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**PRIMITIVE MAN
AND HIS FOOD**

By

ARNOLD DEVRIES

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FIRST IMPRESSION

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For Avis

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Health: Civilized and Primitive

MUCH HAS BEEN thought, said and written on the condition of human health in civilized society. Most of this has been given in optimistic tone, describing modern medical advances involving the development of new drugs and surgical techniques. Results have been less spectacular and impressive than we have been led to believe, however, and the true picture is far from being pleasant or hopeful. Indications point to a very low standard of health for the population as a whole. This is especially notable in the advanced countries of North America and Western Europe. Here we find examples of human deterioration manifesting themselves on a scale heretofore unknown in the realms of biology and medicine.

What are the characteristics of the physical and mental degeneration of modern man? Briefly they are: dental decay, deformity of the dental arch, defective facial and body form, impaired reproductive efficiency, lack of strength and endurance, low immunity to many infectious diseases and all degenerative processes, wide prevalence of nervous disorders, and increased susceptibility of the body to various conditions associated with unsocial traits and a lack of mental control, balance and happiness.

Dental decay has reached the point where nearly all individuals are affected at one the or another. Among young children at least ninety per cent show evidence of caries. Discoloration of the teeth is common in spite of the extensive use of brushes and dentrifices. Deformity of the dental arch is brought about by the narrowing and, to some degree, receding of the jaw. It is mild in some, severe in others, but the majority are affected by the deformity in some measure.

The latter deformity is in part responsible for the deformity of the entire facial form. The general narrowing of the face, and particularly of the nostrils, is common also, so much so, in fact, that it is often looked upon as a sign of physical beauty. The shape of the face is often defective in other ways too, with the nose, mouth and other features assuming different shapes which are neither normal nor symmetrical.

To like degree the body is imperfectly formed. Clothing disguises some of the most apparent deformities, but even it cannot create the semblance of excellent physical form except in a minority of cases. Excesses and deficiencies of weight are often carried to great extremes. Over-development of certain body parts, under-development of others, and disproportionate

arrangement of the features as a whole have given many an unfavorable appearance. Still other defects, resulting from arthritis, polio and other diseases, render life itself much more difficult, and sometimes almost impossible.

Reproductive inefficiency is responsible for prenatal deformities and abnormal disease susceptibilities of the newborn and it also makes parturition so painful and difficult that this is recognized as akin to a pathological process. Failure of proper pelvic development and the low status of body tissues have thus created a problem of fear and dread to every woman.

A lack of strength and endurance is often common during youth, and is accepted as general in later years. It is considered a normal counterpart of advanced life. Likewise infectious diseases, though less prevalent than in the immediate past, affect all of us at one the or another, and especially during childhood. The degenerative types of disease are an even greater problem, and the fact that their rate of increase is progressively accelerating, especially as regards heart disease and cancer, gives them a position of major importance. Some of the degenerative processes have, in fact, more than doubled in the percentage of affected per capita during the first half of this century.

Lowering of the infant mortality rate is one of the few optimistic signs, and it has almost alone been responsible for the fact that we live longer than did our immediate ancestors, whose duration of life was at a very low point for the human race. But the average life expectancy for man, after middle age is reached, has increased only slightly. Nor is the present life expectancy at a near maximum for the human race. It is, when compared to the normal biological possibility as determined by our period of growth, still rather short. Further, the limited life extension thus far achieved has not been entirely a happy one. Our later years are fraught with the troubles of degeneration and senility, far more severe than normal expectations would indicate necessary.

With respect to our nervous and mental condition, human deterioration has attained its maximum rate of increase. Our extensive facilities, such as asylums and prisons for the mentally defective and socially unacceptable, are correctly spoken of with pride as an important aid to civilization, but the very fact that they are necessary, to so great a degree, indicates that something is seriously wrong in the first place. It is perhaps significant that the majority of defective delinquents are physically below average as well, indicating that both conditions may have, in part, the same causes. It is today estimated that fully ten per cent of the American population receives psychiatric treatment at one the or another, with about half of these spending some the in an institution for the mentally defective. How many more need, but do not receive, professional care of this type, can be only estimated. What is further important, the situation is not

improving. Indeed, if the present increase in the number of insane per capita were to continue for the balance of this century, the number of affected would rank among the foremost for all diseases.

The defective state of modern man has had its effects upon medicine and the very study of disease. Dr. E. A. Hooton, the distinguished physical anthropologist of Harvard, has remarked that "it is a very myopic medical science which works backward from the morgue rather than forward from the cradle." Yet this is exactly what the customary procedure of medicine has been. The reasons have been somewhat of necessity, it is to be admitted, for one can scarcely study health when the adequate controls are not present. In civilization one studies civilized people, and the frequency of the forms of degeneration which are found then determine what we consider normal and abnormal. As a result, conditions which generally form no part of undomesticated animal life are regarded as normal and necessary for the human species. So long has disease been studied that the physician often has little concept as to what health actually is. We live in a world of pathology, deformity and virtual physical monstrosity, which has so colored our thinking that we cannot visualize the nature of health and the conditions necessary for its presence.

The question should then logically arise: why not leave civilization and study physical conditions in the primitive world? If perfect physical specimens could here be found, the study could be constructive and progressive, giving suggestions, perhaps, as to the conditions which permitted or induced a state of physical excellence to exist. We might then find out what man is like, biologically speaking, when he does not need a doctor, which might also indicate what he should be like when the doctor has finished with him.

Fortunately the idea has not been entirely neglected. Primitive races were carefully observed and described by many early voyagers and explorers who found them in their most simple and natural state. Primitive life has also very carefully been observed and studied with the object of understanding social, moral or religious conditions, in which, however, incidental observations were made too with respect to the physical condition of the people, and the living habits which might affect that condition. Others, in modern life, have studied the savages with the specific object of determining their physical state of health, and the mode of living which is associated therewith.

The results of such work have been very significant, but regarding medicine and nutrition in actual practice, they have been almost entirely neglected. The common view that primitive man is generally short lived and subject to many diseases is often held by physician as well as layman, and the general lack of sanitation, modern treatment, surgery and drugs in the

primitive world is thought to prevent maintenance of health at a high physical level. For the average nutritionist it is quite natural to feel that any race not having access to the wide variety of foods which modern agriculture and transportation now permit could not be in good health. These assumptions have helped to determine existing therapeutic methods, and they have largely prevented serious consideration that might be based upon factual data.

But the facts are known, and these comprise a very interesting and important story. They indicate that, when living under near-isolated conditions, apart from civilization and without access to the foods of civilization, primitive man lives in much better physical condition than does the usual member of civilized society. When his own nutrition is adequate and complete, as it often is, he maintains complete immunity to dental caries. His teeth are white and sparkling, with neither brushing nor cleansing agents used, and the dental arch is broad, with the teeth formed in perfect alignment.

The facial and body development is also good. The face is finely formed, well-set and broad. The body is free from deformity and proportioned as beauty and symmetry would indicate desirable. The respective members of the racial group reproduce in homogeneity from one generation to the next. There are few deviations from the standard anthropological prototype. One individual resembles the other in facial form, looking much like sisters or brothers, with the chief differences in appearance being in size.

Reproductive efficiency is such as to permit parturition with no difficulty and little or no pain. There are no pre-natal deformities. Resistance to infectious disease is high, few individuals being sick, and these usually rapidly recovering. The degenerative diseases are rare, even in advanced life, some of them being completely unknown and unheard of by the primitive. Mental complaints are equally rare, and the state of happiness and contentment is one scarcely known by civilized man. The duration of life is long, the people being yet strong and vigorous as they pass the proverbial three score and ten mark, and living in many cases beyond a century.

These are the characteristics of the finest and most healthful primitive races, who live under the most ideal climatic and nutritional conditions. Primitive races less favored by environment are less successful in meeting weakness and disease, but even the poorest of these have better teeth and skeletal development than civilized man, and they usually present other physical advantages as well.

The experience of primitive man has therefore been one of great importance. We note that people living today, under the culture and environment of the Stone Age, have not only equaled but far surpassed civilized man in strength, physical

development and immunity to disease. The mere existence of this fact poses an important question to modern medicine and should arouse serious thought and consideration.

Of equal significance is the fact that the good health of the primitive has been possible only under conditions of relative isolation. As soon as his contact with civilization is sufficient to alter his dietary habits, he succumbs to disease very readily and loses all of the unique immunity of the past. The teeth decay; facial form ceases to be uniform; deformities become common; reproductive efficiency is lowered; mental deficiency develops, and the duration of life is sharply lowered.

It would hence appear that the nutritional habits of primitive man are responsible for his state of health. So long as the native foods remain in use, there are no important physical changes, and the bacterial scourges are absent, even though a complete lack of sanitation would indicate that pathogenic bacteria might be present. With a displacement of native foods for those of modern commerce the situation changes completely, and the finest sanitation that the white man can provide, together with the best in medical services, is of no avail in preventing the epidemics which take thousands of lives. Among scientists who have studied at first hand both the physical condition and food of many primitive races, the close relationship between the two has been clearly recognized.

Here then lies the basic purpose of this work. If we are to make practical application of the experience of primitive man we must understand the reasons for his state of health. If these are nutritional, as has been indicated, it becomes important to correlate primitive health with primitive nutrition, both to determine the accuracy of the stated premise and to acquire knowledge of the specific foods which have been successful in the primitive dietary programs. The foods may then be evaluated in terms of known human requirements and the practical application in civilization becomes possible.

The following pages provide the story covering these vital factors and give light to the general dietetic and medical history of some of the more important primitive races. The story is old in isolated factual data, but new in correlated assembly. It is drawn from a literary survey of the people of many lands, including all continents and many islands. It covers centuries of the involving observations of racial groups living in the early sixteenth century to those of the modern day. The accounts of early voyagers, explorers and missionaries are considered, together with anthropological studies and knowledge gleaned from various nutritional surveys and medical inspections made in the primitive world. The total picture is one of considerable scope. With it in mind, the details become of interest, and an understanding of their general import may show the way to a new and more healthful life.

Story of the Red Man

AMONG THE best known and most widely studied of all primitive races is the Indian. Living in an extended area from the Canadian and Alaskan parts of North America to Cape Horn in South America they were observed in all phases of life by the innumerable settlers who came from Europe to make their homes in the New World. Thousands of skulls, together with many other skeletal remains, have been left, which indicate the dental condition and physical form of the pre-Columbian Indians. Some of the primitive groups also live today and offer examples of the strength and vigor which have resulted from their respective diets.

We commence with the Indians of North America. With view to nutrition, we find that the tribes of northern Canada and Alaska lived primarily upon the moose, caribou and other animals of the chase. Fish were obtained whenever possible, and occasionally there were berries and the bark and buds of trees, together with moss and the roots of plants. Much of the animal flesh was dried and kept for future use. The few available plant foods were usually dried also, then pulverized and powdered and made into cakes, which were eaten as is or later cooked.

Toward southern Canada and the United States the diet became more varied, as climatic conditions permitted. Fruits and nuts were more common in their wild state, and the cultivated plants such as corn, beans and squash were added by many to the usual game and fish. Among the Sioux and other Indians of the Great Plains area, the flesh of the buffalo was the staple food. In California mice, rats, reptiles and snakes, as well as insects, were widely used. Indians of the New Mexico and Arizona deserts had to rely primarily on grains for their food supply, except when the hunting was good, which was not often. To the east along the Gulf of Mexico and in Florida the moist and warm climate offered a wider selection of foods, and the Indians lived amidst abundance and plenty. There were wild fruits, berries and nuts; the fields were cultivated in grains and vegetables; the game was always plentiful, and fish were taken from both the fresh water streams and the sea. In the West Indies much the same was true, though some neglected the variety of plant foods to include a greater portion of fish in the diet.

Health of the Indian groups varied with climate and diet, but was almost always good as regards skeletal development and

teeth. It was said by the early explorers and missionaries that a deformed Indian was never seen, and the scientific studies of the skeletal remains of pre-Columbian Indians give substantiation, indicating good physical development with freedom from rickets and very little skeletal change due to the arthritic process. Even fractures were rare. A large excavation of skeletal remains at Pecos, New Mexico revealed evidence of arthritis in about four per cent of all cases, and fractures of bones due to blows in three to four per cent. These are the highest percentages seen among any Indian groups, and the usual Indian stock attained higher immunity to defects. Of the skeletal remains uncovered in Florida, there is no evidence of arthritis or other deformity, and indications point only to fine physical development and complete freedom from joint involvements.

Up to seventy-five per cent of the skulls of the Zunis and a few other tribes in the American Southwest show caries, but decay was seldom extensive in any one individual. Other tribes, less restricted to grains in their diet, had better teeth. Some of the skulls of the Algonquins of Kentucky show decay, but the majority contain only perfect teeth. Among the Ankers of the upper Missouri, and among the Wisconsin Indians, only twenty-five per cent of the skulls show traces of decay. The California Indians and the Sioux of the Dakotas indicate further superiority, the percentage of decayed teeth in the skulls being almost zero. For the Seminoles of Florida the percentage was indeed zero, not a single decayed tooth being found in several hundred skulls that have been examined, all of the pre-Columbian era.

Longevity among the Indians of the arctic regions rarely exceeded sixty years. To the south, where the food supply was more favorable, the average length of life was longer, many of the Red Men living to over a hundred years. In the Gulf states, particularly Florida, longevity reached its maximum, with early Spanish accounts telling of Indian fathers in the latter state seeing their fifth generation before passing away. De Ribault from France in 1542 found that these Indians "live long and in great health and strength, so the old men go without stays, and are able to walk a run like the youngest. and are only known by the wrinkles in the face, and decay of sight."

Cabeza de Vaca saw the Florida Indians in 1527, calling them "wonderfully well built, spare, very strong and very swift." Laudonniere noted that "the most ancient women of the country" dance with the others, and he further stated: "The agility of the women is so great that they can swim over great rivers, bearing their children upon one of their arms. They climb up, also, very nimbly upon the highest trees in the country." De Monts found the physical endurance of these Indians enabled them to swim easily for hours; hunger would arrive before weariness, and "the men will follow a fish in the sea, and will take it unless it be too

big."

At running most Indians were equally adept, and it is said that the primitive warrior of the Great Plains would run a hundred miles in a single stretch without undue fatigue. The need for sleep would make itself apparent before physical exhaustion, and it was only this, and possibly hunger, that forced a halt to the run. A tribesman would start chasing a deer in the morning and continue the race until sundown if necessary, until the animal was worn out and caught. The Indian was a creature built for speed — a free, swift, graceful animal — and his physical power in running was always noted by the white explorers making first contact with the people.

Many stories tell of the efficiency of reproduction among the primitive Indians. Well-developed pelvic bones with adequate capacity to allow normal birth, together with strong and elastic muscles and a healthy nervous system, were attributes of the Indian women. They permitted what observers described as painless or near-painless parturition, with no difficulty and very short periods of labor.

The testimony on this subject is considerable, and but a part need be given here. Of interest is a quotation from Dr. Benjamin Rush, the celebrated physician of the Revolutionary Period: "Nature is the squaw's only midwife. Her labors are short and accompanied by little pain. Each woman is delivered alone in a private cabin, and after washing herself in cold water, returns to her usual drudgery."

Bancroft observed in the Yukon territory that "Ingalik women are delivered kneeling, and without pain, being seldom detained from their household duties for more than an hour." In the eighteenth century Begert noted that "The California women lie in without difficulty and without any assistance." Referring to the same Indians in 1786, La Perouse reported that "they suffer very little inconvenience during the the of gestation, and are almost invariably delivered with ease."

Lewis and Clark refer to an Indian woman accompanying the Northwest Expedition: "One of the squaws who had been leading two of our pack-horses, halted at a rivulet about a mile behind to lie; and after an hour overtook us and passed on with her new born infant apparently in perfect health."

Washington Irving included this story in one of his historical accounts: "The squaw of Pierre Dorion, who, with her husband, was attached to a party traveling over the Rocky Mountains in winter, the ground being covered with several feet of snow, was suddenly taken in labor, and enriched her husband with a child. In the course of the following morning the Dorion family made its appearance. The mother looked as unconcerned as if nothing at all had happened."

H B. Cushman spent more than a score of years with primitive Indians, and noted: "With the Choctaw wife, as with

all Indians, parturition was a matter that gave no uneasiness whatsoever, nor did it interfere with her domestic affairs, but for a few hours. Unlike her cultivated sister, she neither required, nor desired, nor accepted any assistance whatever. I have known them to give birth to a child during the night and the next morning would find them attending to the affairs of the dairy."

The Indian historian, McIntosh, gives similar conclusions in his report: "When a woman is with child, she works at her ordinary occupation, convinced that work is advantageous both to herself and child, her labor is easy, and she may be seen on the day after her delivery with her child at her back, avoiding none of her former employments."

In other respects Indians also represented physical superiority. Even the less impressive groups suffered from less disease than the whites. Begert noted that "With all their poor diet and hardships the Californians are seldom sick. They are in general strong, hardy, and much healthier than the many thousands who live daily in abundance and on the choicest fare that the skill of Parisian cooks can prepare." Gout, apoplexy, dropsy, colds and petechial fevers were said to be almost unknown among them. For the better class groups much more could be said, and they attained general freedom from such diseases as tuberculosis, smallpox, measles, trachoma and syphilis. Cancer was very rare, even in old age, and other degenerative processes were not often met with.

Studies of Indian life in the modern era have been made by the gifted scientist, Dr. Weston A. Price, whose observations of primitive racial stock in all parts of the world are of foremost importance. Over a period, of many years, Dr. Price visited scores of primitive groups on five continents and numerous islands, and searched in particular for those still consuming native foods. In addition to making a complete dental survey of each group visited, he produced a number of films and over 20,000 photographs to give illustration of the nutritional and medical significance of his findings. As applied to the Indian people of this continent, the work of Dr. Price was especially wide in scope and should be subject to brief consideration.

In 1932 Dr. Price traveled to the remote and isolated districts of northern Canada and Alaska. Here he found many Indian families living without contact with civilization and without access to modern foods. The people exemplified the results of the native diet, which was in general use, and upon examination they were found to be in good physical condition. They were tall and well-built, with freedom from arthritis and tuberculosis, diseases otherwise common in these regions. "The condition of the teeth, and the shape of the dental arches and the facial form were superb," remarked Price. "Indeed, in several groups not a single tooth was found that had ever been attacked by tooth decay."

In Florida Dr. Price found semi-isolated groups of the white-hating Seminole Indians living deep in the Everglades and Cypress Swamps. Though the hunting territory of the Indians had been encroached upon by the white man, the diet was composed chiefly of native foods, and the people were still able to maintain a very high degree of physical excellence and high immunity to dental caries." Only four teeth of each hundred among these Indians were found to have been attacked by decay.

Nearly all of the other Indian groups in Canada and the United States, and most of those in Mexico and Central America, are now using modern foods, and they have suffered physical deterioration in its worst forms. This is in evidence both on the reservations and elsewhere. All of the unique immunity to disease known by the Indian in the past is gone. Likewise the strength and endurance are but a memory. Reproductive efficiency has been so greatly lowered that the Indian woman of today experiences parturition with as much dread and difficulty as does the white woman. Indeed, Dr. Price was informed by Dr. Davis of the Indian reservation at Brantford, Ontario that maternity problems form the bulk of all cases at the hospital, with long periods of labor and painful childbirth being the usual rule, and surgical interference often being necessary.

The experience of the Sioux is typical of the Indian tragedy. Originally they were considered one of the hardiest and strongest of all tribes, with physiques of splendid proportion and development. When placed upon the Pine Ridge Reservation of South Dakota they were fed bread and refined sugar as staple foods, with little more than coffee to drink. Meat was limited in amount and restricted to the muscle cuts. Within a single generation they presented a pathetic picture of incredible suffering. Nearly all of them developed sore eyes, which spread in epidemic form, and some became blind. The children developed bow-legs and other bone deformities. Their teeth, formerly among the soundest of all races, rapidly decayed, and children of the new generation displayed the usual deformity of dental arches found among white people. Tuberculosis and other respiratory diseases became so common that they accounted for eighty-five per cent of the death rate.

Such has been the Indian experience in North America. Next we consider the races of South America, which likewise have left a record of considerable importance. Aboriginal Indian inhabitants were found in every country of the continent when the early explorers arrived in the sixteenth and seventeenth centuries. The native diets were observed and described by those who made initial contact with the people. Foods were of course selected, as in North America, in accordance with the limitations of climate and topography. In this respect there was some variation, though all diets had certain factors in common.

Along the coastal area of Peru the Pacific water contains a greater concentration of marine life than is found in any other part of the world. This provided the many Indian groups living under the famous Inca rulers with a great quantity of fish, as a staple part of the food supply. Dried fish eggs and kelp were also included in wide measure in the diet. Part of the region was very dry, but the Indians irrigated their soil, and grew more than a score of plants, chief of which were potatoes, squash, corn and beans. Further to the interior, in the Andes mountain regions, the Indians existed upon many of the same plants, plus wild mulberries and other fruits not grown near the coast. The sea food by necessity was replaced by the flesh of land animals, including the llama, alpaca, guinea pig and wild deer. Birds were also included in some measure in the diet of all Peruvian Indian groups.

Along the course of the Amazon river and its tributaries, extending from Peru across Brazil to the Atlantic, the many local Indian tribes were able to obtain a very great variety of foods from different sources. The high fertility of the jungle lands, the abundance of rain and the warm climate combined to induce the development of plant and animal life on a scale unequalled in any other part of the Western Hemisphere. So abundant was food in its wild state that most Indian tribes lived entirely upon the produce of the forest, not bothering to cultivate their lands or practice any form of agriculture. Tropical fruits were common foods, and these included, among others, oranges, limes, melons, grapes, plantains, bananas, guavas and pineapples. Various green plants and nuts were eaten, also the carob bean, and such vegetable roots as yuccas and yams. Many Indians gathered wild honey from hollow trees; all obtained food from the rushing jungle streams which were teeming with fish and water-fowl, and the eggs of birds and flesh of wild deer and other animals completed the diet.

To the south of the Amazon, across Brazil and Paraguay and into Argentina, the Indians existed upon wild animal life and both wild and cultivated plants, the former, however, predominating to a greater degree in the diet as the jungle areas and mountain regions were gradually replaced by the treeless plains. On the Great Pampas of Argentina the Patagonians consumed some vegetable roots, but lived primarily upon the flesh of the guanaco and buffalo. To the west, in Chile, the food supply was more varied. Fruits, including figs, pomegranates, peaches, grapes and strawberries, were found and consumed in abundance; the Indians cultivated their lands and grew potatoes, pumpkins, yuccas, beans, corn and other native plants. The flesh of wild animals, birds and fish was used in moderate amounts. Off the coast of southern Chile, near Cape Horn, the Indians of the island of Tierra del Fuego were restricted chiefly to fish, small animals and birds for their food supply.

The Indians used food in both the raw and cooked state. Fruits, berries and nuts were usually raw; vegetable roots and the carob bean were cooked, and sometimes powdered and made into a form of bread; grains were eaten either parched or cooked, and roasting was the common method of preparing meat and fish. Some Indian groups, particularly the Patagonians, heated their meat lightly over the fire, enough to brown the outside, but leaving the inside almost raw. The Indians of Tierra del Fuego used much of their meat with no heat preparation at all.

Physically most Indian tribes fared well on these regimes. They were indeed superior in many instances to the Indian stock of the North American continent. The early Spaniards found those in Peru and parts of Bolivia and Ecuador to be of fine physique and little afflicted with disease. The Indians of the mountain regions were usually larger, and superior in strength and courage, to those living in the coastal deserts. All had good skeletal development and teeth, as is indicated by modern studies of Peruvian mummies and skulls, millions of which have been preserved. Murphy examined fifty of the skulls of Chimu Indians on a coastal area, finding only four that contained a decayed tooth. "In a study of 1,272 skulls of these ancient Peruvians," declares Price, "I did not find a single skull with significant deformity of the dental arches."

The Indians of the Amazon River Basin in Brazil were among the most perfectly developed of the continent. The finest were those of Tapuyan linguistic stock, who lived in dense jungles near the mouth of the Amazon and also a considerable distance inland. The jungle Indians of Guyana to the north were scarcely less impressive in form. Both groups were very healthy, had few diseases, and were remarkably long lived.

Pigaffeta, the chronicler of Magellan's voyage around the world in the sixteenth century, was one of the first to observe and write of these Indians. He asserted that "They live according to the dictates of nature, and reach an age of one hundred and twenty-five, and one hundred and forty years." The voyager, Warren, came later and found the natives to be "very vigorous in extreme old age." De Monts, arriving from France in 1604, noted that they "live to a great age, which is commonly seven score or eight score years." He also remarked that they "are lively and nimble at a hundred years old." One of the Indians, called Membertou, was said to be "above a hundred years old and yet hath not one white his head, and so ordinarily be the others: and that which is more in every age they have all their teeth and go bare-headed, not caring at least to make any hats of their skins, as the first did that used them in this part (Europe) of the world."

Nieuroff visited Brazil in 1647 and pointed out: "The Brazilians come soon to maturity and arrive to a great age, and that without distempers; they also seldom become grey." Father

Bechamel saw them later in the century, commenting that "They are tolerably endued with good sense, which they have the opportunity to cultivate and refine by a long train of experiences, with which the many years they live furnish them: For they count a man dies young, if he does not live above 100 years."

With respect to parturition, Nieuroff remarked: "The Brazilian women are extremely fruitful, have very easy labors, and rarely miscarry: for no sooner is a woman delivered, but up she gets to the next river, and without any further help she washes herself there." Roger's observation was similar: "The indigenous Brazilian women are very fruitful, and have easy labors, on which occasion they retire to the woods, and bring forth alone, and return after bathing themselves and their child." Warren noted that "when a woman is delivered of her first child she presently goes about her duties as before."

The explorer, Dominguez, found these Indians to be "nimble and vigorous, swift of foot, and so long-winded that they tire out the deer, and catch them with their hands, besides slaying many more with their arrows." Barlaeous stated: "They ran almost with as much speed as the animals they hunted." DeMonts called them "as swift as greyhounds," and commented that "the savages' dexterity is not known only in running, but also in swimming, which they all can do; but it seems that some more so than others. As for the Brazilians, they are so natural in this trade, that they would swim eight days in the sea, if hunger did not prevent them, and they fear more that some fish should devour them, than to perish through weariness."

For the beauty and symmetry of their bodies the Brazilians were also distinguished. The men were tall and muscular, but never corpulent, with finely formed, facial features and limbs of perfect proportion. Warren described the women as being "so truly handsome, as to features and proportion, that if the most curious symmetrian had been there he could not but subscribe to my opinion."

The Indians of southern Brazil and Paraguay were also spoken of in complimentary terms. Viedma in 1768 observed the Yuracares of the mountain regions, pointing out: "They are the tallest of the mountain peoples, and their women are finely proportioned. Everything about the Yuracares indicated force and suppleness and they are well set up. Their proud and arrogant gait accords perfectly with the character and the lofty idea they have of themselves. Their features are very fine and their faces full of vivacity and pride and not wanting in a certain expression of gaiety." D'Orbigny stated that "We believe them to be the best made of all nations we have seen."

Members of another tribe of this area, the Chiriguanos, were described by the missionary fathers as tall and strong, with admirable beauty of physique. They had thick, black hair, which

retained its color until extreme old age, and only rarely was any baldness to be seen among them. "In 1872, I met a band of two hundred naked Chiriguano warriors," declared the widely-traveled Colonel Church, "and nowhere among the many Indian tribes I have known on the western continent, have I seen men of such fine physique and manly bearing, except perhaps, among the Sioux of North America as they were fifty years ago."

The mighty Patagonians of the Great Pampas were probably the best known and most discussed of all South American Indians. In terms of size they were certainly among the largest, standing, on an average, from six feet to six feet five inches in height, according to the measurements of De Cordova in 1785. Some of them measured over four feet around the breast, and though thus fleshy and stout, they were not fat. Their strength was prodigious, and Pigaffeta mentioned that the utmost force of nine men was required to master one Patagonian who visited the ship, and though they had him down, and bound his hands tightly, yet he freed himself from their bonds and got loose, in spite of all their endeavors to hold him." The experience of Sarmiento was quite similar, who affirmed that on his first voyage ten Spanish seamen could hardly hold one Patagonian. These Indians were also very alert and active, being swift runners, having dark and extremely expressive eyes, and very white teeth of perfect regularity. According to Sir Everard Home they "appear to be subject to no diseases" and "enjoy remarkable uniformity of health, and many of them are very athletic and capable of great endurance." De Cordova pointed out that "The children, even in their tender years, show that they are descended from parents of extraordinary size; and, by the largeness of their features, indicate to what they will arrive, when nature shall have attained its full vigor, and their members shall be proportioned."

In Chile the famous Araucans were renowned as warriors, and their success in repelling the Inca invasion from Peru in the fifteenth century, and later their valor in resisting the progress of the Spanish invaders, has remained of utmost interest in the annals of Indian history. Being sound of body, and intelligent and ingenious of mind, they were well qualified for the pursuits of war, hunting and sports, and their activities in all endeavors spoke well of the physical capabilities of their race. In 1646 Alonso de Ovalle, a Procurator for Rome in St. Jago of Chile, observed in detail many of the Araucan Indians, and the following paragraphs selected from his work give illustrations of the remarkable health and longevity of this people:

"The strength and boldness of the women comes from the little tenderness they are bred with, for they avoid neither heat nor cold; and in the coldest winters, when birds are killed with cold, they wash their heads in cold water, and never dry their hair, but let it remain wet, and dry itself in the air; and as for

their children, they wash them in the rivers, when they are yet very young; and when they are brought to bed in a very little the they are about the house, as if it were not they, but some other women that had lain in.

"If the women behave themselves thus, what might be expected of the men? It is a wonderful thing how little they fear weather, though in the midst of winters; and to see an Indian, with that simple habit we have described, his head bare, without hat, or any other covering. I have seen them in this condition endure mighty showers, which wet them all over, and came out of their breeches, and yet laugh and not value that which to others would have been unsupportable.

"By these means they are so hardened that a wound which the bravest Spaniard would take his bed for, does give them so little trouble, that I have seen them go without minding it. I have known them to have a broken head by accident at play, and all they do is wash it in cold water, never leaving their employment or business; and with this, and the application of their own herbs, which indeed, are of great virtue, they are soon well; but the excellency of their own constitution helps not a little to their cure in wounds, as well as all other distempers, out of which they get well with a great deal less the and care than the Spaniards.

"The constitution of the people is the cause that the does not make so strong an impression on them, as on us; and they bear their years mighty well, turning grey very late, at four score or thereabouts; and till then they look like young men. When they are over white, or have any baldness, you may guess them at about a hundred: they all live long, and particularly the women; and when by age they lose their judgment, they seldom falter in their memory, which lasts them to their dying day, even to remember all their young days from their infancy. Their teeth and eyes are so good that they seldom lose either; and in short, all the infirmities of old men, which are the forerunners of death, come to them later than to other nations."

Over a century and a half later, in 1817, these Indians of Chile were observed by the American voyager, Amasa Delano, who found them to be still using native foods and preserving their characteristic health and vigor. Delano stated: "Without surpassing the usual size, they are generally robust, well-formed, and of a warlike aspect. The face is nearly round; the eyes small, but lively and expressive; the nose somewhat flat; the mouth well made, with white and uniform teeth; the legs muscular and elegant, and the feet small and flat. . . . Many of the women are handsome, particularly those of Boroa. They live to an advanced age of seventy, eighty, and even one hundred years, without any perceptible decay of mind and body. Their mental qualities correspond to their bodily vigor; and they are characterized as intrepid, patient of the fatigues of war, prodigal of their lives in

defense of their country, ardent lovers of liberty, in defense of which they are willing to make any sacrifice, jealous of honor, courteous, hospitable, faithful to their engagements, grateful for benefits, generous and humane towards the vanquished."

The Indians of Tierra del Fuego and the nearby islands were physically less impressive than those of the continent. Their limbs, however, were of good form; the teeth were free from decay, and none were affected by deformity. They survived in a cold climate without clothing. Charles Darwin found them to be "quite naked, and even one full-grown woman was absolutely so. It was raining heavily, and the fresh water, together with the spray, trickled down her body. In another harbor not far distant, a woman, who was suckling a recently born child, came one day alongside the vessel, and remained there out of mere curiosity, while the sleet fell and thawed on her naked bosom and on the skin of her naked baby. . . . At night five or six human beings, naked and scarcely protected from the wind and rain of their tempestuous climate, slept on the ground, wet like animals!"

Small groups of South American Indians have preserved their isolation to the present day, and modern studies have shown them to be much as the early explorers and missionaries described them. Some of these are located in Brazil and Peru along the Amazon River Basin. In 1938 the anthropologist, Dr. W. H. Holden reported that "The Wai Wai Indians of Brazil live in a tropical fairyland untouched by modern civilization, and they are free from all modern-day ills." Another very primitive group, the Antipa Indians of the upper reaches of the Amazon, were observed by the traveler, De Graff, who found that they are "well-built and strong, move with the grace of a jaguar, and are as much at home in the water as on land." With only two exceptions, De Graff noted the Indians to be "absolutely free from diseases." They were said to "compare well with monkeys in agility," and the women were "capable of lifting 100 lbs. to their shoulders and moving through the forest with perfect ease.

The Borono tribe of the Amazon has also retained its isolation and native way of living to a recent era, and its members have been observed in this century. The Boronos are different in appearance from some of the other Indians, resembling the Malay rather than Mongoloid in physical form. They are a strong and active people and have beautiful bodies and regular features. The European traveler, Savage-Landor, has made the most extensive observations of the Boronos, and he described them, in part, as follows:

"They displayed powerful chests, with ribs well covered with flesh and muscle. With their dark yellow skins they were not unlike beautiful bronze torsi. The abdominal region was never unduly enlarged, perhaps owing to the fact that their digestion was good, and also because they took a considerable amount of daily exercise. . . . The anatomical detail of the body was

perfectly balanced. The arms were powerful, but with fine, well-formed wrists — exquisitely chiseled, as were all attachments of their limbs. Great refinement of the race was also to be noticed in the shape of their legs — marvelously modeled, without an ounce of extra flesh, and with small ankles."

Price studied Indian groups in the coastal, areas and mountains of Peru, and also in the Amazon basin at the foothills of the mountains. Those using native foods were strong and vigorous. An examination of a group of twenty-five Indians from the high mountains of the Urabamba Valley "revealed the fact that not one tooth had been attacked by dental caries and that, at all ages, the teeth normally due were present." We are also informed that "The Indians of this region are able to carry all day two or three hundred pounds, and they do this day after day. Their capacity of enduring cold is also great, for, as Price states: "They can sleep comfortably through the freezing nights with the ponchos wrapped about their heads and their legs and feet bare."

In the Amazon River Basin Price found that "some of the finest Indians we have seen were enjoying life in its fullness." These people had splendid physiques and noble countenances, as well as a dental condition of complete perfection. The dental arches were broad and well formed, and in the entire group not a single tooth had been attacked by decay.

Thus concludes our selected testimony pertaining to the South American Indians of past and present, living upon the native, foods of the race. It is hardly necessary to point out that these Indians are now but a small minority, the greater part of the continent being relatively settled and civilized. In all such areas where this is true the native population consumes the same foods as the whites. Coffee, tea, refined flour products, refined sugar, salt and canned goods are in widespread use. Tobacco forms one of the chief pleasures of life. Alcoholic beverages are consumed whenever the native can get them. The stimulating Mate tea is used everywhere.

The resultant physical changes have been very marked. Epidemics of smallpox and other diseases wiped out great numbers as the first consequence of dietary change, and today the total native population is but a fraction of that in existence when the continent was discovered. In Brazil as an example the native population had decreased eighty percent by the beginning of the twentieth century. Today the epidemic diseases have subsided somewhat, leaving in their wake the degenerative processes which are less destructive to life but equally dreaded and painful. Dental decay is extremely common, virtually every adult native being afflicted, and the dental arches usually present some degree of deformity. Changes in the facial form develop in the generation succeeding the dietary change, the regularity of features of typical tribal pattern being lost.

Mentally the deterioration has been fully as rapid. Formerly the people were noble and proud, forceful and bold. Today they are meek and afraid, quite willing, though not happily, to take the secondary position in life the white man has allotted them. They are less fierce it is true, but less happy as well, no longer being representative of the laughter-loving races that existed in the past. Their spirit is broken, their confidence gone. What relation this may have to their subordinate economic position one can only guess, but with health and vigor gone it is doubtful that any social advantage can restore the pleasure and contentment had when the bow and arrow was the only economic asset.

Such is the story of the Red Man. Once a physical specimen that had few equals the world over, he today lies in weakness and sorrow wherever he has adopted the white man's diet. His pre-civilized experience gives example of his power of adaptation and maintenance of health on a climatic range extending from the cold of the arctic to the torrid jungles of the Amazon. His post-civilized experience gives example of his failure to adapt himself physically to any climate or mode of life. The total experience is demonstration *par excellence* of the efficiency of his different habits of nutrition, as they succeeded in the past, but proved inadequate under the changes brought about by civilization.

People of the Northlands

THE ESKIMO represents the native racial stock of the arctic regions of the North American continent. Though living in some instances in the same area as the northern Indians, the Eskimo is a specific racial type which is readily distinguished from the Indian. The two races rarely intermingled in a friendly manner and indeed tended to avoid each other. The total Eskimo population at the time of the discovery of North America was estimated at about one hundred thousand, the people living in Alaska, northern Canada and Greenland. The Hudson Bay region was the center of the most populous groups, and it was here that the first important contact with the people was made as well.

The name, Eskimo, is derived from an Indian word meaning "eaters of raw meat." This is an accurate indication of the Eskimo diet, for raw meat is used in some measure by nearly all isolated groups. In some instances it forms the predominant part of the diet, whereas in others most of the meat is boiled or roasted. On the Eskimo menu are dried salmon and other fish, the caribou, seal and whale, and occasionally small animals, migratory birds and eggs. In the summer ground nuts are gathered and stored for winter use; kelp is also obtained, and the blossoms of flowers and sorrel grass are taken and stored in seal oil. These plant foods, however, do not generally form more than a maximum of five per cent of the diet, computed on a year-round basis, and often the percentage is even lower.

Though the Eskimo does not consume his animal or fish in its entirety, he does choose considerably more than the muscle flesh. The head as a whole is given preference; the fat behind the eyes is first taken, followed by the brain, tongue and other parts. One point of interest and possible importance is that the contents of the stomach among the large game animals, containing twigs, moss, grass, etc., is readily devoured.

Usually about ninety per cent of the flesh is consumed fresh. The rest may be dried for preservation or allowed to decay until highly tainted in flavor. Bird eggs are occasionally decomposed before consumption. Some Eskimos store the fins, tails, heads and guts from fish in large pits in the ground, and cover these with clay. Several months later, when the entire mass has decomposed into an homogenized paste, it is used for food. The flavor is then like that of strong cheese and considered quite

appetizing by the Eskimo.

The Eskimo, while living in his native environment according to the dietary habits outlined, is highly immune to certain conditions of illness and degeneration. Mental ailments are quite unknown; the people are happy, and by the common testimony of observers they laugh as much in a month as civilized people do in a year. According to Bancroft, Chappell and other travelers who have seen the Eskimo under primitive conditions, but few physical ailments are peculiar to the race. Dr. Romig of Alaska has pointed out that acute surgical problems requiring operation of the internal organs do not tend to occur among the primitive Eskimos, and tuberculosis is also generally absent. Dr. A. Gilberg noted the same in regard to appendicitis, and added that both cancer and venereal diseases are unknown. Abbe Rayna referred to scurvy among the people, but the report was in error or confined to a single group, for no later visitors have given confirmation. Rickets and most other malnutritional diseases are also not to be seen. One disease possibly due to food deficiency (vitamin K) that affects some Eskimos is a certain liability to bleeding from the nose and other mucous membrane surfaces. Two other ailments that have often been mentioned are a scaly skin disease afflicting some and the presence of ophthalmia among the men. The latter is due to the reverberation of the rays of the sun from the snow and lakes, which dazzle their eyes and force the hunters sometimes to wear shields, slitted for sight, as consequent protection.

Physical development of the Eskimo is as follows: The men are of short to medium stature, averaging five feet five to five feet eight inches tall. All tend to be broad and well-formed during youth, though their flesh appears to be flabby rather than muscular. Towards middle life they become notably heavier, but they are not corpulent in our sense, and there are no abdominal protuberances. Deformity is very rare among them. They have great endurance and are very strong in the prime of life. Observers tell us that the adult Eskimo can carry a hundred pounds in each hand and a hundred pounds in his teeth and walk with ease for a considerable distance.

The Eskimo teeth are notably free from caries. Dr. Hrdlicka, Curator of Anthropology in the National Museum of Washington, stated after an extensive study that he had been unable to verify any case of dental decay among the Eskimos of past or present who had been uninfluenced by European habits. Dr. S. G. Ritchie, of Dalhousie University, studied the Eskimo skeleton collection of Dr. Diamond Jones and reported that "In all the teeth examined there is not the slightest trace of caries." The collection of 100 Eskimo skulls brought to the American Museum of Natural History in New York by Vilhjolmur Stefansson showed no sign of decay. The Danish scientist, Pederson, studied over 500 skulls in an old burial place in

Greenland, and noted but one skull with dental caries, or two carious teeth in the 5,745 examined. Of 3,656 teeth of living Eskimos examined by Price only four indicated traces of decay.

Among some of the Eskimos there is excessive wear of the teeth. This is due in part to the chewing of leather in the process of tanning, but more specifically to the drifting sands which lodge upon the moist fish that are hung up to dry. It is of interest that though the teeth may be worn almost to the gums among the very old, the pulp chambers are never open, but always filled with secondary dentine, which is indication of the extreme immunity to decay of the Eskimo teeth.

Parturition is generally easy among the primitive Eskimo women. The observer, Bilby, tells us: "A girl will be attended in childbirth with her first baby, but not after that. The expectant Eskimo mother has to be alone (except on the first occasion) in a little house set apart for her, and without assistance. . . . The event itself is thought little of, and not looked forward to with any dread. The writer has known the case of husband and wife being on the trail together with their sled, in midwinter, when the woman was suddenly taken in labor. The man merely stopped the team and hastily put up a snow shelter. The wife retired to it for a little while, then placed the new-born child in her hood, clambered back in the sled, and continued the journey. A long day's journey later, they reached the village for which they were making, and in a very short while the mother was walking about in it, as well and strong as ever.

The Eskimos who yet live upon their native foods, as have been described, represent a very small minority. The greater part of the race has adopted the living habits of the European and American settlers of the respective countries. Most of the people speak English, wear civilized clothes, and not only eat the white man's food, but practically live upon it. At the government trading posts of the north the Eskimo buys refined sugar, white bread, confections, canned foods, etc., which form the great bulk of the diet. Animals may be hunted or trapped for their furs, which are traded to the whites, or fish may be obtained, also for purposes of commerce. But the native foods are forgotten, and the mode of nutrition becomes completely civilized.

Under these conditions the Eskimo becomes sick and on every count his previous forms of immunity are lost. Infectious diseases, which previously were not common, have spread among the people in epidemic form and sharply reduced their numbers. Measles and tuberculosis took the greatest toll of life, and the latter disease still remains the number one killer among them. Dental decay became common. and the teeth of the modern Eskimo are among the worst in the world. Narrowing of the dental arch has produced irregularity of the teeth, and the facial form itself changed from its normal broad pattern. The total Eskimo population has fallen to but a fraction of its former

number; only 15,000 today remain, with an approximate equal number who are mixed Eskimo and white. The average duration of life among the modernized Eskimos of Alaska is only twenty years, and it may be still less elsewhere. Due to the on continuing ravages of tuberculosis, complete extinction of the race in some sections is feared.

The experience of other races that have lived in the arctic regions has been similar in some respects to that of the Eskimo. We may consider the Icelanders and the Faroe Islanders for instance. Iceland was settled in the ninth century by settlers from Ireland and Scandinavia, who brought with them cattle, sheep and horses. The diet of the people was almost strictly animal, including fish, mutton, a little beef and some milk and butter. Cereals were rarely imported, and when available, they were used for making beer rather than bread. In the Faroe Islands the diet was much the same, except that there were more plant foods, these being barley and bread, and at times a limited supply of vegetables.

Early accounts from travelers tell us that the Icelanders were of average longevity, or slightly above, with much the same diseases as in Europe, though these were somewhat less frequent. In height they were above average, in development superior to the Europeans, there being few corpulent individuals among them, and scarcely any deformed. The Hastings-Stefansson trip into Iceland in 1905 resulted in the collection of over eighty skulls and many loose teeth from a medieval graveyard that was being cut away by the sea. These were taken to the Peabody Museum of Harvard University, and subsequent study indicated the complete absence of any dental caries.

In the Faroe Islands health conditions were better. There was general freedom from dental decay, as in Iceland, but infectious diseases were less frequent. A report cited by Wrench from an 1840 publication by the Edinburgh Cabinet Library states that the people were "in general, remarkably intelligent. They are extremely healthy and live to a great age, and an old man of ninety-three rowed the governor's boat nearly ten miles." Influenza was said to prevail after the winter scarcity, when boats would arrive from Denmark, but otherwise "few diseases are prevalent amongst them."

Conditions remained as such until about the middle of the nineteenth century, when more frequent contact was established by both Iceland and the Faroe Islands with the outside world, and importation of food was increased. Dental decay has steadily increased ever since, until today it is fully as common as in any civilized community. The dietary habits of the people have been completely modernized, and the usual refined and canned foods are in general use.

To summarize, the Northland racial groups, whether Eskimo or otherwise, maintained very high immunity to all dental and

skeletal defects while living upon their native diets. Their success as regards other diseases and longevity varied in accordance with dietary limitations, but it was always better than that of individuals of the same race who have since undertaken consumption of modern foods. The most restricted of primitive diets has thus proved itself more efficient in maintaining racial vigor and immunity than has the typical dietary regime of civilization.

Dietary Habits in Europe

OF ALL THE continents Europe would seem, at first impression, to be least adaptable to the study of primitive nutrition. Being one of the chief world centers of civilization, it might be expected to reveal dietary habits completely modernized in every respect. Yet in spite of modern living standards and long-established civilized processes, certain parts of the continent lend themselves well to the type of study here considered. We have two important instances, in the area, of a controlled change in nutrition involving the use of some primitive-type foods. We also have examples of preservation of native dietary habits in certain areas, and studies of the state of health associated therewith. This combination serves to indicate the physical excellence that has been attained by races familiar to us all, in conditions of climatic environment typical of those of America and many other civilized nations.

Denmark is first to be considered. The World War I experience of this nation involved one of the most important dietary experiments of modern times. This was necessitated by the war itself, and though the experiment was of short duration, the reactions which followed were of striking magnitude.

Prior to the war Danish farmers imported much of their wheat and other grains from America. A portion of these were used for making flour for local consumption, the balance being fed to cattle, swine and fowl. The resulting animal products — milk, bacon, eggs, etc. — were shipped to England and other countries, and also consumed locally by the farmers and townspeople.

When the United States entered the war an effective blockade against Germany also affected Denmark, and kept the usual supply of grains from reaching the country. There was therefore insufficient food for the five million domestic animals, and a serious economic crisis rapidly developed. There was also a lack of grains for the making of flour, and there was not enough bread for the people.

Professor Mikkel Hindhede, Superintendent of the State Institute of Food Research, was requested by the Danish government to deal with the situation. Given control of the food distribution of the country he lost no time in finding a solution. Recognizing that only about ten per cent of the food value of grains is recovered in the flesh of animals. Hindhede established

an important nutritional saving by having four-fifths of the pigs and one-sixth of the cattle killed, with the remaining grain then being fed to the human population. To assure maximum nourishment all bread was made from wholemeal flour, consisting of rye, oats and extra bran. All distillation of grains for the making of spirits was forbidden, and the consumption of beer was reduced fifty per cent.

The change in Danish nutrition was thus three-fold. It involved a great decrease in the consumption of pork, with a consequent increase in the use of replacing foods — green vegetables, fruits, milk and butter. It provided the famous Kleinbrot whole grain bread as the staple food of the people. It required a marked reduction in the consumption of alcoholic beverages. The food regulations continued in effect for nineteen months, from March, 1917 to October, 1918.

Within just a short time the standard of health sharply rose; Denmark soon became the healthiest nation in western Europe. At a time when the surrounding nations were suffering from malnutrition and increases in disease, and especially the great wartime influenza epidemic, the people of Denmark were commenting on their good health and they were only lightly affected by the epidemic of influenza. Within a single year the Danish death rate fell forty per cent to what Hindhede described as "the lowest mortality figure that has been registered in any country at any time."

As the Danish dietary experiment was being concluded, another was beginning in England, on a smaller scale, but covering a longer period of time. The location was the County Palatinate of Cheshire, where 600 doctors began practice under the National Health Insurance Act, with the object of fulfilling its stated purpose: "The prevention and cure of sickness."

The doctors were given a standard annual salary. Payment was made on the treatment per capita, but the number of patients was limited for each doctor, and an increase in sickness did not alter this division, or increase the doctor's income. A decrease in sickness, however, provided the doctor with more leisure and free time, so that he might add to his income by accepting patients on a regular fee basis from the upper class people not covered by the Act.

The doctors, thus having a vested interest in the health rather than sickness of their low-income patients, proceeded to create the conditions favorable to health. On this point diet was given immediate attention, and a change from civilized nutrition to a semi-primitive type nutrition was established among part of the population. The farmers were instructed to raise their crops with organic fertilizers, based on the Indore humus method of organic gardening. The village bakers were taught how to make real whole wheat bread, and even the whole wheat flour was reinforced with an equal amount of raw wheat germ. The people

were told to consume all milk in its raw state, and to balance their diet with liberal amounts of fresh fruits, vegetables and eggs. For pregnant mothers special attention was given to insure adequate nutrition, extra greens and salads being provided, and the infants were fed at the breast for at least nine months and then weaned by a year or a little more.

The committee of doctors issued its report, called a Medical Testament, on March 22, 1939, covering the results of nearly a quarter-century of practice in Cheshire under the health program. The farmers and townspeople who failed to follow the nutritional instructions, and were fed from birth on white bread, tinned salmon, dried milk and other modern foods, were said to have continued in ill-health throughout the course of years. Common diseases were anemia, bad teeth, rickets and constipation, the latter being held responsible for many of the conditions for which the aid of the doctors was sought. "We feel that the fact should be faced," pointed out the doctors. "Our daily work brings us repeatedly to the same point: This illness results from a lifetime of wrong nutrition."

But the many who did change their diet improved in health, and the average expectancy of life in Cheshire increased. Among the children who received good nutrition since birth, scarcely any medical treatment was ever needed, and they best exemplified the results of the prescribed nutrition. The report tells us: "The children are splendid. As infants they sleep as well as could be wished, grow well, are not over-fat but weigh well and very seldom ail anything." Broncho-pneumonia, for example, is almost unknown among them. One of their more striking features is their humor and happiness. They are sturdy limbed, beautifully skinned, normal children. It is not desired to give the impression that the child population of this village is perfect, or that compliance with the dietary advised is secured even amongst all who attend the center; but it is a fact that the mothers follow it substantially and with good results, which those concerned think they recognize.

For Denmark, and one county in England, we thus see a controlled approach to primitive nutrition for a limited period of time. The preservation of native dietary habits by certain European groups also offers examples of considerable interest. In this regard the peasant classes of southeast Europe may be given mention. Up to the middle nineteen-thirties they lived largely upon black bread, fruits, vegetables and milk products, with small amounts of refined sugars and starches. They were said to be healthier than their neighbors to the west, and in Bulgaria there were more centenarians, in proportion to total population, than in any other European nation. A survey of 148 Bulgarian centenarians in 1932 revealed most of them to be between the ages of 105 and 125; nearly all were peasants, living in the main upon fresh fruits and vegetables, and sour

milk products. Studies of Bulgarian and Hungarian peasants, in all age groups, also indicated a remarkable freedom from colitis, appendicitis and other diseases due to intestinal infections. The people, with those of other southeast and east European countries, had good teeth as well; of children immigrating to America, an average of ninety-six per cent had sound teeth upon arrival, a condition which rapidly changed, of course, within a few years of American nutritional experience.

In 1931 and 1932 Dr. Weston Price visited continental Europe to find racial groups living entirely upon native foods. His only success was in Switzerland, where a few of the more remote areas offered sufficient isolation to prevent importation of either refined or canned products. Here he traveled through the semi-isolated Loetschental Valley and then into the Valley of the Visp, a great gorge extending southward from the Rhone river. The several thousand inhabitants were found still living entirely upon foods which could be grown and raised locally. In the Loetschental area the diet included fresh milk, natural cheese, whole rye bread, with meat about once each week. Elsewhere the same diet was followed, except that residents of the town, Vispertimen, also made extensive use of the products of the vineyard.

The health of the people was described as excellent. The average number of dental caries among the children of Loetschental was less than one per cent of all teeth examined. Facial form followed a uniform broad and symmetrical development. Not a doctor or dentist was to be found in the entire valley, and none was needed. Even tuberculosis was completely absent; there was no record of its ever having existed in the area. According to the American nutritionist, Quigley, the "expected life period" in Loetschental "is around one hundred years," and the people "are vigorous and well able to do manual work in the 80's and 90's."

Up to 1932 all grains of the Loetschental Valley were ground in the old-fashioned hand mill. A community oven was used for making whole rye bread. Just before Price left, a modern bakery had been installed for dispensing white bread and white flour products. New and improved transportation facilities that had recently been built in the surrounding area were expected to bring in a supply of other modern foods later. Thus the last remaining example of completely primitive nutrition on the European continent has now perhaps disappeared.

Beyond the continent, however, on the outer fringe of Great Britain, the conditions change and we again find an example of near-isolation. Here, located off the northwest coast of Scotland at a latitude nearly as far north as southern Greenland, are the barren and treeless Islands of the Outer Hebrides, also called the Western Isles of Scotland.

The inhabitants are of Gaelic racial stock, and derive their

livelihood mainly from the pursuit of fishing. The surrounding environment is very difficult, the climate being subject to the usual moisture, cold and wind of the North Atlantic. The surface of the islands is covered with peat, making it very difficult to grow vegetables or grains of any kind. The oat grain is about the only one that will grow with any degree of success. The pasturage is so poor that it will not support more than a few cattle, and on a few of the islands even the animals cannot live. The people live in little black houses covered with a thatch roof, which absorbs the smoke that continually permeates the interior atmosphere. The floor is often little more than dirt or bog. The diet of the people is predominantly small sea food — lobsters, crabs, oysters, clams and cod — together with porridge and cereals made from oat grain. On a few of the islands the flesh of seabirds replaces in part the use of fish.

Travelers to these islands in the nineteenth century told of the superior health and physical development of the natives. Occasionally they would suffer from infectious diseases, also a few of the degenerative type, but these conditions as a rule were much less common than in Europe proper. Scurvy was the only deficiency disease, resulting from a lack of vitamin C in the diet at times, but it too was not common. Insanity, apoplexy, gout, rheumatism and tuberculosis were said to be scarcely known, and the people were very fertile, few of the women being barren.

Martin in 1909 noted that the people of the Isle of Lewis "are well proportioned, free from any bodily imperfections, and of a good stature: the colour of the hair is commonly of a light brown or red, but few of them are black. They are a healthful and strong-bodied people, several arrive to a great age. Mr. Daniel Morifon, late minister of Barvas, one of my acquaintances died lately in his eighty-fifth year."

On the little island of St. Kilda, where there were but nineteen families in 1883, when visited by Cumming, sea-birds formed much of the diet. The people were said to have suffered from influenza at times, when ships would arrive from En and, but beyond this were quite healthy. "Ordinarily the people are not subject to colds," declared Cumming, "and they are singularly exempt from that terrible heritage of most communities in which constant inter-marriage is the rule, instead of the exception — namely consumption. This immunity is attributed to the very large amount of oil which they swallow with their sea-bird diet, especially the fulmar oil. They are also singularly free from any form of skin disease, a point which is worthy of note, inasmuch as a diet of sea-fowl is generally supposed to produce this evil."

Goodrich-Freer pointed out in 1902 that the island of South Uist was less favorable than the others as regards the condition of health. The local food supply was more limited, and tea was imported to the island in large amounts. The available water was

"constantly unfit for drinking purposes. Influenza and typhoid fever were common diseases; the people appeared anemic and lethargic, and Goodrich-Freer referred to the "chronic dyspepsia which accompanies the ever present teapot" on the island.

The studies of Price in these islands are particularly important. He found that on the more isolated islands, where the diet was still basically oat products and sea food, the people maintained fine physiques and high immunity to dental caries. The percentage of decay ranged from 0.7 to 1.3 per cent, meaning that an average of one in each hundred teeth was affected. As the natives used the smoke-permeated thatch, which would be removed from their homes at intervals, for fertilizer, this was tested by Price for the growing of oats, and it was found more than to double the rate of growth. The natives claimed similar results, and we may expect that the fertilizer added to the nutritional qualities of the food as well.

On some of the islands Price found modern foods — white flour products, canned marmalades, canned vegetables, sweetened fruit juices, chocolate and confections of all types — to be in widespread use. Here the condition of health was markedly lower than elsewhere. Dental decay among children averaged as high as 32.4 per cent in one area, and was generally widespread everywhere. In the port of Stornoway on the Isle of Lewis, twenty-five of a group of a hundred young adults were found wearing artificial restorations. In the same place a sanatorium had been erected to care for the increasing number of patients afflicted with tuberculosis, a disease that is virtually unknown on the more isolated islands where native foods are yet in use.

The general dietary experiences in Europe are significant in the study of different modes of human nutrition. We find that the few racial groups who, during the past century, have maintained or re-established sufficient phases of the native dietary customs have uniformly had various kinds of physical immunity not found elsewhere. Throughout the greater part of the continent, where modern foods are in general use, there are the usual signs of human deterioration. This is in the form of poor physical development, low resistance to all forms of disease, and dental decay so serious that half the adult population in some areas wear artificial restorations.

In the Lands of Asia

ASIA IS important in this nutritional survey. It is a continent of contrasts as regards climate, topography and social customs, and the differences in nutritional habits give many examples of contrast in human development as well. Primitive or semi-primitive diets are employed in many countries, while completely civilized diets are in use also. Important areas for study are China, the Malayan coastal countries and islands, parts of the Soviet Union, India and Tibet. In the latter two countries are found the finest examples of primitive life and health.

Giving brief review first to China, we find the usual diet to be composed primarily of vegetable foods. Rice is the staple food in most areas; yams, sweet potatoes, manioc, bamboo sprouts and beans are also common foods. Among the northern Chinese the soy bean is used to a much greater extent than in the south, whereas the leaves of the sweet potato vines, watercress and other vegetables have more frequent use in the south. In some cases very little animal food is available; in others, especially rural areas, fish are largely consumed. The flesh of dogs and cats is occasionally pickled and used for food. Eggs find some use, and they are usually allowed to decompose before being eaten. Polished rice and other refined foods are consumed in the cities, and with the recent political change in China and the increased tempo of modernization, these may also be becoming available elsewhere.

The health of the Chinese varies in accordance with the food supply, and we find the lowest physical condition among the city-dwellers and others who consume modern foods. All of the common civilized diseases are here common, and the average duration of life is much shorter than elsewhere. Tooth decay increases with the degree of modernization, and residents of Hong Kong and other modern communities show the maximum number of dental caries.

In the semi-primitive country areas, there are the usual deficiency diseases in times of famine, and the lowered body resistance resulting therefrom renders the people more susceptible to the infectious diseases also. Aside from this, health is better, and when there is an actual abundance of foods, it is often quite good. The Chinese of the northern areas, getting more protein foods, especially soy beans, are usually larger, taller, and better proportioned than those of the south. On an

average the percentage of dental decay among the rural Chinese is but one-half as high as among the Chinese born and raised in America. Their per-capita affection with cancer also stands midway between that of Americans and completely primitive groups. Heart diseases are not common; angina pectoris and arteriosclerosis are very rare, and Dr. I. Snapper, the famous authority on Chinese medicine, points out: "The rarity of coronary thrombosis in North China is the more striking because the increase of this affection in America and Europe is appalling."

The Malayan people of the coastal countries south of China, and those of the islands of the Eastern Archipelago, live under both semi-primitive and civilized conditions. The peasants live largely upon rice, those in the cities upon rice also, together with many refined and canned foods. The use of spices is often common, especially on the islands. Tobacco and the betel nut are in use, and liquors, made from native plants by some and imported by others, are consumed. Among some near-savages in jungle areas, there is considerable animal flesh available, but it is often decomposed before use.

At their best in centuries past some of the natives were described as quite beautiful in form, with fairly good teeth, little affected by decay. The like is true today to the degree that primitive conditions prevail and the diet is varied. The majority, however, are short in stature; there are some diseases, and the duration of life is not commonly long. In the city areas, where rice is polished and the remainder of the diet is modernized, health conditions are at their lowest ebb; there is much beriberi, and other diseases are as frequent as in the usual civilized society.

Some of the better peoples of Asia in the distant past lived in the southern part of Russia. They were described as exceptionally healthy, beautiful and long-lived. Those of the Caucasus mountain region between the Black Sea and the Caspian Sea, then known as Circassia, were usually given special mention. The women of this area were so prized for their beauty that they were the object of slave traders from all the surrounding countries.

In the eighteenth century, Dr. Clarke described the people as follows: "The beauty of features and form for which the Circassians have been so long celebrated, is certainly prevalent among them. Their noses are aquiline, their eyebrows arched and regular, their mouths small, their teeth are remarkably white, and their ears are not so large nor so prominent as among the Tartars; although from wearing the head shaven, they appear to disadvantage according to our European notions. They are well shaped and very active, being generally of middle size, seldom exceeding five feet eight or nine inches. The women are the most beautiful perhaps in the world; of enchanting perfection

of countenance, and very delicate features. Those whom we saw, the accidental captives of war, were remarkably handsome. The most chosen works of the best painters, representing a Hector or a Helen, do not display greater beauty than we beheld in the prisons of Ekaterinadara, where wounded Circassians, male and female, loaded with fetter and huddled together, were pining with sickness and sorrow.

The native Circassian diet was chiefly agricultural, and the country was said to be "cultivated like a garden." Black whole grain bread was the staple food and fruits and vegetables were widely used. Meat was usually taken the form of mutton or pork.

During Soviet times the name of Circassia has been dropped but the region has remained one of interest. Where modern foods are in use dental decay and deformity have altered facial appearance to the degree that the classical Circassian beauty of the past is all but forgotten. Yet in the Caucasus mountain region of Abkhazia, a province of Georgia near the Black Sea, many of the primitive villagers and peasants were still living upon native foods in the decade prior to World War II. As they were said to be the longest-lived and healthiest people in the entire Soviet Union, a committee of scientists, headed by the famous Alexander Bogomolets, went into the area to carry out a detailed investigation.

A high proportion of the people were found to be centenarians; in one little eagle's nest village forty miles into the mountains one-third of a population of ninety men and women claimed to have passed the century mark. Bogomolets listed 35 persons in the general area who were between the ages of 113 and 136, all of whom were reported to be "brisk and lively." One even older was a primitive mountaineer named Zapara Kiut. He had no birth certificate, but from things he remembered and the historical events he took part in, his probable birth date was listed as 1782. He could still see well enough to get around, could hear well and still had half of his teeth. Another inhabitant was Khapara Knut, aged 155 years. He died in 1936. Adleyba Madczachva of the village of Tchilov was said to be 150 years old. "He looks well; has an excellent memory. He is an inveterate reader of the local paper, published in his native tongue," declared the newspaper Komsomolskaya Pravda, 1936, No. 42. In another section of the Caucasus Mountains near Grozny in the village of Elistandizi were found Khansimurad Dadayev and Gunakbay Geziev, 147 and 166 years of age respectively.

The many centenarians lived in semi-isolated areas where donkey trails give access to the settlements and the country is too rugged to permit railways. They were forced by necessity to live chiefly upon local foods; black bread was in general use, and coffee was about the only modern product ever available. Today the condition is being rapidly changed; the Soviets are

proudly bringing in modern foods of all kinds. Local canneries and huge mechanized bakeries represent new industries of the five-year plans. Already in 1935 the American visitor to Abkhazia in the Caucasus, Richard Halliburton, told of the rapid introduction of commerce into the remote valleys. He pointed out that since the "new-fangled improvements have been thrust upon them, the natives' life span was perceptibly dwindling. Instead of living heedlessly to five score and ten years, the new generation is lucky if the doctors can get them to the century mark." "Corn flakes and cod liver oil will come next," declared Halliburton, and "then these champion long-lifers can be expected to die off at seventy-five like the rest of us."

Racial groups in India have been observed and described by a number of different travelers, explorers and scientists. The reports of Sir Robert McCarrison are of the utmost importance in this regard, and they are founded upon more than a score of years of careful observation and study. This now-famous British physician arrived in India as a member of the Indian Medical Service at the beginning of the twentieth century. In 1921 his classic *Studies in Deficiency Disease* was published, and in 1927 he became Director of Nutrition Research under the Research Fund Association in India. His top scientific position and his great interest in the health and dietary habits of all the people he observed combined to make his work of concern to all, and of much import in the consideration of the health and nutrition of primitive man.

McCarrison contrasted the difference of dietary habits between a number of tribes in north India and the racial groups to the south. In the Punjab region of the north he found the Sikhs, Pathons and Mahrattas living upon whole grain cakes, milk and milk products as the chief staples. Supplementary foods were fruits, root vegetables and a porridge made from the seeds of legumes. Fresh meat was used occasionally, about once every ten days among the Sikhs, and somewhat more frequently among the Pathons and Mahrattas. To the south were the races of Bengali and Madrasi. Here the staple foods were polished rice, condiments, vegetable oils, coffee, refined sugar and betel nuts. Milk and fresh vegetables were used in very small quantities, and fruits were scarcely eaten at all.

The differences between the health and physical development of the racial groups corresponded with the differences in diet. The tribes of the north were composed of well-built people — tall, strong, stalwart and vigorous. They were chosen by the British whenever possible to serve in the Indian Army. In the south the people of Bengali and Madrasi were poorly developed and weak. Short in stature and weighing less than 100 pounds in many cases, their average length of life was only twenty years.

Upon examining these people and studying their disease rates McCarrison also found a striking contrast in immunity to a

number of ailments. For instance the proportions of disease in Madrasi to those of the Punjab region of the north run as follows: peptic ulcer, 58 to 1; tuberculosis, 2 to 1; leprosy, 10 to 1; rheumatism, 5 to 1; cancer, 3 to 1; heart disease, 4 to 1; nephritis, 10 to 1; diabetes, 3 to 1; mental diseases, 2 to 1; diarrhea and dysentery, 2 to 1; round worms, 20 to 1; rickets, 4 to 1; beri-beri, 100 to 1, and malnutritional diseases (excepting beriberi), 2 to 1. An average of these figures indicates a ratio of six to one in the amount of disease. It is important to note that the rates for some of the diseases in Madrasi vary but little from the rates for the same diseases in modern England. This would indicate that the primitive diets of north India races are associated with only a fraction as much disease as is found in present civilized communities.

A race yet superior to those of the Punjab lives farther to the north, beyond the Vale of Kashmir, in a beautiful multi-colored valley in the tiny state of Hunza. This is an area nearly isolated from all civilization, for it is found between the greatest folding of the earth's surface in the highest parts of the Himalaya Mountains. Surrounded by a great frame of rocky walls and deep snows, it is itself a fertile valley along the Hunza River, well adapted to an advanced agriculture and a high degree of human development.

A number of trips have been made to the Hunza valley since 1880, when Major Bidulph first wrote of it in *Tribes of the Hindoo Koosh*. At that time the population was only 6,000, but it has since increased to 22,000. In 1891 Colonel Durand led a British expedition into the valley and in *The Making of a Frontier* he wrote of the people's "admirable culture of their ground, the immense and persistent labour spent on their irrigation channels, and on the retaining walls of their terraced fields." The famed General Bruce went on one of his mountain expeditions in 1894 to the Hunza area, and recounted later that he "found the people most charming and perfectly companionable." He referred to them as being "as active as any people can possibly be . . . and as slab climbers nobody in the world can beat the Hunza men." In 1903 the celebrated traveler, Sir Aurel Stein, reported his astonishment at being met in India by a Hunza messenger who had traveled over two hundred and eighty miles by foot in only seven days. Though the trip covered some of the world's highest mountains and the Mintaka Pass, the messenger was neither tired nor concerned when he arrived; he assumed that his feat was nothing unusual. Just two years later Colonel Schomberg published his account of visiting the Hunza. He referred to the excellent health of the people and, in giving some idea of their endurance, stated that "it is quite a usual thing for a Hunza man to walk the sixty miles to Gilgit in one stretch, do his business and return direct." Later Mr. C. P. Sckrine visited the Hunza and wrote interesting accounts of their happy and healthy life. He

told of his astonishment at seeing the ruler of the people, the late Mir, Muhammad Mazim Kham, playing polo when nearly seventy years of age. He "is still a wonderful player," says Mr. Sckrine, "and never once did he hit the ball less than a hundred yards."

Fortunately one of Robert McCarrison's first posts in India was located near the Hunza valley. Soon he traveled into the valley itself and, upon observing the splendid physical condition of the inhabitants, made an extensive study of every phase of their life. Eventually he concluded that it was superior nutrition which gave the people such vigorous health.

In *Studies in Deficiency Disease* McCarrison writes: "My own experience provides an example of a race unsurpassed in physique and in freedom from disease in general. I refer to the people of the State of Hunza, situated in the extreme northernmost point of India. . . . Amongst these people the span of life is extraordinarily long; and such service as I was able to render them during the seven years I spent in their midst was confined chiefly to the treatment of accidental lesions, the removal of senile cataract, plastic operations for granular lids, or the treatment of maladies wholly unconnected with the food supply."

In the year 1922 McCarrison delivered his famous Mellon lecture at the University of Pittsburgh for the Society for Biological Research. He told further of the remarkable people of Hunza, and pointed out in particular: "During the period of my association with these people I never saw a case of asthenic dyspepsia, or gastric or duodenal ulcer, or appendicitis, of mucous colitis, of cancer.... Among these people the 'abdomen over-sensitive' to nerve impression, to fatigue, anxiety or cold was unknown. The consciousness of the existence of this part of their anatomy was, as a rule, related solely to the feeling of hunger. Indeed, their buoyant abdominal health has, since my return to the west, proved a remarkable contrast with the dyspeptic and colonic lamentations of our highly civilized communities."

Again in 1925 (Jan. 2) McCarrison referred to the Hunza. In the *Journal of the Royal Society of Arts* he stated: "The power and endurance of these people is extraordinary: to see a man of this race throw off his scanty garments, revealing a figure which would delight the eye of a Rodin, and plunge into a glacier-fed river in the middle of the winter, with as much unconcern as many of us would take a tepid bath, is to realize that perfection of physique and great physical endurance are attainable on the simplest of foods, provided these be of the right kind. These people are long-lived and vigorous in old age. Among them the ailments so common in our own people — such as gastrointestinal disorders, colitis, gastric and duodenal ulcer and cancer — are extraordinarily uncommon, and I have no doubt

whatever in my own mind that their freedom from these scourges of modern civilization is due to three things: (1) Their use of simple natural foodstuffs of the right kinds; (2) their vigorous outdoor life, and (3) their fine bracing climate. It is some years now since I drew attention to the freedom of these people from many of the maladies which so commonly afflict our own people, and found a reason for it in their use of unsophisticated foodstuffs."

Other observers comment further on the Hunza people. E. F. Knight describes them as a "jovial people, fond of boisterous merry-making over the flowing bowl." He calls the women "really very pretty, having rosy complexions, good

features and lively eyes." Referring to the ability to withstand cold, he tells of the Hunza coolies tramping "along over sharp stones and through snowdrifts with bare feet and legs. Some of them, too, were naked to the waist."

One observer tells of seeing the Hunza playing like seals in the winter — diving into one hole in the ice of the river and coming out of another. Jenny Visser-Hooft writes of their "tireless energy," when, after a long and strenuous march, the Hunza coolies would go into wild and vigorous dances in the evening. J. I. Rodale states that the Hunza "will walk twenty miles a day, heavily laden over irregular mountains and then dance far away into the night at their merry-making, called the *tarnasha*." He believes that the Hunza "are overcharged with energy and dancing is a stabilizing influence."

Mentally the Hunza are known as an intelligent and happy race. Mrs. E. O. Lonimer states that there was "not a moron or cretin among them, in contrast to the Nagyr where both abound." She further remarks: "Nothing in our Hunza observations amazed us more than the amicable relations that normally prevailed among the women of a household. There would be a mother-in-law with three or four sons' wives, all perhaps with growing families about them, an adolescent girl or two, and the herd of youngsters. They work together from dawn to dusk without arguing or recrimination and apparently without anyone's attempting to shirk her fair share of the common tasks."

The health of the infants and children is attributed by McCarrison to the fact that the regular nursing period extends three years. "Infants are reared," he states, "as nature intended them to be reared — at the breast. If this source of nourishment fails, they die; and at least they are spared the future gastrointestinal miseries which so often have their origin in their first bottle."

Comments have often been made on the longevity of the Hunza. Great-great grandparents are common, and centenarians show fewer signs of physical decay than do the old in civilized parts of the world. In 1947 the Mir of Hunza sent a letter to

Rodale in which he stated that everyone in the land dies "by nature if he does not fall from mountain or by other accident, otherwise not before 80 or 85." In the same letter he carefully pointed out that none of his subjects ever develop colds.

McCarrison has pointed out that virtually the only ailments he found in Hunza were those of the eyes. This is generally attributed to the smoke-filled huts the people live in. In particular during the winter the fire burns almost continuously, and the outlet for smoke consists of only one small hole in the ceiling. An excess of smoke remains inside, and this proves irritating to the eyes. Some form of glaucoma or granulated lids thus occasionally develops, especially in the winter, and some of the aged have been seen to have cataracts.

Much speculation has centered upon the origin of the Hunza. They do not resemble the other Indian races, and they are believed to be of Caucasian stock. Tall and fair-skinned, they look more like Europeans, though with their classical features and deep-chested, small-hipped bodies they remind one more of Greek sculptures. Indeed, the Hunzas claim to be descended from the soldiers of Alexander the Great who were left behind in the Indian campaign of 327 B.C. Needless to say, this is nothing that could be proven and the story is accepted merely as an interesting legend.

The land of the Hunza is known for its fruit trees. Durand wrote that there "is so much fruit in Hunza that even the animals take the fruit diet, and you see donkeys, cows and goats eating the fallen mulberries. The very dogs feed on them, and our fox terriers took to the fruit regime most kindly and became quite connoisseurs." McCarrison calls the people "great fruit eaters, especially of apricots and mulberries. They use apricots and mulberries in both the fresh and dry state, drying sufficient of their rich harvest of them for use throughout the autumn and winter months." According to Schomberg, "Fruit is really the Hunza staple. It is eaten with bread, far more so than vegetables, as it is more abundant."

The grains of the Hunza are wheat, barley, millet and buckwheat. These are ground slowly between stone rollers, and nothing is removed. The whole grain meal is mixed with water and made into griddle cakes called chapattis.

Potatoes, tomatoes, sweet corn, turnips, carrots, peas, beans and leafy vegetables are included in the Hunza menu. The sweet corn is usually consumed raw, as are some of the other items. When cooking is done the vegetable skins are never removed, and the foods are always served in their cooking water.

Raw milk and cheese are included widely in the Hunza diet. The milk is used both fresh and as buttermilk or lassi. The butter is often clarified. A little meat is used on occasions about once every two or three weeks on the average.

Nutritionists are inclined to believe that the magnificent

health of the Hunzas is due to their use of wholesome, natural foods and pure water. For evidence they refer to the neighbors of the Hunzas, who live in the same climate and type of environment, but use different diets. Nearly all of the people around the Hunzas suffer from the wide prevalency of goitre, but in Hunza the disease is unknown. McCarrison claimed, and eventually proved, that this was due to the impure drinking water of the surrounding area. The nearby Nagyri people living on the other side of the valley have never bothered to plant fruit trees, and they make little effort to obtain a balanced diet. McCarrison describes them as "poor, undersized, undernourished creatures." Jenny Visser-Hooft refers to the Nagyri coolies as "of small stature and of much less favorable appearance than our Hunza coolies." The Ishkomania, another nearby race, had plenty of good land, but it was seldom cultivated and the people never even bothered to milk their yaks. Of these people Schomberg states: "The more I saw of the Ishkomania, the more I was struck by their degeneracy; they were poor in physique and lacking in brains; a strange type of mountaineer."

The differences of mentality between the Hunzas and people of surrounding areas are as clearly marked as the differences in physical health. The honesty, graciousness, fine manners, hospitality, laughing and joking of the Hunza household are always given important mention by travelers. After going to the Nagyri people Schomberg remarked that it "is certainly difficult to understand how anyone, after having dealings with the Hunza people, could imagine that they had anything in common with their neighbors of Nagyr." Mrs. Lorimer tells how the Nagyr "raised one difficulty after another in supplying our very modest needs." Knight refers to "a village of liars" in Kashmir. Ward Deny's writes that one has a feeling "that lying is really the rule, habit and a characteristic" in Kashmir. Referring to the people of Kashmir he states that "it might be accepted as an axiom that very nearly all of them are thieves." Even the Pingalis of nearby Ghizr are described as a lazy and unhappy people.

Possibly this cannot be ascribed to diet, even in part, though McCarrison noted in his famous Coonoor experiments that groups of white rats fed the typical Hunza fare were gentle and affectionate, whereas those fed the food of the degenerate Indian races invariably became ill-tempered and vicious. In any case the Hunza appear to be healthy mentally as well as physically. Whether or not we agree with McCarrison that this is due to their use of the "unsophisticated foods of nature," we cannot deny that their unique health and diet combination is perhaps more than coincidence.

'The Hunzas have the reputation of being the healthiest people in the world today. This reputation, as we have seen, is not without foundation, but isolated racial groups in other

countries and islands may yet be their equal or superior, and one other race, also in the Himalaya area, is very definitely their superior. This race lives across the Indian border in a remote and otherwise uninhabited mountain region of Tibet. Known as "The Lost Tribe," its discovery was the goal of the British-American Himalayan Expedition of 1931, of which two English physicians, Dr. Jill Cossley-Batt and Dr. Irwin Baird, were co-leaders. Fifteen months of grueling marching found the expedition among this tribe, which, though living without any contact with civilization, was economically independent of the outside world.

Members of this tribe lived on a different diet than did other Tibetians. The jungle below their icy conclaves supplied the food they thrived upon, and they consumed, among other foods, an abundance of fruits, vegetables and berries, which formed the principal part of their diet. During the summer and fall they stored much of the food for use during the winter months. Living in complete isolation in the most primitive and heretofore forbidden country of the world, they had no access to refined foods or modern products of any kind, and the very existence of such foods was unknown to them.

These people were distinguished in appearance from other racial groups in Tibet, and it has been suggested that they may be of Chaldean ancestry, though no direct evidence on this point is available. The women were extremely beautiful, having long hair, clear white skins, and natural healthy color in their cheeks and lips. The people were said to live to be centenarians, with freedom from wrinkles and grey hair, and to hold their attractiveness to old age. They sustained their reproductive vigor up to and often beyond the span of three score years and ten. In a dispatch wired from London to the New York Times in 1932, Dr. Cossley-Batt, then returned from Tibet, was quoted in an interview as giving the following description of this unusual Himalayan tribe.

"This race of people live about 110 years and are very hardy people without any trace of disease. They don't even have colds. They live as naturally as any race now left on earth and although the climate is very cold, they go about scantily clad. They are white and appear to belong to the earliest civilization. They continue to marry at the age of 75 and 80. There is no nervous tension and the people are athletic and marvels of physical fitness."

Thus is the testimony given covering Asiatic peoples who have developed and maintained through the centuries an adequate form of nutrition and a healthy mode of life. These physically superior people of Tibet, India and the Caucasus give a splendid example of the physical and mental scale man has attained when living in a proper environment. We observe here the highest form of physical perfection to exist under conditions

of natural and balanced nutrition, with a somewhat lower state of health and physique as the dietary habits become less natural, with fewer fruits in proportion to grains, and the influence of civilization a more dominant factor. When the primitive ways of life are completely lost, as pertains to nutrition, the complete failure to maintain immunity to disease, associated with a very short life span, is seen. So follows the racial and tribal history of Asia under the varied living conditions and dietary customs of the land.

Tribes of Africa

THE REPUTATION of Africa as the dark continent stems from its late arrival to the status of limited civilization, which is now confined to certain areas. Until the beginning of the twentieth century, much of the interior had been explored but little and Lake Kivu was not discovered until 1894. To this day much of the continent exists under more or less primitive conditions. The number of natives still living in accordance with historical dietary customs is correspondingly large, in comparison with that of other areas. Some of the tribes have thus far had very little contact with civilization or the white race.

The environment of Africa is often very difficult in terms of human life and survival. Few Europeans or Americans can live in the central tropical regions for more than a few years without serious illness. Many return to the temperate zone at regular intervals, which is thought necessary for maintenance of health. White children born in Africa are sent back to Europe or America for their most important growing years if they are to expect normal physical development.

While in equatorial Africa all foreigners take daily hygienic measures. Dysentery epidemics are so frequent that all drinking water is boiled, and in many instances all food is peeled and cooked. In certain lowland regions it is considered unsafe to step from behind mosquito netting at any time after sundown, as a protection against malaria. Everyone is on guard against fever-carrying ticks which are abundant in the grasses and shrubbery. No one will touch the hides worn by certain native groups, for these contain many lice which are thought to carry the bacilli of typhus and other serious diseases. The white population is forbidden to enter many areas because of the dreaded tsetse fly, carrying sleeping sickness, which is common there.

One may well wonder how some of the primitive racial groups, having but few protective measures, are able, not only to survive, but to attain a high immunity to many diseases. They do not boil drinking water; they consume considerable amounts of uncooked food; they wear the lice-ridden hides which are believed to create grave dangers to others, and they consume large quantities of insects which are avoided even in contact by the white population. Certain factors in their environment appear to give them greater resistance to the bacterial diseases. Many have thought food to be the most important such factor, and consideration of food habits, historical and present, thus becomes important.

Prior to civilized times foods were obtained from such local sources as were available, and these varied with the different racial groups. The Hottentots of the Cape of Good Hope, on the southern tip of Africa, were largely scavengers, eating dead whales which happened to be shed ashore, as well as dead fish which were in the process of decay. Some pieces of flesh were buried in the sand until they were even further decomposed, and then consumed. Fresh meat was in the form of rabbits and other small animals. Milk from their cattle furnished the chief form of drink. The roots of plants which were usually dug up from rivers furnished the chief form of vegetable food.

Cookery was little employed by any of the Hottentots. The animal flesh, including the entrails, was rapidly devoured in its raw state. Milk was of course also taken raw. The vegetable roots were usually broiled or boiled before being eaten.

To the north, among the Kafirs and Zulus and up the famous Gold Coast along the western boundary of Africa, the tribes were predominantly agricultural, eating some fruits, which they usually baked, and great amounts of toasted corn and boiled millet, as well as other cereal grains. Flesh, either roasted or boiled, was consumed and, as in the case of the Hottentots, some preferred it well decayed before consumption. A number of tribes made liberal amounts of intoxicating beverages from fruits and corn, and these were very generously used at the feasts and dances. Tobacco was also grown in certain areas, where men, women and children smoked much of the time.

In central and eastern Africa the agricultural tribes also relied on grains, along with beans, potatoes and limited amounts of bananas and other fruits. All forms of animal food were used sparingly, and neither liquors nor tobacco were much in use. Most of the foods were cooked before being eaten, the grains being made into hard cakes.

Cattle tribes, such as the Masai and Muhima of central Africa, lived primarily upon the milk, blood and flesh of animals, with some fruits and vegetables or cereals. A special device was used for bleeding the cattle at periodic intervals, and the growing children and pregnant and lactating women were given a special ration of the blood. Races near Lake Kivu and Lake Victoria in the equatorial regions partook chiefly of fresh water fish, with bananas and sweet potatoes. The swarms of insects which often settled several inches deep on the shores of the lakes were gathered by the natives, dried and used in puddings, and the same is true of other insects which could be obtained, including locusts. The Pygmies lived largely upon insect preparations, with flies, insect eggs and ants figuring largely in the diet. In Ethiopia the diet was more varied, though insects were consumed very liberally.

To the north in Anglo-Egyptian Sudan there were again many pastoral tribes, including the Terrakeka, Neurs, Dinkas, Turkana

and Karomojo. These used the milk, blood and flesh of their animals, quantities of fish from the Nile and some cere and wild honey. In the Arab regions of Sudan and other parts of northern Africa the milk of the camel was the staple food. A much greater proportion of the food was used in its raw state by these and other pastoral racial groups than was so used by the agricultural tribes, whose cooked grains and tubers constituted the bulk of their diet.

With the great variation in native diets we find similar variation in the physical form and resistance to disease of the different racial groups. The Hottentots were among the first Africans to undergo much observation by Europeans, and early accounts picture them as being wild, savage and wretched, living under conditions of unbelievable filth. Their life span was not usually long, sixty years being the approximate average. Yet they appeared free from some of the degenerative processes common in civilization. Nieuroff in 1653 described them as having "black quick eyes and very good white teeth." The men "have well made legs, but slender calves, and are so nimble as to be able to outrun a strong bull and stop him in full career. The women especially have very fine and small feet with flat bellies and round buttocks; but their fingers and nails very long."

The races north of the Cape of Good Hope, but yet in South Africa, and those of the west coast so often visited by the slave traders and others in the eighteenth century, were of medium to tall stature, free from skeletal deformities, and had good white teeth of regular form. Most were well built, though the pendulous breasts of some of the women, and the distended abdomens of many, detracted

from the beauty and symmetry of form. The abdominal deformity was restricted to certain tribes, and seasonal periods, when the natives would live almost entirely upon grains for various lengths of time.

Parturition among the women was not usually associated with difficulty or pain, according to many early accounts. Astely pointed out that "when a woman is near her time, a crowd of both sexes, young and old, come about her; in the midst of whom, without any shame, she is delivered in public. And their labor seldom exceeds a quarter, or half an hour, and is attended with no outcries or signs of pain. Villault and Barbot reported similar cases and claim that the woman returns to work in a half hour or so after birth.

Diseases were much less frequent among these natives than among the white slave traders living in the vicinity. However, there were some native maladies which caused trouble. Fevers, headaches and edema were reported in some sections, and a number of groups seemingly failed to maintain resistance to smallpox, even while living on their native diet. One serious ailment reported to be very common in the coastal areas was a

parasitic worm infection, which affected all parts of the body, but particularly the legs. This was thought due to the lack of sanitation — especially the foul water supply — which was peculiar to the districts affected by the malady.

Agricultural tribes in central and eastern Africa were of equal form and development in most respects, having the physical advantages mentioned, but also certain diseases, and sonic dental decay. Their strength and endurance, however, were such that they were often given special mention. "Burdens with them," declared Lander, "are invariably carried upon the head; and it not infrequently required the united strength of three men to lift a cabash of goods from the ground to the shoulders of one, and then, and not until then, does the amazing strength of the African appear. Some of the women which we saw, bore burdens on their heads that would tire a mule, and children not more than five or six years old, trudged after them with loads that would give a full grown person in Europe a brain fever."

It was among the cattle tribes, and the groups partaking liberally of the fresh water fish from the lakes and streams, that the manhood were found on the African continent. The natives were even stronger and more rugged than either the agricultural or insect-eating groups, and they had fewer diseases. In physical form most of them were very tall. The Watusi near Lake Kivu stood on an average at least six feet in height, and this was true also of the Turkana and Karomojo, the latter being usually considered the most physically perfect of all African tribes. Some races of Sudan were even taller, though not so well proportioned, the Neur women being at least six feet tall, the men standing up to seven and seven and one-half feet in some cases. Most of these races were very athletic; a number were fierce and savage; swimmers of exceptional ability were found among them, and all were excellent spearsmen, as they had to be in protecting their herds against lions and other carnivorous animals.

The African groups that have maintained their native dietary customs to the present day are physically much as they were described in the past. Orr and Gilks of England have compared the Masai cattle people with the nearby Kikuyu agriculturists, and found that the former possess greater immunity to dental decay, deformities, anemia and bronchitis, and also have fifty per cent more strength than the latter. The Watusi also retain their superiority over the agricultural tribes, and they are reputed to be the most capable athletes in Africa. They are great high jumpers, and travelers have photographed them leaping as high as eight feet in the air, which exceeds the world's high jump record.

Dr. Price studied twenty-seven of the African tribes using native foods, finding dental decay among the agricultural groups to range from 5.5 per cent to 6.2 per cent, with the pastoral and

fishing groups having less than one per cent of the teeth affected. Thirteen of the tribes presented so high a record of dental excellence that not a single individual was found with deformed dental arches, and in six of these tribes there was not a single tooth attacked by caries. Members of the finer tribes were also said to have magnificent physiques and were powerful athletes and wonderful swimmers. According to information received by Price from Dr. Anderson of the government hospital in Kenya, the natives were also free from appendicitis, gall bladder trouble, cystitis and duodenal ulcer. Malignancy among them was said to be a very rare occurrence.

The African groups still using native foods are large in number, but yet a minority, and inhabit the interior regions that have not been subject to settlement by Europeans. Throughout the greater part of the continent, in particular the western coastal areas and the northern Arab regions, native foods are little used, except those of harmful effect such as palm-wine and other spirituous drinks. Salt, spices and other imported foods came into widespread use during the previous century, and now white sugar and white flour products have been added.

The results have been sadly disappointing, though not unusual, in view of the many similar experiences of other primitive races. A great increase in the prevalence of infectious diseases first followed the dietary change in Africa, and this was associated with rapid decreases in population wherever the epidemics would develop. In French Equatorial Africa the native population indeed fell from twenty million in 1911 to two and one half million in 1931, which is characteristic of what earlier happened in other provinces. Nor have the people escaped the common degenerative processes. According to Price, dental decay averages 12.1 per cent among the modernized African groups. Deformities of the dental arch affect the majority of natives; in some cases these are so severe as to distort the entire facial form and alter the facial expression.

Africa thus represents a marked contrast of strong and vigorous tribes on one hand, and groups of sick and deformed on the other. Between these extremes are the people using native foods of inadequate variety, which sustain the race and maintain certain forms of immunity, but do not permit the physical excellence which is general among the better-nourished primitive tribes. Under the difficult conditions of his environment the African thus endeavors to preserve his health and existence, and the success attained exemplifies the adequacy of the nutritional regimes used by respective tribal groups.

Aborigines in Australia

THE PRIMITIVES of Australia, commonly known as the Aborigines, are the oldest living human race. The people have the most primitive type of skeletal development. With their very deep-set eyes and prominent brows they even bear some resemblance to pre-historic Peking Man. The localized features in their frontal and frontonasal region have also been compared to those of the Neanderthal Man. Living on a continent which is unique because of its preservation of animal life that long since became extinct elsewhere, the Aborigines represent a form of human development which has otherwise ceased to exist for the species.

The Aborigines' native diet consists primarily of animal foods, including fish from the small streams and lakes, snakes, lizard small animals, kangaroo, insects, birds, eggs and wild honey. Those who live near the coast also include sea plants, sea cow and shellfish in the menu. Plant foods are occasionally found in form of berries, roots, seeds of grasses, stems and leaves. There is no method of agriculture or animal domestication, and foods are obtained entirely from the sources of wild nature.

None of the animal foods are used completely raw, and yet none can be said to be well cooked. Having no vessel in which to boil water, the natives can only place the flesh upon coals until browned. This is usually done for no longer than a few minutes, with the inside flesh remaining nearly raw. The whole animal is consumed, including blood and entrails. Those plant foods which are not eaten raw are roasted in underground ovens similar to those used in the South Sea Islands.

The Australian native lives under adverse and exacting conditions. Some of the coastal areas receive a fair amount of rainfall and support an average plant and animal life, but the interior regions, to which the Aborigine is now largely restricted, are less favored with these factors. Over half of the interior land area receives less than ten inches of rain each year. Much of this is little less than parched desert. In the vicinity of Lake Eyre the annual rainfall is indeed less than five inches, and, with the exception of a portion of the Sahara in Africa, this is the hottest area of the earth. Clearly these conditions are not favorable to an extensive plant or animal life. There are but few species of large animals — the kangaroo, wallaby and dingo —

with a limited number of birds, some reptiles, and many insects constituting the chief animal groups. Human life as a whole is difficult under these climatic and ecologic conditions — so much so, in fact, that in many areas inhabited by the Aborigines, the white population is unable to live, and frequent attempts at settlements have failed.

The fact that the Aborigine has been able to maintain a vigorous existence under such conditions is of significance. For thousands of years the race has apparently maintained relatively good physical development and high immunity to disease. Studies of skeletal remains of Aborigines from the pre-civilized era indicate excellence of bone structure and teeth, with only 2.3 per cent of all teeth examined being carious. The first travelers to see the Aborigines reported them to be filthy in their habits, coarse in their features, and wild, savage and superstitious, but with good bodies, free from deformity, and generally little affected by either physical or mental ailments. There were no epidemic diseases and the degenerative processes were infrequent. The people were prolific, the population numbering about 150,000 and being held at this figure through the common practice of infanticide, necessitated in part by limitations of the food supply under the existing environment and in the absence of any agricultural development.

The celebrated English voyager, Captain James Cook, was one of the first to visit the Aborigines. He stated that the men "were of a middle size, and in general well made, clean-limbed, and vigorous, active and nimble; their countenances were not altogether without expression, and their voices were remarkably soft and effeminate." Captain Keppel, observing those near Port Essington in North Australia, reported them to be "well formed; their limbs are straight and muscular; their bodies erect; their heads well shaped; the features generally good; teeth regular, white and sound. They are capable of undergoing considerable fatigue and privations in their wanderings, marching together considerable distances." Lieut. Breton observed the natives in 1830-83, and pointed out that "Natural deformity is very rarely met with, and most of them retain their teeth, in all their perfection to the very last."

The extremely acute senses of the Aborigines, together with their unique cleverness and ability in outwitting the fleet animal life of the country, gave these people the reputation of being the best hunters in the world, which indeed they were. Working near movable blinds near a pack of kangaroo they were able to spear animal after animal without disturbing the rest. With respect to water birds they would work entirely underwater, drawing the animals under without disturbing the flock. Fish would be accurately speared in an average of three out of four times with no other guide as to the location of the animal than the surface movement of water and the slight movement of grasses and

reeds growing in the water.

William Jackson, after living as a voluntary captive for a considerable period with a group of completely primitive Aborigines in 1853, remarked as follows regarding their senses: "The native senses of sight and smell possess an exquisiteness which enable their possessor to follow the traces of an object which to civilized man, would be totally indistinguishable. Thus furnished, the aboriginal Australian, when sufficiently stimulated by cupidity or revenge, pursues his victim for a hundred miles, and nothing but the fall of rain can baffle his unerring pursuit."

Commenting further upon this, Jackson refers to a morning hunt for kangaroo which well displayed this uncanny perception of sense. "By the time the dew was dry on the grass and herbage — and they never hunt before — their spears were in readiness. Led by the chief, who took good care to keep me near him, they filed off into the scrub. A couple of miles brought us to a sudden halt. To my eye there was nothing visible, absolutely nothing. The native eye, and ear, and smell, have a keenness of perception of which civilized man knows nothing. After a breathless pause of about two minutes, the chief raised his hand, making certain motions with its fingers, when the party flew off in different directions, while I was an admiring spectator of the strange maneuver. Presently they had formed a wide circle. Now they advanced a step or two. Then they were motionless as statues. Then they all moved a few steps again; and again were still; and all this while every eye seemed fixed on some central object which, to my unpracticed sight remained invisible. At length, however, I saw the game — two hundred kangaroo or more. The beautiful things were grazing among the scrub. They fed; the hunters advanced; they erected themselves to reconnoiter, and they of the chase were still."

By the early eighteenth century the Aborigines in some parts of Australia, chiefly those near the port areas, began to use many of the foods imported from Europe. Lieut. Breton pointed out in 1833 that those in the neighborhood of Sydney "learn to drink, and also become idle, depending entirely upon the charity of the whites for food, and neglect during their stay among them, all those active habits to which they have become accustomed." These natives Breton called "the most wretched in appearance of any I have met with," much in contrast to those of Moreton Bay who "have not yet" learned "to get drunk, smoke tobacco, or acquire any of the vices so prevalent amongst the whites." In point of appearance these people were described as "greatly superior to those in the neighborhood of the capital, being more robust, manly, as well as healthy looking."

Other writers describe the frequency of epidemics among the Aborigines using imported foods from the port cities. Beriberi was one of the first deficiency diseases to become common.

Gradually through the nineteenth and twentieth centuries, as group after group became modernized with respect to food habits, the racial health and vigor have deteriorated. Today on the government reservations, the natives are fed chiefly upon the products of commerce — largely refined and canned. Mothers here lose the ability to nurse their children. Price tells us that the milk of those who can nurse is so defective that the children often become ill from it. Diseases of many kinds are very common. Dental decay reaches the high proportion of forty to fifty per cent of all teeth examined. The extremely high death rate has been responsible for a great decrease in population; today less than fifty thousand. Aborigines remain in Australia. In the areas where contact with civilization is most frequent, an eighty per cent reduction in numbers has been common, and in some cases entire primitive groups were wiped out by epidemic diseases after adopting the diet of the white man.

There still are, however, some comparatively isolated Aborigine groups which live entirely upon the foods of the primitive wilderness. They preserve all of the health amid vigor that otherwise were restricted to the pre-European era. To this day they have retained the keen perception of sight which enables them to see stars that the white man can see only with the telescope. Price states that they prove they can see the satellites of Jupiter "by telling the man at the telescope when the eclipse of one of the stars occurs." It is also said that they can see animals moving at a distance of a mile, which civilized man cannot see at all. This should not seem too difficult to believe when we consider that pre-historic man also possessed such unusual sight, as is confirmed by archeologists who discovered a prehistoric cavewall painting of the Pleiades star group. The painting included ten stars, four of which we now need telescopes to see.

The physical strength and agility of these Aborigines is shown by a report from Philip Chauncy, who points out that he has seen native Australian men perform athletic feats which would be considered difficult or impossible even by circus performers. He refers to an example of extraordinary quickness of sight and suppleness and agility of limb and muscle in the case of an Aborigine who stood as a target for cricket-balls thrown with force by professional bowlers at only ten to fifteen yards and yet successfully dodge them or parry them off with a small shield for at least half an hour. In another instance he refers to a native hurling a cricket-bail for so great a distance that it beat the English professional record by thirteen yards. Another Aborigine was said to have outdone the best circus performers by bounding from a springboard in a somersault over eleven horses standing side by side. And yet an even greater feat accomplished by this same native was described by Chauncy as follows:

"I saw the same man leap from the ground, and in going over he dipped his head, unaided by his hands, into a hat placed in an inverted position on the top of the head of another man sitting upright on horseback — both man and horse being of average size. The native landed on the other side of the horse with the hat fairly on his head. The prodigious height of the leap and the precision with which it was taken so as to enable him to dip his head into his hat, exceeded any feat of the kind I have ever beheld."

The primitive Aborigines of today present physical excellence in other ways also. Nearly all have good teeth. There is very little decay; the dental arches are of regular form, and the facial development is full and broad. The hair likewise attains exceptional growth, being coarse and very heavy throughout most or all of life. Baldness is very rare, even among the oldest members of the group.

Extremes of heat and cold are withstood by the natives without any protection whatsoever. Furs of wild animals are always available, but they are neither needed nor used. The winters are bitterly cold on the central uplands and on the coast of the Gulf of Carpentaria. The natives sleep here without clothing and in no apparent discomfort. In the deserts of central Australia, the summers are extremely hot; the remorseless sun beats down upon Europeans, often causing sunstroke and rendering life difficult and at times impossible. Baldwin Spencer tells us that the native women "normally wear nothing" in these areas, and the men wear only a few decorations in the form of fur strings around the head, neck and waist. Yet they appear comfortable at all times and never suffer from sunstroke or weakness from heat.

The experience of the Aborigine in Australia is important, for it is a demonstration of high immunity to many diseases and a high level of physical capability under a most adverse and difficult environment with a very limited food supply, but with such foods as are available being unrefined, fresh and not excessively cooked. The simple but natural Aborigine diet proves more efficient than one that is quite varied but both refined and canned. The latter is used by the modernized Aborigine, and his rapid deterioration, equaled by the whites of Australia as well, demonstrates the inadequacy of the dietary program in use.

New Zealand Maori

THE MAORI are the native racial stock of the two main islands of New Zealand, located to the south and west of Australia at a 45 degree latitude, but in a comparatively warm and equable climate. The people bear much resemblance to the Polynesian race, both in appearance and language, and some classify them as Polynesians. Their similarity to the Cook Islanders is most clearly marked. After their migration to New Zealand they rapidly multiplied in number, being two hundred thousand strong when the islands were discovered by Europeans.

The primitive Maori diet was derived both from the land and sea. The people cultivated fruits and vegetables and also used many wild plants, in particular celery and the roots of ferns, which were used in vegetable stews. Both land and marine birds were killed and consumed whenever possible, and their eggs also found an important place in the Maori diet. Kelp was gathered from the sea, along with many kinds of shellfish, the latter generally being prepared by baking.

The Sutherland report for the New Zealand Council for Educational Research tells us that the pre-European Maori "were long lived, dying from accidents, war injuries, or natural causes, diseases being rare. The special senses, touch, sight, hearing and smell were well-developed. There were few insane folk, and few with physical abnormalities. Maoris bore pain stoically, and had great recuperative powers. Their physical endurance was marked; most men were warriors, trained for skill and fitness in war, while even the sports and dances for lighter hours required vigorous activity. Theirs was a race sound, hardy and healthy."

This is well substantiated by reports from the first voyagers to visit New Zealand. Captain Cook saw the Maori in 1772, and he pointed out: "It cannot be thought strange that these people enjoy perfect and uninterrupted health. In all our visits to their towns, where young and old, men and women, crowded about us, prompted by the same curiosity that carried us to look at them, we never saw a single person who appeared to have any bodily complaint, nor among the numbers that we have seen naked did we perceive the slightest eruption upon the skin, or any marks that an eruption had been left behind.

"Another proof of health, which we have mentioned on a former occasion, is the facility with which the wounds healed that had left scars behind them, and that we saw in a recent state;

when we saw the man who had been shot with a musket ball through the fleshy part of his arm, his wound seemed to be so well digested, and in so fair a way to be healed, that if I had not known no application had been made upon it, I should certainly have enquired, with a very interested curiosity, after the vulnerary herbs and surgical art of the country.

"A further proof that human nature is here untainted with disease is the great number of old men that we saw, many of whom, by the loss of their hair and teeth, appeared to be very ancient, yet none of them were decrepit; and though not equal to the young in muscular strength, were not a whit behind them in cheerfulness and vivacity.

Though Captain Cook mentioned the loss of teeth among the very old, this seems not to have been common among the others. As a rule the Maori teeth were white and regular and little affected by decay. Indeed, when Pickerill examined 250 ancient Maori skulls he found only two that exhibited any signs of decay. The exact ratio was one carious tooth for each two thousand examined. This may indicate that the people had bad teeth prior to Captain Cook's arrival, or that the cases of loss of teeth noted by him were due to causes other than caries.

The beginning of the change in the Maori diet took place at the time of Captain Cook's visit (1772). Some European foods were left at the island, in particular, white potatoes. The latter were soon planted everywhere, and within a half-dozen years they became the staple food in some areas. They were usually not eaten fresh, but instead kept in a stream until putrid, and then cooked and made into a dish called mahi. Alcoholic beverages soon arrived in quantity and a formerly abstemious race became highly addicted to drinking. There followed coffee, tea, flour, biscuits and other imported foodstuffs.

In modern New Zealand almost none of the old diet persists. The art of fishing has been forgotten; the younger generation has lost the knowledge of fishing grounds and seasonal lore, and few gather shellfish. Berries are no longer gathered from the forest. The former staples such as taro, yams and fern roots have long since been replaced by other foods. Edible seaweeds, used so frequently in the past, are very rarely found on the modern New Zealand tables.

Instead, we find the very extensive use of white sugar, confections, refined cereal products and tinned fish. Potatoes are still eaten at almost every meal. Milk and butter, as well as eggs, are too expensive for the average Maori, and meat is used no more often than twice a week. Tea is the usual form of drink.

Deterioration in Maori health took place concomitantly with the dietary change. In 1790, less than a score of years after Captain Cook's visit, a fatal epidemic of dysenteric character broke out upon the arrival of an English ship in Mercury Bay. Five years later the disease, tingara, became prevalent in port

areas and took a heavy toll of life. In some instances the epidemic was so fatal that the living had difficulty disposing of the dead.

Inland areas, untouched by civilization, remained quite healthy and free from disease, as compared to those near the ports. In 1807, the voyager, Savage, referred to the Maori he observed as "a race of people hitherto enjoying a constitution of body remarkably sound and healthy. In a few generations, in all probability, how great will be the change — children of diseased parents, they will grow up a puny race; and in many instances, both miserable and disgusting; in no respect resembling the hardy inhabitants of the island, previous to their unhappy communications with civilization. They will bear about them the traces of the injuries we have afflicted."

Subsequent history well illustrated the accuracy of this prediction. Very soon, as the use of imported foods spread to other island areas, did new diseases make their appearance. In 1836 the situation became so serious that a Mr. Ford was sent to the missionary station of Kaitai to benefit the New Zealanders medically. In the next year he communicated to the Church Missionary Society as follows:

"I regret to state that there has been more disease among them during this period than has ever been observed in any previous epoch of their history. Its nature appears to be quite new, and such as they appear never to have suffered from before. It has, in many of its features, the influenza of late years in England, which brought us so much mortality; and this in like manner has been very destructive."

With reference to a different disease the same author stated that "the epidemic from which they have more recently been suffering, has been more general, and of much more serious results to them. By it their numbers have been sadly thinned, and many have been carried off in a sudden and unexpected manner. It appears to have been of an erysipelatous character, and produced by the same causes as the former affection. During the past two months, the application from the natives for the relief of this disease have been almost incessant; and at Paihaia alone, I should think medicine has been administered to no fewer than twelve hundred patients."

At the same time the disease, scrofula, became common. In 1844 influenza reached epidemic proportions; the year, 1847, is remembered for the prevalence of whooping cough, that of 1851 for a great epidemic of mumps and 1854 for the beginning of measles and scarlet fever, which later wiped out great segments of the population.

In 1859 Murray reported that from ten to twenty per cent of the Maori population then displayed the marks of scrofula. He listed fevers, bowel complaints, consumption, spinal disease, ulcers and leprosy as other maladies of the native population.

Complete blindness resulting from cataract was common among the aged. "Bodily deformities are as common among the New Zealanders as among the English," declared Murray. "The most frequent is the outward or inward turning of one or more feet. Supernumerary fingers and toes are seen; varicose veins in the legs are rare. Young children frequently have umbilical hernia, but this deformity, produced in the first instance by neglect, disappears in adults. . . . Persons blind from disease and age are not unfrequent. Five albinos have been seen, two of whom were half-castes. The unpleasant tongues of stammerers are heard in the villages. Flat feet are common, a formation which is no impediment to long walking, although soldiers are rejected for it in the English army. Acute curvature of the spine, resulting from disease is common. Squinting occurs; and persons with stiff joints, unreduced dislocations, and badly united fractures giving rise to deformities, are met with in traveling throughout the country."

By 1896 the Maori population had fallen to forty thousand. At that time, tuberculosis, typhoid fever, dysentery and respiratory diseases accounted for most of the deaths. Venereal diseases were also very common, as they are today. At the beginning of the twentieth century the death rate gradually began to lower, the birth rate increasing. This trend has continued to the present day with an existing population of more than twice the number of a half-century ago.

Diseases, however, have remained common. The fatal epidemic maladies are much less frequent, but ailments of a degenerative character are increasing in number. Tuberculosis still afflicts many of the Maori and sanatoria for care of patients exist throughout the country. The people have one of the highest rates of dental decay in the world. Facial deformity is correspondingly great, as the dental arches become narrower and the teeth more crowded. Generally speaking, the race is much as Savage predicted it would be one hundred and fifty years ago; disease and deformity have altered completely the character of Maori life.

In recent decades there have been a number of searches for semi-isolated Maoris still following the old ancestral diet. These have not met with complete success, though in 1925 a number of rural inhabitants were found who supplemented their European fare with many products of the sea and forest. Among the children here perfect sets of teeth were five times as common as among European children of the same age.

In the travels and studies of Dr. Price in New Zealand some of the communities of the Mahia Peninsula still lacked a large supply of modern foods. The diet was predominantly native, with seaweeds and shellfish used in abundance, in particular by the older members of the groups. Dental decay averaged but two per cent of all teeth examined, which is only one-twentieth as

high as the typical rate in the more modern communities of New Zealand.

Thus the Maori, from the time of their arrival in New Zealand to the present day, have lived in health or sickness, depending on the type of food supply that has been available. In their primitive state, prior to the arrival of the Europeans, they are thought to have been one of the finest races living on the face of the earth, as some of the earliest visitors described them to be. With importation of foods, beginning in the latter part of the eighteenth century, they have gradually deteriorated until today, except in the more isolated areas, they scarcely resemble the race of old, being weak in body, susceptible to disease, and often of deformed structure.

Marquesas Islanders

AMONG THE most handsome and interesting of the primitive races are the Polynesians, a strong and well-formed people living on the romantic islands of the South Seas. Their normal characteristics are oval features, dark hair either straight or curly, a complexion of pale golden color, height exceeding the average, pleasant dispositions, and facial features somewhat between the Caucasian and Malay in form. Approximately 160,000 members of this race lived on an archipelago of 13 volcanic islands, known as the Marquesas, located near the Equator in the South Pacific Ocean. The Marquesas have long been known as the most beautiful and picturesque of the South Sea Islands, and their inhabitants had the distinction of being physically the most perfect of all the Polynesians, thus being pre-eminent among many fine racial groups.

The Marquesans lived in their primitive state primarily upon tropical fruits and plants. These grew profusely in the genial climate of the area, and nearly all trees on the islands yielded fruit or other edible produce. The stately breadfruit tree, which was met with to some extent in nearly all Polynesian lands, attained its greatest excellence in the islands of the Marquesas group, where it was found

in fully 52 varieties and flourished in the utmost abundance. The breadfruit itself formed the principal article of food for nearly all of the natives. Coconut and bananas were next importance, in the order named, with the former being usually consumed in its immature state, when it was rich in fluid and of a soft jelly-like texture. The banana was found in different sizes and types, there being nearly thirty varieties of this fruit on the islands. For vegetable roots the people used taro, supplemented by yams and sweet potatoes. Sugar cane was consumed in moderate amounts. The Marquesans did not till their soil, and though some of the trees and plants were given special care, the plant foods in general were obtained in their wild state, as the bountiful nature here supplied them.

Of animal foods, the Marquesans were passionately fond of raw fish, which were rapidly devoured just as soon as they were taken from the sea. The fish were consumed in their whole state, including the head, eyes, scales, bones, gills and internal organs. Other animal foods used by the Marquesans were fowl and pork, though these did not figure largely in the diet. The fowl were

rarely eaten, but were kept chiefly for the sake of their feathers, which were plucked out and used for decoration or ornament. The hogs were allowed to roam at large in the fruit and coconut groves, and on special occasions — the birth of a child, a wedding or funeral, the tattooing of a person of distinction, and certain large dances and festivals — some of them would be killed and eaten at the associated feast. Among a number of the tribes, however, the pork was tabu to the women and eaten only by men of the privileged order of society.

The Marquesan diet was very largely uncooked. In addition to fish, the young coconuts and many of the fruits were used without cooking or other culinary preparation. Taro roots were often grated and mixed with coconut oil; sugar cane was chewed in its raw state, and sometimes the juice would be extracted and consumed. Fresh breadfruit were usually roasted for ten to fifteen minutes on the embers of a fire, whereas various breadfruit puddings were baked for a short period on the hot stones of underground ovens. The latter method was also commonly used in the preparation of certain other foods, in particular yams and pork.

The first explorers to arrive at the Marquesas Islands called the people the healthiest and most beautiful in the world. Never before or since has a racial group been so enthusiastically extolled for its excellence of physical development. Glowing accounts told of the natives' superb physiques, fine countenances, very attractive facial features, and vivacious, happy dispositions. Some of the men were said to display the torsos and arms of veritable giants; the women were smaller, of delicate development and matchless perfection of form. The Marquesan teeth were described as pearly-white, completely immune to decay, and of perfect regularity. The people were said to live to great age and were strong and vigorous in advanced years. Travelers wrote with almost poetic delight of this paradise of song, games, swimming, dancing, mirth and laughter. Some of the early navigators were so impressed by the health and happiness of the people that they reported the islands as the Garden of Eden.

The testimony from the past, which illustrates the Marquesan physical superiority, commences with that derived from the voyage of Alvaro de Mendana, a navigator of the Spanish Viceroy. Mendana discovered four of the Marquesas Islands in 1595, and he made landing expeditions on each of them. His second in command, Fernandez de Quiros, was chronicler of the voyage, and three other Spaniards — Sanvitores, Figueroa and Mendoza — also left notes telling of their observations on the islands. All described the natives as finely formed and beautiful to behold, with Quiros leaving us the following description of the approach to Magdalena, the first island to be seen, and the impression made by the first natives who came to meet the ship:

"On the following day, without doubt whether that island was inhabited, the ships were steered to the south of it, and very near the coast. From a point under the peaked hill towards the east end, there came out seventy small canoes, not all the same size, made of one piece of wood, with outriggers of cane on each side, after the manner of the gunwales of galleys, which reach to the water on which they press to prevent the canoe from capsizing, and all their paddles rowing. The least number they had in a canoe was three, the greatest ten, some swimming and others hanging on—altogether, four hundred natives almost white, and of very graceful shape, well-formed, robust, good legs and feet, hands with long fingers, good eyes, mouth and teeth, and the same with the other features. Their skin was clear, showing them to be a strong and healthy race, and indeed robust. They all came naked, without any part covered; their faces and bodies in patterns of a blue color, painted with fish and other patterns. Their hair was like that of women, very long and loose, some of it twisted, and they themselves gave it turns. Many of them were ruddy. They had beautiful youths who, for a people barbaric and naked, it was certainly pleasant to see; and they had much cause to praise their Creator."

"Among them was a boy who appeared to be about ten years of age. He came rowing in a canoe, with two others. His eyes were fixed on the ship, and his countenance was like that of an angel, with an aspect and spirit that promised much, of a good color, not fair but white; his locks like those of a lady who valued them much. He was all that has been said, so that I never in my life felt such pain as when I thought that so fair a creature should be left to perdition."

On another island to be observed, Santa Christna, Quiros informs us that "The Chief Pilot did not see anything of the women because he did not land at the time that they came; but all who saw them reported that they had beautiful legs and hands, fine eyes, fair countenances, small waists, and graceful forms, and some of them prettier than the ladies of Lima, who are famed for their beauty."

Sanvitores reported that the people of this race "remain in good health to an advanced age and it is very normal to live ninety to one hundred years." Figueroa found the Marquesan men to be "well made, and of good stature," and he observed the young boys to have "beautiful faces and the most promising animation of countenance." He noted the women to be "extremely beautiful," having "delicate hands, a good shape, and slender waists." Mendoza stated that the Marquesans were "light-complexioned people of pleasing and regular features," with some of the men being "as large as giants, and of so great strength, that it has actually happened that one of them while standing on the ground, has laid hold of two Spaniards of good stature, seizing each of them by one foot with his hands and

lifting them thus as if they were children."

Mendana left the Marquesas on August 5 of the year of their discovery, and the islands were not visited again for nearly two centuries. In 1774 the illustrious Captain Cook rediscovered the group, with the addition of the island of Fatahuka. He found the natives to be the most beautiful he had ever seen, and he stated: "The inhabitants of these islands, collectively, are without exception the finest race of people in this sea. For good shapes and regular features, they perhaps surpass all other nations."

During the next score of years, a number of other prominent navigators stopped at the Marquesas Islands, and the northern section of the island group was first observed by an American, Captain Ingraham, in 1777. The first missionary ship to arrive at the islands was the British vessel, Duff, which came in 1797 and left one missionary in the area. Captain Wilson was commanding officer of the ship, and when three miles from shore he noted his first visitors: "They were seven beautiful young women, swimming quite naked, except for a few green leaves tied round their middle; they kept playing round the ship for three hours." The first taken on board was described as "offering such symmetry of features, as did all her companions, that as models for the statuary and painter their equal can seldom be found."

Upon landing and observing the general population, Captain Wilson also made many insertions in his journal account that are pertinent for this study. As examples: "The women at the Marquesas, for beauty of feature, symmetry of form, and lightness of color, far exceeded the other islands. . . . Their diseases are few; I have indeed hardly observed the appearance of any. . . . Not a single deformed or ill-proportioned person was seen on the island; all were strong, well-limbed and remarkably active. . . . Their countenances are pleasing, open and display much vivacity."

In 1804 the Russian explorer, Captain Krusenstern, stopped at the Marquesas Islands and visited the island of Nukuhiva. Here he made a considerable study of the inhabitants and gave these notations as to their physical well being: "The Nukuhivers are invariably of a large stature, and well made; they are very muscular, with a long handsome neck; have a great regularity of countenance; and an air of real goodness which was not belied by their dealing with us. . . . These islanders are besides remarkable for having no deformed persons among them, none of us at least saw any, and their bodies are besides free from hues and sores. . . . The Nukuhivers are in the enviable possession of the most constant health, and they have hitherto been so fortunate as to escape the venereal disease; as they are free from complaint, so are they ignorant of all medicine."

During the following year another Russian voyager, George Von Langsdorff, entered the Marquesas area and carried out an

extensive investigation of the archipelago. While stationed near one of the islands, at the time of his arrival, he made these observations:

"A number of islanders a short the after came from the opposite shore of the harbor, which was to the northwest and swam to the place where we were anchored, a distance of three miles. At first we could only see a shoal of black-haired heads just above the water; but in a short the we had the very extraordinary spectacle presented us of some hundred men, girls and boys, all swimming about the ship, having in their hands coconuts, breadfruit and bananas, which they had brought to sell. The cries, the laughter of these mirthful people, was indescribable, and made a very novel impression upon us. Only a few, whom Roberts pointed out as persons of distinction, were invited on board, the rest swam and played about like a group of Tritons."

On land Langsdorff noted that the Marquesans "excel in beauty and grandeur of form, in regularity of features, all the other South Sea Islanders." The people's expression of countenance was "generally pleasing" and "open and animated." The women were found to be much smaller than the men, but they were said to be "extremely well proportioned, being "of pleasing form, with slender waists and great vivacity, so that they had just cause to be called handsome. They have "well formed heads, their faces are rather full and round rather than long, they have large sparkling eyes, clear complexions, very fine teeth, great expression and regularity of features and generally black curly hair."

Of the other sex Langsdorff had this to say: "The men are almost all tall, robust and well made. Few were so fat and unwieldy as the Tahitians, none so lean and meagre as the people of Easter Island. We did not see a single cripple or deformed person, but such regularity of form that it greatly excited our astonishment. Many of them might very well have been placed by the side of the most celebrated masterpieces of antiquity, and they would have lost nothing by comparison. Their beards are commonly shining, black, and thin, as they are very much in the habit of plucking up the hairs by the roots. The hair is generally long, curly, strong and black; among a few it was less black."

"A certain Mau-ku-u, or Mafau Tapautakava, particularly attracted our attention from his extraordinary height, the vast strength of his body, and the admirable proportion of his limbs and muscles. He was now twenty years old, and was six feet, two inches high, Paris measure, and Counsellor Telesius, who unites the eye of a connoisseur and an artist, said he never saw one so perfectly proportioned. He took the trouble to measure every part of this man with the utmost exactness, and after our return to Europe imparted his observations to Counsellor

Blumenbach, of Gottingen, who has studied so assiduously the natural history of man. This latter compared the proportions with the Apollo of Belvedere, and found that those of the masterpiece of the finest ages of Grecian art, in which was found every possible integer in the composition of manly beauty, corresponded exactly with our Mafau, an inhabitant of the island of Nukuhiva. We were told that the chief of a neighboring island, by the name oh Upoa. with equally exact proportions as Mafau, was at least a head taller, so at least Roberts and Cabri both assured us; if they were correct this man must be nearly seven Paris feet high."

Regarding other observations on the Marquesas Islands, Langsdorff noted that the women experienced very easy delivery in childbirth, with labor usually lasting about a half-hour. The children were not weaned until they were able to speak or go about alone, and fruits and raw fish supplemented the milk fare in these early years. The people were found to have extreme facility in climbing trees and steep rocks, but it was in the sea that they displayed the most incredible celerity. They learned to swim when mere infants, and many of the adults would spend half their waking hours in the water. A number swam about the ship for the greater part of the day. without ever appearing tired. They would even eat meals in the water, having the coconut, breadfruit and bananas tied on the end of a stick, which each would carry to sea. Thus guiding themselves solely by the feet, they could easily shell and eat a coconut. Some of the women swam with little children on their shoulders, and others would think nothing of throwing themselves from high rocks and cliffs into the water. Some of the men ran up the main mast of the ship many times, and hurled themselves from it into the sea in a frenzy of delight and pleasure.

The Marquesans were impressive to Langsdorff, and they were equally so to the American, Commodore David Porter, who saw them in 1818. Commodore Porter visited different islands in the group, but spent most of his time in the valleys of Happa, Shoeume and Hannahow in Nukuhiva. Here he observed thousands of natives, and stated that "a more honest or friendly and better disposed people does not exist under the sun." He noted that "all are in health and vigour: old and young are active and strong." Regarding the general characteristics of the people, he pointed out:

"They have been stigmatized by the name of savages: a term wrongly applied; they rank high on the scale of human beings, whether we consider them morally, or physically. We find them brave, generous, honest, benevolent, acute, ingenious, and intelligent, and the beauty, and regular proportions of their bodies correspond with the perfections their minds. They are far above the common stature of the human race, seldom less than five feet eleven inches, but most commonly six feet two or three

inches, and in every way proportioned. Their faces are remarkably handsome, with keen, piercing eyes; teeth white, and more beautiful than ivory; countenances open and expressive, which reflect every emotion in their souls; limbs which might serve as models for a statuary, and strength and activity proportioned to their appearance."

The women were described by Porter as "possessing open and intelligent countenances, fine eyes and teeth, and much acuteness and vivacity. Their limbs and hands are much more beautifully proportioned than those of any other women." The young girls "were handsome and well formed, their skins were remarkably soft and smooth, and their complexions no darker than many brunettes in America, celebrated for their beauty."

Other American travelers to visit the Marquesas, and see the natives in their primitive state, were the naval officers, Captain Fanning and Captain Finch. The former observed natives in the northern part of the island group, and he found all the men to be "well formed and exceedingly active, either on land or in the water," with both sexes having "excellent teeth, as white and sound as one could declare possible." Captain Finch and his party went into Happa Valley, and the chaplain, Stewart, reporting on the trip, noted that the natives were "decidedly a finer and more handsome looking people than the Society or Sandwich Islanders." He described the women as being "exceedingly beautiful," and observed that "in figure, they are small, and delicately formed, with arms and hands that would bear comparison with any in the drawing rooms of the most polished noblesse. . . . Their eyes have a rich brilliancy, softened by the long glossy eye-lashes that can scarce be surpassed, which with a regularity and whiteness of teeth unrivalled, add greatly to the impression of features of a more European mould than most uncivilized people I have seen."

Few writers have touched upon the Marquesas Islands with the genius of Herman Melville. This celebrated writer of a century ago saw the Marquesas in 1844 during a four-months residence in the Typee Valley (adjoining Happa Valley) of Nukuhiva Island. The residing natives were about two thousand in number. They were known as a war-like people who resisted the influx of civilization, and their valley was one of the last parts of the island to become civilized. At the time of Melville's visit they were still living under conditions of comparative isolation, and some of them had never before seen a white man. The native diet, in all particulars, was yet in use. Melville described the Typees in eloquent and poetic terms and found them to be magnificent examples of physical perfection. One of the young girls, by name Fayaway, especially attracted his attention, and her description, which "will in some measure apply to nearly all the youthful portions of her sex in the valley," is here given in part:

"Her free pliant figure was the very perfection of female grace and beauty. Her complexion was a rich and mantling olive, and when watching the glow upon her cheeks I could almost swear that beneath the transparent medium there lurked the blushes of a faint vermillion. The face of the girl was rounded oval, and each figure as perfectly formed as the heart or imagination could desire. Her full lips, when parted with a smile, disclosed teeth of dazzling whiteness; and when her rosy mouth opened with a burst of merriment, they looked like the milk-white seeds of the 'arta,' a fruit of the 'valley, which, when cleft in twain, shows them reposing in rows on either side, imbedded in the rich and juicy pulp. Her hair of the deepest brown parted irregularly in the middle, flowed in natural ringlets over her shoulders, and whenever she chanced to stoop, fell over and hid from view her lovely bosom. Gazing into the depths of her strange blue eyes, when she was in a contemplative mood, they seemed most placid yet unfathomable; but when illuminated by some lively emotion, they beamed upon the beholder as stars."

Melville also described the "matchless symmetry of form" of one of the men. "His unclad limbs were beautifully formed; the elegant outline of his figure, together with his beardless cheeks, might have entitled him to the distinction of the Polynesian Apollo; and indeed the oval of his countenance and the regularity of every feature reminded me of an antique bust. But the marble repose of art was supplied by a warmth and liveliness of expression only to be seen in the South Sea Islander under the most favorable development of nature. The hair of Marnoo was a rich curling brown, and twined about his temples and neck in close curling ringlets, which danced up and down continually when he was animated in conversation."

But it was not only in certain individuals that such physical excellence was found. At one of the many dancing festivals, where nearly all inhabitants of the valley were gathered, Melville noted: "In beauty of form they surpassed anything I had ever seen. Not a single instance of natural deformity was observable in all the throng attending the revels. Occasionally I noticed among the men the scars of wounds they had received in battle; and sometimes, though very seldom, the loss of a finger, or an eye or an arm, attributable to the same cause. With these exceptions every individual appeared free from those blemishes which sometimes mar the effect of an otherwise perfect form. But their physical excellence did not merely consist in an exemption from these evils; nearly every individual of their midst might have been taken for a sculptor's model."

On yet another occasion Melville observed: "Nothing in the appearance of these islanders struck me more forcibly than the whiteness of their teeth. The novelist always compares the masticators of his heroine to ivory; but I boldly pronounce the

teeth of the Typees to be far more beautiful than ivory itself. The jaws of the oldest greybeards among them were much better garnished than those of most of the youth in civilized countries; while the teeth of the young and middle-aged in their purity and whiteness, were actually dazzling to the eye."

Melville referred to the "light-hearted joyousness and continual happiness" that everywhere prevailed in the valley. This, he thought, sprung principally from "the mere buoyant sense of a healthful physical existence. And indeed in this particular the Typees had ample reason to felicitate themselves, for sickness was almost unknown. During the whole period of my stay I saw but one invalid among them; and on their smooth clear skins you observed no blemish or mark of disease."

Melville provided one of the last descriptions of Marquesan life as it still existed under the age-old customs of the race. There were, however, some Marquesans that remained in isolation, living upon native foods, throughout the following years and indeed up to the present century. In the early nineteen-twenties a group of these were found living on one of the islands, and they were extensively photographed for the travel film, *Gow*, covering primitive life on the South Sea Islands. The splendid health, perfect physiques and great vivacity and happiness of these natives were then given vivid illustration. In more recent years the number of individuals living entirely on native foods has doubtless further decreased, and on the islands visited by Dr. Price in 1934, only a few remained for observation.

With the exceptions mentioned, the general Marquesan population has followed a historical pattern similar to that of other primitive races, with most sections of the islands being subjected to the influences of civilization even prior to and during the of Melville's residence. In the vicinity of Nukuhiva Bay, where there was much commerce between Europeans and natives, Melville noted that the people were addicted to civilized vices, suffered from disease, and were much inferior in physical strength and beauty to the inhabitants of Typee Valley. Missionaries had arrived and were busily engaged in the process of saving the natives from the gods of their traditional antiquity. European clothing was replacing, by force of missionary demands, the nudity and semi-nudity of the past. Special foods were imported for use by the missionaries, and soon the natives were using them too. Trade ships brought in tea, salt, biscuits, syrup, sugar, flour and liquor. Opium was shipped to the islands in large amounts to please the immigrant Chinese, and its use quickly spread among the natives. The change in Marquesan life proceeded gradually throughout the years, and today it may be seen in its total culmination. The modern Marquesan has largely ceased to depend upon the sea for food, and few of the staple plant foods known in the past are ever eaten. The basic portion

of the diet now consists of white flour products, refined sugar and other modern foods, which are obtained from trade ships in exchange for the native productions of cotton, coffee, vanilla and copra.

Throughout the past century, writers and travelers have told of the Marquesas Islands and the tremendous changes, both physical and mental, affecting the native people. Just as soon as the new foods and civilized vices came into use in a respective district did the people become ill and rapidly die. In Happa Valley, for instance, the group of people described in such moving terms by Porter and Stewart gradually submitted later to the introduction of civilized ways. In 1888 the visiting poet, Robert Louis Stevenson, reported them to have been very nearly wiped out by small-pox, tuberculosis and other diseases. Only two survivors, a man and woman, remained to flee from the newly created solitude.

So deadly were the infectious diseases in the Marquesas that only 52,000 of the natives were still living at the time of the 1842 census; 4,000 were counted at the beginning of the twentieth century, and today less than half that number—scarcely one per cent of the original population—remain. They are a sick and dying primitive group, struggling to maintain their existence and preserve their race. The French government has supplied them with a hospital, four leper asylums, modern dispensaries and advanced medical services, but this seems to be of no avail in the face of innumerable diseases that strike. Measles and certain other infectious ailments are less common than formerly, but tuberculosis remains a serious problem, and about ten per cent of the natives exhibit symptoms of the disease. Few of the islanders retain a clear and smooth skin, and various forms of skin eruptions and ulcerations, in particular leprosy, are frequently seen. Physical deformity is not uncommon, with the average stature of the people no longer reaching the lofty proportions of former days. The most striking change, however, is to be seen in the condition of the teeth, for dental decay is rampant and discoloration is the usual rule.

Such are the physical changes which have followed in the wake of modern foods. The mental changes have been no less marked. What had been called the world's happiest and most active race has become unhappy, lethargic and lazy. Residents and visitors have told in many volumes of the gloom and depression which have settled over these islands. Survivors of the pestilences and diseases see their villages desolated and their friends forever lost. Missionaries come out to console and save them, but the natives only bring out the deformed and dying and lay them in front of the missionaries, as evidence that the white god does not save them. The natives see their approaching end. They view it without fear, but with a melancholy and sorrow so tragic and deep that words can hardly describe them. In resigned

distress the people mourn, suffer and look forward to the inevitable, without confidence and without hope.

"Today," declares O'Brien, "insignificant in numbers, unsung in history, they go to the abode of their dark spirits, calmly and without protest. A race goes out in wretchedness, a race worth saving, a race superb in manhood when the whites came. . . . Soon none will be left to tell of their departed glories. Their skulls perhaps shall speak to the stranger who comes of a few decades hence, of a manly people, once magnificently perfect in body, masters of their sea, unexcelled in the record of humanity in beauty, vigor and valor."

So concludes the dramatic history of the vanishing Marquesans. Living in their primitive state chiefly upon tropical fruits, plant roots and coconuts, with moderate amounts of animal sea food, the Marquesans perhaps exceeded all other races in terms of beauty of body, regularity of features and happiness of mind. They maintained high immunity to virtually all forms of disease and lived over a great span of years. With the advent of the white man, and the corresponding change in physical environment and dietary habits, the picture rapidly changed, as former qualities and attributes were lost and severe physical deterioration set in. The final tragedy, as is exemplified by modern Marquesan life, stands as a remarkable contrast to the existence of old, when happiness was complete and physical perfection the general rule.

Pitcairn's Island

OF THE FAMOUS sea stories of the past, few compare in drama and excitement with that of the Mutiny on the Bounty. The writers, Nordhoff and Hall, have woven the facts and legends of this well known historical event into the romantic and interesting tale which has been read by millions throughout the world. Later production on the screen gave many others an insight into the general pattern of this celebrated drama. The sequel to the story, covering the Pitcairn's Island adventure of the seamen who mutineered, has also been told many times. What has been less often considered, however, and indeed now almost forgotten, is the experience of the descendants of the mutineers, a little race of its own, which developed a form of primitive nutrition and exemplified a state of primitive health. The factual data connected therewith has long been available and we shall consider it here, starting with a short introduction which covers very briefly the preceding events of the voyage of the Bounty and the associated mutiny.

The story begins in 1787, when the H. M. S. Bounty, under the command of the notorious Captain William Bligh, sailed from England on a voyage to the South Seas. The ship was fitted out by the English government for the purpose of obtaining plants of the breadfruit tree, which afforded the inhabitants of the Society Islands, in particular Tahiti, a large portion of their nourishment. This step was taken in response to a request made from the planters and merchants interested in doing business with the government's West Indies. The breadfruit was desired to be transported to these possessions and there planted to serve as a cheap food for the slave labor engaged to work for the English.

The first part of the mission was readily accomplished in the allotted time. Thousands of plants were gathered from Tahiti and placed on board ship. The return voyage was never made, however. Under the cruel treatment of the brutal Captain Bligh the majority of seamen mutineered. They placed the Captain and those who remained loyal to him in a small boat at sea, and taking full control of the ship themselves, they returned again to Tahiti. Here a number of those on board were left to settle in a new life with the natives. The nine remaining seamen, including Fletcher Christian, the second in command to Bligh, and ten

Tahitian women, one girl and six Tahitian men, sailed again in search of an uninhabited island which might afford them a settlement in safety from the punishment of the English government.

Pitcairn's Island, located several hundred miles south and west of Tahiti, and not heretofore visited by voyagers, was chosen, and the landing was made in 1789. Captain Bligh and his party in the meantime made their way to the East Indies, landing on the island of Timor after much suffering and hardship at sea. They were then transferred to England, where they told the story of the mutiny, and action was immediately taken. A ship was sent to Tahiti, where the mutineers who were left were captured. Four of these died in a shipwreck on the return voyage to England. Of the ten who were tried for mutiny, six were found guilty and four were acquitted. Search was made in the following years for the *Bounty* and its seamen, but without success.

Returning to Pitcairn's Island, we find life beginning successfully for the mutineers, their Tahitian wives and men. Shelters were constructed from the materials at hand; the lands were cultivated, and fish were obtained from the sea. For a few years life was peaceful, and though there was some quarreling, cooperation was general pertaining to the necessary work to be done. Soon, however, there developed jealousy between the men over the affections of the women, and two Tahitian men died mysteriously thereafter, perhaps as a consequence. Secret plots followed; the remaining Tahitian men suspected the seamen of planning to control all land and make the others the workers and slaves. Soon the Tahitians started a bloody massacre, killing five of the seamen, but in the ensuing battle the Tahitians were also killed, leaving but four men and the eleven women and their children on the island. The men thereafter learned to make a strong liquor from the ti-plant; an orgy of drinking followed, the women sometimes taking part, but later moving elsewhere on the island to live alone and care for their children. Soon one of the seamen, McCoy, died in a mad suicidal leap from a high cliff. Another, Quintal, was killed by Young and Smith, and the former died of asthma in 1789. Thus leaving the one seaman, all the women, and by now a flock of children, on the island, life proceeded in peace. Smith taught the children to speak English, also to read, and a primitive community was in the process of development.

The diet of the islanders from the very beginning consisted of the local foods the land and sea could provide. Coconuts, breadfruit, plantains, watermelons, pumpkins, yams, sweet potatoes, taro and sugar cane were in general use. Animal foods were seldom eaten, usually no more often than twice a week, and then consisting of fish or pig. Distilled liquors were not used after the deaths of McCoy and Quintal.

After nineteen years of island life without a visit from the outside world, the American ship, *Topaz*, under the command of Captain Folger arrived in 1808. Smith came out to meet the ship, along with the others, and he informed the Captain of the mutiny and all later experiences. A chronometer and compass from the *Bounty* were given by Smith for forwarding to the Admiralty, but they were apparently never received in England. For no notice was taken of the discovery until 1814, when the *H. M. S. Britain* and *Tagus* arrived under Captains Stains and Pipon. The former related all details of the amazing answer to the *Bounty* riddle to Admiral Dixon, who made them public in England to the surprise and interest of all.

By this time the little Pitcairn group had multiplied to forty-six, and both Captains described the settlement as the happiest and most delightful they had ever seen. Cooperation and contentment was general among all, and the people were very healthy and strong. The descendants of the mutineers were now young men and women of splendid physiques, and their children in turn were also fine in appearance. Under the wise leadership of Smith the community prospered in all ways and exemplified all that might be desired. In the words of Captain Stains: "The young men all born on the island were very athletic, and of the finest forms, their countenance open and pleasing, indicating much benevolence and goodness of heart; but the young women were objects of particular admiration, being tall, robust, and beautifully formed, their faces beaming with smiles and unruffled good humor, but wearing a degree of modesty and bashfulness that would do honor to the most virtuous nation on earth; their teeth like ivory were regular and beautiful; and all of them, both male and female, had the most marked English features. The clothing of the young females consisted of a piece of linen reaching from the waist to the knees, and generally a sort of mantle thrown over the shoulders, and hanging as low as the ankles, but this covering seemed chiefly as a protection against the sun and weather, as it was frequently laid aside, and then the upper part of the body was entirely exposed, and it is not possible to conceive of more beautiful forms than they exhibited."

Captain Pipon recorded: "A young girl accompanied us to the boat, carrying on her shoulders as a present, a large basket of yams, over such roads, and on such roads, and down such precipices, as were hardly passable by any creatures except goats, and over which we could scarcely scramble with the help of our hands. Yet with this load on her shoulders, she skipped from rock to rock like a young roe."

The island was again visited a few times during the next decade, and in 1925 the people were host to the illustrious Captain Beechey, who described in detail their happy little settlement, and made the following comments on their health,

strength and general agility:

"The Pitcairn Islanders are tall, robust and healthy. Their average height is five feet ten inches; the tallest person is six feet and one quarter of an inch; and the shortest of the adults is five feet nine inches and one eighth. Their limbs are well proportioned, round and straight; their feet turning a little inwards. The boys promise to be equally as tall as their fathers; one of them whom we measured was, at eight years of age, four feet; one inch; and another, at nine years, four feet three inches. Their simple food and lots of exercise give them a muscular power and activity not often surpassed. It is recorded among the feats of strength which these people occasionally evince, that two of the strongest of the island, George Young and Edward Quintal, have each carried, at one time, without inconvenience, a kedge anchor, two sledge hammers, and an armorer's anvil, amounting to upwards of six hundred weight; and Quintal, at another time, carried a boat twenty-eight feet long.

"Their activity on land has been already mentioned. I shall merely give another instance which has been supplied by Lieutenant Belcher, who was admitted to be most active among the officers on board, and who did not consider himself behind hand in such exploits. He offered to accompany one of the natives down a difficult descent, in spite of the warnings of his friend that he was unequal to the task. They, however, commenced the perilous descent, but Mr. Belcher was obliged to confess his inability to proceed, while his companion, perfectly assured of his own footing, offered him his hand, and undertook to conduct him to the bottom, if he would depend on him for safety.

"In the water they are almost as much at home as on land, and can remain nearly a whole day in the sea. They frequently swam round their little island the circuit of which is at least seven miles. When the sea beat heavily on the island they have plunged into the breakers, and swam to the sea beyond. This they sometimes did pushing a barrel of water before them, when it could be gotten off in no other way, and in this manner we procured several tons of water without a single cask being stove.

"The treatment of their children differs from that of our own country, as the infant is bathed three times a day in cold water, and is sometimes not weaned for three or four years; but as soon as that takes place it is fed upon 'Popoe' made with ripe plantains and boiled taro rubbed into a paste. Upon this simple nourishment children are reared to a more healthy state than in other countries, and are free from fevers and other complaints peculiar to the civilized world. Mr. Collie remarks in his journal, that nothing is more extraordinary than the uniform good health of the children; the teething is easily got over, they have no bowel complaints, and are exempt from those contagious diseases which affect children in large communities."

In 1831 it was decided to move the Pitcairn Islanders to Tahiti, and a special ship was provided by the British government for this purpose. On March 6 all left, being given provisions of the usual British seamen's food while on board, and using like foods to some extent after arriving in Tahiti. But little time elapsed before they were taken sick; between April 21 and June 21 twelve of them passed away. Thus, discontented and fearful for their own lives, the remainder decided to return to Pitcairn's Island. Having chartered an American freighter for this purpose they left immediately. Three more died, however, before the voyage was ended, and another two died by the end of the year on the island.

The hogs having gone wild and destroyed the crops during the absence from their island, the Pitcairns were still in difficulty, and they took to distilling spirits from the ti-root, many of them drinking to great excess. Fortunately this was of short duration; in 1833 all stills were destroyed, a law was passed against drunkenness, and all were again feeding upon their native diet. Life had returned to the healthy conditions of the past, and so it was up to the year 1839, when Lieutenant Lowry visited them and made the following comments:

"At the time of our visit, they had increased to 102 (51 males and 51 females), a great part of them children, and as fine a race as I ever saw. Some of the girls and young women were very pretty, and would be considered beauties in Old England, and all were good looking. There was but one ever born on the island with any defect in his person, and that was only in his eye. Their manner of living is so simple, that they have few diseases, and deaths rarely visit them except in old age."

From here on this story returns to tragedy, as the British took official possession of the island and it became a trading-center for ships which occasionally stopped. These the islanders provided with sweet potatoes, yams, coconuts, oranges, pumpkins and other items, for which they received tea, flour, biscuits, salt beef and similar foodstuffs. The native foods were still used in part, but they were balanced in ever-increasing amounts with whatever importations they might obtain. More than two hundred ships visited the island between 1840 and 1856, leaving provisions of food as the people requested or were able to purchase.

The Register of Pitcairn's Island, carefully maintained from 1790 to 1854, as well as accounts from many voyagers, tell of rapid increases of disease taking place from 1841 on. In that year fifty cases of influenza were reported in a single epidemic. In 1843 the first death from cancer was mentioned, and in the following year sixty of the inhabitants were vaccinated. This seemed only to give the spreading ailments a further impetus, and in 1845 a bilious fever made its appearance, the Register telling us that "There is not a single house but what there are one

or more sick in." We are also informed in the same year that "Asthma, rheumatism, consumption, scrofula, and last but not least, influenza, under various modifications, are prevalent. Five times during the last four years, has the fever been rife amongst us, though it has not been so severe lately."

And so the conditions continued. An epidemic in 1849 afflicted every single inhabitant, and it was later followed in many of them by "a most distressing cough." In 1853 influenza returned to render most of the people seriously ill. In 1856 the missionary, Murray, observed that "Though the climate cannot be called unhealthy the people are not generally long-lived. Arthur Quintal, the oldest man now among them is about sixty years old. Elizabeth Young, daughter of the late John Mills, the oldest person on the island, is sixty-four, she having been born in 1792. The ailments to which the people are most afflicted are rheumatism, influenza, bilious affections and diseases of the heart."

The year 1856 marked a closing phase of the Pitcairn's Island adventure. As the small area was no longer capable of supporting the increasing population, which now counted 194, all were moved in the British ship, *Morayshire*, to Norfolk Island, some three thousand miles away. Here life began anew and a permanent settlement was formed. In later years some of the people again returned to Pitcairn's Island. However, in neither area were any important changes made in nutrition, and health conditions remained on the usual level common to civilized society.

Such was the aftermath of the Mutiny on the *Bounty*. Heretofore little known, and then only as a romantic and interesting story, we find it to have serious implications of concern to medicine and nutrition. From a small group of English seamen, mostly crude sailors and their Polynesian wives, development of a healthy and happy society, based upon the sound nutritional habits that nature necessitated. From then on, we observe the physical deterioration of the inhabitants of the same settlement, as they gradually lose their isolation and change their mode of nutrition. The experience of these people is one to remember.

Other Island Races

WE HAVE considered some of the more important island primitive races. Here we shall give thought to others, which likewise have presented a dietetic and medical history of significance. These include the remaining Polynesian racial groups, the Melanesians of the New Caladonia and the Fiji Islands, the natives of the Torres Strait Isles north of Australia, the Marianas Islanders, and the inhabitants of Tristan da Cunha in the South Atlantic Ocean.

Beginning with the Polynesian Isles, we view Tahiti, the largest and most famous island of the Society group. Originally it was called one of the most beautiful amid delightful of the South Sea Islands. The native population was about 240,000 in number. Dietary habits were much like those on the Marquesas Islands. Breadfruit was not so abundant, but other fruits and many coconuts and plant roots were plentiful. For the common people these plant foods constituted about nine-tenths of the food supply, the balance being in the form of fish. Control of the land was in the hands of the superior classes (chiefs, nobles and earees), and they received the choice of plant foods, as well as pig. Food preparation was simple, as among the Marquesans, but there was perhaps more cooking, and fish were consumed both raw and baked.

The first of the European voyagers to see the Tahitians was L. A. de Bougainville of France, who arrived at the island on April 2, 1768. Bougainville noted the natives to be "free from almost all our diseases," being also "better made and better proportioned people" than any he had seen elsewhere. He also observed: "The Tahitians are to be seen bathing in every river that we cross; their vigor and agility, even in old men, surpass those of our young folk. . . . The contented old age which they attain, without any infirmities, the acuteness of all their senses and the singular beauty of their teeth, which they keep at the most advanced age — what a testimony to the healthiness of the climate and the wholesomeness of the regimen followed by the inhabitants!"

A few years later Captain Cook visited Tahiti and his reports of the strength and beauty of the people, and the harmony of their natural life, corresponded with the earlier reports of Bougainville. He stated: "As to the people, they are of the

largest size of Europeans. The men are tall, strong, well-limbed and finely shaped. The tallest that we saw was a man upon a neighboring island, called Huaheine, who measured six feet three inches and a half. The women of superior rank are also in general above our middle stature, but those of the inferior class are rather below it, and rather small. Their natural complexion is that kind of clear olive, or brunette, which many people in Europe prefer to the finest white and red. In those that are exposed to the wind and sun, it is considerably deepened, but in others that live under shelter, especially the superior class of women, it continues its native hue, and the skin is most delicately smooth and soft: they have no tint in their cheeks which we distinguish by color. The shape of the face is comely, the cheek-bones are not high, neither are the eyes hollow, nor the brow prominent: the only feature which, in general does not correspond with our ideas of beauty is the nose, which in general is somewhat flat; but their eyes, especially those of the women, are full of expression, sometimes sparkling with fire, and sometimes melting with softness; their teeth also are, almost without exception, most beautifully even and white, and their breath perfectly without taint."

The naturalist, Dr. Forster, who arrived at Tahiti with Captain Cook, gave the following description of the superior and common people of the island: "The features of the face were generally regular, soft, and beautiful; the nose something broad below; the chin is overspread and darkened by a fine beard. The women have an open cheerful countenance; a full, bright and sparkling eye; the face more round than oval; the features heightened and improved by a smile which beggars all description. The rest of the body above the waist is well proportioned, included in the most beautiful and soft outline; and sometimes extremely feminine. The common people are likewise, in general, well-built and proportioned, but with limbs and joints delicately shaped. The arms, hands and fingers of some are so exquisitely delicate and beautiful that they would do honor to a Venus de' Medicis."

From the journals of Captain Wilson of the ship, Duff, we are told that the eyes of the Tahitians "are black and sparkling; their teeth white and even; their skin soft and delicate; their limbs finely turned; their hair jetty, perfumed and ornamented with flowers; they are in general wide and large over the shoulders." The women "possess eminent feminine graces; their faces are never darkened with a scowl, or covered with a cloud of sullenness or suspicion. Their manners are affable and engaging; their step easy, firm and graceful; their behavior free and unguarded; always boundless in generosity to each other and to strangers; their tempers mild, gentle, and unaffected; slow to take offence, easily pacified, and seldom retaining resentment or revenge, what ever provocation they may have received. Their

arms and hands are very delicately formed; and though they go barefoot, their feet are not coarse and spreading."

Similar testimony might be quoted from other voyagers of the eighteenth century, all indicating much the same, and describing the beauty and general happiness and contentment of the Tahitian people. Among the superior classes the luxury of food and the great quantities in which it was consumed often led to a condition of corpulency in later years, but beyond this the people were much as have been described — fine in development, beautiful in features, with teeth of general perfection. Diseases among them were not common, and the length of life was long, the people retaining strength and vigor into the late years.

Dietary change came gradually at the beginning of the nineteenth century. The natives were then curiously trying the new foods which the seamen from other lands would bring them. Liquors soon began arriving in quantity, and many made intoxicating drinks from the native ava plant. Coconut toddy, an intoxicant made from the coconut, also came into widespread use. Coffee, tea and tobacco became common items of the new Tahitian life.

Results were quickly forthcoming. Infectious diseases arrived with dramatic suddenness, and by 1850 the greater part of the population had died in epidemics of smallpox and tuberculosis, diseases which were unknown before the white man arrived. Other diseases also became common. In the years 1872-82 Coppinger studied the remaining population and commented as follows upon one aspect of their physical condition:

"A great number of both sexes were affected with a rather unsightly skin disease, evidently of a parasitic character, which they call 'pester.' It begins on the chest and shoulders in small circular patches somewhat resembling 'ringworm,' and evidently extends over the entire cutaneous surfaces, causing disfiguration of the cuticle and giving rise to a very distressing itching. When the disease has become well established, the skin exhibits grooves of the 'snail-track' pattern, which intersect each other in various distances that on examining at a few yards distance a man who is extensively diseased, he seems at first sight as if covered with artificial cicatrices, arranged so as to represent some hieroglyphic device.

Modern studies of the Tahitians indicate continuance of physical deterioration, and a change in mental attitude similar to that seen in the modernized Marquesans. Formerly the people were lovers of song, dancing, games and swimming, but these have been forgotten, and all seem depressed and lethargic, as they see their own health fade and the race diminish in number. A marked narrowing and lengthening of the face, together with decay of teeth and changes in the dental arch form, have all but destroyed the classical Tahitian beauty so highly prized in past

generations. In the first World War, the French moved many of the able-bodied natives to the battlefields of Europe, and most of those who returned were maimed and crippled. Today less than five per cent — only 10,000 — of the original population remain, and nearly all of these are living largely upon refined flour products and canned goods. Groups still using entirely native foods are very few, but these significantly have escaped all form of physical deterioration, and they are healthy and happy. Those studied by Price were very fine looking, with excellent dental arches and complete immunity to tooth decay.

The next important settlement of the Polynesian race is the Tongan Isles, located south and east of Tahiti, between 18 and 22 degrees south latitude. The primitive diet here was quite similar to that of other Polynesians. Some of the islands were laid out almost entirely in plantations of breadfruit, coconuts, bananas, plantains, sugar cane and yams. The superior classes had pig, as well as the choicest of vegetable products, though animal sea foods were available for everyone, and some of the lower order of society included, in small measure, the flesh of rats in their diet.

Captain Cook spoke well of the people, giving these notations in his journal: "They have a good shape, and regular features, and are active, brisk and lively. The women in particular are the merriest creatures I ever met with. . . . They have fine eyes, and in general good teeth, even to an advanced age. . . . The bodies and limbs of most of the females are well proportioned; and some absolutely perfect models of a beautiful figure."

Captain Cook referred to the presence of a skin disease among some, but beyond this stated that he saw "neither sick nor lame amongst them; all appeared healthy, strong and vigorous." On another occasion he provided similar data, stating that "they may be considered as uncommonly healthy; not a single person being seen, during our entire stay, confined to the house by sickness of any kind. On the contrary, their strength and activity are in every way answerable to their muscular appearance; and they exert both, in their usual employment and in their diversions, in such a manner, that there can be no doubt of their being as yet little debilitated by the numerous diseases that are the consequence of indolence, and an unnatural method of life."

Few people have been happier in their primitive state than the Tongans. Captain Cook pointed out that "joy and contentment are on every face." The island group was first known as the Friendly Isles because of the friendly attitude of the natives toward the early navigators. Hundreds of them would throng every new ship that might come, and on shore the visitors would be royally entertained in every manner that was possible. There were games and dancing almost every day, and swimming and frolicking in the sea. were included in the common pastimes.

The Tongan Islands have retained a greater degree of isolation than has any other South Sea group. During World War I the price of copra increased from \$40.00 to \$400.00 per ton, which brought trading ships with white flour and sugar to exchange for the copra. This was followed by much dental decay and disease in the port areas, but elsewhere on the islands the people remained generally healthy. When Price arrived, the trade ships seldom called at the islands, for the price of copra had dropped tenfold and the product was no longer in great demand. The people in the port areas still had dental caries, to the proportion of 33.4 per cent, but further decay was arrested and the caries were no longer active. On the more isolated islands the percentage of dental decay was only 0.6 per cent.

The old Hawaiians represent another Polynesian group. About 60 to 75 per cent of their calories were derived from the taro root and sweet potato, with coconut, breadfruit, guavas, bananas, papaya, fish and pig as supplementary foods. The fish were often eaten raw, though they were highly salted by some of the lower classes, as was the other flesh. Among a few of the chiefs the ava plant found frequent use.

These islands were discovered by Captain Cook, and after this great navigator met his death at the hands of

natives, Captain King issued the necessary reports. He stated that the Hawaiians who used great quantities of salt in their diet often suffered from boils and ulcers, and chiefs consuming the intoxicating drinks made from the ava plant suffered severely, having many diseases and being afflicted with early and decrepit old age. The remaining population, however, constituting the great majority, was described as healthy and happy, fond of running and playing over the sands and disporting themselves for hours in the ocean.

“They seem to have few native diseases among them,” declared King. They are, in general, above the middle size, and well made; they walk very gracefully, run nimbly, and are capable of bearing great fatigue. . . . Many of both sexes had fine open countenances; and the women, in particular, had good eyes and teeth, and a sweetness and sensibility of look which rendered them very engaging.”

Settlers from Japan and America arrived in the Hawaiian Islands after the discovery, and throughout the nineteenth century they imported foods for their own use, and for the natives as well. Later came the Chinese, Portuguese and Filipinos, increasing further the food importations. Finally the manufacture of canned and refined products was accomplished directly on the islands, and today the native Hawaiian lives primarily upon these, adding occasionally a little poi, raw fish or other native food.

The population of the islands was estimated at about 300,000 at the time of Captain Cook’s visit. Bloody tribal wars during

the next score of years depleted much of the male population, with an epidemic disease between 1802 and 1807 also killing many thousands. In 1820 missionaries arrived, and three years later they estimated the population at 142,000. Then came many more traders and considerable business development, and by 1853 the census count indicated only 73,138 natives yet remaining, with measles, whooping cough, diarrhea and influenza having struck with epidemic force on nearly all islands. Through the continuing years, up to the present day, the death rate has exceeded the birth rate, and as of July, 1949, only 10,548 pure Hawaiians remained.

Respiratory ailments and blood vessel diseases now account for the greater proportion of deaths, with severe dental troubles adding to the native difficulty. According to the 1934 report of Jones, Larson and Pritchard, covering their Hawaiian investigations, "the teeth of Hawaiian babies of today are often ravaged by decay before they completely erupt. The contour of the face has changed, with a progressive receding of the chin, narrowing of the nostrils and general facial structure, and malformity of the dental arch. From a once proud and noble race, physically sturdy and mentally happy, the Hawaiians have thus deteriorated and suffered, as they now approach possible extinction.

Other Polynesian lands are the Samoan Islands, Phoenix Islands, Cook Islands and Easter Island. The native experiences here have been much the same as elsewhere. A marked physical decadence has invariably followed the use of imported foods. In American Samoa this has been most clearly described by many travelers. The Samoans of centuries past lived chiefly upon fruits, coconuts, yams, sugar cane, and many animal sea foods — shell fish, sea crabs, octopus and beche-de-mer — most of which were used in the raw state. Their health was then very good; infectious diseases were rare; the people were unusually fertile, and death was said to have resulted in general only from accident or old age. Today the people are going through the unhappy experiences of epidemics and degenerative diseases. Thompson has described whooping cough and measles as being very common, with yaws afflicting nearly every child at one time or another. Many of the women are said to be barren. Only in the more remote and isolated districts have a few native groups lived almost entirely without modern foods, and they have preserved their normal immunity to disease. Price listed the percentage of dental decay at only 0.3 per cent in these sections.

South and east of Samoa lie the Fiji Islands, and a few hundred miles beyond these is New Caledonia. Here live members of another race, the Melanesians, a dark people, shorter than the Polynesians, with long, kinky hair and broad, muscular bodies. In their primitive state they were considered very strong and quite healthy, having good physiques and

excellent teeth, the latter often stained, however, as a result of chewing the betel nut.

Melanesian foods were fruits, vegetable roots, animal sea food and pig. Fresh water fish were used by the natives living near the few mountain streams. Of significance is the fact that treaty arrangements between the warring inland and seacoast tribes assured an interchange of plants for sea foods at all times, thus assuring both of adequate nutrition. One of the favorite Melanesian foods was the meat of the coconut crabs. These animals were captured when they climbed the coconut trees to obtain food. They were then placed in large pens and fed shredded coconut until they were so fat that they burst their shells. At this time they were considered delicious and eaten in large amounts.

According to reports in the late nineteen-thirties, there were still some Melanesians living upon native foods. Physically they were strong and well-developed, with high immunity to dental caries. The other Melanesians, constituting the great majority, live largely upon white flour products, polished rice, refined sugar and canned foods. Their numbers have been decreasing throughout the past hundred years, and the death rate still exceeds the birth rate. The epidemic diseases have accounted for most of the deaths, with a single epidemic of measles carrying off about 40,000 natives in Fiji in 1875. Today the degenerative diseases are becoming more common. Dental decay and abscessed teeth are so serious they have been listed as frequent causes of suicide, there being no dentists present in many areas to prevent pain and suffering. General narrowing and lengthening of the face, with crowding of the teeth in the dental arch, have given the modern Melanesian a different appearance than has been characteristic of the race.

In the Torres Strait, between New Guinea and northern Australia, live another dark-skinned people, these of Asiatic and Malay stocks. The numerous small islands in the area each support a population of a few hundred to several thousand. The natives of most of the islands buy their food at government food stores. On the more isolated islands, and even a few on which a number of whites have settled, the native foods are still in use. These include taro, pumpkins, bananas, papayas and plums as the staple plant foods, together with a great variety of scalefish and shellfish.

The natives of the islands were studied by Price. He found that they suffered from a high degree of dental decay and other disease when foods were purchased from government stores. The groups using native foods all had "sturdy development throughout their bodies, broad dental arches" and a "close proximity to one hundred per cent immunity to dental caries." The strength of the native swimmers was said to be "almost beyond belief." Dr. J. R. Nimmo, a physician on one of the

islands, told Price that in thirteen years he had failed to see a single case of malignancy among the four thousand natives using their customary foods. At the same time he found it necessary to operate in cases of several dozen malignancies among the white population, numbering only a few hundred, all of whom consumed modern foodstuffs. Other conditions requiring surgical interference were also reported to be very rare among the primitive stock.

Next we consider the Marianas Islands, lying about two thousand miles directly east of the Philippine Islands in the Pacific Ocean. When discovered, these islands were represented as a veritable paradise, abounding in everything necessary for life, with delicious fruits — guavas, limes, sweet oranges, breadfruit, bananas, watermelons, etc. — found everywhere, and the nearby seas containing great numbers of fish to add to the food supply. The topography was a delightful intermixture of valleys and rolling hills, with clean and well-kept villages to shelter the happy population then numbering about one hundred and fifty thousand.

The people were of Malayan racial stock, being as dark in color as those of the East Indies, but taller in stature, more robust and active. Pigaffeta in 1521 referred to the women as being "beautiful and delicate," and other voyagers were likewise complimentary in their comments on the physical appearance of the people. The Marianas were a healthy race; they were naturally acute and ingenious, and previous to arrival of the Europeans they thought themselves to be the only people in the world. In their disposition they were particularly cheerful; as navigators they were active and intelligent, spending much of their time in the sea both for pleasure, and the acquisition of food.

In 1667 the Spanish missionaries arrived. So zealous were they in the work of converting the natives to Christianity that soldiers accompanied them for purposes of assistance, and very soon the entire character of native life was changed. Clothing was added; many were made slaves to cultivate the newly-developed rice fields; tobacco was introduced, and the people learned to make cocoawine from the coconut. Navigation and the sea were forgotten, as nutrition was altered, and a little rice and other food formed a more common daily fare than the fruit and fish of the past.

Commodore Anson relates that by the time he had arrived at the islands in 1745, some of them had been entirely depopulated by epidemics. Byron, arriving later, noted that many of the islands had become an uninhabitable wilderness, overgrown with impenetrable thickets. Most of the population had died or fled to the Caroline Islands to escape disease and subjection to the Spanish. Rule was maintained by force of arms, and it made life quite unbearable for the natives. Many women were said to

have put an end to their lives by hanging and other ways, some throwing their infants into the sea so they might escape the trouble, disease and misery of future life.

By the beginning of the nineteenth century, the work of extermination, or as the missionaries phrased it, the pacification of the inhabitants, was very nearly completed. The Russian, Otto Von Kotzebue, then arrived in the Rurick, and so commented: "Could I have transported myself back to the time when Magellan discovered these islands, the Rurick would long since have been surrounded by many canoes with happy islanders. This was not the case now; the introduction of the Christian religion has not here diffused its benign blessings, for since that time the whole race of natives has been extirpated. We looked in vain for a canoe or a man on the shore; and it almost seemed that we were off an uninhabited island. The sight of this lovely country deeply affected me. Formerly these fertile valleys were the abode of a nation who passed their days in tranquil happiness; now only the beautiful palm trees remained to overshadow their graves: a deathlike silence everywhere prevailed."

The same navigator returned to the islands in 1814 and found conditions much the same. Nine-tenths of the remaining population was then concentrated in Guam, we are told, and according to Shoberl, they were "neither mariners nor swimmers; they have ceased to build boats and are utter strangers to the sea." All their peculiarities and arts, indeed their very language, were lost. "They live and dress like the Tagalese about Manila, cultivate rice, prepare cocoawine, chew betel, and smoke tobacco," said Shoberl. In 1842 about five thousand were left, these all in Guam, of racial intermixture with settlers from Spain, Mexico and the Philippines, all Christians, speaking the Spanish language, and acknowledging no relationship to the original tribes whom they have displaced. Since that time the population has gradually increased, but disease has always remained prevalent, and nutrition is now fully modernized, particularly with respect to the refined starches and sugars of civilization.

From the Pacific we turn to the South Atlantic and consider very briefly the little island of Tristan da Cunha. The island was once uninhabited, but was settled in the eighteenth and nineteenth centuries by settlers from Europe, numbering only a few families. The population rapidly increased, and was eventually a thriving settlement of more than a hundred and fifty people. Until a few years ago the sources of food were almost entirely local; cereals, sugar, tea and coffee could only be obtained from trade ships, which stopped infrequently, and hence they were rarely used. Potatoes and boiled fish were the staple foods. Milk was occasionally consumed, and at rare intervals a cow or sheep would be slaughtered for food. At

nesting season, seabirds' eggs were available, and in the summer and autumn a few vegetables and berries were included in the diet.

Visitors to this island reported the people to be much healthier than those of civilization, with a higher immunity to disease and a longer duration of life. In 1932 a medical inspection was made of the inhabitants by the surgeon commander of the ship, H. M. S. Carlisle, which stopped at the island. This revealed that the children were entirely free from rickets, and that such infectious diseases as mumps, measles, scarlet fever, whooping cough and diphtheria were unknown. The dental condition of the people was studied by an English physician, Dr. Sampson, and later by Dr. S. D. Hendricksen, an investigator attached to the Norwegian Scientific Expedition which visited the island. Both investigators reported the dental arches of the people to be broad, the teeth of regular placement, with high immunity to dental caries. The percentage of decayed teeth, according to Sampson, was only 1.84 per cent, and 83.4 per cent of the mouths were dentally perfect.

The recent development of the fishing industry in the sea surrounding Tristan da Cunha has brought about a change in the inhabitants' manner of living. A company has been established for the purpose of obtaining and selling large numbers of crayfish, and the company food store supplies the people with various kinds of modern foodstuffs. A cannery is being constructed, which is expected soon to provide all the islanders with canned foods. The American physician, Dr. William Brady, visited Tristan da Cunha in January, 1950, and he reported that the diet of the children had already undergone a significant change, with soft drinks, candy and white flour products being consumed. A new medical and dental survey of these people a few years hence might be expected to reveal some interesting and important changes in the general state of public health.

The island races which have been here mentioned represent one of the most important sources of information on the study of primitive man and his food. The island often gives a degree of isolation not found on the continent, and so long as this remains, the respective racial groups live upon the food which the land and surrounding sea can provide. The resulting physical condition of the inhabitants, as we have seen, is generally good, and for some a very high degree of bodily perfection is attained. Yet we see this rapidly disappear under the influence of civilization, as the dietary habits change in accordance with the importation and manufacture of foodstuffs. The islanders are healthy or sick, as the case may be, in direct ratio to the amount of native or modern foods that are consumed.

Value of Primitive Foods

GOOD HEALTH in the primitive world is found only in correlation with an adequate form of native nutrition. As the latter is replaced by the typical civilized dietary regime we observe immediate deterioration, both physical and mental. Practically every form of previous immunity is lost. Bacterial scourges arrive first; the degenerative diseases become common later. For the majority of races the population rapidly diminishes in number as the first consequence. This may continue for decades or centuries, until extinction, or until a stabilizing point is reached, when the birth rate again gradually increases and the death rate falls. The race again becomes prolific, with increase in numbers, but with continuing disease and ill health, as is typical in the average civilized community.

What, we may ask, are the qualities or factors found in the native primitive foods which have been successful in sustaining a high degree of physical excellence? Also, what are the qualities or factors found in modern foods which have failed on all counts to meet the necessary requirements? How are we to account for the very great differences involved?

A complete answer to these questions, giving all evidence which now exists, would entail a survey extending into volumes. A limited answer, serving the purpose of this work, will briefly cover the most important nutritional concepts involved, and it may be sufficient to allow a practical understanding and application of these to our modern life.

Biologically speaking, the human body is a chemical and physiological unit, depending for its efficiency of function upon the many elements, catalytic agents, and combinations of these, found in our daily foods. Values are rated in terms of proteins, carbohydrates, fats, minerals and vitamins. The role of hormones, enzymes and other activating substances is of possible importance, but present knowledge does not permit evaluation. The total chemical composition determines the uses to which the food can be made, and to the degree that the former is adequate and complete, the body reacts in health and disease.

A natural food, uncooked and unrefined, grown in fertile soil and consumed in its fresh state, contains maximum amounts of the chemical elements needed by the human body. Its physical state is such as to permit proper digestion and assimilation. As a part of the normal nutriment for animal life it is generally

adequate, the recipient species living in a condition of excellent health, with usual freedom from disease and deformity.

As the food is altered it becomes less complete as a nutritional unit. Separating the food into fractions, as in the process of refining — discarding certain of the fractions and consuming others — means that a number of nutritional qualities will be lost. Heating the food at high temperatures is likewise associated with nutritional losses and changes in physical structure. Other forms of processing and treatment, mixture of the food with various irritants and synthetic ingredients, and then prolonged storage — all these tend to detract from the original value of the food.

In a condition of undisturbed nature there are no such grown under civilized farming practices.

The like is true of the fruits and plants grown in virgin soil. One could scarcely find a greater contrast than the health and vigor of the average wild plant, and the susceptibility to disease of the usual cultivated plant grown in commercially treated soils. The former, growing in the rich and undisturbed lands of high organic matter content, is highly nutritious. For many primitive groups the predominant or entire portion of plant food is obtained in the wild state from the fertile soils of forest and plain. In civilization the opposite is true, scarcely any wild fruits or plants being included in the typical dietary regime.

Animals living upon nutritious plant life may be expected to yield more nutritious flesh than animals fed in the usual civilized manner. The primitive gets his flesh from healthy wild animals or domestic animals which are properly fed and cared for. Quality, not quantity, is the primary object. This is contrasted to civilization, where domestic animals are fed in a manner deliberately calculated to produce an abnormal amount of fat.

An excellent example is to be found in the case of the domestic hog. In civilization, the animals are carelessly fed practically all edible substances, including garbage and slaughter-house wastes in many cases. The hogs coming to market average the very high percentage of 1.5 per cent trichinous. The primitive Polynesian and other racial groups of the South Sea Islands raise hogs which are generally free from this dangerous parasitic infection. The animals are fed on an exclusive diet of breadfruit, coconut, taro and yams. They are much cleaner than American and European hogs; they are not allowed to scavenge, and do not have the habit of wallowing in the mire. According to Forster the flesh of such animals is of much superior quality; "the fat was to be compared to marrow, and the lean had the tender taste of veal." Porter noted that it was "remarkably sweet and delicate," and Melville described it as "the most docile and amiable pork" which "possesses a most excellent flavor."

Healthier animals also mean better eggs and milk. The egg yolk has long been considered a rich source of vitamins, but it is known that the vitamin content is seriously affected by the food eaten by the hen. The fertility of eggs varies with the food supply and is a direct measure of the vitamin content, particularly vitamin E. Likewise with milk, the nutritional value depends upon the food of the cow. The vitamin A content is very high when the animal is living upon richly-colored grasses which contain the vitamin in abundance. The milk of the dry-fed animal is often so deficient in fat-soluble vitamins that it is inadequate even for the ration of the calf. Its nutritional value is generally no higher than that of ordinary pasteurized milk.

The primitive judges his cattle by the amount of the it takes for a new-born calf to get up and run. This, as is the case with reindeer and many other herbivorous animals, is but a few minutes in most cases. In civilization, where quantity of milk and butter fat is the sole object, many of the calves are not able to stand for many hours, often as long as twenty-four. The difference lies in the care of the animals — less dry feed and more rapid-growing green grass, sunshine and exercise for cattle of the primitive. All cheese is made in the summer, after a heavy period of green-feeding, when the mineral and vitamin content of the milk and cream is at its highest. Price found that in Loetschental Valley the dairy products had a much higher vitamin content than is average throughout the world. Even the stored green hay of the area was comparatively high in chlorophyll.

In the choice of animal foods the primitive is likewise at an advantage. Instead of restricting his choice of flesh chiefly to muscle meat, which is the least nutritious of all animal parts, he is usually a whole-carcass eater, consuming all edible parts of his quarry. The vital organs are given particular preference, and these are of high nutritional value. The Indians of northern Canada make a special effort to include in their diet the adrenal glands and walls of the second stomach of all the moose they kill. The Eskimo prefers certain layers of skin in one of the species of whale. It is known that these animal parts are extremely rich in vitamin C, and thus are important for preventing scurvy, which otherwise might develop on a near-carnivorous diet. Many primitives also make it a point to consume the eyes of all fish, along with the tissues immediately back of the eyes. Recent nutritional inquiry indicates that these are of exceptional value; the eye retina and the tissues mentioned are among the richest of all animal sources in vitamin A content. The marrow of animal bones, so preferred by the primitive, adds as well to the supply of fat-soluble vitamins.

Another difference between civilized and primitive dietaries is the feeding of infants. In civilization breast-feeding is rarely employed for more than a few months, when it is employed at

all. Yet its importance may be gauged by the experience of the Infant Welfare Centre of Chicago in the years 1924-25, when 20,161 infants were cared for. Of these, 9,794 were wholly breast-fed; 8,605 were partially breast-fed, and 1,707 were artificially-fed. The mortality rate of the last group was fully fifty-six times greater than among the breast-fed infants, and the rate among those partially breast-fed was four times as high. The difference was accounted for in part by the deaths resulting from respiratory infection, and to a lesser degree, gastro-intestinal ailments. Whereas only four of the breast-fed infants died of respiratory infections, eighty-two of the artificially-fed infants died from this cause.

If this experience can be applied to primitive life, we have one very good reason for the superb health of the usual infant. The fact is that virtually every primitive infant is breast-fed, and the nursing period extends in most cases from two to three years, the mother's milk being the basic food during the time. If the supply fails, which is not often, the infant is usually nursed by another lactating woman. Among island races, having no cattle, survival itself is dependent upon the long nursing period. The dairying races are able to use animal milk if necessary, but this is seldom done, and mother's milk is always given priority for infants feeding.

The general primitive choice of foods in an isolated environment rarely permits the use of salt, spices and similar substances which, as shown both by human observation and animal experiment, impair physiological efficiency and are irritating to tissues. To like degree, the common drinks of coffee and tea, containing the toxic caffeine and tannic acid respectively, are not found in the primitive diet. Fermented drinks are not used by the better primitive groups and are restricted in strength and frequency of use by most of the others. Foods as a whole are selected and used with an eye to nourishment, rather than stimulation or intoxication, as in civilization.

Of equal interest is the freshness of primitive food. The nutritive losses involved in unnecessary preservation are not often known. Grains are made into bread on the same day that they are ground. Fruits are often sun-dried, but beyond this are rarely treated for preservation. Animal flesh is usually consumed immediately after the animal is killed. There are exceptions, which have been mentioned, with respect to the less favorable primitive groups, and these are associated with signs of physical inferiority not generally found elsewhere.

Important is the fact that none of the primitive foods are refined. In the manufacture of white flour an average of four-fifths of all minerals and vitamins are lost. Regarding refined sugar the losses are even greater. The most important nutrients of rice are in the outer hull, which is discarded during the

refining process. In the average modern diet, up to twenty-five per cent of all calories are taken in the form of sugar, and over half of the diet is composed of products made from refined sugars and starches. The primitive, getting no such foods, escapes the most important single cause of nutritional deficiency.

No primitive foods are canned. This is very important, considering the fact that many minerals and vitamins are lost in the canning process. This is due in part to the greater or longer application of heat than is usual in ordinary cooking. There are also probable nutritional losses while the food remains in storage. The addition of salt and refined sugar to many canned foods adds to the general impairment of the product.

On an average, cooking is less often employed by the superior primitive races than it is by either the inferior primitive races or civilized man. Losses of minerals and vitamins, and destruction of necessary cellulose in plant foods, are thus reduced. All milk and milk products are used in their raw state, pasteurization being unknown. In many cases even the animal flesh or sea food is used in its uncooked state.

Such foods as are cooked usually undergo exposure to heat for a shorter period of time than is customary in civilization, and when there is cooking water it is served with the foods, thus providing the consumer with the valuable water-soluble minerals. The Hunzas of India, for instance, cook their whole-grain chapattis but a few seconds before twitching them off to a platter for later consumption. Among the Polynesians and other races of the South Sea area, the process of enclosing food in banana or palm leaves and placing this on the red hot stones of underground ovens, then covering it all with a generous supply of earth, is the least destructive of all methods of cooking. The earth keeps the steam from escaping, and the food thus loses a minimum of flavor and nutritional elements. Actual losses in minerals and vitamins do not exceed one-third of those resulting from modern cooking procedures involving the boiling of foods in water.

The advantages of primitive foods thus range from soil to choice and the methods of preparation. Just how important these are may be understood from the work of Price. In his travels in all parts of the earth, this scientist obtained samples of every food used by each primitive group he visited. These were subjected to chemical analysis for their mineral and vitamin content, and then compared in this respect to the common foods of civilization. The results indicated that the typical primitive diet was several times as rich in the necessary nutritional factors as is the typical modern diet. Exact figures were given in regard to some of the minerals, and these are arranged here, together with data on the fat-soluble vitamins, in tabular form. The numbers in the various columns show how many times as much

of the respective elements are found in the respective primitive diets as in the modern diet. For instance, the table shows that the diet of the Australian Aborigine contains 4.6 times as much calcium, 17 times as much magnesium, 50.6 times as much iron, 6.2 times as much phosphorus, and 10 times the amount of fat-soluble vitamins as in the displacing diet. The rest of the table, which here follows, may be read accordingly.

RACE	Calcium	Magnesium	Iron	Phosphorus	Fat-Soluble Vitamins
Australian Aborigines	4.6	17	50.6	6.2	10
New Zealand Maori	6.2	23.4	58.3	6.9	10
Melanesians	5.7	24.4	22.4	6.4	10
Polynesians	5.6	28.5	18.6	7.2	10
Cattle Tribes of Interior Africa	7.5	19.1	16	8.2	10
Agricultural Tribes of Interior Africa	3.5	5.4	16.6	4.1	10
Eskimos	5.4	7.9	5.5	5	10
Indians of Northern Canada	5.8	4.3	2.7	5.8	10
Coastal Peruvian Indians	6.6	13.6	5.1	5.5	10
Peruvian Indians of the Andes Mountains	5	13.3	29.3	5.5	10
Native Swiss	3.7	2.5	3.1	2.2	10
Gaelics	2.1	1.3	1	2.3	10

The ten-fold ratio for fat-soluble vitamins was listed by Price as the minimum for the respective racial groups, though in some instances it was in excess of this figure. In all of the primitive diets there was a large increase in the amount of water-soluble vitamins over those of the displacing diets. Iodine amounts were also listed for Indian and Eskimo diets, these being 8.8 and 49 times as great as in the displacing diets.

Clearly, primitive nutrition is superior to modern nutrition. In supplying many times the quantity of nutritional factors as the latter, it indicates an important approach to the optimum standards of nourishment which are normal to animal life in a condition of nature. This is significant in terms of possible application to civilization. If we are to profit from the primitive experiences we must adopt the better features of primitive nutrition in our own dietary programs. The technical facilities of civilization should render this possible, and indeed permit improvement over many primitive diets. The full utilization and scientific development of agriculture can afford sufficient variety of the necessary foods, and modern transportation and refrigeration can assure these reaching the consumer in abundance and in their natural state.

Briefly these are the changes called for: 1. Rational methods

of soil care, 2. Proper feeding of domestic food animals, 3. Abstinence from irritating, stimulating and intoxicating foods and beverages, 4. Abstinence from canned foods and all tinned and processed meats, 5. Discontinuance of pasteurization of dairy products, 6. Reduction of cooking process, in time and temperature, to minimum, 7. Breast-feeding of infants in all cases, 8. Consumption of fresh foods, eaten as soon as possible after gathering, 9. Consumption of whole grains and whole grain products instead of refined foods, 10. Use of honey or other natural sweetening agents instead of white sugar, 11. Liberal consumption of fruits, vegetables, nuts and other foods which are most appropriate in their raw state, 12. Arrangement of diet in such a manner as to assure maximum variety of all healthful foods.

The story of primitive man and his food is an important one. Here we have but outlined the basic facts and provided a short summary of their nutritional meaning. The implications to modern man should be distinctly in evidence and present opportunity not heretofore visualized. With the general application of existing knowledge pertaining to this study, we may expect in civilization an improvement in human health equalling the physical status of the finest primitive racial groups. We shall see a gradual diminishing of the signs of physical degeneration which today mark civilized man. The profession of dentistry will become nearly superfluous, and medicine will find its work and problems to be considerably lessened. Man will again be proud, and physically strong, with a real basis for mental normality and happiness. But our accomplishment will not have been an exceptional one, being only an approach to the physical excellence which is the biological norm throughout the wild animal kingdom of the world.

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