

NEW LIGHT FROM PRIMITIVE RACES ON MODERN DEGENERATION — PHYSICAL, MENTAL AND MORAL*

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Degeneration like growth may be an unconscious process and will be recognized and evaluated best by making comparative measurements. Accordingly, studies of changes occurring in our modern civilization require a set of standards in order to make these comparisons. For evidence of a need for making such studies it will be helpful to note the comments of competent observers in various fields.

OBSERVATIONS IN VARIOUS FIELDS

Ernest Thompson Seton has been a critical student of the early American civilization that preceded modern European invasion and conquest. In his analysis of the relative virtues of the American Indian as recorded in his book *The Gospel of the Red Man*¹ he makes this observation:

"The civilization of the white man is a failure; it is visibly crumbling around us. It has failed at every crucial test. No one who measures things by results can question this fundamental statement."

Referring to the comparative physical qualities of our modern whites he says:

"All historians, hostile or friendly, admit the Indian to have been the finest type of physical manhood the world has ever known. None but the best, the picked, chosen and trained of the Whites, had any chance with him."

In his discussion of the comparable cultural qualities of the modern whites and the Indians he states:

"The culture and civilization of the White man are essentially material; his measure of success is 'How much property have I acquired for myself?' The culture of the Red man is fundamentally spiritual; his measure of success is, 'How much service have I rendered to my people?'"

The severe expressions of modern degeneration as they affect various organs and tissues constitute the every day experience of surgeons. This group of specialists has developed because of the imperative need that dis-

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eased parts of organs and tissues should be removed in order to prolong the function and comfort of other structures. Sir Arbuthnot Lane, a world renowned authority on the disturbances of the intestinal tract of the modernized whites as compared with the more normal functioning of primitive races, has expressed his deep impressions in his Preface to *Maori Symbolism*² as follows:

"Long surgical experience has proved to me conclusively that there is something radically and fundamentally wrong with the civilized mode of life, and I believe that unless the present dietetic and health customs of the White Nations are reorganized, social decay and race deterioration are inevitable."

Sociologists emphasize strongly the evidences of an alarming increase in the percentage of individuals in our modernized cultures who cannot manage their own lives successfully, and hence require some supervision by those who are more competent. Laird in discussing this problem under the title *The Tail That Wags the Nation*³ states:

"The country's average level of general ability sinks lower with each generation. Should the ballot be restricted to citizens able to take care of themselves? One out of four cannot. . . . The tail is now wagging Washington, and Wall Street and LaSalle Street. . . . Each generation has seen some lowering of the American average level of general ability. Although we might cite anyone of nearly two dozen states, we will first mention Vermont by name because that is the place studied by the late Dr. Pearce Bailey. It would be, he wrote, 'safe to assume that there are at least 30 defectives per 1000 in Vermont of the eight-year-old mentality type, and 300 per 1000 of backward or retarded persons, persons of distinctly inferior intelligence. In other words, nearly one-third of the whole population of that state is of a type to require some supervision.'"

The seriousness of the decline in modern physical fitness has been emphasized by many individuals and organizations. An expression of the deep interest and concern is seen in the large contributions amounting to many millions of dollars yearly for scientific research to find the contributing factors. This generous response by philanthropists has made possible the engaging of the services of many prominent research workers in various fields of investigation. Among these, the contributions of Dr. Alexis Carrel have been outstanding. In his profound studies of the problem under the title *Man, the Unknown* he has made a most forceful review of the present dilemma and places great importance on modern man's increased susceptibility to degenerative diseases. In relating this phase to modern medicine he states:

"Medicine is far from having decreased human suffering as much as it endeavors to make us believe. Indeed, the number of deaths from infectious diseases has greatly diminished. But we still must die in a much larger proportion from degenerative diseases. . . . All diseases of bacterial

origin have decreased in a striking manner. . . . Nevertheless, in spite of the triumphs of medical science, the problem of disease is far from solved. Modern man is delicate. Eleven hundred thousand persons have to attend the medical needs of 120,000,000 other persons. Every year, among this population of the United States, there are about 100,000,000 illnesses, serious or slight. In the hospitals, 700,000 beds are occupied every day of the year. . . . Medical care, under all its forms, costs about \$3,500,000,000 yearly. . . . The organism seems to have become more susceptible to degenerative diseases."

While it has been a matter of general knowledge that progressive deterioration was in operation, the search for contributing factors has not adequately revealed the causes. The forces at work have been largely assigned to either heredity or environment. The exponents of these two views have marshalled impressive evidence in support of their interpretations. It is of particular importance that practically all of the efforts at correction have been built around either the prevention of reproduction by defective individuals or the modifying of the environment of defectives in order to prevent or correct the development of the disturbance. A widely accepted interpretation of the controlling factors in heredity has been the acceptance of the principle that the carriers of individual qualities, as involved in the function of the sex cells and the entire processes of reproduction and development, are practically immutable and as such cannot readily be modified by the environment into which the individual is born. These principles have been supported by impressive evidence from both animal and plant life illustrating the laws of transmission of Mendelian qualities. The very principle on which racial and tribal characteristics are evaluated and classified implies a faithful transmission from generation to generation. This view requires that these dominating forces prevail over disturbances in prenatal environment and provide normal offspring from normal ancestry.

That the journey of the fetus resulting from the fertilized ovum encounters grave experiences in the prenatal environment is indicated by the report of the American Association of Obstetricians and Gynecologists⁴ as follows:

"Out of every one hundred pregnancies in the United States, 25 are lost before birth."

An evaluation of the controlling forces requires that light be thrown on the rôle of each heredity and environment and on the forces at work prior to fertilization, during gestation and after birth. As an approach to this phase it is important that we have in mind the nature of the defects, for which we must find the causes.

The ills of modern man have required the services of large groups of

specialists trained for rendering service in the various fields. The dental profession is organized to serve civilization and treat and care for the ills of the oral cavity including dental caries, dental arch deformities and diseased supporting tissues of the teeth. Similarly, each organ of the body has its corps of specialists equipped to furnish first aid and make repairs and adjustments where possible. Their greatest effort, and in the dental profession nearly the entire effort, is expended in repair and replacement of defective or removed organs. Available data indicate that from 90 to 100 per cent of the individuals in our modernized groups have suffered from dental caries.

THE USE OF CONTROLS

A comprehensive study of modern degeneration will require the use of controls in order that standards of excellence may be established. Not finding adequate controls in our affected groups it became necessary to look elsewhere in Nature's great biological laboratory which has been in operation throughout the history of life. For this the primitive racial stocks that have persisted through centuries have been selected. These have been located both where still protected by the isolation, and where they were in the process of being modernized by contact with the culture and commerce of the white man. For this fourteen primitive racial stocks have been studied by comparing the individuals of the more isolated groups with groups of the same stock in various stages of modernization, also with modernized Europeans and Americans. The following primitive racial stocks have been studied: Swiss, Gaelics, Eskimos, North American Indians, Polynesians, Melanesians, Africans, Australian Aborigines, New Zealand Maori, Malay Micronesians, Ancient Peruvians, Isolated Peruvian Indians, High Andes Indians and Amazon Jungle Indians. The data obtained from these comparative studies together with the results of animal experimentation are the basis for this report.

It is clearly impossible in the limited space available for this text to include extended supporting data. Many have been provided in the author's recent book *Nutrition and Physical Degeneration* with a subtitle "A Comparison of Primitive and Modern Diets and Their Effects," published by Paul B. Hoeber, Inc., Medical Book Dept., Harper and Brothers, New York. The data presented here will be classed under two heads; injuries that result from forces at work after the individual is born, and those that are produced prior to birth. For brevity and to avoid confusion arising out of extended details only general results are provided in this text.

Were it not for the greater importance of the larger problems involved in modern degeneration, it would be appropriate to use the available space

for this communication in the discussion of new light on the dental caries problem since the detailed data are so illuminating. Under the circumstances the dental problem will be discussed here only briefly.

COMPARATIVE INCIDENCE OF DENTAL CARIES

The comparative incidence of dental caries in the various isolated groups and the same groups when modernized, expressed in terms of affected teeth, ranged from an average of about one per cent for the isolated to thirty per cent of all teeth studied for the modernized. In several groups the effect of contact with modern white culture and its commerce involved an increase in the incidence of dental caries of several hundred fold. The one factor in the contact with modern civilization that was universally found to be present and always associated with loss of immunity to dental caries and in proportion to its use, was a change from the native foods as selected by the isolated groups to the commercial foods of commerce. In many groups the loss of immunity occurred promptly after the change in nutrition was established and existed only during the period of the change, immunity being reestablished with the return to the original nutrition of the tribe.

This is illustrated by the calling of ships to isolated islands in the Pacific to purchase copra (dried cocoanut meat) when the price suddenly rose from forty dollars to four hundred dollars a ton. This lasted for only a short time and in two years the price dropped to about four dollars per ton, which terminated the calling of the ships to these isolated groups. The only changed factor that could be found in the environment was the displacement of the native diets with the foods of commerce that were used to make the exchange. I was informed personally by the administrator in charge of the outfitting of trading vessels that 90 per cent of the exchange was required to be taken in white flour and sugar and only 10 per cent could be taken in clothing and other products. In ports of regular call on ship routes the displacing diet included also canned foods, polished rice, vegetable fats, etc.

My studies on isolated Pacific Islands were made a few years after the temporary calling of copra ships. They revealed that teeth that had recently erupted, particularly first or second molars, at the time there was a change in the nutrition, had evidence of past active caries related directly to the period of changed nutrition. The cavities were open but immunity had been reestablished by a return to the native foods.

The data obtained from these various studies strongly indicated that the presence or absence of immunity of the teeth to dental caries was not dependent upon a change of structure in the formative period. The problem

of immunity to dental caries has seemed clearly to be related to nutrition of the affected individual at the time the dental caries is active. Similarly other effects such as rickets, avitaminosis diseases, were found to relate to changes in the structure of the organs and tissues rather than being transmitted qualities from the ancestry. A large group of affections were found to be directly related to forces that were operative before birth. These contribute the principal discussion of this communication.

It would be fortunate if the members of the dental profession and, for that matter, if the public at large could experience the thrill of seeing the entire population of a primitive community with practically perfect teeth free from dental caries; and then experience the depressing effect of seeing members of the same racial stock suffering severely from infected pulps and abscessed teeth. The joy of life which overflows naturally in mirth and song becomes displaced with a cloud of general misery. Children in this group are often seen crying with abscessed teeth and parents are distraught. The misery is so great that even suicides occur. There is no dentist within hundreds and often thousands of miles and no means to go to him. Exploitation progresses far in advance of relief measures made necessary by contact with the degenerating forces of our modern civilization. A glimpse of the dental tragedy which ushers in the disappearance of many of these primitive racial stocks is shown by the four views in Figure 1. The girl at the upper left is an Hawaiian. She is not only suffering from abscessing teeth but is coughing with tuberculosis, from which her mother and a brother recently died. The boy at the upper right is a Fijian, typical of many suffering from abscessing teeth. The woman to the left below is a typical illustration of the Australian aborigines confined in reservations in Australia being fed by the government. The woman at the lower right is a typical modernized Florida Indian.

END RESULTS

The end result has been the same in all the primitive racial stocks studied when they changed from their native dietary as selected in accordance with the accumulated wisdom of their race to the foods of modern commerce. These have been largely the same for the different groups. It is a matter of great importance in connection with the world problem of dental caries that these several racial groups that established immunity for themselves by using a proper selection of available food did so on very different dietaries when judged on the basis of type and name of the foods. Their efficient diets, however, were very similar when reduced to mineral and vitamin content. The outstanding difference from the chemical



Fig. 1. The suffering from dental caries and abscessing teeth of members of primitive races when the native diets are displaced by the foods of commerce is very severe. The Polynesian girl, upper left, has in addition to abscessed teeth, tuberculosis. The Micronesian boy, upper right, has an abscess nearly broken externally on his face. The Australian Aborigine, lower left, has had nearly all teeth wrecked by caries and now suffers from abscesses. The Indian girl, lower right, has lost nearly all teeth by caries. These cases are typical of thousands of pathetic sufferers seen in the modernized groups

standpoint is the comparative level of body building and body repairing materials in proportion to heat and energy factors or calories. In general all the efficient dietaries were found to contain two to six times as high

a factor of safety in the matter of body building material, as the displacing foods.

The people in the isolated valleys of Switzerland provided a high immunity by the use of exceptionally high vitamin dairy products and entire rye bread, with meat about once a week and vegetables as available, chiefly in the summer.

The people of the Outer Hebrides accomplished high immunity with the use of sea foods, oat cake and oat porridge with limited vegetables in season. Marine plants also were used.

The Eskimos and Indians of Alaska and the Far North accomplished a high immunity with sea and land animal tissues used as foods but limited vegetables and very limited seeds. Green foods were used in season and in some districts were stored. The organs of animals were used liberally.

The people of the South Sea Islands whether Polynesian, Melanesian or Micronesian provided a high immunity with a liberal use of sea animal foods, marine and land plants, limited seeds and lily roots or taro.

The cattle tribes of Africa established their high immunity by the use of milk, blood and meat supplemented by plant foods. The agricultural tribes of Africa used domestic animals, utilizing their organs, fresh water animal life, insects and a variety of plants.

The Australian Aborigines established their high immunity by the use of large and small wild animal life, wild plants, and where available, fresh water or marine sea life, large and small.

The New Zealand Maori had a high immunity to dental caries by a liberal use of sea animal life, marine plants, marine birds and their eggs, land birds, seeds of trees and plants and vegetables, particularly fern root.

The Indians of the plains of North and South America provided a high immunity by the liberal use of the organs and tissues of wild animal life, a large variety of plant foods and fresh and salt water animal life, as available.

The coastal Indian tribes of North and South America provided a high immunity by a liberal use of sea animal life together with plant life of the coastal region.

The Amazon Jungle Indians provided a high immunity with a liberal use of fresh water animal life, small land animals and birds, and wild plants and seeds.

In all of these groups the displacing diets that consisted of the foods of commerce were more or less highly refined sugars, refined flours, canned goods, vegetable fats and polished rice.

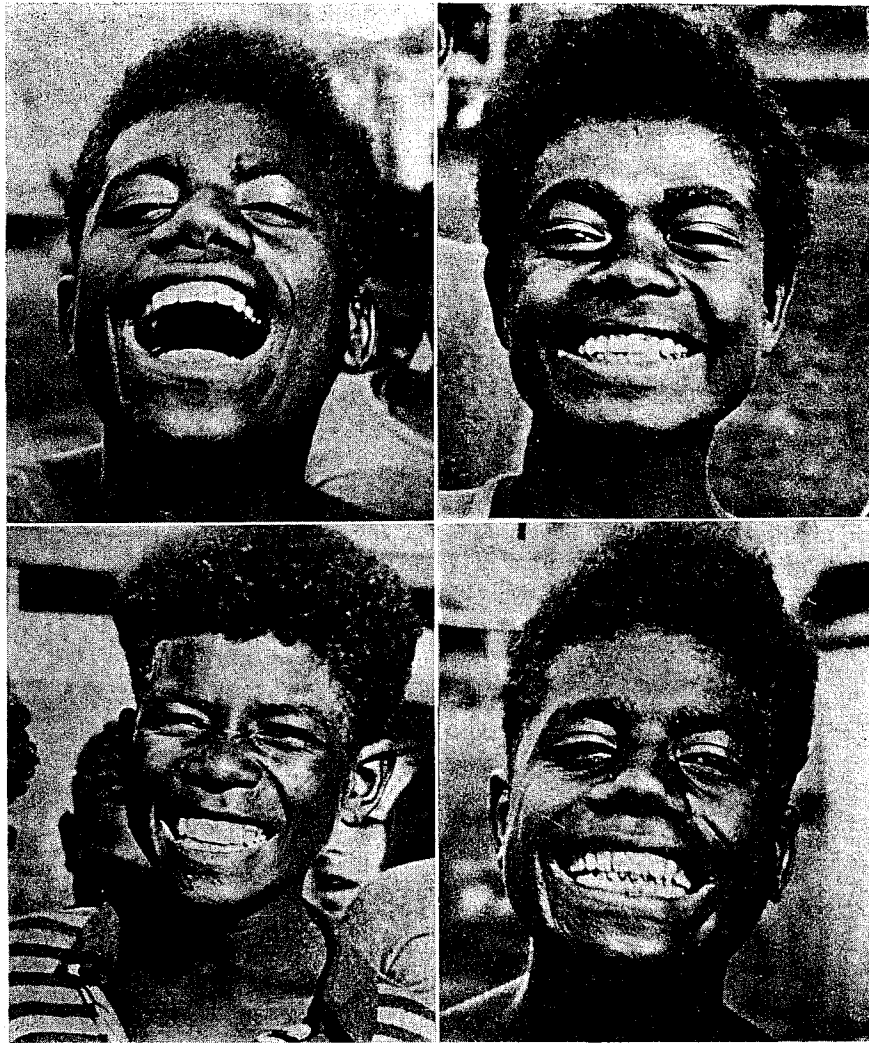


Fig. 2. These four Melanesian boys born on different islands look like brothers but are not blood relations. They illustrate the role of heredity in reproducing racial type

My investigations have included, when visiting these tribes, the gathering of samples of foods utilized by them. These were carried or sent to my laboratory for chemical analysis. Clinical investigations also were made in which individuals who had lost their immunity to dental caries in our modern highly susceptible groups were provided special dietaries which were modified to make them as nearly as possible equivalent in minerals



Fig. 3. These four Polynesian girls live on different islands and are not related though they look like sisters. They record their racial type by undisturbed heredity

and vitamins to the efficient primitive dietaries. The result of doing so not only has prevented the development of dental caries in practically all cooperating individuals but has controlled dental caries where active in over ninety per cent of the individuals so studied. Practical application of these principles are discussed in detail in my book *Nutrition and Physical Degeneration*.

DEPARTURE FROM RACIAL TYPES

An important new light has been thrown by these studies among primitive races on modern departure from racial types. Whereas it has been assumed that gross changes in physical form could only result from influences operative through a vast number of generations, these studies have revealed that gross changes can occur in a single new generation.

I have referred to the view in physical anthropology that has provided for the classification of skeletal material and its assignment to races on the basis of uniformity of structure and design. This has also enabled individuals to be classified into racial groups while living. It is based on recognition of similarity of facial and body form in various individuals in a given racial stock and recognizes a constancy regardless of location. This constitutes a fundamental expression of the laws of heredity.

This is illustrated in Figure 2 in which four Melanesian boys are shown who were photographed on different islands where the stock was still isolated. While they probably have never seen each other the family resemblance is purely a racial resemblance and demonstrates that under an adequate environment the racial characteristics were perfected in these various locations some of them hundreds of miles apart.

Similarly in Figure 3 will be seen Polynesian girls. They look like sisters but only so because they look like Polynesians. They have been born and lived in locations many hundreds of miles apart. In these groups the accumulated wisdom regarding nutrition was similar.

In Figure 4 will be seen a Melanesian boy and a Polynesian girl who belong to the first generation born after their parents had been in contact with modern civilization and had displaced the native foods with the foods of commerce. The boy was sullen and very self-conscious because of his deformity. The girl can never be beautiful like the four Polynesian girls in Figure 3, because of the gross changes in facial form including design of the dental arches.

We are concerned to know how quickly gross changes like these can occur. An important part of these studies included an examination of parents and their offspring, both where still isolated and where recently modernized. In Figure 5 above is shown an African father and son of the Wakamba tribe. The father was born before the advent of imported foods. He works for the railroad which furnishes the family nutrition and his son has a marked change in facial form as may be seen. In Figure 5 below will be seen a Fiji father and son. The father was born before the influence of foods of commerce had reached that group. He and his wife have excellently developed faces and normal dental arches.

Their son was born after the change in nutrition. The father works for a sugar plantation which provided the commercial foods. The son has a narrowed upper dental arch, and modified facial form.

In Figure 6 above is seen a father and his son of a coastal Indian tribe in Peru. Note the father's excellent facial and dental arch development. He was born when his parents lived largely on sea foods. He is now working for the International Oil Company at Talara which furnishes the food for the family. The boy has badly deformed dental arches.



Fig. 4. This Melanesian boy is humiliated by his deformity. He is not handsome like the older men of his tribe. The Polynesian girl at the right can never be beautiful like those shown in Fig. 3, due to the faulty development of the bones of her face. She, too, is humiliated by her affliction

In Figure 6 below, is shown an Indian father and son living in the High Andes in Peru. The father is the product of the primitive nutrition as used by his parents, and the son is the product of the use by the parents of modern foods of commerce.

These marked changes in facial form are characteristic of many individuals in our modern civilization and in the modernized groups of the primitive racial stocks represented in this study.

If space for illustrations permitted we would use many obtained in various parts of the world indicating the superior physical structure including facial and dental arch design as found among primitive races in many countries. People do not require to be specialists to recognize a large

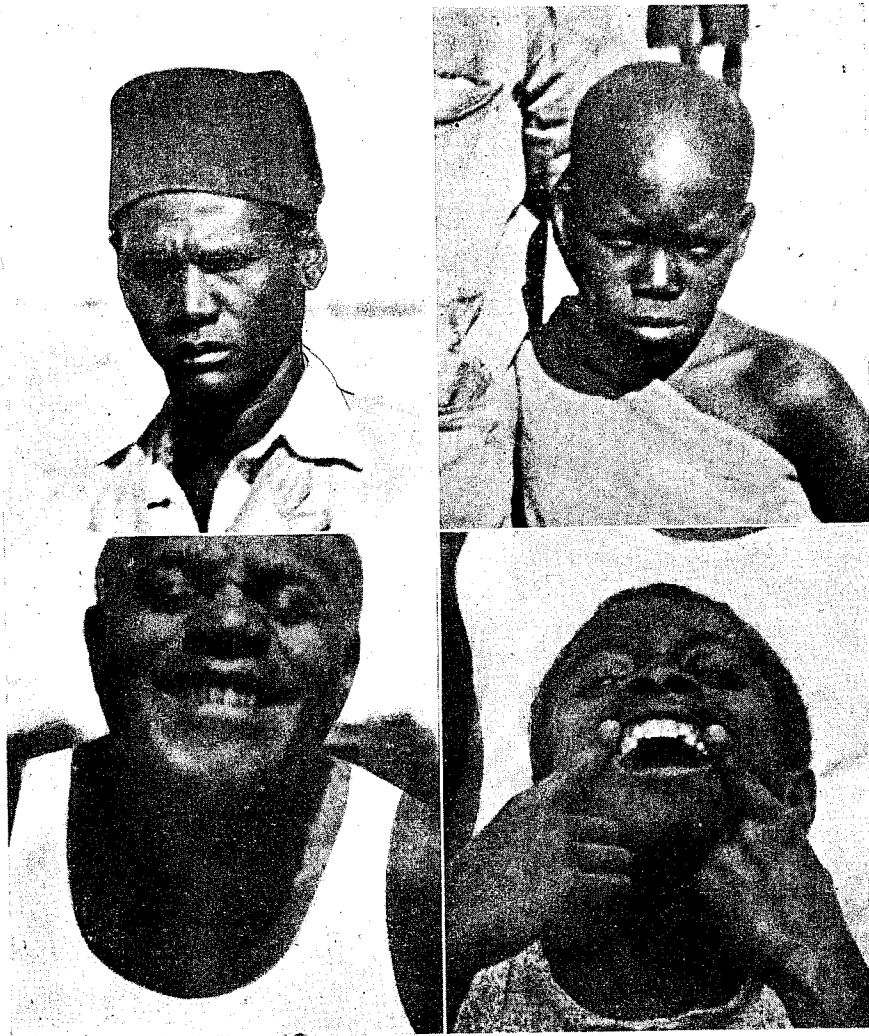


Fig. 5. Facial and dental arch changes in a single generation. Above are shown a father and his son in the Wakamba tribe in Africa. The son has lost the tribal expression, as the result of change of nutrition of the parents from the native foods to foods of commerce. Below, are shown a Fiji father and son. Due to change of nutrition of the parents the son's upper arch is badly narrowed

percentage of individuals in modern European and American life with deformities of the face and dental arches. My studies in many parts of the United States and Europe have disclosed that from 25 to 75 per cent of the population carry injuries of these types. In some communities the percentage is even higher.

In contrast with this, in a study of twenty-seven native tribes in eastern and central Africa, I found thirteen tribes in which I did not record a



Fig. 6. A single generation change of facial and dental arch form are shown above in a coastal Indian and his son, Peru. Below, in a single generation father and son in the high Andes, Peru. These constitute disturbed heredity

single instance of even moderate deformity of facial and dental arch form. Similarly, in studies in Peru of the ancient burials along the coast, an examination of 1,276 skulls in succession did not reveal one with deformity

of the facial design and dental arch form. The modernized natives in these as in all modernized groups showed a considerable percentage of the population -with gross deformities. The change that occurs in even the next generation after the parents have adopted the modern foods of commerce is so marked that one would expect that some other force like mixture of bloods would be involved. This is typically illustrated in Figure 7. While a considerable variety of pattern changes occur in each racial group with modernization, I have selected as an example a very common type of deformity consisting of a dropping inward of the upper laterals with a narrowing of the upper arch and consequent prominence of the cuspids. This will be recognized as a very frequently occurring deformity in our modern civilization. In A of Figure 7 this has developed in a modernized Eskimo; B, an Indian of northern Canada; C, a Polynesian of the South Sea Islands; D, an East Indian of Mombasa; E, a Negro of Belgian Congo and F, an Arab of Khartoum. Similar illustrations are abundant in each of the primitive racial stocks examined wherever they are in the process of modernization, occurring even in the first generation after the adoption by the parents of foods of modern commerce.

The gross physical changes occurring promptly after modernization were not limited to structures of the head. The narrowing and lengthening of the face was usually only a small part of the change in body form. The hips and chest were usually narrowed with a tendency for narrowing throughout the length of the body. As we will see later, the bones of the head, particularly the maxillary bones, seem to suffer most severely.

An important development occurs in a large percentage of our modern families which, so far as I know, has been entirely overlooked by even the members of the dental profession. This is expressed as changes within the family group in individual facial and body form, which disturbances tend to occur more severely in late members of a family than in the first or early born. Orthodontists will have an opportunity to study this phase by noting the birth rank of the children of a family who have greatest need for orthodontia. Where the child needing this service is the oldest, it is very often the only child in the family. Another factor operates of course, namely, that an only child will often receive professional service because the expense can be afforded while it cannot always be afforded for the children of large families. The fact that among both the modernized primitives and our modern whites there is a tendency for a greater injury to occur in the late children in the family is of great significance, because of its indication that a lowering of capacity for reproduction has occurred in the parents.



Fig. 7. Among modernized primitives many dental arch deformity patterns develop similar to common deformities in Europe and America. In this deformity pattern the upper laterals develop inside the line of the arch. The upper arch is narrowed and the cuspids develop outside the arch. A, Eskimo; B, North Canada Indian; C, Polynesian, South Sea Island; D, East Indian, Mombasa; E, Negro, Belgian Congo; F, Arab, Khartoum



Fig. 8. Typical degeneration in younger members of same family. Above, Maori, New Zealand; center, Aborigines, Australia; below, Micronesians, Island north of Australia. This condition of lowered reproductive capacity of parents though unrecognized is very common in America

In Figure 8 are shown two children in each of three families of modernized primitive races illustrating the marked change in the facial form of the individual to the right as compared with the older member of the family to the left. At the top are two Maori girls, in the center two Australian Aborigine boys and below two Micronesians, Badu Island, north of Australia. In this last family the older brother at the left was born before the white man's store was put on that island, the brother to the right after modern foods were used. These cases are typical of those in scores of families all about us. Many cases were seen where the younger members of the family not only had deformity of the face and dental arches but also of other structures. I have presented examples of these in my book *Nutrition and Physical Degeneration*.

A striking observation among the isolated primitives was the absence of physically defective individuals and their frequent occurrence in the modernized sections of those groups. These defects included harelip, cleft palate, club feet, usually associated with deformed faces. It was reported by local officials and tribal chiefs that these did not occur in the most primitive groups. Examples of these among the more modernized primitive groups are shown in Figure 9. Upper left shows harelip in an African; upper right deformed face of a coastal Indian boy in Ecuador and, just below, his badly deformed club feet; second row, left, a deformed foot of a high Andes Indian boy. In the group second from the bottom are shown the feet of three members of the same family. The one in the center, the second child, is shorter in stature than the third child and has badly deformed feet. The group at the bottom is of particular interest. The oldest child at the left has normal feet and normal features. The second child has flat feet and distorted features. The third child has club feet and badly distorted features.

The problems of body distortions have much greater significance than readily appears. Disturbances in the architecture and development of structures of the head and face often involve also the brain itself. Whereas reproduction and child birth were simple experiences in the isolated primitives, they often become problems of great suffering and even of life itself after modernization due to faulty pelvis formation. Fortunately, important light is thrown on this problem by the changes that are occurring in domestic animals. Data from these sources now can be used directly in evaluating the role of nutrition and for studying the nature of the forces producing the changes.

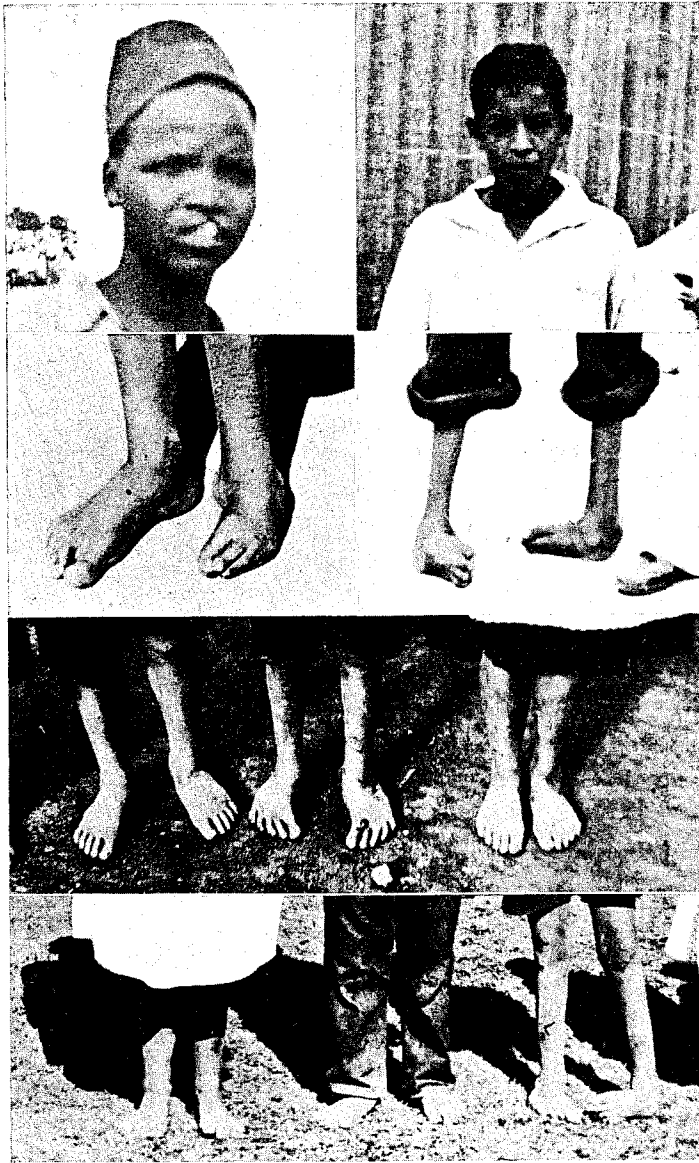


Fig. 9. With modernization many expressions of physical deformity may appear. Above left, African negro of Mombasa with harelip; above right, badly developed face and below it is this boy's club feet, this is a coastal Indian boy, Ecuador; at left second row, deformed foot of modernized high Andes Indian boy; third row, badly deformed feet of second boy, oldest child is at right, the second boy is smaller than the third boy shown at left, Maori, New Zealand; fourth row, progressive degeneration of feet, normal at left, flat feet in second boy and club feet in third boy, Maori, New Zealand

EVALUATING THE ROLE OF NUTRITION

During the recent drought period in several large areas in the United States there has been a marked increase in the number of domestic animals born with deformities. These have included club feet, spinal bifida, cleft palate, harelip, defective eyes, defective ears, gross body deformities and gross brain changes. These serious injuries affecting the health of the domestic stock and reducing the income therefrom, have induced a search for the causes of the contributing factors. Since an important effect of the drought was to produce a marked reduction in available green foods for pasturage and fodder, investigations were concentrated on the effect of the absence of these foods for breeding stocks. Since carotene and other vitamin A precursors were reduced greatly, the sources of vitamin A were restricted accordingly and experiments were conducted to determine the effect of the absence of vitamin A and its precursors from the diets of parent animals. In an experiment conducted at College Station, Texas, by Professor Fred Hale⁵ he reduced the vitamin A content in the diets of six female pigs before mating and for thirty days after mating with the result that every piglet in the six litters had gross deformities. Of the fifty-nine young born to these six sows all were without eyeballs and optic nerves and many, in addition, had one or several of the following: cleft palate, harelip, deformities of the jaws, deformities of the ears, club feet, spinal bifida and internal defects. Through Professor Hale's kindness I am able to show pictures of several of these deformities, as illustrated in Figure 10.

These investigations are in complete accord with the observations I have made among primitive races in the process of modernization. These data are of great importance for throwing light on the etiology of many body deformities, and their interpretation throws light on the future welfare of the individuals suffering from them. Many individuals with deformed dental arches, harelip or cleft palate have been gravely concerned as to whether they should marry and reproduce because of the fear that these injuries would appear in their offspring. Important light is thrown on this phase by the fact that when some of these deformed pigs were reared and mated on an adequate nutrition the offspring apparently were perfect and were entirely free from these gross lesions of their parents.

Similarly, very important light is being thrown on modern physical defects by experiences that are happening in dogs. The modern English bulldog is a gross distortion and often is of interest chiefly because of his deformities, as are many other types of distorted dogs. In Figure 11 are shown four skulls of dogs. Above shows the normal relationship in canines of the mandible and maxillary bones in which the anterior teeth



Fig. 10. These deformed pigs resulted from depriving their mothers of vitamin A for several months before mating and for thirty days after mating. Fifty-nine young were born to six sows. All were without eyeballs and optic nerves, several had one or more of cleft palate; harelip, club feet, spinal bifida, deformed ears, deformed heads (kindness of Professor Hale)

of the mandible are in contact with the lingual surfaces of the upper incisors. Second from the top shows a typical skull of an English bulldog in which the maxillary bones have not developed normally and the upper incisors are far inside the lowers. The arch is also narrow. The third view shows a typical skull of a Boston terrier, again illustrating the marked underdevelopment of the maxillary bones producing gross distortion. In the bottom view is seen a typical gross deformity of a toy dog which also shows that several of the teeth in the lower arch have never erupted. It is of great importance that in all of these deformed breeds a large percentage of the pups have to be removed by Cesarean operation to save the lives of the mother and her pups. I have been advised by a dog breeder that the proper body form for a valuable English bulldog requires that the body shall be the shape of a pear; the big end of the pear being represented by the head and shoulders and the small end by the hips. Expert dog breeders know how to produce typical deformities.

We are concerned to know the quantity of vitamin A that would be adequate for preventing a marked change in the physical perfection of offspring. Hale has shown that whereas these six sows when given a nutrition in which vitamin A with its precursors was absent prior to mating and for thirty days thereafter caused the production of fifty-nine defective pigs, these sows did so in spite of the fact that they were given regular large doses of vitamin A after the lapse of thirty days following mating. It was thus clear that the gross damage had been done prior to the end of the thirty day period. He accordingly gave one of the sows the same test the second time with the result that she went down with typical vitamin A paralysis and could not rise to her feet. One dose of vitamin A was given with the result that in eight hours time she was up and running around. In two weeks she was mated and the offspring had partial eyes and optic nerves. This litter did not have complete absence of eyes and optic nerves as occurred in the previous test. This indicates strongly the influence of even a small but inadequate amount of vitamin A in the reproductive process and the imperative need for an adequate amount.

For various reasons there seems to have been a great modern increase in the need for dogs as companions and family pets. The serious maladies of this new population has called for the development of a large group of veterinarians who are very busy treating these canine maladies. They report large numbers of deformed specimens in the modern litters born both normally and those removed by Cesarean. A very frequent lesion is a cleft palate. A typical pup with cleft palate is shown in the upper left of Figure 12, which is one I have in my collection. It was

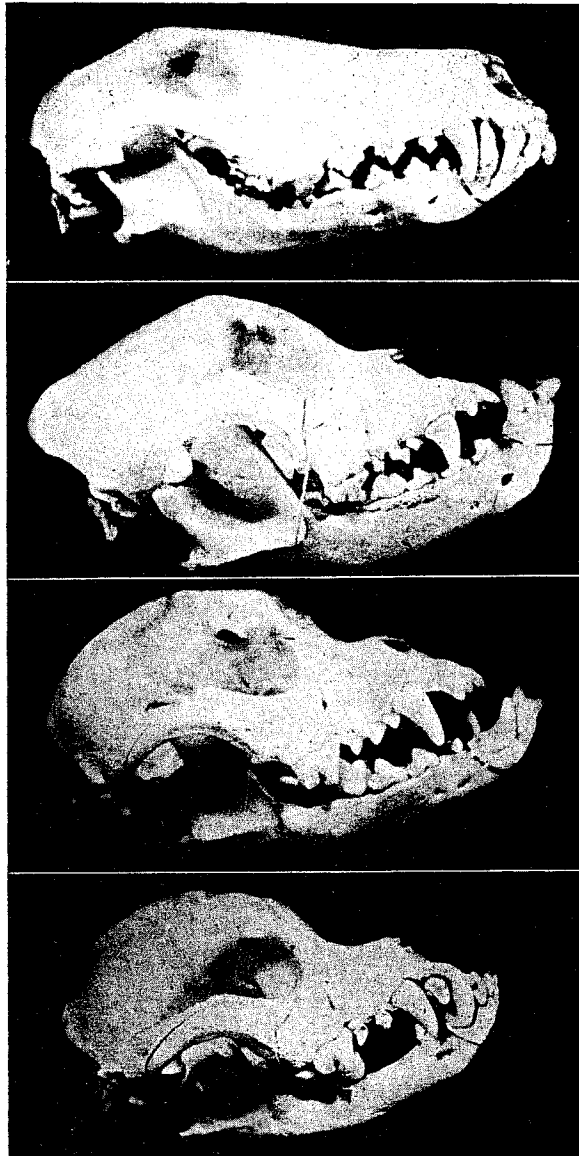


Fig. 11. Common deformities in modern dogs. Above, normal canine relationship of arches; second from above, skull of typical English bulldog showing underdevelopment of maxillary bones; third, skull of typical Boston terrier; bottom, skull of typical toy dog. Note the absence of teeth in the lower arch

born in the third litter, the mother of which did not have a single pup in the two preceding litters sufficiently perfect to live. At the upper right and below, are shown cleft palate and spinal deformity of another pup, which I also have in my collection. There were two pups in this litter with these two deformities and they were two of five pups with these deformities which appeared in four litters born about the same time, all sired by the same male dog. This gives us important evidence directly relating the injury to germ cells and, in this case, germ cells on the father's side. This strongly emphasizes the importance of special studies directed to this phase of the problem.

Gynecologists and embryologists have presented illuminating data on the frequency with which malformations develop and their direct relationship to injuries or defects in the germ cells. Murphy⁶ has recently published extended investigations on *congenital malformations* that have developed in births recorded in Philadelphia. He has traced a large group of mothers who gave birth to defectives by studying the recorded birth certificates which tabulated only gross deformities easily observed at birth. In his summary he details thirty-two conclusions, the last of which is as follows:

"The observations which have been made during the course of the present investigations lead to the general conclusion that gross, human, congenital malformations arise solely from influences which affect the germ cells prior to fertilization. No evidence is available to indicate that they result from factors which operate for the first time after fertilization has taken place."

Dr. G. L. Streeter, Director of the Department of Embryology, Carnegie Institution, Washington, has made critical studies of embryological material with particular consideration of the etiology of deformities. His statement⁷ regarding their origin is very concise and impressive, as follows:

"It is well known that eggs, and by eggs I refer to fertilized ova, are not all of equal quality. In pigs and in man it is estimated that as many as 25% of them are not good enough to be born as living individuals. . . . In man such specimens make up a large part of the material that the physician encounters in miscarriages. Nor is the importance of quality limited to uterine life. Whether the infant survives its first year—and in fact a large number of them fail to do this—depends in considerable part on the original quality of the egg. If they withstand the usual experiences of life until between 50 and 60 years old and then succumb to its aggregate wear and tear, they conform to the actuary's 'expectation of life at birth' and to the embryologist's expectation of the performance of an egg of average quality. It is only the extraordinarily good egg that is still going strong at 80 years, and we see him (or her) do this in the absence of any exquisite hygienic regime or environmental favor."

The preceding data have dealt primarily with modifications in physical form and the nature of some of the controlling forces in the individual's

history and the time when they were operative. Modification of the structures already emphasized have been chiefly those that have been

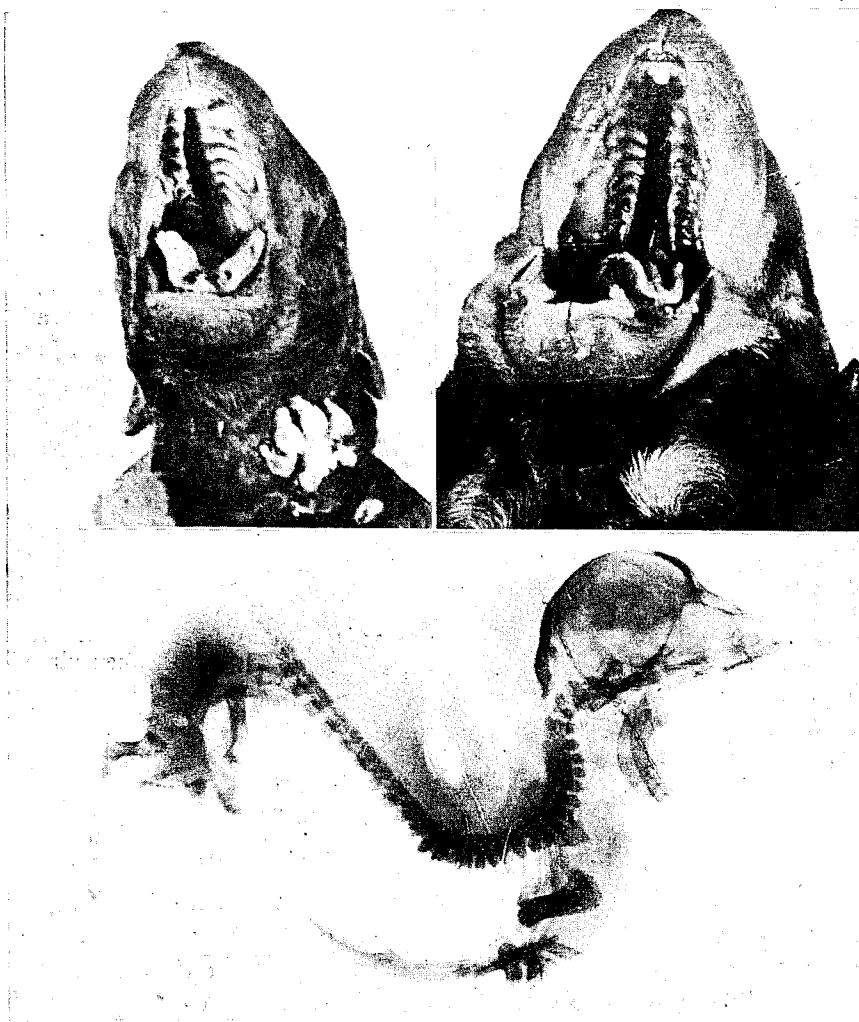


Fig. 12. Typical deformities in pups. Upper left, cleft palate. All pups in two previous litters by this mother dog were too defective to live. Upper right and below, cleft palate and spinal deformity typical of five with these deformities born in four litters. All sired by the same father dog

readily visible on the exterior. Data have been presented indicating that twenty-five out of every hundred pregnancies are lost before birth. Gynecologists and obstetricians have reported that a large percentage of these

are expelled in the second and third months as monsters so grossly deformed that they could not function as fetuses.

Harris⁸ quotes Mall⁹ as follows:

"He estimated from the records of 100,000 pregnancies that there were 80,572 normal births, 11,765 abortions of normal embryos and early monsters, and 615 monsters born at term. Thus at term 1 child in 132 is born with some anatomical defect. For each such case appearing at term, 12 others died and were aborted during pregnancy."

Accordingly, 13 out of 132 were either aborted during pregnancy or appeared at term all with anatomical defects, or about 10 per cent. Therefore, only a small fraction of the seriously deformed appear at birth and have a possibility of remaining in society.

In the large assortment of pronounced defectives there is a group called Mongoloids. They have a very typical facial and body expression and a marked underdevelopment of the maxillary bones and tendency for the upper arch to be much too small for the lower arch. We recognize them by these gross physical expressions and by their lack of mental development. Studies that are being made of the brains of defectives indicate that they are characterized by marked deficiency in special tissues. Whereas, a normal brain shows a large number of convolutions the mongoloids' brains show fewer. They usually do not have the mentality sufficient to manage their own lives or even to be serious social problems, not sufficient to be criminals. Usually they remain infantile. A typical one is shown in Figure 13 in six views. This boy at sixteen years was infantile, physically and mentally. The upper arch passed readily inside the lower arch. The nostrils were so small that he could not maintain life by breathing through his nose. The left nostril was entirely occluded. He played on the floor with blocks like a three or four year old. The pictures above and below at left show his appearance front and side view. With the belief that an important phase of his problem was lack of functioning of the pituitary body, I widened his upper arch rapidly by opening the median palatal suture, still ununited. In thirty days he could breathe easily through his nostrils with the changes shown in the two central views. In six months he passed through physical adolescence, was growing whiskers and mustache and had the appearance of two views to the right. There was a marked improvement mentally as I have reported in my book, not sufficient to make him a balanced citizen. We had created a dangerous sex pervert. A study of the history of mongoloids reveals that a majority of them are the last child in the family born after the mothers have passed forty years of age. A few are born to young immature mothers as their first child.

Embryological studies of defectives indicate that the nervous system is

easily disturbed and most frequently affected. In extreme cases of gross physical deformity the brain is often largely or entirely absent.

The studies of the brains of defectives in The Wrentham State School, Wrentham, Mass., have thrown important light on this phase. The report¹⁰ of this group on the basis of an examination of 125 mongoloids states:



Fig. 13. Physical changes in the Mongoloid type due to movement of maxillary bones to stimulate the pituitary gland in base of brain. Left: Front and side views before. Center: Front and side view in thirty days. Right: Front and side views six months after. Aged sixteen, infantile before, adolescent after, growing whiskers

“Summarizing our investigations, the pituitary in mongoloids reveals a peculiar and definite pathology. On the basis of fourteen cases we feel justified in emphasizing that in mongolism definite failure of the pituitary development is to be found. Mongolism appears as a hypopituitarism of a specific type, in which the absence or deficiency of basophiles seems to be essential.”

A further report by Benda¹¹ states after reviewing the accumulating data:

"All factors gathered by us in the last year point toward a pituitary disorder as responsible."

Mortimer of Montreal has shown¹² very marked interference with skull and brain growth as a result of surgical removal of the pituitary. His data reveal important changes in the development of the maxillary bones, skull and brain associated with disturbed pituitary function.

Barrie¹³ has shown that an inadequate amount of vitamin E produces marked disturbance in the growth of the offspring of rats and further that: "The changes observed are similar in several ways to those produced by hypophysectomy (removal of pituitary gland). Marked degranulation of the anterior pituitary is found in both the abnormal young and the adult sterile animals. Lack of vitamin E therefore produces a virtual nutritional hypophysectomy in the young rat."

Modern society presents in its assortment of defectives, divergencies from normal of a large and apparently progressively increasing group that might be classed as mentally backward and unable to manage their own lives without supervision, and a group that might be classed as delinquent whose behavior is so unsocial that they constitute a large part of the problems of the criminal courts. This group apparently is also on the increase in many districts. These two groups have been accounted for largely on the basis of either hereditary influences or bad environment.

It is of great significance that many of the primitive races studied had few, if any, police or prisons while in their isolated environment. Delinquencies of various types as well as reduced mental capacity have appeared very conspicuously in many of these primitive racial stocks when modernized.

In Figure 14 above will be seen two Indian girls, the one at the left, from the modernized Indians of the high Andes. Whereas moral standards in this racial stock have been very high in their isolated organization. this girl at nineteen years of age was reported to have given birth to five illegitimate children. It is important to note the gross physical deformity of her face in relation to her disturbed social behavior. The girl at the right is sixteen and belongs to a modernized Indian tribe living in Canada. She already is reported to have given birth to two illegitimate children. In Figure 14 below are shown two recently notorious criminals; Charles Jefferson, convicted of kidnapping and assaulting two girls in Florida and murdering one of them; and Robert Nixon, age eighteen, who admits slaying five women. Such cases regularly pay the supreme penalty with their lives. It is important to note the strong evidence of injury in the formative period on the basis of the studies herewith presented.

Extended studies have been made in many countries regarding the



Fig. 14. Modern moral degeneration of defectives. South American Indian girl, upper left, nineteen years old, mother of five illegitimate children. Canadian Indian girl, upper right, sixteen, mother of two illegitimate children. Below, a sex pervert and murderer, Florida; lower right, Robert Nixon confesses slaying five women. Note the strong evidence of deficiency due to injury in the formative period

contributing factors to delinquency. Burt¹⁴ of London summarizes his wide experience with the following comment:

"It is almost as though crime were some contagious disease, to which the constitutionally susceptible were suddenly exposed at puberty, or to which

puberty left them peculiarly prone. . . . Of all the physiological causes of crime the commonest and the greatest is usually alleged to be defective mind."

Tredgold¹⁵ of England recognizes two sources of brain injury which he has described as "germinal blight" and "arrest." He puts particular stress on the former as being pathological and not spontaneous, and related to the germ of either or both parents due to poisoning of the germ cell. It is very important that he has recognized a direct relationship between mental deficiency and facial and dental arch development. He states: "Palate—The association of abnormalities of the palate with mental deficiency has long been recognized, and there is no doubt that it is one of the commonest malformations occurring in this condition. Many years ago Langdon Down drew attention to the subject, and more recently Clouston has recorded a large number of observations which show conclusively that, although deformed palates occur in the normal, they are far and away more frequent in neuropaths and the mentally defective. He states that deformed palates are present in 19 per cent of the ordinary population, 33 per cent of the insane, 55 per cent of criminals, but in no less than 61 per cent of idiots. Petersen, who has made a most exhaustive study of this question, and has compiled an elaborate classification of the various anomalies found palatal deformities present in no less than 82 per cent of aments (mental defectives), in 76 per cent of epileptics, and in 80 per cent of the insane."

While the deformity patterns vary through a wide range, all apparently having their origin in nutritional injury of the germ cells of the parents, certain abnormal physical characteristics have been recognized in delinquents by specialists in that field. Hooton of Harvard in his elaborate investigations *Crime and the Man*¹⁶ says:

"On the whole, the biological superiority of the civilian to the delinquent is quite as certain as his sociological superiority."

As a result of his studies of 15,000 criminals in ten states he makes the important observation:

"One set of consistent contrasts rears itself in a solid, unbroken, and towering front. The putatively law-abiding citizen, however humble his social and economic status, is largely superior in physique and in most anthropological characters, so far as judgments of quality can be made, to the White criminal of comparable ethnic and racial origin and drawn from approximately similar occupational levels."

It will be helpful and of interest to note the many evidences of corroboration of the data presented here that appear from day to day in the literature and in the reports of current events.

Apperly¹⁷ in a recent study of 930 American Rhodes Scholars presents tables indicating the birth rank of those individuals of outstanding mental capacity. His data show that a larger percentage appeared in the rank of the first child in the family than in any other rank. Apperly refers

to Cattell's studies¹⁸ who made an investigation of 855 leading American men of science which shows that an unduly large proportion of first sons had attained distinction. Studies of very large families have been reported to me by health officers as frequently showing mental and physical defects in the last child.

In order to throw light on the degeneration of backward and unsocial individuals in our modern society I have made studies in Cleveland and in several parts of our country. In brief, these have shown a very large percentage, well over 90, of each group, the mentally retarded, the delinquent and incarcerated criminals to have evidence in their facial development of injury in the formative period. I have reported this in detail in my book on *Nutrition and Physical Degeneration*. Striking illustrations of the physical evidence of degeneration are shown in the daily columns of our newspapers and reports of criminals and social offenders.

APPLICATION OF DATA

The practical application of these data can make a very important improvement in future generations. Public education of necessity will be the most important first step in public betterment. This should include public instruction by our educational systems with emphasis on the placing of information before boys and girls of high school and college age. Fortunately, their training in the biological sciences has prepared them splendidly for understanding these new principles. Their earnest desire to improve society makes them eager for this task. Fortunately, these new data can be presented in very simple and concise form with illustrated text for visual educational programs. The keynote of social recovery from modern degeneration must be through prevention primarily by avoiding injury to the unborn. The primitive races by their accumulated wisdom can aid us materially. It is a matter of profound significance that in many of the primitive racial stocks studied nutritional programs were taught and practiced for the better preparation of both parents for childbearing. Their subservience of all personal ambitions and comforts to the best interests of their race discloses why they were successful in maintaining their cultures through long periods. It is at this point of willingness to make personal sacrifice for the general good that the greatest danger seems to lie in our modern degenerating civilizations. Nature's laws must be obeyed. Cultures that cannot or will not do so will obliterate themselves.

The application of these new data, obtained from primitive races, to our modern problems of racial and social decline constitutes one of our greatest immediate opportunities and responsibilities. It is very clear

that this can be accomplished best by public education. Fortunately, the available new material lends itself splendidly for application in programs of visual education through our various educational institutions such as colleges and high schools, parent-teacher associations, child welfare and social worker organizations in various fields. The material has accordingly been organized into eleven titles under the general subject: LIGHT FROM PRIMITIVE RACES ON MODERN DEGENERATION with the following individual titles:

1. SKETCH OF THE PRIMITIVE RACES STUDIED
(Swiss, Gaelics, Eskimos, North American Indians, Plains and Coastal Indians; South American Indians, Coastal, High Andes and Amazon Indians; Melanesians, Polynesians, Malaysians, Australian Aborigines, New Zealand Maori, African Negroes and African Arabs.)
2. HOW PRIMITIVE RACES HAVE PREVENTED TOOTH DECAY
3. HOW THE FACES OF PRIMITIVES WERE MORE BEAUTIFUL BEFORE THAN AFTER MODERNIZATION
4. HOW FACIAL BEAUTY CAN BE LOST IN A SINGLE GENERATION BY PARENTAL IGNORANCE
5. WHY THE LATER BORN CHILDREN IN THE FAMILY OFTEN HAVE MORE DEFECTS THAN THE EARLIER BORN
6. HOW DEFORMITIES ARE READILY PRODUCED IN ANIMALS BY DEFECTIVE FEEDING OF THE PARENTS
7. WHY THE FATHER MAY BE RESPONSIBLE AS WELL AS THE MOTHER FOR DEFECTS IN THE OFFSPRING
8. LIGHT FROM PRIMITIVES ON HOW THE MENTALLY BACKWARD MAY BE PRODUCED
9. HOW PRIMITIVES PREVENT THE PRODUCTION OF DELINQUENTS AND CRIMINALS
10. SPECIAL NUTRITIONAL PROGRAMS OF PRIMITIVES FOR PARENTS-TO-BE
11. RACE REGENERATION BY OBEYING NATURE'S BIOLOGIC LAWS

Each of these lectures is profusely illustrated with original photographs made by the author and the illustrations are interpreted in an accompanying manual synchronized to the numbered illustrations. The reproductions are being made in the following forms: film strip, single frame, 35 millimeter film used vertically, double frame, film strips used horizontally, and two by two glass slides. These are for use in the various small projectors which are specially suited for classroom work. The reproductions are being produced also in the standard three-and-a-quarter by four glass slides for large auditorium use. The descriptive data are being prepared

also on records for talking slides and on records for electrical transcription by radio.

While the contributions of the primitive races as assembled in this series have much wider application than the field of dentistry, many of the uses of the data can be applied directly to dental problems as practical programs for preventive dentistry. It is, accordingly, appropriate and important in the interest of the dental profession that these phases should be utilized liberally by the dental profession.

SUMMARY

1. Evidence is presented that in the fourteen primitive races studied, a high immunity to dental caries was established and maintained by an adequate selection of foods.

2. The adequate nutritions differed in accordance with the latitude and altitude and the controlling factors in the physical environment.

3. Mineral and vitamin content of these various nutritions were relatively much higher than is provided by the foods of modern commerce.

4. Members of these various racial stocks who changed from the native nutrition to the foods of commerce, lost their high immunity to dental caries while consuming these foods and regained their immunity when they returned to the native diet.

5. The isolated primitives were free from facial and dental arch deformities so long as their parents used the native foods, but these changes appeared in many of the children developed and born after this change in nutrition.

6. The first born children of the family, after the parents adopted the foods of commerce, had less deformity than the later children.

7. This condition is prevalent in Europe and America.

8. Many primitive groups used special nutritions for parents-to-be, before conception occurred, and practised rigid spacing of children.

9. Animal experimentation discloses that removal of vitamin A from the diet of mother pigs for a few months before mating and thirty days thereafter produces offspring with gross deformities, including harelip, cleft palate, club feet, nerve, brain and spinal defects, and complete absence of eyeballs and optic nerves.

10. When these defective pigs are reared to adults and mated and given an adequate diet, their offspring are normal.

11. The nervous system injuries include brain defects in varying degrees which are related to abnormal behavior and defective mental capacity.

12. A relationship is shown between defective facial development

and defective behavior of delinquents, associated in certain types with brain defects.

13. A procedure is indicated for reducing the percentage of defectives in modernized civilizations.

14. A program is provided for the direct utilization of these contributions from primitive races to the problem of the education of the masses by means of a series of visual education lectures and radio programs.

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