desire is for a feeling of buoyancy and well-being which they have experienced in the few moments of occasional relief. Owing to their inability to measure performance on account of their own defects, they readily accept promises of help and relief, no matter how fanciful. The psychology of patent medicine vendors and consumers is based on this principle. The vendor knows that those ailing from some trouble can easily be induced to believe their difficulty to be greater than it is; and so he works up a description of symptoms which is certain to tally with some of the patients' feelings. The consumer, already off his guard through the general tendency of illness to deprive one of a proper sense of proportion, becomes alarmed, believes, and buys. In a population where practically everybody lives on a low vitality plane and where many are actually sick, there is no general standard for the performance of the possible, and superstition, credulity, and a general lack of estimating promises at their true value, are the result. The pessimism of old age, too, can be explained on this principle. Power to perform is in a large measure gone, and there is just enough energy left to resent this inability. But man cannot live in a resentful mood for a long time without changing the tone of his whole attitude. For a time he may be satisfied in speaking about the superior performances of his younger days. This soon becomes tiresome, and inability

to act effectively creates a feeling of distrust in the value of one's own actions in the course of time. The final result is pessimism or perhaps superstition, even in as brilliant a man as the late Alfred R. Wallace in his old age. Lombroso is another case in point.

The application of this general principle is not far to seek. The connection of endemic diseases and of Nirvana was hinted at in the last chapter. This may have seemed fanciful, but on the basis of the principle just stated, it appears less so. Where every possible means to rid oneself of continuous suffering has failed, and where misery is the one permanent and universal element in the social environment, the whole of individual existence comes to be regarded as consisting of pain, and the annihilation of individuality or the ceasing of activity in Nirvana must appear as the only way of solving the problem. The average Hindoo, not being sufficiently educated to comprehend such a doctrine, just as naturally resorts to various superstitions as means of relief; and the numerous practices of the most revolting character in the religions of India amply testify to what depth of degradation a people can descend when constant physical suffering, even in a mild degree, perverts the whole mental attitude toward seeking relief at any cost. The voodooism of the Porto Rican negro was referred to as due to a similar source. In short, it seems to me, that many superstitions in religion and other departments of life originated in a feeling of inability to perform, and in the consequent absence of a personal measure for the value of promise to perform. But the whole of the tropical and of the ancient world has been subjected to this inability owing to the practically general occurrence of endemics and frequent epidemics; hence all of the religions originating there are not only full of superstitions,

but express above all else the ardent desire for relief from suffering.

The principle stated may be applied also in the political realm. The civilized world is informed almost every year about a revolution in one of our Central and South American republics. These people have what the politicians and statesmen always talk about—free institutions, liberal constitutions, and for the minority, at least, a fair system of education. Yet, it is the most educated in those countries who are plotting and counter-plotting, and each new aspirant for presidential honors readily finds adherents. How does he get them? By promises of various kinds, all of which are plainly utopian. Yet, to the peon of Mexico, or of the different republics of Central and South America, they seem credible because he has never performed systematic work in his life and has, thus, no standard to measure the promises of others in regard to the possibility of performance. And why can he not work? Because he is born with a weak constitution, gets malaria during his childhood, has uncinariasis in his youth, and never has an opportunity to lay up any surplus energy. Hence any demagogue who is shrewd enough to make his promises sufficiently glowing, has no difficulty in finding adherents, although the least modicum of common sense and the oft-repeated impossibility of keeping said promises ought to teach these people that any plans proposed by the most fervid orator are but so many idle words, spoken to enthrall the fancy of a multitude incapable of thinking, because bent only on relief from an intolerable condition. A blind belief in promises of any kind has taken the place of clear thinking, and the demagogue appeals to this desire for liberation from suffering. The present political and economic condition of some parts of Europe furnishes a recent

illustration of the same principle. Lack of food during the World War produced widespread devitalization. The result is a belief in all kinds of vagaries, especially in Russia where conditions were worst. These people have lost optimism and self-control.

Whichever way we turn, then, the phenomenon of low vitality in the warm climates, due chiefly to endemic diseases, confronts us with its retardation of progress, lack of initiative, and absence of clear thinking. For whatever the ultimate explanation may be, the primary fact remains that the phenomena of consciousness are inextricably involved with physiological conditions; they are exalted or depressed with the latter; they unfold and flourish with the health and vigor of the organism; and decline or fade away with the deterioration of the body. The human body is an engine for the conversion of food into energy. In proportion as the engine is supplied with good fuel and is kept free from friction, will the energy be greater and expended more economically.

In the warm climates the food is generally poor and the friction in the organism is great and incessant, owing to parasites; hence no surplus power can be generated, and, inferentially at least, no high mentality can be created. The result is stagnation within and retardation of civilization introduced from without.

Mexico will serve as a good illustration of this condition of things. It is the treasure vault of the globe, not only by virtue of its mineral wealth but by its agricultural potentialities. But though Mexico is rich, Mexicans are very poor; they can, moreover, never be rich unless the conditions of health are changed among the peons. When the vast majority of a people is under the influence of debilitating diseases—and Mexico has a

large amount of malaria and uncinariasis beside many others—persistent work is out of the question, and work alone will bring wealth to a country. These people are without energy, merely doing enough to meet their few elementary needs. When aroused into some kind of frenzy, as is apt to be the case with mentally poorly balanced people, they become cruel and irresponsible. The world has been shocked many times by savage acts of cruelty on the part of soldiers and officers. The revolutionists shoot down the defenders of any established government in cold blood, and any revolutionist is treated as a traitor. It is better to die on the field of battle than to become a prisoner, since massacre of prisoners goes on from decade to decade. Having a poorly balanced nervous system owing to poor food and internal parasites, the peon can be stirred only by the promise of the satisfaction of his elemental passions for loot, revenge, and violence. These are easily aroused and the leaders see to it that they are satisfied; and any bandit making promises in this manner will find ready followers. When not aroused the peon is about as lazy and inactive a being as physiological necessities permit him to be. This may explain why Porfirio Diaz created a most efficient corps of *rurales* from bandits and leaders of robber bands. These men had shown at least sufficient energy to be bad, while the average peon merely gave evidence of an unconquerable desire to eat, drink, and sleep, perhaps to loaf when not too tired. Only a hopelessly devitalized people would permit a government such as Mexico has had—a handful of Spaniards in alliance with a small section of the mixed race has held all the offices in the courts, army, and administration. And not once have the lower strata of the population risen in revolt against this small class. Revolutions there have

been, but always instigated and engineered by men of this small class against one of their own coterie. And as long as the peon remains the mere physical wreck which he generally is, no free constitution nor book-learning can help him. The mere wish to be free is not enough; there must be physical and mental energy behind the wish to make it a reality. As soon as modern medicine brings the necessary relief, the peon will rise and crush the whole artificial superstructure of class rule. There are a few indications of this already.

The most progressive states of Mexico are those in the north,—Coahuila, Chihuahua, Sonora, and Durango; they have a more temperate climate on account of their great altitude, and are more healthful. Endemic diseases are not nearly as prevalent as further south and along the sea coasts, and the people are stronger, more vigorous, and mentally alert. This difference in health may explain the various estimates placed on the peon better than the theory of race. Diametrically opposite opinions are reported about him. He is held by some to be a robber and savage by nature, while others regard him as extremely intelligent and faithful; some consider him a ne'er-do-well, others an exceedingly capable workman, improving rapidly under instruction. The solution seems simple enough. The peon who is ridden by parasites is and must be worthless as a laborer, and savage when aroused, just as our southern mountaineers are, under similar conditions; while the peon who comes from the higher altitudes has a better constitution, and is more willing and capable to learn when opportunity offers under American employment with better pay, treatment, and improved housing conditions. The incapables in New York nearly all belong to the physically devitalized class, while **capable workers in any occupation enjoy at least fair health.**

In New York we classify the paupers and ne'er-do-wells among the physically defective or at least those of low vitality; why not do the same with Mexicans?

Summing up, we find that low vitality is the cause of nearly all the troubles in the tropics, because it means inability to perform and achieve, and, consequently, the absence of a standard to measure the value of promise to perform on the part of others. Hence superstition in religion and credulity in politics. For the psychological basis of both is inability to perform. This is amply illustrated in more advanced societies in other realms. The promoter of various "get-rich-quick" schemes frequently and successfully appeals to ministers and teachers, because they are not experts in business. It is difficult to "beat" a horsedealer in his line; but he may pay fifty dollars for a bushel of wheat "blessed" by a religious quack—an actual occurrence during 1912 in Brooklyn, N. Y. Even intelligent people take to medical nostrums when suffering from chronic disease, or adopt any medley of religio-philosophical theories. The inability to perform in any particular line provides an opportunity for the charlatan of every description.

Fortunately, the conditions just described are not universal in the tropics and sub-tropics. There are a number of areas free from at least the worst of the debilitating effects of endemic diseases; they are found chiefly in the mountains and on small islands in the sea where the breezes mitigate the effects of too great heat. We are concerned here chiefly with the health of islands in higher altitudes, since the islands of the sea have had comparatively little influence on world-progress.

The zones of altitude are almost as important as the

zones of latitude. If a mountain is sufficiently high, it may present features of the higher latitudes in the midst of a tropical climate, as the temperature decreases normally one degree Fahrenheit for every 270 feet altitude. This means that an altitude of 5,000 feet has a temperature by 18 degrees lower than the seashore, and in high mountains, such as the Himalayas, there results a very considerable range of flora and variety in climates. The long incline of Mount Everest down to the sea level at Calcutta, comprises in a few miles the climatic conditions of Asia from arctic to tropic; and the southern slope of Monte Rosa, from the glacier cap to the banks of the river Po, yields within certain limits all the varieties of climates in Europe from Lapland to the Mediterranean. In a study of health this is very important, since not only heat decreases as we ascend, but absolute humidity. Deaderick says that a few hundred feet in altitude are equivalent, as far as malarial conditions are concerned, to as many miles in latitude, although it may occur in places as high as 6,000 feet within the tropics. To a certain extent the same holds true concerning uncinariasis, since in Colombia the portion of the population living below 3,000 feet altitude is infected to the extent of 90 per cent, while it scarcely occurs above that level. It is interesting to notice here that those portions of South America, *e.g.*, Argentina and Chile, which are practically free from these endemics, are the most advanced in civilization, and have the most stable governments.

The important social and climatic differences which may often exist within comparatively short distances may be illustrated by a reference to Sweden, where we have the Lapps in the north, and only a hundred miles to the south, the Swedes; the former merely eke out an existence, the latter live in comparative comfort. The

differences in civilization are even greater between the two peoples. Other countries show similar differences. In the highlands of northern Palestine with their cool, moist, and cloudy climate we have the Druses with their blue eyes and brown hair; while in the depression along the Dead Sea, about 120 miles south, negroid types survive. In the Blue Ridge Mountains we have the Baltic type who survive in racial purity, but at their foot, 100 miles or so away, lives the negro. In central Italy and in northern Spain the blonds are found mostly in the cloudy uplands, while the darker colored types live in the valleys. These cases show plainly, that there may exist great differences of climate within comparatively small geographical distances, provided that mountains give variety to the landscape.

Another factor may be mentioned here. Certain areas and islands are entirely free from a disease, while neighboring localities are devastated. This immunity is apparently not due to the absence of unfavorable conditions, but rather to the presence of some inimical factor preventing the development of the parasite. And the problem of stamping out malaria and hookworm, for instance, will be greatly facilitated if that factor should be discovered. With the rapid development of medical knowledge in the realm of bacteria and parasites, it is not unreasonable to hope that such a discovery will be made in a comparatively short time, giving us perhaps a new and better explanation of these and other diseases and their influence upon man.

Hills, mountains, and the plateaus between them, are, then, comparatively free from the effects of most known endemics. It was in these localities that a healthier race than in the lowlands was developed all through the ages. **These men are more intelligent and more alert than those**

in the valleys, just because they are less debilitated by disease. The conquerors and the men of initiative in the sub-tropics have generally come from the highlands all through historic times. The Aryans invading India, the Medes, the Assyrians, and even the Kurds of today are examples. The ancient civilizations of the Incas in Peru and that of the Toltecs and the Aztecs in Mexico had their seats in cities located at high altitudes. The Incas preferred to extend their conquests along the Andean valleys for a stretch of 1,500 miles; they found it easier to climb pass after pass and mount to higher altitudes, than to descend to the hot, steaming coast where man and beast were constantly attacked by parasites; when they finally did descend to the seaboard, their degeneration soon began and a handful of Spaniards was able to vanquish them. The areas which were comparatively free from endemic diseases, have produced a high type of man all over the globe, even when they were small; and a civilization surpassing that of less healthy regions was produced. What was the reason for their inability to pursue the course entered upon? There were two; first, migrations into warmer climates; second, the limitation of the healthy areas; or lack of continuity, and insufficient extension.

1. *Lack of Continuity.* The tendency of man has always been toward greater ease, and a cold, perhaps raw and damp, climate has rarely proved attractive to any race. Hence we have the numerous migrations from the higher altitudes into the nearby valleys, from the plateaus of Central Asia both south and west into regions with more favorable climatic conditions. Coming into contact with more comfortably situated but physically enfeebled races, these healthier tribes had no difficulty in subduing them and establishing new governments. A higher civili-

zation resulted, since minds were stimulated by this contact, and the conquerors—having enslaved the native races—had leisure to develop whatever capacities they had. For a while things went well, and in a number of instances remarkable progress was made. Then the inevitable decline began, owing to the fact that the conquerors were unable to withstand the diseases of the warmer climates, in which they had never had any racial training. In the course of time they degenerated, and eventually died out. The civilization which had been essentially the work of a healthy race, could not be continued for long by the enfeebled native races, and sooner or later passed away; and the partially civilized natives relapsed to lower levels.

India and Egypt are good illustrations of this process. The native races of India were never able to attain a high level by their own efforts, since with the conditions of health indicated in previous chapters, this was absolutely impossible. Egypt was in a similar position. With endemic diseases always abounding, no one could live in the Nile valley but the fellaheen. From time immemorial, conquerors have come from the north and occasionally from the mountains of the south to become the pharaohs of the country, always imposing their government upon the patient peasantry; but the principal parts of their civilization which have come down to us are their huge tombs, in the building of which thousands of slaves lost their lives. Yet the slaves are there today, still toiling for new masters from the north; while all the former rulers died out long ago, scarcely leaving us their names.

And so it was with Italy. How many Teutons were there who obeyed the call of their Emperors during the Middle Ages in order to retain the crown of "The Holy Roman Empire of the German Nation," only to find the

malaria of the Campagna and of southern Italy a more deadly foe than the stiletto of the crafty Sicilian! The last of the noblest dynasty of those conquerors, Konradin the Hohenstaufen, met a martyr's death, due to the inability of his warriors to adjust themselves to the parasites. Thus has it always been. The conqueror vanquished the enfeebled population of the warmer climates; yet in the course of time he fell a victim to the merciless but invisible foe which attacked his blood and intestines. The native population, enervated and unprogressive but sifted through the survival of the fittest, still continues to live and procreate, and is now seeing a better day ahead because modern science is able to cope with these deadly parasites.

Civilizations in the past were, consequently, of necessity ephemeral. One race of conquerors followed another in the same country; and although some of the achievements of former rulers survived, the vast majority of them were lost, and a new start had to be made every time that two races came in contact with each other. Continuity of progress is, in other words, essential to a high civilization; only where achievements are handed down through successive generations, can the new generations start fairly well equipped for conquests in still unknown fields of knowledge. Owing, then, to the debility of races native to warmer climates, and to the inability of races from healthier localities to adapt themselves to such climates, no continuity of progress was possible, nor could any civilization of antiquity rise beyond a certain level.

2. *Insufficient Extension.* The other reason for the failure of the peoples in the healthy areas to rise higher was the limitation of these areas. No high civilization is ever built up by a single people, no matter how capable

it may be. One must learn not only from predecessors, but from contemporaries. Exchanges of views must not only be numerous, but varied. In proportion as a capable people enters into friendly relations with other fairly well advanced nations, will it develop by receiving and giving suggestions. The healthy areas in the tropics and sub-tropics are generally of small extent, and hence are able to support only small populations, more particularly in former ages when the means for increasing the food supply were limited to the domestication of animals and to a crude form of agriculture. Social and religious conditions forbade, moreover, too frequent or too varied contact with foreign races. Diffidence, which poor health always implies, generally prevented people from extending their social consciousness beyond the tribal domain, since they lacked the courage born of good health to conquer unknown difficulties or even to wrestle with those immediately at hand. The expansiveness and good nature of vigorous health was a rare occurrence in those times, and this is reflected in the social and religious creeds of primitive man—and of savage man in all climates today—who look upon every foreigner as an enemy and every worshiper of a different deity as a heretic. The history of religious persecutions even in comparatively modern times is a confirmation of this statement, since the foremost persecutors of other creeds were generally men in poor health—if one may judge from their gaunt figures and emaciated features. The recent "holy war" of the Greeks, Servians, and Bulgarians against the Turks was justly ridiculed by many people, ignorant of the sanitary conditions in the Balkans, since it was a most unholy one, although the savagery of all parties was inexplicable to the critics. The fact of the Allies attacking each other after the

defeat of the Turks, justifies the inference that the cruelties perpetrated by all parties to this war and the narrowness of their social and religious consciousness may be due largely to the general ill health of these peoples, induced by endemic diseases. We have here another case like that of the Mexicans discussed above—peoples ravaged for generations by endemic diseases, consequently without balance; and, when aroused, satisfying merely animal instincts of lust and revenge without let or hindrance. All parties were drunk with blood, and lost all control of themselves. Concerning Greece we know that malaria is very prevalent, and concerning the other countries we simply lack statistical evidence, although the disease is widespread and others may exist. (See the Preface for an explanation of the inactivity of 750,000 men owing to malaria.)

In localities where endemic diseases were at least rare, and a healthier stock could develop in the course of time, social consciousness still continued to be comparatively narrow owing to inherited customs which it is always difficult to change, especially among people on lower planes of civilization. Hence these people would not enter into any but hostile contact with others, and the enslavement or extirpation of the defeated peoples was almost inevitable. This prevented a profitable exchange of views and kept the civilization even of healthy races on comparatively low levels, since no single race has been able to rise very high unaided by the efforts of others. The rapid spread and high development of modern civilization is among other things due to the rapid extension of our means of communication, which has enabled every civilized nation to be teacher as well as pupil of every other. And the most advanced nations in the spread of civilization are, and always have been, the healthiest,

because they have had the courage to face all kinds of dangers, and confidence in their ability to cope with all sorts of difficulties. The pioneers in discoveries have always enjoyed good, if not abounding, health.

Two conditions are, then, necessary for a high civilization—continuity of progress and sufficient extension. These two factors have met only in the history of the White Race, and more particularly in that of the Baltic stock. Since it is admitted that intelligence is not confined to one kind of pigmentation or to one head form, as we saw above; and since the origin of the physical differentiations is still an unsolved and exceedingly complex problem—witness, for instance in the case of the negro, the existence of a dense cuticle, diminished perspiration, smaller chest with less perspiratory power, lower temperature with a more rapid pulse, and constant subjection to endemic diseases, all of which variations may enter into the question of coloring—we need not enter into even a brief discussion of racial beginnings.* We are concerned only with the question of higher mentality as the cause of civilization.

Our direct human ancestors originated in all probability in the Indian archipelago, since the oldest human remains have been found there on the island of Java. From the archipelago migrations took place in a northwestern direction into Asia, and here the stream divided, turning along the coasts, east and west, and northward into the higher altitudes; one stream eventually getting into Europe and another into Africa. The details of these migrations and the problem of the population of America and of the Pacific islands, do not concern us. Our only

* The most acceptable theory is that of Professor Giddings, as given by F. Stuart Chapin in *Social Evolution*, pp. 208-226, on the basis of unpublished lectures.

problem is that of the increase of mentality as affected by these migrations. The Indian archipelago is notoriously insalubrious, and man could make comparatively little progress there, as is proved by the low mental condition of the aborigines of Borneo and Australia. The further north he went, the more healthful were the regions he entered; the stream of migration which eventually turned into Africa lost some of the mentality gained during the long sojourn in more salubrious regions and dropped to lower levels owing to the notoriously bad sanitary conditions of that continent.

One question must be answered before we proceed. What was the motive for these migrations? The usual answer has been overpopulation. Even today the great continent-like areas of Borneo, New Guinea, Sumatra, and some of the larger islands of the Philippine group have a sparse population, and Australia is noted for its exceedingly few inhabitants all over the northern central districts. It is true that some of the smaller islands in the archipelago are densely populated, but this is due to local conditions which have been produced by Europeans, who selected the most fertile regions favorable for the cultivation of special products. A striking example is furnished by Amboina, the isle of the famous clove monopoly where the population reaches 1,000 per square mile, while in the other Moluccas, where Papuan influences are strong, it drops to 20. Underpopulation is found over the larger part of the tropics. "Economic and social retardation have kept the hot belt relatively underpopulated. The density map shows much the largest part of it with a population less than 25 to the square mile. Only the small portion contained in India, southernmost China, and Java shows a density over 125 to the square mile. This density has to rise to 500 or more to the square mile

before emigration begins. The would-be exiles then have a wide choice of new homes in other tropical lands, where they find congenial climate and phases of economic development into which they will fit." ¹¹¹ Compare this statement with the following by the same author.

"In the tropical highlands of Mexico, Central and South America,—concentration of population and its concomitant cultural development begin to appear above the 2,000 meter line. Here are the chief seats of population. Mexico has three recognized altitude zones, the cold, the temperate, and the hot, corresponding to plateau, high slopes and coastal piedmont up to 1,000 meters;—but the first two contain nine-tenths of the people. While the plateau has in some sections a population dense as that of France, the lowlands are sparsely peopled by wild Indians and lumbermen. Ecuador has three-fourths of its population crowded into the plateau basins (mean elevation 2,500 meters) inclosed by the ranges of the Andes. Peru presents a similar distribution, with a comparatively dense population, on a plateau reaching to 3,500 meters or more, though its coastal belt being healthful, dry, and fairly well supplied with irrigation streams from the Andes, is better developed than any other similar district in tropical America. In Bolivia, 72 per cent of the total population live at an altitude of 6,000 to 14,000 feet, while five out of the nine most densely populated provinces lie at elevations over 11,000 feet." ¹¹²

Overpopulation of the tropics cannot, then, have been the motive for emigration northward from the Indian archipelago, since the stress of population must have been less in pre-historic times than it is today. Primitive man had, moreover, means, as savage man has today, for preventing this calamity by killing off the old people and the children.

Neither can the motive for migration be found in the scarcity of food, since the regions mentioned and the hot belt in general are more productive with less labor than higher altitudes or latitudes. Any possible scarcity of food was easily remedied by cannibalism within the group or without by war, since the bodies of slain friends as well as of foes could be and were used not only in emergencies but often as a delicacy. Owing to his general aversion to needless exertion man has never entered upon long journeys or other hardships without an urgent reason. In primitive times he was even less inclined to do so on account of his diffidence and his ignorance of overcoming obstacles. Yet we see him go north and climb mountain slopes to establish a habitat. What was the strong motive which induced him to abandon the favorable conditions in the valleys of warm climates?

The dread of disease is the only answer to this question. Even in earliest times man must have noticed the tremendous mortality which he found all around him, and must have feared a like fate, since the love of life has been the one permanent instinct of the human race. The "will to live" is, perhaps, stronger in nature-peoples than in the civilized, notwithstanding the small value put upon life by the lower races. It is one thing to value other persons' lives lightly; it is quite different when it comes to one's own. The savage is unsophisticated in this matter, and while he has but little to live for, the dread of death, once he has acquired sufficient intelligence to form an idea of it, is a strong motive for almost superhuman exertion. We see this almost daily in the lower strata of civilized nations where people without the comfort of religion and philosophical resignation, stand in perfect terror of death, and would rather suffer any privations than submit to the inevitable. How much more horrify-

ing must this calamity have appeared to man after he had peopled the world with all sorts of evil spirits, and had no way of reconciling himself to his fate by the comforts of a more rational view of the world? Life was hard, but death was terrible! And so he struggled with all his power to postpone the evil day. The best way to do that was to seek more healthful regions.

We need not assume that the discovery of the possibility for a longer life was made suddenly. It came like all other discoveries and inventions gradually and accidentally. The man who had wandered into the hills in search of food or in stalking game must have felt the exhilaration of a purer atmosphere and the beneficent effect of the absence of at least some insect pests. Man was teachable, and he deliberately repeated the experience. In the course of time he formed a dim and crude notion about this matter, and the most enterprising men must sooner or later have gone in search for such localities. These men were naturally the strongest, since they alone could undergo the hardships of even moderately distant travel. In these localities they gained better health and greater strength, and perhaps began to prey upon the people in the valleys. Owing to the plasticity of early man, new stocks with greater vitality and mentality were soon formed, and both became incentives to further exercise of physical and mental faculties, since good health with surplus energy craves for an outlet. The weaker members were left in the less wholesome regions, as is the case today, and as brought out so strikingly by Miss Semple in the passage quoted above concerning Peru, Bolivia, and Ecuador. Little or no progress was possible under these conditions, and the typical "deadly climates" have always been the abode of devitalized and uncivilized peoples. The migrants, on the

other hand, traveled on, always leaving the weaklings behind in what seemed to the latter favorable places for settlement; they separated and traveled in different directions, driven partly by genuine *Wanderlust*, and partly by the desire to match their wits and courage against new difficulties. In the course of time these groups became estranged, changed, and when their descendants met after thousands of years in entirely new countries they fought each other for the best localities in which to make a living; but the battle always went to the strongest, *i.e.*, the healthiest. The peoples of the mountains or from comparatively disease-free plains always subjugated those in the less salubrious but more fertile plains, and the contact between two different stocks generally had a deepening and broadening effect upon the minds so that new civilizations sprang up here and there in the tropics and sub-tropics. All of them were, however, local and ephemeral, since the healthful areas were nowhere of sufficient extent to enable a large number of people to exchange ideas, and since the small number of conquerors subjugating a large population in less sanitary but more fertile regions invariably succumbed sooner or later to the endemic diseases, leaving the natives with a culture which they were unable to maintain long, because of their inherent physical and mental weakness. We must come back, therefore, to our problem of the civilization produced by the white race and more particularly by the Baltic or Teutonic stock, since this alone has had continuity of progress and sufficient extension to mature into a truly high and world-wide culture.

In the Mediterranean countries we have for the first time a combination of circumstances which made a continuity of progress possible and permitted a sufficient extension of civilization to insure the contact of numerous

and varied races and stocks. An independent civilization sprang up in Mesopotamia and another in Egypt; both were located in fertile river valleys, and both were the result of strong and healthy races coming in contact with peoples who had, under the influence of favorable climates, built up a fair material culture. The native races were unable to rise above the level of economic considerations, and only the more virile races who came from northern countries could add a touch of something more spiritual to this culture by art, religion, and philosophy. When the invaders succumbed to the endemic diseases, a relapse into a lower condition invariably resulted, and only a new set of conquerors from a different country could take up the thread and spin it further. For Egypt has been ruled by foreigners from time immemorial to the present day. Fortunately, the interregnum was never too long, and the new dynasty could always begin at least somewhere near the plane where its predecessors left off. Some of these dynasties conquered other countries, both south and northeast, and thus the Mesopotamian and Egyptian civilizations came in contact with each other. A conquest of Nineveh by Amenophis II is reported as early as 1566 B.C.; and from that time on the intercourse between the two countries was almost continuous, owing to the fact that both countries strove for the mastery of Syria and Palestine, until Essarhaddon of Assyria captured Egypt about 671 B.C. An important civilization had also developed in the island of Crete; and the rivalries between Egypt and Mesopotamia gave the Phœnicians an opportunity to create a dominant power along the Mediterranean, not so much by conquest as by commerce. Greece and Italy must have been affected by these movements, and if the theory of Baltic immigration should be based on fact, these

blonds would have found a civilization well advanced and of a sufficiently high and varied character to fertilize the minds of a vigorous race. Thus Greek and Roman culture developed on the basis of all those produced by the peoples along the Mediterranean. As these two peoples of apparently Baltic stock perished through their lack of racial training against malaria and, most probably, uncinariasis, their civilization dropped to lower levels, since the disease-ridden but acclimated natives of these countries could not raise civilization beyond a certain plane without the assistance of a more vigorous race that had accumulated a vast store of vitality in healthful countries.

From the fall of the Roman Empire at the hands of later Teuton invaders—all of whom shortly perished of these prevalent diseases—to the present time, civilization has gradually moved northward, first to Florence, Milan, and Venice, then to France, Germany, England, Denmark, and Scandinavia. While Italy is still prominent in art, Denmark has developed remarkably in that respect, and Scandinavians are becoming more prominent as writers of really important literature. The Latin nations, notably France and Italy, may be able to hold their place as teachers of the fine arts owing to the vast accumulations of classical remains in their museums, but the science and art of producing and distributing wealth and creating welfare among the masses, are now taught by Teuton countries. The Scandinavians, the Germans, the English with their colonies, and the Americans, are now leading the world in all matters pertaining to social well-being, and are likely to keep the lead for a long time over the Latins, since they are not handicapped by fighting a constant foe to their vitality. Italy and Greece may be able to avert the worst forms of devitalization by

the application of modern scientific methods, but that costs money which the other countries are able to apply to productive uses. "Ricchi calculates that the Adriatic Railway Company alone, for 1,400 kilometers of railway and for 6,416 workmen in the malarial zones, spends on account of malaria the enormous sum of 1,050,000 francs a year."¹¹³ This disease and its eventual eradication will cost Italy and Greece enormous sums, and even then the battle will only half be won, since it will take many years before the depleted constitutions can be brought up to the normal so as to produce balanced brains and bodies.

We have come to the end of our review of civilization as affected by health. European culture has become possible on account of its continuity of progress and extension. Around the Mediterranean alone were there extensive areas where civilization could rise to comparatively high levels owing to better sanitary conditions than are found in the tropics and sub-tropics. There alone are different races found which assured not only numerous but varied contacts so as to stimulate the mind. There alone we find an almost continuous influx of healthier and stronger northern races which respond readily to the stimuli of more favorable conditions than they had in their native habitats. A continuity of progress was thus made possible, and a gradual movement of civilization further north toward the regions which are practically free from endemic diseases. The races living there enjoy good health and have strong vitality. The average duration of life in Sweden is 50.9 years for males and 53.6 for females; in Denmark 50.2 and 53.2; in France, the country with the next highest records, 45.7

and 49.1; in England and Wales, 44.1 and 47.7; in Massachusetts 44.1 and 46.6; in Italy, 42.8 and 43.1; in Prussia 41.0 and 44.5; in India, 23.0 and 24.0, respectively.¹¹⁴ These figures are a proof of the strong vitality of the Scandinavians, with an average longer life of 8 years for males and more than 10 years for females as compared with Italy. This fact will assure the continuity and permanence of civilization, since the neighboring countries are likewise healthful and are productive of high vitality. These races are, moreover, spreading over the whole globe, and willingly adopt anything advantageous to themselves and transmit it to others. World commerce—now almost entirely in the hands of the Baltic race—brings about the most numerous and varied contacts between all races, and stagnation is thus precluded for a long time to come. All the conditions for a permanent and world-wide civilization are meeting now for the first time in the history of mankind, and science is just beginning to study and improve them with the purpose of conveying these benefits to all peoples.

CHAPTER XII

HEALTH AND WORLD-PROGRESS (*Concluded*)

Is civilization always to be precarious, as it has been in the past? Or is it always to be looked upon as the result of degeneration, as it is by some at the present time, on the basis of the philosophy popularized by J. J. Rousseau and Cesare Lombroso? If so, the present intensity of the struggle for a higher life and for a more general spread of civilization ought to be discountenanced; since, if bringing knowledge to the poor only increases their misery, and if giving culture to nature-peoples only dooms them to extinction, our endeavor in scattering the fruits of European achievements over the globe would be nothing short of criminal. It would justify the claims of those who say that civilization is a curse and the only life worth living is that of nature in its unadorned state.

It cannot be denied that many nature-peoples have become extinct, because rapacity on the part of the commercial and political exploiters took the best they had and gave them the worst in return; and our ignorance of tropical endemic diseases prevented the possibility of our rendering aid to them in the only manner where assistance was of real importance. A change is, however, beginning to come into our policies toward the peoples of the tropics. It is becoming recognized that the world needs them, and that it is necessary to have them in good health, so that beside the happiness which will come to the people themselves, they will be able to produce the various kinds

of food which only a warm climate can produce. In the **past** men from the north had to go south and settle there if they wanted to enjoy those products. The result was always the same—decay and extinction. A later policy of exploitation became possible with better means of transportation. This has likewise been recognized as being unwise, for if the people inhabiting the tropics should become extinct, who would raise those products which we need to an ever-increasing extent? For even with our knowledge of how to cure tropical diseases, men from the north will not be ready for some centuries to settle permanently in warm countries, since it is one **thing** to endure a climate and quite another to thrive in it. It is, therefore, necessary for civilized peoples to **form** a sound and coherent policy in regard to the tropics, if their culture is to extend and encircle the globe so as to benefit all.

The precariousness of civilization in the past as discussed in previous chapters, was due mainly to two reasons—the small areas of the isles of health, and the extinction of the migrants from the north in lower latitudes. Thus neither a large extent nor continuity of culture was possible, and it could never rise to a high level. A third reason may now be added—the impossibility of maintaining large cities in a sanitary condition for a long time.

3. *Unsanitary Condition of Cities.* In the past the city has always been a devourer of people from the country. Hardly any of the city families prospered beyond the third generation. “If the conditions in city life generally or in a given city are conducive to human mortality, it may well be that city life generally or the life of some city in particular, may be of such a bad character that the death rate is higher than the birth rate. If

that is the case the city is dependent upon migration to it, not only for its increase in population but as well for its continued existence as a city.

“We may say that this was the condition of most cities in the European world prior to the opening of the nineteenth century. Thus it is said that in London in the forty years from 1603-44 there were 363,935 burials and 330,747 christenings. A German student who investigated the church records of baptisms and burials in several German cities came to the conclusion that on the average there were eighty or ninety births to one hundred deaths in the period from 1550-1750.”¹¹⁵

Through better sanitation and greater medical skill, cities have constantly reduced their death rate during the nineteenth century, so that they themselves are furnishing from one-fourth to one-half of the increase in their population in Sweden and Germany and about three-quarters of their increase in Great Britain. In 1900 the mortality of the United States per 1,000 was 15.4 in rural districts and 18.6 in urban. Since that time the death rate has been reduced still further, so that New York City, for instance, has had an excellent record with 16 deaths per 1,000 in 1909; 15.98 in 1910; 15.13 in 1911; 14.11 in 1912, and 13.77 in 1913. Other large cities have similar small death rates; *e.g.*, Chicago in 1912, 14.68; Paris, 16.38; Berlin, 14.39; London, 13.52. With increased knowledge of hygiene and dietetics, better sanitation and greater medical skill, the cities may eventually be able to balance their death and birth rates. In any event, no civilized city will ever share the fate of many ancient cities of becoming a ruin after a few hundreds of years, because of plagues and other diseases arising from filth and dirt. No such spectacle will be offered to future generations concerning Paris and London as

we have of Troy and Babylon, where we find several cities buried one under the other. These modern cities may fall some time, but not on account of devastating diseases, and Macaulay's famed traveler from New Zealand may have to wait some thousands of years before he can view the ruins of the imperial city from London bridge.

The significance of the city for civilization lies chiefly in the fact that there contacts between human beings are both numerous and varied—one of the essentials of high mental development. In the past as well as today, the cities have generally produced or at least harbored the most intelligent men. Men of ability and ambition have always sought in the urban centers the larger opportunities for meeting people with gifts different from their own. Because of the unsanitary conditions in the cities of the past, these men often fell victims to various diseases and were hardly ever able to give their children strong constitutions, so that mankind could not benefit from generations of well-born sons and daughters descended from famous men. Hence most of the good stock ended with its most prominent member, or the offspring was decidedly inferior. The city thus epitomizes the two conditions discussed above. Owing to poor conditions of health, cities in the past could never be large; contacts were, consequently, always comparatively few and similar. For the same reason cities could never have a long life, and continuity was impossible. As the southern plains and valleys attracted the more healthy men from the hills or from the north only to produce an efflorescence of civilization before their inevitable decay commenced, so the cities enticed the most capable men into their walls where greater opportunities offered every facility for a higher mental development but undermined

their vitality. Under these conditions an extensive and continued civilization was impossible.

At present, cities are not only improving their sanitary conditions and thus insuring their continuity, but they are becoming constantly larger and furnish better opportunities for more numerous and varied contacts. According to the census of 1910 our urban communities contained 46.3 per cent of the total population, and incorporated places of less than 2,500 inhabitants 8.8 per cent, making 55.1 per cent residing under conditions more or less urban in character. And the cities are attracting not only the stronger elements from the country districts, but the better class of the foreigners. The urban communities had 72.2 per cent of the foreign born, 65.3 per cent of those of foreign or mixed parentage, and only 27.4 per cent of the negroes; while the rural communities had 27.8 per cent, 34.7 per cent, and 72.6 per cent of these elements, respectively. Whatever one may think about foreigners locating in cities, they furnish at least many incentives for thought, and often reveal remarkable ability under the stimulating influences of urban life. Civilization is thus likely to rise higher and spread farther, since the cities are more directly in contact with every corner of the globe through improved methods of communication, and attract the most ambitious and capable men from everywhere.

It is perhaps due to this fact that not only has civilization taken tremendous strides during the nineteenth century, but that cities have developed phenomenally during that period. No reference need be made here to American cities, since their rapid growth is well known; but a few statistics concerning some of the older cities may serve to illustrate this point. "London is probably two thousand years old, and yet four-fifths of its growth

was added during the past century. From 1850 to 1890 Berlin grew more rapidly than New York. Paris is now five times as large as it was in 1800. Rome has increased 50 per cent since 1890. St. Petersburg has increased fivefold in a hundred years. Odessa is a thousand years old, but nineteen-twentieths of its population were added during the nineteenth century. Bombay grew from 150,000 to 821,000 from 1800 to 1890. Tokio increased nearly 800,000 during the last twenty years of the century; while Asaka was nearly four times as large in 1903 as in 1872, and Cairo has more than doubled since 1850. Thus, in Europe, Asia, and Africa we find that a redistribution of population is taking place, a movement from country to city. It is a world-phenomenon." ¹¹⁶ And so, also, is civilization becoming world-wide. The growth of cities and the extension of at least material if not cultural civilization, are inextricably intertwined; and with the health of the city the continuity and extension of culture is assured. We have solved the problem of the precariousness of civilization.

Will it be possible to extend it to lower latitudes? In order to answer this question it may be best to refer to what has already been accomplished in those regions. The Panama Canal Zone was known for centuries as one of the worst breeders of disease, and the French were unable to build the canal because of this fact. They not only lost \$260,000,000 in this fruitless endeavor, but buried over 22,000 men with an average working force of 10,200 in that failure. Their death rate was 240 per 1,000 during the eight years of work, 1881 to 1889. Under American management the total death rate among the employees of the Isthmian Canal Commission and the Panama Railroad Company for the calendar years since work began has been as follows: 1904, 13.26; 1905, 25.86;

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1906, 41.73; 1907, 28.74; 1908, 13.01; 1909, 10.64; 1910, 10.98; 1911, 11.02; 1912, 9.18. The malaria morbidity per 10,000 was 821 in 1906; 426 in 1907; 282 in 1908; 215 in 1909; 187 in 1910; 184 in 1911; 110 in 1912, and 76 in 1913. Meanwhile the number of employees increased from 82 in 1904 to 50,893 in 1912; and 38,340 of these were blacks from the West Indies and other sub-tropical countries where cleanliness is rarely a habit of the colored population. This increased the difficulties of fighting disease, as may be shown by the fact that the death rate from *disease* for whites from the United States was only 3.25, and that of white employees generally 4.62, as against 6.94 for colored employees. The white employees were, moreover, in many cases Spaniards, Italians, and Cubans, and were not of a particularly moral type, as may be inferred from the fact that of 101 deaths from all causes among them in 1912, 43 were due to violence over against 58 to disease. The death rate for the total population of the Canal Zone has decreased from 49.94 in 1905 to 20.49 in 1912 per thousand.¹¹⁷ Thus we have a material reduction in the death rate from disease in a region which has always been considered a pest hole, and with a population which was not by any means the most promising for an experiment of this kind.

The Panama Zone is, moreover, not the only place where results of this kind have been won. Malaria appeared, for the first time at Ismailia in 1877. From August to December there were 300 cases out of a population of 10,000. By 1891 nearly 2,500 cases were reported. The town fell into decadence and the government offices were moved. With a population of about 6,000, there were 2,250 cases of malaria in 1900, 1,990 in 1901, and 1,548 in 1902, when drainage works were estab-

lished; the beneficent effects of these were seen in the reduction of malaria cases to 214 in 1903, to 90 in 1904, and to 37 in 1905. Klang and Port Swettenham, contiguous towns in the Federated Malay States, with a population of about 4,000 and an annual rainfall of 100 inches, obtained similar results. They had 510 cases of malaria in 1900 and the number was gradually reduced to 23 in 1905. Hong Kong reduced its number of malaria cases from 1,294 in 1901 to 419 in 1905.¹¹⁸

Italy offers a most interesting study in this respect. The annual mortality from malaria used to be about 15,000, representing about 2,000,000 cases of sickness. In 1902 a State monopoly for quinine was established to insure the purity of this medicine at a reasonable price. The result may be seen from the following figures; 1901-02 the deaths from malaria numbered 13,358. In 1902-03, the year following the State monopoly, 4,932 pounds of quinine were sold and the deaths numbered 9,908; as the use of pure quinine increased, the number of deaths decreased, until in 1906-07 we have with the consumption of 45,591 pounds of quinine only 4,875 deaths from malaria. Incidentally the government made a profit of 41,759 pounds sterling during these five years.¹¹⁹ Many other cases, covering widely different localities in the tropics and elsewhere, might be mentioned; but they would merely illustrate the same point.*

The objection may be raised that these results were gained at too high a cost to make the remedy generally applicable in the tropics and sub-tropics. That is, however, not the case. At Ismailia the initial costs of opera-

* See *The Prevention of Malaria*, by Ronald Ross (with contributions by many physicians); E. P. Dutton & Co., New York, 1910, pp. 369-575.

tion were 6.25 francs, and the annual expenditure for maintenance about 2.3 francs per head of the population. Klang expended 3,100 pounds sterling for clearing 332 acres of swamp, and about 270 pounds annually in the campaign for health; Port Swettenham spent 7,000 pounds sterling for clearing 110 acres, and about 240 pounds per year for upkeep. The cost of the sanitary provisions at Panama are variously estimated. A member of the Isthmian Canal Commission, Mr. H. H. Rousseau, estimates the total expenses of the Sanitary Department at \$2,000,000 per annum, with more than 1,200 men on its pay roll and including both the curative and preventive work. The total cost of this department may be about \$20,000,000 including sanitation, quarantine, and all possible prophylactic measures. That amounts to about five per cent of the total cost of the Canal. This is certainly a reasonable expenditure when we recall that yellow fever was frequent prior to the beginning of this work and that as late as 1904 about 75 per cent of the people in the Zone were infected by malaria.¹²⁰ Figuring \$2,000,000 per year and an average of 50,000 employees for the last five years—although it was somewhat smaller—the cost per man per day would be somewhat over ten cents, or about \$40 per year. Dr. J. S. Lankford claims that the purely preventive work averaged one cent per day per man, and maintains that this investment was responsible for the low mortality and morbidity rates.¹²¹ General Gorgas himself, in a paper read before the American Society of Tropical Medicine, in June, 1910, estimated the cost per capita per day at two and one-half cents for medical and hospital treatment, and for sanitation alone at only nine mills per day.¹²²

The reason why the estimates of cost of the sanitary,

medical, and preventive work at Panama differ so widely is the complicated bookkeeping of the government. General Gorgas gives two cases as illustrations.* When the President of Panama died the medical department was ordered to embalm the body. The expenses—about \$100—were charged to that department, but the refund from the family, amounting to more than the costs—was credited to engineering and construction. Similarly the expenses for certain patients in the hospitals—about \$30,000—were charged to sanitation; but the receipts of the Commission from them—about \$50,000—were credited to construction and engineering.

The expenditures cited are well within the financial ability of any tropical country when its resources are even moderately developed. It is true, of course, that financial considerations were not of primary importance in the vast majority of cases where work of this kind was undertaken. For administrative reasons something had to be done to reduce the appalling morbidity and mortality rates, no matter what the costs might be. It has proved, nevertheless, to be good business.

General Gorgas figures † that if the mortality rate of the workers under the American régime had been that under the French, there would have been 78,000 deaths during the ten years the Panama Canal was building instead of the 6,630 which actually occurred with an average working force of 39,000. It is a question whether the people of our country would have been willing to have the canal built under these conditions. The sanitary and medical work saved the Canal Commission in direct cost \$39,420,000 by preventing 39,420,000 days

* *Sanitation in Panama*, by William Crawford Gorgas; D. Appleton & Co., New York, 1915, pp. 239 and 242.

† *Op. cit.*, p. 283.

of sickness among the workers. The indirect saving was, of course, much greater.

It may be in place here to point out that this work of making the tropics endurable for men from higher latitudes has become possible only within the last twenty years; that is, since the discovery of one species of mosquito as the carrier of malaria, of another species as that of yellow fever, and of the discovery of the hookworm, coincident with the cause and cure of other tropical diseases. So no matter how skillful De Lesseps may have been as an engineer, he could not have completed the Canal without sacrificing many more hecatombs of men to diseases at Panama. The cost in lives would literally have staggered humanity. If we consider that medical men are just beginning to devote special attention to tropical diseases and that remarkable results have been achieved within a short time, the auguries for the future are certainly propitious. We may, therefore, expect to accomplish many things in this direction, deemed impossible at present.

It will become more necessary as time goes on to investigate these matters and to find means for making the tropics more habitable; that is, more fit for the whites to live in and for the colored to work in, since the human race is becoming increasingly dependent on the warm countries for a large part of its food supply. This is due to two facts—increase of population, and greater need for a varied diet.

The rapid increase of the world's population may be seen from the following figures. The *World's Almanac* for 1903 states that the population of the Roman world at the time of Emperor Augustus was only 54,000,000, notwithstanding great density existing in some spots. By

1810 it had increased to only 682,000,000 and by 1905 to about 1,600,000,000. This tremendous increase in the last century was due to various causes; *e.g.*, discovery of new lands which furnished an enormous food supply, reduction of mortality by means of better sanitation, greater medical skill, fewer wars, and greater comforts. The earth is far from being overpopulated, since Ravenstein estimates it could support 207 people per square mile with present methods of production, whereas the present density is much below that, *e.g.*, 14.71 for Africa, 13.42 for North America, 5.19 for South America, 59.05 for Asia, 111.32 for Europe, and 12.2 for Oceania, making an average of 33.50 per square mile for the world. True, only about 28,269,200 square miles of the world's area (49,668,000 square miles) are reputed as fertile, while 4,888,800 square miles are taken up by the polar regions, 4,180,000 square miles by deserts, and 13,901,000 square miles by steppes. This means that the area for the polar regions has to be deducted from the total area capable of supporting any people and we may even deduct the deserts for the present. The steppes, however, will in the course of time become habitable, since we are finding means to make them yield an ample food supply through irrigation, dry farming, and specially adapted crops. In the United States alone about 75,000,000 acres may be made available through irrigation and at least 50,000,000 through dry farming. We are also trying to drain the 100,000,000 acres of swamps within our own territory—the most fertile land, by the way—in order to support a larger population. It has been estimated that the swamp, desert, and arid land in the United States could well support about 100,000,000 people. Nevertheless, if the population increases at the ratio of even one hundred per cent in a century instead of nearly

three hundred as in the nineteenth century, the food supply will become insufficient in a few hundred years, and a larger demand will have to be made on the tropics for additional food, notwithstanding all possible increase from additional lands recovered and from more scientific cultivation. The tropics have an almost unlimited capacity for increasing our food supply if properly tilled, owing to the much larger amount of heat the land gets from the sun. The land which can grow two, three, or even four crops a year of different food products, will and must play a large rôle in the economy of the world when the population has grown to four or five times its present number.

A greater variety of food will likewise demand that the tropics and sub-tropics be made habitable. The finer the human organism becomes, the greater the variety of food it needs. Primitive man might live on uncooked herbs, roots, and nuts, and perhaps occasional raw meat; but what was his brain? Very little above that of the animals which fed on the same products of nature. Only by better and more regular meals was man able to develop a better nervous system with its greater power of coördination and combination. The savage whose ability to count only up to three, and who has to make *e.g.*, thirty-three payments for ninety-nine sheep, that is, for each three sheep separately, may be a human being with untold capacities; but as a plain matter of fact his abilities have not been developed, and he is far removed in power of combination from the modern business man for whom a few millions are a mere trifle. This difference in power of coördination may be illustrated even within historic times.

The greatest business man of antiquity was perhaps Job, with his 7,000 sheep, 3,000 camels, 500 yoke of oxen,

500 she-asses, and a very great household; so that this man was the greatest of all the men in the East, according to the Old Testament. He had, moreover, the ability to double his whole fortune after the loss of everything but his perfect and upright character. But what is he in comparison with a modern trust magnate who controls vast natural resources, numerous railroads, banks, factories, even restaurants—with all their ramifications in civilized and even uncivilized countries? He could buy out Job with a month's profits, or more likely those of a week. And he may be equally perfect and upright in character.

Take another illustration from a different field of human enterprise. Alexander the Great overran all the countries of the Mediterranean in a few years with about 30,000 soldiers. He had them under his eyes practically all the time, and could instantly take measures to meet the emergencies of a battle. In the late Russo-Japanese War, Field Marshal Yamagata had a battle line usually 300 miles in length, at times 500 miles; the details to be attended to were complex and numerous, as there was a constant shifting of positions, while aides-de-camp, telegraphs, and telephones brought messages continually. Or take Field Marshal von Moltke in the Franco-Prussian War of 1870-71, who had prepared his plans beforehand, and carried them out in a hostile country with clock-work precision. During the recent European war the powers of coördination had to be larger still, with war-fronts of over 1,000 miles, all the modern means of communication, and armies of millions demanding attention.

What an infinitely larger power of coördination over varied and numerous factors is necessary in all these cases compared to the very simple affairs of antiquity!

In speaking of the comparative mental capacity of the ancients and the moderns we generally look at subjective achievements, that is, those in art, literature, and philosophy; and since they excelled us along these lines, we hastily conclude that they were men of a superior race. We forget, however, that there are giants in our own days, but in different lines of activity. We have those giants, too; compare a Michelangelo in art, a Shakespeare in drama, a Kant or a Hegel with Socrates or Plato. But in activities requiring a large power of coördination, we are head and shoulders above the Greeks or Romans. Even in comparatively abstract matters we excel them. Aristotle is a pigmy beside Herbert Spencer, and the former is justly charged with imperturbable dogmatism, owing to his ignorance of the limitations of his own knowledge. Spencer may be dogmatic at times; but his range of knowledge is infinitely broader than that of the Greek sage, and his power of coördinating a vast amount of information is very much higher, while he rarely believes his own propositions to be final. Comparisons in other fields might be made in favor of the moderns, but the few examples given will serve to show that civilization is not retrograding and that man of the twentieth century A.D. is at least the equal of the man of the fifth century B.C. If civilization is measured by the distance between the agent and the place of action, we have certainly advanced since the times of Pericles.

How did man acquire a better nervous system? Briefly stated, by better food, better housing and clothing, and more regular work and exercise. Food serves three purposes—health, pleasure, and economy; and all three are now met in a better way than ever before. We eat regularly and therefore rarely overload the digestive

organs, as the savage frequently does owing to periods of starvation. Our food is on the whole nourishing and well prepared, and we need, consequently, a smaller amount of it, unlike the nature-peoples, who often eat enormous quantities of poor food in order to satisfy their craving for nourishment. Improved housing and clothing insure a more even temperature of the blood without drawing too much on vitality which is necessary for other purposes. The Eskimo, for instance, needs a vast amount of fats merely to maintain a proper temperature of the blood, and a good deal of energy is consumed in this process, which otherwise might go into the building up of a better nervous system through improved digestion and a more varied diet. More regular work and exercise, possible only on the basis of the two conditions just mentioned, likewise contribute to the growth of a better nervous system. Any organ will develop more perfectly if it has regular, constant work and exercise, since differentiations of finer organs are possible only on that basis. The fortuitous "sports" may have had a rôle to play in evolution, but little dependence can be placed on them; since of necessity they appear very irregularly, and systematic development cannot take place that way. The only thing which will, at least in human society, bring about progress, is regularity of work. And that is possible only with good health as the basis of a finer nervous system. Good health is, however, dependent not only on regularity of food consumption, better housing and clothing, and regular exercise, but on a more varied diet. That brings us back to the tropics from a new point of view.

Even if man in high latitudes had sufficient food of the kind produced in his own climate, history proves that he developed higher capacities only when he came further

south, or when the south was, figuratively speaking, brought north. In other words, the foods produced in the north could produce in combination with other favorable factors prevailing there, a strong physique and a strong brain, but not a fine nervous system and brain. The digestive organs were too much burdened, for instance, with the assimilation of starch in northern latitudes, and the nerve fiber could not become as fine as that which was nourished on sugar. When these healthy, large-boned, and muscular men from northern climates came south, they found this very substitute for starch in the sugar of grapes, figs, dates, honey, and other products of warmer climates. This was a great economy for the digestive organs, and a larger surplus of energy was created, which went into the growth of a finer nervous system, since it was not needed for meeting additional expenditure in the struggle for existence, owing to the reduction of the native population to the condition of slaves, and the consequent leisure of the conquerors. What is true of sugar may apply to other products of warmer climates, which serve a necessary purpose in our physical make-up, but can be had in the north only in a roundabout way through heavier and less digestible foods. Man's remote ancestor was able to digest cellulose, as the camel and the goat are doing now; but he could not develop much mentality, since the process of digestion required too much energy. Later he secured starch instead of cellulose from fruits and grains, and the digestive organs were relieved of a large amount of work with a consequent higher possible development of mind. Still later, he consumed sugar from southern fruits, and relieved his digestive organs still more, with a consequent higher possibility of producing a finer brain. Thus there is a constant saving of energy in the process of digestion

from cellulose to raw, and later, cooked starch, and eventually to sugar, for physiologists have shown that carbohydrates are presented to the cells in the form of a sugar, both in plants and animals. If a similar saving is taking place with other foods obtainable in the south, we can readily understand why the people from the north when coming south were able to have an efflorescence of a mental life unknown to them before, especially as this saving in energy was accompanied by contact with a new civilization. Their diet, chiefly nitrogenous in the north and creative of initiative, was supplemented in many ways by the lighter foods of the south, and a more economical and more satisfactory nourishment of the body was possible, while social conditions suggested new avenues for discharging their increased vitality and mentality. This advancement continued, however, only a few centuries, as we have seen before, owing to the endemic diseases prevalent in these countries, and the civilizations thus created fell into decay. The natives of the warmer countries lacked nitrogenous food as a rule, and this circumstance, combined with the general low sanitary conditions discussed in previous chapters, prevented them from developing a higher mentality.

With the development of more rapid and frequent transportation another solution has been found—to bring the south to the north by importing the products of warmer climates. The imports of tropical and sub-tropical products into northern countries of Europe and America has increased very considerably during the last 30 years. The Statistical Abstracts of the United States for 1912 (p. 557) and for 1916 (p. 519) give the following figures for the import of tropical products into this country:

	Year 1885	Year 1912	Year 1916
Spices	22,124,757 lbs.	63,116,548 lbs.	82,880,337 lbs.
Sugar	2,717,875,412 "	5,998,930,550 "	7,618,196,085 "
Tobacco leaf.	12,924,265 "	57,740,838 "	54,732,098 "
Rice	119,740,577 "	194,737,948 "	267,965,948 "
Tea	72,104,956 "	111,406,816 "	109,865,935 "
Cocoa	10,300,112 "	145,968,945 "	243,231,939 "
Coffee	572,599,552 "	887,747,823 "	1,203,866,007 "
Cotton	5,115,680 "	144,490,745 "	233,135,696 "
India Rubber	24,208,148 "	125,656,386 "	304,182,814 "
Indigo	3,034,650 "	7,658,067 "	6,599,583 "
Licorice Root	27,406,008 "	78,582,225 "	41,003,295 "
Olive Oil....	493,929 gall.	5,472,528 gall.	8,109,375 gall.
Silk	3,424,076 lbs.	26,584,962 lbs.	41,925,297 lbs.

These imports are not luxuries, as the moralists, advocates of the "simple life" and of the "return to nature," would have us believe; they are absolute necessities of a higher physical and mental organization. Meat eaters may have strength and initiative, but they become nervous; vegetarians have endurance for mere physical toil, but consume too much energy in the process of digestion to develop self-reliance and originality. "Not only does health of body and mind depend upon the food, but it is built up from childhood, and appears to be responsible for the making of man what he is—the most advanced creation of the animal world. While man has attained this station by virtue of his intelligence, we shall show later on that this intelligence, too, depends upon his food. As a matter of fact, we find that wherever man is restricted to a sparse, one-sided and incomplete diet, (and that of most animals is of this nature) as are the inhabitants of many of the southern islands and the Bushmen, his intelligence is likewise of the lowest order. Thus, the ancient Aztecs, who already cultivated corn and cocoa, and lived on a plentiful and varied diet, although principally a vegetable one, had a well-ordered state, with courts of justice very similar

to our own. We can also show, by means of instructive examples of which we shall give several later on, how both man and beast are made what they are by their foods." ¹²³ According to the same authority health is likewise a matter of combating bacteria. "We eat in order to build up our tissues, we eat in order to put ourselves into condition to withstand the endless assaults of lower organisms which attack us by day and by night, and we also eat in order that our organs, and in particular our brain, will be enabled rightly to perform their functions." ¹²⁴

If this reasoning be correct, two problems will be explained. First, why disease-ridden people cannot develop a strong body and mind; second, why inadequately nourished people cannot develop a completely healthy body and mind. The first problem has been dealt with in the preceding pages, and need no longer be discussed; the second needs brief mention here for the purpose of explaining the movements of civilization.

The peoples coming from northern latitudes or higher altitudes in the south were unusually free from bacteria, which enabled them to develop strong bodies and minds. They lived, however, chiefly on a meat diet, and developed restlessness and ambition. Their strong bodies and minds represented merely raw material which required working over through a supplementary vegetable diet and contact with different social organizations in southern latitudes. This opportunity was furnished them by their migrations south or from the mountains to the valleys. This explains why these people were the last to be reached by civilization in their native home around the Baltic; for Germany, Great Britain, and the Scandinavian countries were the last to become civilized. It also explains why these people with their more excitable nervous

organization fell victims more readily to the various endemic diseases in southern latitudes, especially as they were without racial training for them. In proportion as these migrations became more difficult or impossible, and transportation of southern products to the north became more frequent and regular, civilization could move northward. So we find the Egyptians and Babylonians in almost direct contact with the tropics, but living in the sub-tropics; later the Greeks and Romans in indirect contact with warmer climates; then the Venetians and Genoans, supplying the rest of northern Italy with southern products; still later the Spaniards, Portuguese, and French, who came into more direct contact owing to the discovery of new sea-routes; finally, the Dutch, English, Germans, and Scandinavians either in direct or indirect contact with the tropics and sub-tropics. This contact, which has now become well established, is another factor in the permanency of civilization, and assures its continuity as well as its world-wide character, since these nations will always depend on the tropics for the supplementary articles to their prevailing nitrogenous diet.

This means, that the southern countries must in turn be made more habitable in order to be able to meet the larger demands for their products by men in temperate zones. We have seen what has been done by way of sanitation in a very short time at certain points which were looked upon for centuries as pest-holes. It will now be necessary to point out that the tropics need the products of the temperate zone. The people in the warmer climates live principally on a vegetable diet which is as one-sided as that of the people in the extreme north. Their diet needs, consequently, supplementing with more nitrogenous foods. Medical science is agreed now that a poorly balanced diet produces scurvy on the one hand,

and beriberi, rickets, and pellagra on the other. If either too much meat or too many vegetables can produce serious diseases, it stands to reason that a poorly balanced diet cannot produce a fine brain.

The opinion that but little animal food is necessary in warm climates has been abandoned. Major Woodruff, in speaking about what white men should do in southern latitudes, says:

“ This brings up the question of food, and it is well to say that physicians are now almost unanimous in declaring that the old doctrine that we should eat very lightly of animal food in the tropics is a very pernicious one. The natives are now known to be suffering from nitrogen starvation and we should not imitate them in this respect any more than we should imitate their filthy habits.” ¹²⁵

We know that General Gorgas turned the negroes into good workers by a fair allowance of meat. The Japanese, too, have become more efficient by resorting to a mixed diet, especially in the navy and army. If we want the people in the tropics to produce the vegetable food we need, we must supply them with the animal food they need, because only in that way will they be able to work better and produce more.

The common interest of men in temperate and warm climates is thus established, and it would be well to reckon with the fact by taking a larger view of our mutual dependence. Hitherto our attitude toward men in the tropics has been one of condescension; we have either exploited them on the more or less explicit understanding that they were inferiors; or we have given them religion, education, or free political institutions with the idea that this was all they needed to become like ourselves. But we have never acknowledged that our relation to them is one of mutual dependence, and so we have failed to give

them what they most needed—the means to keep healthy and to become intelligent workers. A beginning has been made in regard to proper sanitation of the tropics, as has been shown above, and we are just coming to recognize the necessity of making these people prosperous by a more intelligent management of their affairs.

Whether this management is to be by the control of white men, or whether it is to be intrusted to the colored races, is a question which cannot be answered finally at present. In the past the relation of the whites to the colored races has usually been one of parasitism or open exploitation, and this has warped our whole mental attitude in regard to their actual and potential capacities. The assumed natural and permanent inferiority of the inhabitants of warmer climates was a ready argument with those who wanted to profit from their ignorance and inexperience. And so we find almost all observers testify to the laziness, lack of capacity, shiftlessness, and other shortcomings of the southern races. Practically all imperialists are unanimous in this respect, but one quotation will sufficiently indicate the trend of opinion. Judge Lambert Tree, speaking of the fact that white men cannot live in the West Indies, says:

“As the white man loses his grip the black man tightens his, and hence is perceived everywhere, substantially, negro control.

“Thus, in that precious republic Hayti, the white man is not permitted to hold real estate, and a number of other privileges are denied him which are permitted to the black citizen. Judging from the examples of negro rule in Hayti and Santo Domingo, as well as from the social and political conditions in other of the West Indies where they are in partial control, it would seem that the negro is seen at his best where he is under the influ-

ence and control of a considerable body of the white men.

“By himself, it is nearly, or quite, self-evident that he is not capable of administering government for the general welfare of the people over whom he rules. The negro is an imitator, and with the influence and example of the white men absent, racial instincts beyond his control seem to draw him back as by the ‘call of the wild.’ His idea of government in the republics in the West Indies he rules over, is to plunder the weak. ‘Might makes right’ is the rule of the barbarian, and this is the rule of those whence he sprang and toward whom he is again drifting. If the negro is left to himself much longer in Hayti and Santo Domingo, all government will ultimately disappear except that of the tribal relation. Nothing is more clear than that he is retrograding in that direction.”¹²⁸

The picture drawn by Judge Tree is undoubtedly correct, but the causes assigned are open to question. He is evidently convinced of the racial inferiority of the negro, and that serves as a sufficient cause and explanation of the present condition of Hayti and Santo Domingo. The same charge has been made against the peon of Porto Rico, against the whites of the various Central and South American republics, of Mexico, and of our own Southern States. Mexico in 1913 and 1914 presents analogous conditions to those of the two black republics; yet there are few negroes in Mexico, and comparatively few in Honduras, Guatemala, Costa Rica, Venezuela, Colombia or Peru. Nevertheless, Major Woodruff, who quotes Judge Tree concerning Hayti, says: “Venezuela is not a republic at all, but a turbulent mob without organization, because there are not brains to organize the units. Murder, pillage, and freebootery

dominate it from end to end. Neither life nor property are safe. Population and industry are declining. Investors are excluded just when their investments are to turn out mutually beneficial. It has brought us to the verge of war more than once. It is, then, not fanciful to picture the United States as the policeman of the Caribbean using a 'big stick' to threaten the nations into decency. It is a living necessity of more complete mutual relations in the future."¹²⁷

Judge Tree puts the blame on race, Major Woodruff on the actinic rays of the sun, neither of which factors we are able to control, and so no other policy is left but that of the "big stick." But that policy has been tried for several hundred years. The negroes in the Caribbean, and the brown and the red peoples all over those and other tropical regions have been exploited by chicanery, fraud, and force. At the same time we have sent our missionaries and our teachers to declare to them the oneness of mankind and the equality of all men. And then we wonder that they cannot reconcile the application of the lash with the offer of professed brotherhood. Poorly nourished brains are the natural breeding-places for wild ideas. Who can blame these people—with blood impoverished through poor food, malaria, uncinariasis, and in a large number of cases from venereal diseases—that the wildest kind of ideas originated or took root in their poorly nourished brains, when for several centuries the discrepancy between our preaching and our practice was forced upon their attention? What but brutal retaliation can be expected from peoples who, generally speaking, have been subjected to all forms of abuse which greed and lust could invent? This is not to justify but to explain the behavior of the Haytians and other peoples of southern countries toward the white men whenever they

were able to retaliate. The cruelties perpetrated upon the Congo negroes and the Amazonian Indians for the sake of raw rubber are still fresh in the memory of every newspaper reader. Who would blame these people if they should rise and avenge themselves upon their oppressors? Who can blame them if they loathe labor when it benefits others only and becomes a means of endless torture to themselves? We have tried to show previously what radical changes often take place in men whose poorly nourished brains could hardly contain the simplest ideas or else gave rise to all kinds of wild schemes, after they had been freed from endemic diseases. Would it not be well to try a similar course with other peoples before we hastily pass judgment upon them as worthless and inferior? Wherever this has been attempted the results have been favorable. A quotation about a country which Major Woodruff so severely condemns will perhaps best serve the purpose. An American who closely observed the people in the Orinoco region of Venezuela has written to the Rockefeller Sanitary Commission this opinion:

“Venezuela is a country of marvelous and limitless natural resources. If the hookworm can be abolished and these listless, lifeless, almost worthless people, who are in this condition because of disease, can be transformed as a young man was whom I saw restored there by an English physician, into vigorous, red-blooded, mentally alive people, their economic efficiency can be increased a thousandfold and the country can be started on a career of development which will make a factor in the progress of the world.

“Poorly nourished brains are the natural breeding places for wild ideas. I believe that the eradication of the hookworm will do more than any other one thing to banish the chronic state of revolution from the countries

of Latin America and allow these countries to attain the prosperity to which they are entitled by reason of their natural resources." ¹²⁸

This quotation indicates the line which mutual relations between peoples of the temperate zones and the tropics should take. We can give them health, some of our foods, and our manufactured articles; they can give us their foods, raw products, and such beverages as tea, coffee, and cocoa. This would be mutually advantageous, and the relation of parasitism, which we have maintained, would change to commensalism. Owing to the gradual disappearance of the economic theory that he is richest who sells most and buys least, we shall learn that the prosperity of the tropics will be to our advantage, for they will buy more, and our prosperity will enable us to buy more from them. We need each other; and the further we advance, the more interdependent we become, since *the higher a civilization, the more numerous and varied are the factors of existence—physically, mentally, and socially.*

This law has been applied to physical sustenance, but it can easily be shown that we owe a good deal of our understanding of our mental, moral, and social development to the study of the lower races still extant. The study of these peoples has been incomparably more fruitful in yielding valuable results for the history of civilization than that of the few remains of primitive man in various parts of the globe. This is especially true of the development of morality and social customs, to both of which the finds in Java, in the Neanderthal and Spy, or elsewhere, have contributed nothing. On higher levels of civilization we become mentally interdependent, as in the sciences and many of the arts. No nation is self-sufficient in these respects, and a discovery in France is just

as important to Americans as one made by our own countrymen. The internationalism of science is established, that of commerce has begun, and that of politics must follow. Only in proportion as we are in touch with all nations, can we expand and broaden. And this contact with others must be of a mutually beneficial nature. The old exploitation of nature-peoples must cease, and we must stop treating them as inferiors.

The question how to control the tropics—if it is granted that we need them—is difficult to answer, and not a part of our discussion. One thing is certain, though. Our attitude toward tropical peoples must change if we are not to endanger our own existence. They must be put into a condition to produce the articles we need, and that is impossible if we continue to employ the policies pursued in the past. Furthermore, our attitude toward the whole problem of the inhabitability of the tropics must change. If climate or intensive light is responsible, we can do practically nothing, since these factors are unchangeable, or only very slowly and slightly changeable; and we must always remain, to some extent at least, slave-drivers in the warm countries. With our constantly growing population and rising civilization our demands for tropical products must of necessity increase; and if it be granted, that for a number of generations the hot countries will be uninhabitable for white men and that the natives of these countries are unable to escape the enervating influences of the climate and produce little—we cannot avoid the conclusion that the brown and the black races will soon be exterminated, through our greed for their products. If we only take without giving something valuable, these people must die, as numerous races have already done. If, on the other hand, we give what we can spare, and take what they have in abundance,

there is no need of dreading the future, since there will be enough produced for all. The white man may then stay in his native clime and send representatives to all the tropics to guide the natives in their industries and exchange their products for ours.

What we can give, is health. We have just begun the study of the factors which make for health, and have already achieved much. In proportion as we study these factors more and attain better results, we shall be able to make invaluable contributions to the welfare and happiness of the tropical peoples. They will be able to look after themselves better, produce more, and buy more. If the results already attained justify any conclusion, there would seem but little doubt that we have it in our power to make the tropics healthy at least for the natives. Disease is a factor which we have learned to control in part; and we shall soon learn how to do it better. On the basis of the conquest of yellow fever, malaria, typhoid, uncinariasis, and the bubonic plague, it will be in our power to re-make the tropical and sub-tropical peoples, and bring their lands into the service of civilization as fast as their products are needed. This will be a long step taken for the advance and well-being of the whole human race.

It is true that our desire to make the tropics healthy, will not be sufficient. But it is true that the results attained in the control of the endemic and epidemic diseases mentioned justify the conclusion that we can do it if we try, while it is at least doubtful whether the heat and the light of those regions are the cause of the low physical, mental, and moral condition of the inhabitants. Civilization is becoming more conscious of itself, and, consequently, more telic in its endeavors. What used to be considered unalterable factors or immutable laws of

nature, have been found to yield to intelligent treatment when we learned to understand them. Disease was not so long ago looked upon as an important item in our moral training, and therefore inevitable. We know now that it is the very opposite, and avoidable. In proportion as we plan intelligently and analyze factors of life scientifically, we find that we are making progress in all directions. This statement may be illustrated by the attempts to lengthen the average life of man.

According to the records of the city of Geneva, Switzerland, the average span of life was 21.2 years in the 16th century; 25.7 in the 17th; 33.6 in the 18th, and 39.7 from 1801 to 1883; while in Sweden at present it is 50.9 years for males and 53.6 for females; and in India only 23 for males and 24 for females. One may grant that India is less healthy than Sweden; but the fact that the life span in Switzerland and in all other progressive countries has lengthened so considerably, is proof of what intelligent and progressive measures can do. India, with its superstitious people, showed no advance from 1881 to 1901—a period fruitful in advances along this line in all European countries.

Sweden is a conspicuous illustration of what can be done by a scientific view of health. It has achieved most because it has looked upon the problem of health as a whole. In America infant mortality and tuberculosis have attracted wide attention; protection against germs has been given all possible publicity. Germany has paid much attention to sanitation and a proper water supply. Sweden has looked upon health as the result of various causes—heredity, sanitation, diet, temperance, exercise, personal hygiene, instruction; and has emphasized each one in proportion to its relative importance. The result is not only a greater average length of life, but a smaller

death rate than in any other country. While reduction in the death rate elsewhere, *e.g.*, in the United States, is due chiefly to a very much smaller mortality rate among children with an undiminished, if not increased, death rate among persons just past middle life, the improvements in Sweden are general, and the chances for all age classes are better. Infancy, middle age, and old age show a lower mortality rate there today than in times past. The Swedes have realized that even the excellent opportunities of a healthy country may be improved by the application of intelligence; that it is our duty and privilege to be well and happy, and to have an abiding sense of the beauty and nobility of a sound mind in a sound body.

When other nations begin to have a similar ideal of health and try to realize it by every known means and by others still to be discovered, saner views will be entertained concerning the sanctity of human life, not only in the temperate zones but in the tropics. We shall realize that there need not be such a tremendous waste of lives in those regions for the sake of a few products not obtainable elsewhere, and we shall try to give those peoples the one thing which will assist them in becoming not only better producers, but better men, parents, and citizens. This contribution of our knowledge will help them as well as ourselves, since in proportion as we give it to them, they will be able to return to us the products of nature, which the tropics alone can produce. A general improvement in character is bound to follow if our statements and facts quoted, have any meaning. And it is better characters that mankind needs at present if civilization is not to halt but to rise and spread. We need more endurance, more patience, more forbearance, greater willingness to apply the laws of health already

known, and optimism to believe that it depends largely on ourselves whether we are to be well and happy through productive work, and the giving of our own surplus to those who give us of theirs. The problems of nutrition, eugenics, sanitation, and personal hygiene must receive more attention on the part of intelligent men and women; and only social coöperation within the nations and of the nations with each other is necessary to obtain good health for all. Physicians are working most unselfishly, and are performing almost herculean tasks along this line.

Are our statesmen awake? Shall we have to wait much longer for a national department of health? Conservation of our natural resources is being agitated in our legislatures and congress. It is a necessity pressed upon us by their rapid depletion. But the conservation of human lives, the improvement of our health, and the increase of our vitality are certainly as important for the continuation of the nation. In the past the fate of nations and of armies depended on health; this has been the principal agency in the re-arrangements of the map of the world, and it has always been the most potent factor in civilization. The varied activities of the twentieth century are all of the greatest importance, but sanitation contains the great promise for the future.

“It may be that we are today spectators at the beginning of one of the most important periods of history, and are standing on the threshold of an epoch that may change the standards of mankind, and establish new limits for human achievement.

“It is also possible that this period may mark the dawn of a new civilization, wherein the conservation of the health of the individual is a basic principle; a civilization that recognizes that the highest development of the

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race depends upon the health of its members and that progress and science, the arts, commercial achievement, and other fields of activity, are limited by the physical capabilities of its people. What the results of this great movement will be, no man can fully predict. That its effect upon the nation will be profound, there seems to be no question; but who will attempt to mark the confines of its effectiveness, or prescribe the boundaries of its influence?" ¹²⁹

CHAPTER XIII

HEALTH AND ORIGINALITY

WHATEVER view one may take concerning the origin of genius, the influence of the men who possessed it cannot be denied. Whether those men are looked upon as insane, as by Nisbet; as degenerates, as by Lombroso and his school; or whether they are considered the quintessence of a nation, one fact stands out prominently—they have influenced history profoundly. Among savage tribes they were chiefs and warriors; among the semi-civilized, founders of religion and of crude philosophy; among civilized peoples they are military commanders and statesmen, artists and philosophers, men of letters and of science. Their influence has entered every sphere of life, and they win the admiration of their fellowmen by striking out into new paths, in some cases owing little to education, in many cases arising from the most humble environments and fighting their way against numerous obstacles into positions of prominence among their contemporaries and posterity. It will, therefore, be necessary to treat genius briefly from the point of view of health, to discover, if possible, whether the leaders of civilization have been healthy men, or whether they have been diseased. The question of civilization is rather closely connected with that of genius, if once the latter's influence upon history has been admitted.

If civilization is the product of healthy peoples, the leaders must have been healthy men. This conclusion is

inevitable, if the facts on the preceding pages have any meaning.

Genius means an extraordinary capacity for making syntheses. This definition will cover all kinds of geniuses as they have appeared in history and influenced the fate of nations. The material used by genius may, however, be of two kinds; it may be developed chiefly from within, as a result of a lively imagination; or it may be the result of observation and study of facts. This gives us what may be called subjective and objective genius. It would be impossible to draw a clear line of demarcation between the two types, just as it is extremely difficult to distinguish the anthropological races sharply from each other. In a general way the distinction holds, however; and an attempt will be made to make it clear.

The genius has, then, an extraordinary capacity for synthesizing in the meaning of Kant, *i.e.*, the organization of the manifold, whether of external or internal sensation, under some unifying principle. In proportion as this capacity is general, the genius is of the highest type and covers several fields, like Leonardo da Vinci, who was painter, sculptor, architect, musician, mechanical engineer, and natural philosopher. In proportion as it is specific, genius is confined to one particular line of work with, perhaps, corresponding *lacunæ* of knowledge in other lines; like Turner, who, according to Nisbet, "stands alone as an example of a surpassing faculty for color, combined with the lowest intellectual powers."¹³⁰ Between these two extremes there are numerous intermediary stages which it is not necessary to follow. It is more important to show what genius is, biologically and sociologically.

Genius is a useful variation and constitutes the few outlying members of an orderly series, the members in

the group diminishing in number according to determined laws as the degree of eminence or divergence from the average increases. If this statement is true, we should expect that the greater the genius, the better health its possessor must have. What then, do we find in this respect? It may be convenient to select a few men whose genius is universally recognized. Omitting the ancients owing to the scarcity of reliable data concerning them, we may begin with modern men.

A few remarks must be made, however, before we proceed to these men. If we remember that health is not necessarily identical with robust strength or athletic and muscular development but rather with sound morphological structure and physiological function, we shall see that a number of men come under the heading of "healthy" who do not pass ordinarily as strong men. Vitality is more important than muscular development or brute strength; ability to resist small but constant ailments is a better measure of health and vitality than ability to lift weights or run a Marathon race; and regular mental exertion is a better index to brain power and general physical endurance than mere physical labor for eight or ten hours a day. That the strain from brain work is a greater tax on the constitution may be inferred from the fact that more brain workers break down than day laborers. Formerly such men were poets, artists, philosophers, and scientists; business men and manual workers were comparatively free from collapse. When business began to partake more of the nature of mental exertion, the number of breakdowns among business men increased rapidly; and the same thing is happening with manual laborers when their work requires not so much strength as close attention to a machine or the manipulation of a few deft but continuous and exact movements.

It is the constant effort along a particular line and the continuous exertion of a particular organ, which is more detrimental than general physical labor, although heavy. There is more rest in the latter case for all organs owing to the change in occupation. For the specialist, which the mental worker has always been, this rest is impossible; hence more frequent breakdowns among this class of workers were unavoidable, although deplorable, at a time when the human machinery was less understood than at present, and when the mind was considered to be independent of the body. The general neglect of the commonest rules of health among mental workers is one of the saddest chapters in the history of intellectual development, and the recognition of the interdependence of sound mentality and sound corporeity is one of the greatest advances made. In proportion as this principle came to be adopted, the lamentable failures in health among mental workers decreased in frequency, since these men are now among the healthiest specimens of the race, and knowledge of a socially useful kind has advanced proportionately. In looking over the history of geniuses and other mental workers, we should remember this fact concerning the general neglect of the body. Even the most robust constitution must become weakened, if not ruined, by the abuse of the body; and the result is inevitable—vagaries and the wildest kinds of superstitions outside of the regular vocation of the scholar; *e.g.*, Newton's ideas on religion in the *Apocalypse*.

Another thing which should be borne in mind before judging geniuses as insane or degenerate, is the love of these men for their work. Whenever anyone becomes too much interested in his vocation, overexertion in its pursuit is apt to occur. Perhaps no work is as fascinating as mental work, at least to those who are inclined

that way. The result is absorption to the extent of not only neglecting the body by denying it proper rest and food, but abusing it by too much strain in the line of one's specialty. The constant use of one particular organ may strengthen it, but at the expense of other organs; these will in consequence become weaker and unable to do their work properly, and their gradual deterioration must eventually produce a weakening of the constitution as a whole, including the organ strengthened at the expense of the others. A slight irregularity in the construction of the most used organ will often cause a tremendous strain not only on the organ itself, but through it on the whole body, because the organ is handicapped and is called upon to do perfect work with an imperfect instrument. This is particularly the case with the eyes, which during waking hours have practically no rest, especially in the case of near-workers who have to concentrate vision on small objects, and often require great precision of vision for the proper performance of their duties. A slight astigmatism in such a case may produce a heavy strain on the whole nervous system, as Dr. George M. Gould has pointed out.¹⁸¹ If to this near-work with the eyes there is added the strain of continual deep thinking, the nervous system is kept in a constant tension and must eventually give way, or must at least suffer. Dr. Gould explains the poor health of many men of genius and the physical ruin of others through this strain of poorly constructed eyes, which in former times could not be relieved by proper glasses owing to ignorance of how to correct numerous and often purely individual refractions. Among the men he discusses are De Quincy, Carlyle, Darwin, Huxley, Browning, George Eliot, Wagner, Parkman, Herbert Spencer, and Nietzsche. While physicians generally declare Dr.

Gould to be an extremist, he had the indorsement among others of the nerve specialist, Dr. Weir Mitchell. That constant although slight irritations may cause serious effects was, however, brought out at the meeting of the International Surgical Association in New York by Dr. A. J. Ochsner of Chicago and by Dr. William J. Mayo, of Rochester, Minn. The former in particular claimed that constant irritations may and do cause cancer of the stomach.*

We have here a parallel case to that discussed in previous chapters concerning the cumulative effects of endemic diseases which do not kill, but vitiate vitality through constant interference with vital functions by almost uninterrupted nagging and irritation. As there, so here we may explain many effects on civilization by means of small defects. There we had the endemic diseases which prevented men from reaching a full and vigorous manhood; here we have in many cases specific small ailments which sometimes warp an otherwise strong mentality, and sometimes prevent a full development of social usefulness.

These facts are referred to in order to show that some men of genius who were afflicted with maladies may have had good heredity, that the structure of their bodies was good, and that some particular small ailment which went uncorrected either through ignorance or negligence was responsible for many breakdowns and infractions of logic and social conventions.

Nisbet and Lombroso forget to take social conditions into account when they charge men of genius with oddities and disregard of social rules. Even a great man is still a human being and subject to the foibles and follies of his times. Greatness must exert itself along the current social

* *Medical Record*, New York, April 25, 1914, p. 779.

channels. In the Middle Ages most men of talent went into the service of the church either directly as monks and priests or indirectly as artists and architects. During the Napoleonic era most of such men went into the army because the rewards were highest in that service. In our own times the most energetic men go into business. As in great things so in small. If a particular society expects the genius to be odd and unkempt, he will accommodate his fellowmen and become a mendicant monk; if it expects him to exhibit his power by splendor and ostentation, he will build magnificent palaces and adorn himself with gorgeous robes; if it wants him to be a "Bohemian," he will be wild and reckless in his speech, dress, and manners; if it wants him to live a proper life as other mortals do, he will submit to social conventions. A genius becomes more amenable to social proprieties in proportion as other men demand that he should act like others instead of one exempt from human laws. Many things were not only forgiven the genius in the past, but were directly expected of him for which a more proper and conventional age would condemn him. Let us now consider ten men of genius from the point of view of health.

Among naturalists we have Darwin and Spencer. The former is reckoned even by Lombroso among sane men of genius. Darwin lived to be 73 years of age. He had inherited a strong constitution, as is proved by the fact that he "wasted" his time at Cambridge by shooting, hunting, riding, and sporting, and was in excellent health and high spirits. Whether it was his five years' journey on the *Beagle*, or the constant trouble with his eyes which interfered with his health, it is impossible to determine now. He suffered, however, from nervous weakness the rest of his life, but managed by careful limitation of his

studies and by the removal of all unnecessary distractions to accomplish work not only comparatively large in quantity, but very high in quality. A man who could write of himself in his old age, after having been recognized as the foremost scientific man of his times, the words following must have had an almost perfect poise and balance, resulting from good physical structure. "My success as a man of science, whatever this may have amounted to, has been determined, as far as I can judge, by complex and diversified mental qualities and conditions. Of these the most important have been—the love of science—unbounded patience in long reflecting over any subject—industry in observing and collecting facts,—and a fair share of invention as well as common sense. With such moderate abilities as I possess, it is truly surprising that I should have influenced to a considerable extent the belief of scientific men on some important points." ¹³²

Herbert Spencer had a remarkable vitality, as is shown by the fact that at the age of thirteen he became homesick at school and started one morning at six for home, walking 48 miles the first day, 47 the second, and 20 the third, with very little food during the three days. He was a good runner and skater as a boy. As a draughtsman at twenty-one he worked from eight in the morning to twelve at night and one day a week he worked till three in the morning, keeping at this schedule for several years. This strain resulted in a nervous breakdown at the age of thirty-five, but he continued in fair health until sixty-two, when he had to shorten his customary long walks. A man who lived to the age of eighty-three, and wrote such a large quantity and of good quality, whose range of knowledge was so encyclopædic—must have had an excellent constitution, such as could be ruined only by

utter disregard of all rules of health. But it responded quickly as soon as Spencer began to take better care of himself; otherwise he could not have accomplished the work he did. Mention should be made here of A. R. Wallace, perhaps equally prominent as a naturalist, who passed the age of ninety years, but kept vigorous in body and mind till very near his death.

Among the philosophers, Kant and Hegel are the most prominent in modern times. Of the former we read: "He enjoyed good health, was absolutely regular in his daily habits, free from the cares of family-life, and, for three-quarters of a century, devoted to science and intellectual pleasures."¹⁸³ He lectured at the university until seven years before his death, lived to be eighty years of age, was cheerful in temperament and social in disposition. Hegel lived only sixty-one years. Lombroso does not mention him, and Nisbet only states that his sister was insane, but does not give the cause. Hegel was never a strong man, but neither was he sick. His vitality was what is technically called "medium," and with good care of his health he was able to keep very busy, accomplishing a remarkable amount of work of the highest order. I have found only one reference, in Kuno Fischer's volumes, to Hegel's health when he was professor in Berlin: "Die früh gealterte Figur war gebeugt, doch von ursprünglicher Ausdauer und Kraft."¹⁸⁴ When about sixty-one years old he began his winter lectures with a fire and energy which surprised his hearers, but died in November of that year (1831) of cholera, which proved almost invariably fatal in those days.

Of modern poets Shakespeare and Goethe are among the foremost. Lombroso is silent concerning the bard of Avon, but Nisbet says: "Shakespeare's perceptions must have been extraordinarily keen and persistent. His

mind must have photographed everything he saw. Natural scenery, natural objects, human character, society and its usages—all must have been vividly impressed upon his brain, and there associated with extensive and hardly less vivid memories. Had we known the man we should probably have discovered that he had limitations. All we can gather from his writings is that his surroundings must have impressed him with a force out of all proportion to the attention he could have given them, and that his impressions being retained must have furnished him with an enormous amount of intellectual material and a basis of comparison infinitely greater than that possessed by ordinary men. He seems to have been untraveled, and to have had but a moderate knowledge of books; yet by dint of acquisitions—mainly visual in their origin, but extensively cohering together and thus creating a great identifying or constructive faculty—he was able to people foreign scenes and the ancient world with appropriate characters, and to supply them with incidents to match. Such immense creative power as Shakespeare's can only be understood in connection with a morbid impressionability." 185

In the sixth chapter of his book, Nisbet bases his conclusion as to the insanity of "the greatest poet that the world has seen" on the alleged great mortality of Shakespeare's family, on his supposed paralysis, and the incompetence of his brothers. It may be well to remember here what was said above about the influence of social conditions upon genius. Those were the days of "merrie England," and there is no reason to expect that this dramatist did not enter into the spirit of his times with all the zest of a man who wants to enjoy himself and find what is known as "copy" in modern parlance. Being engaged, moreover, in so many capacities,—actor,

playwright, poet, stage manager and boon companion,—it would be a miracle if he had lived over fifty-two years under the generally unsatisfactory conditions of sanitation of those times. That he must have worked hard and managed well is shown by the fact that at the age of thirty-seven he bought a house and garden in New Place, London, and at forty-eight he was able to buy a freehold house at Blackfriars for 145 pounds, and to retire to Stratford as a squire, which implied that he had at least a fair amount of property. Remuneration for any of the activities in which Shakespeare engaged was rather meager in those days, and the accumulation of a fair fortune in London by a runaway country boy indicates a good amount of common sense in addition to constant work.

In regard to the alleged great mortality of the family, the records tell a different story. The poet was one of a family of eight, two of whom died in infancy, and the others reached the following ages: William, 52; Gilbert, 46; Joan, 77; Annie, 8; Richard, 39; Edmund, 27. As the ages of the two infants are not given, we have 249 years for the combined age of the other six; divided among the eight children, we get a little over 31 as the average age for the eight. This compares favorably with the average age in Geneva, Switzerland, which had an average age of 21.2 years in the 16th century, and 25.7 in the 17th century. If we omit the two infants, we have an average of 41.5 years for the six children who survived—which compares well with Prussia's average of 41.0 for males and 44.5 for females during the period of 1891 to 1900. That two out of eight children died in infancy is not an argument for poor vitality of the parents, since the perils of infancy were infinitely greater at that time than they are at present in civilized

countries. If the general infant mortality of England at that time had been that of the Shakespeare family it would have been 250 per thousand; this compares well with Austria's 227 during the decade of 1893 to 1902, and very favorably with Russia's 272 and Chile's 333 during the same years. William's only son, Hamnet, died at the age of twelve, but his two surviving daughters reached the age of 66 and 77, respectively. Through his sister Joan, the Shakespeare family is known to have extended over nine generations, the last known survivor, George Hart of Birmingham, having emigrated to Australia in 1864. Considering all circumstances, the vitality of the Shakespeare family is above the average of their time; and remembering the condition of sanitation and of medical knowledge, and the social customs of those days, it is evident that the mortality of the family was certainly not greater than that of the well-situated classes of the time. William must certainly have had a good constitution to do all the work credited to him, and to gain a competency at a poorly paying occupation; all this required balance and good management.

About Goethe we have more definite data. "He was a man of genius distinguished by the comprehensive character of his ability. He was a poet and dramatist of the highest rank, his mind was stored with the most varied knowledge, and he contributed to the advancement of natural science. As minister of state and as director of a theater, he was occupied with practical affairs.

"He reached the age of eighty-three years, and he passed through the phases of life in relatively normal circumstances; in his many writings there are most valuable facts which throw a keen light on his life and nature." ¹⁸⁶

He was, with the exception of comparatively short

periods in his life, a healthy man, and maintained his physical and mental vigor to the very last, finishing "Faust" less than a year before his death. His strength and vitality were prodigious, and the balance of functions remarkable. His contemporaries agree that even in his old age he was still beautiful; and in his seventy-fifth year he walked for several hours at a time, forcing the pace and exhibiting an amount of strength which filled Eckermann, his companion, with delight.

Leonardo da Vinci was a person of splendid physique, outstripping younger men in feats of strength, and zealous in his multitudinous activities; he lived to be nearly sixty-seven years of age; and even Lombroso is unable to count any aberrations against him.

Michelangelo was ascetic in his habits, worked with furious intensity up to his seventieth year, and then had enough energy left to plan and carry forward great architectural works like St. Peter's in Rome. As poet, painter, sculptor, and architect he not only excelled most of his contemporaries, but is one of the few masters whose genius is of the very highest, retaining full possession of his faculties until his death in the ninetieth year of his life.

Lombroso¹⁸⁷ has two objections to the soundness of his mind. One is his "complete indifference" to women; the other, his religiosity in old age. In regard to the first supposed shortcoming, Lombroso admits the existence of at least two letters indicating that the artist was capable of ardent love for women; this in addition to the sonnets which mention women. The interesting thing in this connection is the absence of any mention of Kant's supposedly defective genius on this score. In regard to Michelangelo's religiosity, the only statement which needs to be made is Lombroso's omission to consider the spirit

of the time and social customs. When everybody—not excluding kings and emperors—tried to die in the odor of sanctity by donning a monk's cowl, it is easily understood why the artist should follow the general custom and try to make amends for his real or imaginary sins. Even hardened scientists like Lombroso feel this impulse to set themselves right with God in their old age, and that in a much less religious era like the twentieth century. The only difference is in the method. Michelangelo followed the approved method of his age by giving money to the church for masses and alms to the poor; Lombroso died the defender and believer in a spiritism which he knew to be tinctured with fraud, and the champion of a "medium" who had been exposed several times. That was not even the approved method of our age.

The Bach family thrived for three centuries, commencing in 1550 and producing 29 musicians of eminence. Sebastian Bach, the greatest of the family, became blind shortly before his death at sixty-five, after such severe use of his eyes as perhaps few have ever endured. He was a man of tireless industry and great vitality, and the general respect in which he was held as an excellent father, friend and good citizen, proves that his contemporaries found him perfectly normal.

Of Beethoven—the least promising from a physical point of view in this series of ten geniuses—we have a special study by Dr. James Frederick Rogers.¹⁸⁸ Born of a consumptive mother and a sottish father, much abused in his childhood by having to practice for whole nights, he was nevertheless a physically strong man, and had a powerful constitution. Dr. Rogers says: "The physical Beethoven was a most impressive figure. He was not tall—was in fact, short—not over five feet five inches, but with broad shoulders, and very firmly built.

Siegfried said that 'in that limited space was concentrated the pluck of twenty battalions.'—On the whole his was not a handsome figure, 'but the ugly pock-marked man with the piercing eye was possessed of a power and beauty more attractive than mere physical charm.' One person described him as 'power personified,' and another thought of him as Jupiter." Toward the end of his article Dr. Rogers says: "Beethoven remained physically robust to the last, notwithstanding his continual fight with disease. . . . The examination of the wreck of that most powerful bodily machine showed the auditory nerves shriveled and degenerated, the liver, the source of his digestive disturbances, shrunken to half its normal size, and there were other signs of chronic disease. . . . The convolutions of the brain were more numerous and twice as deep as usual." He died at fifty-seven.

In another article Dr. Rogers discusses the relation of the intellectual and the physical life. After examining about ninety men of genius and talent in various walks of life, he says: "Of those mentioned, some seventeen may be said to have been more or less delicate from childhood, though most of these were by no means sickly much of the time. Some eight or ten more, like Darwin and Spencer, broke down after a healthy, vigorous youth and early manhood. At least fifty were robust and many of these remarkable for physical powers. The remainder were probably above the average in physical endurance, even if their physique and health was not so impressive." 184

The temptation is very strong to take up at least briefly the many men of our own generation who have attained to prominence in various fields of life, and to show that with increasing knowledge concerning the importance of health

for maintaining a sound mentality, the health of geniuses and talented men has generally been at least good, and in most cases excellent. The prominent men at German, French, English, and American universities are usually healthy, if not robust. We must, however, proceed to the second part of this chapter to discuss briefly what is meant by originality.

Genius was regarded as a useful variation. Originality then must mean useful innovation. A man cannot be regarded as a genius merely because he originates new ideas. Extraordinary power of synthesis may be of two kinds, socially useful or useless. The true genius is generally in close touch with his times; is keenly interested in the highest endeavors of his contemporaries, and tries to direct them not only into new, but into socially useful channels by virtue of his wider outlook and deeper insight. The genius is, consequently, the average man raised to the highest power; and this enables him to be more useful in directing the currents of his time than are the majority of men. "To know that the greatest men of earth are men who think as I do, but deeper, and see the real as I do, but clearer, who walk to the goal that I do, but better,—that may be an incitement to my humility, but it is also an inspiration to my life."¹⁴⁰ Unless the genius contributes in some substantial manner to the welfare of his fellowmen, he may have a temporary vogue but no enduring fame. Mere originality in the sense of producing something new that has no relation to the well-being of man, may be indicative of great power of imagination, but it can startle only savages and barbarians. There is more originality of this kind to be found in the Sacred Books of the East or in the Kwakiutle Tales of one tribe of the Columbian Indians, than can be discovered in our most resourceful poets.

This originality had, however, very little, if any, connection with life, and left the people at the social level where the men highly gifted with imagination found it. Men of this kind may make many people rich with conjectural benefits, but the hollowness of their promises will soon be discovered. The medicine man and the shaman of various religions among barbarians, were compelled sooner or later to yield the first place to the warrior who actually liberated his people from the enemy or protected them against him. With these tangible benefits the medicine man could not compete; and in order to maintain his influence, he often resorted to fraud by going into a trance, claiming inspiration from his deity, or in some other way. The magician of the Middle Ages was in a similar position; he often claimed power which he could not prove to be real, and so was not altogether unjustly incarcerated or put to death.

What impresses people in the long run is the demonstrable and the true. This has been the only salvation of science in its long contention against ecclesiasticism—it could prove its statements by conferring substantial benefits upon society. Of the other type of men—rich in power of unbridled imagination—the vast majority have been at least slightly insane or degenerate. And it is mostly this class which Lombroso discusses; but he should not have honored these men with the name of genius.

True genius is sane, because it is generally healthy. There are three tests of sanity for the genius—objectivity, attainability, utility.

The genius produces something of which society may avail itself. Whether as poet, artist, philosopher, statesman, or scientist, he gives something to his fellowmen which they recognize as theirs, and adopt. A poem may be clothed in the most beautiful language, but will not be

read if it does not somehow or other find an echo in the minds of the many. The experience expressed must be capable of being experienced by the average man when he reads it; he must be able to say to himself, "this man expressed what I felt but could not state in words." A poem setting forth an unique experience which has no racial or national background is generally only an adornment on the shelves of libraries or is consigned to the waste-basket, because it is not in touch with the current of life—the poet has failed to make his experience objective, *i.e.*, experiential by other men. The artist who appeals to the nation or to the race, has something in his picture or his statue, which stirs their imagination as something they have in common with him; and he will succeed in proportion as he is firmly rooted in the spirit of his age. Hence the greatest art has always been national in character—Greek, Roman, and Mediæval. The great artists of every age express the tendencies of the times in a higher key than other men can do; but the contact with others is always there, and close. The philosopher likewise expresses the best thoughts of his contemporaries in the most logical and systematic manner. They understand him, because he is flesh of their flesh raised to a higher power. Hence the changing periods in art, poetry, and philosophy. Only the men of highest genius have succeeded in impressing themselves not only upon their contemporaries but upon posterity, because they treated subjects which concern all men in a masterly manner. The genius rose in this case from individual experience, thence through national to general human experience.

The scientist is, however, the most objective of all great men. He creates something which other men cannot only feel after him, but do after him. The artists

of Athens and of Florence are still in many cases unexcelled, because their originality was only in part objective. They succeeded in making others feel what they alone could express; but they could not teach their method; that was largely subjective. Others might see, admire, receive instruction, but could not produce more than replicas of the masterpieces. For art is subjective and a man must create his own method, and that is not communicable. If this statement were not true, we would excel the Greeks in art at least as much as we do in science. But we are still their unsuccessful imitators, notwithstanding the vast progress in the purely mechanical means which science has furnished the artist. The problem of art is, consequently, still unsolved and rests on that of individuality.

Philosophy is more objective than art, because its reasoning can be followed, repeated, and improved by others. But it deals largely with ultimate problems, and hence rarely succeeds in solving any of them. The questions which confronted Plato, the Stoics, Kant, and Hegel are still awaiting a final answer. The same problems are discussed today as of yore; we simply have more philosophies than before.

It may be said that neither has science reached any definite agreement in regard to many points, as proved by the constant change in its hypotheses. That is true. There is, however, this difference. When a scientist in Berlin reaches a conclusion, it can definitely be proved to be true or false, because the method by which the results were obtained is objective and the experiment can be repeated in London, Paris, New York, Chicago, Tokio, or Melbourne, and must yield the same results if the method is correct. If verification is impossible, the conclusion or the method stands condemned; if the same

results are obtained, it is generally accepted and forms a permanent addition to knowledge, serving as a new basis from which other departures may be taken for further experiments. Again, differences among scientists occur chiefly in the realm of philosophy, *i.e.*, in the interpretation and ultimate meaning of facts. No one doubts, for instance, the phenomenal benefits derived from electricity. What electricity is, concerns not science so much as it does philosophy, because that problem is connected with the ultimate constitution of matter. The use of scientific imagination may eventually give an answer to that question, but meanwhile science proceeds from one conquest of nature to another by means of experiments, and puts an ever larger number of men into a position to do and repeat what scientists do. Science has made it possible to distribute the works of art and poetry more widely than ever, without producing any great men in these activities, although it has helped to increase the number of men attaining high rank in various scientific fields very considerably. Full objectivity requires sanity; *i.e.*, balance of mind, ability to compare and to judge accurately, and self-control, so as not to be led away by whims and impulses. All this is possible only on the basis of good health.

A remark may be in place here. The reason why the geniuses of the more subjective type were held in such high honor during the past seems to be the inability of the many to repeat what the great man did. When the shaman throws himself into a trance, few are able to repeat the feat. This principle applies in a decreasing ratio to the poet, artist, and philosopher. On the other hand the scientist is more honored today, because we have emerged from the more emotional and subjective attitude to the intellectual and objective; *i.e.*, we have gained a

truer idea of the genius as a higher power of ourselves. He is no longer an enigma to us because we know that, being firmly rooted in social experiences, he drinks from the same fountain of knowledge as we do, but more deeply.

Attainability is the second mark of sanity in genius. "The Kingdom of heaven (still) suffereth violence, and the violent take it by force." The kingdom of man is in the same position at the hands of the youthful genius who is full of violence and wants to bring about the millennium not only in impossible ways but in a wild rush. Very nearly every youthful genius has started out to declare war against society and to devise plans which were plainly unattainable. From Schiller and Shelley, down to Stirner and Nietzsche there is one continual variant of the same subject—society must be reformed rapidly and completely. The ways and means proposed betray an utter lack of insight into the slow and gradual development of intelligence and power of coördination among men. The relation between means and ends is incomprehensible to this type of immature intellect.

"The Solarian citizens have made wonderful progress in the arts and sciences. They have ships that plow the seas without sails and without oars; and cars that are propelled by the force of the wind; they have discovered how to fly, and they are inventing instruments which will reveal new stars. They know that the world is a great animal in whose body we live, and that the sea is produced by the sweat of the earth, and that all the stars move. They practice perpetual adoration, offer up bloodless sacrifices, and reverence but do not worship the sun and the stars."¹⁴¹ One may argue that a number of things prophesied by Campanella in this passage have

come true and he deserves the epithet of "sane"; but the fact that the possible is juxtaposed with the absurd and that absolutely no means are indicated how to attain the possible, is sufficient indication of insanity; and there is no need to refer to Campanella's badly formed skull with its seven hills or inequalities, to find it out. No inventor or discoverer working in the realms of steam, aëronautics, or telescoping could even get a hint of how to proceed from reading all the books on Utopia ever written. They plainly deal with the unattainable, because they have no basis in the facts then known; and when the author of "The City of the Sun" claims that the citizens of that commonwealth will be invincible in battle because they fight for their country, natural law, justice, and religion—he speaks of something for which no basis will ever be known.

The sane genius always strives for the attainable, since he, better than anyone else, knows both the capacities and limitations of human nature. It may take a long time and infinite pains—and from this point of view Michelangelo's definition of genius as an infinite capacity for taking pains, is perfectly correct—to attain to higher levels of social and individual living, but the genius does not swerve from the path known to be correct after a careful examination of the facts has disclosed the attainable. Any other road may hold great promises of conjectural benefits, but the sane man knows them to be spurious, because unattainable, and prefers to work slowly toward a goal which will be reached sooner or later. If not able to reach it during his own lifetime, he is satisfied to open the path for future generations; but he will not make promises which are untrue to the facts. The long and wearisome search of Darwin through almost innumerable details before reaching one

conclusion is a good illustration of the respect for facts which the true genius has. Every objective genius has worked in this manner, and that is the reason why the results obtained are substantial and lasting, as well as broad and universal. In the objective realm the attainable can be reached only in conformity with the facts, and the sane genius knows it better than the less gifted, simply because his mental horizon is broader and his insight deeper.

The third criterion of sanity in genius is utility. Whatever a great mind may produce must ultimately be tested by its applicability to society as it is, even though the purpose be to raise men to a higher level. Utility is not to be understood here in the sense of market value, but in the sense of benefiting society either by inspiration through higher ideals or by providing better conditions of living. From this point of view there is again a distinction between the less and the more objective genius. The former may, by the power of rich and facile construction, give us joy or consolation through art and literature; and by raising the tone of our mentality, he may be very useful to society. But after all, art and literature are holiday affairs for the great majority of men; they enable us to enjoy ourselves when we are "off duty"—a condition which to most men is a comparatively rare experience. And it cannot be otherwise in the very nature of things. What has come so easily to one man cannot affect other men's lot very deeply. To give joy and pleasure is useful; but to increase the means of life and to ease its burdens is more useful. And the latter can be done only by the hard and constant work of the more objective genius. To invent the steam engine or to discover the relation between certain parasites and certain diseases, requires strenuous application, frequently for

long periods. But the results justify the pains taken, because they affect the whole of society in its work-days. And this is true not only of scientific innovations, but philosophical as well. To give the world a well-thought-out system of metaphysics, or epistemology, or psychology; and to make men think clearly and logically, is often exceedingly useful even though the whole scheme may be out of touch with life; because our whole civilization consists of ideas rather than of material possessions. Such systems cannot be built up, however, by "inspiration," but only by close application and the ability to sustain mental conflict for a long time. The usefulness of the productions of genius is, consequently, always proportionate to the work involved.

This implies that the ethical value of work applies to the genius as well as to other men. And here we get another distinction between the subjective and the objective genius. It is certainly noteworthy that the men of genius who have gone wrong belong with rare exceptions to the former type. Because production is comparatively easy for them, they feel less in need of the stern discipline which the scientific worker has to impose upon himself. As a matter of fact, the subjective is always easier than the objective. And if a man deliberately chooses the subjective he certainly follows a natural instinct along the line of least resistance; he misses, however, a valuable opportunity to develop qualities which lie perhaps dormant, but could be developed and would make him a greater genius by keeping him in closer contact with life. And the usefulness of the genius from this point of view is very great, since the deeds of the men on the heights gradually percolate through society by imitation; and any wrong example is certain to work mischief with thousands. The model lives of many

scientists and philosophers are as large an asset from this point of view as their work is from another.

In closing this brief discussion of genius and sanity a few other remarks may be made. The objective genius requires a certain amount of maturity. It is a striking fact that many great men have been pessimistic in their youth, *e.g.*, Goethe; while as they reach manhood they seem to overcome that stage and become serene if not optimistic. This change seems to be due to greater objectivity attained through life's experiences. In proportion as our contacts with life are varied and numerous, we seem to gain not only new knowledge but a more satisfactory view of life. The pessimist imagines life to be very different from what it actually is. This purely subjective attitude can be overcome by larger experience. A number of men of genius who did not live beyond this period of youthful pessimism, have given us lamentations and vituperations about society which have been charged to genius as such, whereas they ought to have been charged to its youth and immaturity. The young man is very sensitive since life has not had an opportunity to even up things with him, and judgments are formed rashly on the basis of immediate impressions. The senses are, moreover, keener than later in life, and joys and sorrows make a deeper momentary impression. The result is that the whole attitude becomes largely subjective, and the "Werther" type of Goethe is developed. In proportion as life presents a greater variety of experiences which influence the young, there is a better opportunity for the balancing of joys and sorrows, and the attitude becomes more objective and, therefore, more optimistic.

This immaturity of the young genius may be explained also on the basis of intellectual development. The very

young are happy because life's problems are not realized and so none exist beyond those of immediate physical welfare; health is a sufficient reason to insure happiness in children. The youth begins to comprehend these problems, is unable to solve them, becomes puzzled, and sooner or later turns pessimist, especially if health is not exceptionally good—a frequent occurrence since young men are usually careless of the laws of hygiene. The more mature man not only sees the problems, but knows how to solve them on the basis of past experiences. Hence his general attitude is one of serenity.

The individual repeats thus the experience of the race. The savage, still undeveloped, has comparatively few problems, abandons himself to pleasures, and is happy as long as the vital functions are undisturbed. The semi-civilized man, being more developed mentally, is puzzled by the complexities of life, and his attitude is serious on the whole, since he is unable to find solutions for his difficulties. The civilized man is aware of the problems but is serene, since the history of the race has taught him that one difficulty after another has been overcome; and so he is confident that other problems will be solved in due time.

The subjective genius, particularly in his youth, is largely in the position of the semi-civilized. Just because he is able to see further and deeper, the problems of life seem more numerous and complex. Owing to inexperience and to frequent neglect of health, he lacks ability to find a solution and the buoyancy of high vitality to inspire him with hope. Hence the numerous pessimists among men of this class.

The objective genius is rarely pessimistic. His very vocation calls for discipline in every respect. He must have keen perceptions and a clear mind in order to ob-

serve facts accurately; hence he usually takes good care of his health. He has trained himself, moreover, to take one step at a time, knowing that this will bring him so much nearer to a solution. Success, often moderate enough, inspires him nevertheless with confidence that complete success will ultimately be attained, and so he rarely gives way to useless complaints and lamentations—unless he is old and decrepit, a condition characterized by inability to accomplish, begetting a disbelief in the performance of others. The generally optimistic attitude of scientists and of the more mature philosophers is due to the fact that they have produced something on the basis of experience and made it available to others, that they have striven after the attainable and made it socially useful. Men must progress together. The genius who is unintelligible to his fellowmen, might as well not have lived; only in proportion as he helps his fellowmen to see more clearly, to act more generously and efficiently, and to strive more nobly and earnestly, can the genius be called sane. And to be sane, he must be healthy.

Whether genius is subjective or objective, the extraordinary power for synthesis requires vitality, at least if the synthesis is to be coherent and applicable to life. While this extraordinary power is characteristic of the genius, it is not always combined with facility of synthesis. Even in the case of the subjective genius great endurance is necessary. Newton and Kant could maintain for hours at a stretch a struggle with difficulties which would exhaust an ordinary man in five minutes. They did this, moreover, day after day, and included a vast mass of ideas in their systems. This certainly required vitality of a high order. We have seen above that Bach and Beethoven had great vitality, although musical genius is supposed to compose in a flash or by

inspiration. That may be true. But long hours of high tension precede the fruitful flash of creation, and when at last the tension is released, the new symphony springs fully planned into existence. Hence the exhaustion which usually follows one of those creative moments; hence also the frequent abandonment to sensuous pleasures on the part of the weaker members of the artistic, musical, and literary fraternities after such moments. The fact that the highest men of these classes were able to keep their equilibrium at such times, is an argument in favor of their health, while the abandonment of the lesser men argues equally for their lower vitality. For, every new creation implies a heavy expenditure of vitality; and the extreme fatigue which overcomes the weaker men, lowers—as fatigue always does—their power of resistance and they fall into evil ways.

Richard Wagner—the best tumbler and sommersault-turner of the large Dresden school and an adept at every form of bodily exercise, who could stand on his head when near seventy years of age¹⁴²—worked almost incessantly for a whole month on his *Walküre*, although he composed with facility. The mere notation of the music involved vast labor. Several of his operas have each over a million notes. Since the stems are at an axis of 90 degrees and the five ruled lines of the music paper at an axis of 180 degrees, and since the value of the notes is almost constantly changing, the mere problem of writing them down accurately required not only much strength but very close application. Wagner, moreover, wrote the libretto and designed the costumes as well as the decorations for his operas. And all this he had to do with astigmatic eyes. Considering that he wrote twelve operas beside many smaller works, the conclusion that only a man of great vitality could stand the strain is inevitable.

With the objective genius the tension at any one time is, perhaps, not so high; but it lasts longer, often for years, and demands the combination of innumerable details in many cases. The work of great physicists, chemists, naturalists, and physicians requires first of all the mastery of many facts, and then a continued application for classification, finally a high power of coördination, and the scientific use of the imagination if anything new is to be produced. This has to be tested and tried to see if it works properly and is useful. Much greater accuracy is required in such a case, since the innovation must stand the tests of other scientists and that of saving or helping human beings; *e.g.*, a new medicine or a new electrical device. The scientist needs, consequently, an imagination of as high an order as the poet and artist, but it has to be better trained and must include details. If a piece of art is not acceptable, that ends the matter; but if a bridge is poorly constructed, hundreds of people may lose their lives. Whether the genius be subjective or objective, the exertion in creating something new always involves a tremendous strain which only men with good vitality are able to endure.

The majority of socially useful great men have been strong and healthy. They were neither insane nor degenerates. A number of them suffered severely from some functional defect, but in every case there was at least sound structure, promising good health with proper care. Social conventions often required indulgence in various vices, and the tremendous strain of creative effort led many of the subjective geniuses to seek relief along the same channel. Medical ignorance of former times was unable to cope with small difficulties and the victims of slight diseases became sufferers from their accumulated effects. All this has changed.

The genius is no longer required to be a social outcast, nor is he expected to disregard the laws of hygiene. Physicians are able now to relieve if not cure smaller ailments and to render every possible help to the genius as well as to the ignorant. Above all else, our men of science have come to recognize the value of health and are taking good care of their bodies; consequently they are as a rule not only long-lived but vigorous. Poets and artists are gradually following in their footsteps in this regard. The general campaign against neglect or abuse of the body is slowly affecting all classes, more particularly the mental workers. This may produce a new conception of the genius as the physically best-equipped man instead of that of a degenerate or insane person. For, the genius who suffered did not produce because of suffering, but in spite of it, by virtue of his strong vitality and finely organized brain. His works would have been more perfect and wonderful had he enjoyed uniformly good health. If we look at the great masterpieces of art, literature, philosophy, and science, produced by the handful of ancient Athenians, we cannot escape the conclusion that the believers in the principle of "a sound mind in a sound body" must have been right. Ultimately the physically most perfect man must have the best mind. He must be as he has always been, closely bound to the thoughts of his contemporaries, and incarnate the best ideas of his times.

"He does not create; he reassembles in one organism the *scattered members*, the medial vibrations of the crowd; he feels and expresses all that is new and beautiful and great that is in process of formation in the men who surround him, who are frequently unconscious of the beauty which is in them. . . . The medial intellectual man who has produced it [a work of art or of science] is a

beneficent genius to humanity because he aids its upward progress by appealing to the better part in each individual." ¹⁴³

Lombroso must have thought of this combination of a sound physique with a sound mind when he wrote of the sane men of genius as follows:

"Such have been Galileo, Leonardo da Vinci, Voltaire, Machiavelli, Michelangelo, Darwin. Each one of these showed, by the ample volume and at the same time the symmetrical proportion of the skull, force of intellect restrained by the calm of the desires. Not one of them allowed his great passion for truth and beauty to stifle the love of family and country. They never changed their faith or character, never swerved from their aim, never left their work half completed. What assurance, what faith, what ability they showed in their undertakings; and, above all, what moderation and unity of character they preserved in their lives! Though they, too, had to experience—after undergoing the sublime paroxysm of inspiration—the torture inflicted by ignorant hatred, and the discomfort of uncertainty and exhaustion; they never, on that account, deviated from the straight road. They carried out to the end the one cherished idea which formed the aim and purpose of their lives, calm and serene, never complaining of obstacles, and falling into but few mistakes—mistakes which, in lesser men, might even have passed for discoveries." ¹⁴⁴

CHAPTER XIV

RESULTS AND PROSPECTS

IN the preceding chapters, emphasis has been placed upon the importance of health from every point of view, and especially upon the influence of malaria and hookworm on civilization. Figures have been given to substantiate the statements which were made. The reduction of malaria in particular was, however, due chiefly to the governments which took up sanitation in the tropics because they had to protect their own officials sent to the infested regions. They needed not to trouble themselves about expense, since they had the power of taxation and, in many cases, that of military discipline. The areas thus taken up would always remain small if private capital could not be interested. If disease is to be eliminated, or at least much reduced, its removal must be shown to be a profitable investment and proof must be given that the appeal is made not merely to benevolence but to sound business sense. It is the purpose of this chapter to give additional data in proof of the proposition that both governments and private capital are becoming aware of the tremendous opportunities for profitable investment in health, especially in torrid regions and farther north where endemic diseases prevail. A forecast of what is already planned for the future by one private corporation will also be necessary to show that the problem of health is interesting an ever widening circle of intelligent people.

THE UNITED FRUIT COMPANY

The United Fruit Company was organized in 1899. Recognizing the necessity of health among its workers, the company organized a sanitary and medical department in 1900. It is the business of this department to lay out settlements for the workers, keep them in sanitary condition, and instruct the laborers and their families in dietetics and hygiene. The plantations are kept free as far as possible from mosquitos and other insects. Hospitals are provided in the different republics, clinics in the larger settlements, and physicians in the smaller ones. In order to encourage the study of diseases which are most frequent in the territories where the company's lands are located, it started and supported a school of tropical medicine at Tulane University, La.

The Company had invested \$220,244 in hospitals during 1912, and \$451,391 in 1913. From the annual reports of the medical department the following interesting figures are taken. The author wishes to acknowledge the kindness of Dr. W. E. Deeks for his valuable assistance in this part of the discussion.

Year	Hospitals	Dispensaries	Death Rate in Bocas Toro (Panama)		Total
			White	Black	
1912	10,383	53,082	12	11.15	11.2
1913	10,497	61,932	3.33	7.7	7.5
1914	15,406	91,324	0	14.4	13.7
1915	12,362	83,117	0	8.6	8.1

A striking feature is the low hospital mortality rate: 30 per 1,000 in 1912; 33 in 1913; 26 in 1914, and 41 in 1915. Another striking feature is the low morbidity rate

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in Bocas del Toro; it was lowest in February, 1912, with 18.36 per 1,000 and highest in August with 28.52. This compares well with an average of 33 per 1,000 in the United States, even though all ages of the population are included in this figure, while for Bocas del Toro we have only the workmen of the company.

The education of the laborer has been one of the principal objects of the company. The worker knows now that it is to his interest to obey the rules of the physicians; he has learned that the protection of his health against mosquitos is an important matter, and needs but little urging to help to wipe out the pest. In pursuit of its educational campaign the company has provided schools and churches, which have helped to produce a better class of labor, since both teachers and ministers preach sanitation. With a steady and well paid job, a house and a garden, chickens and other fowl, the laborers are happy and contented. They have varied in number from about 20,000 with dependents in 1904, to 71,910 in 1914, but they have always willingly paid the small monthly contribution to meet the considerable annual deficit. According to a letter of September 18, 1916, from Dr. W. E. Deeks, the general superintendent of the medical department, the relation of the deficit of this department to the "operating cost of tropical divisions" was as follows:

Year	Total Cost	Deficit of Medical	
		Department	Percentage
1913	\$18,312,658.41	\$ 89,758.33	0.49
1914	19,676,607.84	130,047.16	0.66
1915	16,647,077.19	134,804.73	0.81

The reason for the increase of the deficit was the fact that fewer laborers were employed in 1914 and 1915,

while the overhead charges of the medical department remained the same. These statistics prove that sanitation in the tropics is not ruinous for private enterprise.

The men at the head of this company had a large vision. They were willing to meet disappointments and temporary loss in several branches of the business. Perhaps the most difficult task was the education of the laborers, since no military discipline could be resorted to, nor importation of Spaniards and Italians. The company made it an object to get its working material on the spot by educating the natives and negroes. This required the arousing of interest on the part of an apathetic class of people. It was done by improving the health of the workers through sanitation and hygiene, because an under-vitalized man is content with few things and stops work when these are obtained; while a healthy man has more wants and is able and willing to work longer to secure them. The shiftlessness and unreliability of the laborer in the tropics is due to poor vitality, and an educational campaign must begin with the improvement of health and sanitation.

The company has found this expenditure good business. Its assets in 1900 consisted chiefly in land, of which it possessed or leased 236,201 acres in various parts of tropical and sub-tropical America; only 66,294 of this acreage was improved. In 1913 it controlled by lease or deed 1,210,443 acres—an area almost equal to the state of Delaware—of which 331,344 acres were improved. It has established a number of towns and cities, steamship lines and railroads with terminal facilities; it controls a large share of the exports and imports of various smaller states, and has paid over ten per cent in annual dividends, besides putting a large share of the earnings

back into the business, and accumulating a surplus of \$16,284,211 by September, 1913.*

The occupation of the tropics may seem a formidable undertaking. So was that of our own continent. Little did the 5,000,000 people of this country dream in 1800 that by 1900 we should have occupied all the land between the Atlantic and the Pacific. We increased our farm area from 1850 to 1900 by 463,000,000 acres, an average of 25,000 acres daily. The new farms occupied and improved within these fifty years are greater in area than Germany, France, Italy, England, Scotland, Denmark, Belgium, Ireland, Holland, and Switzerland in the aggregate. It was the love of adventure and abounding health that made us do it. Necessity will compel us to do in the tropics what we have done at home. In two or three centuries the increased population of the world will cry for bread, and the tropics will have to furnish it—if the world can wait that long. We shall have to do it, and we already have the means.

Perhaps the principal foods for the white race will always be produced in the temperate zones. But we have constantly extended the area of cereals further north. In a few decades, varieties of wheat, rye, and barley have been profitably produced by scientific selection in Winnipeg and further north. No one supposed fifteen years ago that Alaska would produce a variety of cereals; yet, in 1914, the harvester was singing its song along the Yukon River. Another variety of wheat has been produced which yields excellent crops on the formerly arid lands of Colorado, Idaho, and Wyoming. Even the desert lands of southern California and Arizona

* See *The Conquest of the Tropics*, by Frederick Upham Adams; Doubleday, Page & Co., New York, 1914, for a complete description of this company.

have opened up their wonderful resources at the magic touch of irrigation.

With these facts before us, it is entirely within the range of probability that cereals and even cattle will be adapted to lower latitudes in the course of time. The tropics and sub-tropics will undoubtedly furnish a larger amount of food for the population of the future. Scientific selection is a young though lusty branch of knowledge. What it will achieve in a century, no man now living can tell. We are no longer subject to nature; we have mastered her in many ways, and our control over her forces is growing constantly. Telic civilization has taken the place of genetic development. We know what we want, and adapt ways and means to satisfy our needs. The forces of nature controlled development in the past; in the future man will control his own fate. Climatological and geographical features are becoming less important every day. Perhaps General Gorgas may prove right after all in claiming that civilization is drifting back to the tropics. He states * that man could travel faster than the microbes, and thus reached healthy regions in higher latitudes where he could live and be well, after the discovery of fire and clothing. Now he has discovered how to go back to the tropics by controlling the diseases which drove him out. The increase in population will certainly compel man to obtain more food there by improving the health of those countries.

SOUTHERN UNITED STATES

When the Rockefeller Sanitary Commission began its work for eradicating hookworm in the Southern States, much opposition had to be overcome and an educational

* *Op. cit.*, p. 286 ff.

campaign had to be carried on in order to show that the work was imperatively necessary for the health and welfare of the people. As soon as the results proved the importance of the work done, legislatures became more deeply interested and appropriated money more liberally for the purpose of improving sanitary conditions. The appropriations increased from \$255,395 in 1910 to \$1,416,111 in 1918. This made possible the treatment of an ever larger number of hookworm and malaria victims, but what is more significant is the reduction in the cost of treatment per patient. In 1910, for hookworm patients, it was \$4.66; in 1911, \$1.05; in 1912, \$0.72, and has since that time been kept low.

A striking illustration of the effect of practically ridding a community of malaria is furnished by the report of the International Health Board for 1918. The town of Hamburg, Arkansas, has a population of 1,285. In 1916 there were 2,312 physicians' calls for malaria; in 1917, after the Board had been working for one year, there were 259; in 1918, only 59. The reduction from 1916 to 1918 was 97.4 per cent. The per capita cost was reduced from \$1.45 in 1917 to \$0.44 in 1918. The demonstration of the feasibility and economic value was so complete that Hamburg took over the entire cost of the work at the end of 1917, having paid only 33 per cent of the expenses in 1916 after an educational campaign had convinced the people of the necessity of the work. At \$2.00 per physician's call this community paid in 1916 alone \$4,624—a sum several times larger than it paid in the two following years to get rid of malaria and the mosquito as a pest. This case is only one out of many in various parts of the South; everywhere a comparatively small outlay made under the direction of experts was

sufficient to practically exterminate malaria by controlling the breeding-places.*

"The examinations for hookworm disease made among United States soldiers confirmed in a striking way the board's experience of the last few years, and demonstrated that even light hookworm infections are of great importance," says the report. "Judged by the Binet-Simon and other tests, many full-grown soldiers who harbored comparatively few hookworms had the mentality of persons only 12 years of age. The mentality of 10,000 white men at Camp Travis who harbored the disease was about 33 per cent below normal. Negroes were infected quite as frequently as whites, but they appeared to be relatively immune to the serious effects of the disease and did not show the same predisposition to other diseases or the same reduction in mentality.

"Mental tests of a similar nature among 340 school children in Queensland, Australia, showed that there was an average retardation of approximately two years among heavily infected children. The longer the infection persisted the greater was the retardation. The average retardation of lightly infected cases was nine months.

"In Siam, the weights of ninety-nine highly infected soldiers were taken upon their entrance to the army, and again at the expiration of a year. Meanwhile, sixty-nine of these soldiers were treated for hookworm disease, and the other thirty remained without treatment. Those who were treated gained an average of 10.6 pounds in a period of one year; those who were not, an average of only 1.1 pounds.

"In Costa Rica sixty-six laborers before being treated for hookworm disease normally cultivated 563 acres of coffee monthly. After being treated for hookworm disease they cultivated 750 acres, resulting in a net monthly increase in wages of 27 per cent, after allowing for a 15 per cent reduction in unit pay. Moreover, in India, Clayton Lane reports that the amount of work increased 20 per cent on one estate and 50 per cent on another, and on both was of better quality than before

* Some interesting results of hookworm disease and its cure are reported by the International Health Board in the "Fifth Annual Report, The Rockefeller Foundation," 1918, pp. 31-33.

the laborers were treated; while reports from British Guiana indicate that the efficiency of the laborers employed by one company increased from 25 to 50 per cent after hookworm measures were put into operation."

FOREIGN COUNTRIES

In Brazil, the Federal and six State governments made approximately \$750,000 available for hookworm control alone in 1918.

In India, the percentage of infection among the rural population often ranges from 80 to 100. In the province of Bengal alone 30,000,000 of the 45,000,000 population are infected. From this country the infection is carried to many parts of the world by coolies and travelers. The government has at last recognized the economic importance of the disease and has entered into an arrangement of coöperation with the International Health Board for carrying out a demonstration in control measures in the province of Madras.

In Ceylon many communities and plantations are now engaged in stamping out the disease, and are paying more attention to sanitation and hygiene.

Other countries in which work is done for the elimination of hookworm disease are: Siam, China, Java (with an average infection of 93 per cent), Guam, Jamaica, and practically all of the other parts of the West Indies, all of the Central American States, the Fiji Islands, the Seychelles, and Papua. In 1917, Jamaica appropriated \$12,000 and Papua \$5,000 for this purpose.

It is most fortunate that the International Health Board has taken up the eradication of malaria in connection with that of hookworm, since in most tropical and sub-tropical countries and further north, the two diseases go hand in

hand, infesting the same persons either simultaneously or successively.

OTHER DISEASES

The practical elimination of yellow fever, except in a few breeding-places, needs only to be mentioned. Typhoid fever is likewise nearly extinct where control is complete; *e.g.*, in the United States army and navy. For less controlled populations, the results are at least encouraging. Virginia reduced its morbidity rate from this disease from 14,400 in 1909 to 5,038 in 1917.

Among the poor people represented by the Industrial Department of the Metropolitan Life Insurance Company, the death rate from tuberculosis was reduced from 203.0 in 1911 to 172.8 in 1916 per 100,000.

Wherever scientific study has been applied to diseases, a diminution of mortality and morbidity rates has resulted, irrespective whether it is done in the forest jungles of Brazil or in the steel mills of Pittsburg. The United States Steel Corporation spends vast sums of money on welfare work, chiefly for the improvement of health. The Illinois Steel Corporation finds it economically profitable to spend \$1,000,000 a year in the protection of its workmen against disease and accidents.

The Metropolitan Insurance Company voted \$100,000 to the National Tuberculosis Society a few years ago to establish a "health town" and the result is reported by *American Medicine* for November, 1919, as follows: "When level-headed insurance directors spend such a large sum of their company's money, they naturally expect it to bear interest, however indirectly it may be. Framingham, Mass., was chosen for the experiment. The leading spirits of the town, level-headed business men, saw a good opportunity for investing the town's money,

and raised the per capita expenditure for public health from 39 cents to \$1.00. The purpose of this experiment was to show that in many cases sickness and death, particularly tuberculosis, can be eliminated by medical treatment and careful nursing, personal hygiene and adequate health administration. The experiment proved an unqualified success. In 1916 before the experiment was begun, 81 babies per 1,000 died; during the first year of the experiment this was promptly reduced to 61 per 1,000. Previous to the inauguration of health conditions in this town of 16,000 souls, 121 persons died in one year from tuberculosis. In the first year of the test this was reduced to 99 deaths, in the second year to 79, in the third year to 76—and this reduction occurred while the town increased in population. At the end of three years the town leaders were well satisfied that their investment of 61 cents excess tax for health was an exceedingly profitable one. The directors of the insurance company felt that their \$100,000 experiment was beginning to pay them better than if it had been sunk in first mortgages. Health towns, it was discovered, paid. The health of babies and adults was actually an "asset," which could be measured in dollars and cents. We beg the indulgence of legislators for our carelessness in overlooking these facts and for sentimentally regarding the health of babies and adults merely from a humane point of view."

Much more needs to be done. If private corporations find such large expenditures for health profitable, the country as a whole will do so, too; indeed, the world as a whole will. For, the world as a whole is concerned in this matter, not excepting our own country. While this treatise has been concerned chiefly with two endemic diseases prevalent in southern latitudes there is no special

reason why we should be in an exultant mood. Our country received a rude shock when we learned in 1917 that out of about 1,300,000 volunteers for the army and navy only 448,859 were physically qualified, the rejections being 66 per cent. Some of these were later drafted; but even if 50 per cent of our young men should be found physically unfit for military service, the percentage would be uncomfortably high. These figures were later reduced, as will be shown. It was, perhaps, this revelation which started several new movements for improving the health of mankind, chiefly that of the Red Cross.

PROSPECTS

The International Health Board is planning to extend its activities during 1919. In addition to its work against yellow fever, hookworm, and malaria, the Board will include tuberculosis in France, for all of which an appropriation of \$2,367,130 has been made. Medical education will receive \$3,726,504, part of which will be spent in China, and the Medical School of Johns Hopkins University has received an endowment of \$10,000,000 from Mr. Rockefeller for the study of prophylactic medicine. Work against hookworm and malaria will be done in twelve Southern States and in twenty-one foreign countries.

During the draft of 1917 and 1918 about 3,208,000 men were examined, of whom 521,606 or 16.25 per cent were utterly unfit for any military service whatsoever. A comparison of the age groups of registrants showed that 76.89 per cent of those aged 21 were physically fit, and of the age group between 21-30 only 69.17 per cent were fit. Of such a select group of men as college students are supposed to be, one in every four was physically dis-

qualified for full military duty. The obviously unfit and many others who had dependents were, of course, not examined, and the statement made previously that about 50 per cent of all men of military age may not be able to qualify for full military service, seems to be approximately true, especially since nothing is said about those over thirty years of age. What is more important is the fact that the Federal Government has been forced to face the situation of a large amount of ill health in our country, especially among the men who should be most vigorous. Perhaps millions of men with remediable diseases will be restored to health, and other millions will be kept in good health by the introduction of prophylactic measures and systematic health culture. When the military strength of a country is at stake, the government usually acts, just as the English Parliament acted after a similar revelation during the Boer War.

The Red Cross is inaugurating a world-wide movement for public health. An International Committee of Red Cross Societies was organized in April, 1919, with the foremost specialists of the medical and sanitary professions of Great Britain, France, Italy, Japan, and the United States, as members. Representatives of other countries will be elected as soon as possible. The plan is to have a central office in Geneva, Switzerland, which is to serve as a clearing house on all matters of health and sanitation. Any new discovery in curative or preventive medicine will be communicated to this office and disseminated from there all over the world. Anything else contributory to health will receive the closest attention, since the work is to be prophylactic as far as possible. A vigorous manhood is to be built up by telic methods. The results to be attained are briefly as follows:

First—Owing to the close international relations through commerce and migration, diseases are now spread from some obscure corner of the world to other countries. The work proposed would arouse the peoples of every country to a sense of their obligation to their fellowmen, and there would naturally follow in each country an awakening to the needs within its own borders, and a determination to meet them as far as possible.

Second—It would throw light on the darkest corners of the earth, and would give to all the world the full benefit of scientific study and experience in the cure and prevention of disease.

Third—It would make possible the immediate coöperation on the part of various organizations to render aid when necessary in the case of great disasters.

If such an organization had been operative in 1917 it is probable that the influenza epidemic could have been confined to its source in China, that several millions of lives would have been saved, thousands of others would have been spared its weakening effects, and untold misery prevented.

Whatever aspect of health is considered, it has an important bearing on social progress. The men of genius who have given to the world the vital ideas which have made civilization possible, were healthy men. Progressive nations could live only in regions which permitted at least a fair amount of health. The increasingly greater need for food will compel the nations of the north to make the countries of the south sanitary. The many serious ailments from which society suffers, will be largely alleviated, if not removed, by greater attention

to health. It is within human power to turn our social destiny by more diligent application of scientific discoveries already made and others soon to come, into paths of health and happiness. A gift of \$50,000,000 was announced January 1, 1920, by Mr. Rockefeller for the scientific extension of work on health all over the world. This will enable mankind to apply the medical discoveries already made more widely, and to pursue the search for health more generally. A new era is thus dawning in which health will be considered one of the most important assets of society.

NOTES

EXPLANATION: The notes throughout the book are numbered consecutively. The numbers have no reference to pages.

- ¹ *Influence of Geographic Environment*, by Ellen C. Semple; Henry Holt & Co., New York, 1911, p. 2.
- ² *The Efficient Life*, by Luther H. Gulick, M.D.; Doubleday, Page & Co., New York, 1907; pp. 177 and 178.
- ³ *Secret of Hegel*, by J. Stirling, Vol. II, p. 554.
- ⁴ *The Play of Animals*, by Karl Groos; D. Appleton & Co., New York, 1898.
- ⁵ *Inductive Sociology*, by F. H. Giddings, p. 252.
- ⁶ *The Aristocracy of Health*, by Mary Foote Henderson; Harper & Brothers, New York, 1906; p. 6.
- ⁷ *Inductive Sociology*, by F. H. Giddings; pp. 257 and 259.
- ⁸ *Hereditary Genius*. Macmillan & Co., London and New York, 1892; p. 271.
- ⁹ See Dr. H. K. Carroll's article in the *New York Christian Advocate*, January 30, 1913, on "Statistics of the Churches of the United States—1912."
- ¹⁰ *Body and Mind*, by Henry Maudsley, M.D.; D. Appleton & Co., New York, 1884; pp. 110 and 111.
- ¹¹ *Growth of the Brain*, by Henry Herbert Donaldson; Chap. III.
- ¹² Maudsley, op. cit., p. 38.
- ¹³ *Pure Sociology*, by L. F. Ward; pp. 267-272.
- ¹⁴ *Politics*, Book I, Chap. VI.
- ¹⁵ *Inductive Sociology*, p. 252.
- ¹⁶ *The Theory of the Leisure Class*, by Thorstein Veblen; The Macmillan Co., New York, 1908; p. 15.
- ¹⁷ *Inductive Sociology*, pp. 259 and 260.
- ¹⁸ *A Practical Study of Malaria*, by Wm. H. Deaderick, M.D.; W. B. Saunders Co., Philadelphia and London, 1909; pp. 17 and 19.
- ¹⁹ *Tropical Diseases*, by Sir Patrick Manson; Wm. Wood & Co., New York; p. 68.
- ²⁰ *Ibid.*, p. 70.
- ²¹ *Ibid.*, p. 70.
- ²² *Ibid.*, p. 72.
- ²³ Deaderick, op. cit., p. 237.
- ²⁴ *Ibid.*, pp. 295-297.
- ²⁵ *Ibid.*, p. 298.
- ²⁶ Manson, op. cit., p. 109.
- ²⁷ *Ibid.*, p. 110.
- ²⁸ *Malaria: A Neglected Factor in the History of Greece and Rome*, by W. H. S. Jones, M.A.; "Introduction" by Major R.

- Ross, F.R.S.; "Concluding Chapter" by G. G. Ellett, M.B.; Macmillan & Bowes, Cambridge, England, 1907; p. 7.
- ²⁹ Jones, *op. cit.*, p. 102.
- ³⁰ Deaderick, *op. cit.*, pp. 31-33.
- ³¹ Deaderick, *op. cit.*, pp. 22 and 23.
- ³² *Influences of Geographic Environment*, by Ellen C. Semple; Henry Holt & Co., New York, 1911; pp. 110 and 111.
- ³³ *Hereditary Genius*, by Francis Galton, F.R.S.; Macmillan & Co., London and New York, 1892; p. 329.
- ³⁴ Galton, *ibid.*, p. 331.
- ³⁵ Jones, *Malaria and Greek History*, pp. 15 and 16.
- ³⁶ Major Ross, in Jones, *Malaria*, p. 4.
- ³⁷ *Handbook of American Indians*. Bulletin 30 of Bureau of American Ethnology, Washington, D. C., 1910, Part II, p. 286.
- ³⁸ *Sociological Papers*, London, 1904; article "Eugenics: Its Definition, Scope and Aims."
- ³⁹ *Malaria and Greek History*, by W. H. S. Jones, M.A., University Press, Manchester, 1909; pp. 12 and 13.
- ⁴⁰ Jones, *Malaria*, p. 11.
- ⁴¹ *Lectures on Tropical Diseases*, by Sir Patrick Manson, M.D.; W. T. Keener & Co., Chicago, 1905; pp. 103 and 104.
- ⁴² Ross, in Jones, *Malaria*, p. 7.
- ⁴³ Deaderick, *op. cit.*, p. 26.
- ⁴⁴ *Tropical Diseases*, p. 1.
- ⁴⁵ *Report on the Prevention of Malaria in Mauritius*, p. 51; quoted by Jones in *Malaria and Greek History*, p. vi.
- ⁴⁶ *Malaria and Greek History*, p. 23.
- ⁴⁷ *Ibid.*, p. 27.
- ⁴⁸ *Ibid.*, p. 34.
- ⁴⁹ *Ibid.*, p. 16.
- ⁵⁰ Ellett, in Jones, *Malaria*, pp. 94-95.
- ⁵¹ *Malaria and Greek History*, p. 85.
- ⁵² *Ibid.*, p. 97.
- ⁵³ *Ibid.*, p. 102.
- ⁵⁴ Jones, *Malaria*, pp. 95 and 96.
- ⁵⁵ Deaderick, *op. cit.*, pp. 28 and 29.
- ⁵⁶ *Malaria and Greek History*, p. 11.
- ⁵⁷ Jones, *Malaria*, p. 41.
- ⁵⁸ *Encyclopædia Britannica*, 11th ed., Vol. XVI, article *Latium*.
- ⁵⁹ Jones, *Malaria*, p. 66.
- ⁶⁰ *Ibid.*, p. 85.
- ⁶¹ *The Effects of Tropical Light on White Men*, by Major Charles E. Woodruff; Rebman Company, New York, 1905; p. 224.
- ⁶² *Ibid.*, p. 239.
- ⁶³ *Encyclopædia Britannica*, 11th ed., Vol. XVIII, p. 915; article "Mauritius."
- ⁶⁴ *Malaria and Greek History*, p. 48.
- ⁶⁵ *What Have the Greeks Done for Modern Civilization?* by John P. Mahaffy; G. P. Putnam's Son, New York, 1909; p. 209.

- ⁶⁶ *The Races of Europe*, by William Z. Ripley; D. Appleton & Co., New York, 1899; p. 259.
- ⁶⁷ *The Effects of Tropical Light on White Men*, by Major Charles E. Woodruff; Rebman Company, New York, 1905.
- ⁶⁸ *The Hookworm Disease*, by George Dock, M.D., and Charles C. Bass, M.D.; C. V. Mosby Co., St. Louis, 1910; pp. 19-32.
- ⁶⁹ Rockefeller Sanitary Commission for the Eradication of Hookworm Disease; Washington, D. C., 1911; Publication No. 6, pp. 26 and 27.
- ⁷⁰ Rockefeller Sanitary Commission, etc., 1911; Publication No. 5, p. 11.
- ⁷¹ Dock, *Hookworm Disease*, p. 183.
- ⁷² Hygienic Laboratory, Bulletin No. 10, Washington, D. C., February, 1903, p. 45 ("Prevalence and Geographic Distribution of Hookworm Disease in the U. S.," by Charles Wardell Stiles, M.D.).
- ⁷³ *Uncinariasis (Hookworm Disease) in Porto Rico*, by Bailey R. Ashford, M.D., and Fedro Gutierrez Igaravidez, M.D. Senate Document No. 808, 61. Congress, Washington, 1911; pp. 89 and 90.
- ⁷⁴ Rockefeller Sanitary Commission, etc. Publication No. 6, p. 75.
- ⁷⁵ Rockefeller Sanitary Commission, etc. Publication No. 6, p. 7.
- ⁷⁶ Rockefeller Sanitary Commission, etc. Publication No. 5, pp. 120 and 121.
- ⁷⁷ Rockefeller Commission, etc. Publication No. 5, pp. 113-126.
- ⁷⁸ Dock, *op. cit.*, p. 97.
- ⁷⁹ Ashford, *op. cit.*, p. 4.
- ⁸⁰ Ashford, *op. cit.*, p. 6.
- ⁸¹ Ashford, *op. cit.*, p. 7.
- ⁸² Ashford, *op. cit.*, p. 11.
- ⁸³ *Anemia in Porto Rico*, Preliminary Report, 1905, p. 25.
- ⁸⁴ *Report of the Governor of Porto Rico for 1913*; statistics on pages 145 to 152.
- ⁸⁵ *Annual Report of the Department of Health of the Isthmian Canal Commission for 1906*, pp. 4 and 5.
- ⁸⁶ Ashford, *op. cit.*, p. 205.
- ⁸⁷ *History of Philosophy*, by Alfred Weber; Charles Scribner's Sons, New York, 1896; pp. 519 and 520.
- ⁸⁸ *The Mind of Primitive Man*, by Franz Boas; the Macmillan Company, New York, 1911; pp. 16 and 17.
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- ⁹⁰ Rockefeller Sanitary Commission, Publication No. 5; "Exhibits, Photographs," Figures 2, 7 and 8.
- ⁹¹ *Influences of Geographic Environment*, etc., p. 42.
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York, 1868; p. 317, pages 308 to 318, discussing "The Zone of the Founders of Religion."

⁹⁸ *Social Evolution*, by F. Stuart Chapin; The Century Co., New York, 1913; pp. 160 and 165.

⁹⁴ *The History of Civilization in England*, by H. T. Buckle, Vol. I, Chapter II; London, 1857-1861.

⁹⁵ Ashford, *op. cit.*, p. 7.

⁹⁶ Quoted by William Thompson, M.D., in *Brain and Personality*; Dodd Mead & Co., New York, 1910; p. 51.

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⁹⁸ Boas, *op. cit.*, p. 24.

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¹⁰⁷ *The Races of Europe*, by W. Z. Ripley, pp. 407 and 408.

¹⁰⁸ *Weather Influences*, by Edwin Grant Dexter, Ph. D.; The Macmillan Company, New York, 1904; p. 75.

¹⁰⁹ *The Races of Man: An Outline of Anthropology and Ethnography*, by J. Deniker, Sc.D.; Charles Scribner's Sons, New York, 1907; p. 145.

¹¹⁰ *Encyclopædia Britannica*, 11th edition, article "Malaria," written by Arthur Shadwell, M.D., and Harriet L. Hennessey, M.D.

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¹²⁴ Lorand, *ibid.*, p. 7.

¹²⁵ Woodruff, *Effects of Tropical Light on White Men*, pp. 345 and 346.

¹²⁶ Woodruff, *Expansion of Races*, pp. 309 and 310.

¹²⁷ *Expansion of Races*, p. 309.

¹²⁸ Walter H. Page, "The Hookworm and Civilization," in *The World's Work*, September, 1912.

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