

LIGHT FROM PRIMITIVE RACES ON THE  
RELATION OF NUTRITION TO INDIVIDUAL  
AND NATIONAL DEVELOPMENT

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# LIGHT FROM PRIMITIVE RACES ON THE RELATION OF NUTRITION TO INDIVIDUAL AND NATIONAL DEVELOPMENT

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**I**N my studies of primitive racial stocks in various parts of the world, there has been evidence of the presence in the nutrition of factors which control the physical development and cultural characteristics of the native stocks. These physical factors have expressed themselves in each body build, high immunity to infective processes and immunity to dental caries. In every instance in which the racial stocks were living in close proximity to a liberal supply of sea foods, the faces and dental arches were characteristically broad and well developed. However, in those individuals of these various groups who had abandoned the native foods and had adopted the foods of modern commerce, immunity to tooth decay had been rapidly lost, particularly in the presence of overloads, as in the case of growing children and mothers.

Another important effect of the change in nutrition expressed itself in the children of the next and succeeding genera-

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tions born after the parents had adopted the foods of commerce. This change occurred even in the same family. It expressed itself as a narrowing of the face and nostrils and a disturbance in the development of the features and in the form of the dental arches. The pattern changes were varied and usually included one of the following: underdevelopment of the middle third of the face, underdevelopment of the lower third of the face, or both, and often involved not only the maxillae and mandible, but also other structures of the head and body. Note that this occurred only after the parents had replaced the native foods with the foods of commerce.

If this interpretation of my investigations among several primitive racial stocks is correct, it should be true that in any large group of any period who had lived through succeeding generations in a favorable environment, such as is furnished by access to the animal life of an ocean current which is rich in marine forms, succeeding generations in that environment should show these characteristics. This strongly suggested the importance of extending these studies to

the west coast of South America, which is bathed by the Humboldt current with its superabundance of marine life. It was for this purpose that I extended my field studies among primitive peoples to that area, chiefly to Peru, in 1937.

From the standpoint of these investigations, the physical characteristics of that district were particularly exacting and therefore favorable. The area between the Andes and the coast for about 3,000 miles varies in width in general from 40 to 200 miles, usually about 100 miles, to the crest of the outer range, known as the Black Cordillera. In gen-

of approximately 2,000 miles. The direction of the tradewinds across South America is from east to west. They carry the vapors of the South Atlantic across the vast Amazon basin, to be largely precipitated on the eastern ranges of the Andes Mountains and the plateaus. The vast streams, produced accordingly, carry the greater part of the precipitation down the eastern watershed, where they combine to make the mighty Amazon. There is, accordingly, very little moisture left to be precipitated on the western Andean range, and consequently there are few rivers running to the Pa-



Fig. 1.—Seven typical skulls of ancient civilization buried near coast. The arches are broad and round.

eral, the Andes consist of two or three parallel ranges, the most easterly known as the White Cordillera. Between these ranges, there are vast plateaus ranging from 10,000 to 15,000 feet above sea level. The Cordilleras themselves forming the Andean walls range from 16,000 to 22,000 feet in height. Peru has fifty mountain peaks 18,000 feet high or over. One peak, the second highest on the American continents, is 6,000 feet higher than Mt. Blanc. The area between the Andean range and the sea is in general an arid desert for a distance

cific. The tillable land, therefore, along the coast and throughout the coastal plain is limited to the river bottoms or areas that may be irrigated from these streams. Plant food, accordingly, would either have to be developed by irrigation or be transported from the Sierras or brought in ships. The nutrition of the people of the past has, therefore, been controlled by these physical factors. That the coastal area of Peru has been arid for thousands of years is demonstrated by the fact that whole cities were built of stucco throughout the plains and their

massive walls and fortresses have not completely been destroyed as they would rapidly have been had rains been frequent in that area. Within historic times, two rains have occurred, one in 1925. These have wrought vast havoc by dissolving the old buildings and forts. We experienced several earthquakes, one of which was quite severe, sufficient to make church bells ring and to injure buildings. This disturbance was followed by a light rain which we were advised was very unusual for that district.

The extreme dryness of the soil, therefore, together with its high alkalinity,

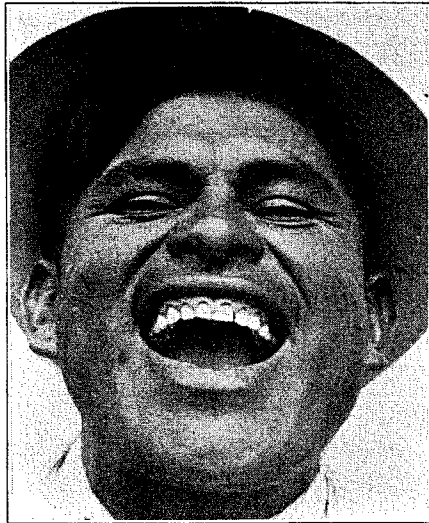


Fig. 2.—Typical Indian facial and dental arch development at coast. The diet was largely sea food.

has provided very favorable conditions for the preservation of graves. It is estimated that there are 15,000,000 along the coast which are in an excellent state of preservation. Even cereals, such as corn, and beans that had been buried appeared to be in an excellent state of preservation. We were advised that seeds that had been taken from some of the ancient graves had sprouted and grown. These graves contained specimens of the art work of past cultures. This has made

it possible to identify the areas covered by various cultures and to determine the order of their existence. The Inca culture that the Spaniards found had been preceded by several other distinct cultures.

Therefore, since we are concerned only with the effect of the environment on the inhabitants, these succeeding cultural groups lend themselves to a study of the relationship of the nutriment available for that area to the physical development of the succeeding racial stocks. We have, accordingly, three distinct types of material for study, the skeletons from the ancient graves, the living descendants of ancient cultures now living in accordance with the accumulated wisdom of their race and the modernized individuals of the same stock who are living on the foods of modern commerce. In addition to the coastal area, the cultures of the past and present of two other areas were available and were studied. These were those cultures of the high Andean plateau and the inhabitants of the eastern watershed and Amazon basin.

The space available for this presentation permits only brief illustrations of the data obtained. Extended studies and interpretations have been published in book form. This includes a consolidation of my investigations among fourteen primitive racial stocks with an interpretation and application of the data to modern problems, under the title, "Nutrition and Physical Degeneration."

Of the vast number of ancient graves along the coast, many thousands have been opened by robbers in search of gold and silver. One mound alone is said to have yielded several million dollars worth of precious metals. While grave robbing is now prohibited, it is still going on clandestinely. The result is that thousands of skeletons have been strewn over the burial grounds and are available in large numbers for study. When disinterred, they are in an excellent state of preservation. The grave robbers, however, are not careful to avoid the loss of

the straight rooted teeth, many of which are lost by their rough handling. Since we are concerned with the skeletal development, particularly the shape and design of the head and dental arches, the incidence of dental caries is not considered here. Special studies have been made of the incidence of caries in the freshly disinterred specimens. Murphy<sup>1</sup> reports that in an examination of fifty mummies in succession, he found only four with a tooth with dental caries.

In an examination of 1,276 skulls in succession, I did not find a single skull with as much deformity of the dental

formly, the upper arches produce outside curves and the third molars in both upper and lower arches stand in normal position and occlusion. This is in complete accord with my findings in the other primitive racial stocks living on native foods of similar quality.

Fortunately, there are several fishing villages in northern Peru, the people of which are descendants of the old Chimu civilization, which was the last preceding the domination of the Incas. Their isolation in a district that is very difficult to reach has apparently been their protection. They can be identified as be-

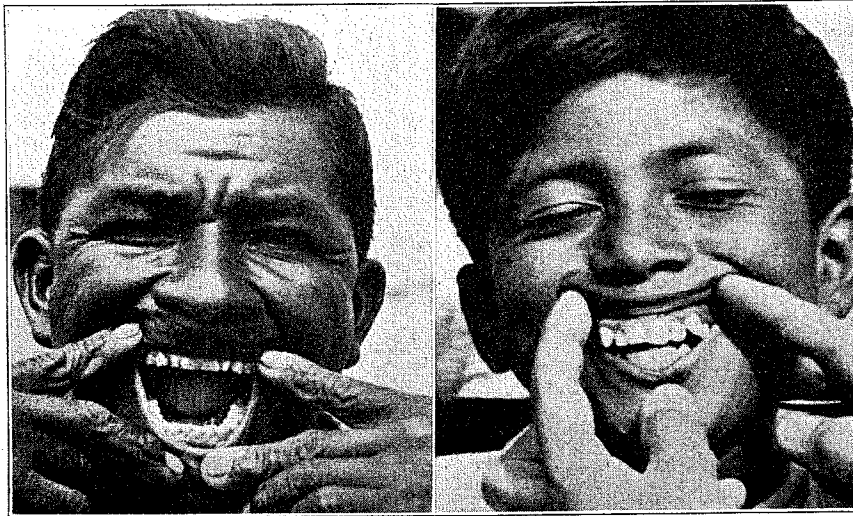


Fig. 3.—Left: Indian from sea coast reared on primitive diet, largely sea food. Right: Son of Indian at left, reared on commercial food. There is evident a marked change in facial and dental arch form.

arches as I have found in from 25 to 50 per cent of the modern residents of the United States, Canada and England. This remarkably high state of physical development constitutes at once an example and challenge for our much vaunted modern civilization. In Figure 1 will be seen seven typical skulls as they lay bleaching on the sand. Quite uni-

1. MURPHY, R. C.: *Bird Islands of Peru*. New York: G. P. Putnam's Sons.

longing to the Chimu civilization by the flattened back of the heads in accordance with the custom of that era. Through the assistance of government officials, I was able to examine groups in these villages. They were still living very largely on food obtained from the sea. Their superb body build and excellence of facial design clearly indicated that the same environment is now providing similar physical excellence to that produced for their long buried ancestors. A

typical illustration of facial form is shown in Figure 2.

Modern industry has been introduced in several communities by the establishment of sugar and cotton plantations in river bottoms. A superior quality of oil is being obtained in a few areas. At Talara, Peru, there is a very important oil producing industry and settlement. It is situated on almost completely barren, arid territory. The limited fresh water supply for the settlement at the coast is piped 40 miles from a stream from the Andes. Nearly all of the food is brought in by ships. This includes a large propor-

ing from the native foods of the coastal Indians to the modern foods of commerce. I had the assistance of the officials of the International Petroleum Company, including the Peruvian dentist who was in the employ of the company. He reported that dental caries was very active among the growing children of the settlement and that their teeth were very different from those of their parents, particularly the fathers. He took me to a native residence community to meet the parents and children.

In Figure 3 will be seen a father who had been reared to manhood in a coastal

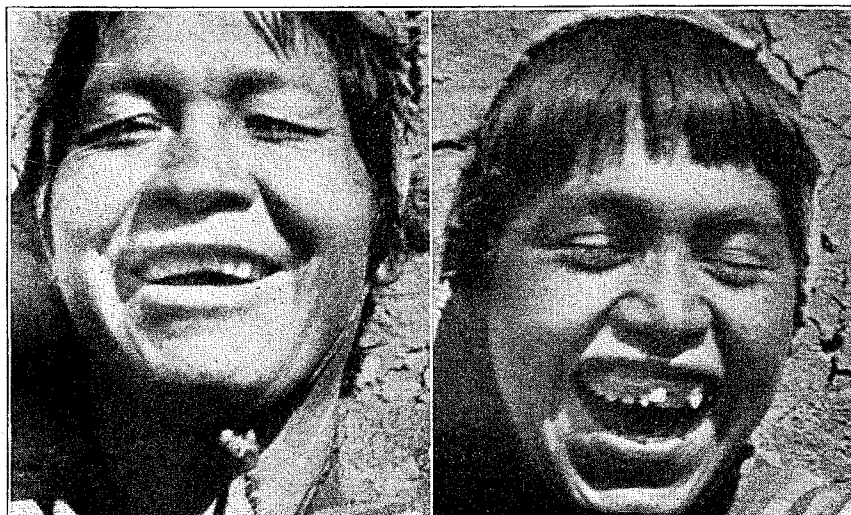


Fig. 4.—Left: Sierra Indian reared on native diet. Right: Son of Indian at left, reared on foods of modern commerce. The marked change in facial and dental arch form is evident.

tion of the modern foods of commerce, such as white flour, sugar, canned goods, polished rice and fats. The officials and their families of the International Petroleum Company are from England, Canada and the United States. The laborers are the Peruvian Indians, part from the coastal districts and part from the Sierra. This native settlement is provided with a school which is run in connection with the school system of Peru.

Talara proved to be an excellent place to study the immediate effect of chang-

village which depended very largely on sea foods for nutrition, supplemented by plant foods grown in a river bottom. Since working for the company, he and his wife had used the foods supplied by the company. One of his children is shown beside him in Figure 3. There is a marked change in the design of the face including the narrowing of the dental arches. This is typical of the condition that I have found in many parts of the world at the point where the previously isolated primitives had met modern com-

merce and adopted its foods. The graves along the coast contained many evidences of an intimate relationship and exchange between the coastal Indians and those of the highlands. This included wool from the highlands for making cloth and foods from the coast sent to the highlands. Some foods were also brought to the coast from the upland districts.

I studied the Indians living in the Andean Sierras in four districts of northern, central and southern Peru. While they wore costumes characteristic of the customs of these different areas, their physical excellence if they were still

merce are now reaching that interior and are displacing the native foods for some of these highland Indians who are descendants of the Incas. This is bringing about a change in the form of the face and often modification of body build in the new generation. In Figure 4 will be seen a native Sierra Indian and his son. The father was born and grew to manhood in the community where the natives were depending on native foods. With his contact with modern influences, the native foods for himself and his wife were displaced largely by the foods of commerce, particularly white flour, sugar

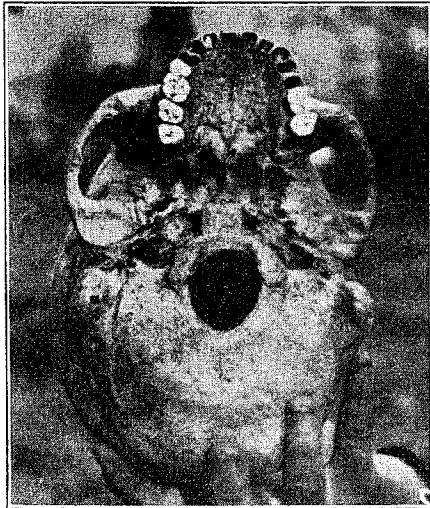


Fig. 5.—Typical skull from ancient grave in high Andes. The breadth of the dental arch is to be noted.

primitive was very marked. The Sierra Indians are shorter and stockier and have phenomenal strength even at altitudes from 10,000 to 18,000 feet. They are able to carry heavy burdens for long distances. Two hundred pounds was considered a fair load for a porter.

With the completion of the railroad to Cuzco by way of Arequipa, from the coast at Mollendo, and with the development of modern transportation and tourist travel to Cuzco, foods of com-



Fig. 6.—Typical dental arch of Indian of high Andes.

products and vegetable fats. The effect of this change on their son is strikingly shown by the difference in his facial and dental arch form.

It was my privilege to examine about twenty skulls that had recently been exposed in the movement of rocks by one of the earthquakes. This burial was at an elevation of approximately 11,000 feet. In the high Sierras, one of the methods of burial involved placing the bodies in rock shelters in caves the entrance to which was closed with rocks.

Notwithstanding the limitations placed on this high area in the matter of producing foods owing to the temperature, all of these skulls showed excellent physical development. A typical one is shown in Figure 5. The breadth of the dental arch is excellent.

A group of about twenty Andean Indians were brought down especially for my study to an 11,000 foot level. I did not find a single tooth attacked by dental caries and the design of their dental arches was superb. One of these is shown in Figure 6. In Figure 7 will be seen a young man who was brought down

the latter to prevent "big neck." This commerce between the coastal and Sierra tribes dates back to antiquity, as evidenced by the graves.

Ample opportunity was provided to study modernized Indians living near the copper mines and in the Sierra villages that had contact with the outside world. Two of the highest standard gage railways in the world run over passes between 15,000 and 16,000 feet above sea level. Many of the children of the new generation who had reached the teen age showed marked narrowing of the features and dental arches. The eastern slopes

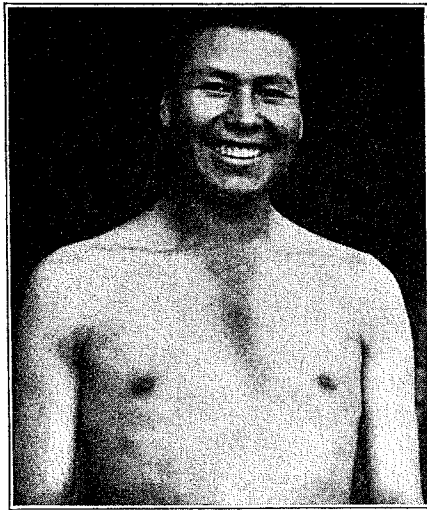


Fig. 7.—Typical boy of high Andes reared on native food; showing excellent chest development and good facial features.

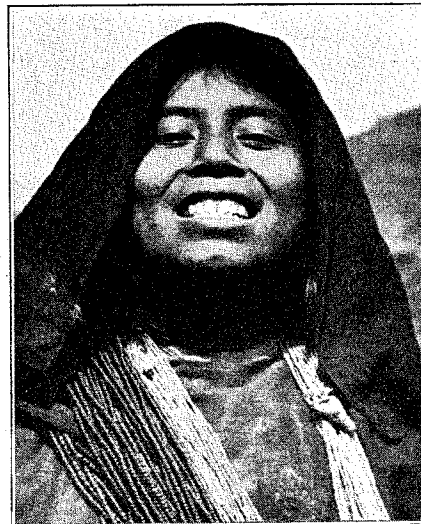


Fig. 8.—Typical Amazon belle in dress regalia.

from a high level. He has a fine chest development and well-formed dental arches. He had been reared completely on the native dietary, which consisted of corn and beans used with meat of the llama and alpaca, and with chicken and guinea-pig, the latter being raised for food. It was of great interest to learn that practically all of the Indian homes in the high Sierras had two products from the sea, namely dried fish eggs and dried kelp, the former for fertility and

of the Andes enjoy a climate regarding which some writers have become very enthusiastic, even suggesting that here might well have been placed the Garden of Eden. With the abundance of rain and sunshine, plant growth is very luxuriant. The eastern slopes of the Andes are completely covered with forests to an altitude of about 10,000 feet.

The Amazon river basin covering hundreds of thousands of square miles is largely a jungle. Many parts of this



forest have never been explored by white men. It is peopled by Indian tribes who have adapted themselves to jungle life. They are skilful hunters and fishermen and have built up an immunity to many of the diseases that rapidly break down the European constitution. The Peruvian Corporation has developed a large coffee plantation at the margins of the Amazon jungle. They depend entirely on inducing the native Indians to come out of the jungle to harvest the coffee beans. Through an arrangement made in advance, I was able to study groups of these jungle Indians at the coffee planta-

caries. This was in striking contrast with the condition found in a modernized group of this same racial stock, in which many of the teeth had active caries and many had been lost.

We are particularly concerned in this study to obtain information that will throw light on modern expressions of degeneration. When we examine the facial form and design of the dental arches of our modern inhabitants of the United States in practically any district, we find a large number and indeed in many districts a considerable percentage having a narrowing of the face and



Fig. 9.—Typical facial and dental arch development of Amazon jungle Indian.

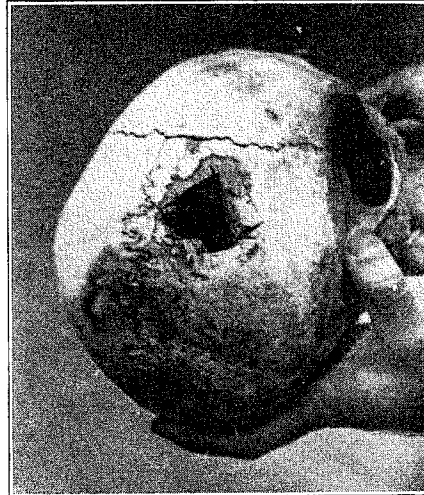


Fig. 10.—Typical primitive operation to remove crushed-in bone. The patient apparently died before healing.

tion. While they wore exceedingly little clothing in the forest, they have clothing for special occasions, as when having their photographs taken when studied by me. Their physical development is excellent. In Figure 8 will be seen one of the women. She has a noble carriage and fine countenance, also very excellent teeth. In Figure 9 will be seen the dental arch of one of the men. In an examination of one chief and about thirty members of his clan, I did not find a single tooth that had been attacked by dental

nostrils with deformity of the dental arches. We have been accustomed to explaining this as one of Nature's expressions of individuality accounted for by a mixing of ancestral blood. It is important to note that in the pictures of fathers and sons, in this study as in many previously reported primitive racial groups, the new generation is as pure blooded stock as the parents, and what has occurred has been in spite of heredity and constitutes an interruption of hereditary laws. That these are simple expres-

sions of the larger problem of community and national degeneration constitutes one of the most important contributions of my studies of primitive racial stocks.

If individual and national development and character are controlled primarily by biologic laws in which thinking is as biologic as digestion, we should expect these primitive racial groups who show such high physical excellence to have developed an advanced type of culture. This has constituted one of the principal objects of my quest among these primitive races. In this connection, we

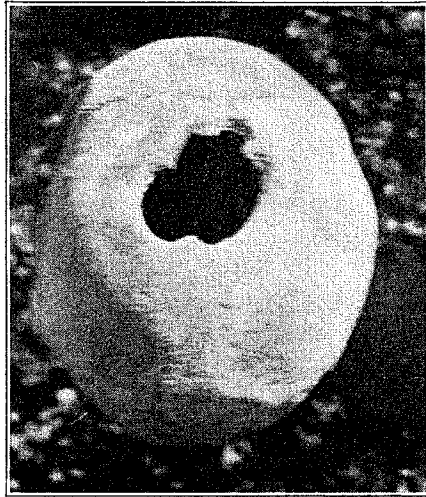


Fig. 11.—Typical marked healing following skull operation. The patient evidently lived months or perhaps years.

note the great advance that has been made by these primitive races in Peru in agriculture, engineering and science. Few people realize how many of our modern food and drug plants were developed by the ancient Peruvians; for example, the agave, alligator pear, beans, kidney and lima, coca (cocaine), cherimoya, chili pepper, cotton, guava, maize or Indian corn, manioc, bitter and sweet, peanut, potato, squash, quinine, sweet potato, tobacco and tomato.

I visited one of the ancient aqueducts and traveled beside it for 35 miles into

the foothills of the Andes. Modern engineers have estimated that it is capable of delivering 60,000,000 cubic feet of water a day. It is now in ruins, as is also a vast acreage that was once tilled by these primitive races. The fields and trenches lie as idle now as they were occupied centuries ago.

The marvelous stone work of the ancient inhabitants of the high valleys is everywhere illustrated by the magnificent walls, temples and forts built of cut stone; many of them of enormous size, even up to 70 tons. So skilfully morticed together are they that it is difficult to place the point of a penknife in the joints, yet no cementing substance was used. To this day, engineers are unable to understand how these feats were accomplished without the use of hardened tools and modern machinery.

Their marvelous skill in surgery is illustrated by the hundreds of skulls in the museums that were operated on presumably for the correction of war wounds which had crushed in areas of the skull. The fact that more than 60 per cent of these skulls show by the healing of the bone that the patient lived for months or years afterwards testifies to the success of these operations. The method of cutting out sections of bone that had been crushed in is shown in Figure 10. This person apparently did not survive as there is no evidence of healing in this skull. In Figure 11 is seen a skull that had been operated on and which shows extensive healing and repair, with new growth of bone. An important step in surgery often included placing of a plate of pure gold over the skull opening under the scalp.

In Figure 12 will be seen two views of a skull that had been operated on and a gold plate put over the opening. In the second view, the plate is removed to show the extent of the healing. Many such gold plates have been found in the exhumed bodies. Of particular interest to the members of the dental profession

will be the evidence of the skill of the surgeons of the ancient Indian cultures of North and South America. In Figure 13 is shown a lower jaw with a trephine opening through into a cyst chamber. The margins of the bone are rounded by the process of new bone growth. This specimen was obtained from a grave in southern Florida.

The physical and mental excellence of the ancient American cultures as evidenced by these data were accompanied in Peru by a government organization under which there was practically no poverty or crime. Every person had a

ture is to be stemmed, it will be only by learning Nature's laws and by developing strength and courage sufficient to obey them.

An essential difference between the programs adopted by the primitive races and those of our modern cultures relates to our approach to living in harmony with the laws of Nature. The primitive races had formulas for accomplishing this in which they reasoned from cause to effect. They did not pretend to know the chemistry of the foods, but they did understand that the proper selection of foods had the desired result. For

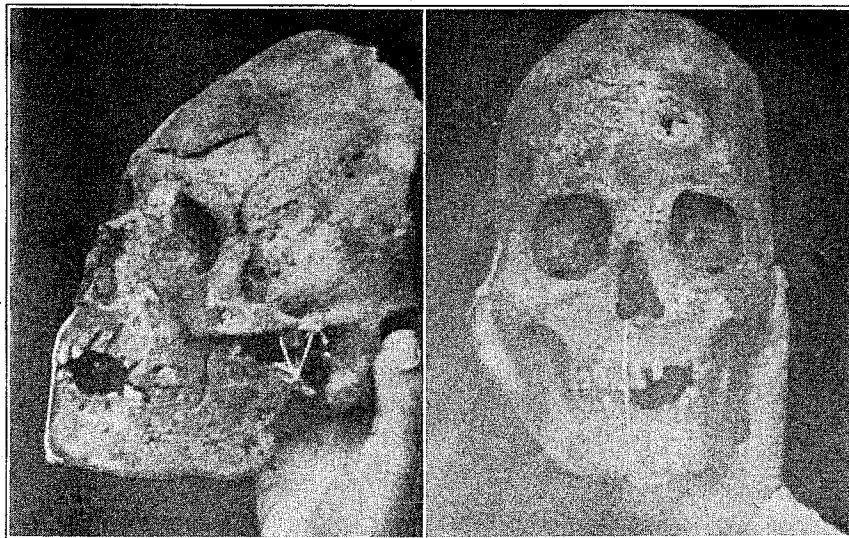


Fig. 12.—Primitive Peruvian surgery. Surgeons often placed a gold plate over the cranial opening as shown at the left. The skull with plate removed is shown at the right. Extensive healing is evident.

plot of land. The beneficent government maintained great storehouses of food against scarcity or want. Every man contributed with his labor, yet all were provided with ample opportunity for rest, relaxation and sports. The contrast between the opportunities for happiness and successful and comfortable living as developed by the primitive races of Peru and those of most of our modern communities indicates that if the progressive degeneration of our modern cul-

ture, obedience to these laws of Nature was more fundamental and sacred than life. They were conscious of a keen responsibility for the coming generation as well as for the care and maintenance of their own bodies. According to the evidence available, they understood that not only their physical bodies, but also the quality of their spirits and their behavior, depended directly on the obeying of these laws.

In Peru, I found three primitive groups

who believed that special nutrition is necessary before conception takes place, and that this must apply to both the mother and the father. This is in accord with my findings among several other primitive stocks. It is exceedingly important that their methods for successful living with Nature be recorded and studied in detail and thus be made available for the betterment of modern civilization, particularly the white civilization,

prior to conception. Also an inadequate nutrition for the mother during the developmental period of the fetus results in a handicapped infant, thrown on the world with incomplete organization and development of various structures of the body often including the brain. I do not expect that the limited data presented in this paper and in my other reports will be adequate to justify this new view. I will ask, however, that the readers con-

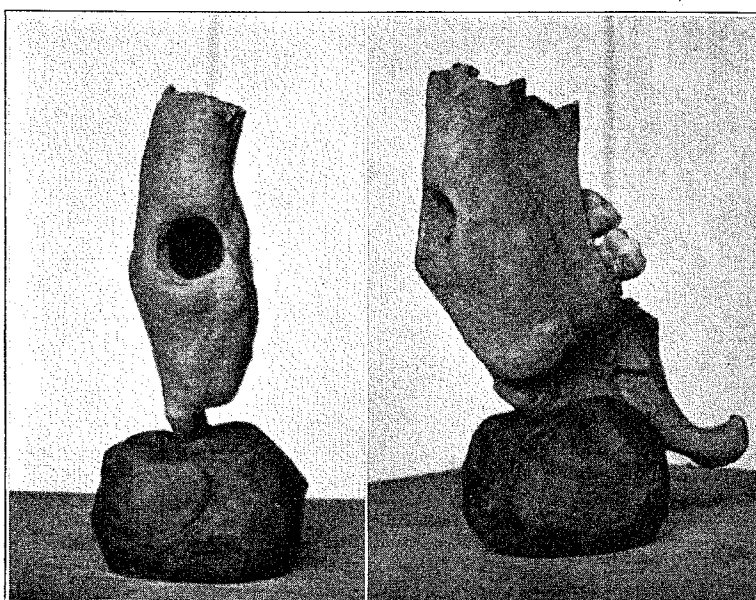


Fig. 13.—Pre-Columbian primitive surgery: Trephining into a mandibular cyst. Marked healing at the margins is evident.

which is progressively declining physically, mentally and morally in all parts of the world where it has adopted our modern system of nutrition.

On the basis of the customs of the primitive people and the light provided from this source, we see the problem of the backward child, the delinquent in his various stages and finally the hardened criminal all as in part, and in many instances in very large part, the direct result of faulty nutrition of the parents

sider these data as indicating an early step in this process of physical degeneration. More severe involvements result similarly from greater injuries in the formative period. Injured individuals also have reduced reproductive efficiency. Much that we have thought of as being inevitable because of a hereditary origin is not inevitable for future generations in this new light, since much of the injury was due to intercepted heredity.

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