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ANTHROPOLOGICAL WORK IN PERU IN
1913, WITH NOTES ON THE PATHOLOGY
OF THE ANCIENT PERUVIANS

WITH TWENTY-SIX PLATES

BY

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I. INTRODUCTION

In 1910 the writer made a brief visit to Peru, resulting in the acquisition of some valuable data and of important skeletal collections,¹ but this gave merely a taste of the anthropological riches of the country and created a strong desire for further work in that part of the South American continent.

An opportunity to extend the investigations was afforded the early part of the year 1913, in connection with the preparation of anthropological exhibits for the Panama-California Exposition at San Diego; and three busy months were spent on the Peruvian coast and in certain parts of the mountain region of Peru, in exploring the ancient cemeteries.

Due to adverse climatic conditions, poor means of communication and transportation, the backward state of the people, and the prevalence of infectious diseases, the journey proved uncommonly difficult. For these reasons and also because of the impossibility of further extending the absence from Washington, it became necessary to limit the territory to be covered. Notwithstanding these conditions however, much was learned, while a large number of the rarer specimens were gathered for further study.

Before proceeding with the account of what was accomplished, grateful acknowledgment should be made to the Peruvian authorities and to good friends in different parts of the country, for the generous help extended to the expedition. The writer wishes espe-

¹ Reported by the writer in "Some results of recent anthropological exploration in Peru," *Smithsonian Misc. Coll.*, Vol. 56, No. 16 (Publication 2005), Washington, 1911, pp. 1-16, with 4 plates.

cially to thank His Excellency the President of Peru, who personally granted the needed permits for the exploration; to Sr. Luis Felipe Paz Soldan, the Director de Gobierno, who assisted the writer with the permits and in other matters; to the Hon. Ministro de Fomento, and the Srs. Ingenieros José Bravo and C. W. Sutton, who rendered valuable aid in more than one direction; to Mr. H. Clay Howard, the U. S. Minister at Lima, who gave much official and friendly aid with the Peruvian authorities; to W. R. Grace & Co., both at New York and at Lima, who helped the expedition very materially with introductions and in facilitating the transport of the collections; to Sr. Miro Quesada, editor of "El Comercio," for his kind recommendations to the President of Peru in regard to the expedition; to the excellent friends, Senator Sr. Victor Larco, of Trujillo, and Sr. Enrique Fracchia, of Lomas, without whose generous aid a large part of the work in the Chan-Chan and the Nasca regions could not have been accomplished; to the family Tello, of Huarochirí, to the members of which the writer is indebted for many favors; and last but not least to Messrs. Otto Holstein and R. H. McGeary, officials, respectively, of the Central and North Eastern Peruvian Railroads, who assisted with transportation and in other directions. And these names by no means complete the list of those who unselfishly helped in one way or another toward the success of the trying work.

The principal objects of the trip were, to determine, as far as possible, the anthropological relation of the mountain people with those of the coast; to make further studies regarding the distribution of the coast type; to determine the type of the important Nasca group of people; and to extend the writer's researches on Indian and especially pre-Columbian pathology. Advance was made along all these lines, although the limits or final words were not reached in any case. The earlier conclusions of the writer were in the main corroborated, but the new facts add details and show exceptions. With regard to the mountain regions, much remains for future determination. As to the pathology of the native Peruvians before contact with the whites, the main work can perhaps now be regarded as done, or nearly so, though individual variation in different morbid processes seems inexhaustible, and much in this line will doubtless appear in further collections.

The total skeletal material examined on this journey was enormous, the collections alone filling over 30 cases. No excavation, however, was undertaken, attention being restricted, on the coast, to the

bones upon the surface of ancient cemeteries, exploited by the peons and occasionally by persons "higher up" for the sake of the pottery and other valuables buried with the bodies; and to the usually equally exploited burial caves or houses in the mountains. This procedure was necessary on account of the limited time available for the journey, as well as to comply with the terms of the official permits. It had the unequalled advantage of enabling the writer to examine an immense number of specimens. This made it possible to learn promptly many facts offered by the material, and to make representative collections in a relatively short time. These precious and now rapidly disappearing opportunities present, however, also certain disadvantages which can be compensated for only by patient and prolonged excavation. They render difficult and in many respects impossible, any exact statistical determinations, and only rarely do they give opportunity to examine all the parts of the individual skeleton.

As heretofore mentioned the opportunities for anthropological and pathological studies on the prehistoric material in Peru are on the wane, and should be taken full advantage of before they are largely lost, which is seemingly a matter of only a few years. In 1910, after the writer returned from Peru, he called the attention of the Anthropological Society of Washington to the vandalism going on unrestrainedly in the richest burial grounds and ruins of that country, and a resolution was adopted by the Society calling the attention of the Peruvian Government to the necessity of stopping this wanton destruction.¹ As a result, a set of rules was promulgated by the president of Peru prohibiting unauthorized excavations and exportation of archeological specimens from the republic.² These rules were published and communicated to the various Peruvian authorities concerned in the subject and while they failed to accomplish their full purpose, yet they have diminished the excavations to a very large extent, and have especially made the peon wary, so that in many instances he now hides the traces of his work by covering the bones. Meanwhile the destruction by the elements of the skeletal remains left on the surface is rapidly advancing, so that cemeteries that were still rich in such material in 1910, to-day, in many cases, offer little more than useless rubbish. The laws against the destructive work of the peon will doubtless be more fully enforced

¹ See *Science*, 1911, p. 552; *The American Anthropologist*, 1911, p. 317.

² Edict of August 11, 1911, published in the *El Comercio* and other Peruvian periodicals; translation in *The American Anthropologist*, 1912, p. 204.

in the future, as they should be, and four or five years hence, except in the mountains and the more sheltered localities, but little will be found in Peru for the anthropologist without costly and time consuming excavation.

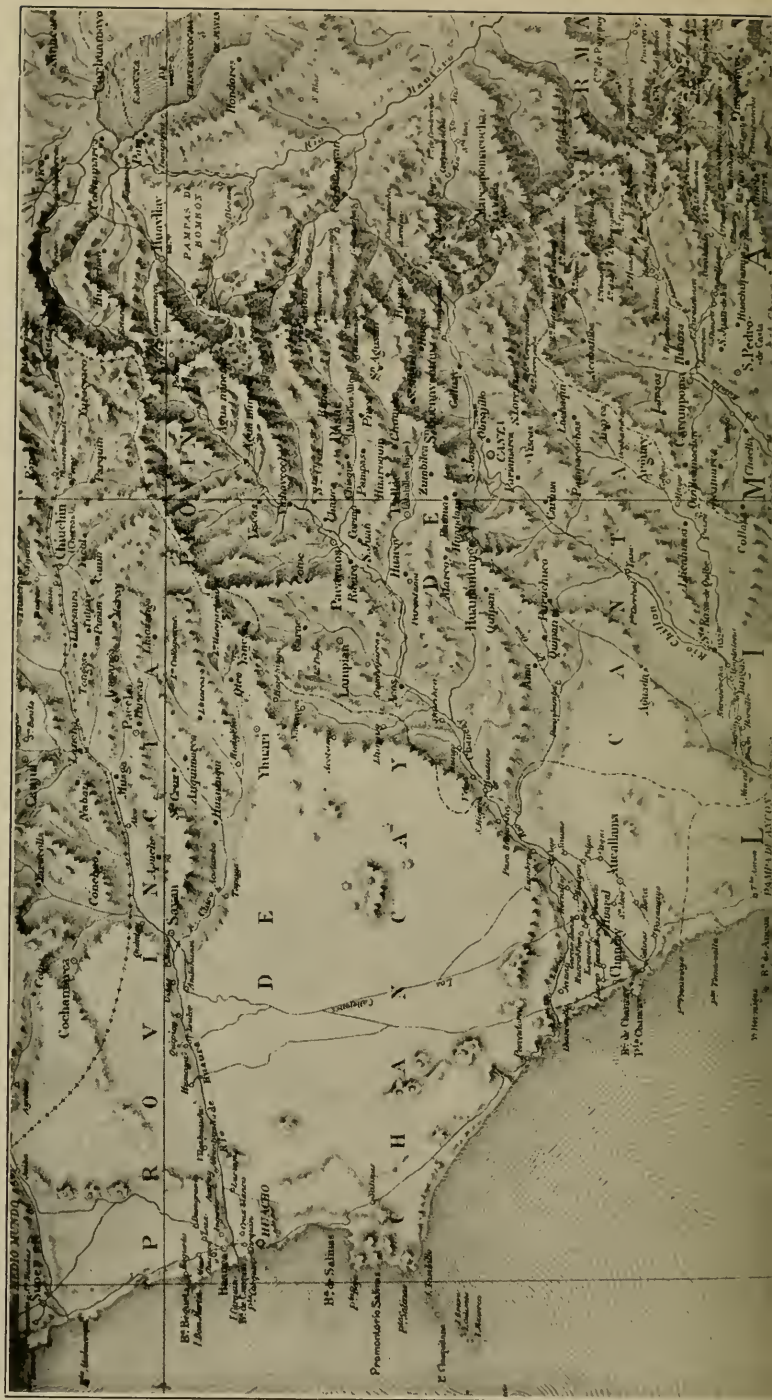
II. EXPLORATIONS IN THE SIERRAS: REGION OF HUAROCHIRI

The rugged, high, mountainous district southeast of Lima, known as the province of Huarochirí, is entered either from the line of the Central Peruvian Railroad, or by a detour from the coast. The former route involves the passing through localities infected with dangerous diseases peculiar to certain parts of Peru, the *uta* and especially the *verruca*, as well as some long and steep ascents. The other route passes through a healthier territory, but means two to three days arduous journeying, devoid for the most part of all accommodations for man and beast.

The Huarochirí region has no special historical importance, and, although so near to Lima, it has never been well studied archeologically or anthropologically; but it has long been known to be relatively rich in ruins and in trephined crania. Some of the trephined skulls found their way into the remarkable collection described 15 years ago by Muñiz and McGee,¹ and two years ago the Harvard Medical School purchased a large number of similar specimens from Dr. Julio C. Tello, a native of the town of Huarochirí. The latter collection, as yet undescribed, was made by Dr. Tello, with the assistance of Dr. Clemente Palma and some of the natives, entirely in the district of Huarochirí, and when seen by the writer was found not merely to present highly interesting conditions from surgical and pathological standpoints, but also to show crania of a remarkably uniform type such as occurs only exceptionally in the coast regions. These facts and the problems they offered made a personal investigation of the burial places of this district very desirable. After duly obtaining permission from the Peruvian authorities, the writer therefore started at once toward Huarochirí.

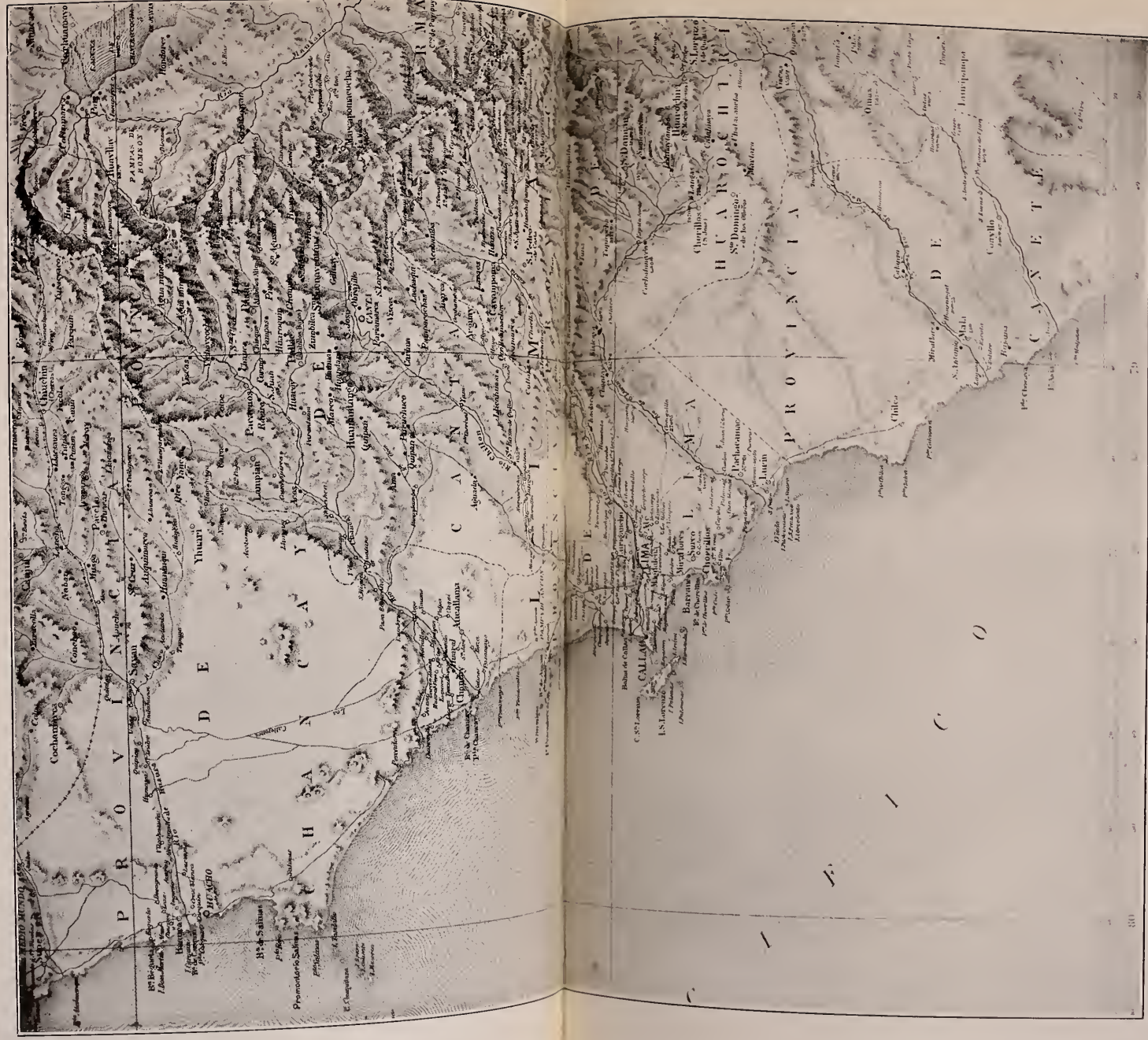
Preceded by a brief visit to the ruins of Cajamarquilla, the route chosen was that by way of Matucana, whence a perilous and long day's journey took the writer, with a soldier-companion and a native, to San Damian, the center of a difficult but archeologically

¹ Muñiz, M. A., and McGee, W. J.: Primitive Trephining in Peru, 16th Ann. Rep. Bur. Amer. Ethnol., Washington, 1897.





MAP (AFTER RAIMONDI), SHOWING THE CENTRAL PARTS OF THE PERUVIAN COAST, AND THE PROVINCE OF HUARO-CHIRI.



MAP (AFTER RAIMONDI), SHOWING THE CENTRAL PARTS OF THE PERUVIAN COAST, AND THE PROVINCE OF HUAROCHIRI.

rich region, from which shorter trips were undertaken in several directions. At San Damian, Dr. J. C. Tello, who had been appointed by one of the ministries as a companion, met the writer, who with him proceeded to Huarochiri, whence again a number of trips were made into the neighborhood. Then, with the rainy season making further travel in the mountains out of question, our small party returned by the more southern route to the coast. The rapid observations made on this journey under difficult climatic and other conditions were as follows:

Cajamarquilla.—The extensive ruins known by this name lie in a nook of the foothills rising at the northern limits of the Rimac Valley, approximately 18 miles east of Lima, and about five miles from the little station of Santa Clara on the Peruvian Central Railway. They have not as yet been thoroughly investigated, though partially explored by Squier,¹ Middendorf² and Uhle³ and visited by Dr. Charles W. Currier,⁴ Mr. M. H. Saville and other archeologists. According to Squier's estimate, the ruins cover nearly a square league. The structures are all of adobe, and have suffered considerably from climatic conditions and earthquakes. They are not very imposing, but their extent shows that the city must have harbored at one time a very numerous population. Contrasted with this is the relative scarcity of cemeteries. Burial grounds, one large and one small, have been located just south of the ruins on the plain and one exists on the top of a hill to the north. There seems but little chance that any extensive burial grounds have thus far escaped notice, and these cemeteries together are so disproportioned to the probable population of the town, that, as cremation or distant burials were not practiced, there seems to be only one explanation for these conditions, namely, a rapid building and a brief occupation of the town. No historical mention of the place is known; a vague tradition in the valley ascribes the town to the "reconcentrados" during the early part of the Spanish dominion, while Uhle found that the archeological contents of the graves represent several cultures. The writer led by the *dueño* of the hacienda Nieveria, to which these lands belong, visited the two cemeteries on the plain, found numerous skulls

¹ Squier, E. George: Peru, etc., Svo, New York, 1877, pp. 91-97.

² Middendorf, E. W.: Peru, Vol. 2, Berlin, 1894, p. 74.

³ Uhle, Max: Ueber die Frühculturen in der Umgebung von Lima. Trans. Intern. Congr. Americanists, Wien, 1909, p. 362; also a map (No. 2, Distribution de las Varias Civilisaciones en el Valle de Lima), Lima, 1907.

⁴ Currier, Charles Warren: The Dead City of Cajamarquilla. Bull. Pan-American Union, Washington, August, 1912, pp. 301-308.

and other skeletal remains on the surface and also some open graves in the form of deep adobe-lined cists, resembling considerably the stone cists encountered farther south, in the Nasca and Acari valleys. The bones indicated a homogeneous population of medium stature and strength. The skulls were almost invariably brachycephalic, of the coast type, and usually free from the characteristic artificial antero-posterior deformation so common in prehistoric times on the coast, but which disappeared soon after the coming of the Spaniards. A few that showed the fronto-occipital flattening showed it in a small degree only. These facts would seem to speak for a rather recent, post-Columbian, period for these ruins and burials.

Fifteen miles eastward of Cajamarquilla, in the now rough and narrowing valley of the Rimac River, lies the health resort Chosica, and, according to information obtained, skeletal remains of the mountain population, with a few trephined crania, have been found in the hills to the north as well as to the south of this locality.

From Chosica the canyon ascends at an increasing grade to Matucana, passing through what is probably the most dangerous verruga region in Peru. Signs of ancient occupation in the form of terraced fields on the slopes of the mountains appear in many localities, and the natives tell of ruins and burial caves in the sides and especially on the tops of the scarcely scalable great rocky hills. Here for the first time the rather puzzling fact was met with—seen later on to be the general rule in these regions—that the ancient settlements and burials are found not in the scanty lowlands, but near or at the summits of the less extreme mountains.

Opposite and north of the village and station of Surco, 56 miles from Lima, a huge mountain rises, known as the "Cerro Wacapuna," the summit of which is reported to show remnants of a large, ancient fortification, and a subterranean cavity with burials.

Matucana itself is a small town situated 64 miles east of Lima at an elevation of 7,800 feet, in a narrow part of the "quebrada," of the Rimac, and is surrounded on all sides by mountain masses that reach several thousand feet higher. In the great elevation which dominates Matucana on the south there were said to exist some burial caves, and a number of apparently more important localities with ruins and burial caves were reported to exist in the rough country to the northeast of Matucana. Due to the presence of the verruga in this region, personal exploration of the various remains was not undertaken, but an arrangement was made with

Sr. Lizardo Montes, an ex-prefect of the district of Huarochirí and a 20-year sufferer from the dread "wart" disease, for a collection of skeletal material. The results were about 30 crania and a box of other bones of the skeleton. Sr. Montes reported that all the sites examined have been found despoiled by those who hunted for valuables, and in many instances the skeletal remains had been thrown out from the caves and were found broken and more or less decomposed on the side of the mountain. Of the 30 crania collected, one showed trephining. None of them presented any deformation, and a large majority belong to the same oblong type as that represented in the Huarochirí collection at Harvard.

San Damian was found to be a fair-sized and picturesque village situated on the shoulder of a mountain, at an elevation greater than that of Matucana and probably not far short of 9,000 feet (pl. 2, fig. 1). The place is surrounded on all sides by mountain masses and peaks, separated by more or less deep "quebradas." Washing the foot of the promontory on which the village stands winds a branch of the Rio Lurin. The summits of the mountains rise from 10,000 to over 13,000 feet in height, and many of the lower ones show ruins, ancient fortifications, or burials. The canyons are for the most part so narrow, unhealthy and difficult of penetration, that the ancient inhabitants of these regions were obliged to search for more favorable spots on the heights; they terraced the fertile mountain sides for fields; they fortified some of the more inaccessible summits; and they buried in caves, crevices or rock shelters, which were walled up when no more used, or in peculiar long low stone houses, constructed near the settlements and on high elevations in the neighborhood. The present inhabitants (pl. 5, fig. 1), all of whom are of mixed blood, but some of whom doubtless descend from the former Indians of these regions, have taken the terrace fields as a heritage and continue their cultivation in what is probably the old manner (pl. 2, fig. 2; pl. 5, fig. 2). Such "andenes" are found in all parts of the district of Huarochirí, at various localities in the canyon of the Rimac, and in all neighboring territory as well as in a great many other parts of the mountainous regions in Peru. They are often exceedingly picturesque, with their well-made supporting walls, green-lined acequias, rich black earth, and fresh crops of corn, alfalfa, wheat, or potatoes.

There are indications that at the time of the conquest, or just before, the population of this territory was larger than at the present time. The cultivation of the difficult terraines, it is seen, was more

extensive and the region is full of ruins. The latter can be found on or near all the summits where water could be had and where some of the steep slopes in the neighborhood could be terraced.

The writer's stay at San Damian was too brief for a thorough survey of the ruins and he can only report upon them collectively. The nearest are known as Pueblo Viejo. They top a hill less than two miles northeast of San Damian, tapering toward the east and northeast. Farther on in the same direction, on the steep slope on both sides of the road to Toctococha, are numerous burials in shallow caves and under the rocks. On a large hill to the north of that of Pueblo Viejo and across a canyon, is another ruin; on the mountain beyond that still another, and the same applies to the great ridge that extends northwestward. To the south and southeast, there are several ruins, one, like Pueblo Viejo, partially in view from San Damian. Directly to the east a huge mountain blocks the way, but to the westward appear the "Cinco Cerros" or Five Peaks, a remarkable stone fortress and an important burial ground (pl. 2, fig. 2), while still farther west, near Tupicocha, are the ruins of Sunaikaka (recently visited by Dr. Tello), and to the south there are said to be remains of still other old settlements.

The region would well repay a three or four months exploration in a favorable season. The writer had only ten days and most of this time it was a work of traveling in clouds or chilly drizzle. He did not suffer from the soroche, or mountain sickness, which incapacitates so many in these altitudes; nevertheless the climbing of the steep slopes, to reach the ruins or burials, was attended by considerable difficulty in breathing and a continuous effort for more than three or four minutes was impossible. A piece of the rough ground would be scaled, until the lungs would threaten to burst, when it would be necessary to lean on some rock for several minutes until more normal respiration was reestablished; then the procedure would be repeated. Nor were these the only difficulties. Serious obstacles were encountered on the part of the natives, ignorant, superstitious, unwilling, and enfeebled by alcohol. Reliable information or help was out of question; and due to the general poverty and the season, it was almost impossible to secure the necessary animals, or food for them when secured. Notwithstanding, visits were made daily to ruins and fair collections were obtained from the Pueblo Viejo, Ullulla, and especially from the "Cinco Cerros." And the exploration would have been prolonged had it not been found that the majority of the more approachable ruins had been



Fig. 1. San Damian, with the clouds rising from the "quebrada" just beyond



Fig. 2. "Cinco Cerros" ("five peaks") from just beyond San Damian. On the steep slopes in the foreground to the left, some "andenes" or terrace fields

THE VILLAGE OF SAN DAMIAN AND THE OLD FORTRESS "CINCO CERROS"



Fig. 1. Ruined stone burial houses on a rocky promontory opposite the ruins known as Pueblo Viejo, near San Damian



Fig. 2. Stone burial houses higher up on same rocky ridge as those shown above
OLD STONE BURIAL HOUSES NEAR SAN DAMIAN, DISTRICT OF HUAROCHIR

visited by Tello or his native friends, who secured whatever seemed more valuable of the skeletal remains for the collection that was later sold to Harvard. The "Cinco Cerros" have fortunately escaped, though, like nearly all such locations in Peru the remains were despoiled by the treasure hunters; and the writer found here some precious cases of trephining as well as some interesting anthropological material.

The results of the exploration about San Damian cannot be fully given before the elaboration of the collections. A number of the most evident facts, however, are as follows:

The region was settled predominantly by people with a more oblong type of skull, the same as has been found in the neighborhood of Matucana and which has before been seen in the Tello collection from the district of Huarochiri. Besides this, however, there were also found remains of what may have been clans in some of the settlements, with a more brachycephalic type of crania approaching those of the coast. At the "Cinco Cerros" ruin, the remains of the individuals of this type, who were in minority, occupied one separate burial house.

The long and other bones showed that throughout the region the people were well-built and of fair stature. Also they were a people remarkably free from such constitutional diseases as would leave marks on the bones, for pathological specimens among the latter were very scarce. Injuries of the various parts of the skeleton were also rare, but on the other hand wounds of the skull were common. These wounds were evidently due in a large majority of the cases to sling shots and clubs, and often when the injury was not immediately fatal, the subject would be operated on by trepanation.

The peculiar burial houses met with in this region and later on in other parts of the district of Huarochiri, deserve a special mention (pls. 3 and 4). They are structures from 8 to over 30 feet long, about three feet inside and five and one-half feet in outside diameter, with walls approximately four feet high, and a flat or a low A-shaped roof rising from one to two and one-half feet higher. Few of those seen may have exceeded somewhat these dimensions. The walls where finished are generally seen to have been quite well-built of unhewn stones. They were covered by big slabs reaching from side to side, and on these were placed flat stones in an offset manner in such a way as to form sort of eaves on each side and rise to a convex or a bi-sloped roof. The interstices among the roof

stones were filled with earth, and sometimes the whole surface of the stone roof was evidently covered with earth or sod. In some instances the roof was left very low and quite flat, but in others the A-shape is well marked. In one of the sides there would be, at the level of the ground, one, two or even three doorways, according to the size of the house, through which a man could just crawl. Some of the longer houses were divided into two and even three compartments by a secondary stone wall on the inside, and the floor was generally lowered below the level of the outside ground.

These burial houses, as well as burial caves, often served for secondary communal burials, but besides this, individual bodies were also placed in them in the contracted position, and in some instances, as later seen near Huarochirí, all of the burials in a given mortuary house might be of this nature. The bones or bodies were placed close together and scantily covered with earth up to the level of the outside ground; above this they were evidently laid in without any covering.

Some of the largest burial houses seen at the Five Peaks each contained the remains of over one hundred individuals, while the smallest ones might not shelter the bones of more than two or three bodies. None were found filled to their capacity, and a few were almost empty. Their position and arrangement seldom showed anything noteworthy; at the "Cinco Cerros" however, there existed in the midst of a group of such houses a moderate-sized square, which may have served for ceremonies, and one isolated burial house at the same place was found surrounded by a circle of single larger stones. When a burial house was no longer used—and the same is true of the burial caves—the doorways (or mouth in the case of the caves) were walled up.

These stone houses seem to the writer to be nothing but modifications of the well-known chullpas found in the highlands farther eastward, and this opinion was corroborated by what has since been found by Drs. Tello and Cl. Palma in another part of the district of Huarochirí (pl. 4). They show various modifications in different parts of Peru (pl. 18) and, modified by environment, they become the stone or adobe burial chambers or pits found in some parts of the coast region.

Huarochirí (pl. 5, fig. 2).—From San Damian the writer proceeded, through a territory less rich in and in some parts wholly devoid of ancient remains, to the valley of Huarochirí. This with the neighboring elevations was found to be a beautiful and picturesque



BURIAL TOWER, BURIAL HOUSE, AND WALLED-IN ROCK-SHELTER FOR BURIALS; RUINS IN THE SIERRA DE HUACHUPAMPA, DISTRICT HUAROCHIRÍ, NORTH OF MATUCANA

(From a drawing by Dr. C. Palma, furnished by Dr. J. C. Tello)



Fig. 1. Natives, all mixed bloods, of San Damlan, Dept. of Huarochirí



Fig. 2. The town of Huarochirí, with San Pedro and the Cerro de San Pedro in the rear. Andenes on the slope of the mountain

NATIVES OF SAN DAMIAN AND THE OLD TOWN OF HUAROCHIRÍ

region, even richer in ruins and other remains of the past than San Damian. The ruins exist in every direction from the present town, and several of them represent large ancient settlements. This is especially true of those on the hill overlooking Huarochirí on the north, those occupying the surface of a low, long mesa about three miles down the valley, and some to the southeast, at some distance from San Pedro. A number of the ruins on the north side of the river were examined by the writer in company either with Dr. Tello or the gobernador of Huarochirí. Those of the two large settlements mentioned above, that to the north and that down the valley, showed the remains of numerous stone walls of houses, enclosures and terraces, with a series of formerly walled-up burial caves (pl. 6), and of half ruined and now empty burial houses. The habitations were built throughout of moderate-sized uncut stones, and with a few exceptions the workmanship was rather mediocre.

More interesting conditions were found at a locality known as Lupo, situated on the northern slopes of the valley about 10 miles up the river Rio Mala from Huarochirí. There were no ruins of dwellings, but numerous burials existed under some huge boulders strewn over the slope: and farther up, at a distance of a few hundred yards, in a range of scarcely approachable rock shelters, there were over a score of burial houses, looking very much like cliff dwellings.

A most interesting group of these houses was encountered on the second visit to the locality. After a perilous descent, before which the natives provided themselves with ample quantities of coca and cigarettes, supposed to antagonize the injurious effects resulting from the showing and especially handling the old human remains, we reached, partly with the help of a lasso, a long narrow shelf in the nearly vertical rock cliff, and there in the shallow shelter found a row of nine burial houses. The fundamental characteristics of these were the same as in the case of those about San Damian, but they were shorter, higher, divided by cross slabs into two stories, and with flat roofs made of stone slabs and earth. The walls were well constructed of uncut stone. Between the three more proximate and the six more distant houses, there was an interval behind and above which the wall was much blackened by fire; and on the wall above the house, well out of reach, were seen large marks in red, plainly made by the aborigines. Under these unintelligible marks in one place was a cross, with a lower branch longer than the three others, as among the Catholics, traced by pigment like that used in the large painted symbols or figures above the

houses, and probably contemporaneous. This makes it possible that these particular burials date from the early era after the Spanish invasion. Nothing was found with the bodies that would demonstrate a contact with the whites, but this cannot be regarded as a proof that the burial place was pre-Columbian. There can be no question but that numerous burial places, both in the mountains and along the coast, are post-Columbian, for the natives did not disappear immediately after the whites came, nor did they at once give up their old cemeteries or methods of burial; and a large majority of them doubtless died in the earlier times after the Spanish invasion without any chance to acquire such articles of white man's manufacture as would be interred with them and persist to the present time.

The burial houses now visited, though in better condition than those of similar nature seen lower in the Huarochirí Valley, nevertheless also showed the effects of marauders. Not one was intact. The walls and especially the ceilings were in many places broken down, and many of the bones and mummies that originally, according to all accounts, existed here, had doubtless been thrown over the cliff and lay broken in fragments below. Nevertheless, a number of naturally preserved mummies with crude wrappings were still encountered, as well as a considerable quantity of bones and upward of 30 crania, one of the latter showing a remarkable example of trepanation by scraping. This ruin yielded, besides the skeletal remains, a few gourds, some decorated by burning; several rawhide sandals, almost identical in style with those still used by the common people in these regions; and a "liburi" or "bola," a lasso with three irregular and rather small but heavy metal balls, a weapon much like that used by the Patagonians. Among the bones was a humerus showing a clean amputation, which, as amputation of bones was unknown to the prehistoric Indian, strengthens the supposition that these burials were post-Columbian.

On the whole the exploration in the environs of Huarochirí, which regrettably was soon terminated by the advancing rainy season, showed the following:

In pre-Columbian and probably the early Spanish times the region was thickly peopled. But the inhabitants were evidently for the most part poor and had not made much advance in architecture or in other lines of material culture.

Anthropologically, the people of this region show again two cranial types, the more oblong one, which seems to be characteristic of a



Fig. 1. Burial hole; ruins above



Fig. 2. Burial cavern, amidst ruins

BURIAL HOLES AND CAVERNS AMONG AND IN THE VICINITY OF RUINS COVERING A LARGE PART OF THE TOP OF A MOUNTAIN JUST NORTHWEST OF HUAROCHIRI

large part of the central western sierra, and a more rounded one, related and possibly identical with the prevailing type on the coast. In some of their ruins, one of these types is seen to predominate and in others the other, but in most instances there is also present some mingling and probably intermixture.

Artificial deformation of the head has not been practiced by any of the people of the Huarochirí Valley; rarely, however, a skull will be found showing the circular or "Aymara" compression and one specimen was brought from some distance with a typical fronto-occipital flattening such as met with along the coast.

As in the neighborhood of San Damian, the people were rather well built, with good though not excessive musculature. Remains of very tall and again very short individuals were not met with. Diseases, at least such as would leave marks on the skull or bones, were very scarce and the same is true of injuries, except those of the head. In regard to the latter, fractures of the skull ranging from small impressions to a complete fragmentation were quite common, as about San Damian. There doubtless had been considerable fighting in the entire district of Huarochirí. Some broken skulls also indicate falls down the precipices.

Wounds of the head frequently were treated by trepanation, and this was often successful; but the local medicine men were evidently not well versed in the treatment of fractures of the long bones or other surgical procedure.

The exploration in the entire district of Huarochirí demonstrates, on the whole, the prevalence in these mountains of a type of Indian differing physically as well as culturally from that common to the coast. The identity and the connections of this interesting, handsome, oblong-headed type remain to be determined. As will be seen later on, there are indications that this type reached much farther to the north as well as to the south. These people may have been related to but were not tribally identical with the "Aymara" as we know them from Bandelier's collections.

Besides the above, there is found at some points in this district a small, and at others a moderate intrusion of more round-headed people, probably related to the coast people, but not practicing head deformation. The skulls of this type cannot be regarded merely as modifications of the more oblong variety, because they are not infrequently found in a burial cave or house where none or but a few skulls occur of the other type. Exactly what they represent is another problem for the future.

III. EXPLORATIONS ALONG THE COAST NORTH OF LIMA

Ancón.—Due to its accessibility from Lima, the large cemetery of Ancón has been visited, explored, and described more than any other single burial ground in Peru. Notwithstanding this it is still fairly rich in material, some of which throws additional light on the people and conditions of the region.

The first effects of the view of this cemetery on the writer, who was led from the report of the place to expect something extraordinarily extended and interesting even for Peru, were rather disappointing. It cannot compare with the burial grounds of Pachacamac, Chan-Chan, and other localities. Also there are no ruins near by. There are in fact no signs of any settlement in the vicinity with the exception of the refuse heaps within and near the present small town.¹

The surface of the cemetery was rather poor in material, especially such as would be fit for examination. A good many of the skulls, were found broken by stones—one of the amusements of the Ancón excursionists. On close examination and repeated visits, nevertheless, a number of interesting specimens were discovered.

The refuse heaps are composed mainly of shells and contain an occasional burial. There seems no reason why they should be regarded otherwise than as contemporaneous with the cemetery, for they are neither so great nor so diversified as to indicate a different age.

As to the cemetery itself, there are indications that some parts of it are older than others, and the graves nearer the railroad tracks to Lima seem post-Columbian. The older burials yield bones that are freer from remains of the soft parts and skulls that generally show a marked fronto-occipital flattening. In the more recent and generally more superficial graves, more flesh remains on the bones, the skulls are frequently undeformed or show but moderate antero-posterior flattening, and the bones on the whole are fresher and more resistant. Notwithstanding the differences in age of the burials, however, the Ancón skulls are all or very nearly all the same type. They are the brachycephals of the coast; the rare exceptions belong to the oblong type such as found in the mountains. Also, the bones of all ages at Ancón indicate about the same stature of the people, which was rather moderate, and, for the men at

¹ See in this connection Uhle, M.: Die Muschelhügel von Ancón, Peru. Trans. 18th Int. Congr. Americanists, 1913, Vol. 1, p. 22, et seq.

least, a very good development in strength. There was at no time any intrusion of foreign people. The cemetery is evidently that of the fishermen of the Ancón Bay and has in all probability been used from the time of their coming to the locality up to historic times.

A number of peculiarities worthy of special mention were met with in this burial ground. The very first skull picked up showed a small impressed lesion and an unfinished trephining by the rare method of boring. Curiously, no other case of trephining was discovered at Ancón. In a superficial grave near the middle of the cemetery and wrapped in native articles of clothing, lay the still partly connected skeleton of a young woman, who was killed from behind by being struck on the back of the head with a club or a large stone, and with her lay uninjured the body of her infant, possibly put to death in some manner because of the decease of the mother.¹ Finally, there were found here relatively numerous cases of exostoses in the meatus auditorius, of symmetric osteoporosis of the skull,² and of "mushroom head" femora (arthritis deformans).³

Huaral.—A little over a year ago an extension of the railroad line was constructed from Ancón to Huacho and Sayan. The line, after passing over the arid and sterile paupa of Ancón and the sandy hills farther on, descends to the fertile low flats of Chancay and Huaral. This region contains numerous remains of aboriginal population, including some cemeteries. The villages were of adobe, worked in the form of large, heavy blocks; but there are also remains of habitations made of reeds or totora (cat-tails).

One of the more important ruins was examined. It is situated about eight kilometers southwest of Huaral, at the base of a rocky hill. The structures were all built of big adobe blocks, resembling in this respect very closely those of some of the ruins in the Lima Valley, especially in the neighborhood of Chorillos. The ruin is in a poor state of preservation and has been much excavated by the peons of the neighboring haciendas. Notwithstanding the usual reports of "montones" of bones, only a small number of skeletal remains were discovered. The skulls showed antero-posterior compression, as usual along the coast, and evidently represent the same people as those of Ancón. Two similar skulls were seen in other localities of the valley.

¹ Among the North American Indians, as well known, a child at breast was not infrequently buried with the dead mother.

² See Appendix.

³ See Appendix.

Kilometer 98.—After passing Huaral, the railroad line soon enters again the desert depressions and hills, which extend to the valley of Huacho. In constructing the line over a barren elevated flat facing the sea, 98 kilometers from Ancón, the workmen struck an old graveyard, which they promptly set to excavate, and which yielded quantities of pottery with many human bones. Due to the kindness of Mr. Otto Holstein, the chief of traffic of the railroad, the writer and his companion for the time being, Dr. Tello, were “dropped” off at this hot and desolate place one Saturday noon, and stayed there until the afternoon of the following day. The place was found littered with pottery as well as human bones (pl. 7). Probably more than 200 burials had been excavated. There were no ruins nor any signs of habitation in the neighborhood, with the exception of three or four mealing stones among the sands a little to the south and some shell accumulations; nor were there any ruins within a considerable distance in any direction. The place was evidently a settlement of fishermen, and was occupied only during certain portions of the year. The cemetery, which is not completely exhausted, was very rich in pottery, from two to as many as ten or more vessels being found with each body, as we learned later on. The earthenware represented in the main kitchen utensils and tall water jars, but there were also other types. It was well made and in numerous instances quite artistic in shape or decoration, though scarcely comparable with the better class of Peruvian pottery.

The vandalism in this place was appalling. Hundreds of vessels which could not readily be sold or transported, lay broken and even entire over the surface, and skulls and bones, in many instances damaged by the diggers, lay in every direction. A busy afternoon was spent in examining the remains and selecting what was worth saving; a cache was made of the entire or better preserved pieces of pottery (pl. 8, fig. 2), and a valuable selection of skulls and bones were packed in sacks and eventually brought to Lima.

That night we were to be taken away by a “train,” but the train proved to be only a machine and this passed serenely by leaving us where we were. We, therefore, slept on the sands. The next morning, Sunday, our first occupation was a dangerous descent down a steep slope to the sea, more than 200 feet below, for a bath. When we returned an hour later, we found to our astonishment five men busily engaged in digging in the graves (pl. 8, fig. 1), and at the same time saw a railroad hand car on which they came. They



Fig. 1. Waste of pottery, skulls and bones. A party of peons excavating farther on



Fig. 2. Another part; the pottery is that of less salable grades and therefore broken or abandoned by the diggers

CEMETERY, IN ALL PROBABILITY PRE-COLUMBIAN, AT KILOMETER 98 ON THE R.R. FROM ANCÓN TO HUACHO, DESPOILED BY PEONS. THE CONDITIONS SEEN ARE QUITE TYPICAL OF MANY SIMILAR SITES IN PERU



Fig. 1. The diggers and their spoil (mainly in the bags)



Fig. 2. Some of the abandoned pottery

SAME CEMETERY AS SHOWN ON PLATE 7, SHOWING A SUNDAY PARTY OF THE VANDALS AND SOME OF THEIR WORK

proved to be a party of railroad laborers, who came out under the direction of their foreman, to engage in their usual Sunday recreation of digging for pottery. Upon our questions as to who permitted them to do such work, the foreman met us only with indignities¹; but later on, from apprehension, he became more civil and eventually, in the afternoon, finding that after he had loaded his men and his spoil some room was left on the car, he transported us, at a break-neck rate, to one of the wooden shacks built by the railroad for the accommodation of the laborers. Here my companion was taken ill; however, we spent another night on the sands and the next morning were taken back to Huaral.

The skeletal material recovered at "Kilometer 98" proved to be in all important respects like that from Ancón. An interesting specimen, the first of the kind met with by the writer along the coast, was one skull with the Aymara type of deformation. A large majority of the remaining crania presented a more or less marked fronto-occipital flattening. The few that were not deformed or were deformed to only a small degree, showed the ordinary brachycephalic type of the coast people. In regard to pathology about the same conditions prevailed as at Ancón.

The Valley of Huacho.—This extensive well-watered valley or rather low plain, was doubtless quite as thickly peopled before and early after the arrival of the white man as it is at this day. The proofs of this are seen in the numerous ruins, mounds or *huacas*, and old cemeteries. The ruins, of the adobe-block type, are found generally on the deserts outside of the cultivable grounds. The more important ones are located at the Pampa Industria, along the north-western border of the valley in the direction of Begeta, and in the neighborhood of the hacienda of Vilcahuaura. *Huacas*, which as a rule enclose adobe structures, are especially in evidence in the vicinity and to the east of Huaura. The cemeteries finally are located in numerous places along the edge of the sandy deserts surrounding the valley, especially to the southward, and some are of considerable extent.

The burial grounds examined were, one just south of the railroad line at Km. 140; one just to the east of the last curve of the railroad line before it enters Huacho; three or four extensive ones to the southeast of the valley in the direction of Agua Dulce and San

¹ It is only just to the railroad authorities to state that when they found what happened, they promptly stopped the wanton destruction.

Lorenzo ; one large and one small one near Huaura ; three moderate-sized ones near Mazo and between this and Begeta ; two at Pampa Industria ; two at Vilchahuaura ; and two burial caves at Quintay, north of Sayan.

Some of these cemeteries, especially that at Km. 140, are in all probability post-Columbian. The mummified bodies there are in a relatively fresh condition, preserving considerable odor of mummified and even decomposing flesh. Also the dead were buried here in the extended position as at the present time.

All of these cemeteries have been, of course, despoiled by the peon, the bones being left scattered over the ground. Due to damage during excavation and to disintegration of the longer exposed specimens by the elements, a large proportion of the skeletal remains, particularly on the sandy slopes to the southeast of Huacho, were already in poor condition. It was possible, nevertheless, to examine, with the cooperation of Dr. Tello, about 600 crania and a large quantity of other bones with the following results :

It was evident that the valley was peopled at all times by natives of good physique and of very fair, though not strictly tall, stature. The natives of the present day in this region, though largely of mixed blood, are still perceptibly more robust and look healthier than similarly mixed natives along other parts of the coast. The explanation of these facts is probably that the fertile valley has always afforded ample and good nourishment to the people ; it was seemingly not as badly infected with malaria as other valleys along the coast ; and the natives have never been reduced to peonage on a large scale. Many to this day possess a piece of rich land of their own and are practically independent.

Besides being sturdy the people of this valley were also remarkably free from diseases such as would leave their marks upon the bones. "Mushroom" femora were about as frequent as at Ancón, but symmetric osteoporosis of the skull was less common, nor were any extreme forms of it encountered, and other bone diseases as well as injuries were rare.

Anthropologically, the large majority of the Huacho Valley people of all times belonged to the coast brachycephals ; two or three of the cemeteries, however, showed a very noticeable admixture of the more oblong skulls of the mountain type.

Most of the crania presented a more or less pronounced fronto-occipital flattening, but some percentage of little deformed or unde-

formed skulls, showing clearly the cranial type of the people, were encountered in every cemetery. An interesting fact is that there were found dispersed in the valley seven skulls, mostly of women, with a typical Aymara deformation. Whether these were slaves or individuals introduced in other manner among the Huacho people, and whether pre-Columbian or post-Columbian, could not be determined. None the less the occurrence shows that the Huacho Valley people came into contact with individuals of the Aymara culture.

Several specimens of special or collateral interest were found in this valley. One was a clearly syphilitic skull, and four evidently tuberculous bones. The period, however, to which these bones belonged could not be ascertained and it is quite possible that they were fairly recent. The rarity of fractures was very remarkable. Some of the skulls showed injuries by stones or clubs, but there were no trephining. And there existed, doubtless due to strong development of the occipital tendons and muscles, an unusually large percentage of impressions (physiological) in the occipital at the inion.

So far as cultural objects are concerned, the pottery of the Huacho Valley, outside of some specialties, seems well to represent the more ordinary pottery common to the coast. There are, however, cemeteries which yield a better class of earthenware than others, and a few forms were seen which may be peculiar to this region. Besides pottery the people also made oblong moderate-sized palm baskets, which were occasionally buried with the dead, filled with utensils and materials for sewing and weaving. There were evidently few, if any, high class fabrics; but the ordinary weaving presented some local peculiarities, one of which was the frequency of network stuffs.

The caves at Quintay, distant about 50 kilometers from the coast and already well in the mountains, showed still a predominance of skulls with the fronto-occipital deformation, but about one-fourth of the crania presented undeformed oblong forms, such as those met with in the Huarochirí highland district farther south.

According to information obtained from various sources, considerable quantities of skeletal material lay exposed in the vicinity of Supe, about 32 kilometers in a straight line north of Huacho, and especially on the grounds of the hacienda Paramonga, in the neighborhood of Supe, but these regions could not be visited on this occasion.

SOUTH OF LIMA

Chorillos.—Twelve kilometers south of Lima, on the coast, lies the watering place and town of Chorillos. Following the road which leads from this town eastward and then southward, toward Lurin, the traveler passes rather extensive adobe ruins, and at least two burial grounds. Curiously enough, though so near to Lima, these ruins and cemeteries have not as yet been properly explored. Uhle, on his archeological map of the Lima Valley (4to, Lima, 1907), marks them as belonging to the "last civilization of the valley before the Incas," but they are probably more recent. They show excellent construction from huge blocks of adobe, formed doubtless in situ, in frames. The burial grounds were examined by the writer in 1910, and were seen again on this occasion. At the former date a quantity of skulls and bones lay over the surface; these have since then almost entirely disappeared. The crania showed a prevalence of the antero-posterior deformation, and were evidently of the ordinary coast type, though occasionally an oblong skull was present. The bones indicated people of moderate stature and moderate muscular development.

A considerable number of burials probably still exist in this neighborhood and they, as well as the ruins, deserve attention before it is too late.

Pachacamac.—About 18 kilometers southeast of Chorillos, within a few hundred feet from the sea and just north of the Rio de Lurin, on and about a number of moderate elevations, lie the great ruins of Pachacamac (pls. 9, 10) well known from Uhle's description.¹ The writer has referred to this old city, to which he made two brief visits in 1910, in another publication.² Although the present owner of the land on which the important ruins stand forbids the peons to excavate for themselves and is opposed to wanton destruction of the remains, still they are in a perceptibly worse state than three years ago.

The abundant skeletal material found here by the writer in 1910, and from which 2,200 skulls with several thousand other bones were at that time secured for the U. S. National Museum, has in a large measure disappeared, mainly through the influence of the elements. New excavations, however, have been carried on for a person of high standing in Lima, and it was possible to examine

¹ Uhle, M.: Pachacamac. University of Pennsylvania Publications, fol., Philadelphia, 1903.

² Hrdlička, A.: Some Results of Anthropological Exploration in Peru. Smithsonian Misc. Coll., Vol. 56, No. 16 (Publication 2005), Washington, 1911.



PACHACAMAC FROM THE NORTHWEST. THE WHOLE RANGE OF LOW ELEVATIONS IN THE FOREGROUND IS ONE VAST STRETCH OF RUINS AND CEMETERIES. THE HILL OF THE "TEMPLE OF THE SUN" IS SEEN ON THE RIGHT



THE UPPER VIEW SHOWS THE HILL OF THE TEMPLE OF THE SUN AT PACHACAMAC, THE LOWER
A RECENTLY TAPPED GROUND AT PACHACAMAC, FULL OF BURIALS

the skeletal material left from these (pl. 10, fig. 2). They have not changed the conclusions reached during the former visit, which, for easier reference, are with slight modifications here repeated.

The people of Pachacamac as well as those who did not live but were buried there, were of moderate stature and physical development, with shorter and weaker individuals rather frequent.

The crania belong largely to the brachycephalic coast type. A fair percentage is fortunately free from deformation and shows the type clearly.

With the more rounded skulls were mingled in some of the burial sites a smaller or higher percentage of more oblong skulls, occasionally attaining pure dolichocephaly. These skulls, it is now seen, are of a very similar type to those found in the mountain district to the east (the district of Huarochirí), and doubtless represent visitors, invaders, or an intrusion of these people. The majority of these narrower skulls were without any deformation, while a few showed some occipital compression probably of intentional origin. It was seen in the former part of this report that the oblong skulls from the mountains are generally free from deformation.

The majority of the Pachacamac skulls of the more round-headed variety and some of the narrower specimens, present a fronto-occipital artificial compression which, however, is seldom excessive. In some instances the frontal flattening is scarcely detectable, and there are cases in which, though they probably belong to the same class as the preceding, only an occipital flattening can be discerned. The pressure on the frontal must in these instances have been very weak. Deformed crania were particularly frequent in the large burial ground in front, that is just to the north, of the old temple of Pachacamac.

No specimen was met with at the former nor at the present visit to Pachacamac, which would show the "Aymara" type of deformation. This indicates that the highland people where such deformation was in vogue neither visited nor invaded the town or its temples.

A number of submicrocephalic and even microcephalic, but otherwise normal, adult crania were found in the vast cemeteries of this locality. They have nothing in common with the small skulls of idiots, being normal in every respect except size. They doubtless belonged, as shown by occasional small bones of the rest of the skeleton, to diminutive individuals. They range in capacity from 1,050 to 910 c.c.

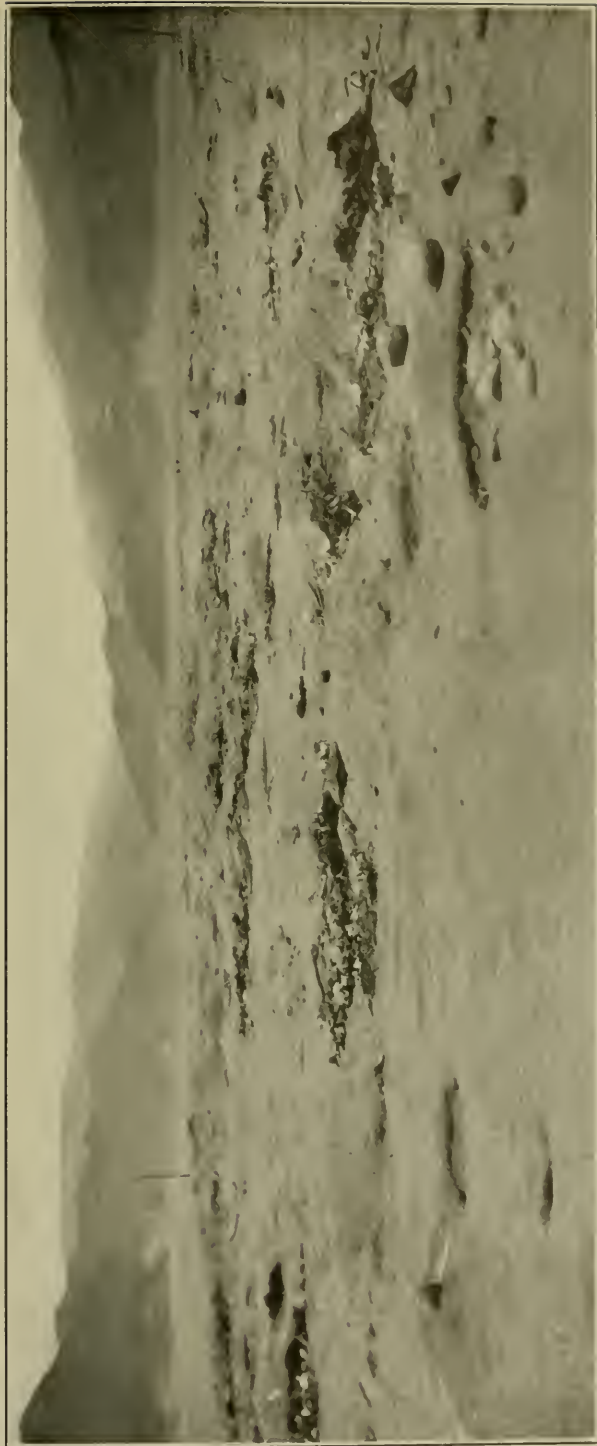
The long and other bones from Pachacamac afford many features of interest, especially to pathology. Fractures, as elsewhere along the coast, were very rare. Symmetric osteoporosis of the skull and the "mushroom-head" femur, were fairly frequent, about as at Ancón. One plain case of trephining was found, one was discovered among the specimens collected on the first visit to these ruins, and three or four other specimens in the total collection show partly cicatrized lesions which may have been due to such an operation.

The Pachacamac burial grounds are still far from exhausted (pl. 10, fig. 2).

Chilca.—From Pachacamac, the main road south leads to the cultivated valley of Lurin and then follows the coast deserts to the large but, due to aridity of the region, now half-abandoned town of Chilca, 70 km. south-southeast of Lima. The visit to this place was due to information obtained from Sr. José Bravo, Chief of the Bureau of the Engineers of Mines of Peru, and was facilitated by kind aid from Sr. Bravo and Engineer C. W. Sutton.

Upon arrival at Chilca, it was found that one large and one small burial ground with a number of shell and refuse heaps existed to the north of the place, and that ruins with numerous burials were located on and about a hill three miles to the northwestward.

The main cemetery, which commences a short distance beyond the outskirts of the town, was found to have been in part recently excavated, for another a high dignitary of Lima; but the larger part of it is fortunately still intact (pl. 11). This burial ground proved on examination to be uncommonly interesting, for it was found to represent in a large measure a wedge-like intrusion among the coast population of the oblong-headed mountain people. The ground so far as dug over was strewn with bones and fabrics. The majority of the bones and skulls showed well-developed people of the type met with in the not far distant district of Huarochirí. Besides these there existed a moderate admixture of the more round-headed coast elements. As in the mountains, the oblong skulls were generally free from deformation, while those of the coast type showed mostly the intentional antero-posterior flattening, though not in a high degree. Two or possibly three cases of trephining were discovered in this burial ground, and there were a number of interesting pathological specimens, though on the whole the people have evidently been very healthy. There was no well-defined case of "mushroom-head" femur, and symmetric osteoporosis of the



THE CEMETERY AT CHILCA.

skull was rare—both features in which the population represented in the cemetery concurred more with the mountain tribes than with those of the coast.

The age of this cemetery could not be determined. The bodies showed many remains of the soft parts, which were not entirely dry. Also there was still considerable odor to some of the remains. The burials, however, were all in the contracted position, the fabrics were strictly of native material, design and manufacture, and no objects indicating contact with whites were encountered.

The burials farther to the north lay in the path of a shallow stream in which there is seldom any water; nevertheless we were informed that after a late freshet a number of the skulls and bones that lay on the ground had been washed away or covered. The skulls that remained, though mostly imperfect, showed the ordinary coast type of people. On and beyond the northern bank of the wash are various refuse heaps.

The ruins on the hill three miles to the northwest of Chilca are evidently the remains of a settlement, and possibly a fortification, of the people who cultivated the lowlands among the dunes which surround the hill from the southwest to the southeast. They buried principally in and at the foot of the slopes of the hill, and in the dunes. The skeletal remains resemble those of Pachacamac in every respect, including the admixture with the more oblong-headed type. Considerable fighting must have taken place about this hill, judging from the number of skulls showing wounds. Of 11 skulls found at the foot of the slope to the southeast, nine presented traumatic lesions which must have been mortal. The excavations in these localities were not recent and the exposed skeletal material was in general in a poor state of preservation.

No other ruins or cemeteries were heard of in the near neighborhood of Chilca, but important archeological remains are reported to exist to the southeast, on the Rio Mala, in the vicinity of Calango. These, as well as other ruins on that river and on the one a few miles farther south, were indicated on his map by Raimondi (see pl. 12). Still farther to the southward, about Cañete, other ruins exist, including the "Incahuasi" described by Larrabure¹; and these are followed, farther southward, by the ruins and *huacas* of the region of Chíncha and Tambo de Mora, beyond which one enters the region of Ica and Nasca.

¹ Larrabure y Unanue, E.: *Incahuasi*. 8vo, Lima, 1912. pp. 1-16.

IV. EXPLORATIONS IN THE LOMAS AND RIO ACARÍ REGIONS

Lomas.—The rather insignificant port of Lomas lies about 280 miles southeast of Lima, and between 80 and 90 miles south-southwest of Nasca. It is formed by a small rocky barren peninsula, on which nestles the little sombre town of Lomas. The peninsula as well as the surrounding country is desert, but a sandy depression just to the north and northeast contains some moisture which gives rise to a sparse growth of vegetation; in the midst of this depression is a well which supplies a poor quality of water, used mainly for animals, while a better class of water must be brought from springs nearly three leagues to the north.

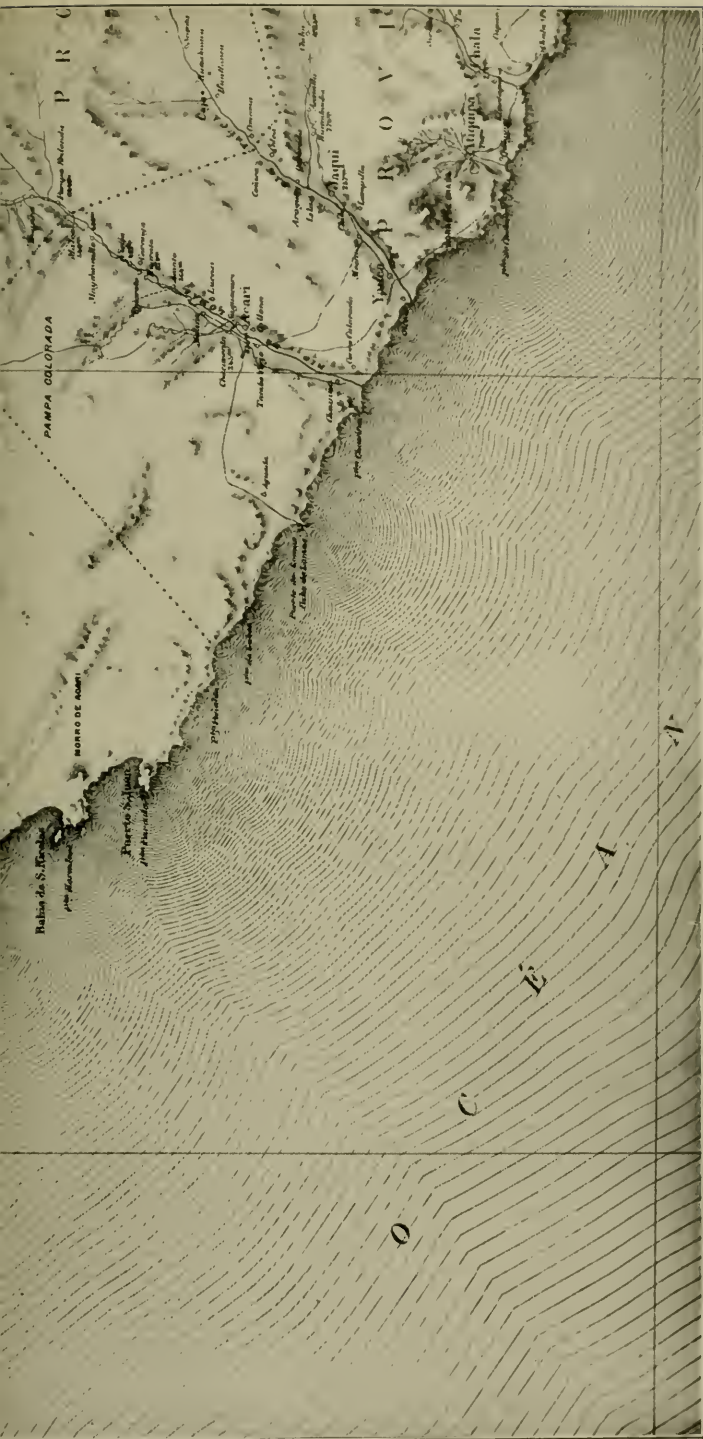
The sandy wastes just to the north of the road between the peninsula and the above-mentioned well, contain a number of old cemeteries. These as usual have been to a large degree dug over and despoiled by the peons. Judging from their extent, they represent a prolonged occupation of the spot by a fairly numerous people, reaching probably to post-Columbian times. Ruins, with the exception of a few remnants of walls on the northern border of the peninsula, are wanting. The region was in all probability peopled by fishermen, who for the most part built easily perishable habitations.

At Lomas the writer was fortunate enough to find an excellent friend in the wealthiest and most cultured man of these regions, a Piemontese, Sr. Enrique Fracchia, and whatever success attended the explorations between here and Ica is largely due to the generous assistance given by this gentleman.

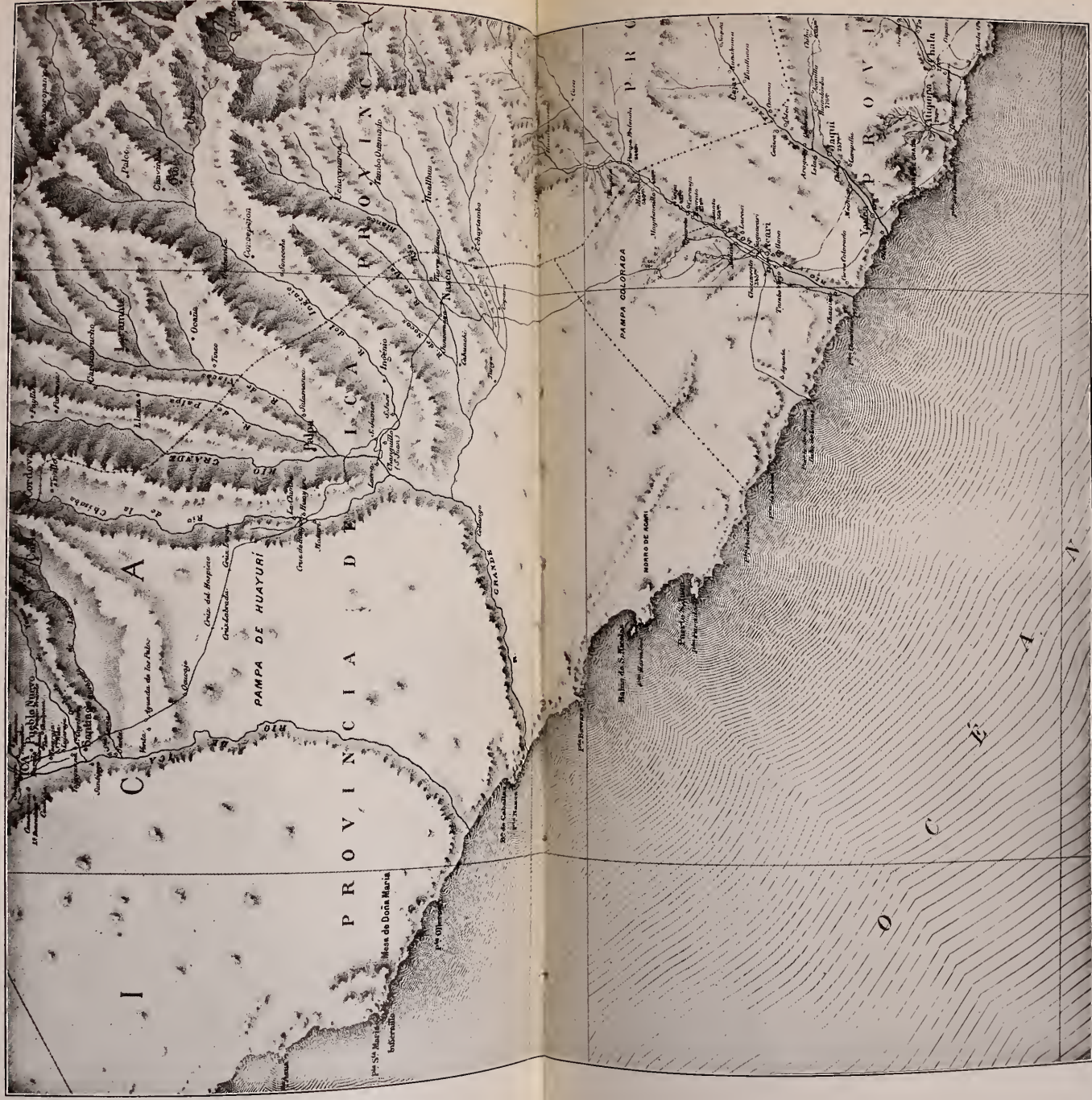
The skeletal material exposed in the cemeteries about Lomas represented the remains of between 400 and 500 bodies. Much however is doubtless still left in the ground.

The Lomas cemeteries date plainly from different periods and do not represent exactly the same people. One of the small burial grounds is probably post-Columbian, though no articles of white man's manufacture lay exposed. In this cemetery the bodies were not only in fresher condition but the burials were extended, while in all the other cases the body was interred in the usual contracted position. An interesting ethnological detail is that all the bodies in this region, including even those in the most recent burials, were sewn and bound into bundles, and the clothing with other fabrics was more abundant than in any of the more northern cemeteries that were examined. These fabrics were predominantly of wool,





MAP (AFTER RAIMONDI), SHOWING MORE SOUTHERN PARTS OF THE PERUVIAN COAST. WITH THE NASCA REGION.



MAP (AFTER RAIMONDI), SHOWING MORE SOUTHERN PARTS OF THE PERUVIAN COAST, WITH THE NASCA REGION.

from the llama, but there were also those made of cotton. Besides the fabrics, there is occasionally discovered in these graves a palm fiber basket in character much like those of the Huacho Valley, filled with thread balls and various feminine utensils. Pottery, judging both from the reports and from the great scarcity of potsherds, is met with much less frequently than in the cemeteries of the Nasca Valley, but the varieties are on the whole similar. A specialty of these burial grounds, though later found over the whole Nasca region, was the frequency of the *huarakas* or slings, and of small round stones which were thrown from these. One or two of these slings were apparently buried with every grown male, while smaller ones were found with the male children. Some of the slings were beautiful examples of workmanship, and it was interesting to note that the design and colors on the strings near the central part generally imitated a serpent.

Physically, most of the people buried in the Lomas cemeteries belonged to the coast type of moderate brachycephals. Besides this predominant strain, there were varying proportions, according to cemeteries, of oblong-headed individuals, but the percentage was never very high. None of the people were very robust, comparing in this respect most closely with the inhabitants of Pachacamac. Also, the stature was very seldom above medium.

The usual coast fronto-occipital deformation was practiced extensively. But there were no extreme cases, and in numerous instances the frontal flattening was but little marked. Evidently none of the Peruvian coast people used planks to produce the deformation, such as have been in vogue, for instance, in the Columbia River valley. More probably they employed a pressure by a pad or a double pad over the forehead, the bandage fastening the head to something which simultaneously, by counter pressure, flattened the occiput. It was frequently seen that the more oblong-headed individuals have also suffered from the antero-posterior deformation, showing that they were already inherent units of these tribes and followed the same culture. Only a small proportion of both the brachycephalic and the more oblong crania in the older cemeteries of Lomas were undeformed. No example of "Aymara" deformation was discovered.

From the pathological standpoint, the symmetric osteoporosis of the skull was found to have been frequent but generally rather mild. Not even one fracture of any of the long bones nor dislocation was noted; but wounds of the head by sling projectiles or clubs

were very common. In one of the small cemeteries, every subject, men, women, and children, was thus killed; and in the majority of cases the wounds were in the posterior half of the skull, indicating that the people were probably slain while running away from those who attacked them.

Trephining was very rare, if practiced at all. Two specimens were recovered which show a partly healed lesion that may have been a trephining, but the diagnosis is not certain.

Not one really pronounced "mushroom-head" femur was found, and even moderate grades of the disease were quite rare, which seems to justify the conclusion that this peculiar disease was more prevalent among the coast people farther north. Signs of more ordinary arthritis, on the other hand, especially on the vertebræ, were not infrequent. Dental caries, curiously, was rather common in this locality.

Chaviña.—About 20 miles, by the road, southeast of Lomas is found the mouth of a fair-sized river, known on maps as the Rio de Lomas, but locally called Rio Acarí. The cultivated lowlands on both sides of the river at this place constitute the hacienda Chaviña (fig. 1). The dwelling of the overseers is situated at the edge of the high ground which bounds these lowlands to the northwest, and a short distance to the east of this building, among low sandy hillocks, exists an extensive and highly interesting old cemetery. Three other burial grounds, or rather one cemetery in three parts, are situated about two miles to the west of the dwelling on the lower sandy ground near the sea and not far from a hill fortified by the ancients, the locality being known as Conventillo; while several small to fair-sized burial grounds are found in the sandy slopes on the south side of the river, opposite the headquarters of the hacienda.

The scattered cemetery east of the house showed exposed the skeletal remains of about 200 individuals. So far as it was possible to judge, the brachycephalic element was predominant, but there were also longer skulls. A highly interesting feature was the prevalence of extreme forms of fronto-occipital compression, produced evidently by tying the head very firmly to a plank or cradle-board (pl. 13). This was the first cemetery in Peru where such pronounced deformations were seen, but another one was heard of to the south of the river, one was found later on in the valley of the Rio Grande de Nasca, and still another was seen about 60 miles to the north of the valley at the hacienda Ocucaje, near



A SKULL WITH AN EXCESSIVE AND PECULIAR FRONTO-OCCIPITAL OR "FLAT-HEAD" DEFORMATION, FROM CHAVINA, ON THE RIO DE ACARI (S. "R-DE LOMAS") PERU



Fig. 1. Remains of walls, made of waterworn stones, on the plateau



Fig. 2. Part of the plateau and the slope towards the river

TWO VIEWS AMONG THE ANCIENT RUINS KNOWN NOW AS TAMBO VIEJO, NEAR ACARÍ

Ica. They doubtless represent a special clan or tribe of the coast people.

In contrast to the cemeteries of Lomas and also to those at Conventillo, the burials in this locality were poor in fabrics, including slings, but there were present wooden clubs made of the heavy huarango (a variety of mesquite). Another interesting condition was that some of the burials at least were made in stone-lined pits. The bodies were buried in the contracted position.

Pathologically, the bones of this cemetery showed a prevalence of arthritis; but there were no well-developed "mushroom" femora, and only traces of osteoporosis. Otherwise the conditions agreed with those of the rest of the coast people in this vicinity.

The cemeteries of Conventillo have yielded glass beads, copper pins made in the European style and some other objects indicating contact with the whites, and must therefore be classed as post-Columbian; but they date probably from the early part of that period. The burials, as at Lomas, were rich in fabrics and especially in slings, and the fabrics in general were identical in material, colors and designs with those of Lomas. The skeletal remains also, physically as well as pathologically, presented identically the same conditions as those from the Lomas burial grounds. There can be no doubt but that these remains belong to the same tribe of people as do the majority, at least, of those of Lomas, and their date is also a valuable index for the antiquity of those from the more northern locality.

The Acarí Valley.—The narrow valley of the Río Acarí, from Chaviña to Otapara (a distance of about 30 miles), is dotted and in some places overspread with the relics of the aboriginal population, both ruins and cemeteries (fig. 1). Of these remains, those on the south side of the river could not be examined closely on account of the impassable condition of the stream at this time.

Along the north side of the river ruins and cemeteries are found in the vicinity of all sites where cultivation of the lowlands was possible. The ruins show low walls or foundations, made of water-worn stones, without any cement. Evidently the remainder of the dwellings was of more perishable nature and has completely disappeared. The enclosed spaces are rectangular and generally of moderate dimensions.

Burial grounds, merely tapped or excavated only in part, exist near all the ruins. The skeletal remains exposed are fairly abundant, but often in poor condition. Moderate fronto-occipital

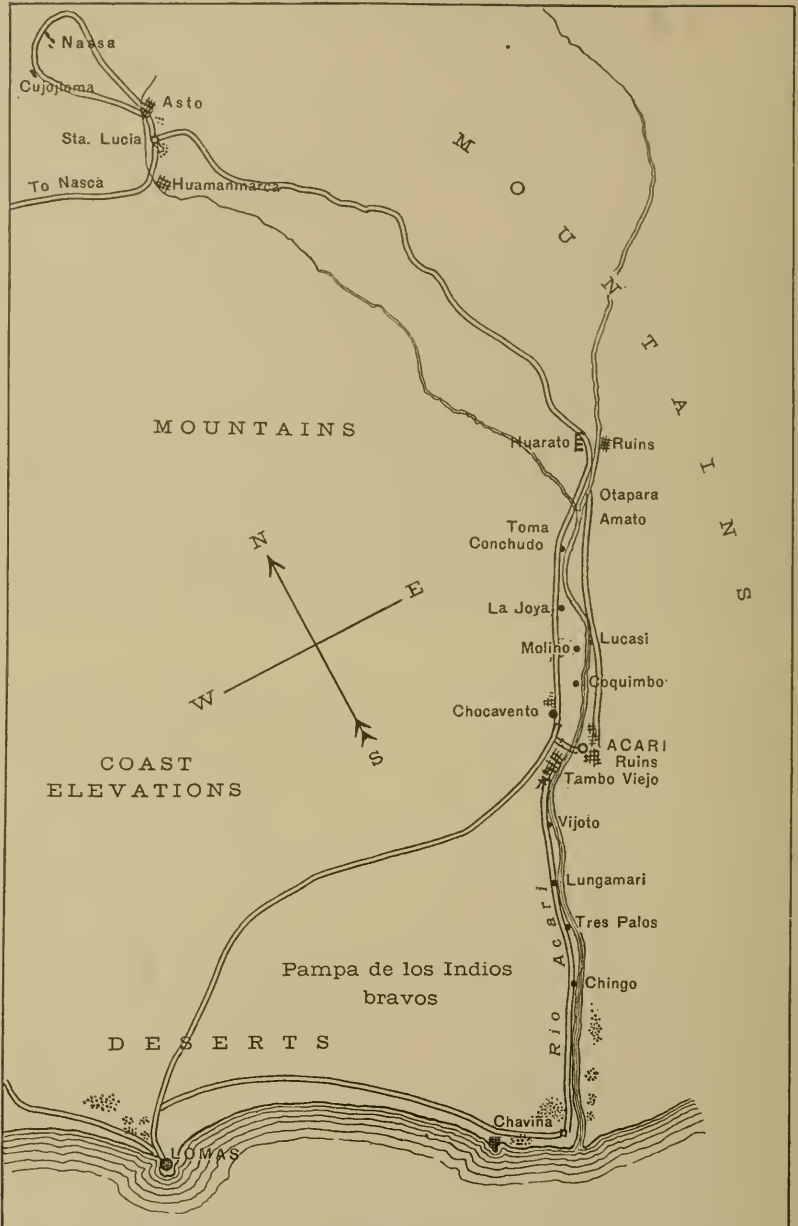


FIG. 1.—Sketch map of the Lomas, Rio Acari, Sta. Lucia Region.
 (Cross lines indicate ruins; groups of dots are cemeteries.)

deformation of the skulls is general. The coast type of people predominates; in some of the cemeteries however there is a marked admixture with the more long-headed and less deformed element, and in one moderate-sized burial ground the latter type existed almost to the exclusion of the former. The culture of these different groups was, however, very similar. The architecture is the same; there are everywhere traces of cylindrical or oval stone-lined burial pits; and the fabrics, as well as pottery (neither abundant), are, as far as could be learned, also alike. It therefore seems safe to conclude that the valley was settled by people of only one cultural group, which however included sub-tribes or clans physically more or less distinct and which perhaps did not occupy all the sites that now bear archeological remains contemporaneously.

The skeletal remains show that the people, while not very robust, were remarkably free from such diseases as affect the bones. The very few fractures found indicate a lack of surgical knowledge in treatment. As on the coast, numerous skulls showed lesions produced by stone projectiles or clubs. No instance of trepanation was discovered. Also there was no case of the "Aymara" head deformation. All the burials were in the contracted position and the body, covered with one or two fabrics, was tied up in a pack. In rare instances there were large, more elaborate, cotton-padded mummies, surrounded by some fabrics, resembling closely those of the Nasca Valley. Pottery, not very common, approximates the Nasca type.

Tambo Viejo.—About 16 miles from Chaviña and almost opposite the present town of Acarí, the flats to the north of the river are covered with extensive and interesting ruins known as Tambo Viejo (pl. 14). The ruins consist of many foundation walls, walls of houses, and two *huacas*. The dwellings were, as a rule, quadrilateral, often square, with frequently a stone-lined pit in the center of the floor. In general, they were of moderate size. The upper parts, above the stone foundation, were doubtless of reeds or other perishable material of which no trace now exists. The stone walls were made of moderate-sized cobblestones, laid with mud mortar, and notwithstanding the fact that the material does not yield itself readily to high-class results, the constructions show very good workmanship. In a few instances the low stone wall was heightened by adding small adobes. The base and southern slope of the *huacas* facing the river were carefully paved with larger cobblestones, while their interior disclosed adobe constructions. To the north of the

huaca adjoining the river is a large square surrounded by houses and the other mound. In a northeasterly direction, across the square, is an elevated compound of constructions which were apparently of some special importance. To the east of the ruins extend the burial grounds, which, on account of the difficulty of excavation (the ground being full of water-worn stones), have as yet hardly been touched by the peon. At a few spots where excavations have been made the skeletal remains show the usual coast type of population.

Acari, and Eastern Part of the Valley.—A short distance from Tambo Viejo is a primitive ferry which transports one across the raging river (in the rainy season), to Acari. This is a small town with mixed-blood population, situated on a moderate-sized flat made in previous times by the river, and extending close to a rocky hill, lying in the shadow of the high slopes behind. The lower part of this hill is covered with many remnants of ancient stone constructions. Just to the east of the hill, following the valley, in sandy nooks between smaller elevations, are found burials, which again show the usual characteristics of the coast people.¹

A little over a mile northeast from Acari, to the north of the river, is the hacienda Chocavento, belonging to the brothers Orezzaoli. Here the writer stopped three days, exploring the neighboring territory.

Some burials of the coast type people were found just to the east of the dwellings of the peons belonging to the hacienda. Crossing the river once more and following the valley eastward for approximately four miles, a small burial ground was found on the low sandy slope, not far from the stream, opposite the little settlement of La Joya; and about four miles farther east, near the abandoned hacienda of Amato, another burial ground was examined. A short distance northeast of Amato on the north side of the river is a small rocky hill, known as Otapara, with numerous remains of walls of ancient habitations; this will be described subsequently. Traces of irrigation were seen on the south side of the river, but no ruins with the exception of those near Acari.

On the north side of the river in this vicinity there are also no ruins of any account, but at two spots in proximity to the road some uncovered skeletal remains indicated burials. A regular

¹ It is worthy of remark that the first native in this region who could be regarded as a full-blood Indian was seen at Acari; he was, however, only a visitor of the place, coming from the sierra.

cemetery was not found until near the above-mentioned hill of Otapara.

Otapara (pl. 15) was evidently in the past a place of some importance. Now it is uninhabited, with the exception of three huts of Quechua-speaking mixed-breeds, recently erected. The hill was found to be a rocky elevation less than 100 feet in height, but difficult to scale, and, on the land side full of ruins of stone walls. Some of these doubtless represent habitations, while others may have served more for defence. The workmanship was mediocre throughout. Many potsherds of common kitchenware lay about, and strewn over the hill, especially at the summit, were numerous bones of the llama. At the foot of the hill to the north several chambers were excavated by the peons, yielding a little pottery, a few copper implements and a number of burials. The skulls and bones showed a more or less brachycephalic population, of moderate stature, with frequent fronto-occipital head deformation, hence the type of the coast.

Acari Valley as a Whole.—On the whole, the skeletal remains seen in the Acari Valley, from Chaviña to Otapara, were found to represent predominantly the now well-known coast type of the Peruvian Indian, with more or less admixture of the more oblong heads, some intrusion of which occurs in so many other localities along the coast. All the principal characteristics of the skulls and bones of the people of this region are exactly like those from the Pachacamac and Chinu cemeteries in the north. The resemblances are so close, even in regard to the admixture with the more oblong-headed elements, that the three groups cannot be considered otherwise than as parts, and that contemporaneous parts, of the same people. Throughout the valley there were many evidences of warfare in the numerous wounds found on the skulls. In the majority of cases these wounds were made by rather small stones, doubtless sling shots; in others the skull was crushed by a club. As to diseases, no very advanced case of symmetric osteoporosis of the skull was discovered in these regions, nor any pronounced case of "mushroom-head" femur. The majority of the scarce pathological specimens seen consisted of arthritic changes, and rarely a variety of osteoperiostitis attacking some of the long bones, especially the the tibia. The dead, as a rule, had been buried in the contracted position and bound in a bundle. Such a bundle or pack regularly showed some thin fabric about the loins of the body, a cotton or woolen shirt, or a blanket, and occasionally a *faja* (sash), a *telega* (woven bag), or a *huaraka* (sling). The bundle would be tied sometimes, in a wide-meshed network, with a rope

made of the wool of the llama—exactly similar to the rope used at this day by the more primitive mountaineers just to the east of this region. Such a pack would be buried in a pit three and a half to six feet deep, sometimes without, sometimes with, a piece of decorated pottery.

Huarato.—Three miles from Otapara, farther up the valley, is a locality known as Huarato, now occupied by a moderate-sized hacienda. From this place the roads divide, one leading farther up into the narrow valley, while another ascends a high mountain and leads to Sta. Lucia, Puquio and Andamarca.

In the past, the neighborhood of Huarato was evidently well peopled. On a low sandy elevation across the river are seen the ruins of a moderate-sized old town, with rectangular pebble-stone foundations, as at Tambo Viejo. This belongs doubtless to the valley and coast culture. On the north side of the river, however, and just beyond the hacienda—in fact including a part of the ground of the present buildings—is found a large and highly interesting earthwork rather than a ruin, unlike anything seen elsewhere in the valley (fig. 2). It consists of a low artificial ridge, not unlike a breastwork, made of earth and adobes and running for about 300 feet from west to east. From this run at right angles four or five similar though less distinct ridges, 200 feet down the slight slope in the direction of the river. Within the two enclosures formed by the more eastern ridges are seen the remnants of adobe foundations of the dwellings, and also low elevations the nature of which could only be determined by excavation.

One of the more western transverse ridges of these curious remains of antiquity contained a number of superficial burials which were dug out by the peons from the hacienda, and, most unexpectedly, the crania from these showed without exception a typical "Aymara" deformation. This was the first instance of such an occurrence met with on the coast—nor was anything like it seen in the further explorations to the west of the mountains.

Having secured with considerable difficulty the help of a man and a single heavy spade, the writer chose, more within the ruin, a spot which looked as if it might contain a burial and made excavation. We passed through a layer of sandy earth, then through one of earth and ash, through another layer of earth, and through an accumulation of chunks of adobe and numerous fair-sized cobblestones. Finally, at the depth of four feet, lay a bundle containing a skeleton. The body was buried in the contracted posture,

and was tied up in a single piece of ancient cotton cloth of natural color and poor quality. The bones were those of an adult male. Again the skull showed the "Aymara" deformation. No earthenware or other articles were buried with the body. A decorated moderate-sized jar of dark brown color was shown to us later at the

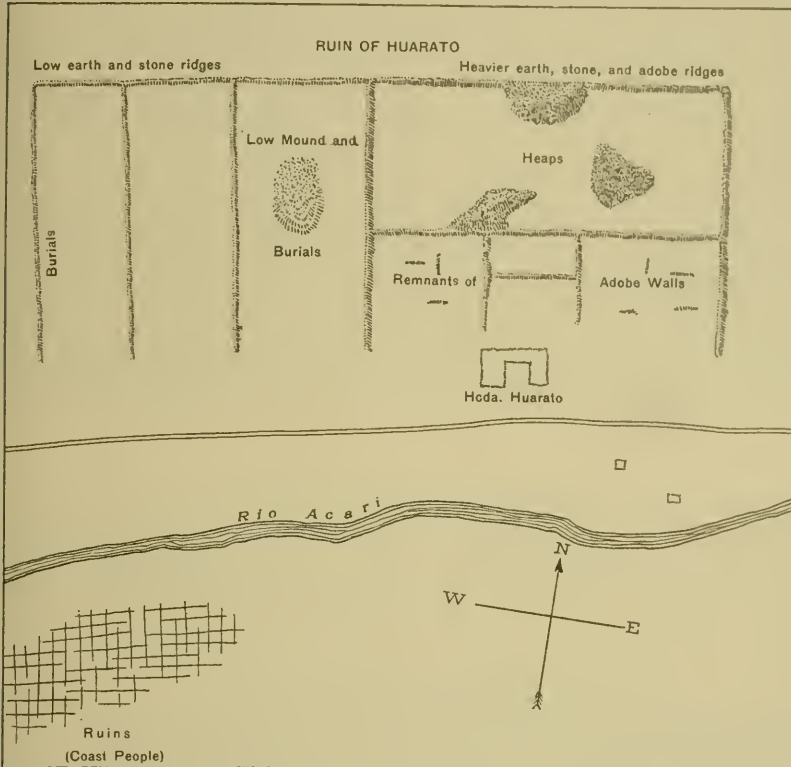


FIG. 2.—Sketch of Huarato, showing approximately the lay and ground-plan of the peculiar ruins of the people with the Aymara head deformation (to the north of the river).

hacienda and was said to have been dug out from another burial in these ruins.

It is evident that these ancient remains of Huarato present a very interesting intrusion into the coast region of people from somewhere in the mountainous country farther to the east, and the burials at this place, hardly touched as yet, deserve a careful excavation.

V. EXPLORATIONS IN THE MOUNTAINS TO THE NORTHEAST OF THE ACARÍ RIVER

Santa Lucia.—After a day's stop at Huarato, the writer set out once more for the sierra, which holds a key to many of the anthropological problems of Peru. The parts of the district of Lucanas now entered have never before been visited by a scientific explorer. They were reported to contain numerous ruins as well as burial caves, and as a further inducement the writer was informed that a three days journey from Huarato, in the old town of Andamarca,¹ there could be found many full-blooded Indians, speaking scarcely anything except Quechua and preserving their ancient dress as well as many old customs.

The writer, unfortunately, was to be guided and assisted by a merchant from Puquio. For the convenience of this merchant, the start from Huarato, on the 17 leagues (over 40 miles) journey to Sta. Lucia, was not made until five o'clock one afternoon. The main ascent of the mountain occupied over four hours. Long before that the sky became overcast, the darkness was almost impenetrable, and our animals stumbled on the perilous path. After we reached the top we were in addition overtaken by the usual cold drizzle of the rainy season in the hills, and this accompanied us the remainder of the journey. After midnight, the hitherto sandy upper country became more rocky and the darkness quite black. The animals could no more be guided, and we labored down and up, slipping and climbing, not knowing where we were or where the next step might land us, until three o'clock in the morning. That we this time escaped serious injury was a marvel and wholly due to the sagacity of the animals. When we emerged we were on the freer ground near Sta. Lucia. The miserable village itself was reached about three quarters of an hour later. Approaching, still in the rain, the hut where there were to be accommodations for us, we found first that it was very inadequate in size; second, that the yard was a pool of ill-smelling mud and water; and third, that the roof of the addition, more a shed than a part of a dwelling, which was to be our quarters, leaked so badly that there was no place inside where one could lie down or even crouch to sleep and escape the dropping water. It was raw and chilly. Two of the burros with loads had been lost in the darkness. But we were weary, and so the merchant took a corner of the floor, while the

¹ This is not to be confounded with the Andamarca farther north reported upon by Raimondi and Barrailler. Bol. Soc. Geog. Lima, Vol. 2, 1892, p. 121.



THE HILL OF OTAPARA, IN THE VALLEY OF THE RIO ACARÍ, COVERED WITH ANCIENT RUINS



Fig. 1. The fortified hill of Huamanmarca



Fig. 2. Despolled stone-lined burial pits at Huamanmarca, with decomposed bones to the right
THE FORTIFIED HILL OF HUAMANMARCA, NEAR STA. LUCIA

writer rested on a primitive improvised narrow platform, a few sticks on four green forked poles, and the rest of the night was passed in wet oblivion.

At this place, with people too indolent to make even a ditch to carry the water away from their yards, with the baby of the family ill with bronchitis and the mother with tuberculosis, it was necessary to stay several days; and each day from four or five to 16 hours of cold drizzle. All this is mentioned merely to show some of the difficulties under which, at this season at least, the explorer labors in the Peruvian mountains, and some of the reasons why Andamarca was never reached by the party. The other reasons were, impossibility of obtaining native help and animals, and limits of personal endurance. The promises of the merchant proved to be just so much "palangana," an expressive Peruvian word, meaning the saying of a great deal that is never meant, or known.

Notwithstanding the untoward climatic conditions, the stay at Sta. Lucia was well utilized for examination of the region. The village doubtless lies on the site of an old native settlement. A number of large stone-lined burial pits, unfortunately almost wholly despoiled, exist in the slope of the hill opposite to the northeast. On the higher ground more to the north are stone ruins and the remains of a small row of partly subterranean, more or less oval burial chambers, plainly modifications of the burial houses of the more northern regions in the sierra. Farther to the north, on still higher ground, are other burial houses of the same nature and numerous remnants of low stone walls of habitations, as well as some beautifully preserved terraced fields or andenes; this locality is known as *Asto*. Across the valley of the stream that flows by Sta. Lucia on the west, there are other ruins and burial houses; and on the high plateaus to the north are ruins of dwellings, remnants of enclosures, and other evidences of ancient occupation. Finally, three miles southwest of Sta. Lucia down the valley, is a remarkable fortified rocky hill, with various burial houses, and with clear outlines of extensive slightly terraced fields about the base, known as *Huamanmarca* (pl. 16).

Most regrettably the more easily found burials in all the above places were thoroughly excavated many years ago and nothing was found left of the remains beyond small piles of decomposed bits of bone. However, in the burial houses between Sta. Lucia and *Asto* were seen several damaged skulls which indicated a type of people like those of the coast, with moderate fronto-occipital deformation.

After the ruins nearer to Sta. Lucia had been examined, an excursion was undertaken, with two of the mixed-blood natives, to the much higher and rougher regions about 15 miles north-northeast of the village,¹ where burial caves were reported.

The region now reached was found to consist of more or less parallel granite ridges or long narrow mesas, separated by canyons—in no case probably over 300 feet deep, but with slopes rather steep and full of boulders. A curious geological feature, not seen elsewhere in the writer's travels, was that in a large proportion of the greyish granite boulders there were nicely shaped rounded or oval cavities, in some instances amounting to good-sized caves, evidently blasted out by the winds. It was in two such cavities that, wet to the skin, cold, with soaked horse blankets beneath, wet poncho for a cover, and nothing more for supper than a box of sardines with a handful of parched corn, there was passed another night to be remembered.

In the morning it developed that my guide, besides being afraid through superstition, was not any too sure of the location of the burial caves, which by this time were reduced from several to "one or two," and we therefore set out to find some shepherds. In this, due to some native instinct of my companions, we were successful. We found an old woman with three daughters, of somewhat mixed blood, but speaking nothing but Quechua; had a royal breakfast of hot goat's milk with fresh parched corn; even found some tough grass for our animals; and then set out for the cave—only one now remaining. But it so happened that one of the young women, with a child, had an inflammation of the breast and in reward for the little help which it was possible to give her, her old mother volunteered not merely to locate exactly the cave we sought, but also to show us another one, unknown to anyone except herself, though at some distance.

We started for the first cave, while the old woman promised to meet us later on. Descending from the hut down one of the canyons through which was running a small stream, we saw on one of the slopes the remnants of crude stone walls; and about 15 minutes later, in a second canyon, we came to the burial cave. It was a good-sized rock shelter in the slope, and had been closed by a stone wall. Now it lay about two-thirds open, with its floor strewn with stones, skulls, and bones. Not far from 100 skulls and a large

¹ These directions and distances must be taken as only approximately correct.

quantity of corresponding bones were found here. They belonged to healthy, strong and rather tall people, with evidently normally meso- to brachycephalic skulls, but which in every case presented more or less the "Aymara" deformation.

This cave is known as *Nassa*, which is said to be a Quechua word, but the signification of the term was not known to the writer's informers. The accumulation of human remains in the cave represented plainly a secondary burial. There were no traces of pottery, nor any metal objects, but shreds of fabrics were present, some of which showed handsome colors and weaving. For the first time also since the writer touched at Lomas, there was an absence of wounds of the skull.

Just as the exploration of the cave and the selection of specimens were finished, the old shepherdess was seen descending with her dogs from the opposite ridge among the bowlders. She was soon with us, and then led us up ridge and down canyon, over native trails and again where there were no roads, until we reached, still surrounded on all sides by bowlders, an elevated V-shaped nook on the slope not far from the top of one of the mesas, in one side of which was seen an oblong, black crevice, closed except for a small opening by stones. Through the opening, the writer could see a large, dark cavern, the floor of which was covered to about two-thirds of its extent with human skulls, pelves, spines with ribs and bones of the limbs.

That forenoon, fortunately, we for once had no rain and the light was quite bright, so that, removing the stones, it was possible to crawl in and examine the inside without a fire. Upon entering it was evident that, for the first time since the writer's work in Peru, he was in a burial cave which had not been visited or disturbed by anyone. The skulls and bones lay exactly as placed there by the Indians, not even showing any damage by rodents or carnivores. The hollow of the cave was filled with droppings—probably of the guanaco which still abounds in this region, and a large number of the bones and skulls were buried entirely or partly in this substance. About 40 skulls, however, and numerous other parts of the skeleton lay, as before stated, uncovered. As in the first cave so here all the crania, with one exception, showed a typical "Aymara" deformation. As to the undeformed specimen and several of those where the deformation was of slight degree, they showed not the small oblong type of skull which we thus far have associated with the term "Aymara," but more rounded and in instances quite large

crania, which could be more directly compared with the better developed type of the coast skull, or with the shorter, undeformed crania found mingled to some extent with the prevailing longer type in the sierra of Huarochirí.

Again as in the Nassa cave, the burials were plainly secondary, and it was evident that in many instances a body only partly decomposed had been forcibly disjointed to a greater or lesser extent, before being placed in its last resting place.

Although the sun was shining when the writer entered the cave, before he was through with the examination of the skeletal remains lying on the surface, thick mists began to envelop everything about, and were soon followed by the "aguacero" or cold drizzle. A large quantity of skeletal material still remained buried in the refuse with which the cave was filled, but it was necessary to hurry and only the more accessible parts could be examined. The total number of skulls inspected was more than 100, and according to the indications there were possibly as many more in the cave. Besides the skulls numerous other bones were looked over. Among this mass of material not a single pathological skull or bone was discovered. Also, there were neither pottery nor fabrics, but a number of various sized undecorated gourds lay on the floor, probably representing vessels that contained food and drink offerings.

The native name for this cave is *Cuxoxloma*, which again is said to be a Quechua term, but of unknown signification. It is not impossible, however, that these names are derived, in common with some others met with later on in these regions, from some other language.

While the cave was being examined, the old woman and also the writer's companion kept carefully at some distance away, for fear of the dead. The limit of daring was shown by the younger man in taking the selected specimens from before the opening of the cave, out of which the writer pushed them, and placing them with grass in bags.

No cultivable grounds and no ruins exist in the proximity of this cave or in the nearer neighborhood, and the remains must have been brought here from some distance. Exactly who these people were remains to be determined. The Aymara deformation may have been only an extension of that habit from the real Aymara people southeast of this region.

Sta. Lucia to Nasca.—Having done what was possible in the vicinity of Sta. Lucia and not being able to go farther inland, the

writer started for his original goal, the valley of Nasca. The journey by the route chosen occupied, not counting the stops, two and a half days, and showed a number of interesting conditions.

The first stop was made at the old fortress Huamanmarca. The fortifications were primitive but extensive and before the introduction of firearms must have been quite effective. In and about the fortifications, especially on a hill to the northwestward, were found quantities of quartzite chips and rejects, indicating a considerable stone industry. A somewhat similar condition had been seen at and above Asto. No finished implements were discovered, but, according to the natives, arrow points, larger worked blades, star-shaped club heads and other articles of stone are occasionally found by the children, or in working the fields. The writer saw no traces of stone manufacture along the coast, or in the mountains of Huarochirí.

Late in the afternoon of the same day, a narrow but at this time of the year dangerous river was passed, the most southern affluent of the Rio Nasca. On the subordinate elevations just to the north of the river were seen crude stone ruins, evidently untouched, of a moderate-sized settlement, with some burials; and that night another remarkable fortified hill was reached, known as Llaxwa.

The *Llaxwa* ruins (pl. 17) consist of stone remains of terraces, fortifications, and dwellings. The hill which they cover is easily approached from the east, but dominates the lower mountainous land on all other sides. The ruins are in a poor state of preservation; it is seen however that they have not yet been thoroughly despoiled and contain some untouched burials. The stone masonry, while showing care, is not of high order. No cement was used, and there are no imposing edifices. At the distance of about half a mile to the east from these stone structures, on high sloping ground, exist two groups of burial houses, not as long, but otherwise considerably like those described before from the district of Huarochirí (pl. 18). Unfortunately, these houses have been visited long ago by the treasure hunters, who have left little except fragments of the bones; nevertheless by excavation numerous specimens could probably still be discovered. The remains of the crania show without exception the "Aymara" deformation. A few huts about the Llaxwa ruins are now occupied by Quechua speaking mixed breeds, who seem to know nothing about the history of the locality.

VI. EXPLORATIONS IN THE NASCA REGION

From Llaxwa, a hard day's journey brings one to the Hacienda de Las Trancas, on a river of that same name but which later on joins the Rio Nasca. It is from this road that one appreciates best the dominating nature of the fortress. The country traversed is dry and no other remains of ancient settlements are met with until one reaches the narrow rocky valley of the river. There in numerous localities are seen stone foundations of ancient dwellings, made of large water-worn stones; despoiled burial pits lined with stones; and on a few large blocks of stone there are petroglyphs resembling remarkably those common to North America.

The above remains are, however, rather unimportant; the archeological wealth of the Nasca region commences at the Hacienda de Las Trancas. The main road of this large estate passes in several spots across remnants of ancient habitations and burials, and numerous cemeteries that have yielded quantities of fine pottery are in the vicinity. Skulls, bones, fabrics, and other objects are strewn in patches over the desert outside of the arable lands of the shallow valley. A group of these cemeteries at a locality known as *Poroma*, about three miles southwest of the hacienda, were examined later.

From Las Trancas the writer proceeded to *Majoro*, one of the haciendas of his friend from Lomas, Sr. Enrique Fracchia, and located only a short distance below the town of Nasca. From this place limited excursions were made farther up and down the valley of Nasca, and also to the above-mentioned *Poroma*. Subsequently the river was followed to considerably below where it merges into the Rio Grande. What was learned during the rapid survey of these regions was briefly as follows:

Ruins of importance are found in the vicinity of Nasca, but remains of small settlements exist at many spots along the edges of the sandy plains bordering the arable lowlands. In a number of instances posts of the hard and enduring huarango (mesquite) indicate the presence of habitations, while other posts of the same wood, standing in rows, subserved functions not yet determined.

Along the various branches, as well as by the main stream of the Rio Grande de Nasca, in the deserts, beyond the cultivable ground, there are numerous old cemeteries, some quite extensive, but the majority of small size. A great deal of excavation has been done in these cemeteries, particularly during the recent period of drouth, when, according to local reports, they proved a "god-send" to the poor people.



Fig. 1. The hill from the northeast



Fig. 2. The hill from the southeast. Native hut, for the moment the writer's quarters, in the foreground. The inhabitants are mix-breeds, speaking Quechua

THE FORTIFIED HILL OF LLAXWA, ABOUT 50 MILES (BY THE PATHS) S. E. OF NASCA



BURIAL HOUSES A SHORT DISTANCE EAST OF THE ANCIENT FORTIFIED HILL OF LLAXWA, IN THE WESTERN CORDILLERA, S. E. OF NASCA

Throughout these regions there are found with the burials not only excellent potteries of the Nasca type, but also, though to a less extent, nicely decorated fabrics, even feather work, and now and then articles of gold. It was the indiscriminate digging for and the sale of such articles, that sustained for two years the poorer part of the Nasca population. Since the law was enacted prohibiting such exploitation it has been greatly reduced, but irreparable damage to scientific investigation has already been done. The objects taken from the graves have been distributed broadcast, in the main to private curio collectors. And there are at the present time individuals who keep on excavating the remaining graves and hunting for whatever may be salable, some of them periodically and a few daily. Good pieces of pottery bring on the spot as much as a pound (\$4.90); the gold objects are sold usually by weight, and the fabrics for whatever they will fetch. A great deal is broken or torn and left, so that the total loss is enormous. Some of the more recently excavated burial places were found, as at Lomas, almost covered with remnants of fabrics, slings, ropes, and even scalps with peculiar braids, of all of which it was still possible to secure a good-sized collection; but it would be very costly at this day to make anything like a first-class representative gathering showing the Nasca culture.

The burials of the Nasca region are of several varieties, which however are in the main closely connected and do not indicate separate periods or cultures, or different types of people. The tombs seen over the 40 odd miles of territory between the haciendas Majoro and Coyungo and in the valley of the Las Trancas River, included some low mounds, with chambers built of moderate-sized adobes; ordinary, stone, or sand-block lined pits; subterranean chambers constructed of poles of the hard wood, or of wood and adobes; besides which there were simple graves in the sand or gravel, and finally, in several localities, burials in large, stout, undecorated, earthenware urns, especially made for that purpose. The huarango poles in the graves or burial chambers, as well as in the remnants of the habitations, had generally been reduced to the proper length by burning, but instances also occur in which they had been cut.

The bodies have as a rule been buried in the contracted position, and bound in bundles; and those of important personages were made up, with the aid of abundant raw cotton, into huge mummy-packs.

Physically the population of the entire Nasca region was remarkably homogeneous, which is a fact of considerable interest; and,

what is important, it was possible to determine conclusively that it represents merely a portion of the brachycephalic, moderately developed, coast type of people (pls. 19, 21).

Deformation of the head, fortunately, was much more rare than closer to the coast. What was present was exclusively of the same fronto-occipital variety. Not a single instance of the "Aymara" type came to notice, but it was learned that two or three skulls of that nature were found in one grave at some distance down the main valley. In one case, just above the dwellings of the hacienda of Coyungo, a moderate-sized cemetery was met with in which all the crania were marked by the pronounced fronto-occipital deformation such as was met with in the burial ground to the east of the house at Chaviña.

The oblong type of the skull (pls. 20, 22), which was found frequently in the valley of Acarí, was seen only rarely in the region of Nasca. There was less admixture of this type among the people of the Nasca than among those of most of the localities along the coast. However, at *Coyungo* (over 40 miles west of Nasca), two moderate-sized burial grounds were examined in which this oblong type was again in greater evidence.

As regards pathology, the Nasca region compares closely with that of Lomas and the Acarí Valley. Fractures were equally rare; symmetric osteoporosis of the skull occurred seldom and not in extreme form; and there were but few "mushroom-head" femora. A number of cases of more ordinary arthritis and a small number of inflammations exhaust the finds in this direction.

In the deeper burials of the Nasca Valley, the skeletal material, either from age or moisture, is generally in a poor state of preservation, and is almost invariably reduced by those who excavate into fragments, many of which are then reburied. So far as it was possible to examine this class of remains they were seen to be of the same type as those from the more superficial graves, but the fronto-occipital deformation of the skull was more common.

The uneven size of the various cemeteries in this region will be appreciated from the following records:

Of the four well-excavated cemeteries at Poroma, six leagues south-southwest of Nasca, the first showed exposed 156 crania and a corresponding quantity of bones; the second 63 crania; the third 101, and the fourth 200 crania. Five smaller burial places at Coyungo gave, the first 72 skulls, the second 34, the third 78, the fourth 9 (with perhaps as many in fragments or reburied), and



THE TWO TYPES OF SKULLS SECURED IN ANCIENT CEMETERIES ON THE COAST OF PERU: A MALE AND A FEMALE SKULL OF NASCA, SHOWING THE PREDOMINANT BRACHYCEPHALIC COAST TYPE



A MALE SKULL (TOP) FROM CHAVIÑA, AND A FEMALE SKULL FROM CHILCA, SHOWING THE MORE OBLONG TYPE OF PERUVIAN CRANIA, WHICH OCCURS IN MINORITY ALONG THE COAST BUT PREDOMINATES IN THE WESTERN PARTS OF THE MOUNTAINS



Male



Female

THE TWO BRACHYCEPHALIC SKULLS SHOWN IN PLATE 19 FROM ABOVE



Male



Female

THE TWO DOLICHOCEPHALIC SKULLS SHOWN IN PLATE 20 FROM ABOVE

the fifth 23. But in each case some addition must be made for skulls accidentally reburied and for a few that may have escaped discovery.

Owing to lack of time, the shorter more eastern part of the Nasca Valley could not be visited, and the same is true about the watersheds of the northeastern branches of the Rio Grande, all of which are said to contain cemeteries as well as other remains of antiquity.

The burial grounds on the lands of the hacienda of Coyungo represented, as indicated above, in a large measure the Nasca people and Nasca culture. The pottery at the hacienda, of which a collection was seen, was also in the main of the Nasca type, with some aberrations. Finally the cotton-bale mummies were rather common (pl. 23, fig. 2).

Coyungo-Ica-Pisco.—The distance from Coyungo to Ica is estimated at over 80 miles, and up to about 25 miles from Ica the road passes over hot barren deserts, which show few traces of the ancient population. At the point just indicated, the road reaches the hacienda of *Ocucaje*, a large, shallow, green depression. At a number of sites on the outskirts of this depression are seen mound-like elevations which possibly contain remains of habitations and show burials. At one such place a number of defective skulls on the surface were found to present the interesting highly deformed "flat-head" variety, such as seen before in one of the cemeteries at Chaviña and in two near Coyungo. The bones belonging to these skulls showed also the same moderately developed people as were found in the other cemeteries just cited, and as were general along this part of the coast.

A brief stop was made at this hacienda and one of the owners demonstrated to the writer a collection of various objects recovered from the local burial grounds. These specimens, while showing in many points a relation to the Nasca culture, presented a number of differences. Thus for the first time on the coast there were seen bows and arrows. Both were of large size. The bows were simple. The arrows were made of reeds and had long wooden points barbed on one side. A kind of a colored palm-fiber basketry was seen, representing possibly parts of a head gear. The pottery, while showing numerous resemblances to the more ordinary types of the Nasca region, differed from the latter by the absence of certain shapes and in decoration. Furthermore there were signs of wood carving, which is only rarely met with about Nasca. Feather work

was present, but of simple design, and even this was said to be rare in this vicinity.

From Ocucaje the road leads over a swell in the ground to the valley of Ica. Just where the road enters that valley, a low artificial elevation was seen and the ground in the neighborhood was strewn with skulls and bones, for the most part very defective due to long exposure. The type of the crania and bones was that of the ordinary coast population, and the majority of the skulls presented more or less of a fronto-occipital flattening.

In the valley of Ica, thickly overgrown by the huarango, a number of localities were heard of at which there were old burial grounds, and traces of ruins, or huacas; but evidently none of these are of great size or much importance. On the day following his arrival at Ica, the writer, with the kind assistance of the prefect of the district, made an excursion to a rather large mound and cemetery located at *Chalcaca* (or *Chulpaca*), near Pueblo Nuevo, about five miles southeast of Ica. The place was found thoroughly dug over by the peons, and the work was evidently completed a number of years ago, for the skeletal remains were in poor condition. The burials, or at least some of them, were made in large cylindrical earthenware jars or urns, about two and a half feet high and nearly the same in diameter. A number of these jars, not unlike the sections of a huge sewer-pipe, lay about one of the neighboring huts, apparently too substantial to be broken and too large to be made any use of by the present people. The skeletal remains showed a prevalence of the ordinary coast type people, with moderate fronto-occipital deformation of the skull; but there was a very perceptible admixture of the more oblong-headed element, well known from other places referred to in this report. At the house of one of the wealthier men of the neighborhood was seen a collection of pottery and other objects, showing the ancient culture of this vicinity. The specimens resembled closely those of Ocucaje, the pottery, however, showing decoration still more at variance in designs from that of Nasca. A large percentage of the vessels were more or less globular water jars of different sizes, with a narrow neck. The collection embraced very few fabrics, but included 20 or more stout staffs with well-executed carvings at one extremity, and set in the ground in front of the house was a carved post showing an attempt at a representation of a human figure. The bows and arrows were like those at Ocucaje.



Fig. 1. Some recent excavations in one of the old Nasca cemeteries, showing the abandoned skulls and bones



Fig. 2. Excavations at Coyungo, showing a subterranean burial chamber and debris of the cotton-padded mummies

ANCIENT CEMETERIES IN PERU, SHOWING THE RESULTS OF THE PEON'S WORK. THE SKULLS, BONES, FABRICS ETC., ARE LEFT TO DESTRUCTION

A noteworthy condition in regard to the human bones at this locality was the relative frequency of various pathological conditions of inflammatory nature, and a rather poor development of many of the bones in strength.

The above was the only burial ground within easy reach of Ica that offered any fair prospects for finding skeletal material; and according to information obtained from various sources, no cemeteries or other remains of antiquity of any account exist on the deserts between Ica and Pisco. None are, in fact, said to be found before one reaches the Rio de Pisco, and especially the vicinity of Tambo de Mora and Chincha, which localities the writer was also unable to examine.

VII. GENERAL REMARKS ON THE LOMAS, ACARÍ, NASCA AND ICA REGIONS

The explorations along these parts of the Peruvian coast and especially those in the Nasca region, have demonstrated beyond any possible doubt that the population of this territory and to the west of the high mountains, was an integral and inseparable part of the coast people. In every respect, even in the occasional admixture of the longer-headed element, this population was identical with that of more northern districts of Pachacamac, Rimac, Ancón, Huacho and Chan-Chan. Its culture differed, however, from that of these districts in many particulars; but it was not homogeneous, differing more or less from spot to spot and even from cemetery to cemetery. The Nasca group, physically the purest, seems to represent the oldest part of this southern coast population.

VIII. EXPLORATIONS IN THE DISTRICT OF LA LIBERTAD

From Pisco the writer took a steamer northward and, after rapidly arranging matters at Lima, left for Salaverry, 300 miles to the northwestward of Lima and nearly six hundred from Nasca. After reaching Salaverry, he proceeded immediately to the hacienda de Roma in the valley of the Chicama (fig. 3).

It was in the *Chicama Valley* and from the same hacienda, that the writer was able in 1910 to visit 29 old native cemeteries and to make an important collection. Over 1,200 crania and a large quantity of other bones of the skeleton were secured on that occasion; nevertheless the region had by no means been exhausted of specimens, or

scientifically. In particular, a number of pathological problems remained to be settled and made further investigations very desirable.

Fortunately for the work, the writer gained the friendship of the most influential as well as enlightened man of the Chicama Valley, Senator Victor Larco, and the aid of this gentleman, with that of those who have charge of his estates, made it possible to accomplish what otherwise would have required much more time, and might even have been impracticable. On this occasion at the writer's wish and before his arrival, Sr. Larco detailed a number of his employees to collect everything in the line of skeletal remains that was exposed from one of the large prehistoric cemeteries, not before examined, near the hacienda of Chiquitoi, and from several other localities. As a result when the writer arrived, he found the floor of a spacious hall in the local hospital piled with skulls and bones, a material on the whole in a rather poor state of preservation, but making possible some statistical determinations, particularly in regard to pathological conditions, for which there was formerly no occasion. The results of these are given in the appendix to this paper.

The work at Roma concluded, the writer made an interesting visit to a large huaca and a cemetery on the Casa Grande hacienda, and then proceeded toward the seashore, where a number of burial sites were investigated. He came unexpectedly across an exceptional burial ground near Huanchaco; examined once more the cemeteries about the Cerro de la Virgen; found another remarkable cemetery on the edge of the slightly elevated Chan-Chan plateau about two miles south of Huanchaco; examined two large and one small cemeteries at Chan-Chan; passed over the burial grounds in the edge of the desert from Moche to the huacas of the Moon and the Sun; and finally nearly completed the circle about Trujillo by making a journey to the eastward and northeastward of the town, following the ancient acequias and walls. A more detailed visit than was formerly possible was also made to the great Chan-Chan ruins.

The results of these explorations in the La Libertad district may be briefly summarized as follows:

Since the writer's visit to many of these places three years ago, a very perceptible change for the worse was observed to have taken place in the state of preservation of the old remains. Also, where formerly were seemingly inexhaustible quantities of skeletal material,

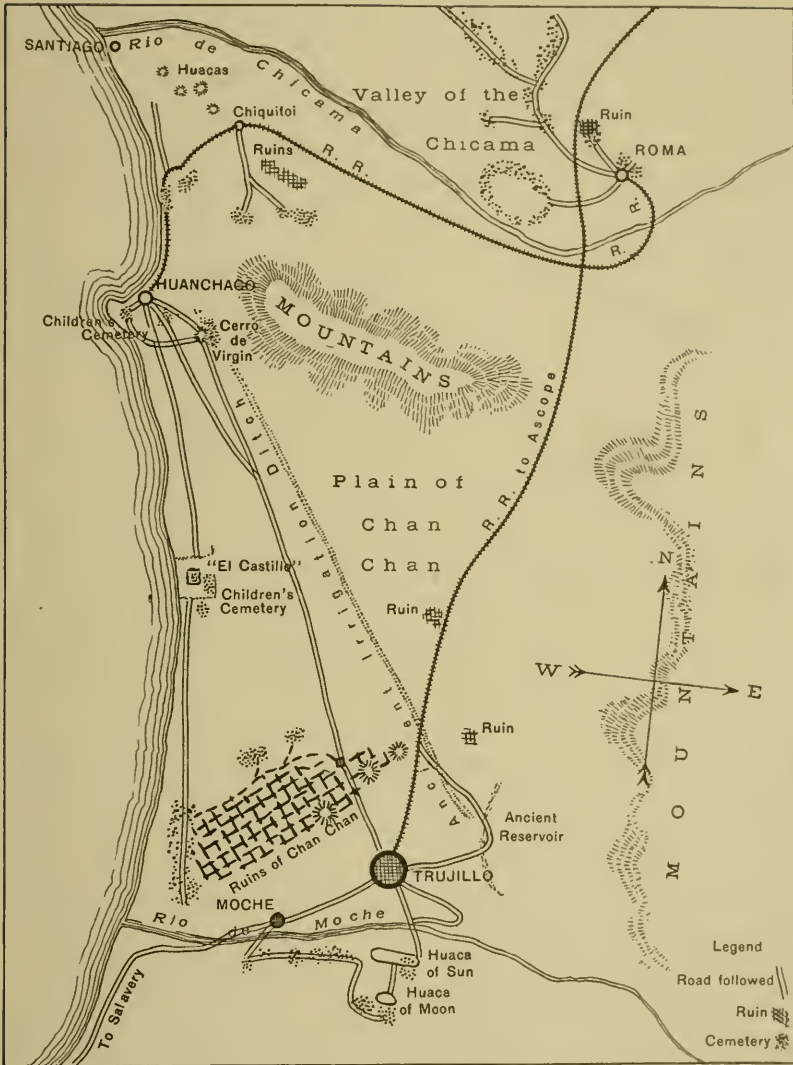


FIG. 3.—The environs of Trujillo and the Valley of the Chicama. Sketch showing the territory examined by the writer and approximate location of a number of the ruins and cemeteries.

there is now a dearth of the same. No such collection as that made in 1910 will ever again be possible from these regions, and had the material not been gathered at that time, it would be to-day for the most part unavailable, due to atmospheric destruction.

As on the occasion of the former visit, so now, the major part of the ancient population of the Chimú region was found to belong to the more or less brachycephalic coast type, of moderate stature and moderate to (close to the coast line) strong muscular development. The valley of the Moche River, the cemeteries about and on the huacas of the Sun and Moon, and Chan-Chan itself, show a population identical with that of the Chicama Valley; and this population is of precisely the same type as that of Huacho, Ancón, the Rimac Valley, Pachacamac, Lomas, Acarí Valley, and of the Nasca and Ica regions. These conclusions it is now possible to state definitely.

As elsewhere along the coast, the Chimú people were wont to practice, though not with equal frequency or intensity at all periods of time or among all their subdivisions, the antero-posterior head deformation. Even those cases which formerly appeared to the writer as being simple occipital flattenings are, he has now reasons to believe, merely lighter varieties of the "flathead" type; they are cases in which the pressure on the forehead was inadequate to cause enduring changes in that region, nevertheless was sufficient, coupled with the weight of the head of the infant, to produce a flattening of the occiput.

As many other localities along the coast, so also the Chicama and Moche valleys, as well as the Chan-Chan region, show more or less admixture, the proportion differing from cemetery to cemetery, of a more oblong-headed element of the same type as that met with in the mountain region of Huarochirí. But it seems very probable that this type was in the main of a relatively late appearance. It is rare among what appear to be the oldest burials; and it manifests itself in mingling, or living side by side, rather than admixture. This type evidently brought with it differences in culture, including the absence of the habit of head deformation, which however was in part adopted later. The occurrence of this type, which can represent no local variation and which is very scarce among or absent from the oldest Chimú as well as Nasca burials, indicates late prehistoric relations, more or less extensive according to locality, with the highland people who carried it, and a considerable subsequent intrusion of these people into the coast settlements. Quite likely exploration in

the mountains will show all along the line similar intrusions of the people of the coast type into the hills.

A number of especially interesting particulars resulting from these later studies in the Trujillo and Chicama regions, were as follows:

At the cemetery near a large huaca on the lands of the hacienda *Casa Grande*, while a larger part of the burial ground yielded nothing but the coast type of people, a small collection showed a taller and better developed strain with large and beautifully oblong skulls, free from all deformation.

On a promontory of the elevated flats rising a short distance south of *Huanchaco*, a moderate-sized burial ground was found which, with the exception of one or two adult individuals, yielded nothing except the skulls and bones of children and young adolescents, and the crania of these belong without exception to the fine, oblong, undeformed type, such as was found near the above-mentioned *Casa Grande* ruin. The cemeteries north and east of *Huanchaco* showed the usual coast type of people.

A little over two miles south from *Huanchaco*, at the edge of the elevated and in the olden times cultivated, but now desert, plain of *Chan-Chan*, a double, quadrilateral, isolated enclosure exists, which has been regarded by some as the remains of an old castle or fortification (see fig. 3). Instead, this relatively simple structural unit was a convent, school, or a shelter for more grown-up children and young adolescents, and was occupied by people other than those of the valley, for just outside the walls of the inner enclosure, to the east, exists a cemetery which again, as at *Huanchaco*, yielded nothing but the bones and skulls of the young and the skull in every instance was found to be of the oblong, undeformed, fine variety. Just outside of the wall to the south of this compound were some burials of adults which gave the usual coast crania.¹ No other

¹ It is doubtless this compound to which Squier (Peru, etc., N. Y., 1877, pp. 122-123) refers as *El Castillo*. But Squier must have written of this structure from recollections that had become somewhat unreliable. The quotation is introduced below. It is certain that the burials mentioned by Squier were not those of young women, but of children and young adolescents of uncertain sex; such skulls, however, can easily be taken for skulls of women by one who is not an anatomist. Also, there are no traces of the "several acres stuffed with skeletons"; the large exposed *Chan-Chan* cemeteries exist farther southward. Finally, skulls showing traumatic lesions are common in many parts of the coast. It is certain that nothing now indicates that any battle has taken place in this locality. Of course, the skeletal

occurrence of a similar grouping of the oblong-headed type was met with in these regions, nor anywhere else along the coast.

The *Cerro de la Virgen* cemeteries and neighborhood were again examined and it was definitely determined that this small rocky eminence has never been fortified; that the cemeteries about it are just ordinary burial grounds of rather poor people of the coast type; and that the neighborhood was in olden times irrigated and cultivated, the remains of a large, deep ditch leading for miles to the eastward and terminating in a reservoir, now dry, east of Trujillo.

The cemeteries of *Chan-Chan*, to the north and northwest, are still to a large extent unexplored; however, digging by the peon goes on. Those immediately to the west of the ruins have by this time been quite dug over. There are stores at Trujillo, including the principal pharmacy, which openly buy and in some instances sell the "wares."

It is strange that this great ruin, the center or rather culmination of the Chimu culture and as such one of the most important archeological remains of ancient Peru, also one of the sites most dug

remains exposed 35 years ago have in all probability completely disappeared, but the peons generally keep on excavating in such localities turning up new specimens. Squier's note reads: "We took a long sweep past La Legua to an eminence near the sea, on which stands an extensive work with a *huaca* and other monuments inclosed, called, from its position and assumed purpose, El Castillo. The sandy soil in front of its principal entrance, over an area of several acres, is stuffed with skeletons, buried irregularly, as if after a great battle; a supposition supported by the fact that the bones which had been exposed by excavation or laid bare by the winds were all of adult men, and that a large part of the skulls bore marks of violence. Some were cloven as if by the stroke of a battle-axe or sabre; others battered in as if by blows from clubs or the primitive hammer to which the French have given the appropriate name of *cassetête*; and still others were pierced as if by lances or arrows. I picked up a piece of a skull showing a small square hole, precisely such as would be occasioned by the bronze arrow-heads found here and there among the ruins.

"I could not resist thinking, in spite of tradition, that perhaps on this very spot had been fought the last decisive battle between the Inca Yupanqui and the Prince of Chimu, and that here were mingled the bones of the slain of both armies: a notion supported by finding mixed together the square, posteriorly compressed skulls of the peoples of the coast, the elongated skulls of the Aymaras, and the regular, normal heads of the Quechuas of the sierra.

"Inside the Castillo we found a terraced cemetery, containing, however, only the skeletons of young women, carefully enveloped in a fine cotton cloth. These skeletons were apparently of persons that had died at between 15 and 18 years of age."

over by treasure hunters, has to this day received scarcely any scientific attention.

While visiting the ruins of Chan-Chan themselves, one is struck by the enormous labor and expense undergone by the excavators hunting for gold; and the fancies of many an inhabitant in the valley still dwell upon hidden treasure. Also, to one who has seen them before, the fact is sadly apparent that these ruins are undergoing a gradual decadence. The bas-relief palace was revisited. The figures on its walls, stamped in resistant adobe, and which were still beautifully clear three years ago, are to-day already blurred by the action of the elements; a few years more and they will be so much shapeless dry mud, and not a cast or a fragment of them exist anywhere in a museum. Similar examples of the ravages of time could be multiplied in this great city.

The cemeteries of the *Moche Valley* are now evidently almost exhausted; but burials are said to still occur in the sand hillocks from Moche to Salaverry. The burial grounds about the huaca of the Moon have been thoroughly dug over and seem also to be quite exhausted. The excavations in the huge adobe pile which began a few years ago under the direction of the then prefect of Trujillo and another high public official, Dr. Portugal, have evidently been carried somewhat further, but so far as learned without adding much to the results of the first digging. The great huaca of the Sun has been injured no further. Undisturbed burials doubtless still exist about and on, as well as in, this immense structure. A skeleton of a woman, which the writer secured, has been recently dug out from a small flat near the top.

The skeletal material examined or gathered from all these places duplicates, as already indicated, that from the valley of the Chicama, and offers similar pathological conditions. The four principal classes of lesions found in the Chan-Chan region include symmetric osteoporosis in the young; the "mushroom-head" femur; other signs of arthritis; and exostoses in the external part of the auditory meatus. Besides these there were met with a few cases of more or less localized periostitis or osteoperiostitis, one of a destructive bone lesion or tumor, and a few fractures and dislocations.

IX. GENERAL CONCLUSIONS

During his late expedition to Peru, the writer examined approximately 4,800 crania and a very large quantity of other bones of the skeleton. This material belonged in a large part to the coast region,

but to some extent also to two of the more western districts of the highlands. The investigations were an extension of those of 1910, when, besides the considerable quantity of specimens examined, 3,400 skulls and a large number of bones were collected.

The investigations on both these trips to Peru followed, as already stated in part, three main objects, namely:

(1) The determination of the anthropological characteristics of the pre-Columbian Indian of the coast as well as of the highland regions, so far as these could be covered;

(2) The study of the diseases of the pre-Columbian Peruvian, with a collateral inquiry as to trephining and other possible surgical practices; and

(3) The gathering of any indications that might be found relating to man's antiquity in that country.

The results of the work are not ideal, nevertheless a number of points of value, have been determined. Important parts of the territory could not be reached, and even within the regions attained the exploration had to be limited to what lay exposed on the ground or in the caves. Furthermore, it was difficult to determine the age of many of the burial grounds. Except where clear signs of a contact with Europeans were present the age of the cemetery could only be surmised. Yet it is certain that a large majority were pre-Columbian; and the problems seriously affected by the uncertainty are few in number, and belong only to the realm of pathology and surgery.

Anthropologically, the opinions ventured after the conclusion of the first expedition are in the main confirmed. While a few links in the chain of evidence are still wanting, it can now be regarded as quite certain that the Peruvian coast from Chiclayo at least, in the north, to Yauca in the south—a distance of over 600 miles—was peopled predominantly before the advent of the whites by one and the same physical type of Indian. This type was characterized by brachycephaly, moderate stature, and moderate to strong musculature according to localities. The most important facts ascertained in this connection are that both the Chimú and the Nasca were innate and, on physical grounds, inseparable parts of this people.

These coast people were fishermen, or agriculturists, according as they were settled close to the sea or farther inland. Evidently they were organized into numerous political groups, which developed smaller or greater cultural differences according to environment and other influences. It may be permitted to introduce here a few

generalizations, however imperfect, in regard to their cultural life, based on the extensive knowledge obtained of their remains.

They built dwellings of reeds, as well as larger structures of small uncut stones, of moderate-sized sun-dried brick, or of great blocks of adobe, and they constructed of adobe, stones, and earth characteristic larger edifices, and mounds of various sizes, known as *huacas*. The latter probably served partly for ceremonial purposes and partly for burials.

These people were remarkably well acquainted with the arts of weaving, pottery making, and decoration. They wove from the native cotton and from llama wool. The color and decoration of the fabrics, and the shapes, artistic value and variety as well as the symbolism of the decoration of the pottery, differed from place to place, in accordance with time and other influences.

The pre-Columbian Peruvians of the coast knew copper, silver and gold, with some of their combinations, and worked these metals to a limited degree. They dressed principally with a poncho shirt, a loin cloth, and sandals, with little head-gear; what there was of the latter was often decorative or symbolic. They made considerable use of gourds. They made few or no stone implements. They utilized wood in their houses and for ceremonial purposes, in the latter case developing more or less carving. Their weapons were a metal or stone mace, a wooden club, a copper axe, a variety of copper knife, the sling, and in some regions also the bow and arrow. Their implements were the whorl, weaving sticks, looms, cactus-spine or bone needles, bone needle holders, sharpened sticks, copper knives, copper axes, hoes; and in the case of the fishermen, nets, sinkers, reed-bundle boats or balsas, and peculiar rafts, with paddles. In pottery they made frequent use of molds and stamps, and were masters at imitating natural objects and animals as well as man. They knew no precious stones, except possibly, in rare instances, the emerald and the turquoise; and they had no pearls. They used beads, claws, seeds, feathers, multicolored yarn, and metal objects for personal decoration. Nose and ear ornaments, though probably in use, have not been found by the writer in the many cemeteries examined. Their musical instruments were the drum, the pan-pipe, the flute, and the rattle.

Throughout the extent of the territory which they occupied, the coast people deformed the heads of their infants by applying a pressure, probably by means of a bandage and pads, to the forehead, and this practice flattened at the same time by counter pressure the

occiput. The oldest parts of the population, except perhaps at Nasca, seem to have deformed less generally than those just before the arrival of the whites. The frequency and intensity of the deformation differed according to groups and possibly clans, of the people. They practiced no filing, cutting or chipping of the teeth, and no other mutilation which would leave marks on the skeleton. In the Chimu region, there may have been something like the nose-cutting among the Apache and other tribes.

These people of the coast have spread along the valleys to the foothills of the Cordillera, and have probably in some instances penetrated into the mountains. Meanwhile, however, they became in many though not all localities more or less mixed, or rather mingled, with dolicho- or near dolichocephalic elements, which must have come from or across the mountains. In a few instances a cemetery will be found near the coast in which this oblong-headed type predominates or is almost the only one present.

Pathologically, so far as shown by the bones, the people of the coast were decidedly freer from diseases than would be an average white population of such numbers. Some systemic diseases well known to us were seemingly entirely absent before the advent of the Spaniards. On the other hand, there existed several morbid conditions which may not be known or are very rare among the whites. The absent diseases were rachitis, osteomalacia, and probably syphilis, tuberculosis, and cancer. The diseases peculiar to the coast, were symmetric osteoporosis of the skull, in infancy and early childhood; a strange progressive arthritic process affecting the head of the femur and the cotyloid cavity in the adult or rarely the adolescent, called here from its most characteristic feature the "mushroom-head" femur (arthritis deformans); and characteristic exostoses in the distal part of the auditory meatus, tending toward its occlusion. There was a great scarcity of fractures, but on the other hand there were everywhere numerous traumatic lesions of the skull, showing fighting and perhaps executions.

Notwithstanding the frequency of wounds of the skull such as would lend themselves to operation, trephining was very rare on the coast, if practiced there at all. The instances found were all at places within easy reach of the mountainous districts where trepanation is known to have been common. As to other operations, in the valley of Chicama two lower limbs were seen, both in the possession of Dr. Velez Lopez, now of Trujillo, in which the foot had been

disjointed from the leg and the limb fitted with a cylindrical wooden pedestal with a cup-shaped cavity for the stump. But no assurance can be had that these specimens are pre-Columbian. As to the treatment of fractures, too few of these were met with to justify any conclusion; in some cases the very good results suggested the use of splints, in others, if any aid was given, it was unsuccessful.

Only a very few crania were found along the coast showing the "Aynara" deformation, hence the people who practiced this must have had a very limited contact with those of the coast, and the possibility is not excluded that such contact was post-Columbian.

As to the *mountain people*, conditions differ between the two territories visited, namely, that of the district of Huarochirí, and that southeast of Nasca. The Huarochirí district, and doubtless the neighboring parts of the sierra, were peopled predominantly by the oblong-headed type of the Indian, such as found mingled in various proportions with the coast population. Besides this, there was also a proportion of broader-headed people, possibly derived from the coast. The material culture was relatively poor, except as regards agriculture and to some extent weaving; and with the exception of a few examples of the fronto-occipital flattening, there was no head deformation. In the region southeast of Nasca, on the other hand, while some burial places showed apparently the coast people, others gave exclusively those with the "Aymara" deformation, though probably not of "Aymara" descent.

In both regions the mountain people were characterized by a good average development of the body as well as of the skull, and by a great freedom from disease. Facts of especial interest are that there was a complete absence of the symmetric osteoporosis, of the "mushroom-head" femur, and also of the auditory exostoses, in both territories. In the Huarochirí district, where injuries to the cranium were not fatal they were followed in many cases by the operation of trepanation. This, though often large and quite crudely done, was evidently in many cases successful. The practice in all probability persisted to and even after the coming of the Spaniards. In the mountains southeast of Nasca, wounds of the head were scarce and no clearly recognizable instances of trepanation were discovered; one such instance was, however, reported from a place a day's journey to the southeast of the farthest point reached by the writer. Of other surgical procedures there were no traces either in the hills to the north or those to the south.

Antiquity.—As to the third main object of the expedition, namely, the search for evidences of man's antiquity, the results were wholly negative. Aside from the cemeteries or burial caves of the common coast or mountain type of people, and their archeological remains, there was no sign of human occupation of these regions. Not a trace suggesting even distantly something older than the well-represented pre-Columbian Indian was met with or heard of anywhere; and the coast or mountain population itself cannot be regarded as very ancient in the regions which it occupied, so far as these were studied. There are no signs that any group has been in any of the sites for even as much as, say, 20 centuries; nor does it seem that any of these people have developed their culture on these spots, except in some particulars due to environmental opportunities or requirements.

As to the density of the pre-Columbian population in Peru, there are plain indications that in numerous localities it was greater than at the present time, while in others it probably was less. However, the burial grounds as well as the ruins offer everywhere plain evidence that they are not contemporaneous, though the differences in their age may often not be very great. The population changed, new groups superseding others. Some of the ruins were doubtless such long before the advent of white man, while others, including the great Chan-Chan, were probably in decline, if not fully abandoned, when the country was entered by the Spaniards. In one word, as among the North American Pueblos, nowhere was the aboriginal Peruvian population at any time as great as the relatively numerous cemeteries or ruins might lead one to suppose, for these burial grounds and ruins date from different, though not far distant, periods.

Future work.—In closing this report, the question naturally presents itself as to what remains to be done in Peru in the lines followed by the writer. The answer is—the work recorded here, while to some extent establishing a foundation, is far from sufficient. Similar investigations and collections wait urgently on the anthropologist in the districts of Piura, Eten, and Moquegua, on the coast; in the western sierras from the neighborhood and latitude of Cajamarca to those of Arequipa; and in the eastern highlands from Tiahuanaco to Moyobamba.

The four most important problems in Peruvian anthropology that await their solution are (1) The derivation of the coast brachycephals; (2) The extension and connections of the mountain type or types;

(3) The extension and exact physical characteristics of the Aymara; and (4) The physical identity of the Quechua. Besides this it will be of great importance to determine archeologically the exact relations of culture to the physical type of the people. The writer must repeat again what he wished to accentuate in his former report, that, due to the lack of scientific supervision of the vast majority of the excavations practiced in Peru to the present date, the actual archeological collections from that country in the museums are little more than so many curiosities, which for the most part it is impossible to refer either to any definite people or period. For some time there was hope that the work of the National Museum at Lima would throw light on these subjects; but that work has stopped and lately the museum, so far as anthropological and archeological interests are concerned, has much retrograded. It is earnestly to be wished that the Peruvian Government might assist anthropological investigations in its extensive territories, and especially that it might itself do everything in its power, before it is too late, to gather the data and material which are of fundamental importance to the American anthropologist.¹

X. APPENDIX A. SPECIAL NOTES ON SOME OF THE PATHOLOGICAL CONDITIONS SHOWN BY THE SKELETAL MATERIAL OF THE ANCIENT PERUVIANS

SYMMETRIC OSTEOPOROSIS OF THE SKULL

A peculiar disease, or a manifestation of a disease, occurring quite commonly in infancy among the prehistoric Peruvians of the coast (pl. 24). Found by the writer in 1910 at Pachacamac and Chicama, and at all other parts of the coast that were examined in 1913. It was absent in the mountains, and along the coast its frequency and perhaps its grade differed from locality to locality.

This condition of the skull began to manifest itself in infancy or early childhood. The osseous changes were, so far as could be determined, limited to the cranium, all other parts of the skeleton remaining normal. In all probability they represented not a local

¹ Since the above was written the welcome news has reached the writer that by a decree of the President of Peru, the Anthropological and Archeological parts of the Museo Nacional have been separated from the Historical and placed in charge of the energetic young Dr. Julio C. Tello.

disease, but an indication of some systemic disorder, and this was more likely of toxic than of nutritive or degenerative nature. The disorder was often fatal and that mostly before the changes in the skull reached their maximum; but in a fair percentage of cases the subject recovered. The changes on the skull were characterized by considerable symmetry, by limitation to a very large extent to the outer surface, by invasion of only those parts which do not give attachment to muscles, and by the avoidance of the sutures as well as the facial portions, thus differing radically from such diffuse osteoporoses as described in apes by v. Hansemann. The process began, as can well be seen from the numerous specimens, in the roof of the orbits, or on each side of the frontal squama, between the frontal tuberosity and the coronal suture. In the orbits it began by an increase of vascularity, followed by deposition of porous tissue, which in extreme cases came to look exactly like a low growth of coral. On the frontal the first changes were more like those of localized periostitis, but eventually led also to more or less surface osteoporosis. Following the frontal, more exclusively osteoporotic manifestations developed on the posterior portion of each parietal, between the temporal crest and the sagittal suture, and on the occipital above the crest (see pls. 24, 25). If the condition still advanced, then the wings of the sphenoid, parts of the temporals and parts of the base with the palate began to show signs of proliferation and fine osteoporosis, while localized breaking down of the altered tissue may have taken place in one or more of the older lesions. These were evidently the limits of the bone changes. If recovery took place, there was some thickening of the affected parts of the skull, disappearance of all overgrowths, and a persistence of more or less of a sieve-like condition of the altered surfaces (pl. 25). The rest of the skeleton, as already stated, was either unaffected or affected but slightly.

The condition here briefly described was not rachitic, for rachitis did not exist in the pre-Columbian Indian. It cannot be assumed to have been syphilitic, for in no case were there any other manifestations present that would point to that disease, and its clinical picture does not correspond to that of hereditary syphilis in the infant—there were no nodes nor any intracranial lesions on any infant's or child's head among the many examined, whether with or without osteoporosis, and the recoveries left results unknown in syphilis. Nor was it a part of a tuberculous affection, for the lesions differ greatly from those of this disease. The only conclusion the writer can



PARTS OF THREE SKULLS OF INFANTS, SHOWING LESIONS OF SYMMETRIC OSTEOPOROSIS. THE MIDDLE SKULL IS FROM AN ANCIENT BURIAL NEAR HUACHO, PERU WHILE THE TWO FRONTS ON SIDES ARE FROM PREHISTORIC PUEBLO CEMETERIES IN ARIZONA



ADULT PRE-COLUMBIAN MALE SKULL FROM THE VALLEY OF THE CHICAMA, SHOWING RECOVERY FROM AND THE REMAINS OF SYMMETRIC OSTEOPOROSIS IN INFANCY

reach in regard to this symmetric osteoporosis is that it represents a process not well known in the pathology of the white race, though perhaps not limited to the ancient Americans.¹

EAR EXOSTOSES: OSTEOMÆ OF THE TYMPANIC RING

A relatively large proportion of the pre-Columbian people of the more central parts of the Peruvian coast suffered, as shown by the skulls, from a greater or lesser occlusion of the external auditory canals by bony tumors. These are generally hard osteomata, from one to three in number, ranging in size from those like a minute drop to those of several millimeters in diameter, mostly rounded or pearl-shape, but occasionally irregular, frequently with enamel-like surface, and situated just within, or perhaps protruding slightly from, the orifice of the osseous meatus. These little tumors, which are associated with no signs of any inflammatory nature, develop invariably from the tympanic ring and particularly from its extremities. They were in no case seen to coalesce, and though they may almost close the meatus they were never seen to do this entirely. Similar osteomata occur, though far less frequently, among the whites; they have been mentioned by Virchow from Peru; and they are found occasionally in the skull of a North American Indian.

"MUSHROOM-HEAD" FEMUR: ARTHRITIS DEFORMANS OF THE HIP-JOINT

Never seen in the young, and only once met with in an adolescent. Evidently always of gradual development.

Occurs unilaterally (more frequently) or bilaterally (due to nature of material exact data in this respect not possible).

Sex influence?

Never found advanced to synostosis.

As a rule, without any exception, there were no accompanying changes in the shaft or lower extremity of the same bone, barring an occasional slight to moderate arthritis.

¹ In 1909 the writer brought two infant skulls with a coral-like osteoporotic development in the roof of each orbit from a XIIth dynasty cemetery in Egypt; while Virchow reported (*Verh. Berl. Ges. Anthr.*, 1874, 61-62) similar lesions in a skull of a Pampa Indian from Argentina, and mentions of having seen much the same in the cranium of a young Berliner. It is, of course, possible that such isolated orbital lesions are not homologous pathogenetically with the process described above, but they are of identical character.

Was absent or exceedingly rare in the mountains.

Was less frequent in the south (Nasca region) than in the north (Chimu).

The condition showed many variations. The form changes of the head and neck may reach a fairly advanced stage without a trace of inflammation. Of the more affected specimens there were two principal varieties, one characterized by a great shortening of the neck and a pronounced flattening of the head of the femur, with a shallowness and roughness of the acetabulum; while the other was marked by a deepening of the cotyloid cavity, with less roughness, and the assumption by the head of the femur of a shape much resembling the *caput penis* (see pl. 26). The changes in the acetabulum include in advanced cases the bridging over of the cotyloid notch by irregular masses of bone and a conversion of it into a cavity. Characteristic changes are also observable just above the acetabulum.

Three specimens of the humerus were collected in which the head of the bone underwent similar transformation, *i. e.*, pronounced flattening, spreading and roughening.

ARTHRITIS

Arthritis, Arthritis senilis, A. deformans (ordinary type), Spondylitis deformans

Conditions not separable in the Peruvian skeleton, differing only in grade and individually.

Found thus far only in adults, and especially in the aging.

Commenced in the Indian generally, first in some of the vertebræ and at the same time, or soon after, on the lower articular surface of one or both femora.

In the vertebræ the process commenced generally in the lower joints, very rarely in the upper. In the majority of instances it remained restricted to the lowest joint.

First signs: one or two "abrasion" spots on the posterior part of the surface of one or the other condyle. There may also have been early in the process slight concretory deposits on the surface of the condyles. These conditions were soon followed by a slight, uneven marginal redundancy (as if the end of the bone turned into less solid consistency and articular surface was being forced out along the margin), which gradually extended and increased until it assumed the character of a marginal, continuous, more or less irregular exostosis. As a rule it was the posterior part of one or the other



ARTHRITIS DEFORMANS OF THE HIP-JOINT AMONG THE ANCIENT PERUVIANS. PELVIC BONE AND FEMUR ON RIGHT FROM ONE SUBJECT. FEMUR ON LEFT SHOWS EARLY STAGE OF ALTERATIONS; THAT IN MIDDLE REPRESENTS A VERY ADVANCED CASE OF FLAT "MUSHROOM-HEAD", THAT ON RIGHT A PRONOUNCED *caput penis* CONDITION. ALL FROM THE CHIMU REGION

articular surface of the condyles that showed the first lesions. The initial lesions were gradually followed by more roughness of the articular surface, associated with an augmentation of the marginal exostosis; and then, in the case of the condyles, followed the gradual development of an abrasion-surface, grooved antero-posteriorly, with more or less wearing off of the compact layer of the bones so that some of the bone cavities beneath became visible, and with a polishing of the abraded portion.

Exostoses about the head of the femur came generally much later than those about the condylar articular surfaces, if at all.

In the tibia, changes corresponding to those in the femur developed simultaneously on and about the upper articular surface; and about the same time, or later, the process began to manifest itself also in other bones, especially the vertebræ and the humerus (lower end). Not seldom the first and occasionally the only manifestation of the disorder was manifest in the vertebræ, particularly those of the lumbar, lower dorsal and cervical regions. The material examined seemed to show plainly that the cause which gave rise to the manifestations was constitutional.

“TENDON LESION”

This was evidently an inflammatory lesion, of varying extent, on the posterior surface of the lower end of the femur, at and about the insertion of the medial head of the gastrocnemius.

It was quite frequent in the Chimu region on the coast, but was not noticed in the mountains, though lighter grades may have escaped attention.

Not accompanied (except accidentally) by other pathological conditions.

Present occasionally in the adolescent, but not in children.

Traumatic origin?

<i>Osteoperiostitis</i>	adult	1
whole shaft affected;		
bone light.		
"Mushroom head" humerus	adult	1
<i>Specimens showing more than one lesion</i> (included in the above):		
a. Head fractured and deformed, and shaft bent (not rachitic).		
b. "Mushroom" head, and moderate arthritis lower joint.		

Special

Number of adult bones with aperture in septum.....	123	= 21%
Number of children bones with aperture in septum.....	4	= 7%
Total	127	

RADII

Number of adult bones examined.....	255
Number of children bones examined.....	32
Total	287

Of these:

<i>Fractures</i>	adults	2
both broken just above distal end.		
<i>Dislocations</i>		0
<i>Arthritis</i>	adults	7
3 moderate, upper joint.		
3 slight, upper joint.		
1 moderate, lower joint.		

Special

In two, a pair, a congenital deformation of lower articular surface.

Combinations of lesions on same bone..... none

ULNÆ

Number of adult bones examined.....	301
Number of children bones examined.....	16
Total	317

Of these

<i>Fracture</i>	adults	2
1 fracture of shaft.		
1 of coronoid process.		
<i>Dislocations</i>		0
<i>Arthritis</i>	adults	16
9 slight, upper joint.		
7 moderate, upper joint.		

Combinations of lesions on same bone..... none

FEMORA

Number of adult bones examined.....I,210
 Number of children bones examined..... 133

TotalI,343

Of these:

Fractures 0
Dislocationsadults 2¹
Exostosesadults 4

1 button-exostosis or osteoma.
 1 small outgrowth of bone postero-inferiorly,
 just below the bifurcation of the linea
 aspera.
 2 moderate excrescences on the great trochanter.

Arthritisadults 36

22 slight, lower joint.
 12 moderate, lower joint.
 1 pronounced, lower joint.
 1 slight, head as well as lower joint.

"Mushroom head".....adults (including 1 adolescent) 16

Periostitis {adults (with 1 adolescent) 9
 {children 1

7² slight and localized (one or more spots or
 patches).

3 moderate (one or more spots or patches).

Osteoperiostitisadults (including 1 adolescent) 6

3 localized inflammatory enlargements.
 1 moderate, generalized.
 1 pronounced, generalized (in adolescent, bone
 light).
 1 exostotic, lower half of bone.

Other inflammatory:

Small ulcer-like lesion on neck.....adult 1

Miscellaneousadults 3

infantile paralysis..... 2

lesion, destructive, lower two-fifths..... 1

Specimens showing more than one lesion (included in the
 above):

a. Moderate osteoperiostitis, and slight arthritis both
 joints.

b. "Mushroom" head, and destructive lesion lower two-
 fifths.

¹ See also under "ossa innominata."

² Including the adolescent and the child.

TIBIÆ

Number of adult bones examined.....	781
Number of children bones examined.....	99

Total 880

Of these:

<i>Fractures</i>	0
<i>Dislocations</i>	0
<i>Exostoses</i>	adults 6

- I pronounced exostosis popliteal ridge.
- I spine beneath medial condyle.
- I traumatic exostosis at middle.
- I traumatic exostosis lower third, ant. surf.
- 2 moderate excrescences above fibular groove.

Arthritis adults 12

- 8 slight superior arthritis.
- 4 pronounced superior arthritis (of which 1 with abrasion-surface).

Periostitis {adults 12
children 1

adults 9 } slight, in patches.
children 1 }

- 2 moderate, localized.
- 1 advanced, localized.

Osteoperiostitis adults 5

- 4 moderate, localized.
- 1 pronounced, general.

Specimens showing more than one lesion (included in the above):

- a. Pronounced exostosis of popliteal ridge and moderate arthritis upper joint.
- b. Moderate excrescences about fibular groove and slight arthritis upper joint.

FIBULÆ

Number of adult bones examined.....	266
Number of children bones examined.....	24

Total 290

Of these:

<i>Fracture</i>	1
<i>Dislocations</i>	0
<i>Arthritis</i>	adults 2

- I moderate, both ends.
- I moderate, lower end.

<i>Periostitis</i>	adults	3
	1 slight, localized.	
	2 moderate, localized.	
<i>Combinations of lesions on same bone</i>		none

OSSA INNOMINATA

Number of adult bones examined.....	694
Number of children bones examined.....	30
Total	724

Of these:

<i>Fractures</i>	0
<i>Dislocations of femur, unreduced</i>	adults 8
	all early, with an irregular, shallow new joint above the cotyloid cavity.
<i>Exostoses</i>	adult 1
	moderate, just above acetabulum.
"Mushroom" cavity	adults 25
	10 well-marked.
	14 shallowing of cotyloid cavity and defects or lesions antero-superiorly in and above the border of the cavity.
	1 moderate, in an adolescent.
<i>Combinations of lesions on same bone</i>	none

SACRUM

Number of adult bones examined.....	199
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Of these:

<i>Arthritis</i>	29
	29 arthritic exostoses, upper border.
	2 of the above also joined to pelvis both sides.
<i>Other lesions: erosion-like defects, anterior surface</i>	1
<i>Combinations of lesions on same bone:</i>	
2. Arthritis upper border, and of both the iliac articular surfaces.	
1. Arthritis upper border, and erosion-like defects anterior surface.	

Special

Sacral segments: 4—0; 5—79 (58%); 6—56 (41%); 7—1 (0.7%); 63 undeterminable because of damage.

ATLAS

Number of bones examined..... 31

Of these:

Arthritis 1
 about condylar and odontoid facets.

Exostoses 1
 a process for articulation with a paroccipital process.

* *Special*

Congenital union with axis..... 1

AXIS

Number of bones examined..... 36

Of which:

Arthritis 3
 2 about lower surface of body.
 1 probably arthritic synostosis with third.

OTHER VERTEBRÆ

Number of bones examined..... 822

Of which:

Arthritis (superiorly or inferiorly)..... 92
 mostly lumbar; synostosed: 2 lumbar; 5 lumbar with 6 dorsal (in one).

Other lesions: body moderately flattened..... 1

Special

Five of the lowest lumbar, and one of the upper lumbar, show a separation (congenital) of the posterior part of the arch.

Two cervical vertebræ are congenitally joined.

STERNA

Number of bones examined..... 26

Pathological 0

Special

In 4 manubrium attached; in 22 manubrium separate; in 3 the body shows an aperture in lower third.

SCAPULÆ

Number of adult bones examined.....	229
Number of children bones examined.....	9
Total	238
Of these:	
<i>Fractures</i>	0
<i>Dislocations</i>	0
<i>Arthritis</i>	adults 11
	9 slight, glenoid cavity.
	2 pronounced, glenoid cavity.

RIBS

Number of adults (an adolescence).....	2,410
Of these:	
<i>Fractures</i>	14
<i>Dislocations</i>	0
<i>Exostoses</i>	1
	a flat exostosis ventrally at angle.
<i>Arthritis</i>	36
	4 of articulation on head.
	32 about articulation on tubercle.
<i>Periostitis</i>	1
	slight, external surface.

Remarks

First ribs show occasional arthritic conditions at sternal end.
No case seen of ossified cartilage or of synostosis with a vertebra.

No ulceration.

One instance of anomalous juncture of two long ribs by a broad process near the spinal extremity of the bones; not traumatic.

CLAVICLES

Number of adult bones examined.....	117
Number of children bones examined.....	12
Total	129
<i>Fractures</i>	0
<i>Dislocations</i>	0
<i>Exostoses</i>	adult 1
	moderate, under surface, distal end.

<i>Arthritis</i>	adult	1
	at sternal joint.	
<i>Periostitis</i>	adult	1
	moderate, under surface, distal end.	
<i>Combinations of lesions on same bone</i>	none	

PHALANGES

Number of bones examined (adults or adolescents)..... 213

Of which:

<i>Fracture</i>	1
<i>Arthritis</i>	3

A brief analysis of the preceding figures shows that among 3,406 long bones only 157, or 4.6 per cent, presented one or at most two pathological conditions; while among the remaining 4,777 other bones, such bones numbered 231, or slightly less than 4.9 per cent. These are exceedingly small proportions of diseased specimens, far smaller than among the modern whites of any class. The distribution of the lesions was as follows:

	Long Bones	Other Bones
<i>Fractures</i>	6 or one in 567 bones	15 or one in 318 bones (14 in ribs).
<i>Dislocations</i>	2	8 (all at hip-joint).
<i>Exostoses</i>	11	4
<i>Arthritis</i>	85 (48 at knee joint)	176 (92 in vertebræ).
"Mushroom-head" fe- mur or humerus (ar- thritis deformans)....	17 (16 femora)	25 (acetabulum).
<i>Periostitis</i>	24 (12 in tibia)	2
<i>Osteoperiostitis</i>	12	...
<i>Miscellaneous</i>	6	3