

With the compliments of

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Peabody Museum of American
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CAMBRIDGE, MASS.*

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THE WEDDING & BANQUET DAY AT THE NEW PUEBLO
NEW MEXICO 1883

ENGINEER DEPARTMENT, U. S. ARMY.

REPORT

UPON

UNITED STATES GEOGRAPHICAL SURVEYS

WEST OF THE ONE HUNDREDTH MERIDIAN,

IN CHARGE OF

FIRST LIEUT. GEO. M. WHEELER,

CORPS OF ENGINEERS, U. S. ARMY,

UNDER THE DIRECTION OF

BRIG. GEN. A. A. HUMPHREYS,

CHIEF OF ENGINEERS, U. S. ARMY.

PUBLISHED BY AUTHORITY OF THE HONORABLE THE SECRETARY OF WAR,

IN ACCORDANCE WITH ACTS OF CONGRESS OF JUNE 23, 1874, AND FEBRUARY 15, 1875

IN SEVEN VOLUMES, ACCOMPANIED BY ONE TOPOGRAPHICAL AND ONE
GEOLOGICAL ATLAS.

VOL. VII.—ARCHÆOLOGY.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

FORTY-THIRD CONGRESS, FIRST SESSION.

CHAPTER 455.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, for the objects hereinafter expressed, for the fiscal year ending June thirtieth, eighteen hundred and seventy-five, namely:

* * * * *
For engraving and printing the plates illustrating the report of the geographical and geological explorations and surveys west of the one hundredth meridian, to be published in quarto form, the printing and binding to be done at the Government Printing Office, twenty-five thousand thousand.
* * * * *

Approved June 23, 1874.

FORTY-THIRD CONGRESS, SECOND SESSION.

CHAPTER 76.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the act entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and seventy-five, and for other purposes," approved June twenty-third, eighteen hundred and seventy-four, be, and the same is hereby, amended by adding to the clause of said act relating to the engraving and printing of the plates illustrating the report of the geographical and geological explorations and surveys west of the one hundredth meridian, the following words: "and that two thousand copies of the report shall be printed by the Congressional Printer," after substituting the word "dollars" in lieu of the concluding word of said clause.

Approved February 15, 1875.

FORTY-FOURTH CONGRESS, FIRST SESSION.

"Mr. VANCE, of Ohio, from the Committee on Printing, reported the following resolution; which was read, considered, and adopted:

Resolved by the House of Representatives (the Senate concurring), That the following distribution shall be made of the reports of the United States geographical surveys west of the one hundredth meridian, published in accordance with acts approved June 23, 1874, and February 15, 1875, as the several volumes are issued from the Government Printing Office, to wit: Nine hundred and fifty copies of each to the House of Representatives, two hundred and fifty copies of each to the Senate, and eight hundred copies of each to the War Department for its uses."

March 29, 1876. (See Congressional Record, vol. 4, part 3, page 2037.)

Agreed to by the Senate May 4, 1876. (See Congressional Record, vol. 4, part 3, page 2969.)



NOTE.

Seven volumes, accompanied by one Topographical and one Geological Atlas, embrace reports upon Geographical Surveys of the territory of the United States west of the one hundredth meridian of longitude from Greenwich, as follows:

Volume I.—Geographical Report.

Volume II.—Astronomy and Barometric Hypsometry.

Volume III.—Geology and Mineralogy.

Volume IV.—Paleontology.

Volume V.—Zoölogy.

Volume VI.—Botany.

Volume VII.—Archæology.

The Topographical Atlas edition, consisting of Title-page, Legend, and Conventional Sign Sheets, Index, Progress and Basin Maps, and Sheets Nos. 49, 50, 58, 59, 66, 67, 75, 76, 83, 53 (C), 61 (B), 61 (C), 61 (C₁), 61 (D), 62 (A), 62 (C), 65 (D), 69 (B), 69 (D), 70 (A), 70 (C), and 77 (B) have been issued at date of sending forward the MS. of this volume. Other sheets, of which there are twenty-seven in various stages of completion, will follow as rapidly as they can be prepared, engraved, and printed.

Sheets 53 (C), 61 (B), 61 (C), 61 (D), 62 (A), 62 (C), 65 (D), 69 (B), 69 (D), 70 (A), 70 (C), and 77 (B) are projected upon a scale of 1 inch to 4 miles, while the scale of 1 inch to 2 miles has been used for sheet 61 (C₁), the latter embracing a part of the San Juan mining region of Southwestern Colorado. The scale of 1 inch to 1 mile has been selected for the six-sheet map of the lake region of the Sierra Nevada encircling Lake Tahoe; and the contour map of the Washoe Mining District, in which is situated the famous Comstock Lode, drawn to a scale of 1 inch to 500 feet, will be published to the scale of 1 inch to 1,500 feet, making a map of the size of four regular atlas sheets.

The following Geological Maps, forming a part of those supplementing Volume III, based upon the topographical sheets, have been published, *i. e.*, Title-page, Index Sheet, Restored Outline of Lake Bonneville, Nos. 50, 59, $\frac{1}{2}$ of 58, and $\frac{1}{2}$ of 66, 67, 75, 76, and 83. Other sheets are in the course of completion.

The Topographical Atlas referred to, embracing the entire area west of the 100th meridian, will comprise 95 sheets, on a scale of 1 inch to 8 miles, numbered consecutively from 1 to 95, inclusive, while the "Geological Atlas" will consist of the same number, using the topographical maps as a base. (See Progress Map of 1878.) Upon a number of the topographical maps as a base, the classification of lands into the following divisions, (1) Agricultural with irrigation, (2) Timber, (3) Grazing, (4) Arid and Barren, is shown by colors. It is intended to expand this classification to embrace the entire area, thus gathering data upon which a new legal subdivision to settlers, to accord with presumable values as to class, may be made, pursuant finally to the following divisions:

- | | | |
|---|---|--|
| 1. Arable or Agricultural, | } | without irrigation. |
| | | with irrigation (sufficient water being available) or by drainage. |
| 2. Timber, | } | 1. Large, } with prevailing species, as Live |
| | | 2. Small, } Oak, Cedar, etc. |
| 3. Pasturage or Grazing, | } | 1. Good, } with species and quality of |
| | | 2. Bad, } grasses. |
| 4. Arid or barren, including "desert lands." | | |
| 5. Swamp, tide, and overflowed. | | |
| 6. Location of the precious and economic minerals, such as— | | |
| 1. Gold, in place or placer. | \| | 8. Tin and nickel. |
| 2. Silver. | \| | 9. Antimony and arsenic. |
| 3. Cinnabar. | \| | 10. Sulphur. |
| 4. Copper. | \| | 11. Sodium, chloride and carbonate of. |
| 5. Lead. | \| | 12. Alum and borates. |
| 6. Iron. | \| | 13. Peats, marls, and clays. |
| 7. Coal. | \| | 14. Asphaltum, petroleum. |

Each full atlas sheet represents two degrees and forty-five minutes in

longitude and one degree and forty minutes in latitude (an area of from 17,000 to 18,000 square miles, or an average of 11,200,000 acres), and is so constructed, upon a special projection, as to admit that the several sheets may be joined to comprise entire political or other divisions.

The plan for the systematic prosecution of a detailed topographical survey of the territory of the United States west of the one hundredth meridian, as the main object, was submitted to the Engineer Department by the officer in charge shortly after the return of the expedition of 1871, was then approved by Brig. Gen. A. A. Humphreys, Chief of Engineers, and the honorable the Secretary of War, and received the sanction of Congress by a specific act, approved June 10, 1872.

In addition to the astronomic, geodetic, topographical, and meteorological observations needed for the preparation and construction of the map, such observations as are required, and are commensurate with the present condition of development of this region, are made in the branches of mineralogy and mining, geology, paleontology, zoölogy, botany, archæology, ethnology, and philology.

The quarto reports embrace the results of the special branches of the Survey that are completed at the date at which each is separately submitted, while annual reports of operations of the work, accompanied by maps, showing progress during the fiscal year, are regularly submitted to the Chief of Engineers, and appear as appendixes to his Annual Reports.

From the accumulation of field data, the finished topographical maps are completed as fast as the draughting force permits, and, with the necessary additions, special editions, showing geological formations and land classification, are issued from time to time. Neither atlas will be complete until the whole work is finished.



U. S. GEOGRAPHICAL SURVEYS WEST OF THE ONE HUNDREDTH MERIDIAN.
1ST LIEUT. GEO. M. WHEELER, CORPS OF ENGINEERS, U. S. ARMY, IN CHARGE.

REPORTS

UPON

ARCHÆOLOGICAL AND ETHNOLOGICAL COLLECTIONS FROM VICINITY OF
SANTA BARBARA, CALIFORNIA, AND FROM RUINED PUEBLOS OF
ARIZONA AND NEW MEXICO, AND CERTAIN INTERIOR TRIBES.

BY

FREDERICK W. PUTNAM,

CURATOR OF THE PEABODY MUSEUM, CAMBRIDGE, MASS.,

ASSISTED BY

C. C. ABBOTT, M. D., S. S. HALDEMAN, LL. D., H. C. YARROW, M. D., H. W. HENSHAW,
AND LUCIEN CARR, ASSISTANT CURATOR PEABODY MUSEUM.

WITH APPENDIX OF INDIAN VOCABULARIES,

REVISED AND PREPARED BY ALBERT S. GATSCHET.

IN TWO PARTS, WITH TWO APPENDIXES.

ILLUSTRATED BY A FRONTISPIECE, SKETCH, 20 PLATES, AND 185 TEXT CUTS.

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UNITED STATES ENGINEER OFFICE,
GEOGRAPHICAL SURVEYS WEST OF THE 100TH MERIDIAN,
Washington, D. C., May 15, 1879.

GENERAL: I have the honor to present herewith reports, submitted to constitute Vol. VII of the series of quarto volumes, the publication of which is authorized by acts approved June 23, 1874, and February 15, 1875.

The collections at vicinity of Santa Barbara and adjacent islands were made by a special party of the expedition of 1875, under Dr. H. C. Yarrow, assisted by Dr. J. T. Rothrock and H. W. Henshaw, the opportunities for search having been pointed out by Prof. S. F. Baird, now secretary of the Smithsonian Institution, whose keen appreciation and foresight served not alone to prompt this office, but others, to the examination of a number of localities, from which abundant material has been gathered.

The localities at which special examinations and excavations were made, are Dos Pueblos and La Patera on the main land, shown on the accompanying sketch of the coast in the vicinity of Santa Barbara and outlying islands, and near Prisoner's Harbor upon the island of Santa Cruz.

Mr. Paul Schumacher and Mr. Stephen J. Bowers have since made successful searches at Carpenteria, at points on the Santa Maria River, along the western flanks of the Santa Inez Mountains, and on the Santa Barbara Islands. Some of this material has been accessible to Professor Putnam.

The portion of the within report bearing on the Indian pueblos of the interior has resulted from collections made at several of the existing and extinct pueblos of the Colorado and Gila River basins and that of the Rio Grande, by a number of assistants, among whom notably are Dr. H. C. Yarrow, Oscar Loew, Ph. D., and Francis Klett.

The vocabularies have been gathered, as circumstances permitted, from forty distinct localities, and are divisible into seven linguistic stocks. Their preparation for publication was intrusted to the philologist Albert S. Gatschet. The Cachina, a sacred dance of the Zuñi, a representation of which appears in the frontispiece, was observed and described by Francis Klett, accompanied by a small party. The entire contribution has resulted from the incidental labors of members of several expeditions, and but points the way to a large and almost untrodden field of research among aboriginal remains. The opportunity for further exploration in the western mountain, plateau and valley region, among the mounds, *débris* of habitations, caves, sites of present and extinct pueblos, and search for inscriptions, is great, and the work is most fascinating. The ruins of early habitations line numbers of the little mountain valleys of the Southwest, especially in New Mexico and Arizona.

Exhaustive search will doubtless yield much to reward the investigator and throw a more certain light upon the origin and condition of the presumably populous Indian tribes that once occupied this now sparsely-settled region, glimpses of which reach us from the writings of the earliest historic period.

When considering the primitive source whence aboriginal stocks are drawn, Northern Mexico and portions of the southwest of the United States comprise an uncertain ground, and whether migrations to these localities set in from north to south or from south to north still remains uncertain, and how far the sources have been from Asiatic lands to the eastward as against a migration following from the rising to the setting of the sun still remains a subject of speculation.

Professor Putnam has been assisted in the preparation of his reports by Dr. C. C. Abbott, Dr. S. S. Haldeman, Dr. H. C. Yarrow, H. W. Henshaw, and Lucien Carr, the labor of each of whom merits a grateful recognition.

A sketch of the Santa Barbara Islands and the contiguous coast is introduced to show the sites where investigations were conducted by the survey, and also the locations of numerous shell-heaps and burial places.

It remains but to make mention of the assistants who, in addition to

other labors, have contributed the material within discussed to the interesting subject of antiquities.

The quarto illustrations of many of the articles from the Santa Barbara collections are reproduced by the Heliotype Company of Boston, Mass., while the colored plates, the originals of which were executed with creditable skill and taste by Mr. H. J. Morgan, have been lithographed at the well-known and excellent establishment of Thomas Sinclair & Son, Philadelphia, Pa.

Very respectfully, your obedient servant,

GEO. M. WHEELER,

Lieutenant of Engineers, in Charge.

Brig. Gen. A. A. HUMPHREYS,

Chief of Engineers, United States Army, Washington, D. C.

THE SOUTHERN CALIFORNIANS.

INTRODUCTION.

THE discovery of the Peninsula of California, in 1534, by an expedition fitted out by Cortés, brought the Spaniards into contact with native tribes that were in several respects unlike the nations they had already met and partially conquered. The naked savages of this newly discovered land maintained their rights to their home, and, probably in return for the usual Spanish treatment of those days, killed Grijalva, the commander of the expedition. The next year, it is stated, Cortés himself explored the peninsula (at that time thought to be an island), and in this expedition he was accompanied by negro slaves and settlers, as well as by priests and soldiers. The expedition under Ulloa followed in 1537, and from that date we receive accounts of the inhabitants; but it was not until one hundred and sixty years afterwards that the Jesuits began to establish their missions and take possession of a country, the settlement of which had been abandoned, after numerous disasters, by the leaders of the Spanish military expeditions.

The heroic acts of the Jesuit Fathers in the fulfilment of their labors of "christianizing" the savages are well known, and will not be recapitulated here; but while all credit is due those worthy men for their disinterested motives and benevolent intentions, it can hardly be questioned that it is in great part owing to their misguided work in endeavoring to "save the souls of the savages" regardless of the body, that the deluded Indians of portions of the Californias owe their rapid and almost unresisted extermination. Naturally indolent, unclean, licentious, and thoughtless of the morrow, under the missionary system they were reduced to slavery, confined in towns, subdued in spirit, and treated, to use a phrase from Forbes,

like "herds of human animals". In consequence of this treatment they became diseased, and the natural result soon followed.*

To the ethnologist this degradation of the race is of interest in considering the inherent qualities which made it possible.

Though Upper California had been discovered by Cabrillo as early as 1542, it was not until the expulsion of the Jesuits from Lower California, in 1767, that the Indians of the more northern portion were doomed, under their "christianizers," the Franciscan Fathers, to an experience even worse than those of the peninsula.

Forbes† copies from Humboldt a list of eighteen missions which had been established in Upper California between 1769 and 1798, and states that in 1831 the number had been increased to twenty-one. The mission of San Diego was that first established, and thence they were spread along the coast, reaching as far north as San Francisco, where a settlement was made ten years afterwards.

The rapidity with which the deluded Indians were at first brought into the missions, not always by gentle means, as shown by Beechey's account of a proselyting expedition, was probably very satisfactory to the Fathers, and it tells its story of the natural condition of the Californians. In 1786 La Perouse found the number of domesticated Indians at the ten missions in Upper California to be about five thousand. Humboldt, twenty-six years afterwards, gives the number at the eighteen missions then established as between fifteen and sixteen thousand. At this date the rapid increase at the missions falls off, probably in great part owing to the increased death rate and the removal of the remnants of the wild tribes from the immediate vicinity of the missions, for during the next twenty-nine years the total number was only three thousand more, though three additional missions had been established.‡ From this time the doom of the race, settled at the first period of contact with the European,

* To those who think this statement may be too strongly drawn, I simply refer to the work of VENEGAS, and particularly to the carefully considered statements by FORBES (*History of California*), pp. 210-234.

† FORBES' *History of California*, 8vo, London, 1839.

‡ FORBES gives the total number of domesticated Indians at the twenty-one missions in Upper California as 18,683, and at that time there were less than five thousand inhabitants other than Indians at the twenty-one stations. As showing the rapid decrease at the mission of Santa Barbara the following note received from Dr. Yarrow is of interest: "In 1834 there were 1,200 Indians at this mission; in 1840 there were only 400."

becomes apparent, and of the thousands of free and indolent savages who formerly inhabited the beautiful garden-land of our Pacific coast, how few and how degraded are those now left in the vicinity of their old homes.

California has, unquestionably, been the meeting ground of many distinct tribes and nations of the wide-spread Mongoloid stock. In no other way does it seem possible to account for the remarkable commingling of customs, arts, and languages. From such a mixture, and the over-population of the most desirable portions of the country, would naturally result the formation of the hundreds of petty tribes that existed in both Upper and Lower California when first known to the Spaniards. Especially in Upper California has this diversity of tribes been noticed by all who have written from personal experience. Father Boscana, who lived at the Mission of San Juan Capistrano for about thirty years, and wrote his account of the Indians during the first quarter of the present century, thought that the California Indians, in general, corresponded to the description of the Chichimecas* of Mexico as given by Torquemada, but qualifies this and points out some distinctions in the following words:

“The diversities of language, and other peculiarities, render it extremely difficult to ascertain to a certainty if all the inhabitants of Alta California descended from the Chichimecas. Those between Monterey and the extreme northern boundary of the Mexican domain shave their heads close; while those to the south between Santa Barbara and towards St. Lucas wear their hair long, and take great pride in cultivating its length as a mark of beauty. Those between Santa Barbara and Monterey differ considerably from these, as regards their habits; being much more industrious, and appear an entirely distinct race. They formed, from shells, a kind of money, which passed current among them, and they constructed out of logs very swift and excellent canoes for fishing. Their dead they interred in places appropriated to that purpose. The diversity of language is so great, in California, that almost every 15 or 20 leagues you find a distinct dialect; so different, that in no way does one resemble the other. * * * the natives of San Diego cannot understand a word of the language used at this mission, and, in like manner, those in the neighborhood of St. Barbara, and farther north. If it should be suggested that people thus separated could have corrupted the original language in all its phraseology, and manner of pronunciation, I would reply, that such *might* be the case; but still, there would be some connection or similarity, so that they could understand each other.”†

* This name cannot be considered as a tribal designation. It corresponds more closely to the term “savage tribes of Mexico” in contrast with the more advanced nations of the period of Spanish conquest.

† Pages 239 and 240, ROBINSON'S translation.

Mr. Stephen Powers has taken the most pains of late authorities to correctly understand the character, customs, and languages of the remnants of the numerous tribes, especially those of the northern and central portions of the State, and, in his several interesting articles,* has called repeated attention to the great diversity of language and customs which exists among many of the tribes. As the result of his personal observations, Mr. Powers is inclined to consider the tribes located north of Mount Shasta as coming originally from a different stock from those south of that line, which latter he considers as probably of the Chinese stock. He further considers the race as one that has greatly deteriorated. The following quotations from his paper read before the California Academy of Sciences express his reasons:

“The simple fact of the almost total lack of ceramic remains, and the character of the relics found in the Alameda and other shell-mounds, show that the present race must either have supplanted or descended from one which was little more advanced than themselves. The few and simple stone implements used by the California Indians resemble, in their main purpose and design, those of the extinct races exhumed in the shell-mounds, only they are conspicuously ruder and simpler. Take the stone mortars, for instance. The pre-aboriginal mortar is carefully dressed on the outside, and has three general shapes, either flattish and round, or shaped like a duck’s egg with the bowl in the large end, and the small end inserted into the ground. But the Indian takes a small bowlder of trap or greenstone and beats out a hollow in it, leaving the outside rough. Whenever one is seen in possession of a mortar dressed on the outside, he will acknowledge he did not make it, but found it; in other words, it is pre-aboriginal. The pre-aboriginals used handsomely dressed pestles, evenly tapered to the upper end, or else a uniform cylinder for about three-fourths of the length, with the remaining fourth, also uniform, but smaller, for a hand-hold; but the squaw nowadays picks up a long slender cobble from the brook. The pre-aborigines fought with heavy knives, or swords, carved out of jasper or obsidian, which were, probably, used as daggers rather than as swords; that is, the combatants sought to pierce each other with the point instead of dealing blows with the edge. The Indians of to-day fight with rough stones, such as they pick up, choosing those which are long and sharp pointed; and their constant aim is to strike each other in the face with the points, just as their predecessors or ancestors probably did with their carved knives. The pre-aborigines made, out of sandstone or other soft stones, a small and almost perfect sphere as an acorn-sheller; but the squaw nowadays simply selects a smooth cobble from the brook for this purpose. In the collection of A. W. Chase, Esq., of the U. S. Coast Survey, there are spindle whorls of stone, some of them found in mounds made by extinct tribes, and others found among the Klamath River Indians and the Nome Lackees, all of which bear a close resemblance; and, in this instance, there is no perceptible deteriora-

* Overland Monthly for April, 1872, and following numbers.

tion in the workmanship. I strongly suspect, however, if the Indians possessing these implements had been closely questioned they would have acknowledged that they found them and did not make them, just as they acknowledge in regard to the superior stone mortars and pestles. That is, they are really indebted to their ancestors for them. Near Freestone, Sonora County, I saw, in possession of its finder, what was probably a spindle whorl of pottery—the only instance of the kind I know of. In regard to tobacco-pipes the deterioration is not so manifest, for I have seen soapstone pipes of as handsome workmanship as any obtained from the mounds. But I still think there is deterioration shown in the fact that the Indians nowadays use so many wooden pipes of the rudest construction; though we have no means of showing that their ancestors did not use equally poor ones, since their wooden pipes, if they had any, have perished. * * * I might extend these instances and comparisons, but it is not necessary. The California Indians, like their predecessors, belong unmistakably to the Stone Age; and the fact that they have degenerated from a higher to a lower grade in that age argues strongly that their ancestors, after crossing the sea, might have degenerated from the Bronze Age or the Iron Age of China.

“For these reasons I am disposed to believe that the California Indians have simply deteriorated from what we (perhaps erroneously) call a pre-aboriginal race; and ultimately from the Chinese. * * * China itself, with all its vast populations, has stood still for twenty centuries; and a colony from it wandering into a new land, where the abundance of nature and the genial climate invited them to relax the efforts which a crowded community had necessitated for the maintenance of life, might degenerate to a low point without difficulty. When the Chinese of to-day come to this land of plenty, how poor are the dwellings and implements they construct for themselves, compared with those they used in China. How poor are our own, compared with those we made in the East! * * *

“The theory of degeneration above advanced is quite in accord with the climatic changes and the deforestation which have taken place on this coast, even within the historical period. We know, from the statements of Viscaino and other early Spanish explorers, that extensive forests were flourishing near San Diego and Monterey three hundred years ago, where now there are none. Viscaino says the natives of Santa Catalina Island had large wooden canoes, capable of sea voyages, whereas that island is now comparatively treeless. * * *

“While there is nothing to show that the present race of California Indians is descended from an agricultural people, like the New Mexican Pueblos, there is much to show that their predecessors were superior to them, and that their predecessors were also their ancestors. The California Indians are simply a poor copy of the people whom we usually call pre-aborigines; but the copy follows the original so closely that there can be little doubt that it is a copy made by transmission.”*

* Proceedings of the California Academy of Sciences, vol. v, p. 392, 1875.

Just as this introductory chapter leaves my hands I have received the third volume of “Contributions to North American Ethnology” (bearing date 1877, but not received in Cambridge until May, 1878), published by the Geographical and Geological Survey of the Rocky Mountain Region, under charge of J. W. POWELL. This volume contains the important and interesting account of the “Tribes of California,” by STEPHEN POWERS, and on page 432 is given the substance of what I have quoted above, with some changes. The principal change is the discarding of the Chinese element, and the substitution of the word *pre-historic* for that of *pre-aboriginal* in the several instances where the latter expression was used in the former publication.

That there is a marked difference between the tribes of the northern portion of the State bordering on Oregon and the degraded remnants of those of the rest of the State until its southern portion is reached, is evident, and though this degradation is unquestionably due, in great part, to the central and southern tribes having been largely brought into a condition of slavery about the missions and reduced by domestication and disease, still the early accounts show a marked contrast in favor of the northern and southern portions, even including the peninsula, over the central part of the present State of California, rendering it extremely probable that the prevailing blood was somewhat different; and it must not be forgotten in this connection that Dr. Pickering, of the United States Exploring Expedition, expresses himself very decidedly of the opinion that the tribes of the Sacramento had Polynesian affinities of a marked character,* and that he classed the Californian with the Malay race. Though to accept Dr. Pickering's view and consider the Californians as Malays, would be slightly changing the ground from Mr. Powers' determination that they have Chinese affinities, yet the statements of the two authors are conclusive as to the marked difference which they have each noticed between the Indians of the North and East and those of Central California; and it must be remembered that in both cases it is simply an endeavor to discriminate between two groups of a single type, while the type itself, as now existing, is made up of rays, the uniting centre of which has probably long been buried with the races of the past.†

* Races of Man. Bohn's edition, p. 108.

† For several interesting statements relative to the theory of possible connection of Chinese, Japanese, and Polynesians with the tribes of the Pacific coast of America, see, among others, articles by the following authors:

BEECHEY, Narrative of a Voyage to the Pacific and Behring's Strait, in his Majesty's ship Blossom, in the years 1825-'28. London, 1831, Part 1, p. 186.

WILSON, Prehistoric Man, 2d ed., p. 601.

DALL and DAVIDSON, Remarks in the Proceedings of the California Academy of Sciences, 1873, vol. iv, p. 268.

FORBES, History of Upper and Lower California. London, 1839, p. 299.

DAVIS, Overland Monthly, October, 1872.

BROOKS, Proceedings of the California Academy of Sciences, 1875, vol. vi, p. 95. In this paper Mr. Brooks offers evidence of the American origin of the Chinese. p. 113.

POWERS, Atlantic Monthly, March, 1874, p. 313.

As stated in a preceding note, Mr. Powers in his last work does not mention the theory of Chinese contact which he had formerly advanced, but substitutes for it an "invasion from the north before the

Mr. Morgan, in his comprehensive work,* has taken a decided step in a new field to prove the Asiatic origin of at least a large part of the American nations. The results which Mr. Morgan has attained, after many years of labor, lead him to believe that there is no evidence of the Americans, or the Ganowánian † family, as he designates the nations of both Americas exclusive of the Eskimos, having been derived from the Polynesians, and he is forced to the conclusion that its system of consanguinity unites the Ganowánian with the Turanian family of Asia. He points out ‡ the great probability of the route of migration having been by way of the Kurilian and the Aleutian Islands § at a very early time, and, as he thinks, long prior to the passage of the Eskimos, as hyperboreans, across Behring's Straits.

"In other words, the Turanian and Ganowánian families drew their common system of consanguinity and affinity from the same parent nation or stock from whom both were derived; and that each family has propagated it with the streams of the blood to each of its subdivisions upon their respective continents through all the centuries of time by which their separation from each other is measured." ||

Mr. Morgan's argument against the migration of the Malay type by way of the Polynesian Islands is that the Malays of the islands were from an early migration, before the peculiar system of family relationship expressed by the Ganowánian and Turanian system was developed, ¶ and that the difference is such that the system would show itself had such a migration taken place, whereas the Ganowánian family was an offshoot at a later period, when other forms had been engrafted on the original stock. Though Mr. Morgan had not the materials upon which to base any decided conclusions as to the union of the Eskimo family with that of any Asiatic stock, he conjectures that its affinities will be with either the Tungusian

historical period," p. 435. He, however, dwells upon the same facts, showing the differences between the tribes north and south of Mount Shasta.

LOEW, Annual Report U. S. Geographical Surveys West of 100th Meridian, 1876, p. 321.

HYDE CLARKE, Journal Anthropological Institute, London, 1874, vol. iv, p. 148.

BANCROFT, Native Races of the Pacific States, vol. i, p. 187.

* Systems of Consanguinity and Affinity of the Human Family. By LEWIS H. MORGAN, Smithsonian Contributions, No. 218, Washington, 1871.

† Bow and arrow people, p. 131.

‡ Page 426.

§ For a statement of the physical conditions which Mr. Dall thinks should throw the Aleutian route out of consideration, see DALL, Tribes of the Extreme Northwest, pp. 96, 97. (1877.)

|| Page 508.

¶ Page 509.

or Mongolian stocks.* He states conclusively, however, that his investigations have shown that the classificatory system of consanguinity among the Eskimos differs radically from that of the Ganowánian, Turanian, and Maylayan.

“It appears to remove any remaining doubt with respect to the non-connection of the Eskimo with each and all of the families.”

In regard to the Ganowánian family in itself considered, Mr. Morgan's work is replete with solid information; and though he may not have given that attention which seems to be demanded to the indication of some influence upon the family outside of itself, he has probably brought forward the strongest arguments yet deduced to prove the North Americans, exclusive of the Eskimo, of one stock, though he freely admits that there are some doubtful points yet to be made clear. The argument in favor of the identity of the Village Indians of New Mexico and Arizona with the Roving Indians of the North, inasmuch as it would prove the culture of the former to be simply one of advance of a portion of the same original family, not accompanied with any radical change of domestic institutions,† will be, indeed, if accepted, the clearing away of many theories.

From the gradual development of the Village Indians from a state corresponding to the communal conditions of other branches of the family, Mr. Morgan sees no difficulty in accounting for the culture of Central America, and in considering the “palace” at Palenque as a communal house of the same character as the Pueblo of Zuñi, and simply a further development of the communal house of the Iroquois.

It would not be doing justice to Mr. Morgan, even in this mere glance at his valuable work, to omit mention of the very important influence which he attributes to the valley of the Columbia, the natural advantages of which he considers gave “a permanent and controlling influence over all other parts of North America,” and, he thinks, “it can be shown over South America as well. Wherever the Indian family commenced its spread it would sooner or later come in possession of this region; and from that time onward it would become the seed land of the family, and the initial point of successive streams of migration to all parts of the continent. The abun-

* Page 510.

† Page 255.

dance of subsistence in the valley of the Columbia, tending constantly to a surplus of inhabitants, determined for this region a species of supremacy over both North and South America, as the predominant centre of population and the source from which perpetual streams of inhabitants would flow so long as the family remained in its primitive condition. * * * All the great stems of the Ganowánian family found upon the North American continent point their roots to the valley of the Columbia."* At first it seems as if there were irreconcilable difficulties between the results of Mr. Morgan and of those who have worked in other directions towards the same end, but, though Mr. Morgan does erect a barrier that should check too hasty conclusions as to the Polynesian migration of comparatively recent times to America, his reasons do not apparently conflict with that pre-Malayan migration to which archæological evidence leads by way of the same Polynesian route afterward covered by the Malayan wave. Of this latter, perhaps only a slight portion ever reached the eastern limits attained by its predecessor. It must be remembered that Mr. Morgan's arguments can only refer to tribes and nations now existing.

Relying on linguistic evidence, Mr. Morgan† includes the tribes of the southern portion of the State of California with the Shoshonee nations, as follows: "1. Shoshonees or Snake Indians; 2. Bannacks; 3. Utahs of the Colorado; 4. Utahs of Lower California; 5. Comanches." Under the general term of "Utahs of Lower California," he embraces the Cahuillos, Kechis, Netelas, and Kizhes; and states that—

"There are reasons for believing that the Shoshonee migration was the last of the series in the order of time, which left the valley of the Columbia and spread into other parts of the continent. It was a pending migration at the epoch of European colonization. * * * The initial point of this migration as well as its entire course stands fully revealed. Almost the entire area overspread, showing the general outline of a head, trunk, and two legs, is still held by some one of the branches of this great stem. Upon the south branch of the Columbia River the Shoshonees still reside; south of them along the mountain waste of the interior are the Bannacks, a closely affiliated people who occupy quite near to the headwaters of the Colorado. The mountains and the rugged regions drained by the Upper Colorado and its tributaries are held by the Utahs in several independant bands or embryo nations, who are spread over an area of considerable extent. Here the original stream of this migration divided into two branches; one of them the Comanche turned to the southeast and occupied the western

* Page 242.

† Page 251.

parts of the present State of Texas; whilst the other keeping the west side of the Colorado, descended towards the Gulf of California, and appropriated the regions near the Village Indians of the Lower Colorado. These are the Pah-Utes. Still other bands moved westward and southward and occupied Lower California. These are the Cahuillos, between the San Gabriel and Santa Anna Rivers; and the Mission Indians, namely the Kizhes of San Gabriel, the Netelas of San Juan Capistrano, and the Kechis of San Luis Rey. Upon the basis of linguistic affinities the conclusion is inevitable that both the Comanches and Netelas are the descendants of original migrants from the valley of the Columbia."

Mr Bancroft, in his work on the Native Races of the Pacific States,* has separated these tribes of Southern California from the Shoshonees and groups them with other tribes, under the geographical name of Southern Californians; while in discussing their language in the third volume of his work he classifies them under the Shoshonees, at the same time considering that the tie is only "through their Sonora and Aztec connection," as pointed out by Buschmann. It is also of importance to notice here that the Diegueños, though living within the same region and of course included by Mr. Bancroft in his group of Southern Californians, are by their language united with the Yuma group, which includes the Yumas, Mojaves, Yampais, and several other tribes, all east of the limits assigned by Mr. Bancroft to the Californians. It is also well to mention here that the tribes of the Peninsula, or Lower California, are placed by Mr. Bancroft in his geographical division of New Mexicans, which comprises the Apache family in which are included the above tribes of the Yuma group that are not located in California.

From this network, only a small portion of which has been shown in what has preceded, it is evident that the elements exist from which more satisfactory conclusions will be reached when they are separated and analyzed, and that it may yet be possible to show whence many of the elements going to make up the medley are derived.

The great antiquity of Man in California, founded on the evidence obtained by Prof. J. D. Whitney, which proves that man existed on the Pacific coast at a period extending back at least to the time when animals now-extinct lived on that coast, is one of the most important points in relation to the subsequent mixture of races, as to this early race we must

* Vol. i.

look for much that at present it seems impossible otherwise to account for; and it is only at that early period that unity of characters can be expected between the primitive stocks of both sides of the Pacific, and if geological evidence should in future prove what it now hints at, that there was a comparatively recent subsidence of a continental mass in the Pacific Ocean, the unity of this type could hardly be questioned.

Dr. J. G. Cooper thus describes the conditions under which man probably first existed in California.

“From these evidences we perceive that the climate of that day was tropical. The country consisted of peninsulas and islands like those of the present East Indies, resembling them also in climate and productions. From the extent of water surrounding them there was abundant rainfall and luxuriant vegetation, suitable for the animals mentioned.

“It is not unlikely that some of these animals* may have existed before and after the pliocene epoch. * * * The termination of this tropical epoch in California was marked (as described first by Professor Whitney) by enormous volcanic outbursts which poured out great streams of lava on the slope of the Sierra Nevada, covering entirely large tracts towards the north. At the same time the whole country was apparently raised by the elevation of new mountain ranges and increase of old ones, causing the lakes to be drained and their beds filled by washings from the hills mixed with volcanic materials. This great convulsion, no doubt, exterminated most of the tropical flora and fauna of California, although some of its representatives might have existed later in neighboring regions. * * * Many extinct land animals have been found to have lived in Europe since the appearance of man on the earth, and there is strong evidence in the ‘Calaveras skull,’ and others, that the same fact is true of California.”†

It is necessary to add here that Professor Whitney is satisfied that the evidence he will shortly publish will be convincing as to the existence of man in the *Pliocene* of California.

[Since the above was written Professor Whitney has delivered a lecture in Cambridge (April 25, 1878), on the Antiquity of Man in California. In this lecture he gave a portion of the evidence, both geological and legal, in relation to the position of the Calaveras skull and other human remains found in the pliocene gravel under the basaltic layer of Table Mountain. He also mentioned nearly twenty other instances of the finding of human remains, or the works of man, in the auriferous gravels of the same formation as those of Table Mountain. He further stated that the evidence of the existence of man during the post-pliocene period, the deposits of which were formed subsequently to the cessation of volcanic activity in the Sierra Nevada, which period of activity was closed by the eruption of the basalt, was so well established as to show

* The animals mentioned are tiger, wolf, llama, buffalo, horse, rhinoceros, elephant, two species of mastodon, and a large tortoise.

† Proceedings of the California Academy of Sciences, vol. v, p. 389 (1874), 1875.

that man continued to exist in California in company with the Mastodon and other extinct animals. As the archaeologist has no right to be governed by any preconceived theories, but must take the facts as he finds them, it is impossible for him to do otherwise than accept the deductions of so careful and eminent a geologist as Professor Whitney, and draw his conclusions accordingly, notwithstanding the fact that this pliocene man was, to judge by his works in stone and shell, as far advanced as his descendants were at the time of the discovery of California by the Spaniards.]

In this early race there would then be found one element which would tell for a long time on its successors:—the furnishing anew of blood of one branch of the original stock to the modifications formed in other branches developed after long separation and under different conditions. Among these conditions would be, possibly, that of contact of some of the branches with some other primitive stock; for until we find the “missing link” which holds at least two pendants of the chain, we hardly have the right to assume that man had but one birthplace, and ignore the apparently primary differences which now exist between races. Even granting the postulate that man is developed from some early Primate, is it not as possible that he was an offshoot from the generalized monkeys of the Eocene of America as from the ape stock of the Old World?

It is probable that what may be called the Eskimo element in the physical characters and in the arts of the Californians is due to the continuance of the impress of type from a primitive American stock, which in the present Eskimo, or Innuít, is probably to be found its purest continuation. Of course, the important objection can be made that this early race was not the primitive race of the coast of California, because it had reached too high a degree of development; but it must be remembered that the race through its different representatives, has probably existed on the coast for an immense length of time, and under favorable climatic conditions which would allow of all that we know of its development in the arts of savagery. Mr. Dall, in his valuable paper on the Tribes of the Extreme Northwest, has shown that on the Aleutian Islands at least a decided development has taken place since the period of the deposit of the echinoderm heaps, apparently left by the first inhabitants of the islands, through the fishing and hunting stages, and it is very likely that a similar development may yet be found on the coast of California, if not destroyed by the violent geological

changes, at the opening of the present geological period, to which the coast was subject. It is more than probable, however, that the development noticed is not simply one of original growth, but rather that of successive inroads of more advanced tribes from various directions.

The Malay characteristics noticed by Dr. Pickering among the Indians of the Sacramento indicate, with other known facts (upon which fair theories have been founded), especially that of the early migration of the Malay race after that branch of the original stock had come to be Malays, that an impress was left on the Californians by a migration, perhaps accidental or forced, from one of the early Malayan centres.

It may be said that if the Malays and the Californians are of the same post-pliocene stock, this resemblance would naturally follow without recourse to a migration; but the fact, pointed out by Mr. Bancroft, that out of a vocabulary of one hundred and seventy words of one of the Pomo dialects fifteen per cent. indicated Malay similarities,* cannot be accepted in that light.

Mr. Powers, as already stated, has traced a number of Chinese analogies in the Californians which are worthy of consideration in connection with the existing diversities and the very probable contact of that branch of the original stock with the American branch, while the marked contrast pointed out by several authors as existing between the tribes north and east of California and those in the central portion, and the development of what may be called the "Tartar" element in the northeastern tribes, are indicative of an early contact with a nomadic Asiatic stock.

As Mr. Morgan has pointed out the important part which the valley of the Columbia has taken as the nursery of nations, it should be considered

* BANCROFT, *Native Races of the Pacific States*, vol. iii, p. 646.—If linguistic evidence is of any value, and upon it is now based the present classification of our Indian tribes, it seems proper to give this instance indicating a Malayan contact, and those mentioned by Mr. Powers and Dr. Loew indicating a Chinese contact, their due weight, notwithstanding the following statement made on preceding pages (pp. 559, 560) of the same volume by Mr. Bancroft: "It is not at all improbable that Malays, Chinese, or Japanese, or all of them, did at some time appear in what is now North America in such numbers as materially to influence language, but hitherto no Asiatic nor European tongue, excepting always the Eskimo, has been found in America; nor have affinities with any other language of the world been discovered sufficiently marked to warrant the claim of relationship. Theorizers enough there have been, and will be for centuries to come; half-fledged scientists, ignorant of what others have done, or rather have failed to do, will not cease to bring forward wonderful conceptions, striking analogies; will not cease to speculate linguistically, ethnologically, cosmographically, and otherwise to their own satisfaction and to the confusion of their readers."

in this connection, though it seems very probable that what is called the Malay element has always been confined to or near the coast in its migrations,* and, in reality, probably consists simply of the forced migration of one branch of the descendants of the primitive race. It is also very probable that while the dispersion of the tribes of the second or Asiatic branch, after its development on this continent, was mainly north, east, south, and southeast from the Columbia valley, there was also a route of migration westward over the Sierras, and southward through California, the descendants of tribes following this route meeting those which had taken the route down the Colorado valley at the head of the Gulf of California.

A very strong argument in favor of such a line of migration, and also of its having been very early in time, is the absence of the art of pottery-making† by the tribes of Southern California, while those of the Colorado valley have the highest development in this art of all the tribes north of Mexico. Had the migration been a late one from the Colorado valley and extended to the Pacific coast, it is hardly probable that if these tribes had once learned the art of making pottery it would have become a lost art without leaving some trace in the many ancient burial places which have

* One cannot read the early accounts of the Indians of Florida without being impressed with the many resemblances between them and the Southern Californians. The habit of cutting off the limbs and heads of enemies is a very marked instance. The only skull yet known from the lower portions of the shellheaps of Florida more nearly resembles that of a Californian Indian than it does those from the burial-mounds of Florida.

† In the large collections made by Dr. Yarrow's party, and by Mr. Schumacher, only two vessels of clay were obtained, both by Mr. Schumacher. One from the island of San Clemente, where many articles of Spanish manufacture were also obtained, is a small and plain pint bowl. It has the appearance of wheel-made pottery, and was very likely obtained from the Missions. The other, which I have not seen, was from Ni-pō-mō, near San Luis Obispo. Mr. Bowers has also obtained a few small articles of pottery of a similar character, judging from the few pieces I have seen, which consist of fragments of a small bowl found on the island of San Miguel. Dr. Yarrow also informs me that Mr. Bowers states that he has found fragments of pottery at four places on the mainland, at one of which, a burial-place on the Santa Inez River, he also obtained "a round vessel with a somewhat flattened bottom, which would hold about a gallon." The "hunting-whistle of baked clay" found by Mr. Bowers, and the "spindle-wheel of pottery" mentioned by Mr. Powers, are so decidedly Mexican in character as to lead me to the belief that they were originally from that country. As we know from the statements in the narrative of Cabrillo's voyage, and from other evidence, that the Indians of the coast had intercourse with the tribes of the interior, small articles of pottery may have been obtained by barter with them, but, as stated in the text, there is not yet sufficient evidence to class the coast tribes as potters.

Since the above was written a report has gained credence that Mr. Alphonse Pinart, during his explorations on the mainland about Santa Barbara, excavated at a greater depth than the former explorers and found articles of pottery. Should this report be confirmed, and the articles of pottery numerous, it may be necessary to slightly modify the statement in the text so far as to account for the presence of pottery at an early time. If the art ever existed on the coast it was evidently a lost art there at the time of Spanish contact.

been opened in California; whereas if the route of migration was as above suggested probable, and at a period before the art of pottery-making was known, such tribes coming in contact with those of the Colorado already advanced in the art would soon learn to manufacture vessels of clay. The same objection also holds against a late migration from the Asiatic side of the Pacific, for since the ceramic art was early developed and carried to great perfection on the opposite coast of Asia, a people migrating to America would naturally have brought the art with them.

Prof. E. S. Morse has recently made important examinations of the shellheaps of Japan, and the collection of pottery, implements of bone, etc., which he obtained, show this ancient shellheap people to be of the same period of development in the arts as those of South America and of some portions of North America east of the Rocky Mountains. This early pottery from Japan is of similar pattern with that from the shellheaps of the Amazon, and from the St. John's River in Florida; with the former it perhaps more nearly corresponds, though all the specimens I have seen are simply ornamented by pinching, punch-marks, cord-marks, basket-marks, or incised in simple patterns.

In the pottery from the shellheaps of the Amazon, as shown by the collection in the Peabody Museum, received from the late Prof. C. F. Hartt, various simple forms of ornamentation similar to those of the Japanese pottery exist, and, in addition, more elaborate incised work, while a still higher type of ornamentation is seen in the sculptured feet, handles, and knobs of the vases of various shapes.*

In the Florida pottery all the simpler forms of ornamentation also occur, and with them that of stamping by movable and more or less complex stamps. This stamped pottery is more common in the shellheaps on the coast of Florida than in those on the fresh waters. The animal and other sculptured forms similar to those of the ornaments on the Amazonian pottery are, I think, not to be found in the Florida shellheaps, though the later burial mounds there have yielded some sculptured work.

Professor Wyman has shown, in his "Memoir on the shellheaps of

* A still higher class of pottery is found on the Island of Paccoval, of which a large collection was sent to the Peabody Museum by Professor Hartt, but this was not from a shellheap, like that I have mentioned, which was from Tapcrinha.

Florida," that the oldest layers in the Florida shellheaps were *without* pottery, which is only found in the later deposits, and is most abundant in the shellheaps of the coast. From this and other evidence, he argues the appearance in Florida of distinct tribes who have successively formed and occupied the shellheaps. It is also important to note that implements of stone are almost absent in the shellheaps of Florida, except on the surface, where they have been left by recent tribes, while bone and shell implements are abundant. In the collection from the shellheaps on the Amazon there are several bone and stone implements, but their comparative abundance I do not know. In the Japanese shellheaps stone implements were very few in number, as in those of Florida, while implements made of bones, teeth, and deer's antlers were common in both Japan and Florida. To carry this comparison a step further, it is only necessary to call attention to the fact that the shell-heaps of the Atlantic coast of the United States from Florida to Maine abound in fragments of pottery and bone implements, while only a few stone implements have been found.

If we contrast the shellheaps of the Atlantic coast, Brazil, and Japan with those of the coast of California, we find in the three former localities pottery and bone implements common to all, while articles of stone are rare. In those of California we find pottery only in very exceptional instances and on the surface, in such connection with other articles of European manufacture and of such peculiar structure as to lead to the conclusion that it was only known in California after European contact, or by an occasional article received from a distance. Articles of bone and shell are common, and articles of stone exist in great abundance and of fine workmanship.

If we extend our comparison to the Northwest, we find that the lowest beds of the oldest deposits of the Aleutian Islands hold a similar relation to the overlying beds that the lowest layers of the Florida heaps do to those above them. In both cases, these lower beds were formed by people who were in the lowest stage of savagery. On the Aleutian Islands, as shown by Mr. Dall's very thorough researches, which he has so well presented in his recent Memoir,* the earliest deposits consist principally of the remains

* Tribes of the Extreme Northwest, by W. H. Dall, published as Part I of the Ethnology of the Geographical and Geological Explorations of the Rocky Mountain Region, under direction of the Department of the Interior, J. W. Powell in charge. 1877, pp. 41, 91.

of Echinoderms, and in these first evidences of man on the Aleutian Islands only the rudest stone implements have been found, and nothing else. In the *Fish-bone layer* and *Mammalian layer*, which successively overlie the *Echinoderm layer*, a great change has taken place, and either the old race has made a sudden advance, or, what is more likely, as thought by Mr. Dall, a migration to these places of another and more advanced people has taken place. In these middle and upper layers stone and bone implements are found, and the stage of development approximates to that of the tribes which formed the shellheaps of Oregon and California, as described by Mr. Paul Schumacher and others.

In regard to the particular Ethnical period to which the Californians should be referred, there are several difficulties. The absence of pottery would at once place them in the *Upper Status of Savagery*, as defined by Mr. Morgan.* The absence of pottery, however, may be owing, on the one hand, to the difficulty of obtaining clay suitable for the purpose, and, on the other, to the abundance of soft stones, like steatite and serpentine, which were easily worked, and from which could be made more desirable utensils. This fact, however, would not hold if the tribes had once been pottery-makers, for in that case would be found some signs of the decay of the art before that of working in stone was so greatly developed. After the missions were established the Indians belonging to them were taught the art of making pottery, which shows that clay, at least to a limited amount, could be obtained by those who knew what to look for, and probably it is these mission pots of clay, showing signs of having been made on the wheel, which have been found sparingly in the shellheaps.

That the ancient Californians were in every other respect as highly developed in the arts belonging to the *Lower Status of Barbarism*, defined by Mr. Morgan, as were other tribes in various parts of North and South America, is shown by the high state they had reached in the manufacture of chipped implements of flint and quartz; the use of the bow and arrow; the manufacture of many articles of use and ornament from stone, bone, and shell; the very exceptional skill with which they made cooking pots, dishes, pipes, and other articles from steatite and serpentine; the skill and

* Ethnical Periods, by L. H. Morgan. Proc. Am. Assoc. Adv. Science. Vol. xxiv, B, p. 266. (1875.)

labor they bestowed on their large and small mortars and pestles made out of extremely hard stones, and in the perfection attained in many other of the early arts. Particularly, in this consideration of the status of any race, should due weight be given to the perfection of the adaption of means to ends, and certainly the old Californians who lived, and buried their dead on the islands off Santa Barbara and on the mainland in that vicinity, had, to judge from the articles found in the graves and shellheaps, very little material benefit to hope for from a contact with a higher race, and everything to dread. They were provided by nature with an unfailing supply of food in the waters, and in the forests; they had developed methods of easily securing, and properly preparing, abundant harvest. Their want of vessels of pottery was abundantly supplied by those of stone, by watertight baskets, and asphaltum covered vessels, while the ever ready asphaltum enabled them to make many articles of use and ornament. They were also workers in wood, of which they made various articles, often holding the several parts together by the use of asphaltum. They also had large canoes.

From this brief review of some of the arts of the Californians and their perfection in them, it is evident that they were as far advanced as many other American tribes or nations which had reached the stage of pottery making. It is therefore evident that it is necessary to add to Mr. Morgan's definition of the period of the *Lower Status of Barbarism*, which he considers characterized by the introduction of pottery, that of the substitute for pottery, the manufacture of cooking vessels of stone.

From what has preceded, it will be seen that the Californians have probably developed by contact of tribe with tribe through an immense period of time, and that the primitive race of America which was as likely autochthonous, and of Pliocene age, as of Asiatic origin, has retained its impress on the people of California. Still more is the character of this autochthonous race preserved in the Innuits, and probably in the natives of Terra del Fuego, the remnants of the race driven north and south, and to the shores of the continent, by people probably of Asiatic development, and in part with early and slight Polynesian admixture.

It is remarkable that there are on the basis of linguistic evidence two

great families, the Shoshone and the Yuma, that have representatives on the coast of Southern California and in the Colorado valley, yet neither group are pottery makers in California.

That there has been a general move up the valley of the Colorado is indicated by what has taken place in the movements of the *Coco-maricopas* or *Maricopas*, a tribe of the Yuma family that has migrated from the Gulf of California some distance up the Gila.* Professor Turner places the *Mojaves* and the *Diegueños*,† with other tribes, in the Yuma family. That the *Diegueños* of the coast and the *Mojaves* of the Colorado possess many similarities, besides that of language, which would go far to prove their close relationship, is shown by many of their customs.

The *Kizh* of the San Gabriel, the *Kechi* of the San Luis Rey, the *Netelas* of San Juan Capistrano, and the *Cahuillos* of the region east of the *Netelas* and approaching the country of the *Mojaves*, are considered by Professor Turner and others as belonging to the great *Shoshone* family that extends from southeastern Oregon south to New Mexico and Texas, including the *Shoshonees*, *Utahs*, and *Comanches*.

The *Apaches*, *Navajos*, and their congeners of the Colorado region, are by their language not only of a different family from the tribes above mentioned, but they belong to the wide spread *Athapascan* family that extends north, east, and south of the *Shoshone* and *Yuma* families, on the north even reaching the Pacific, according to Professor Turner,‡ at the *Trinity River* in Northern California, while he also states § that the *Apache*

* "*Coco-maricopas*.—This tribe was encountered by Father Kino at the end of the seventeenth century, and is represented to have occupied the country south of the river Gila, nearly 150 miles in length, from its mouth upward. Colonel Emory says: 'We know that the *Maricopas* have moved gradually from the Gulf of California to their present location in juxtaposition with the *Pimas*. Carson found them as late as the year 1826 at the mouth of the Gila; and Dr. Anderson, who passed from Sonora to California in 1828, found them, as near as he could reckon from his notes, about the place in which we are now encamped.' Their present position, as already mentioned, is in a village on the northern bank of the Gila, a few miles west of that of the *Pimas*, in about west longitude 112°."—TURNER, in *Pacific R. R. Reports*, vol. iii, pp. 101, 102, of Report on Indian Tribes, by Whipple, Eubank, and Turner, 1855.

† This name was given after the establishment of the mission of San Diego by the Spaniards, though according to the manuscript report by Don Jose Cortez, dated 1799, in the Peter Force Library, and in part translated and printed in the third volume of the *Pacific Railroad Reports*, the tribe was known under the name of *Cuñeil*. "These are the *Cuñeil* who are on the borders of the port of San Diego and whose towns continue to the outlet of the channel of Santa Barbara," p. 125.—Report on Indian Tribes, by Whipple, Eubank, and Turner.

‡ l. c. p. 84.

§ l. c. p. 83.

nation seems to have been a barrier to the southern descent of the Shoshone tribes.

In the same region where have met Shoshone, Yuma, and Athapascan nations, the greatest development of the North American Mongoloids, next to that of Anahuac, has taken place, and here are found the ruined dwellings of an ancient people, and their probable descendants the Pueblo tribes.

Mr. Bancroft* gives a general account of the Indians of Southern California which agrees in all essential particulars with the statements made by the several authors I have had the opportunity to consult, and will be freely used in the following brief notice of the people. It will be observed that very many of the statements made in the following résumé are fully sustained by the evidence furnished by the objects which have been found in the graves and about the sites of the villages of the several tribes, as described and figured in the following chapters.

Mr. Bancroft writes: "As we approach the southern boundary of California [from the central portion of the State] a slight improvement is manifest in the Aborigines. The men are here well made, of a stature quite up to the average,† comparatively fair complexioned, and pleasant features * * * The beard is plucked out with bivalve shells, which answer the purpose of pincers."

While often going naked they were also found, by the early voyagers, to wear skirts and capes made of skins. The variation in this respect noted by several writers is probably accounted for by the different customs of the many distinct tribes that formerly existed on the coast, and by the difference in the time of year in which the observations were made. It is evident from the fragments of fur garments which have been found in the graves, particularly at Dos Pueblos, that the people of the vicinity of Santa Barbara made use of garments, though very likely they were discarded or

* BANCROFT, *Native Races of the Pacific States*, vol. i, pp. 402, 422.

† This statement is shown to be correct by the numerous skeletons and portions of skeletons which have been obtained.

As already noted, Mr. Powers' volume on the "Tribes of California" has appeared since these pages were written, and though Mr. Bancroft had the use of certainly a large part of Mr. Powers' manuscript, the volume should be read as the most valuable work on the present Indians of the State of California.

very scanty during the hot season. That the people of the coast and islands were extravagantly fond of ornaments is shown by the great abundance of such articles made of shell, bone, stone, etc., found in the graves. Mr. Bancroft states that "around Santa Barbara rings of bone or shell were worn in the nose. At Los Angeles nasal ornaments were not the fashion. The women wore cylinder-shaped pieces of ivory, sometimes as much as eight inches in length, attached to the ears by a shell ring. Bracelets and necklaces were made of ivory ground round and perforated, small pebbles, and shells."*

In the journal of the voyage of Cabrillo, under the date of October 17, 1542, it is mentioned "many canoes came to the ship from the populous coast," and that the people "went clothed with skins, and wear their hair very long and tied up with long strings to which are attached small daggers of flint, bone, and wood." Mr. Bancroft also states that "they take much pride in their hair, which they wear long. It is braided, and either wound round the head turban-like or twisted into a top-knot; some tie it in a queue behind." Dressing the hair in the form of a queue has prevailed extensively throughout both North and South America, and it will be an interesting study to ascertain the particular tribes having this custom, and their connections. In ancient times it was a prevailing custom among the coast Peruvians, who also wore false hair by which they extended their elaborate braids, while "switches" of false hair, sometimes arranged over a skein of large thread, helped to enlarge the queue. That it was also a common way of wearing the hair among the ancient people of Missouri and Tennessee is shown by its representation on some of the human-shaped vessels of pottery.

Bearing on this subject is a very interesting carving from Alaska, in the Peabody Museum. This carving, which is in wood, represents a man with the head held back by means of his long queue tied to the hands, which

*Mention is here made of ivory, and it is possible that it was used to some extent for ornaments, though, as far as I know, articles made of ivory have not been found in the graves. The bones of various animals were used for ornaments, and it is very likely that the long hollow bones of birds were mistaken for ivory, as might also have been the cylindrical perforated ornaments made of a large bivalve shell, as they were highly polished. Beautiful beads of stone, both of fluor-spar and serpentine, have been found in the graves. Several species of shells, particularly a small *Olivella* and the beautiful *Haliotis*, were used for the manufacture of ornaments.

are placed behind his back, conveying the idea of a prisoner securely bound; and as, I believe, the Aleuts do not wear their hair in a queue, it would seem as if they had at some time taken prisoner either a queue-wearing Asiatic or a Californian.

Tattooing was, according to Father Boscana, a custom of some of the tribes of Southern California, the girls being tattooed in infancy.*

In common with savages in other parts of the world, the Californians were fond of ornamenting themselves with paint of various colors. As is the case the world over, red ochre, or hematite, was most used for the purpose, and considerable masses of it have been found in the graves. Wad, or hydrous oxide of manganese (bog manganese), was also used as a paint and has been found in the graves, generally in receptacles, such as shells and small vessels made of stone. A mixture of wad and a specular variety of hematite, evidently prepared for use by the addition of a small quantity of clay, has been found in masses cut into various shapes. Similar carved masses of prepared hematite, without the admixture of wad, have also been found. Besides these there is often found a black pitchy mixture which was probably used as a paint. Mr. Bancroft, when writing of the Central Californians,† states that the tribes of that part of the State were more lavish in the use of pigments than those of the southern portion, and particularly mentions that cinnabar was used, and that "the New Almaden cinnabar mine was a source of contention between adjacent tribes." I have, however, not yet detected cinnabar among the substances which came from the graves in Southern California, and Dr. Yarrow informs me that it can hardly be supposed that cinnabar, or sulphuret of mercury, was used to any extent as a pigment, for its constant employment would assuredly produce constitutional derangements of a serious nature.

The accounts we have of the various articles in common use among the Californians as domestic utensils, weapons, etc., agree with those found

* Mr. Powers, in his "Tribes of California," gives several illustrations of the various patterns of tattooing adopted by numerous tribes. The custom is apparently confined to females, and is thought to be principally for the purpose of tribal identification. It may be noted in this connection that the coast Peruvians also tattooed, as is shown by an arm, from the ancient cemetery at Ancon, now in the Peabody Museum.

† BANCROFT, *Native Races of the Pacific States*, i, p. 370.

in the graves and about the ancient dwelling sites, though there are several patterns of implements found in the graves which have not been noticed by writers who were early in contact with the Indians. Among these the perforated stones, now often mentioned as "weights to digging-sticks," although as likely to have been used as heads to clubs and for other purposes, similar to those found in many other parts of the world, represent implements of this class; as, also, do the singular hook-shaped stones of various sizes.

Among the prominent domestic utensils which were extensively made and used down to a very recent period are the large stone mortars and pestles, the soapstone cooking-pots and baking-stones, and the small, beautifully made vessels of steatite and serpentine. It is now known that the soapstone vessels, and probably many of the mortars, were made by the tribes on the islands off Santa Barbara. The immense number of these pots which have been found in the graves on the mainland indicate an active trade between the islanders and the coast tribes, and it is very likely, from the identity of articles from the graves in both places, that the people were closely affiliated.

The weapons included bows and arrows, knives of stone and bone, and daggers and swords of stone, bone, and wood. The stone daggers or lance-heads were beautifully made, and in perfection of workmanship are probably among the finest of chipped implements found on the continent. The swords or large knives were often made from the jaws of cetaceans, and were efficient weapons, while those made of wood are said to have had "edges that cut like steel." Bone awls, and drills or borers made of stone, were extensively used and are often found in the graves, while rude stone chisels were used in the manufacture of the large pots, mortars, etc.

Mr. Reid and other writers, as quoted by Mr. Bancroft, state that vessels used for holding liquids were made of rushes, and plastered outside and in with bitumen or pitch. Fragments of such a vessel were found in the burial place at Dos Pueblos by Dr. Yarrow. In this instance the vessel was bottle-shaped, and had been roughly coated inside and out with asphaltum.

Besides basket-work, which was an undoubted prehistoric art, nets and woven fabrics are mentioned by the later writers as being made by the

Indians; but, while fragments of the latter have been found in the graves, it is not certain that netting and weaving were not introduced by the Spaniards, though there is an equal chance of their having been derived from the more highly-developed nations of the south. Being in location between the higher nations of the north and south, it is very likely that many of the arts of both sections would in time become known to the Californians in the simple course of trade and warfare of tribe with tribe. From the known facts we certainly have good reasons for assuming that inter-tribal communication was pretty extensive throughout the greater part of America in very early times, and as we know that the ancient Peruvians, for example, had attained as high a development in many of the arts as the Europeans at the time of the conquest of the country, we must be guarded in attributing too much of the development in the arts to Spanish influence, especially when we realize that the Indian tribes, probably without exception, have rapidly deteriorated under contact with the white race.

Like nearly all other North American nations, the Californians were smokers; using as pipes large tubes made of stone, and slightly conical in shape, the mouth-piece being formed by the insertion of a small hollow bone of a bird at the small end of the tube. In many of the graves pipes of this character, beautifully made of steatite and allied minerals, have been found still having portions of the mouth-piece held in place by asphaltum. Among the present Indians of the State similar pipes are occasionally found, and it is very likely that this early, perhaps primitive, form of smoking-pipe has been handed down, and is only giving way of late years to the more universal shape, having the bowl perpendicular to the stem. Tubes made of stone and copper, of various sizes and shapes, have been found in many parts of North America, and while they have been often considered as used for other purposes than that of smoking, the majority are now called pipes by most archaeologists. The tubular pipes, in shape like those found in the graves of California, have been rarely discovered in other parts of the country, and but few have been recorded, the most interesting specimen in this connection being one now in the Peabody Museum at Cambridge, which was found in Andover, Mass. Another of slate has recently been found by Dr. C. C. Abbott in New Jersey. Professor Powell has informed me that

similar pipes are occasionally used by the Utes of the Colorado, by whom they are regarded as of great value. Mr. Powers,* in his note about the "wild tobacco (*Nicotiana plumbaginifolia*)" called "pan" by the Neeshenams of Bear River, California, mentions that this tobacco, which "has a pungent peppery taste," is smoked with great satisfaction "in a wooden or stone pipe,† which is constructed of a single straight piece, the bowl being simply a continuation of the stem, enlarged." He also describes one made of soapstone, about six inches in length, "which tapered down to a bulb, which was inserted in the mouth." That their pipes or smoking tubes were not alone used for the simple gratification which smoking affords is evident from the several accounts given by the early writers, and they unquestionably were used in many of the tricks of the "medicine men" and in superstitious observances. Venegas says: "They applied to the suffering part of the patient's body the *Chacuaco*, which is a tube formed out of a very hard, black stone. * * * Sometimes the tube was filled with cimarron or wild tobacco, lighted."‡

In 1728 Father Luyando, of the Loreto Mission, "as a preliminary to baptism, insisted on the abjuration of faith in the native jugglers or priests, and demanded the breaking and burning of their smoking tubes and other instruments and tokens of superstition as a proof of this."§ It would seem, however, that the pious fathers of the missions in the vicinity of Santa Barbara had not been very successful in this work of destruction, judging from the number of perfect pipes found in the more recent graves.

Pedro Fages in his description of the burial ceremony in Southern California says that, "At the head of the procession marches one smoking gravely from a large stone pipe, followed by three others; he three times walks round the idol and the corpse; each time the head of the deceased is

* Aboriginal Botany, by STEPHEN POWERS. Proc. Cal. Acad. Sci., vol. v, p. 378. 1875.

† The Neeshenams called the tobacco-pipe "panemcoolah."

‡ Quoted from FORBES, p. 20. Dr. Rothrock, in his report on the Botanical collections of the survey (vol. vi, p. 47), states that various indigenous species of tobacco appear to have been used by the native population, past and present, among them *N. Clevelandi*, Gray, which he found only in association with the shellheaps on the coast of California. Dr. Rothrock believes this species to have been the standard supply of the Indians of Southern California, and from personal experience he pronounces it excessively strong.

§ FORBES, p. 20.

passed the coverings are lifted, and he who holds the pipe blows three puffs of smoke upon the body." *

In the way of musical entertainments it is evident that the Californians were limited to very primitive instruments, the only kind that have been found in the graves consisting of whistles made of bones of animals. Some of these, however, exhibit considerable ingenuity, and it may be that they were played upon with skill.

As would be expected from the fact that the islands off the coast were inhabited, boats of several kinds were constructed. In Cabrillo's Journal mention is made of canoes seen on the coast, and other writers have stated that the Indians had boats made of pieces of plank shaped by heating, joined together and paid with asphaltum. Other canoes are said to have been made out of a single log, while the tule raft or "balsa" was also in use. Bancroft states that the boats were sometimes large enough to carry twenty persons, and he also mentions that the paddles were long and double bladed. The graves have yielded portions of wooden structures, which are probably the remains of canoes formed of boards and still showing the peculiar and ingenious method of uniting the pieces with asphaltum.

The houses of the Southern Californians were probably of a simple construction, though varying somewhat in different localities. Usually they are described as conical in shape, and built over a hole dug to the depth of a few feet. Around this hole poles were set forming the frame which was covered with rushes and earth. The door was sometimes on a level with the ground, while in other houses it was placed near the top, when it also served for an exit to the smoke. The statement in Cabrillo's Journal that he saw houses built after the manner of those in New Spain, is thought by Mr. Bancroft to refer to the houses on the coast of the Santa Barbara Channel, where there was an improvement in architecture, and this probably indicates that the square-framed lodges existed here as in other places farther to the north. Dr. Yarrow, however, informs me that "no remains of houses or dwellings of any description, nor any particular indications on the surface of the earth showing where habitations had been (with the exception of kitchen and shell heaps), were noticed either at La Patera or

* BANCROFT, *Native Races of the Pacific States*, vol. i, p. 421.

Dos Pueblos. Boards and posts were found at La Patera, but they marked areas of burials, not habitations." That each tribe or village had a general "council-house," or some special edifice of a public nature, is very probable, and Boscana has described a structure in the vicinity of the mission of San Juan Capistrano, which he designates as a temple or *Vanquech*, in honor of their god *Chinigchinich*. This "temple" seems to have consisted simply of two circular fences, one of which was six feet high, and as they were not roofed in, the "temple" was very much like the staked areas of the Indian tribes of the Atlantic coast, and in which they performed some of their ceremonies. The "temescal" or subterranean "sweat-house" was also a public institution which seems to have existed throughout the whole State.*

In Cabrillo's Journal mention is made of enclosures which were believed to be temples. * * * "and they have an enclosure like a circle, and around the enclosure are many blocks of stone placed in the ground and reaching above the surface about three palms in height, and in the middle of the enclosure are many sticks of timber driven into the ground like thick masts, and on these posts are many pictures, and we believe they worship there, for when they dance they caper around the enclosure."

Mr. Paul Schumacher, who has made very extensive explorations of the ancient village sites on the coast of California and Oregon, has described† in detail one of these sites or shell-mounds, and states that either a natural sandy place, properly located in regard to water, food, and safety from surprise by enemies, was selected, or in case of other things proving a desirable location and the sand wanting, the latter was brought to the place, as in the site he describes on the Island of Santa Cruz in the Santa Barbara Channel. In his description he states that the sites of the former houses are shown by the depression on the surface of the shellheap, while "the original depth may occasionally be traced by still remaining upright boards of the former subterranean enclosure. After the erection of the dwellings the accumulation of the *kjökkenmöddings* began to spread all over the town-site, but was kept imbedded in sand by fresh supplies, thus raising

* Descriptions and figures of the several forms of houses are given in POWER'S "Tribes of California."

† Popular Science Monthly, Jan., 1877, p. 253.

the level of the village gradually, and increasing the depth of the subterranean part of the hut until the latter was deserted, or built over with a new structure. * * * The size of a town-site varies from about 100 metres in length and width, to 1,200 metres or three-quarters of a mile in length, and from 100 to 300 metres in width, the extent of *Os-bi* a *rancheria* in Santa Barbara County, about five miles from Point Sal, which is the largest shellmound derived from permanent habitations thus far explored on the coast."

From the numerous subdivisions of the people, and the many villages of small size governed by chiefs who apparently had but limited power, it is evident that warfare was not conducted on an extensive scale by the Southern Californians, though petty quarrels were undoubtedly of common occurrence. In their weapons the Southern Californians were probably inferior to their northern neighbors, and, although bows and arrows are mentioned as having been in use, fragments of bows have not been found in the graves about Santa Barbara, and as comparatively few small points of stone such as would be classed as arrow-heads have been discovered, it is probable that their arrows were principally provided with wooden points. Swords or large knives of bone, stone, and even of wood, and probably clubs, seem to have been the most important weapons. The perforated stones, which have been considered by some as weights to digging-sticks, would also have formed efficient clubs, and many of them may have been so used, on the principle of adapting the one article to all the uses possible. Mr. Powers casually mentions the sling when writing of the Pomo, and again in his list of weapons of the Californians. It can hardly be doubted that the sling was one of the earliest weapons, but it seems to have been superseded by the bow and arrow, and has only survived as a weapon in a few limited areas, as, for instance, among the Peruvian tribes, which have so many things in common with the tribes of the west coast of North America. It is stated that in battle no quarter was given to men, and that the killed were decapitated and scalped; still, scalping after the method of the eastern tribes does not seem to have prevailed to any great extent. Women and children are said to have been taken prisoners and retained as slaves.

The office of chief is stated by Bancroft to have been "hereditary,

and in the absence of a male heir devolved on the female next of kin." In the Journal of Cabrillo's voyage it is stated that while on the coast "a *female chief* visited the ship and remained two nights."

Polygamy was evidently practised to some extent, but probably depended principally upon the wealth of the individuals, and hence was generally confined to men in power; but this, like many other customs, varied with different tribes.

In keeping with the general Indian character, dancing and gambling are stated to have been the chief occupations of the men when not engaged on a raid or in procuring food. Many of the dances were in connection with their ceremonies and superstitions, while others are mentioned as simply for amusement. The sorcerers were numerous and had great power from the superstitious character of the people.

In the vicinity of Santa Barbara and on the islands cremation does not seem to have been practised so far as known, though north, south, and east of this district it prevailed to some extent, adjoining tribes having different customs in this respect. In the Santa Barbara region each village, as a rule, had its particular cemetery; but slight differences in the character of the burial places and in the designation of the graves have been noticed. On the island spoken of in Dr. Yarrow's report, near La Patera, while the principal burying ground was doubtless near the edge of the cliff (see his report on a following page), yet instances of isolated burials were discovered in various kinds of places. In the majority of the villages the cemetery was very near the sites of the former houses, often even in the accumulated *débris* forming the shellheap, as described by Mr. Schumacher. In one case on the islands he found that an old cemetery had been abandoned, and the more recent burials had been in the deserted houses on one part of the shellheap. On the mainland the cemeteries were often of considerable extent and long used. In some instances the bodies had been buried here and there in the sand, but usually they were placed close together, and the same ground used over and over, as in some modern burial places of our own, where in course of time old and forgotten graves are disturbed to make a new one. In this way many of the bones of bodies and articles of greater age were found to have been disarranged and mixed with those

of later interment; often three or four graves were placed one over the other, or two or three old graves were disturbed in making one of comparatively recent date. In several of the cemeteries the graves were partitioned off by slabs of stone, boards, or bones of whales; in other instances such partitions were wanting. No regularity was observed in the position of the bodies, which were evidently done up in bundles, covered with mats and other articles, and buried in the smallest space possible. That the nearly universal custom of burying with the deceased articles valued while living, and such as were thought to be of use in the future state, prevailed among the Southern Californians to a very great extent is fully shown by the large number found in the old cemeteries, many of which will be described in the following pages.

For several years the antiquities of California have been looked upon with exceeding interest on account of the peculiar conditions under which many implements and articles made of stone have been found, and the great length of time which must have elapsed since their burial under beds of volcanic material, where they are associated with the remains of extinct animals. Many of these articles have been described, particularly by Foster,* and by Bancroft,† the latter of whom gives several figures of articles found at great depths, which are of the same character as those from the graves and shellheaps.

Special examinations of the shellheaps and graves have been made by several reliable persons, and descriptions of the heaps and articles found have appeared from time to time in the Proceedings of the California Academy of Sciences, and other journals. More recently Mr. Schumacher, who has made extensive explorations for the Smithsonian Institution and the Peabody Museum, has published several articles in various journals giving an account of his work.‡ At the time Mr. Schumacher was making

*Transactions of the Chicago Academy of Sciences, vol. i, p. 232, 1869.

†BANCROFT, Native Races of the Pacific States, vol. iv, p. 697, 1875.

‡The most important of these papers were printed in the Reports of the Smithsonian Institution for 1874 and following. The Bulletin of the United States Geological and Geographical Surveys of the Territories, vol. iii, No. 1, 1877. Popular Science Monthly, Jan., 1877.

Articles by Mr. SCHUMACHER have also been printed in the Archive für Anthropologie, vol. viii, and specimens collected by him have been described and figured in BANCROFT'S Native Races of the Pacific States, vol. v, and in the paper by Dr. RAU on the Archaeological Collection of the National Museum (Smithsonian Contributions, No. 287, 1876).

explorations on the coast and islands at the joint expense of the Smithsonian Institution and the Peabody Museum, the party under Dr. H. C. Yarrow, acting assistant surgeon, United States Army, detailed by you for the purpose, were also exploring the ancient sites in Santa Barbara County.

Since the collection was made by your special party, to which this report particularly relates, Mr. Schumacher has made another exploration on the islands of San Clemente and Santa Catalina, acting under the direction of the Peabody Museum; and Mr. Bowers, who was with Dr. Yarrow at La Patera, has made extensive collections on the mainland for the Smithsonian Institution and for private parties. The amount of material that has thus been obtained from the numerous burial-places and village-sites along the coast of Southern California and the adjacent islands is very large, and our knowledge of the archæology of California will soon be more complete than that of many other portions of our country.

The field report which was submitted by Dr. Yarrow on the return of the party sent to explore the region about Santa Barbara, contains so much of interest and importance in relation to the conditions under which the various articles described in the succeeding pages were found, as to make it essential to reprint it here from the Annual Report of the Chief of Engineers for 1876,* and for this purpose he has kindly rewritten some portions of the report and made numerous additions of interest.

* Appendix JJ, Annual Report Chief of Engineers, 1876, p. 312.

REPORT ON THE OPERATIONS OF A SPECIAL PARTY FOR MAKING ETHNOLOGICAL
RESEARCHES IN THE VICINITY OF SANTA BARRARA, CAL.,
WITH A SHORT HISTORICAL ACCOUNT OF
THE REGION EXPLORED.

BY DR. H. C. YARROW,
Acting Assistant Surgeon, United States Army.

THE following statements regarding Cabrillo's exploration of the coast of California are taken from a volume, the full title of which is subsequently given. Only those portions bearing on the work performed and the occurrence of Indians on the coast at different points are here noticed, more especially as the entire narrative is inserted in another portion of this work.

On the 27th day of June, 1542, Juan Rodriguez Cabrillo, a Portuguese navigator in the service of Spain, left the port of Navidad, New Spain, with two small vessels, the San Salvador and La Vittoria, to explore the coast of California, which he sighted on the 2d of July.

The first mention made of Indians is, that on the Isle of Zedros they saw signs of them, but no individuals were seen. After sailing to the northward for a day, they reached a good port, which was named *Puerto de Santa Clara*, and here they saw four, who instantly fled. No mention is made of their villages. On Tuesday, August 22, they landed at a place which they named *Puerto de la Posesion*, and found some Indian fishermen near a lake, all of whom immediately fled; but one they captured and gave presents to. This port is stated to be in $31\frac{1}{2}$ degrees, an assertion which must be received with much allowance, as Cabrillo's reckonings of latitude are obviously wrong. Near this place a few days afterward thirty fishermen were seen. They were peaceable, and some went off to the ships and received presents. These people informed the Spaniards by signs that they did not live near the sea-shore, but had their habitations in the interior, and that there were many of them. They also informed them that in the interior they had seen white men with beards, cross-bows, and swords, and that they could be reached in a five-days' journey. These Indians were curiously marked on the body and thighs with slashes of some white pigment. They were dressed in skins and carried bows and arrows, the latter flint-tipped. In their own country they said "was much maize and many parrots." In $32\frac{1}{2}$ degrees Cabrillo's vessel again anchored, the 8th of September, near a point which he called *Cabo de San Martin*. Landing for water a small lagoon was discovered, and near it forty naked Indians, armed with bows and arrows, from whom were received fishes and roasted agaves. Proceeding up the coast, near Cabo Santa Cruz some Indians were seen in very small canoes. From this point northward the appearance of the land improved very much, and Indians became quite numerous. At a place called by Cabrillo *San Mateo*, and which may possibly now be known as San Diego Bay, many animals resembling sheep

were seen. On the 27th and 28th the vessels passed three islands, one larger than the others. At a port which was called San Miguel he remained a short time. One evening a party went on shore to fish, when they found many Indians, who saluted them with arrows, wounding three men. However, the Indians became peaceable and went off to the ships, telling Cabrillo of people like him and his followers, armed similarly, going on horseback, and killing many of the natives, for which reason they were much afraid. This port of San Miguel is supposed to be near San Pedro or Wilmington Harbor. On the 7th of October he came in view of two islands some distance from the mainland, which he named after his vessels; these islands, lying in Santa Barbara Channel, southwest of San Pedro, are supposed to be San Clemente and Santa Catalina. On these islands Cabrillo found many Indians, who at first showed great fear of the Spaniards, but finally, becoming friendly, told him of numerous other Indians on the mainland. Resting here but two days, he set sail on the 9th. Shortly afterward, reaching a spacious bay and following its shore-line, he came upon a large village of Indians close to the sea-shore. Here his ships were visited by the savages in canoes, from the great number of which he called their town *Pueblo de las Canoas*. It appears impossible to fix the exact location of this town, but circumstances seem to indicate that it was near the head of Santa Clara valley. Mr. Bowers considers this town to have been called *Xuco* by the Indians. On the 13th, resuming his voyage, he passed near two large islands, supposed to be Santa Cruz and San Miguel, and anchored in front of an extremely fertile valley. Here he was visited by many natives coming to sell fish, who informed him that the whole coast was densely populated as far northward as Cabo de Galera, or Point Concepcion of the present day. Northwest from the *Pueblo de las Canoas* he discovered two islands, which he named *San Lucas*, afterward known as San Bernardo, and which at the present day are supposed to be those of Santa Rosa and San Miguel. On his way up the coast, Cabrillo speaks of anchoring in front of two villages (*Dos Pueblos*), largely populated, and this is probably the place where some important discoveries were made by our party.

Point Concepcion was reached by this Portuguese navigator on November 1, after much suffering from cold, winds, and tempests. Anchoring near this place to obtain wood and water, he called the port *Las Sardinias*, from the abundance of fish thereabouts. Here were found many natives, of most friendly disposition, one of whom, an old woman, said to be the Queen of the Pueblos, came off to the captain's ship and remained two nights. Returning to the islands of St. Lucas on account of bad weather, on the 3d of January Cabrillo died on the island called *La Posesion*, believed to be the present San Miguel. Of the manner of his death and his notes in regard to the Indians he saw we shall have occasion to speak hereafter.*

It is worthy of mention that nearly all the Indians met with by Cabrillo seemed familiar with the appearance of himself and friends, as he was repeatedly informed at different points that numbers of men, presumably his countrymen, were journeying in the interior, some of them near a very large river, doubtless the Colorado.

With this account of one of the earlier explorers of the region visited by our

* It should be mentioned that the identification of the localities in the former report were made before Lieut. Commander Taylor, U. S. N., had an opportunity of comparing Cabrillo's narrative with the charts of the coast; consequently his determinations should be accepted, not mine. See paper by Mr. Henshaw and Cabrillo's narrative in another place.—H. C. Y.

selves, as a proper preliminary to a report of our own operations, we now proceed to give the latter in detail; first, however, briefly mentioning the circumstances which led to the exploration in question.

It is reported that some years ago the captain of one of the small schooners common to the Pacific coast returned from a visit to the island of San Nicolas, and stated that he had seen quantities of pots, stone implements, skulls, and divers sorts of ornaments on the surface of shellheaps, which had been uncovered by storms, and exhibited in proof of his assertion a number of these articles which he had brought with him, and which he distributed among his friends. It is also reported that this captain again visited San Nicolas and its neighbor, Santa Catalina, and returned with a full schooner load of relics, but this part of the tradition lacks confirmation.

Little attention was paid to this most valuable archæological discovery until 1872 and 1873, when Mr. W. G. W. Harford, of the United States Coast Survey, happened to visit the islands of San Miguel and Santa Rosa, lying to the northward and westward of the islands before mentioned. From these islands this gentleman procured a small but exceedingly valuable collection of interesting objects, which came into the hands of Mr. William H. Dall, a most intelligent and enthusiastic collector, from which he deemed the locality of sufficient importance to visit it in person. This he did in the winter of 1873 and 1874. Mr. Dall visited San Miguel and Santa Catalina, but as his time was limited, no thorough examination was made of this mine of archæological wealth lying then temptingly open to view. He, however, procured many interesting specimens. During the same season Mr. Paul Schumacher, well known for his investigations farther up the coast, discovered in the vicinity of San Luis Obispo and the Santa Maria River deposits similar to those found on the islands. The results of these discoveries being communicated to the Smithsonian Institution, this establishment determined to make a thorough and exhaustive exploration of not only the mainland, but of the islands also; and in the spring of 1875 Mr. Schumacher was named to conduct the work in behalf of the National Museum. By a fortunate coincidence, one of the parties of the Expedition for Explorations West of the One Hundredth Meridian, under the War Department, of which the writer and Dr. Rothrock were placed in charge, was about to visit the Pacific coast, and an arrangement was entered into whereby hearty co-operation and unity of effort were effected. Mr. Schumacher was to explore the islands, and the Exploring Expedition party the mainland along the coast from Santa Barbara north for a distance of 20 or 30 miles.

Leaving San Francisco June 4, after a pleasant sail of forty-eight hours we arrived at Santa Barbara, and there found the other members of the party, consisting of Dr. J. T. Rothrock, botanist, Dr. O. Loew, mineralogist, and Mr. H. W. Henshaw, ornithologist, whom you had directed to assist in the enterprise. Arrangements were at once made to explore the neighborhood, and on the day following that of our arrival we started under the guidance of the Rev. Stephen Bowers, who we were informed had already made some excavations in the sections about to be visited, for the ranch of T. Wallace More, near the little village called La Patera, some eight miles from Santa Barbara. Arrived at a spot where our guide informed us he had found a few bones and arrowheads, the work, digging a trench in a north and south direction on a cliff overlooking the sea and probably 80 feet above it, was at once commenced. There were no indications that this locality had been used as a burial-place, but after digging a few feet, and beyond

some loose bones that had been reinterred by Mr. Bowers on the occasion of his first visit, we came to an entire skeleton *in situ*. It was lying on the right side, facing the west, with the lower limbs drawn up toward the chin. No ornaments or utensils were found, but a quantity of marine shells were near the cranium. Continuing the excavation deeper, two other skeletons were discovered in a similar position to the first, and near them a few broken arrowheads. These were removed, and the excavation extended downward and backward from the sea-cliff, the labor being rewarded by the finding of seven other skeletons. These latter, however, were huddled together, and gave no evidence that care had been taken, in the burial of the bodies, to place them in any particular position. Near by were a few shell beads and other ornaments, and an abalone shell (*Haliotis splendens*) containing a red pigment. The bones were so friable as to crumble to pieces on exposure to the atmosphere, and on this account none could be secured. On excavating to a depth of 5 feet, a layer of marine shells was reached, under which was a firm stratum of yellow, sandy clay, beneath which, as our subsequent experience proved, burials were never made.* After digging for several hours, and finding nothing further of special interest, the trench was refilled.

Moving around from place to place in the field, our attention was finally attracted to a depression in the center of it, some 200 yards from the sea-cliff, which, on examination, gave undoubted evidences of being a burial-place, ribs and vertebræ of whales being scattered about, and small inclosures found that had been made in the earth by setting up large flat stones on their sides. Digging into one of these inclosed areas, broken bones and some broken pestles and mortars were found, but nothing of special value. The excavation was continued to a depth of 3 feet only, which, as subsequently ascertained, was not sufficient. We left this locality for a time, returning to it later in the season, when deeper and more careful excavations abundantly rewarded us, as many interesting objects were found.

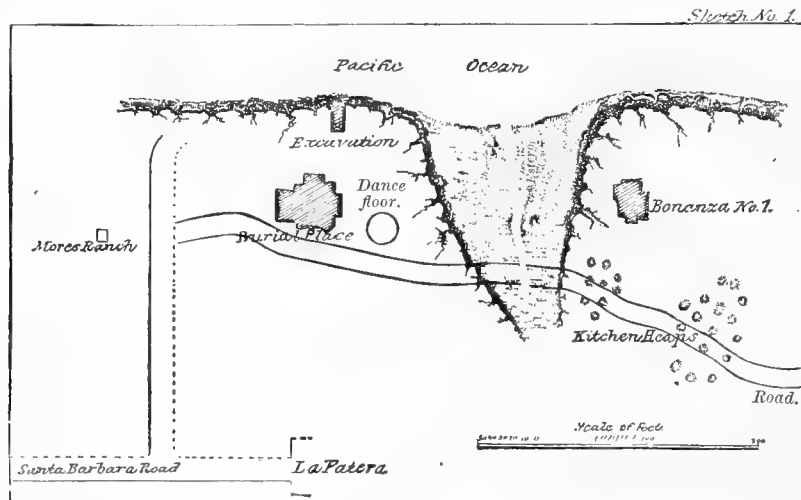
While engaged in the interesting search in question, Dr. Rothrock, who had strolled off some distance after botanical specimens, communicated to us that he had discovered, on the opposite side of a small *estero* to the northward, a locality which he believed to be a burial-place, founding his belief on the fact that he had seen a number of whales' ribs, placed so as to form arches over certain spots. As we well knew that the Santa Cruz Island burial-grounds were similarly marked, we anticipated a "good find," and, indeed, so richly were our anticipations rewarded that we named it the "*Big Bonanza*." The following diagram, made from a rough sketch on the ground by the writer, will give an idea of this place and the several other localities already mentioned.

It is but fair to mention in this connection that the discovery of this valuable locality is *entirely* due to Dr. Rothrock, any assertion to the contrary notwithstanding, as no one in the neighborhood had the slightest knowledge of any burials having been made at this point.

The next morning found us at an early hour near the spot discovered by Dr. Rothrock, and from the surface indications it could hardly be doubted that at some period it must have been a burial-place of note. The surface of the ground, instead of presenting the appearance of mounds, or hillocks, was rather depressed in a semicircular form, and in various spots ribs and vertebræ of whales had been partially buried in the

*I am informed that M. de Cessac, of M. Pinart's party, is said to have discovered pottery beneath this stratum, but I feel confident that it is a mistake.—H. C. Y.

ground, the ribs in some instances being placed together, as reported by Dr. Rothrock, in the form of arches. Selecting what appeared to be a favorable place, 20 feet from the edge of the cliff, fronting the *estero* shown in the sketch, a trench was commenced running due north and south. Two feet below the surface the first indications of burials were reached, quantities of broken bones being met with at every stroke of the spade, interspersed with pieces of whales' bones and decaying redwood. At a depth of 5 feet the first entire skeleton was found in position, and near it several others were subsequently uncovered; in all of them the head fronted northward, the face was downward, and the lower limbs were extended. Over the femur of one of the skeletons was a flat plate of steatite, a sort of soapstone, 12 or 14 inches square, with a hole in one end, which we called a "tortilla-stone," its probable use having been for cooking cakes, or tortillas, or else for heating water, the hole in the end serving to withdraw it from the fire when thoroughly heated. In rear of the skeleton, and to one side of the plate, was an olla, or jar, of steatite, broken, but containing some fine glass beads and human teeth, and behind this a stone pestle of symmetrical shape, about 3 feet in length, of a



hard species of sandstone, and another plate of steatite, and two large ollas of over five gallons capacity, their mouths or apertures fronting north, and just above was a single cranium facing the cliff, face downward, and on top of it a single femur. Continuing the excavations toward the cliff, a small sandstone mortar was exhumed containing a mass of red paint, and in its immediate vicinity a large number of beads of glass and shell with ornaments made from the lamina of the abalone shell, which is common to this coast, being found in great abundance on the islands some 20 miles distant. Digging still farther, other skeletons were found in similar positions, but in many instances the lower limbs were flexed upon the body, while in a few cases the fingers of the right hand were in the mouth. One skeleton was that of a child, near which were found beads, ornaments, tortilla-stones, and two more ollas, one of which contained portions of the cranium of a child. This skeleton had apparently been wrapped in a kind of grass matting, as small portions were found attached to the bones and scattered near by. In the olla containing the head-bones of the child were a great number of small black seeds, smaller than mustard-seed, which were recognized by one

of the laborers as a seed used by the present California Indians and natives in making demulcent drinks and eye-washes, the Spanish name being *chia* (*Salvia Columbaria* Benth.).

A second trench, opened 40 feet from the first, yielded quite a number of excellent crania and other specimens, among which were fish-bones, crenated teeth (of fossil shark possibly), and a very large olla containing bones and covered on top with the epiphysis of a whale's vertebra. The following are the notes furnished by the gentleman in charge of the excavations at this point: First trench, 6 feet by 2, running north and south, trending to the westward. Indications of burials, whales' bones, and rocks set up vertically. Two and one-half feet below the surface found skeleton with face downward, head to the north. Three feet below surface reached a large flat stone, which being removed was found to cover ribs and shoulders of a female skeleton, head pointing north, body resting on left side. A small mortar was over the mouth, small sandstone mortar and pestle of fine workmanship near top of head. This locality proving rather unprolific, a second trench was commenced 40 feet below last, nearer cliff, and about of same size. Two feet below the surface, to our great surprise, a large steatite olla was discovered, which proved to contain the skeleton of an infant wrapped in matting. Unfortunately, upon exposure to the air, the bones crumbled away. Beneath the olla was a cranium, apex west, face north. Three feet below the surface were two skeletons in fair condition, with crania to the north. Our discoveries this day had developed so much of interest that it was not until darkness had overtaken us that we discontinued our work.

In order to give some idea of the amount of material recovered during the excavations, a record of each day's work follows:

June 10.—This morning began work shortly after sunrise at both trenches opened the day before, digging in a westerly direction in the first. In this, numbers of crania and bones were found in similar positions to the first met with, and also several fine ollas, tortilla-stones, mortars, and pestles. All these utensils were invariably in the immediate vicinity of the heads of the skeletons; in fact, in many instances the crania were covered by large mortars placed orifice down. In the second trench, the digging was in an easterly direction, and the first discovery that of a skeleton and a fragment of iron near the right hand, probably a knife or spearhead, which, archæologically speaking, was a source of great grief to us, our hope being that no remnants of Spanish civilization would be found in these graves. It could not be helped, however, although a great deal of prehistoric romance was at once destroyed. Near this skeleton was another, and by its side the first pipe met with, which was similar in appearance to a plain modern cigar-holder, and consisted of a tube of the stone called serpentine, 8 inches long, the diameter of the wider orifice being a little over an inch. At the smaller end was a mouth-piece formed from a piece of a bone of some large water-fowl, and cemented in place by asphaltum. How these pipes were used with any degree of comfort is impossible to surmise.

Continuing this excavation, the next discovery was a steatite olla containing a skull, differing in many respects from those found in the graves; if from one of the same tribe, it shows marked differentiation. Near the olla was a large sandstone mortar, over 2 feet in diameter, and behind it another olla containing more bones, and another pipe, 10½ inches in length, and near this latter article a smaller olla filled with red

paint. It should have been mentioned that from this trench was procured a femur showing evidences of a fracture through the neck of the bone, which had become absorbed, the head uniting to the upper portion of the shaft between the greater and lesser trochanters. Further search revealed at the same depth a mortar, covered by the shoulder-blade of a whale, which also contained the skull of an infant covered with an abalone shell, while near by were paint, a piece of iron, a nail, and various shell ornaments and beads. Near at hand, to the rear, were a broken mortar and pot, underneath which was a small olla, the whole covering the skull of a child; and a little deeper a skull resting upon a fine, large, pear-shaped steatite olla, the outside of reddish color. These remains appeared to have been inclosed in a sort of fence, as a plank and stakes of decayed redwood were near by. At the bottom of this trench, just above the firm clay, and under all the specimens just described, was a fine sandstone pestle $17\frac{1}{2}$ inches in length.

June 11.—Continued in same trench, advancing in a northerly direction toward trench No. 1. At a depth of 4 feet were two skeletons, and near them was a square cake of red paint; alongside were two more skeletons, over one of which was a large mortar, mouth downward, and close by another similar utensil. Under this skeleton were an instrument of iron 14 inches in length, a long iron nail, and two pieces of redwood, much decayed. A little farther in was a small canoe carved from steatite. All the skeletons were face downward, heads to the north. In trench No. 1 the digging was continued in a southerly direction. The first object encountered was an enormous mortar, 27 inches in diameter, with its pestle near by. This article was on its side, the mouth toward the south; around it were no fewer than thirty crania, some in a fair state of preservation, and others very friable, broken, and worthless. Lying on top of this mortar, on further removal of the earth, was an almost entire skeleton, with fragments of long bones and of steatite pottery. As surmised by some of the party, the perfect skeleton was that of a chief, and the remains those of his slaves slain with him; which is at least a possible, if not a plausible, view of the case.

Experience by this time had taught us that nearly all the burial-places or spots had been carefully marked, since near the head of each skeleton were either bones of the whale or stakes of redwood.

Being obliged to leave for Los Angeles June 12, for a few days, Mr. Bowers was employed to continue the work, who, up to June 25, secured the following articles from the two trenches commenced, viz, 32 skulls, 24 large steatite ollas, 6 large mortars, 7 large pestles, 2 small serpentine cups, 7 tortilla-stones, 7 abalone shells, 3 iron knives, 4 stone arrowheads, 1 iron ax (of undoubted early Spanish manufacture), quantities of glass and shell beads, paint, shell ornaments, black seed of the character previously mentioned, 2 pipes, 2 soap-root brushes with asphaltum handles, and a copper pan 8 inches in diameter, which was found covering the top of a skull—the copper evidently having preserved a portion of the hair, which was quite black and silky, and not coarse, as is usually the case with Indians.

June 25.—The same excavation No. 2 was continued, and 3 crania were uncovered, also an olla containing the bones of a child, not far from which were 3 mortars and 2 ollas. Just above the stratum of clay the most interesting discovery was made of an entire skeleton, which had been buried in a redwood canoe, but which was so decayed that only a small portion could be preserved. Near the head of the canoe were a large

olla and mortar, the mouths northward. On removing the skeleton, which was lying on its back, the bones fell to pieces. In the canoe, alongside of the skeleton, were 3 pestles, 2 pipes, an iron knife or dagger blade that had been wrapped in seal-skin or fur, and a stone implement of triangular form and about 6 inches in length, probably used as a file, or perhaps for boring out pipes. This skeleton was probably that of a chief, or a noted hunter or fisherman.

June 26.—Trench No. 2 was abandoned and work resumed in No. 1, which yielded several crania in bad condition. Near a whale-rib, standing on end, was an empty broken olla, and not far off a skeleton on its right side, legs drawn up, head facing west. On its right-hand side, near by, was a small highly-polished serpentine cup and a small mortar and pestle. After excavating awhile and finding nothing but broken bones, digging here was discontinued and an excavation commenced ten feet to the northward and near the edge of the cliff, but after going down 5 feet through kitchen refuse, ashes, bones, shells, it was filled up and work resumed at the second trench. Several hours' digging resulted in finding nothing, but finally the "lead" was once more struck. The first discovery was a skeleton, which, from the appearance of the pelvic bones, was that of a female, and near which were great quantities of beads, shell ornaments, and seeds. It was here we first encountered what at first sight appeared to be dried cloves, but which on closer examination proved to be ornaments of asphaltum, hollow in the center, and in some instances having at one end a small piece of dried grass or fiber by means of which doubtless they were fashioned into necklaces. Some abalone shells were also found, in close proximity to which were the bones of a child. Another mortar was discovered, containing some bones in bad condition.

June 27.—Being Sunday, operations were suspended until the next day.

June 28.—Work was resumed at trench No. 1, but for 6 or 8 feet nothing was met with save isolated bones. Digging to the southward, however, a skeleton was found with top of head to the northward, the position of which was nearly face downward. On its removal we found beneath it a large mortar, cavity down, slightly tipped, and facing west. In another direction, to the eastward, was a large sandstone mortar facing north, and beneath it a skull in good condition, while near by was a small olla containing ornaments of shell, beads, seeds, and paint. Deeper down, still another small olla was revealed, filled with the black seeds, and near it a small pestle. A number of crania and bones were also found, but all in bad condition. One of them, however, was particularly interesting from the fact of two arrowpoints, one of a porphyritic stone, the other of obsidian, being imbedded in the outer table of the skull.* From the position of the arrows it was inferred that the wounds were received by the person while lying down. Digging in a northerly direction in this trench, 8 or 10 more skeletons, all huddled together, were exhumed, also 2 small pestles, 2 mortars, and some abalone shells containing ornaments. In one of the larger of these shells were the head-bones of a young child, and near it two polished serpentine dishes, containing some of the clove-like asphaltum before alluded to. A broken dish had been neatly mended with asphaltum and probably sinew, as drilled holes were found in both pieces. Not far from these cups was found a leather (?) pouch curiously ornamented on the outside with circles of shell-discs.†

* Since this was written Mr. Bowers has reported the finding of skulls with arrowpoints imbedded in the parietal and temporal bones.

† Since ascertained to be the hilt of a native sword.

On June 29, finding that our labor was not so richly repaid as formerly, further excavation in this locality was delegated to Mr. W. L. Shoemaker, who, having discovered only six crania, and those in poor condition, after six hours' faithful labor, the "*Big Bonanza*" was abandoned, and in the meanwhile the writer was prospecting.

Crossing the *estero*, and reaching the ranch of T. Wallace More, esq., we visited the asphaltum mine, from which it is probable the Indians whose resting-places we had been so ruthlessly disturbing, procured their supplies of this, to them, most precious material, since it must have been extensively used in fastening on their arrow-heads or spearpoints, and in mending and filling up cracks and holes in their canoes. Not far from this mine the spot was reached which has been mentioned as that where burials were indicated by whalebones and flat stones, and it was determined to explore it next. Near it was a depression, in which appeared to have been either a threshing-floor or dancing-place, oval-shaped and 60 feet long by 30 or 40 wide. It had been beaten or trodden down so firmly that no vegetation could flourish thereon. In the afternoon, not far from camp, one of the party discovered some fragments of human bones which had been thrown out of a squirrel-burrow, which circumstance led us to search for relics. Opening a trench 300 yards to the westward from camp, at a depth of 3 feet, some broken bones were found and one skull; near the latter were a quantity of beads and a matted mass of fur, apparently of either the seal or sea-lion. After some hours of fruitless labor, digging in this locality was discontinued. This was the only instance in our experience where the burial of but one individual had taken place in one spot.

On the following day, one of the laboring party, assured of finding something to repay further labor in the "*Big Bonanza*," urgently suggested the same, whereupon excavating was again entered upon at that place; and, curiously enough, after a little digging, a remarkably fine knife or dagger of obsidian was discovered, nearly 10 inches in length; a bone implement, similar in appearance to a sword-blade; and two pipes, one of them ornamented. This ornamented pipe was the first of the kind we had met with, and we congratulated ourselves upon having yielded to the suggestion of the workman.

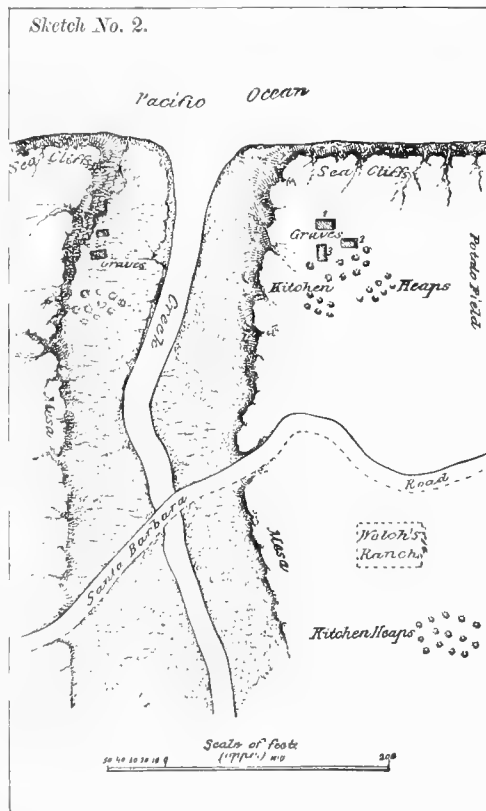
July 1.—Resolved to excavate in the locality last discovered, and an early start was made. This trench on T. Wallace More's ranch was commenced 200 yards from the sea-cliff. At a depth of 2 feet broken bones were uncovered, and at 4 feet entire skeletons, which in many instances had been inclosed with flat stones, forming a kind of coffin. Some mortars and pestles were here also met with, as well as pipes, arrow-heads, and another fine spear of flint, and one of iron. After four days of hard work, with no other results than those mentioned, this trench was abandoned. It is doubtless probable that many more articles might have been found here, but the time that would be consumed in securing a few small articles was demanded where results would most likely prove richer and more interesting. Subsequent experience proved that we had abandoned this locality too hastily, for Mr. Bowers, excavating on his own account, soon after discovered many valuable articles, notably some fine knives or daggers of obsidian.

From Dr. Taylor, of La Patera, a gentleman who for years had studied the ethnology and archæology of the Pacific coast, we learned of the probable existence of burial-places at a spot some 12 or 15 miles up the coast, known as *Dos Pueblos*. Dr. Taylor

having there seen the remains of numerous kitchen-heaps, inferred that a large population once lived in that locality, and that their dead would be found not far distant. Accordingly Dr. Rothrock and the writer started on a prospecting tour, and after a couple of hours' ride came in sight of the Dos Pueblos ranch, occupied by Mr. Welch and family. Making ourselves and object known to Mr. Welch, we received a hearty welcome, and were invited to dig anywhere we might think proper. Mr. Welch showed us in his potato-patch numbers of broken bones that had been turned up by the plow; but being attracted by some whalebones partially imbedded in the earth of the sea-cliff near by, we immediately left the potato-patch, knowing from experience that where the whalebones are there also were graves. The position of these graves, as well as some others subsequently discovered, may be seen from the map. This is undoubtedly the "Dos Pueblos" of Cabrillo, near which he anchored. (See Sketch 2.)

The next day it was determined to move the entire party to this locality and excavate, which was done, the first trench being made at the point marked 1, near the brow of the cliff, where were whalebones and large, flat stones. At a depth of $4\frac{1}{2}$ feet, great quantities of bones were found huddled together, but no skeletons in a particular posture. In some instances, stone receptacles, similar to the one already described, were encountered, but from their infrequency this burial feature was apparently not common. All the bones were in a very bad state, much worse than those about La Patera, and but few were preserved. Throughout the graves, but not placed in particular position, were several large mortars, large and small ollas, pipes, beads, and ornaments, besides bone awls. In locality No. 2, the same class of articles was brought to light, but in larger number.

In the narrative of Cabrillo, by Bartolome Ferrel, this locality is called *Dos Pueblos*, from the fact of there being two towns on opposite sides of the creek, which runs down from the Santa Inez Mountains. These towns were densely populated with a mild, inoffensive people. We were informed by Mrs. Welch that she had heard from an aged Indian woman that two separate tribes, speaking different dialects, lived on opposite sides of the creek, which constituted the boundary-line between them, and that the tribes were not permitted to cross this creek without first obtaining each other's consent. This old crone for many years continued to visit this spot annually to mourn the departed greatness of her people.



Continuing our excavations in No. 2, a long, straight pipe and a small mortar having a handle (the first of its kind), and containing red paint, were found, and near the latter a pipe only partially bored out. On the opposite side of the creek a trench was opened beneath a gigantic piece of whalebone, but several hours' work revealed nothing but broken bones, and it was abandoned and work resumed in Nos. 1, 2, and 3. During the 6th, 7th, 8th, 9th, and 10th, the excavating was continued, resulting in the discovery of mortars, ollas, pipes, etc., and curiously enough in No. 3 of no fewer than 30 skeletons which had been buried in sea-sand, and under which were 3 fine stone spearheads and some fragments of iron. In No. 2 were several large ollas and mortars, and near the head of a skeleton, presumably that of a female, some china cups and saucers of very ancient shape. The time allotted to these explorations having now nearly expired, the remainder of our stay was devoted to filling up holes and packing the specimens. The specimens were roughly estimated as weighing from 10 to 15 tons.

Regarding the people of whom we have been speaking, and of whom no representative remains to tell of their history, but little could be learned; the crumbling bones and household gods we had so ruthlessly disturbed, were the only witnesses of the former existence of a once populous race; but beyond this they made no revelation, while careful examination of the entire literature of the Pacific coast proved fruitless in throwing light on these early generations. All the writers who speak of these Indians, and it is but fair to state that few, if any, of them were possessed of original information on the subject (having gathered their materials from Ferrel's narrative), are of the opinion that they were friendly, peaceable, and inoffensive, which opinion is enforced by the absence in their graves of warlike implements to any extent. Cabrillo states that they were armed with bows, the arrows being pointed with flint heads, similar to those used by the Indians of New Spain; he also speaks of clubs, but mentions no other weapon. As to population, he states that on some of the islands there were no people, but that others were densely populated; the former we have not been able to identify. The Indians told him they had occasionally suffered from the attacks of warriors armed like the Spaniards, and from the fact that toward the middle of the eighteenth century the mission priests of Santa Barbara removed their savage parishioners from the islands to the mainland to escape the ravages of the Russians and their Kodiak allies, it is supposed that this warfare had been going on for a number of years. As to the extent of the population we can form an idea only from the number of burials, at different points, and villages, the names of which have been handed down to us through Cabrillo. At a rough guess, our party must have exposed at their main trenches the remains of no fewer than 5,000 individuals, and, from what we have subsequently learned, there are hundreds of these burial-places along the coast.

With regard to the towns, the Indians informed Cabrillo that the whole coast was densely populated from the Pueblo de las Canoas to 12 leagues beyond the Cabo de Galera (Point Concepcion), and gave him the names of these towns; from the extended list it may be inferred that a large population once lived in the region explored.

With regard to the time that these people disappeared we can only conjecture. From the Mission records it appears that in 1823 the total number of Indians in the vicinity of Santa Barbara was upward of 900, but this census embraced all Indians,

and not alone those from the islands and sea-coast. In 1875, the year in which we write, not a soul can be found to give any information as to the ancient inhabitants of this part of the coast. There is a tradition that many years ago a Mr. Nidever, while on a trip to the island of San Nicolas, discovered there, much to his surprise, an aged hag, and that he removed her to Santa Barbara, but no one could understand her language, and after a short time she died; also, that she was a young woman at the time the Indians were removed to the mainland, and returning from the boats to seek her children, in the hurry and confusion of the embarkation she was left behind; that when found she was clothed in furs, ornamented with the feathers of birds. Doubtless this woman, if the story be true, was the last survivor of the island tribes.

Of their manner of living little if anything is known. Cabrillo states that on most of the islands miserable huts existed, but on the mainland there were houses similar to those of the Indians of New Spain. On one of the islands, however, which he states was four leagues long, there were many good houses of wood. We are at a loss for further information on this point, but it is certain that the dwellings of these people were constructed of perishable materials and not of adobe bricks like the Pueblo Indians of New Mexico, since no trace can be discovered of such material, and it is hardly possible this would be the case in the short space of time since Cabrillo's visit. It is extremely probable, therefore, that they built their houses of timber, or else used the skins of animals slain in the chase. Referring to the matter of houses of wood upon the islands, some doubt might apparently be thrown upon this portion of Cabrillo's narrative, for at present no trees of a size sufficient for building purposes are found on the islands; but this author states that on the Isle de St. Augustin he saw trees similar to red cedar or cypress that had been washed up by the sea, 60 feet in height, and of such girth that two men could not encircle them with their arms joined.

In their choice of localities for towns these ancient people showed the same degree of sagacity as that evinced by the American aborigines down to the present day. On the islands were myriads of water-birds and quantities of sea-lions and seals; the water fairly teemed with fishes and molluscous animals, affording a plentiful supply of food, and no doubt at the time they were occupied there was plenty of sweet water to be had, which, unfortunately, is not the case at present. On the mainland, at all the localities visited, the circumstances of environment must have been such as to render the struggle for existence extraordinarily easy. For instance, at Santa Barbara and up the coast, or what was called the Pueblos de las Canoas, the land is extremely fertile, and must have yielded good crops, for Cabrillo especially mentions that the Indians lived in a fertile valley, and had an abundance of corn and many cows.* In addition to their pastoral pursuits, the Santa Inez Mountains afforded them game, and the waters, fishes, clams, mussels, etc. From the great quantities of shells found in the graves and kitchen-heaps, and the absence of mammalian bones in any quantity, it is fair to suppose that the tribes living near the seaside derived the greater portion of their sustenance from the waters. The favorite places for towns appear to have been not far from groves and near small mountain-streams. Anterior to 1542 these Indians must have been idolaters, but we have good reason for believing that after the advent of the Mission priests many of them embraced the Roman Catholic religion, and faithfully followed its teachings. Cabrillo speaks of having seen on one of the islands (probably

* Probably bison.

San Miguel) a temple of wood, with paintings on its walls, and idols. San Miguel and some of the other islands have been carefully searched for this temple, but in vain. Mr. Schumacher considers Santa Catalina as the island on which was the temple.

It is hardly necessary to refer again to the different utensils found in the graves of these people, but it may be well to state that all the ollas, mortars, cups, pipes, and pestles met with were fashioned out of steatite, or magnesian mica, a sort of soapstone, consequently very soft, which alone was used for the ollas, sandstone of different degrees of hardness for the pestles and mortars, and serpentine for the cups and pipes. It is easy to understand that the ollas were readily carved from the soft soapstone-like material by means of stone knives, but how the gigantic and symmetrical mortars were hewn out with such rude tools is beyond our comprehension; yet they must have been easily procured, otherwise such lavish generosity in burying them with the dead would hardly have been possible. It is thought that the steatite articles were not made by the mainland Indians, since no deposits of this mineral were at their disposal, but by the dwellers on the islands of Santa Catalina and Santa Rosa, where alone this mineral existed, and the supposition is that the islanders trafficked with those of the mainland for their commodities, giving in exchange utensils of steatite. The ollas were doubtless used for cooking, as many of them bear marks of fire, and the mortars for bruising grain, acorns, and grass-seeds, the smaller cups and basins for ordinary household purposes, and the pipes for smoking. Canoes are mentioned by Cabrillo, who states that some were small, holding only two or three persons, while others were of sufficient capacity for ten or twelve. These were probably hewn, not burned, from logs of redwood cast up by the waves. The one mentioned as discovered by our party containing a skeleton was, however, formed of three planks, which had been lashed together by sinew or cord, the joints being payed over with asphaltum. The ornaments and beads of domestic manufacture were made of the nacre of shells and of small shells, but the glass beads found were undoubtedly of European workmanship. There seems but little doubt that nets were used for trapping fishes, a small portion of what appeared to be mesh-work being found. Furs are spoken of as articles of clothing in Cabrillo's narrative, but beyond this nothing is known. In speaking of the employment of furs, mention is made of the long, fine, black, and beautiful hair of the natives; this statement is corroborated by the appearance of some hair found on the skull which we have spoken of as being found covered with a copper pan.*

It was at first supposed that a certain design had been followed in the manner of interment, or rather of the posture in which the bodies were placed, but an examination of the notes already given will show that such was not the case, although most of the entire skeletons discovered at La Patera were in the same position, but those at Dos Pueblos were in all attitudes; consequently we infer that there was no regular mode of procedure. From the fact that so many loose and broken bones were found close to the surface of the earth, it is probable that the same spot had been used over and over again for burials, the remains of the previous occupants being shoveled out to make room for new-comers. Perhaps the utensils disinterred were also made to serve for more than one burial. A question in connection with the burials, which is yet to be satisfactorily answered, is, How were these people enabled to pass the heads of

* A second cranium covered with a copper pan was discovered by Mr. Schumacher on Santa Catalina Island.

children, and even grown persons, through the narrow openings in the ollas, except in a mutilated condition? It is true that some savage tribes expose the bodies of their dead until the flesh is removed, but we know of no instance where savages are in the habit of cutting up their dead for burial purposes. It may be these people practiced the cutting method, or that, finding bones in digging anew, these were thrown in the ollas simply as a ready means of their disposal.

In addition to the burial localities already mentioned, we are cognizant of others to the northward and southward of Santa Barbara, and quite a number of them have already been explored, although doubtless others still remain *perdu* to excite further archæological inquiry. Mr. Paul Schumacher has examined a number in the vicinity of San Luis Obispo and on the Santa Maria River, and Mr. Bowers quite a number in Santa Barbara and in the vicinity of Carpenteria, lying south of that city.

Since our discoveries in the localities mentioned, Mr. Schumacher has resumed the work at Dos Pueblos where we left off, and Mr. Bowers has examined some of the islands and a good part of the coast; and M. Alph. Pinart, of France, assisted by M. de Cessac, also have been exploring for the French Government, their labors being amply repaid by the fine collection made.

We have carefully consulted all available works which would tend to throw light on the history of these people, but, with the exception of the narrative of Cabrillo, have found little pertaining to the subject. The death of Cabrillo, as already stated, occurred on the *Isla de la Posesion*, on the 3d of January, 1543, and was caused by injuries received from a fall which broke his arm near the shoulder. Before his death, he named as his successor Bartolome Ferrel, "Piloto mayor de los dichos navios," and to this successor we are indebted for all we know of the people under discussion.

Mr. Paul Schumacher, referring to the death of Cabrillo and the locality where he was buried (Bull. U. S. Geolog. & Geog. Surv. of Terr., vol. iii, No. 1, p. 45), says: "Santa Cruz, Santa Rosa, and San Miguel, it is well known, were discovered by Cabrillo in 1542, and named by him San Lucas. He died in a harbor in one of those islands. The record says, "He sailed from Monterey Bay, and anchored on the 23d of November, 1542, in a harbor in one of the group mentioned before, and named by him San Lucas." * * * On San Lucas Juan Rodriguez Cabrillo was buried on the 3d of January, 1543. The port in which he died was called Juan Rodriguez." There seems to be hardly any doubt that the port selected by Cabrillo among the group as a shelter was the present Cuyler Harbor, which is the only well-protected port in the three islands. Water is obtainable in the springs the year round, and is plentiful in the season in which his stay occurred. Further the record says: "Ferrel, his pilot (forced by strong winds to return from his northern trip, made in compliance with the wishes of the dying commander to proceed as far to the north as possible), dared not to re-enter this port on account of dangerous breakers at its entrance." This corresponds entirely with the appearance of Cuyler Harbor during the time of rough sea, because from the eastern side of the bay to the rock-islet heavy breakers roll over the partially exposed reef and the rocks in the bay a little to the westward of it, so that coming from the northwest, its way of approach, the entrance seems barred by breakers and impassable. Taking Cuyler Harbor and the ports in Santa Cruz and Santa Rosa into consideration as shelter, and comparing their natural formation with the historic record, there seems to be no doubt that the harbor in San Miguel, and not Prisoner Harbor in Santa Cruz, as

some believe, is the port in which Cabrillo died. We did not spend any time in searching for his grave in San Miguel, where the best location is offered between the spring below the house and the east end of the harbor, but, to satisfy my curiosity, we dug in a place at Prisoner Harbor, which was well described to me in a letter of a southern gentleman, and in a very positive manner, as the grave of Cabrillo; but in vain did we try to enable the Spanish nation to erect for him a monument in commemoration of his noble deeds."

De Mofras, in his work *Exploration de l'Oregon*, states that Cabrillo died in the island of San Bernardo, January 5, 1543. This island, he says, is 8 miles east of a group of rocks called "*el Farallon de lobos*."

It may with propriety be stated that we have here only endeavored to show the results of the exploratory work performed in the vicinity of Santa Barbara by the party sent out under the auspices of the expedition in your charge, and that no attempt has been designed toward solving questions appertaining thereto, more particularly in view of the fact that the entire subject will be fully and ably discussed by Prof. F. W. Putnam, of the Peabody Museum of Archæology, Cambridge, to whom the entire collection has been submitted for examination and study, and who is perhaps better fitted for this most entertaining task than any other person in the country. In his hands we willingly leave the subject, confident that, with the rich materials gathered as a basis he will elucidate many hitherto mysterious problems connected with the customs of this extinct race, and bring to light much of their now hidden history.

In conclusion, it would be a serious omission did I fail to offer my sincere thanks to the many persons residing near Santa Barbara who so kindly assisted with their courteous advice and assistance, exemplifying the well-known and traditional hospitality of Californians. Every facility was afforded and invitations were freely extended to explore in all directions. Among those who showed special favors may be mentioned Mr. T. Wallace More, Mr. Alexander More, Dr. Taylor, Mr. Parks, Mr. Bowers, and Mr. Welch of the Dos Pueblos ranch. To Capt. H. Taylor, United States Navy, commanding the Coast Survey steamer *Hassler*, and to his officers, we are also indebted for many kindnesses. To yourself I beg to extend my gratitude for the privilege of engaging in this work, and for the invariable readiness which at all times you have shown to assist me in my special department; nor should I forget to acknowledge the invaluable services rendered by Dr. Rothrock, Mr. H. W. Henshaw, Mr. Shoemaker, and other assistants.

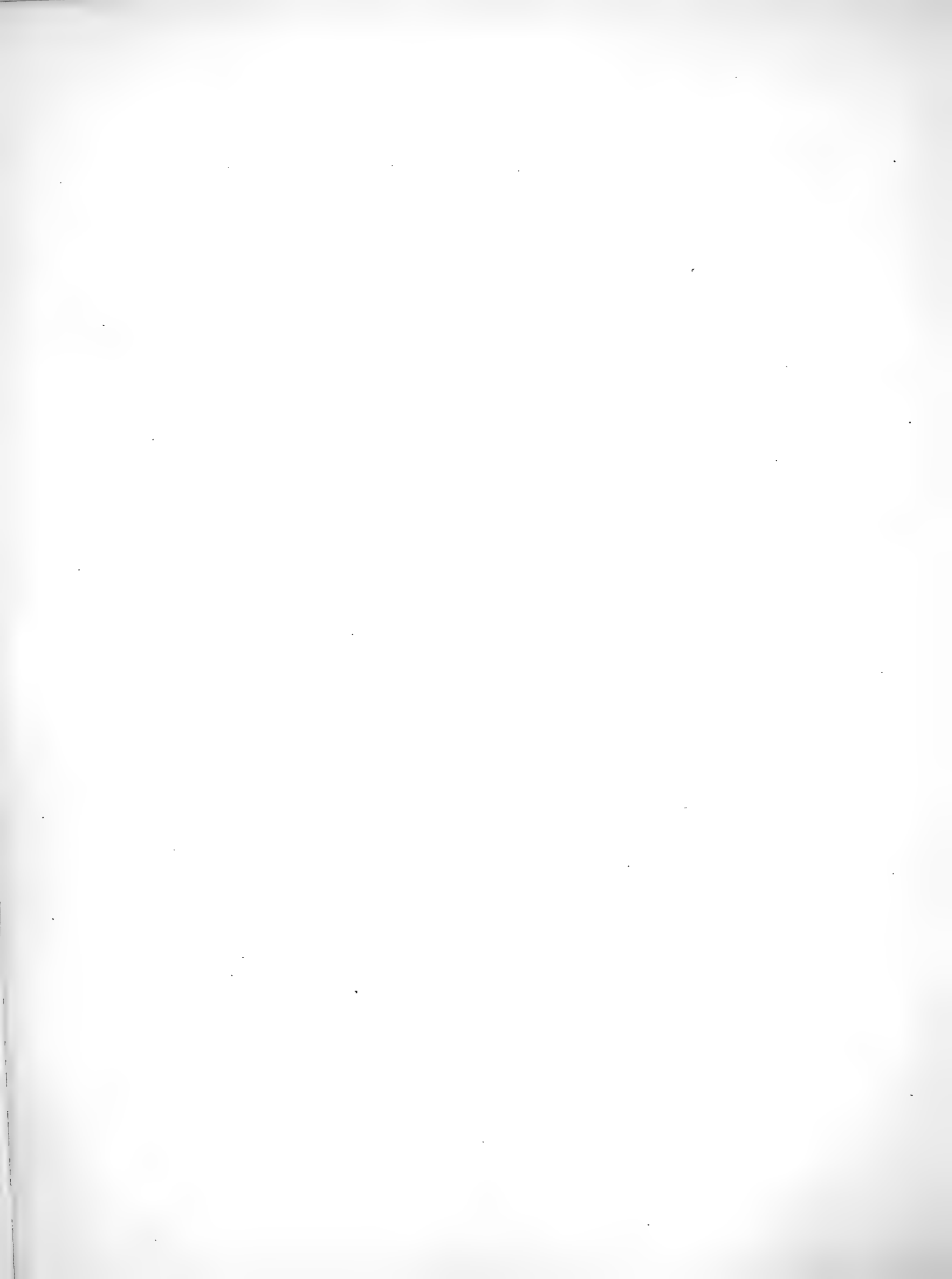
DOS PUEBLOS AND LA PATERA.

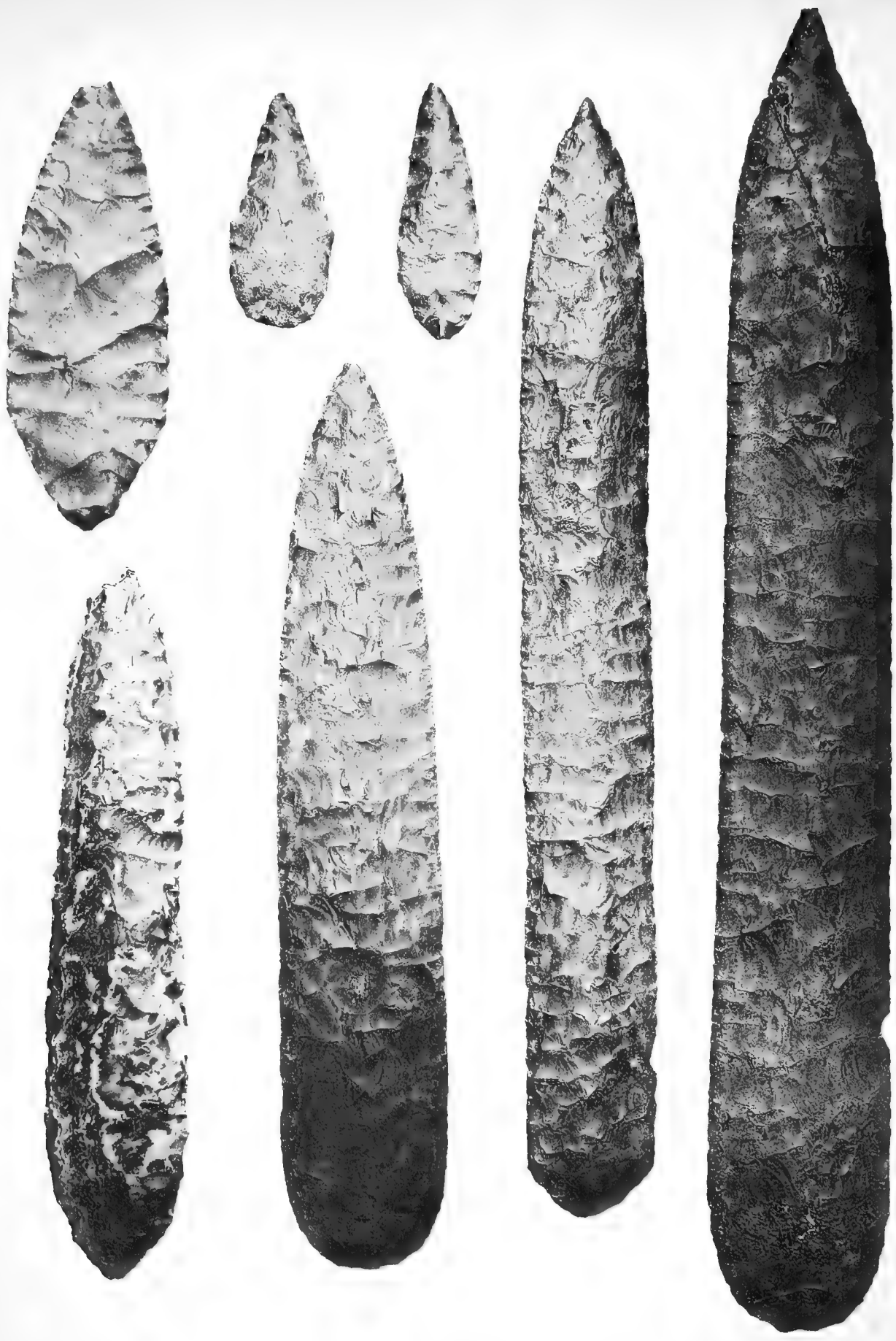
In the preceding account of the excavations by the party at Dos Pueblos and La Patera, Dr. Yarrow has given all that can be said in relation to the condition under which the various articles described on the following pages were found in the cemeteries of these old Indian towns. It is therefore only necessary for me to state that, as there is great uniformity in the character of the materials obtained from the several excavations, it has not been considered essential to mention the precise spot whence the

articles were obtained, except in a few special instances. Therefore throughout the following pages it will be understood that the articles described and mentioned are from the collection made by Dr. Yarrow's party, unless particular reference is made to the contrary.

For the purpose of making the account of the archæology of this portion of California as complete as circumstances would permit, many of the articles obtained by Mr. Schumacher on the Santa Barbara Islands have been compared with those of the mainland, and are here described. The same reason has led to the incorporation of some of the material obtained by Mr. Bowers, but of the latter only a small portion has been available for this report.

The illustrations, both in the text and on the plates, represent the actual size of the articles figured, unless the contrary is stated.





IMPLEMENTS OF STONE, CALIFORNIA.
ACTUAL SIZE.

CHIPPED STONE IMPLEMENTS.

BY C. C. ABBOTT.

PROMINENT in the collection are several specimens of long, narrow, dagger-like blades of a nearly black flint (Plate I, Figs. 4, 5, 6, and 7); all of which are very finely chipped over the entire surface, and brought to very sharply defined edges and acute points. The three largest specimens collected by Dr. Yarrow measure, respectively, ten, eight and one-fourth, and six and three-fourths inches in length. Fig. 4 is a representation of a specimen from San Miguel Island, collected by Mr. Schumacher. Throughout their entire length, they are of nearly uniform width, the tapering at the point being quite abrupt, but varying somewhat, so that, in connection with the rounded base, they have much the appearance of an exaggerated elongated leaf-shaped arrowhead.

These implements, when compared with typical lance or spearheads, exhibit a noticeable difference in that the blades are thickest at the middle, and slope uniformly to the edge, which is very sharp, and remarkably straight. They are, therefore, although varying in this respect, distinctly oval in section; which gives them greater strength than thin flat spearheads of the same size.

To determine the use of this form, if indeed these implements were used solely for one purpose, is manifestly impossible. The want of strength in such slender blades would seem to forbid their use in warfare, for while admirably adapted for thrusting into the body of a man or animal, with fatal effects, it is doubtful if they could be withdrawn unbroken; and, however skillful the California coast tribes may have been in chipping flint and other minerals, they could scarcely afford to produce so elaborate an implement for purposes that would almost certainly destroy it the first time it was used.

An allied but not identical form of implement has been collected in the shellmounds of Oregon, lat. $42^{\circ} 05'$ to $42^{\circ} 15'$, by Mr. Schumacher. Photographs of these (Peabody Mus., No. 7631), labelled "Obsidian and Jasper Knives," show them to vary much in size; the largest measuring fifteen inches in length, the others eight and six inches. These so-called knives differ from the blades figured on Plate I in that they are pointed at each end, and the largest specimen is considerably narrowed in the middle, where, if a knife, it would be grasped by the hand. That these Oregon specimens may be knives is very probable, although they certainly are not in any way such convenient cutting implements as the smaller flints secured to wooden handles; but the double pointing, on the other hand, does not suggest their use as simply a thrusting weapon, or dagger. They certainly may be considered as varying sufficiently from the Dos Pueblos specimens to render it doubtful if the two forms were similarly used.

Fig. 7, Plate I, has still adhering to the base, and extending upwards about one inch, small scales of asphaltum, which indicate that a handle has been attached to this blade. This handle I conceive to have been a short one, by which, dagger-like, the point, rather than the edges, was most prominently brought into play; or, less probably, that this handle was a staff, and the complete implement used as a lance or spear.

If these long, delicate blades were not in common use, might they not have been used only on ceremonial occasions? If abundant, and the occurrence of fragments would testify to this, they doubtless varied, in accordance with their size, as to the purposes for which they were made, being a cutting implement, or a piercing weapon. Dr. Yarrow suggests that they may have been used for spearing or lancing the smaller cetaceans which abound on the coast, or that they may have been used to spear the rayfish which are even at the present day extremely abundant in the estero near La Patera. He is led to this suggestion from the fact of finding similar implements in the wooden canoe with the skeleton spoken of in his preliminary report.

[Mr. Powers, on page 53, "Tribes of California," gives a figure of several weapons of war of the Yurok of Northern California. In this sketch two long chipped implements are represented, one of which is pointed at both ends and the other is very much like the large specimens



ARTIFACTS OF STONE, CALIFORNIA.
ACTUAL SIZE.

from Dos Pueblos. The middle portion of the double-pointed knife was probably wrapped to allow of its being held by the hand. The other implement is mounted dagger-like, on a handle of not quite the length of the stone blade. In describing the weapons of war of the Yurok, Mr. Powers, p. 52, states:

“Another weapon made by them is a sword or knife about three feet long, of iron or steel procured from the whites. Of course this is not aboriginal, but is rather a substitute for the large jasper or obsidian* knives which they used to make and use, but which nowadays are kept only as ornaments or objects of wealth to be produced on occasion of a great dance. * * * Mr. Chase mentions some very large jasper spear-heads four inches long and two inches wide; but these also are now brought forth only at a dance, to give the owner distinction.”

Again, when writing of the Hupâ, a tribe located on the Lower Trinity, Mr. Powers says, p. 79: “There are other articles paraded and worn in this and other ceremonial dances which they will on no account part with, at least to an American, though they sometimes manufacture them to order for one another. One of these is the flake or knife of obsidian or jasper. I have seen several which were fifteen inches or more in length and about two and a half inches wide in the widest part. Pieces as large as these are carried aloft in the hands in the dance, wrapped with skin or cloth to prevent the rough edges from lacerating the hand, but the smaller ones are mounted on wooden handles and glued fast. The large ones cannot be purchased at any price, but I procured some about six inches long at \$2.50 apiece. These are not properly ‘knives,’ but jewellery for sacred purposes, passing current also as money.”

The last collection made by Mr. Schumacher on the Islands of San Clemente and Santa Catalina, and recently received at the Peabody Museum, contains several of these long and beautifully chipped implements. Some of these still show traces of the wooden handles to which they had been fastened by asphaltum.

* So far as the collections I have examined from California can prove the matter, *obsidian* was seldom used by the Californians, as there are but one or two arrowheads or small knives of that mineral among the many chipped implements. A beautiful blue-black variety of flint was very commonly used for the larger and finer chipped implements, and as this mineral has a resemblance to obsidian it is very likely that it is often called by that name.—F. W. P.

Mr. Powers mentions that the present Indians of California, when fighting, use sharp pieces of stone with which they endeavor to cut each other in the face. For such a method of warfare these long points mounted on short handles, it seems to me, would be well adapted, when as simply thrusting implements they would be of little use, as stated above by Dr. Abbott.—F. W. P.]

Less delicately wrought, but much more durable, and by far more common, are other certain dagger-like flint blades, one of which, collected by Mr. Schumacher near Santa Barbara and now in the National Museum (No. 15242), is represented by Fig. 1. These vary from five to six inches in length, and when narrow in proportion to their length, bear a close resemblance to the Danish flint daggers.* When of smaller size than the specimen here figured, whether broader in proportion to the length or not, they become identical with a form that the writer has classed as "jasper knives," when treating of the stone implements of the Atlantic coast States. When this form has distinctly serrated edges, they were very probably used as saws, even if serrated only upon one side, and not the entire length.†

Daggers, if such they are, like Fig. 1, are not peculiar to the Pacific coast. Of this form, and some more carefully shaped, in which the blade and handle are separated by barb-like projections, many are found in Alabama, Pennsylvania, and New Jersey.‡

Plate II, Figs. 1, 2, and 3, and possibly also Figs. 23 and 27 of Plate III, represent very beautiful specimens of spearheads, as we propose to call them. Those figured on Plate II are about, or quite, the maximum size of this form of weapon;§ while Figs. 23 and 27 of Plate III are veritable links between the spear proper and the arrowhead. Fig. 27, in fact, may possibly have been used as a cutting-tool, and not as a hunting implement or weapon. These specimens are chipped from brownish-gray jasper with

* Prehistoric Times, 2d ed., p. 97, fig. 117, London, 1869.

† Stone Age in Scandinavia, 2d ed., p. 80; pl. v, figs. 87, 88, and 90-93. (Some of these, the author has denominated semi-lunar knives, but being serrated along one edge, were more probably used as saws, and not simply for cutting.)

‡ Several specimens of this character and made of the same dark flint were obtained on the Cumberland River in 1876, and are now in the Peabody Museum.—F. W. P.

§ Annual Report Smithsonian Institution for 1875, p. 270. (The specimen here described—the illustration omitted—was probably an exceptional instance, no other specimen of like measurements being on record from New Jersey.)

red veins, and show the same care in workmanship that is so noticeable a feature of the implements figured on Plate I. The specimens figured are from Dos Pueblos, and were collected by Dr. Yarrow and Mr. Schumacher. Another specimen, now in Peabody Museum (No. 13581), from near Santa Barbara, collected by Mr. Schumacher, is of the same character as the one represented in Fig. 3 of the plate, but is about one inch longer, with well defined serrated edges.

As already mentioned, while the chipping is very carefully done, there is a marked difference between these spearheads and the preceding, in that in section they are not oval, but of uniform width from edge to edge, and these edges are not so smoothly wrought as in the case of the dagger-like implements.

While disposed to consider such large specimens as those figured upon Plate II as heads of spears or lances, and that the point rather than the edges was the principal feature of the implement; yet, as weapons of this character, they were necessarily greatly exposed to fracture, and the labor of producing them seems scarcely warranted. The allied forms, if not identical, found in the Atlantic coast States are seldom so delicately fashioned, and are somewhat thicker—a difference arising, doubtless, from the peculiarities of the mineral rather than want of skill on the part of the workman. There are occasionally met with, in New Jersey, objects of this character, of chalcedony, which, for delicacy of finish, are quite equal to those here described. Especially such as have been taken from graves, or discovered in the removal of supposed mounds, are of remarkable finish and beauty. Such spearheads from Gloucester County, New Jersey, associated with tubes of clay-slate, also in many respects like Pacific coast specimens, have been met with. The numbers of these elaborate specimens, as compared with those of smaller size and ruder finish, is such, in New

FIG. 1.



Flint Dagger.

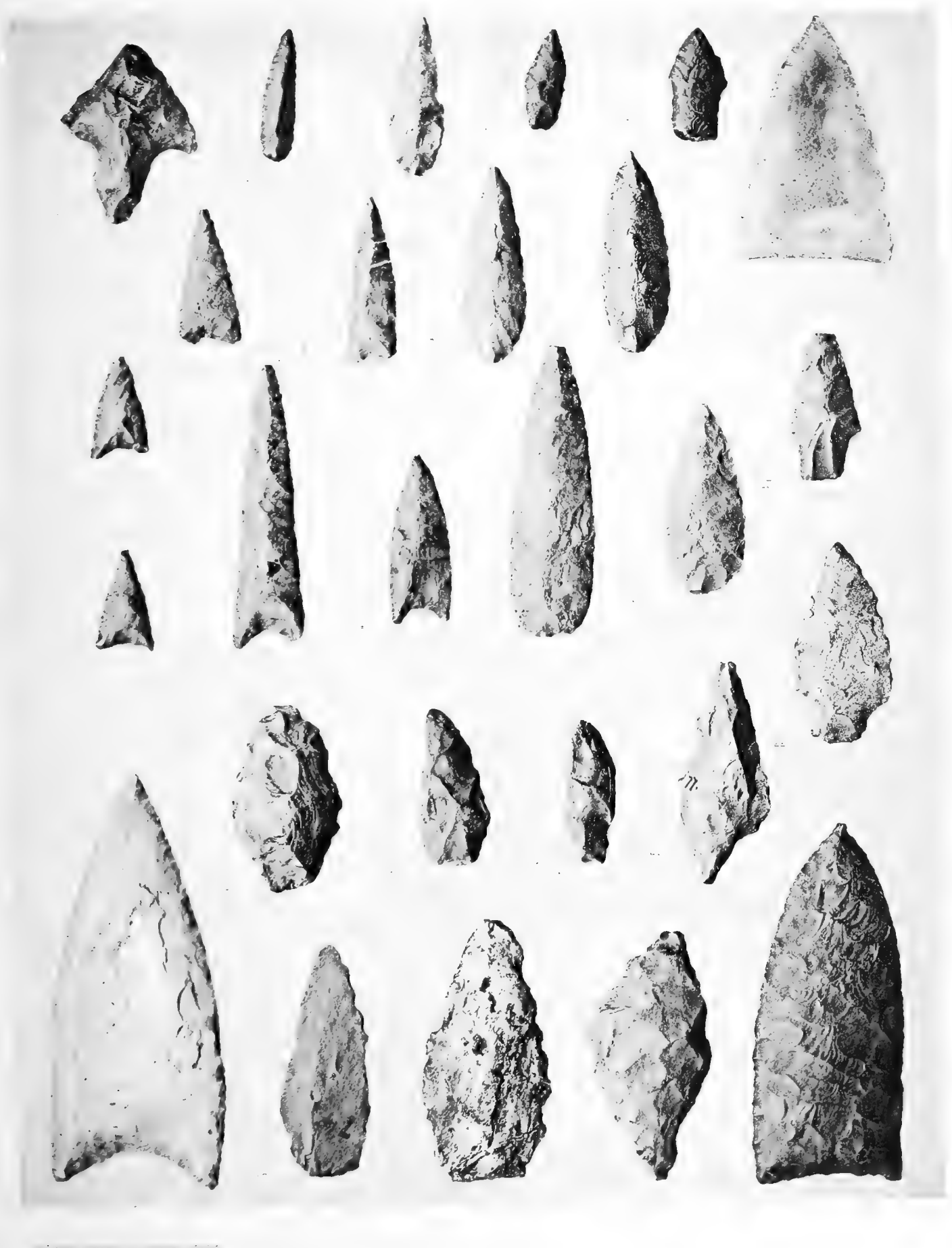
Jersey, as to suggest they were of ceremonial import, rather than designed to meet the requirements of every day life. Fig. 2, Plate II, is scarcely more than one-eighth of an inch in thickness, and if allowed to fall from a table, even upon a carpeted floor, would probably break into two or more pieces. As these large lanceheads are not, however, by any means rare, they cannot be looked upon as exceptional productions of some unusually skillful worker in chipped flints. Indeed, some of these larger specimens bear evidence of hard usage in the deep nicks along the edges, and by the detachment of exceptionally large flakes, which are not likely to be the designed or accidental work of the flint-implement maker. These supposed traces of use are quite prominent on Fig. 2, Plate II.

Figs. 23 and 27, of Plate III, to which reference has already been made, are the minimum sizes of spearheads proper, and of these dimensions the form is an extremely abundant one throughout the country. In fact, this will apply to almost every form of stone implement; as more careful examinations of various and widely separated localities are continually showing how many more relics of the native races do the extremes of our territory possess in common than was at first supposed.

Less common in the Atlantic coast States, but by no means rare, is a larger size, that seems illy adapted for cutting, and of too great weight for an arrowhead. Specimens from five to six inches in length are in the collection, and may be considered as medium-sized spearheads.

A series of seventeen arrowheads exhibit a general delicacy of outline and accuracy of finish. These present but little variation in form, and are smaller, generally, than the same patterns when found in eastern and central localities. Compared with a photograph of a series from Oregon shellmounds (Peabody Museum, No. 7653), collected by Mr. Schumacher, there does not appear to be the same excellence of workmanship in the California specimens as is noticed, more especially in the tanged and barbed arrowpoints, from Oregon. Some of those from Oregon excel the best chipped specimens from the Southern and Middle States, and are equal to the finest Danish specimens.

Fig 10, Plate III, represents a triangular arrowhead of the maximum size. The specimen is smoothly chipped from a quartz pebble, the flaking



STONE IMPLEMENTS FROM SOUTHERN CALIFORNIA
FULL SIZE.

being mostly upon one side, the other being the weather-worn surface of the stone, from which the specimen was made.

From observations of thousands of Atlantic coast specimens, I am led to believe that the so-called arrowheads of this and many other patterns, when they exceed the measurement of Fig. 10, were put to other uses, probably being utilized as cutting-tools. If there is nothing to guide one, however, in determining the particular uses of the various stone implements found in a given locality, it is scarcely safe to form an opinion based upon our own capabilities in the use of the tools and weapons once wielded by savage man. Arrowheads of much larger size than Fig. 10 have been found by the writer under such circumstances as to at once suggest the bow as the projecting instrument rather than the arm, as in thrusting a lance. Weight, perhaps, rather than size should be considered, and modern iron-tipped arrows have their metallic points much heavier than some spear (?) heads of twice the size of Fig. 10, to which we have referred as being probably of the maximum size of an arrowpoint.

Figs. 6, 11, and 12, same plate, represent the ordinary triangular arrowheads, these specimens having slightly concave bases. They are all of flint, of dark color, and in workmanship exhibit no particular skill, as compared with specimens of this pattern from other localities. It is, in fact, a very common form wherever arrowheads are found,* at least in this country, the majority of such specimens varying solely in being of somewhat larger size.

Figs. 7, 13, and 14, Plate III, are additional examples of this pattern, but with slight modifications, the principal of which is the concavity of the base being a more distinctive feature. In the foregoing specimens this concavity is so slight that it may have been accidental, but it is unquestionably intentional in the latter. Fig. 13 is otherwise noticeable for its great length as compared with the breadth. Its shape and lightness both suggest the arrowpoint rather than a cutting tool. Fig. 14 varies from the preceding in having distinctly convex sides, and by this feature more nearly ap-

* *Ancient Stone Implements of Great Britain*, p. 348, fig. 332. London, 1872. (In England it seems that this form is of rare occurrence; but it is, I judge, more common on the Continent.) See also *Nature*, vol. vi, p. 392, London, 1872, for a comparison of English and American forms as to variety of shapes and skill in workmanship.

proaches the succeeding variety. At the present day the forms of arrowheads, whether of metal or stone, vary greatly even in the same tribe, notably those of metal among the Apaches of New Mexico and Arizona. The opinion, so often expressed in various localities, that triangular arrowheads are "war-arrows," does not seem to be based upon any very well defined reason. So far as those of this pattern from New Jersey are concerned, they are never found under any circumstances that indicate they had any purpose not common to the several other forms. In the heaps of refuse indicative of the former sites of arrowmakers' labors, this pattern occurs about as frequently as any other, but as a rule they are of much smaller size. As in the case of the allied form with a convex base, they are occasionally met with of sizes too large to be available for arrowheads, and are presumably knives. The use of the term "knife" in such a connection is, however, somewhat objectionable, as it serves solely to cover our ignorance of the use or uses of certain forms of chipped implements having a moderately sharp edge. A long triangular knife is not a conveniently designed cutting implement, and if such specimens of chipped flints were knives, they served some special purpose, of which we know nothing.

Figs. 2, 3, 8, 9, 15, and 16, Plate III, represent the well-known leaf-shaped form of arrowpoints. When this form does not exceed the size of the specimens here depicted we consider it far more probable that they were used for tipping the shafts of arrows than for other purposes. When longer and *thicker*, it is well known that they were commonly used as knives,* from the fact that specimens still attached to their wooden handles have been found (see Plate IV). This, of itself, cannot be considered a sufficient reason for considering all leaf-shaped flints of small size as knives, particularly those found in the Atlantic coast States. Of hundreds of the latter, gathered by the writer, none exhibit the slightest trace of gum or other material as is seen on the California specimens, even when the handle has itself wholly disappeared. Associated with this leaf-shaped form, in the Atlantic coast States, also, are numbers of chipped jasper implements, that,

*Archæological Collection of Nat. Mus., Smithsonian Contributions to Knowledge, No. 287, p. 2, fig. 1, Washington, D. C., 1876.

from their shape, it is safe to conclude, were knives. They certainly could not be put to any other use, least of all, made available as arrowheads, and it is improbable, considering this, that the more inconveniently shaped leaf-form was used solely as a cutting tool. For these reasons, we have no hesitation in classifying the six specimens in question, and also Fig. 3, Plate I, as arrowheads. This form occurs of greater proportionate width than is shown in any of these, but none are more slender and delicate in the chipping than Fig. 15. It has been suggested that the arrowpoints with convex bases were intended to remain in a wound when made, those with concave bases to remain on the shaft; but this theory can hardly be considered admissible, as arrow-points with convex bases are in the Museum so firmly attached to the shaft as to require considerable force to detach them.

Figs. 1 and 2, Plate I, the one by reason of its size, the other from the peculiarly broad base and traces of asphaltum still adhering to it, give us instances of one form of implement merging into another. Fig. 1, Plate I, represents an admirably chipped leaf-shaped specimen, originally three and one-half inches in length, by one and one-fourth in greatest breadth. The base is not as distinctly curved as usual, but prolonged so as to form a broad stem; still the outline is not sufficiently varied from the typical leaf-shaped form to class it otherwise. This specimen seems much too large for an arrowpoint, but if the size is not objectionable the weight would not be. It bears a marked resemblance in both shape, size, and finish to European specimens, designated by some as "daggers," and again as "javelin heads."*

Fig. 2, Plate I, is within the limit, as to length, of arrowheads proper, but the base is very thick, and of uniform width for nearly one-half its length, a feature foreign to the ordinary forms. This peculiarity of the base may have been a distinction made by the ancient flint-worker; when designed for a cutting tool it was much stouter and more distinctly oval in section than specimens of the same outline intended for arrowpoints. A second specimen, from same locality, is somewhat smaller, of a reddish-brown flint, but not so delicately chipped as the preceding.

Fig. 1, Plate III, is a well-marked example of the common stemmed arrowpoint, but is not as finely chipped and as slim as the majority of the

* Ancient Stone Implements of Great Britain, p. 312 and p. 331, figs. 264 and 274.

preceding forms. With the stem proportionately shorter, this form is quite common throughout the length and breadth of the continent, and common also in Europe.

Figs. 4, 5, 17, and 22, Plate III, are additional examples of stemmed arrowpoints, no other use seeming possible to which to put them. These likewise do not show the same skill in their fashioning as compared with the larger specimens of the same general outline, and are far ruder than the triangular and leaf-shaped arrowheads of the same size found associated with them. Fig. 4 is the most accurately finished of the series, and unusually small for specimens of that pattern. The material of which all these examples are made is apparently identical with the jasper of the Eastern and Middle States, and varies but little in color, Figs. 4 and 5 being bluish-green, the others a slightly mottled black. Dr. Yarrow has had in his possession black obsidian arrowpoints, similar to Fig. 4, from the Pah Vant Indians in Southern Utah, but they were probably made years ago, as it is well known that modern Indians use arrowpoints of stone picked up in different places.

Figs. 18 to 26, exclusive of Figs. 22 and 23, of Plate III, represent specimens that perhaps can be best described by the somewhat vague term of "chipped flints." They are noticed here as being in many respects closely allied to the arrowheads proper, and because they were probably used as such, or may have been "failures." The edges are not sufficiently sharp to suggest a cutting tool, and the points bear evidence of being blunt from use rather than from being so chipped. Arrowheads equally as unsymmetrical and carelessly chipped are figured in the works of both American and European archaeologists, and the writer has gathered many of just such specimens in New Jersey. They can scarcely be considered as unfinished, as they are found singly, scattered wherever the more elaborately fashioned ones occur, and are not at all like the "failures" found upon the former sites of ancient arrow-maker's workshops. It seems probable that when found singly, on the surface, they were made in the field to meet an emergency, or were designed for occasions where the danger of loss was unusually great. As the specimens here figured were taken from ancient graves they are very likely finished implements.

FLINT KNIVES.—Among the earliest wants of savage man, and the most necessary to his very existence, is a cutting implement. Nothing in the way of clothing could well be made without some means of cutting the skins that were used, and a carcass could scarcely be made available for food until first disjointed and reduced to pieces of convenient size by the help of some kind of cutting tool. Almost any splinter of stone may be used, but the savage would be quick to discern a great difference in the value of chance splinters, some being almost worthless, while others were all his needs required, and, we now frequently find chance fragments of flinty stone that bear abundant evidence that they were long used as knives; but the finding of such stones at the moment a cutting implement was required was far too uncertain, and based upon their more primitive experience as to the relative values of certain stones with reference to their retention of sharp edges, artificially chipped flint knives were largely made, as we now know from their great numbers in every locality where stone implements of any description are found.

The specimens, therefore, that are here brought together, although from one locality, are of every variety of shape; and while some of them were, undoubtedly, solely used as knives, others pass imperceptibly on the one hand into typical arrowpoints, and on the other into scrapers. In endeavoring to distinguish between simple cutting tools and arrowpoints, it must be borne in mind that while one well-chipped knife would meet the savage man's requirements for a long time, he would need a great many arrowpoints either in hunting or warfare, and this, I think, renders it very probable that by far the larger part of all small chipped flints, if acutely pointed, were used as arrowheads. The circumstances, too, under which these several forms are met with in the Eastern States certainly favor this view; the rude, or knife-shaped arrowpoints being scattered over the whole country, while typical knives, *i. e.*, chipped flints not practicable to be used as arrowpoints, are met with usually in situations that from other circumstances are easily recognized as the sites of aboriginal villages.

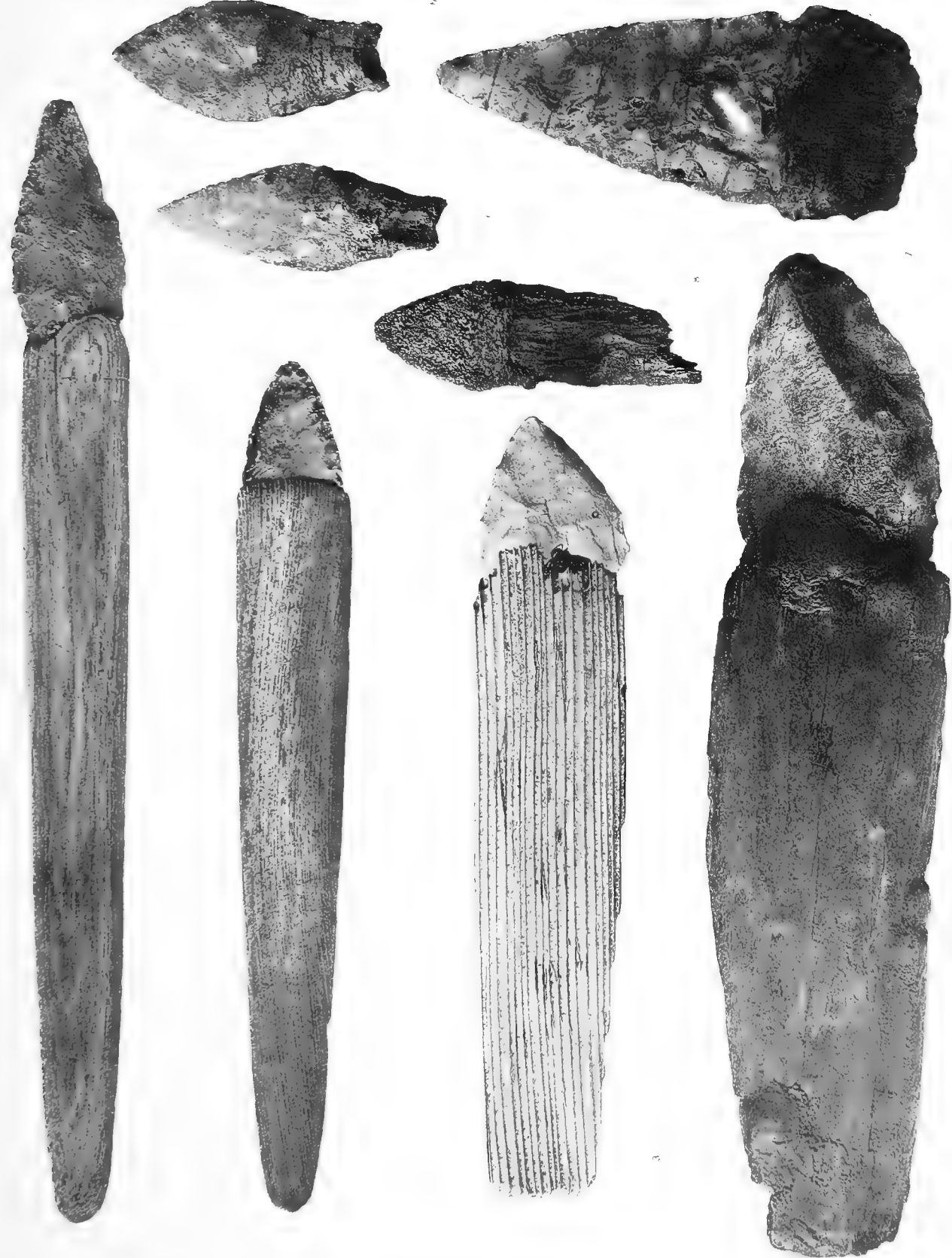
Plate IV represents a beautiful series of flint knives,* the blades of which are available as heads of arrows and spears. Either entire or broken,

* Fig. 8 is one with an iron blade, for comparison.

a handle of wood is still attached to each specimen. Fig. 4 would, I think, if found without a handle, be unhesitatingly classed as a cutting implement, the want of symmetry indicating such a use. Figs. 1 to 3 are of minimum size as knives, as their availability, even for cutting skins, would be greatly diminished if any smaller. These examples are not particularly regular in outline, or otherwise well wrought, and certainly by no means exhibit the same care that is so marked a feature of many of the arrowpoints proper. These specimens were obtained near Santa Barbara and on Santa Cruz Island by Mr. Schumacher, and, with the exception of Figs. 3 and 6, are in the National Museum. Fig. 3, from Santa Barbara, is in the Peabody Museum (No. 13582), and Fig. 6, from Santa Cruz Island, is also in the Peabody Museum (No. 13583). Figs. 5 and 6 are exceptionally well wrought, Fig. 5 being made of white quartz, and more acutely pointed than any of the accompanying specimens. If not attached to the handle the blade would be doubtlessly classed as an arrowpoint. Fig. 7 is of jasper, and its shape suggests the possibility of its being a spearpoint. These knives, as mentioned, are still attached to their original wooden handles, which are now more or less entire, and are held in place by the use of asphaltum. They are identical in every respect with the stone knives in the National Museum obtained by Maj. J. W. Powell from the Pah-Ute Indians. It is a curious fact that no stone knives with handles attached were found by Dr. Yarrow's party at either La Patera or Dos Pueblos. Dr. Yarrow informs me that he has seen a photograph of a knife, found by Mr. Bowers on the island of San Nicholas, which differs from those figured on Plate IV in having a flint point at each end of the redwood handle.

As a substitute for the asphaltum used by the Californians to secure the stone points to their handles, some other less durable substance was probably used on the Atlantic coast, and has now wholly disappeared from the specimens, especially as certain chipped flints that are believed to have been knives, must, to have been available, have been securely attached to handles of at least the size of these Pacific coast specimens, which measure from four to six inches in length.

Other than the hafted knives figured on Plate IV, are eleven specimens that present a considerable range both in size and shape.

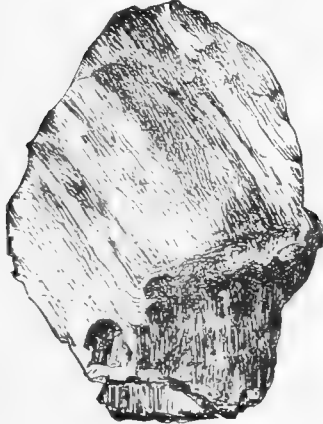


KNIVES IN HANDLES OF WOOD FIGS. 1-7 STONE FIG. 8 IRON FROM SOUTHERN CALIFORNIA FULL SIZE.

THE HISTORIC PHOTOGRAPHIC SERVICE, DISTRICT OF COLUMBIA, D.C.

Fig. 2 represents a well-chipped knife of striped grey flint, having a flat, well-defined base, and the sides tapering to an obtuse point. The under

FIG. 2.



Flint knife.

surface is much flatter than above, although not the plane of a single cleavage. The cutting edges show well-marked secondary chipping. A fragment of the handle, held by asphaltum, is still attached. This specimen is of much interest, as it is of precisely the same shape, size, and material of hundreds found along the Atlantic coast. An identical form is common in Great Britain, where they are usu-

ally referred to as "trimmed flakes," a truly descriptive name, but which does not convey any knowledge of

FIG. 3.



Flint knife.

the use of such "flakes," which is known to be for cutting.

Fig. 3 is closely allied to the preceding, but less labor has been put upon it. The original concavo-convex surfaces of the chip have not been wholly flaked away, but simply the edges made available by secondary chipping, which are, however, very irregular in outline. Like the preceding, this specimen also preserves traces of the asphaltum by which it was formerly united to its handle.

FIG. 4.

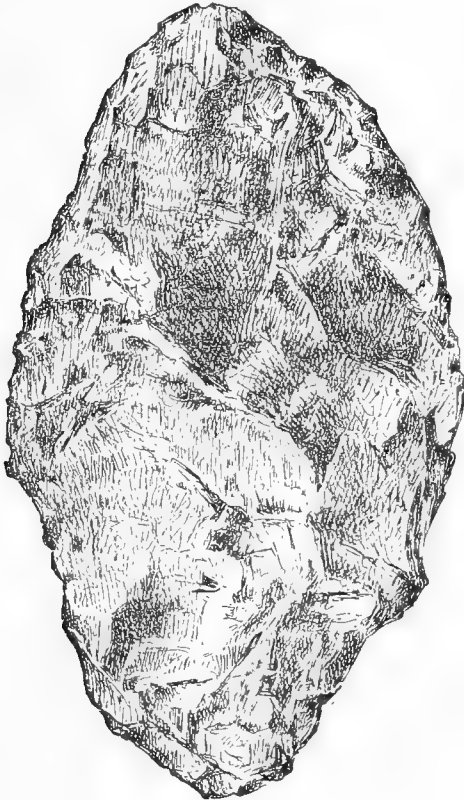


Flint knife.

Fig. 4 represents a specimen of cutting tool presenting many differences from the typical knives

we have been considering. This specimen is nearly square in shape, two of the angles being quite prominent. One of these has been the point of the blade, the other, at which the bulb of percussion is very distinct,

FIG. 5.



Flint knife.

and to which the asphaltum still clings, was inserted into the handle of the implement. This knife is formed from a flake presenting upon one side a single plane of cleavage, and but two planes are upon the other. The cutting edge has been produced by minute secondary chipping, which extends back less than one-fourth of an inch. This subsequent chipping is upon both sides, and gives the margins a dull but quite straight cutting edge. Long use may have made them more blunt than when first chipped, but if as sharp as when finished, the specimen approaches closely that class of implements known as "scrapers," although the peculiar bevelled edge of a true scraper is quite different from that of this specimen.

Chipped jasper and chert specimens, of this general outline and of like dimensions, occur frequently in the "finds" of the Middle and Southern States, and are also common to Great Britain, where they have been described as "horse-shoe" and "oyster-shell shaped scrapers."

Fig. 5 represents a rudely-chipped jasper implement bearing some resemblance to several different, well-worked forms of stone implements. The under side presents a uniform surface; the upper, that shown in the illustration, is ridged and somewhat chipped over the whole surface. The curved margin of one side is brought to a well-defined cutting edge, and is quite sharp; the opposite, straighter side is much more blunt and somewhat fractured. Probably but the one side has been used. The base is still

discolored by traces of the asphaltum, which either held in place a wooden handle, or is what remains of a large rounded mass, which was itself grasped as a handle.

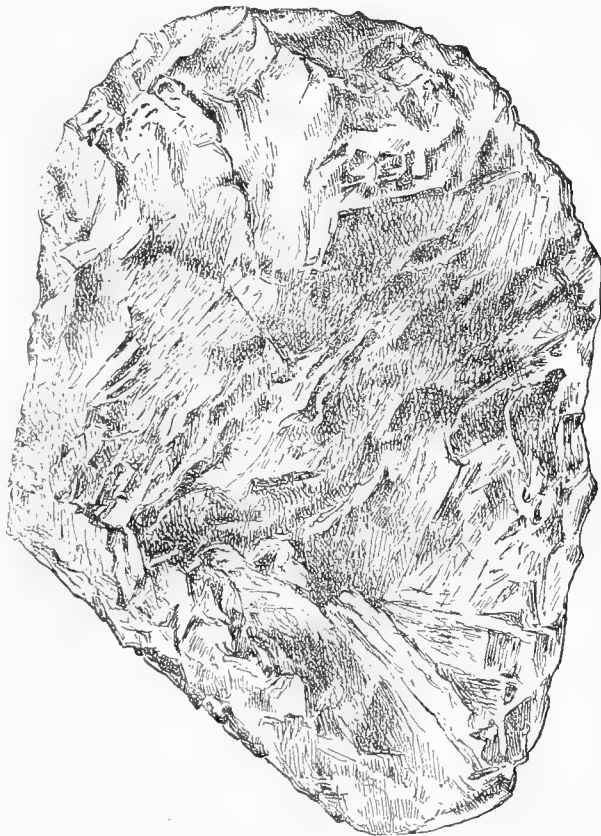
Except for this trace of asphaltum at the base, this specimen might readily be considered an Eastern or Southern chipped flint. It is scarcely less rude than many of the primitive implements of argillite and allied minerals found in the gravel beds of New Jersey, and bears much resemblance to them.

The similarity to European specimens, both from the "drift" and from the surface, is very marked, and is a good example of the uniformity of chipped flints of the more primitive types that obtains throughout the world.

Fig. 6 represents one of those puzzling shapes of artificially-chipped flints that may be considered any one of several forms; yet in all respects like no one of them. While classing it here as a cutting tool, it may be a true scraper. The specimen has the end and both sides quite evenly flaked, and the under surface (that shown in the illustration) is very smooth and a single surface.

There is no trace of asphaltum, and nothing otherwise that indicates its having ever been attached to a handle. The oblique base has been caused by a fault in the mineral, and is not a subsequent fracture. It is evidently a finished implement, though it may not have been designed for a knife or cutting implement of any kind.

FIG. 6.



Flint knife.

Fig. 7 represents a diminutive knife-blade, such as occur in all parts of the country. Carefully chipped from bluish-green jasper, the cutting

FIG. 7.



Flint knife.

edges are all well defined, while the base terminates in a blunt point. Securely fastened to a wooden handle, this little specimen would be an excellent knife, and its shape is one better adapted to cutting than are the sharply-pointed, leaf-shaped knives figured upon Plate IV.

Fig. 8 represents a second specimen of this pattern of small knives, but which, in this instance, is much less distinctly knife-shaped; being more

FIG. 8.



Flint knife.

nearly circular, and equally wrought upon both sides, it has not as well defined and uniform edges as the preceding. There is no trace existing of any attachment to a handle, and the general appearance of the edges seems to indicate that, for whatever purpose the specimen was designed, it has never been put to use. The material is obsidian, or some closely allied mineral.

Circular knives or implements of this pattern, made of jasper, have occasionally been found in New Jersey, which are not only more symmetrical in outline, but are chipped with greater care, and so have better

FIG. 9.



Flint knife.

defined cutting edges. Their size is very uniform, and varies little, if any, from that of the specimen here figured. In classifying these specimens I have followed the custom of other writers, and called every chipped implement a knife, the use of which we cannot readily determine.

Fig. 9 closely resembles the preceding, but is made of jasper. Along the straight base the specimen is quite thick, but tapers rapidly to the edges, which are sharp. Possibly projecting from what now constitutes the base there may have been a stem to act as a handle, or to which a handle was fastened. Stemmed knives of this pattern are not uncommon in the Atlantic coast States, and are all characterized by unusual care in their manufacture.

Fig. 10 brings us to a pattern of cutting implements, often designated simply as "trimmed flakes." This specimen is a thin flake of pale-brown jasper, two and three-fourths inches

in length, and less than one inch in greatest breadth. Having a square base and a well-defined point, and somewhat thinner along one side than the other, this speci-



Flint knife.

men has much in common with the blades of modern knives. Along the edges extends a very delicate secondary chipping, producing slight serrations which are possibly intentional. This form of knife, also, is quite characteristic of the "finds" in the Middle and Southern States, and occurs frequently in England and in some of the caves of Southern France.

It has been reported that the Rev. Stephen Bowers has discovered some chipped flint knives in the vicinity of Santa Barbara, more delicately fashioned and smaller than any described in this paper. These are scalpel-like in form, and extremely sharp along the cutting edge.

FLINT FLAKES.—Simple fragments of a flint pebble, whether produced by natural or artificial means, can scarcely be looked upon as stone implements, although, when the edge was sufficiently sharp, such a splinter or flake might readily have been utilized. If a large number of such flakes, of varied forms and sizes, are found in a limited locality, they mark the site of some ancient workshop, where flint implements of different patterns were made, especially when associated with broken arrowheads and other forms.

Fig. 11 represents a flake wholly different from any of the preceding knives and knife-like specimens. There is an entire absence of secondary chipping, and its outline being so illy adapted for cutting purposes, I am inclined to believe it was not used as an implement. Flakes of identical size, shape, and mineral are very common in the Middle States, especially

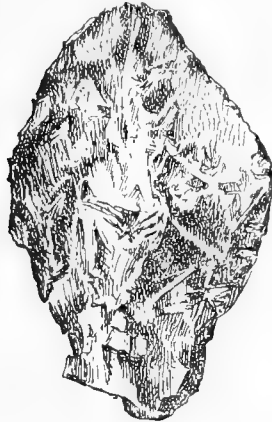
FIG. 11.



Flint flake.

on village sites; where implements generally have been chipped. Singly this form does not often occur, showing, I think, it is a chance flake only.

FIG. 12.



Flint flake.

There is a general resemblance running through this pattern of chipped flint and the spoon-shaped scrapers; but the absence of smoothed or bevelled edges enables a distinction readily to be made.

Fig. 12, likewise, is a chip or flake only, but one so similar in outline to Fig. 2 that it might well have been used as a cutting tool. The difference between the two, however, is quite marked. The one has a well-defined secondarily chipped cutting edge; the flake, Fig. 12, has but the naturally thin edge, characteristic of a splinter of flint of allied mineral.

IMPLEMENTS FOR DRILLING: PERFORATORS.—The ordinary stone drill, so common in the Atlantic coast States, and occurring in numbers in the Oregon shellmounds, as shown by the beautiful specimens collected by Mr. Paul Schumacher (Peabody Mus., No. 7636), is not represented by any specimens from Dos Pueblos, although the existence of the Oregon specimens renders it probable that they were in use by the California coast tribes.

Another and almost unique form was met with, however, which, for want of any definite knowledge of its use, is here provisionally described as a drill or perforator, the distinction being drawn between the two that drills were used in boring in stone, and so were rapidly worn away, while a perforator was intended for making holes in softer substances. This distinction may, indeed, not be warranted, but the variation in the character of these pointed flints suggests this difference in their use.

FIG. 13.



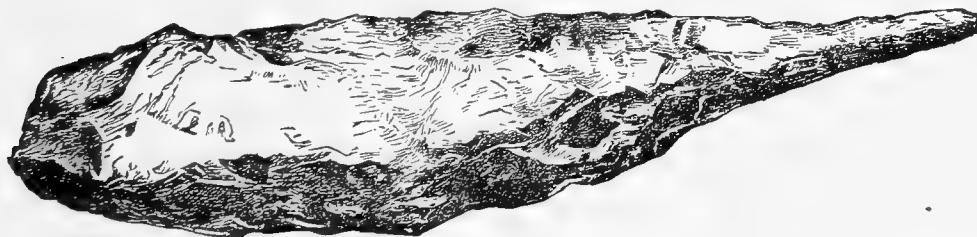
Flint drill.

Fig. 13 represents a beautifully worked implement of opaque grey

flint, five and three-fourths inches in length, distinctly triangular in section and originally acutely pointed at each end. This specimen is so wholly unlike any that the writer has seen from other localities, that he offers nothing but conjecture as to its use. The specimen is not unique; one, "almost an exact copy," being obtained by Mr. Schumacher (Nat. Mus., No. 18165) on the island of Santa Cruz, California. The specimen, of which Fig. 13 is a representation, was obtained at Dos Pueblos, and when found was in one of the tubular pipes. There appears upon the sharper end of this slender implement a somewhat polished surface, which leads to the supposition that it has been used as a drill for some softer mineral than itself, although it is difficult to see what advantage the regularly-wrought triangular sides would have over a drill of the ordinary shapes, except, perhaps, for boring serpentine pipes. Not until many more of these beautiful specimens of flint work are exhumed, and every circumstance connected with their discovery noted, will it be safe to hazard any opinion concerning them. If simply drills, they should be quite common on former village sites, as are the common Eastern forms of that implement. The apparent rarity of their occurrence does not suggest any commonplace use to which so elaborately wrought a flint was put.

Fig. 14 represents a drill or borer, as we suppose it to be, of mammoth dimensions, and is from San Miguel Island. (Nat. Mus., No. 18256.) It measures nearly ten and one-half inches in length, and is a

FIG. 14.

Flint drill. $\frac{1}{2}$.

trace over two inches in average width. Two inches of its length, that most carefully chipped, is less than one-half an inch in width, and this portion, like the whole length of the preceding, is triangular in section. Judging from the well-worn and polished point on a similar specimen from Santa Cruz Island, Mr. Schumacher (P. M., No. 9302), it is presumable that this

specimen has been used for drilling in stone. A noticeable feature of this implement and of others, as the one referred to above, and a third in the National Museum (No. 18305), Fig. 15, from Santa Cruz Island, is the

FIG. 15.



Quartz drill.

three-sided stem, as already mentioned. This peculiarity gives the appearance of this drill being really an unfinished specimen of Fig. 13, and also indicates that triangular drills were those commonly in use. If so, Fig. 13 is properly classed. (See description of "Pipes," on a subsequent page.)

It is scarcely possible to determine the particular use of any flint tool, unless we can find associated with it some finished weapon, implement, or ornament which shows that just such a tool as found is absolutely necessary or eminently adapted to fashion it. In such a case, there is little doubt as to the proper designation to give the specimen.*

The material of which Fig. 14 is made is a dense, opaque, greyish-white flint, that readily yields to delicate flaking, and of itself suggests no reason why the drill proper should have attached to it so unnecessarily heavy and rough a base.

* Other forms of these large drill-like implements have been collected on the islands by Mr. Schumacher and Mr. Bowers. Some of them approximate the rude chisels, and it is very probable that these large implements were used for many purposes besides that of drilling, among which was that of digging out the steatite pots.—F. W. P.

Fig. 16 represents a delicate splinter of flint. Similar splinters of chert and jasper are quite common everywhere, and it seems probable that they are only a natural product of the chipping of masses of these minerals, when fashioning various implements. They might readily be utilized as awls, or perforators of substances soft as leather; and attention has been called to similar flakes in Europe, as allied to, or identical with "the flint flakes of bone harpoon heads occasionally found in Scania," which "are also made of extremely small flakes" (Evans). Inasmuch as fishing was doubtless a prominent occupation of the California coast tribes, and as these splinters of flint are quite abundant, it is quite probable that such fragments were put to several uses, as the one above suggested, but no trace of usage exists upon the specimen figured, or any of the accompanying smaller ones.



FIG. 16.

Flint flake.

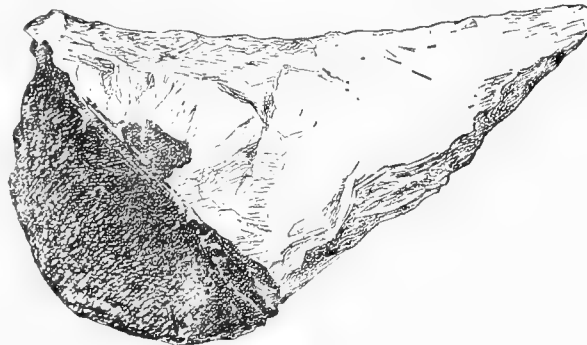


FIG. 17.

Implement of quartz with handle of asphaltum.

Fig. 17 represents a chipped implement of white quartz, found by Mr. Schumacher on Santa Cruz Island (Nat. Mus. No. 18302), that bears some resemblance to the large drill, but which to a greater degree recalls the paleolithic implements of Europe. This tool or weapon, as the case may be, measures a little more than three inches in length, by two in breadth. It is quite smoothly chipped upon its three sides, but is not acutely pointed. Its broad and thick base is covered with a mass of asphaltum, smooth and fitted to the hand.

Oval pebbles of the same size, and larger, with a similarly chipped point at one end, but with the other preserving the natural surface of the stone, are not uncommon to New Jersey and more southern States. These, having an unworked base, would answer the purpose of the specimen represented by Fig. 17, if, as we suppose, the asphaltum attached was intended solely to give the hand a better hold.

MORTARS AND PESTLES.

BY C. C. ABBOTT.

THE stone mortars, with and without accompanying pestles, from the graves at Santa Barbara, vary greatly in size. The workmanship expended upon them, more especially the larger examples, shows that their value as vessels for preparing food was the principal object in view, and so that they met that requirement, they were all that was desired. No attempt at ornamentation by incised lines occurs in the series; a feature common to a few of them, indicating attached decoration, will be noticed hereafter. From other localities, however, examples with a few deeply incised lines have occurred.*

The majority of these mortars are made of a hard sandstone, but many of them are cut out of boulders of basaltic rock.

The general shape characterizing these vessels is like that of a modern Wedgewood mortar; and the modifications from a typical specimen are but slight. Fig. 18, and Fig. 2, Plate V. In many, the opening is the greatest diameter; in others, it is equal to it; but the sides are extended upward without inclination. Some few have the sides of the vessel inclining inwards.

The size varies from nearly two feet in diameter by a foot in depth, to examples as small as five inches in diameter by two inches only in depth.

The largest specimen collected was obtained from the graves at La Patera, and is of hard compact sandstone. It is regularly made, and very symmetrical in shape. The entire surface is pecked and subsequently smoothed, or has been worn smooth by use, both exteriorly and interiorly.

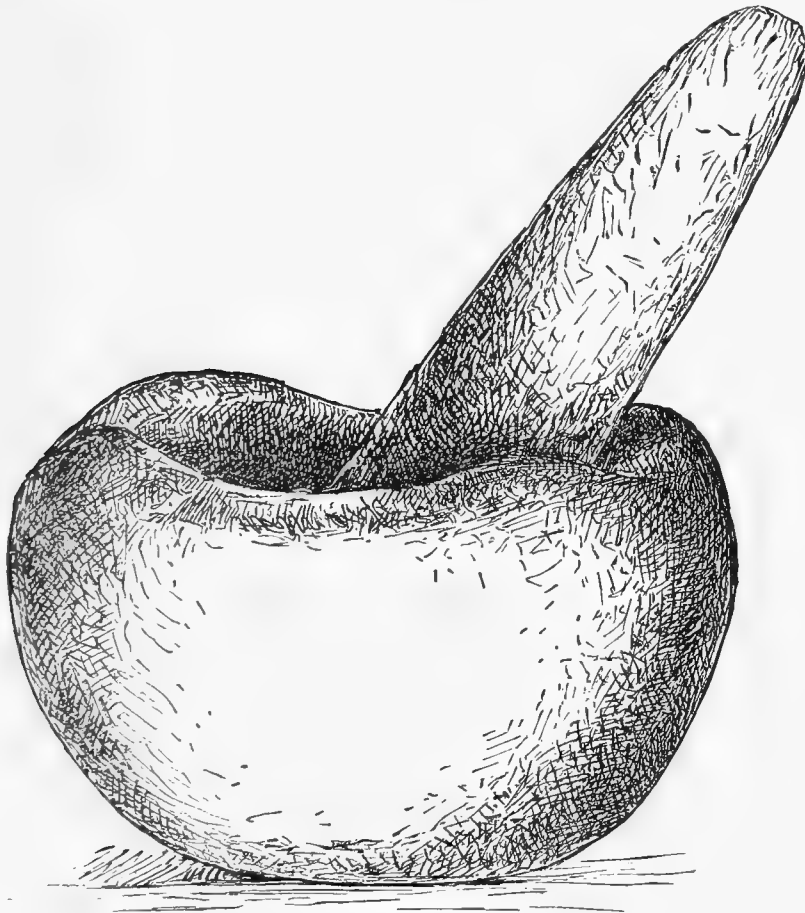
* Native Races of Pacific Coast; by H. H. BANCROFT, vol. iv, p. 701. Also: Smithsonian Contributions, No. 287, p. 39, Fig. 157.



STONE VESSELS FROM SOUTHERN CALIFORNIA
 $\frac{1}{4}$ DIAMETER

There is a well-marked projecting rim, a feature not common to mortars of this size as a class. The projecting edge, being both within and without it, in the first instance, adds materially to the value of the vessel, in preventing the pounded seeds or grain from being spilled. In time, however, this inside rim is nearly or quite worn away by the casual rubbing action of the pestle.

FIG. 18.

Mortar and pestle of stone. $\frac{1}{2}$.

The measurements of this specimen are as follows: Greatest diameter, 22.2 inches; height exteriorly, 14.4 inches; depth of vessel inside, 11.1 inches; thickness of rim, 1.8 to 2 inches.

Another large specimen from La Patera, made of a medium hard sandstone, is quite regular in outline, wide at the top, and with a comparatively

broad and flattened bottom. The surface, as in the preceding example, has been pecked to its present shape, and purposely smoothed, or worn so by use. There is also a projecting rim, but extending inside only. On this projecting rim are ten short longitudinal grooves, which were intended, as other specimens have shown, for attaching, by means of asphaltum, cypreas, and fragments of abalone (*Haliotis*) shell. These were intended, of course, for ornaments only.

This mortar varies but little from the preceding in exterior measurements, though of smaller capacity. The diameter is 20.8 inches; height exteriorly, 10.2 inches; depth of vessel inside, 8.9 inches; breadth of rim, 1.6 to 1.9 inches.

It may be possible that these large ornamented mortars were used for ceremonial more than for useful purposes, as utensils so ornamented, if in every-day use, would, probably, not long retain the laminæ of so fragile a shell as the *Haliotis*.

A third specimen from La Patera is more in common with the general character of these Californian mortars. This example is made of a medium hard sandstone, and has a uniformly pecked surface. In outline, the mortar is regular, with a slightly defined rim extending along the inner edge.

The greatest diameter is 20.5 to 21 inches; the height outside, 12.6 inches; depth of the vessel inside, 9.5 inches; the breadth of rim, 1 to 1.5 inches.

A specimen of these large mortars varies from the preceding in being shallow and more basin shaped. This example is made of medium hard dark sandstone. It is very regularly shaped, the surface uniformly pecked. The bottom is flattened for a small portion only. The rim extends inwardly about .2 of an inch.

The measurements are as follows: Greatest diameter, 20 inches; height, outside, 9.2 inches; interior depth, 7.8 inches; thickness of rim, 7.8 inches.

A fifth example is also of compact sandstone partly scaled off in many places, probably owing to alteration chemically of the material subsequent to burial. The outside, as in all these large mortars, is pecked over the entire surface. The bottom is flattened, but is not so broad as in others. The rim slopes inward, but is not very sharply defined.

This example measures as follows: Greatest diameter, 18.6 inches; height, exteriorly, 12 inches; depth of vessel inside, 10.1 inches; breadth of the rim, 1.5 inches.

In the following example we have almost a duplication of the preceding; also of sandstone, with the bottom somewhat flattened, and with the edge extending inwards. The interesting feature is, in this case, the fact of a small piece of the mineral having become detached and replaced and then fastened by means of asphaltum. This method of repairing injuries will be better described in noticing other specimens.

The measurements are as follows: Greatest diameter, 17.3 inches; height, exteriorly, 11.3 inches; depth of vessel inside, 9.3 inches; breadth of rim, 1.5 inches.

A mortar quite similar to the preceding, but in every measurement except the breadth of the rim, about one inch less, has the rim sloping outward, and in this are six short grooves; but now without asphaltum, which still adheres to many specimens from the same and neighboring localities.

The measurements are as follows: Greatest diameter, 17 inches; height, exteriorly, 10.2 inches; depth of vessel inside, 8.8 inches; breadth of rim, 1.3 inches.

Another, considerably larger, of the same material, with the rim projecting inwards, has but two depressions on opposite sides, one of which is partly broken away.

The measurements in this example are: Greatest diameter, 21.5 inches; height, exteriorly, 12.6 inches; depth of vessel inside, 10.1 inches; breadth of rim, 2 inches.

Still another, showing the character of an overlapping rim, has the same projecting rim both outwardly and inwardly, and wants the depressions referred to in the other specimens. This is made of a softer sandstone.

The measurements are as follows: Greatest diameter, 17.5 inches; height, exteriorly, 10.1 inches; depth of vessel inside, 7.1 inches; breadth of rim, 1.5 to 1.75 inches.

Another example from Dos Pueblos, of very regular shape, has neither the projecting rim nor the depressions. It is noticeable, in this connection,

that the surface is quite rough, the pecked surface being in no degree worn away, or intentionally smoothed.

The following are its dimensions: Greatest diameter, 21.6 inches; height, exteriorly, 13.1 inches; depth of vessel inside, 10.9 inches; breadth of rim, varying from 1.7 to 2 inches.

A specimen of these larger mortars, from La Patera, has upon its rim four pieces of asphaltum for attaching shell ornaments. It is of the usual hard sandstone, pecked into shape, and now quite smooth.

The measurements are: Greatest diameter, 16.5 inches; height, exteriorly, 12.6 inches; depth of vessel inside, 9.5 inches; breadth of rim, varying from 1 to 1.5 inches.

Another example, of the same general outline, and also made of medium hard sandstone, has the surface pecked quite smooth. The bottom of the vessel is not flattened.

There is a portion of the rim wanting, but it is seen by the remains of the asphaltum that it had been put back and mended by the aid of that material. The rim of this specimen has nine grooves for holding the asphaltum by which ornaments were attached, and traces of it still remain in two of the depressions.

The measurements of this mortar are as follows: Greatest diameter, 15.5 inches; height, exteriorly, 10.9 inches; depth of vessel inside, 8.7 inches; breadth of rim, 1.2 inches.

A want of the usual symmetry is shown in a large mortar of soft sandstone, which, however, is quite smooth upon its surfaces. The rim is undulating and slopes outwards.

This specimen, which is from La Patera, measures in greatest diameter 14 to 15 inches; height, exteriorly, 8.1 inches; depth of vessel inside, 6 inches; breadth of rim varying from 1 inch to 1.3 inches.

An interesting specimen of these larger mortars is one made of moderately dense sandstone, having the surface pecked, but not smooth. The bottom is irregularly flattened. On the rim, which is slightly undulating, and slopes outwards, are four small bunches of asphaltum, but without the usual grooves for its reception. This material, however, was doubtlessly so placed for the one purpose of holding ornamental objects on the rim.

The dimensions of this mortar are: Greatest diameter, 14.4 inches; height, exteriorly, 9 inches; depth of vessel inside, 6.9 inches; breadth of rim, 1.2 inches.

An example of these large mortars, of nearly the same dimensions, is made from hard granitic or basaltic rock. It is very regular in its shape, and evenly pecked over its exterior surface. The bottom is flattened and quite smooth, evidently from long use. The rim is quite even, with a slight outward slope. An interesting feature is the careful mending of the vessel by securely replacing a portion of one side by means of asphaltum.

The measurements of this specimen are as follows: Greatest diameter, 14.2 inches; height, exteriorly, 9.5 inches; depth of vessel inside, 7.7 inches; breadth of rim, 1.2 inches.

Allied to the above is a broken specimen of dense granitic rock, quite regular in form and with the usual pecked surfaces. The bottom is flattened. The rim projects outwardly slightly, and its inner edge is worn by the movement of the pestle.

This mortar measures in greatest diameter 14 inches; height, exteriorly, 8.8 inches; depth of vessel inside, 7.6 inches; breadth of rim, varying from 1 to 2 inches.

A mortar of less diameter, but somewhat larger capacity, of comparatively regular shape, well finished and smooth, with the rim slightly sloping outwards, and worn on both the outer and inner edges, is of hard, fine-grained sandstone.

Its measurements are: Greatest diameter, 13.5 inches; height, exteriorly, 10.5 inches; depth of vessel inside, 8.3 inches; breadth of rim, 1 inch.

Another example, made of soft sandstone, and smooth upon the surface, is moderately regular in outline. The rim is much worn, slightly sloping outwardly, and undulating. The bottom is worn from long use.

This mortar measures in greatest diameter 13.5 inches; height, exteriorly, 7.1 inches; depth of vessel inside, 5.1 inches; breadth of rim, 1 inch.

Another, of nearly the same dimensions, is made of medium hard,

dark sandstone, with the bottom curved. The surface is smoothed both on the inside and out. The rim is slightly undulating, and has nine grooves for ornaments, such as we have noticed on several of the preceding specimens.

This mortar measures, in greatest diameter, 13 inches; height, exteriorly, 7.3 inches; depth of vessel inside, 5.2 inches; breadth of rim, 1 inch.

An example, of nearly the same size, is of regular form, with rounded bottom, and made of medium hard sandstone. The edges are undulating, without any well-defined projection of the rim.

This specimen measures, in greatest diameter, 13 inches; height, exteriorly, 8 inches; depth of vessel inside, 5.5 inches; breadth of rim, 1 to 1.5 inches.

An interesting specimen, made of very hard sandstone, is noticeable for its great regularity of shape, and in having nine depressions, each about two inches in length, on the rim, which is slightly cut underneath on the inside.

The measurements of this mortar are: Greatest diameter, 12.5 to 12.75 inches; height, exteriorly, 7.1 inches; depth of vessel inside, 5.1 inches; breadth of rim, 1 inch to 1.25 inches.

One example, showing perhaps a greater care in the finish than is usual among the larger sizes, is made of fine-grained, hard sandstone. It is regular in its shape, with surface evenly pecked. The rim projects inward slightly, and is flat and even.

The measurements of this specimen are: Greatest diameter, 12.7 inches; height, exteriorly, 8 inches; depth of vessel inside, 6.3 inches; breadth of rim, 1 inch.

The description of the above specimen will apply very well to another example which is nearly of the same size, but has a smaller flattened base. It is of dense granitic rock, regular in shape, and has the characteristic pecked surface.

The dimensions are: Greatest diameter, 12.5 inches; height, exteriorly, 9.1 inches; depth of vessel inside, 6.2 inches; breadth of rim, 1 inch.

A very beautiful example of these mortars, made of dense, fine-grained gray sandstone, is basin-shaped, and wrought with great care. It is very symmetrical, with an even rim, sloping inwards.

It measures, in greatest diameter, 12 inches; height, exteriorly, 6.2 inches; depth of vessel inside, 4.3 inches; breadth of rim, 1 inch.

Another, of the same diameter, of hard sandstone, and the surface uniformly pecked, is of regular shape, and with a flat rim. In this specimen there is a circular hole, about one inch in diameter, evidently worn or broken through the bottom, which has been mended by filling up the space with asphaltum; its doubtless served in this condition simply as a receptacle.

The dimensions of this mortar are: Greatest diameter, 12 inches; height, exteriorly, 6.6 inches; depth of vessel inside, 6.6 inches; breadth of rim, 1 inch.

An example made of soft, fine-grained sandstone, is of regular shape, and has smooth surfaces, with the bottom well finished and flattened. This has the rim sloping outwards, and is somewhat basin-shaped.

The dimensions are as follows: Greatest diameter, 12 inches; height, exteriorly, 6.6 inches; depth of vessel inside, 4.3 inches; breadth of rim, 1 inch.

A somewhat smaller specimen is made of soft sandstone, and has its surfaces smoothed. It is regular in outline, and the rim originally was regular and even, but is now much worn and undulatory. The bottom also is well worn, indicating that the specimen had been long in use prior to its being placed in the grave from which it was taken.

The measurements are: Greatest diameter, 11 inches to 11.5 inches; height, exteriorly, 7.1 inches; depth of vessel inside, 5.8 inches; breadth of rim .7 to 1 inch.

A mortar of fine-grained but not very soft sandstone, of a dirty gray color, is quite regular on the sides and bottom, but has the rim uneven. The bottom is very flat. The characteristic pecked surface is partially smoothed.

The measurements are: Greatest diameter, 11.2 inches; height, exte-

riorly, 5 to 5.8 inches; depth of vessel inside, 4 inches; breadth of rim, 1 inch.

An interesting example of an ornamented mortar obtained at La Patera, is of fine-grained, hard sandstone. It is carefully made, regular in shape, with the one exception that the sides are not of uniform height. It is flattened upon the bottom. On its uneven rim are four grooves, each about 1.7 inches long; and in each there still remain portions of a shell (*Cypræa*) which had been thus placed as an ornament.

The measurements of this specimen are: Greatest diameter, 11 inches; height, exteriorly, varying from 5.6 inches to 6.8 inches; depth of vessel inside, 4.7 inches; breadth of rim, 1 inch.

A specimen, of somewhat smaller size, is of hard sandstone, with the surface uniformly pecked, and is very regular in shape. The bottom is flat, and very smooth from use. The rim, which is quite even, projects slightly inside. The edges are much worn from long use of the mortar.

This mortar measures: Greatest diameter, 10.5 inches; height, exteriorly, 6.6 inches; depth of vessel inside, 5.2 inches; breadth of rim, 1 inch.

A similar specimen from Dos Pueblos, with a somewhat less bulging outline, is of hard sandstone, and quite smooth on the exterior surface. The shape is regular; but the rim has been much fractured, apparently at different times, from ordinary usage.

This specimen measures 10.5 inches in its greatest diameter; height, exteriorly, 7.6 inches; depth of vessel inside, 5.9 inches; breadth of rim, .8 of an inch.

An example of the medium-sized, coarse-grained sandstone mortars has the sides more vertical than usual, and having also a flattened bottom, is somewhat cylindrical in appearance.

This specimen, which is from La Patera, measures 9.6 inches in greatest diameter; height, exteriorly, 6.6 inches; depth of vessel inside, 5.2 inches; breadth of rim, .8 of an inch.

A similar specimen from Dos Pueblos, but with somewhat smaller capacity, made of hard, fine-grained gray sandstone, differs principally in having the bottom less flattened.

The measurements are: Greatest diameter, 9.5 inches; height, exte-

riorly, 6.6 inches; depth of vessel inside, 4.4 inches; breadth of rim, .7 of an inch.

A smaller specimen, also from Dos Pueblos, of soft, fine-grained sandstone, is regular in outline, smooth upon the surface, and flattened upon the bottom.

The measurements are: Greatest diameter, 9 inches; height, exteriorly, 6.8 inches; depth of vessel inside, 4.9 inches; breadth of rim, .6 of an inch.

An interesting specimen from Dos Pueblos, Fig. 12, Plate V, of fine-grained gray sandstone, of medium density, is regular in its shape, and with the rim sloping outwards. The inner edge of the rim projects inward, along the larger portion of the circumference; but in some places is much worn, and almost obliterated, probably from the wearing action of the pestle. This mortar has had a large piece broken from the bottom, which has been replaced, and secured by the use of asphaltum. Probably no further use had been made of the vessel as a mortar, subsequently to being mended, as the asphaltum shows no trace of battering; and, indeed, could not withstand a blow from a pestle. As simply a receptacle for pigment or for seeds, etc., it retains its usefulness, and is still discolored by traces of the red powder common to many of the smaller vessels. Thus repaired, it doubtlessly was considered equally as good as an unbroken one for holding articles placed in the grave.

This specimen measures: Greatest diameter, 8.5 inches; height, exteriorly, 3.8 inches; depth of vessel inside, 2.8 inches; breadth of rim, 1 inch.

An example from Dos Pueblos is made of very soft sandstone, which seems too friable to be able to withstand the ordinary rough usage to which most of these mortars were subjected. This specimen was originally quite regular, but the stone has scaled off in many places. It has the rim sloping outward.

The measurements are: Greatest diameter, 7.6 inches; height, exteriorly, 4.4 inches; depth of vessel inside, 3.3 inches; breadth of rim, .6 of an inch.

When found, this mortar was filled with the fine black seeds of *Salvia Columbaria*. These seeds have been found in receptacles of various kinds

and placed with other articles in the graves. It was unquestionably used as food by the Indians of former times as well as of the present, and its presence indicates one of the uses to which the mortars were put.

The identification of this seed is by Dr. J. T. Rothrock, botanist of the Expedition, from whose report on the Botany of the Expedition, p. 48, we take the following abstract:

“During the summer of 1875 my attention was called, while in Southern California, to a mealy preparation in popular use among the Indians, Mexicans, and prospectors. On inquiry I found it was called “Chia.” Further examination proved that it was furnished by the seeds of *Salvia Columbaria* Benth. The seeds are collected, roasted, and ground in the native way between two stones. This puts it in the condition in which I first saw it. It is used as a food by mixing it with water and enough sugar to suit the taste. It soon develops into a copious mucilaginous mass, several times the original bulk. The taste is somewhat suggestive of linseed meal. One soon acquires a fondness for it and eats it rather in the way of a luxury than with any reference to the fact that it is exceedingly nutritious besides. It is in great demand among the knowing ones who have a desert to cross or who expect to encounter a scarcity of water, and what there is of bad quality. By preparing it so thin that it can be used as a drink it seems to assuage thirst, to improve the taste of the water, and in addition to lessen the quantity of water taken, which in hot countries is often so excessive as to produce serious illness. As a remedy it is invaluable from its demulcent properties in cases of gastro-intestinal disorders. It also holds a place among domestic remedies for the same purpose that flaxseed occasionally does with us, *i. e.*; a grain of the seed is placed in the eye (where it gives no pain) to form a mucilage by means of which a foreign body may be removed from the organ. I have found it of great service as a poultice. As a matter of archaeological interest it may be noticed that quantities of this seed were found buried in graves several hundred years old. This proves that the use of the seed reaches back into the remote past. Indeed, I find several allusions to the name Chia in the second volume of Bancroft’s great work on the “Native Races of the Pacific States,” pp. 232, 280, 347, 360. *Chianpinoli* appears to have been made by the so-called Aztec races from corn which was roasted and ground as the Chia was. Chia was among the Nahua races of ancient Mexico as regularly cultivated as corn, and often used in connection with it. Indeed, it was one of the many kinds of meal in constant use, and which appear to have gone then as now under the generic name of pinoli.”

Dr. Yarrow informs me that these statements as to the uses of Chia are corroborated by one of his diggers living in Santa Barbara, who at once recognized the seed when first discovered in the graves, and then and there mentioned the various ways in which it was used at the present day, particularly as a demulcent drink, and for placing in the eyes when it was desired to remove obnoxious foreign substances or inflammatory action.

A mortar of hard sandstone, pecked on the exterior surface, and of regular shape, has the rim much worn. In this specimen there is a hole about 2 inches in diameter broken through the bottom, apparently from a blow of the pestle, when in use as a mortar. This hole has not been mended, as was done in one of the preceding examples.

The measurements are: Greatest diameter, 7.5 inches; height, exteriorly, 5.6 inches; depth of vessel inside, 4.8 inches; breadth of rim varying from .5 to .8 of an inch.

A small, fine-grained sandstone mortar, of regular shape, and not flattened on the bottom, has the rim sloping outwards, and irregular or uneven, as though accidentally chipped at different times when in use. It is slightly discolored inside by red pigment, and with a few black scales that are apparently asphaltum. This mortar contained, when found, portions of a human lower jaw.

The measurements of this mortar are: Greatest diameter, 6.1 inches; height, exteriorly, 2.6 inches; depth of vessel inside, 1.8 inches; breadth of rim, .6 of an inch.

A specimen (Fig. 13, Plate V) of hard, fine-grained, light-colored sandstone, is regular in shape, with the bottom flattened. The sides are more vertical than is usual with this class of stone vessels.

The measurements are: Greatest diameter, 6 inches; height, exteriorly, 7.1 inches; depth of vessel inside, 5.4 inches; breadth of rim, .8 of an inch.

A marked variation in form is seen in a specimen made of fine-grained and very hard, light-colored sandstone. It is regularly made and much rounder than many others, the greatest diameter being below the opening.

The measurements, which of themselves explain its peculiarities, are: Greatest diameter, 6.5 inches; at the opening, 4.3 inches; height, exteriorly, 4.1 inches; depth of vessel inside, 2.4 inches; and with no distinct rim.

A second example of this form, but smaller, of fine-grained and very hard, light-colored sandstone, is equally well made.

The measurements of this specimen are: Greatest diameter, 5.5 inches; at the mouth, 3.8 inches; height, exteriorly, 3.3 inches; depth of vessel inside, 1.8 inches; no distinct rim. Presented by D. A. Miller, Esq.

A mortar of the more usual form, of the same material as the majority

described, is regularly shaped, but has a portion chipped off the side near the bottom ; perhaps accidentally detached in making the vessel.

The measurements are : Greatest diameter, 5.8 inches ; height, exteriorly, 3.8 inches ; depth of vessel inside, 2.3 inches ; breadth of rim, .6 of an inch.

A smooth, hard sandstone mortar from La Patera is quite irregular in shape, and has the rim very undulating.

The measurements are : Greatest diameter, 4.8 inches by 5.5 inches ; height, exteriorly, 4.6 inches ; depth of vessel inside, 3 inches ; breadth of rim, .5 of an inch.

A very symmetrically shaped specimen (Fig. 11, Plate V), of hard, fine-grained, light-colored sandstone, has the bottom very flat and distinct from the sides on the outside, but curved and continuous with the sides on the interior. There is marked uniformity in the width of the rim and thickness throughout the sides and bottom of the vessel. There is some discoloration from the characteristic red pigment that may have been pulverized in many of these mortars ; and one of this size was probably used more for this than any other purpose.

The measurements are : Greatest diameter, 5.1 inches ; height, exteriorly, 2.8 inches ; depth of vessel inside, 2.1 inches ; breadth of rim, .5 of an inch.

The detailed descriptions above given of forty-four examples of these mortars, varying from what may be considered the maximum to the minimum sizes, in connection with the several illustrations, give a good general idea of their range of variation, not only in size, but in shape and style of decoration. Except as exhibiting proofs of excellent mechanical skill, great patience, and long-continued labor, as a class these productions of aboriginal art are not particularly attractive objects.*

Similar forms of vessels appear to be unusual in other localities in North America ; their place being taken by an occasional small example of

* The Rev. Stephen Bowers, in a MS. entitled "Aboriginal Man in Santa Barbara County, California," as I am informed by Dr. Yarrow, mentions having found mortars different in shape and form from any here described, which had on the sides square projections left in the carving by which they could be lifted. As none of these have reached either the Smithsonian Institution or Peabody Museum, a more detailed description is impossible.

a hollowed pebble that has been, perhaps, used as a paint-cup for toilet purposes, and by simple receptacles of pottery.

Regarded as mortars for preparing food and reducing mineral pigments to powder, these vessels are represented in the interior and on the Atlantic coast by objects for like purposes, but of two distinct forms; one being natural hollows in stationary rocks, known as "pot-holes," which are also found in California,* and, the other, irregular boulders of portable sizes (such as Fig. 5, Plate V) that have more or less deeply worn depressions on one or both sides; a third form of mortar, at one time in very common use, was made of wood. To these we need not further allude.

Dr. Yarrow has given me the following interesting information in relation to some ancient mortars found near the site of his excavations: "Just in the rear of Mr. Thomas More's ranche-house mortars were found in a gulch, made by rain and erosion, that were nearly like Fig. 5, Plate V, but larger; others were almost identical with the metates used by the Pueblo Indians and Mexicans, and nearly all, if not all, had been used until a hole had been worn through the bottom. Some of these articles had been covered with 8 and 10 feet of earth. No skeletons or bones, no vessels of steatite, in fact nothing but the remains of grinding-stones, were discovered. It was intended to fully explore this locality, but circumstances prevented further work here. All of these mortars were oblong in shape, and made of sandstone. The largest were quite 24 inches in length. Mr. Bowers has also found similar mortars or grinding-stones, but with feet."

The large sandstone mortars found in the graves were made from blocks of stone and from boulders. Many of the smaller ones give every appearance of being ordinary oval, water-worn pebbles, that have been laboriously pecked out upon one side until a maximum capacity has been obtained

* Mr. Powers mentions that the Yokuts, who inhabit the central portion of the State, use holes in boulders as mortars:

"They say that in remote times they were accustomed to rub their acorns to flour on a stone slightly hollowed like the Mexican *metate*, which was a suggestion of the mouse; but nowadays they pound them in holes on top of huge boulders, which was a suggestion of the wiser coyote. On a boulder in Coarse Gold Gulch I counted eighty-six of these acorn-holes, which shows that they must have been used many centuries."—*Tribes of California*, p. 376.—F. W. P.

consistent with the strength necessary to withstand the violent pounding and rubbing action of the pestle.

Mortars of this character, in some instances, are quite irregular in shape exteriorly, the pebble utilized remaining unaltered; and when the depression is circular in outline there is a great variation in the thickness of the sides, especially when oval pebbles were selected. Others again have the hollow of the same shape as the pebble used. Such small examples as these, not worked upon their exterior surfaces, most nearly approach the Eastern forms of stone mortars, and are essentially the same, except in size, with the toilet cups already referred to.

Mr. Schumacher writes to the Peabody Museum as follows, in describing the manufacture of the large stone mortars:

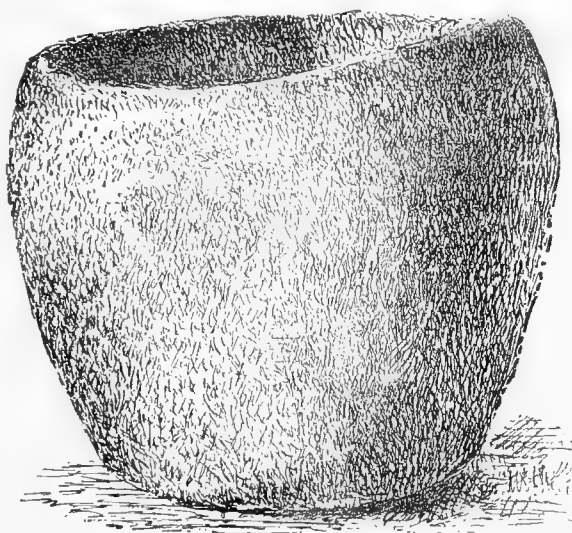
“On the southwestern shore, near the southeast end of San Clemente island, where a fair landing exists, we found a station prominently located on a shallow dune, about a mile below what is known as Chinese Point. To this place large numbers of beach-worn boulders of basalt of different sizes had been brought, mostly such as were best suited for the manufacture of mortars. Some of the rocks were broken in the rough state in the attempt of splitting off a section of the globular form to make a surface in which to cut the hollow; others of a more convenient semi-circular form, bore marks of the chisel, as, in one instance, a circle, outlining the intended size of the basin. Some broke in the hands of the worker, while working the basin; and one, we found had been abandoned on account of a flaw in the rock. The work of shaping the stone was first done with the hammer consisting of a piece of hard rock, especially of quartz, of about a pound in weight, with sharp edges and points. Persistent well-directed blows with such a hammer, applied either direct with the hand, or attached to a handle, will detach even large pieces with sufficient accuracy to form, if the tendency of cleavage is properly taken in consideration; while the finishing and smoothing of the surface was done by directing the hammer vertically against the face, the same as the serrated hammer of the modern stone-cutter is used. The basalt rock, although very hard, is of a crumbling nature and will granulate easily under a pointed hammer. We found, therefore, but few chisels on the sites of the workshops of Clemente island, which were applied more for working out the basin, when the hammer could not be conveniently used. When of sandstone, the common material of the mortar, which is softer, and, instead of being brittle like the basalt, is more adhering or tougher, I believe, the chisel has been used to a greater extent, as indicated by the sharper peck-marks. Judging the progress of work by the advance of a single stroke of the hammer or chisel, I am of the opinion, a neat mortar of common dimension—twelve inches in diameter—did not require more than a week's work; and a pot made of soapstone probably did not require so long a time, not however including the detachment of the mass from the ledge, which probably took another week's labor.”

Dr. Yarrow thinks that Mr. Schumacher's statement as to the time required to make a mortar with stone implements is much underrated; for while at San Ildefonso, N. Mex., he was requested by an Indian squaw to loan her a geological hammer to hollow out a large block of stone (hard sandstone), and at the end of a week, with constant work of several hours daily, she had only made an excavation about two inches in depth. The mortar was about twelve inches in diameter and the hammer had a steel cutting edge

Fig. 19 represents, of actual size, one of several diminutive mortars or cups of sandstone, which we have thought proper to describe in connection with the ordinary mortars, inasmuch as they were doubtlessly used for similar purposes; although these very small vessels were probably designed and used principally for holding and grinding small masses of mineral pigment. Pestless small enough to use in connection with these little mortars have been found associated with them in the graves; although any ordinary cylindrical pebble could have been used as a pestle.

This mortar or cup shows the same careful workmanship that characterizes many of the small cups of serpentine (see Plate VI, Figs. 1, 7, and 11), and is smoother upon its exterior surface than the large mortars above described. The principal difference between this and the two following specimens, and such cups made of serpentine as will be subsequently described, is that the bottoms and sides at the base are much thicker, and evidently intended to withstand the blows and crushing force of a pestle; and again the bottoms are rounded and not angular on the inside, so that every particle of the contained pigment or other substance could be reached and crushed by the curved end of the pestle.

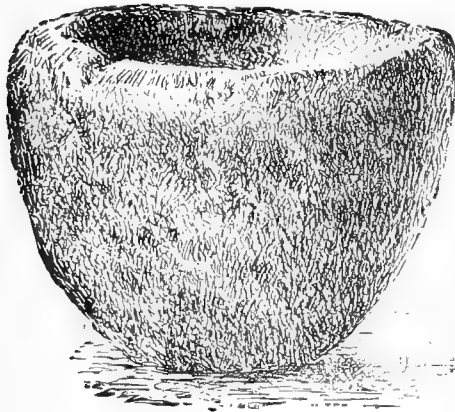
FIG. 19.



Small stone mortar or cup.

Fig. 20 represents, also of actual size, another of these diminutive mortars. This specimen has likewise been shaped with great care, and is very

FIG. 20.

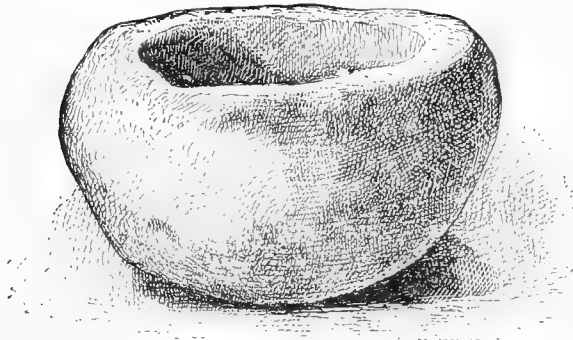


Small stone mortar or cup.

symmetrical. The bottom is flattened; the sides gently curved outwards; the rim level and quite smooth. The pecked surface, characteristic of the larger mortars, is very distinguishable on this little example of this form of stone vessels, indicating a like method having been adopted in making this as in those of the largest dimensions.

Fig. 21 represents the least, in size, of the series of mortars, and yet it has in every particular the features that characterize the largest examples. The material, however, instead of being sandstone, as are the preceding, is serpentine. The base is not flattened, but curved in continuance with the sides. The rim is very broad and flat.

FIG. 21.



Small stone mortar or cup.

The cavity is not deep, so that the bottom is much thicker than in the preceding two small mortars, above described. The interior surface is still discolored with red paint, and we are thus shown the use, or one use at least, of this small stone vessel, which not only was available for preparing a small portion of the

paint for ready use, but convenient as a receptacle for it until needed by its owner in preparing his toilet. In consideration of the exceedingly limited capacity of many of these stone vessels, it is highly probable that they were sometimes made more for the amusement of children than for use by adults, especially as miniature weapons, and imitations of domestic utensils are frequently made by savages as playthings for their children.

Of whatever size, the vessels to which we have here called attention

were used in connection with cylindrical stones which were usually worked into their present shapes with great care, and many of them are ornamented at the upper end. These implements are known universally as Pestles, or the pounding stones by which the material, whether intended for food or for pigment, is reduced to meal or powder, as the case may be. They are common, not only to the locality where the carefully wrought mortars occur, but throughout all North America. Those from the Pacific coast show, in many cases, the same care in their manufacture that characterizes the mortars; but, as a class, they are not so readily distinguished from the examples found along the eastern coast as are the associated mortars.

While great length, uniform and regular shaping throughout, whether truly cylindrical or tapering, are features at once noticeable of very many, these highly finished examples present but little variation. There is seldom a trace of ornamentation proper; the pointed or rounded heads, as they may be called, with their projecting collars, being evidently more for use than for ornament. One marked exception has, however, been noticed by Mr. Henshaw on a pestle obtained at La Patera, which is about the size and shape of the one represented by Fig. 25. Lines crossing each other have been cut over its surface, and, although now nearly worn away, they are in places sufficiently distinct to show that a rude ornamentation, similar to that on many other articles here described, formerly existed.

Fig. 22 represents a carefully wrought example of these pestles of about the maximum size. It is made of a moderately dense, dark-colored sandstone; is comparatively smooth, but still retains the slight depressions or hammer marks made in shaping the specimen. It is 24.5 inches in length, and 9.2 inches in circumference at the lower or rounded end. At a distance of two inches from the end by which the pestle was held by the hands, there is a double collar, or ring, with a shallow circumferential depression one-half of an

FIG. 22.

Stone pestle, $\frac{1}{2}$.

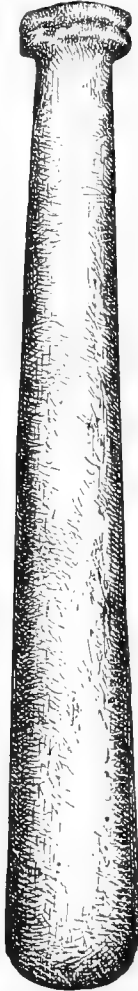
inch in width. This projects about one-fourth of an inch from the body of the pestle, and may possibly have been used for suspending the implement.

Fig. 23 is similar to the one represented by Fig. 22, but is three inches shorter, and nearly one and a half inches less in circumference at the end. It is made of a much harder mineral, is of darker color, and quite

FIG. 23.



FIG. 24.



highly polished; but still retains traces of its originally pecked surface. The head has the collars one inch and a half in width, and the depression separating them is much deeper than in the preceding example.

Fig. 24 is but three-tenths of an inch shorter than the preceding, but varies in both finish and mineral, being of much softer sandstone than either of the others. It has received little or no polish, and is still pitted with the marks of the hammer stone. The projecting collars at the head are more prominent than in the foregoing examples, but have the separating depression less defined. These collars also, in the present instance, are at the extreme end of the implement; but a slight swelling or elevation about their centre, above, may really be a trace of a continuation of the cylindrical body of the specimen that has been broken off, and the fractured surface subsequently worn down to its present condition. The pounding or crushing end of this pestle is somewhat battered, and one large flat splinter has been broken off.

Stone pestles, $\frac{1}{2}$.

Fig. 25 represents a long, symmetrical pestle, made of medium dense sandstone. Either through use or by design it has been polished over the entire surface, and in many places the pecked surface has been obliterated. Evidently, however, the stone has considerably decayed since its burial in a grave, as it is now almost too soft to use for the purposes for which it was intended.

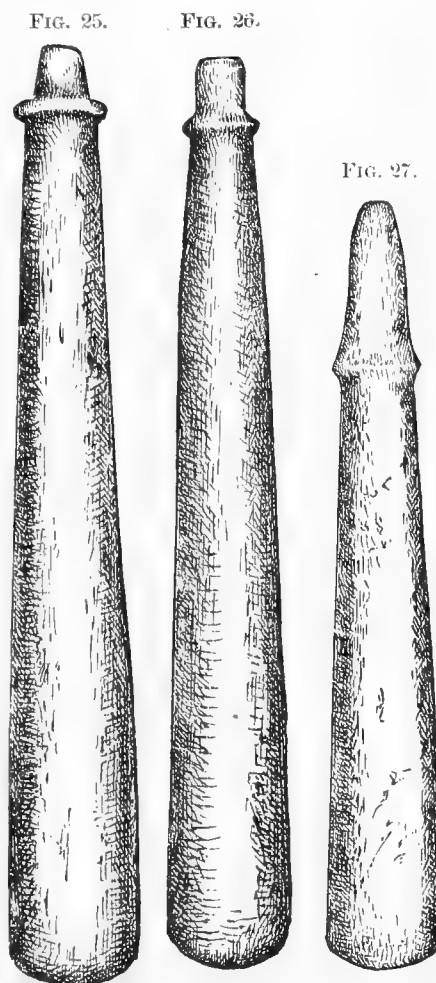
This example varies from the foregoing in having but a single collar, which is well defined; and beyond this the pestle extends a little over an inch, with uniformly decreasing diameter, but terminates in a blunt point.

The pounding end is somewhat more bulging than in the others, is well worn, but not battered, and appears to be of denser structure than the head, or has escaped some destructive agent to which other portions have been exposed.

Fig. 26 represents a pestle, half an inch less in length, and a little smaller in its greatest diameter than the one last described. While in general shape it is quite similar, the material of which it is made is much more compact, and the implement, although smaller, is heavier. It has considerable polish extending over much of its surface, but not obliterating the marks of the pecking or hammering by which it was reduced to its present shape. In common with the preceding, it has a single projecting collar at the head, beyond which the stone extends, of a uniform cylindrical shape, for one inch.

Fig. 27 represents a somewhat smaller specimen, that in general outline closely resembles pestles which have been found in interior and eastern localities. This specimen measures 8 inches in circumference at the end, and gradually decreases in girth from near the end to what I have termed the head. The projecting ring or collar is not so prominent as in the preceding examples, and, quite unlike all the others, is much farther from the head, being about three and three-fourths inches distant.

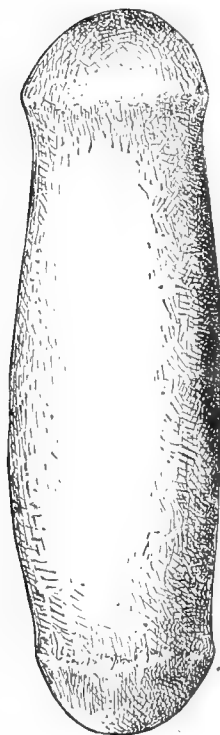
Besides the specimens here described in detail there are many others



Stone pestles, $\frac{1}{2}$.

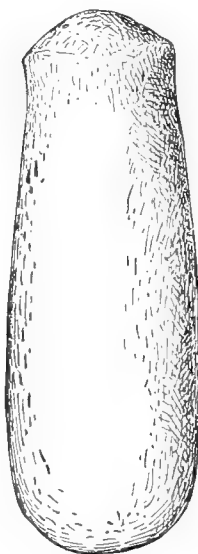
of more or less careful workmanship, and also several which are apparently water-worn cylindrical pebbles that have not been altered in shape, although

FIG. 28.

Stone pestle, $\frac{3}{4}$.

they exhibit traces of hard usage by their battered ends; others have been wrought with the same care as the large specimens here figured, and differ from them only in size; thus exhibiting, as do the mortars, the same care in the

FIG. 29.

Stone pestle, $\frac{1}{2}$.

manufacture of the smallest examples as of those of the greatest dimensions. Several of the rude pestles are represented by Figs. 28, 29, 30, and 31.

The one use of these pestles is so evident that it seems scarcely necessary even to refer to it, and only the *method* of their use, in connection with the projecting collars or rings of some, need be mentioned. This feature clearly, in the large specimens, is for use and not merely ornamental. By it the pestle could have been suspended by a cord to an elastic branch of a tree; and, again, it effectually prevents the hand from slipping, if used either solely by the lifting power of the arm, or in connection with the limb of a tree, as suggested.

Schoolcraft* refers to one of the plates in his work as exhibiting "the mode of pounding maize by suspending the stone pestle from the limb of a tree, as practiced by the ancient Pennacooks of the Merrimack Valley, in New Hampshire," and adds, "the pestle was commonly ornamented by the head of a man or quadruped, neatly carved from greywacke or compact sandstone, the mortar being also of the same material." From this we learn that ornamentation proper occurs on some pestles of the largest size, though it is not common on the Santa Barbara specimens. The statement in the above quotation, that these pestles were "commonly ornamented,"

* History and Condition of Indian Tribes, Pt. IV, p. 175, pl. 21.

may be questioned. At least such are now quite rarely met with in comparison with the vast numbers of perfectly plain examples that have been

FIG. 30.



Stone pestle, $\frac{1}{2}$.

found in our fields. Referring to this ornamentation of pestles, we find it stated in the *American Naturalist*,* however, in commenting on a specimen of pestle, with a wolf's head carved upon it, from Vermont, that "in the collection of the New York State Museum, at Albany, there is a long pestle of identical pattern and same rough carving as the one described from the Burlington Museum. These are the only ones that have come under my observation having the

FIG. 31.



Stone pestle, $\frac{1}{2}$.

handles carved to represent animals, though most of the longer implements of this character have a knob at the handle as if for the purpose of suspension."

These knobs or collars at one end cannot be considered as constant features of pestles, as found in the whole extent of the Atlantic coast States. The writer has, as yet, never met with a specimen thus finished, in New Jersey, out of probably two hundred examples of this form of implement, though there are several examples in the Peabody Museum, from various localities in New England, that have such finished heads. It must also be mentioned, with reference to these domestic implements, that in the series of California specimens there are many with similar rings or knobs which are but 3 or 4 inches in length. In such cases this character may be rather for ornament than use, especially as these diminutive specimens may have been toys, and not designed for practical work. Finally, it may be well to call attention to the marked similarity between these small collared and knobbed examples and many of the so-called plummetts or fishing-line sinkers.

These pestles of all sizes have been obtained by all collectors on the

* *American Naturalist*, Vol. V, p. 12. (Foot-note by F. W. P.)

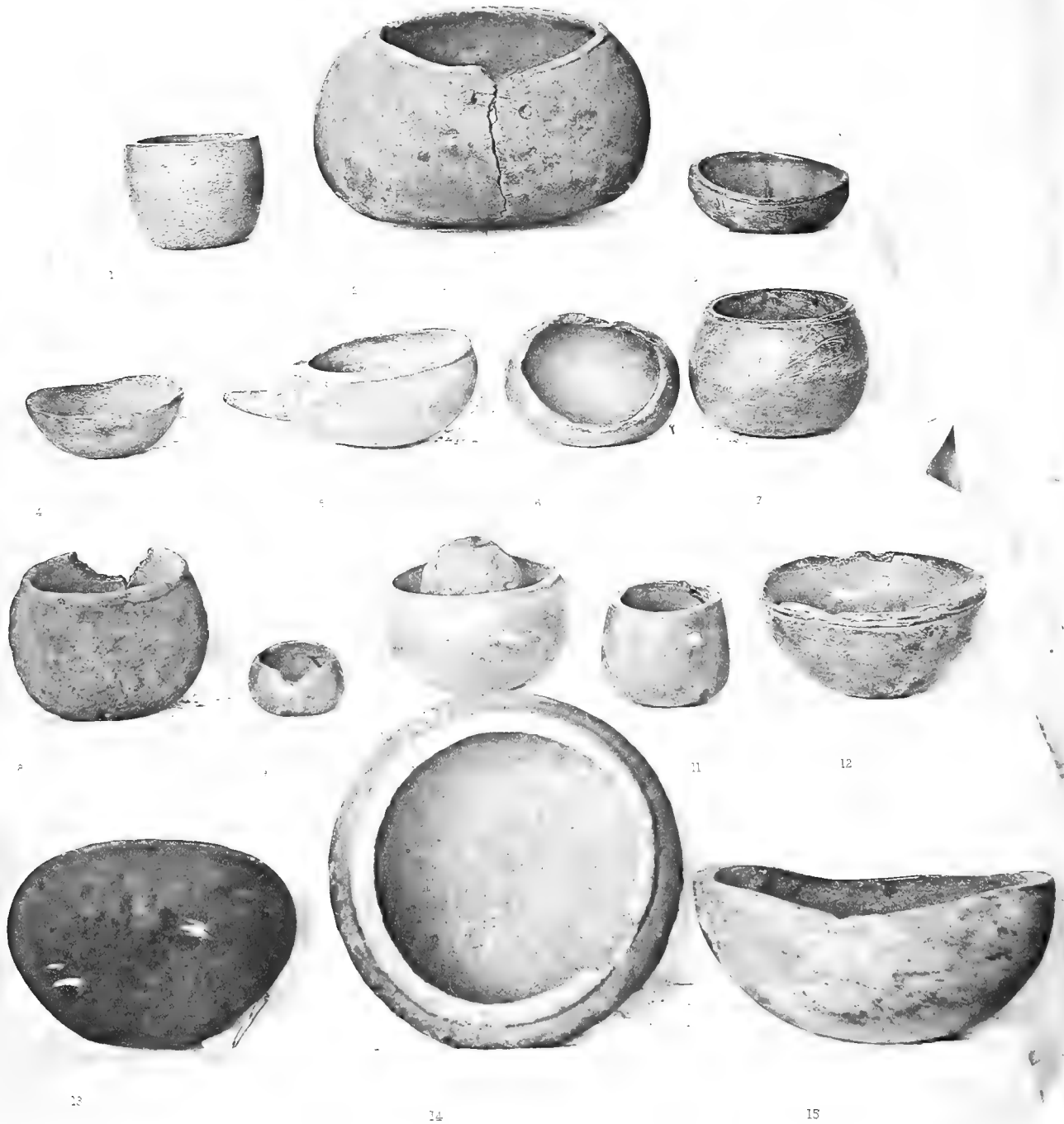
California coast, and are more numerous than the mortars. Particularly is this true of the smaller kind and those of comparatively rude finish. The largest and best finished were found at Dos Pueblos and La Patera, and these have been selected for the illustrations.

My attention has been called to a small book,* in which the author, on page 62 *et seq.*, endeavors to show that some of the large pestles found in California are emblems of phallic worship. He considers the pestle as a phallus, and a round, shallow mortar, figured in the text, as representing the *yonî* or female organ.

It is hardly necessary to add that such deductions are simply ridiculous, and, even should we find pestles, or other articles, so carved as to represent the male organ, they might well be considered simply as examples of savage obscenity or fantasy.

* | The | Masculine Cross | and | Ancient Sex Worship | by Sha Rocco | New York : | Asa K. Butts & Co., 36 Dey Street | 1874. |





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VESSELS OF STEATITE AND SERPENTINE. SOUTHERN CALIFORNIA.
¾ DIAMETER

STEATITE COOKING POTS, PLATES, AND FOOD VESSELS.

BY C. C. ABBOTT.

THROUGHOUT the whole extent of North America the mineral known as soapstone or steatite was much sought after and utilized by the Indians as a material well adapted for many purposes, in consequence of its being wrought with little labor to any desired shape, and yet being sufficiently firm to withstand quite hard usage, while its adaptability for use in contact with fire is a valuable feature. Some of the most elaborate smoking-pipes are carved of this material; but it is in the large vessels for cooking food, especially, that its great value becomes evident; and such stone pots are not an unusual feature among ordinary Indian relics wherever found, although wherever the art of making pottery existed the majority of the cooking vessels were made of clay.

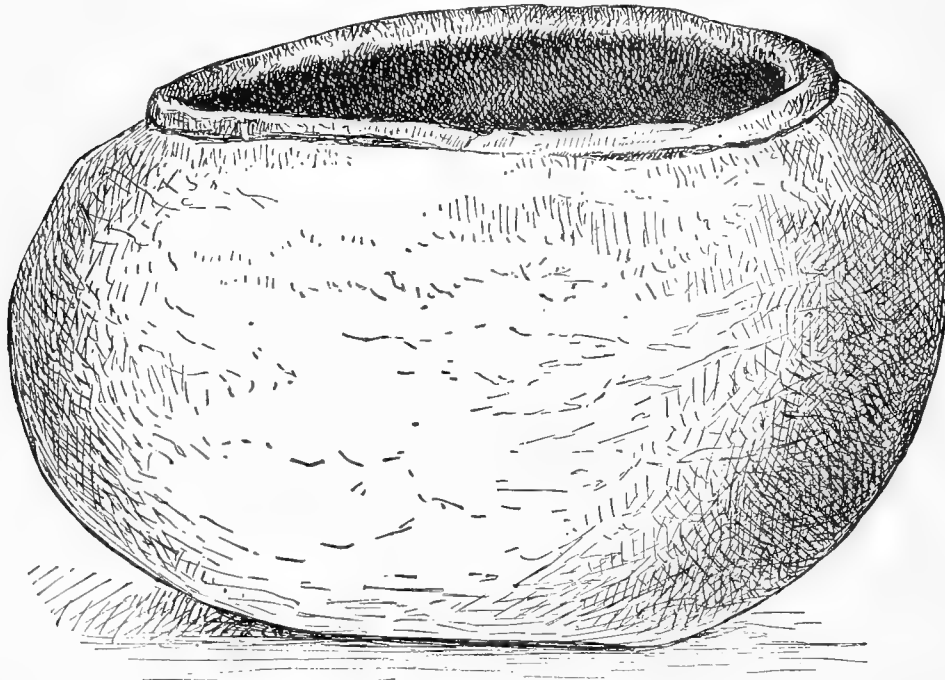
Where large deposits of steatite occur there will frequently be found traces of the ancient quarrying; and in the Peabody Museum is an interesting series of rude stone implements and fragments of steatite from near Christiana, Lancaster County, Pennsylvania, concerning which it is stated* "these tools are believed * * * to have been used by Indians of a comparatively recent time for the purpose of shaping the blocks of soapstone into dishes and pots, and are of interest in showing the use of very rude implements for certain purposes by a race quite far advanced in the stone age."

It is from the graves of Dos Pueblos and La Patera, however, and from the neighboring islands, that cooking vessels made of this material have been obtained which in size and general excellence of workmanship excel all others.

* F. W. PUTNAM in 9th Annual Report Peabody Museum, p. 16; Cambridge, Mass., 1876.

The several illustrations and following descriptions of a number of specimens will give an idea of the general character of these interesting productions of savage art. Figs. 32 and 33 represent the prevailing forms of the

FIG. 32.

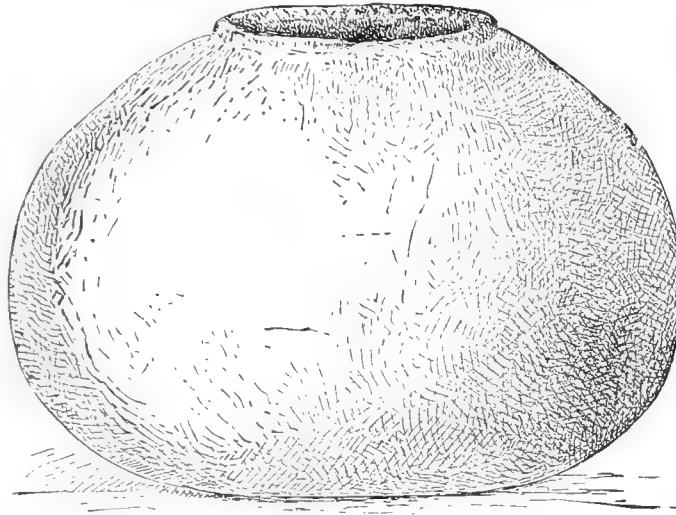
Steatite cooking pot, $\frac{1}{3}$.

large cooking pots. As will be seen by reference to the dimensions given, the same variation in size occurs in this form of domestic utensil as was noted when describing the large series of stone mortars. As a class they are uniformly well made, being smooth upon both their exterior and interior surfaces, but while there is a gradual lessening of the thickness of the walls, as they approach the opening or mouth, this is not always uniform. The bottom, however, whether the specimen be globular or with a flattened base, is always thicker than the rim at the mouth and the sides for some distance from it. While the greater number of these pots or *ollas* are globular in form, some examples have been found differing materially in shape. Of this character were two found at La Patera, but not at hand at the time these descriptions were prepared. Dr. Yarrow informs me that these were pyriform in shape, very handsomely finished, and had not been

exposed to fire. On the outside they were quite smooth, and had been colored with red pigment, which appeared to have been rubbed in. Their nearest resemblance is to Fig. 33.

Of a series of thirty specimens collected from the ancient graves of Dos Pueblos and La Patera, the largest example is globular in form, the bottom not being flattened to any appreciable extent. It has a small level rim around the mouth, and beneath it a series of incised lines forming half diamond figures, with the points directed outwards, and others with no regularity of direction. These lines

FIG. 33.

Steatite cooking pot, $\frac{1}{2}$.

are not now very distinct, but probably were well defined when the vessel was new. This specimen measures in its greatest diameter 17.6 inches; diameter of mouth, 7.5 inches; height, exteriorly, 13.6 inches.

A second example, differing only in size and in having the incised lines more distinctly cut about the rim of the vessel, which is of the same character as in the preceding, measures in its greatest diameter 16.3 inches; diameter of mouth, 5.6 inches; height, exteriorly, 15 inches.

A third specimen, somewhat smaller, but with a rim and ornamentation of incised lines immediately below it, as in the preceding cases, measures in its greatest diameter 16 inches; diameter of mouth, 5.2 inches; height, exteriorly, 13.4 inches.

The following example, besides being, in every dimension, somewhat smaller, is interesting from the fact of having no distinctly defined rim, nor trace of the V-shaped lines that constitute the ornamentation of these utensils. This specimen measures, in its greatest diameter, 15.5 inches; diameter of mouth, 5.8 inches; height, exteriorly, 12.5 inches.

One of the large pots of this series, when found, contained a number of human bones. This vessel had the flat-topped narrow rim around the mouth, common to many. The measurements of this specimen are: Greatest diameter, 15.2 inches; diameter of mouth, 6 inches; height, exteriorly, 13 inches.

A sixth example, still smaller in every dimension, except greatest diameter, has the ornamental lines incised on the rim itself, and not beneath it, as in the preceding examples. This specimen measures in greatest diameter, 15.2 inches; diameter of mouth, 5.2 inches; height, exteriorly, 12.4 inches.

A seventh, of less capacity, has no rim or trace of ornamentation. The measurements are: Greatest diameter, 14 inches; diameter of mouth, 5 inches; height, exteriorly, 12 inches.

A very interesting example of these large cooking vessels was taken from the ancient graves at La Patera, and was half filled with human bones. The mouth of this pot was closed by a lid which proved to be an intervertebral bone of a large cetacean, measuring 11 inches in diameter. The rim in this instance had no incised lines upon it. The measurements of this vessel are: Greatest diameter, 13 inches; diameter of mouth, 5 inches; height, exteriorly, 11.8 inches.

Another of these vessels, represented by Fig. 33, in perfect condition, and still much blackened beneath by contact with fire and smoke, has a well-defined rim with incised marks extending obliquely across it. The bottom of this vessel is flat on the inside, and concave exteriorly; thus making the base comparatively thin over a portion of its extent, but quite thick at the obtuse angle of the base and sides. This specimen measures as follows: Greatest diameter, 14.2 inches; diameter of mouth, 5.3 inches; height, exteriorly, 10.3 inches; height, interiorly, 9 inches. Locality: Dos Pueblos. (Peabody Museum, 9209.)

As a form intermediate between the large specimens, with a comparatively small mouth considering the greatest diameter of the vessel, Figure 32 may be taken as a representative example. This pot is not as regular in outline as is usual, and apparently less care has been taken with the exterior finish. The inside, however, is quite smooth. The bot-

tom is flattened, and on the interior is covered with a thin coating of asphaltum. The dimensions of the specimen here described are: Greatest diameter, 10 inches; height, exteriorly, 6.3 inches; diameter of mouth, 6.6 inches. Locality: Santa Cruz Island, California. Collected by Paul Schumacher. (Peabody Museum, 9273.)

Besides the several examples of the larger sizes of these vessels for cooking food are many of quite limited capacity, and which present many marked variations from the typical form, as represented by Fig. 33. This vessel may, indeed, be considered as an intermediate form, although some of the smaller specimens are but miniatures of the larger, as we stated when considering the stone mortars.

Fig. 2, Plate VI, represents a cooking vessel from La Patera in no important feature differing from the preceding, and is here brought particularly to notice as exhibiting the principal means employed in repairing a broken vessel of this character, so that it might be subsequently utilized as a receptacle for food. In the middle of the side exposed in the figure, there will be noticed an extensive fracture extending to the base of the pot, which is irregularly flattened. About one inch from the rim that surrounds the mouth of the vessel is a small hole drilled through the side, and on the other side of the fracture a second hole, but at a greater distance from the rim. Between these, a shallow groove has been cut, joining the two perforations. The inside of the vessel has a corresponding groove. Into these there has been poured melted asphaltum, which, when hardened by cooling, has formed a band of cement, holding the fractured edges together. It is not improbable that, previous to applying the asphaltum, a cord, either of some fibrous vegetable substance, as bark, or possibly a strip of skin or tendon of an animal, was first used to draw the edges together, the asphaltum poured over it, and thus added strength gained. A vessel thus repaired would, of course, be no longer available for cooking food, as the necessary exposure to heat would soften the luting; but rendered water-tight by this material they were valuable as receptacles for food, whether solid or liquid. Dr. Yarrow informs me that several of these ollas were dug up, the bottoms of which had been partially fractured, probably by

heat. They had a warped appearance, and no attempt had been made to repair them.

Fig. 14, Plate VI, represents a flattened, shallow cooking pot, quite similar to the preceding, but somewhat smaller. It is even more irregular in outline, and the bottom not flattened. The rim is well defined, level, and slightly overlapping the sides on the outside, and still more so interiorly. The characteristic V-shaped incised lines are very prominent. The measurements of this vessel are: Greatest diameter, 7.8 inches; height, exteriorly, 3.7 inches; diameter of mouth, 6 inches.

Fig. 13, Plate VI, shows the outline of a symmetrical and beautifully-designed example of these smaller vessels. Quite unlike the generality of these steatite cooking pots, this specimen has a small but carefully-flattened base, from which the sides extend upward with a gradual increase in their curvature, and then contracting suddenly, giving something of a flattened top in excess of the mouth of the vessel. There is a well-defined rim projecting above the level of the surrounding surface, but this has no trace remaining of incised lines, such as are common in this class of stone pots. This specimen contains three large masses of red paint,* and is much discolored by it, both outside and within; but beneath this can readily be traced, upon the exterior surface, especially the bottom, abundant evidences of long and frequent exposures to fire. The measurements of this small specimen are: Greatest diameter, 6 inches; height, exteriorly, 4 inches; width of base, 2.5 inches; diameter of mouth, 3.3 inches.

Fig. 3, Plate VI, represents a still smaller specimen, differing materially from the preceding in having the mouth of nearly as great diameter as its largest transverse measurements. There is a well-defined rim, formed by a deeply-incised line extending around the opening of the vessel at a uniform distance. This specimen is much more decomposed upon its exterior surface, from exposure to the fire, than any of the larger pots, and is also much encrusted with black scales of what appears to be an admixture of asphaltum and ashes or soot. This specimen, in size and general outline, closely resembles a series of small vessels of serpentine found asso-

* These masses of paint may have been placed in the pot for transportation simply, as these vessels were utilized in that way by the members of the party making the excavations. *

ciated with the large mortars and cooking vessels, to which we will shortly call attention.

Closely allied in use, although widely different in shape, are certain slabs of steatite of various sizes, for which the name "plate" has been suggested. These were called by the men employed by Dr. Yarrow *Tortilla* plates, they seeming to understand what use they had been put to by the Indians. These interesting utensils, as represented by the series collected, generally exhibit traces of exposure to fire upon the under surface, which is convex in many of the specimens. This indication of exposure to fire, taken in connection with the position of the one large hole drilled in each specimen, and the presence of a shallow rim extending around the sides of some of the quadrangular specimens—in some instances omitted on the end opposite that which is perforated—point conclusively, we think, to the fact of their having been used as pans for baking, being practically the same as modern "griddles," which at this time are largely made of the same material.* In this connection, it is well to add that the hole at one end was doubtlessly used, in connection with a crooked stick, as a means of drawing them from the fire.

Of a series of ten specimens, from the same general locality, each has a hole so placed as to give nearly or quite the maximum surface for spreading the food to be cooked. When a slab of steatite has been chosen for making one of these pans *de novo*, it is quite flat, regular, and usually quadrangular in shape, somewhat tapering at the perforated end, and with a carefully wrought rim slightly raised above the general surface. Such specimens have a slight convexity of the under surface. Many of these utensils are, however, evidently fragments of the larger steatite pots, such as we have just described. The curvature of many of these pans is the same as the sides of the larger examples of the cooking pots; and as they are quite irregular in outline, without marginal rims, which is replaced by the greater concavity of the upper surface, and have the hole for the supposed hook-handle variously placed, as determined by the outline of the slab, it is safe to infer that they are utilized fragments of large cooking pots.

* Mr. Schumacher proposes the name of *comali* for these stones, on which the *tortillas*, or thin cakes of bread made from various vegetable substances, were baked, somewhat after the manner of the Southern hoccake.—F. W. P.

Fig. 34 represents a carefully wrought and highly finished example of these stones for cooking food. Nearly rectangular in shape, one inch in thickness, and with more prominently raised margins than the others, this specimen may be considered as typical of this form of domestic utensil. It shows distinctly on the under side, and upon the end without the rim, marks of the fire by the blackening of the surface. This example measures at the upper or perforated end 7 inches in width; the sides are 10 inches each in length, and the width at the broader end is also 10 inches.

FIG. 34.



Stearite plate or baking stone, 4.

Another of these cooking utensils, while similar in general outline, is even smoother upon the upper side, and has the marginal elevated ridge extending around the four sides, which are slightly curved outward, the perforated end being most nearly straight. This specimen is quite thin, and slopes toward the edge at one of the lower corners, giving it the appearance of having become warped. It measures 6 inches in width at the upper end; is 12 inches in length on one side,

and 11.5 inches on the other; width at the lower end, 10 inches.

Another of these cooking utensils is of a much plainer pattern, and is probably a fragment of a large pot, squared and smoothed along the margins. The upper surface is concave. The upper or perforated end is narrower than the other, and the perforation, which is about .75 of an inch in diameter, is quite sloping at the circumference, being in general appearance a repetition on a larger scale of the countersunk holes in the so-called "twisting stones," and in many gorgets. One of the lower corners has been broken off, leaving an even, oblique fracture. The measurements of this specimen are as follows: Width of the perforated end, 2.5 inches; of the sides, which have a uniform outward curve, 9 inches; width of the end, 4.5 inches.

A fourth specimen is of the same general outline, but somewhat larger. It has a small concavity on the upper side and may be a fragment of a cooking pot, but probably it has been made from a slab of soapstone direct, as was Fig. 34. There is on this specimen a series of parallel lines, perpendicular in direction, deeply incised on the edge of the upper or perforated end. This ornamentation, if such it be, occurs on no other of the ten specimens of the series here described. The measurements of this specimen are: Width of the upper end, 4 inches; length of the sides, which have an outward curve, 10 inches; width of the lower end, 3.5 inches; of this and the oblique margin, 7 inches.

A large specimen of these baking pans of steatite, from San Miguel Island, California (Peabody Museum, 9261), collected by Paul Schumacher, is of greater dimensions than any of the preceding, and, having a very deeply curved surface, may possibly have formed originally a part of a large cooking pot; but if so, of one of even greater capacity than Fig. 32. This specimen has not a raised rim, but otherwise resembles Fig. 34 of this series. The measurements are: Width of the upper end, 5.5 inches; length of the sides, which are straight, 11 inches; width of the lower end, 9 inches.

An example of somewhat smaller size is interesting as showing that considerable value was placed upon these utensils. The perforation, near the middle of the smaller or upper end, having been destroyed by a fracture, which detached a large piece from one corner, a second hole has been drilled in the middle of the projecting half of the remaining end. While this gives quite an irregular outline to the article, the available surface for baking has not been lessened. This specimen has a worn sloping edge, and the depth of the concave surface renders it probable that it was a fragment of a pot. The measurements are: Width of cooking surface, 8 inches; length of same, 7.5 inches; width of projection having the perforation, 3 inches; length of same, 2 inches. It was obtained at Dos Pueblos by Mr. Schumacher. (Peabody Museum, No. 9225.)

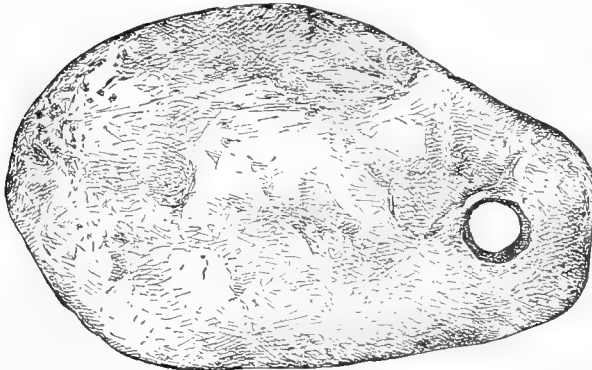
An example of still more irregular form, in the Peabody Museum, indicates that the constant exposure to intense heat caused many of these baking utensils not only to crumble about their edges, but to break into

many pieces. The specimen here referred to was originally probably quite symmetrical, as one side is comparatively straight. The other, however, is very irregular and splintered. The original perforation has in this specimen, also, been broken away, and a second made at a short distance from it. This example has a much more curved surface than any of the others, and bears every indication of being merely a utilized fragment of a cooking vessel. It was collected at Santa Cruz Island, California, by Mr. Schumacher.

An irregularly shaped and comparatively flat example of these domestic utensils, also from Santa Cruz Island, was probably made directly from a slab of steatite quarried for the purpose. It is somewhat boat-shaped in outline, with the sides slightly higher than the middle, but with the ends more nearly on a level with the lowest portion of the main surface. The hole is quite near the middle of the slab, being farther from the end than is usual. This specimen measures 10 inches in length by about 6 inches in average width.

A small example, showing no signs of exposure to fire, is quadrangular in shape, without a raised rim, and with a countersunk hole in one corner.

FIG. 35.

Steatite plate, $\frac{1}{2}$.

Its general appearance suggests that it is a fragment of a still larger specimen, which has not been used since its detachment from the original. It measures 4.5 inches in average width; length, 6.5 inches, and is from Santa Catalina Island, California. Collected by Paul Schumacher. (Peabody Museum, 9268.)

Fig. 35 represents an example of stone implement that at first glance is apparently of the same character as the preceding, but as the convexity of both surfaces is pronounced, and there is no trace of exposure to fire, the use of the implement in question is not demonstrated by any of its features. Whatever may have been its use, which doubtlessly was other

than a culinary one, the specimen is interesting as showing how readily one well-known form merges into another. This was also collected by Mr. Schumacher on Santa Catalina Island. (Peabody Museum, 9269.)

These cooking utensils of steatite from the coast of California and the adjacent islands must not be confounded with the beautifully wrought circular and quadrangular plates found in the interior of the country. The latter are usually decorated with incised lines and marginal notches, and we are not yet warranted in considering them cooking utensils; their elaborate workmanship and regularity of form rather suggesting that they were designed for other and more ornamental purposes than the perforated slabs we have just described.

An implement of steatite, said to have been lately found in New Jersey, is, in all respects, similar to the smaller *comali* here described; its size alone renders it doubtful whether the proposed name is in this case properly applied. That it was used simply as a heating-stone with which to bring water to a boiling point, after the well-known method of many savage tribes, is not probable, as it is too small to be of much use in this way, and it is not so well adapted to that purpose as are the perforated flat pebbles of irregular shapes and sizes which occur in great abundance in the immediate vicinity of where this wrought steatite implement is said to have been found. The latter have been considered, we think with good reason, as heating or boiling stones, although they have also been regarded as perforated sinkers.

[Among the articles received by the Peabody Museum from Mr. Schumacher's explorations of 1877 on the islands of San Clemente and Santa Catalina, are numerous small plates made of steatite, similar to those described above by Dr. Abbott. Several of these are rudely ornamented by deeply incised lines or by raised surfaces, while others show transitions to implements of other characters, particularly to the grooved stones which have been called "arrow-shaft straighteners," and some even pass into small, oblong, cup-like vessels. From a study of these specimens it appears that many of these stones, having one or more holes, were used for purposes where a heated stone was required, and that the hole was simply intended to afford the means of taking the stone from the fire.

Such stones would be very serviceable in heating water in water-tight baskets, and for other similar purposes; while if a hot stone *was* required for the purpose of straightening an arrow-shaft, or any other piece of wood, those having a deep groove running transversely on what may be called the under side of the stone would serve admirably for such purpose. Some of these that are grooved on one face have the opposite surface deeply excavated, thus forming a small receptacle, showing an economical use of the stone.

One specimen, also of steatite, is of a peculiar shape, and without any marks of exposure to fire. This has the general outline of one of the small pestles with a knob at its smaller end and a groove about the larger, but is hollowed out from one surface, making an oval-shaped cup. This article is rudely worked, and its whole appearance is such as to give the idea that it had been attached by cords to some other article. To strengthen this suggestion a small depression has been drilled on one side, as if it had been at first thought necessary to make a hole through the side for the purpose of assisting its attachment, and the idea was afterwards abandoned. The measurements of this article are: Length, 5.5 inches; width, 2 inches; cavity, 1 inch in depth. (Peabody Museum, 13492.)

Another of these stones (P. M., 13168) is about 4.5 inches long by 1.75 inches wide and .75 of an inch thick. One end of this specimen is roughly pointed, and has a small hole bored from both sides. On one surface of the stone are two deeply cut grooves in the form of a letter X. If found on our eastern shore this article would be unquestionably regarded as a sinker, and it is very probable that such was its use, though it shows signs of having been exposed to fire, but that may be entirely due to its having been made from a fragment of a cooking utensil.

Among the specimens in this lot are several which were probably used as baking stones. Of these the following are specially worthy of note :

One (P. M., 13165) is nearly symmetrical and regularly finished; 5.5 inches long, 5 inches broad at one end, and 4 inches at the other, with the sides slightly and regularly curved throughout its length. On the narrow end are three carefully bored holes, the central one being .5 of an inch in diameter, and nearly a third larger than the two others. These holes are

not countersunk, and are nearly of the same diameter throughout. On the under or slightly convex surface, and on each side of the central hole, two smaller holes have been started and carried nearly through the stone. The upper surface of this stone, which is about .5 of an inch thick, is slightly concave.

Another specimen (P. M. 13166), of about the same size and shape as the one just described, has a hole, about .75 of an inch in diameter, in the centre, near the front or narrow edge. Running transversely on the under surface is a lozenge-shaped raised portion about .5 of an inch wide in the centre and standing out from the surface about .25 of an inch.

A third specimen (P. M. 13167), of nearly the same size as the others, has been very carefully cut out and regularly finished. The hole in this is in the centre of the front end, and has been carefully worked out. On the under side a ridge has been left along the front and hind edges, and running longitudinally upon this surface from ridge to ridge are eight deeply cut grooves.

A fourth specimen, though showing by the changed character of the steatite that it has been exposed to continued heat, seems to be of too small size to have been of much value as a baking stone. It is very regularly cut, and all its edges are carefully and squarely finished. The hole placed in the centre near the front edge is of the same size throughout and nearly half an inch in diameter. This stone is 2.75 inches wide at its front margin or narrowest portion, and increases to 3.5 inches measured on the opposite border, and is of a uniform thickness of .25 of an inch. Continued around the stone are two raised portions, with a deep groove between them, forming a band .75 of an inch thick, and thus materially interfering with its use for baking purposes.—F. W. P.]

FOOD VESSELS AND PAINT CUPS.—Accompanying the large mortars, with their pestles, the cooking pots, and plates or pans for baking, which we have already described, are a number of smaller vessels, usually made of a different mineral, and quite artistically shaped, and sometimes ornamented. As in modern wares, we give, for convenience, special names to certain forms, as vase, cup, bowl, and mug, so we might readily separate these several forms under like headings, but it is doubtful if such designations would

really give a clearer idea of their probable uses, it being more than likely that these various forms of stone vessels, whatever their size or shape, were not intended for a more extended range of use than as receptacles for food, whether cooked or raw, and for such pigments as were in use for decorating the persons of their owners. Some of the smallest examples, indeed, may be simply toys for children. Whatever their use, it will be seen, on reference to the illustrations and to the detailed descriptions, that much care has been given to their manufacture and an unusual degree of taste exhibited in the design of very many.

Of a series of nearly thirty specimens collected by Drs. Yarrow and Rothrock, Mr. Henshaw, and Mr. Schumacher, all but seven are made of serpentine; the others of fine-grained sandstone.

Fig. 12, Plate VI, represents a beautifully wrought example of a bowl, or, as we suppose, receptacle for food. This example is circular at the rim, and gradually curves to a flattened base of very limited surface. The bottom and sides of this bowl are of nearly uniform thickness, and the interior and exterior surfaces are equally well polished. The ornamentation consists of two deeply incised lines near the rim, with an intervening space of the same width. The space referred to is highly polished, and stands out in bold relief, surrounded by the dulled surfaces of the incised lines. There is no trace of exposure to fire on this bowl, and no special indications of wear or long usage, unless the slight chippings about the rim may be considered as such. The measurements of this vessel are: Diameter at the top, 5.2 inches; height, exteriorly, 2.8 inches; thickness of sides, .2 of an inch at the rim, and somewhat larger at the base.

A much larger but very similar example of these bowl-shaped vessels is of unusual interest, as it shows that, although badly broken, the specimen was made available for some uses by carefully mending it by the use of asphaltum poured into holes and connecting grooves, as already described. (See Fig. 2, Plate VI.) In this specimen, however, instead of a single fracture, closed by a single fastening of asphaltum, the vessel has been broken into three pieces, and subsequently held together by six connecting grooves and eleven perforations, showing conclusively that great value was placed upon these serpentine bowls, and that the labor of making them

was so considerable that every practicable means, however laborious, was adopted to preserve them, even when so greatly damaged as was this specimen. The measurements of this bowl are: Diameter at the mouth, 7.5 inches; height, exteriorly, 4 inches; thickness of sides of the bowl, varying from .3 to .4 of an inch.

Fig. 10, Plate VI, represents a very beautifully wrought serpentine bowl of somewhat smaller capacity than Fig. 5, varying also in being less in diameter, but of greater depth. The degree of polish and general finish is the same. The ornamentation consists of a single shallow groove near the rim. This example is interesting as showing one of the uses to which such vessels were put, it having still in it two masses of red pigment, which it contained when taken from the graves at Dos Pueblos. This bowl measures 4.2 inches at the rim in diameter, and slightly exceeds this below the mouth of the vessel; height, exteriorly, 2.7 inches. The flat surface of the rim is .25 of an inch in width, and has numbers of transverse incised lines, probably intended as an ornamental design, which are now, however, scarcely discernible.

Fig. 3, Plate V, represents a very symmetrical but perfectly plain bowl that closely approaches a typical mortar in its appearance, and is of the same hard sandstone that most of the mortars proper are made of. This specimen has the sides and base, which is flattened, of nearly uniform size, and both the interior and exterior surfaces are very smooth, but not polished. On the rim are two shallow depressions, of less than an inch in length, each of which have been filled with asphaltum, upon which shells, or fragments of abalone shells, have been placed as ornaments; being the same decoration that we noticed on some of the mortars. This specimen measures: Greatest diameter, 5.3 inches; height, exteriorly, 3.2 inches.

Fig. 1, Plate V, represents a remarkable specimen of workmanship in stone, especially when the conditions of the maker and the character of his tools are considered. It is wrought out of a dense serpentine, and excels in finish, the rim being strictly circular, and not simply approaching to it, while the flaring sides of the vessel decrease uniformly in thickness. The base is flattened, and large enough to permit the vessel to stand firm

and steady. The rim slopes outward slightly, and overlaps the interior surface, and is noticeably sharp and unworn on the edge. There is no trace of ornamentation by incised lines, or other decoration. This specimen measures, in greatest diameter, 5.2 inches; height, exteriorly, 2.5 inches; breadth of rim, .35 of an inch.

Another form of these food receptacles is the oval or boat-shaped, examples of which also occur in the series of stone vessels from California. It is not clear that this shape has any connection with a particular use, and it is not one peculiar to the Pacific coast. A specimen from Massachusetts, figured in *Smithsonian Contributions to Knowledge*, No. 287, p. 36, Figure 143, is distinctly boat-shaped, with a small projecting handle at each end, and Dr. Rau there refers to others from the Atlantic coast States as being of this general pattern.

Numerous objects made of steatite have been found in New Jersey and have been examined by the writer. The similarity of some of them to implements of this material from California and the adjacent islands has been noticed. One marked instance, among several, is the occurrence of a beautifully wrought oval dish, 22 inches in length and 9 in width, which in finish and symmetry quite equals any from the Pacific coast. Fragments of several small boat-shaped vessels have also been met with, but the great majority of those from New Jersey, seen by the writer, have been circular in outline and of much ruder finish than the average stone vessels from the Pacific coast.

A specimen from Santa Barbara, collected by Mr. Bowers (National Museum, 20207), may be considered, perhaps, the typical form of boat-shaped or oval vessels. This handsome specimen of savage art, in finish and design, excels all others in the collection, although there possibly may be no more skill required in shaping an oval than a circular vessel. Be this as it may, the evident intention of the artistic workman has been accomplished, and in every detail the vessel is complete. This specimen is made of steatite, and is prettily veined with black upon gray and brown tints. It is highly polished upon every part, and has the sides of uniform width. The base, which is curved longitudinally, is somewhat flattened transversely, and is of double the thickness of the sides. The ends are curved; the sides and

base gradually merging into each other so as to give a uniform surface, both within and without. In addition to this curving of the ends there is also at one end a prow-like projection which is very symmetrical, and greatly adds to the boat-like appearance of the specimen. Extending along either side and starting from this projection is a raised rim that is flat upon its surface in front, but somewhat curved upon the sides of the vessel. This rim has been originally marked by numerous closely arranged incised lines, extending transversely across it. These are now nearly obliterated in some places, and are not distinctly seen, except on careful examination. This specimen measures, in extreme length, 9.5 inches; in width, 4.9 inches; height, exteriorly, at the middle of sides, 2 inches; at the projecting end, 3.1 inches; at the curved end, 2.9 inches.

Another boat-shaped utensil was found in "Bonanza No. 1," La Patera, in close contiguity to the canoe mentioned in Dr. Yarrow's report, but was unfortunately broken in transit to Washington. It has, however, been mended, and is in the National Museum. It is about twice the length of the one just described, which it resembles, though it is without the prominent prow.*

Fig. 15, Plate VI, represents an irregularly oval bowl, of excellent workmanship, so far as uniformity of width of sides and general smoothing of the surfaces extend, but the want of symmetry is very marked. The rim is now quite smooth and flat, and its undulating character, in connection with the unsymmetrical shaping of the bowl itself, is apparently not the result of fracture, but intentional. This seems the more probable, as a faintly discernible incised line runs parallel to the rim for a short distance on one side. A shallow indentation on each side of the rim has the appearance of grooves for asphaltum, such as we have already noticed on the large sandstone mortars. This specimen measures, in extreme

*Another specimen of these finely finished boat-shaped utensils was found in a grave on Santa Catalina, by Mr. Schumacher, and sent to the Peabody Museum, in 1877. (P. M., 13270.) This vessel is 8.5 inches long, 2.75 inches wide, and 3.25 inches deep at the ends, which are .5 of an inch higher than the sides. The sides are .25 of an inch thick, and the vessel is hollowed to a depth of 1.5 inches. The material is steatite. The perfect construction and shape of this vessel afford almost convincing evidence of its representing the boats of the islanders. The still later exploration of the island of Santa Catalina has furnished, among other articles, a large boat-shaped vessel over two feet in length. This was obtained at the ancient quarry on the island, and is of particular interest, as it is not a finished piece of work; the exterior having been cut into shape while the interior is only partly excavated.—F. W. P.

length, 7.3 inches; in width, 6.2 inches; height, exteriorly, varying from 3 to 3.7 inches.

Fig. 6, Plate VI, represents a well-defined oval bowl or vessel which, perhaps, would be more properly classed with such small specimens of similar general finish as will be subsequently described as cups. This example of the oval-shaped specimens bears much resemblance, except in size, to the preceding, being carefully wrought on the sides and base, and carefully polished both on the interior and exterior surfaces. The rim, however, as in Figure 7 of same plate, is quite undulating; the lowest part being on the sides, as in the other. There is no attempt at ornamentation by the usual incised lines or any other means. The measurements of this vessel are: Extreme length, 4.1 inches; width, 3.1 inches; height, exteriorly, at the ends, 2.3 inches.

Fig. 5, Plate VI, represents what may be considered the most specialized form of the stone pots and vessels taken from the ancient graves at Dos Pueblos. The bowl proper, if it may be thus considered, is admirably wrought, of uniform thickness of sides and base, which is scarcely flattened, and with a well-defined flat rim projecting inwards to a greater distance than is usual among this class of domestic utensils. On the rim, in three equidistant positions, are traces of asphaltum. The one peculiar feature which widely separates this specimen from all others is the handle-like projection. The measurements of this interesting specimen are: Diameter varying from 4.3 inches to 4.5 inches; length of handle-like projection, 1.5 inches.*

Associated with those above described, and more numerous, it would appear, from the relative numbers of the two series taken from the one general locality, are several shallow bowls, or saucer-shaped vessels, made of

* A smaller specimen of these ladle-like cups received from Mr. Schumacher, from the island of Santa Catalina (P. M., 13292), has a handle nearly 3 inches long, while the cup part is about 2.5 inches in diameter, and is excavated to the depth of 1.5 inches. A still smaller and spoon-like, rather than ladle-like, specimen from the same locality (P. M., 13147) has a short bluntly pointed handle of about an inch in length projecting from the bowl portion, which is about 2.5 inches long by slightly more than 1 inch in width, and an interior depth of one-half an inch. The thickness of the bowl of the spoon is not over one-eighth of an inch. The shape of the short handle is such as to convey the impression that it was inserted into a longer one of wood. Both of these articles are made of steatite, without attempt at ornament, except that on the larger one a slight groove has been cut partially round the lip of the bowl.—F. W. P.

different materials, but mostly of serpentine. While many, and perhaps all, of these specimens have been manufactured *de novo*, several strongly suggest the probability of their being the bottoms of larger vessels, such as have been already described, which have been utilized, by giving an even and uniform edge to what were the fractured sides of a deeper bowl or cup. Others, again, are certainly things of themselves, and in no way referable to other patterns of stone vessels.* In some instances, as Fig. 3, Plate VI, there is a trace of ornamentation of a primitive kind in the one incised line extending along the rim; but as a class they are not symmetrical in outline, nor do they exhibit any care in the finish. Their appearance is strongly suggestive, especially the smaller specimens, of being mere playthings for children; which is the more plausible from the fact that our present Indians still fashion, both in clay and stone, similar articles as toys for their children. One of the smallest, however, and also the rudest (Fig. 9, Plate V), still has some of the characteristic red pigment adhering to it, and such vessels possibly were not considered too small for toilet cups for adults. Figs. 4, 6, 7, 8, 9, 10 of Plate V, and Figs. 3 and 4 of Plate VI, represent a series of these saucer-like vessels, and scarcely require detailed descriptions. As they are represented on the plates reduced to a uniform scale of one-fourth their diameter, reference to special measurements is unnecessary †

The presence of pigment in one specimen, as already referred to, will scarcely give us a clue to the intended uses of the shallow vessels; but, whether for adults or children, there are so many possible suggestions that can be made by reference to similar forms in our own homes that it is scarcely necessary to give them any definite name or ascribe as probable any one or more special uses to them.

In addition to these, which as a class were probably used more in con-

* Among a number of articles said to have been taken from Indian graves, lately discovered in Gloucester County, New Jersey, are two steatite saucers of the same shape as the larger examples of this pattern from California. As no others of this form have been found, or at least appear in any of the large private collections in the State, it is presumable that this saucer-shaped pattern was but little used by the Indians of the Atlantic coast, and even the genuineness of many of the steatite articles which are said to have been found in Gloucester County may well be questioned.

† Several much smaller specimens of these little paint-cups have been received from Mr. Schumacher's later explorations on the islands, and are now in the Peabody Museum. One is hardly over an inch in diameter and less than one-half an inch in depth. Several others, made of steatite and of serpentine, vary from this size to 3 inches in diameter.—F. W. P.

nection with food and cooking than as toilet-cups or for the preparation of toilet materials, is a small series of very beautifully-wrought bowls, or, more properly, cups. These vessels are noticeable from the fact that their depth is equal to or greater than the transverse diameter.

Fig. 7, Plate VI, represents a beautifully-wrought example of these carefully-fashioned cups. This cup is well polished on its exterior surface, but is comparatively rough within, and exhibits clearly the marks of the flint knife used in hollowing out. The rim is narrow and slopes inward, and is well defined by a deeply incised line or groove extending around it. This specimen measures 3.5 inches in diameter at the mouth and is 3.2 inches in height. The sides are quite thin and the bottom is .6 of an inch in thickness.

[In relation to ornamented vessels of the general pattern described by Dr. Abbott, three examples cut out of steatite, and received recently in Mr. Schumacher's collection from the island of Santa Catalina, are worthy of special mention.

One of these (P. M., 13316) is of the shape shown in Fig. 7, Plate VI. It has a diameter of 5 inches, measured from side to side, and is 4 inches in height; is excavated to the depth of 3 inches and has a diameter at the mouth of 3.5 inches. On the outside of this cup or bowl is the following ornamentation: A raised band, about one-quarter of an inch wide, is continued round the cup, one-half an inch from the edge of the lip. Round the bottom portion are two deeply-cut grooves, about half an inch apart. Between the band above and the grooves below, on the bulging sides, are three groups of X-like marks. This specimen does not show any indication of contact with fire.

A much smaller cup of the same shape (P. M., 13143) has a similar band about the lip, but in this case so near to the edge as to be in part upon the upper surface of the lip. Below and in part on the bottom of the cup are four deeply-incised lines, forming three raised bands between them. On the sides, in two groups, with a smooth space of about an inch between them, are series of irregularly-cut, oblique lines. One of these groups contains sixteen lines and the other twenty. The inside of this cup is discolored by red pigment and was evidently used for toilet purposes.

A still smaller, globular, and symmetrical cup (P. M., 13146), about 2.5 inches in diameter by 1.5 high, is smoothly finished on the outside, and ornamented by four rows of shallow indentations, like the punch-marks on rude pottery. These marks extend from the lip to the central portion of the bottom of the cup. On one side, close to the lip, there are six dots or small pits uniting with two of the downward lines.—F. W. P.]

A cup nearly resembling the one shown on Plate VI, Fig. 5, is much smaller and a trifle less bulging at the sides, thus making the diameter of the mouth and the greatest diameter of the cup more nearly equal.

Fig. 1, Plate VI, represents a form varying in some respects from the last, and approaching both the typical mortar and the bowls. This cup is carefully carved in steatite, and still shows the flint-knife marks and scratches over its entire surface, which has been smoothed but not polished. The general outline is symmetrical, and the sides are straighter and thicker than in any other of the specimens of similar pattern. The measurements of this stone cup are: Greatest diameter, 3.5 inches; height, exteriorly, 2.8 inches; thickness of sides varying from .3 to .35 of an inch.

Fig. 11, Plate VI, represents a symmetrical and beautifully-finished example of serpentine cup. This specimen varies in its pattern from the others described, but more nearly approaches Fig. 7 of same plate, except in size. On the base and sides are still seen the tool-marks, which subsequent polishing have but partially obliterated. At the rim, which is somewhat less in circumference than the base, there is a narrow incised line, but no further markings of a decorative character. The rim itself is level and highly polished. A faint trace of red pigment in the deeper tool-marks on the bottom shows that the cup has been used as a receptacle for this material. The measurements of this specimen are: Diameter of the mouth, 2.6 inches; of the base or greatest diameter, 3 inches; height, exteriorly, 2.5 inches.

Fig. 9, Plate VI, represents a diminutive example of these small vessels, which closely resembles the preceding, but is of much smaller size. Broad and flattened upon the base, the sides curve upward and inward to a narrow edge, which shows in one portion of its extent a narrow, incised line. Below this, on the sides of the cup, are a few very faint lines,

extending at right angles to the rim line. Much of the edge of the cup is fractured, but enough remains to indicate that when new it had considerable decoration, consisting wholly of delicate lines or scratches. Their regularity and uniform width and depth distinguish them from the ordinary tool-marks, which are still discernible over the whole exterior surface. The measurements of this specimen are: Greatest diameter, or that near the base, 2.2 inches; diameter of the mouth, 1.85 inches; height, exteriorly, 1.4 inches. This specimen, like Fig. 10 of same plate, contains a mass of red paint, and has doubtlessly been used as a toilet-cup exclusively. Stone cups of even less capacity have been found in Indian graves along the Atlantic coast, with similar masses of pigment in them.

In connection with the large series of stone vessels of various patterns, and doubtless for many and varied uses, it is desirable to call attention to a very interesting wooden vessel, which, while somewhat similar to certain of those of stone that have been described, still varies materially in its general character, although it was probably put to much the same use as many of the former.

FIG. 36.

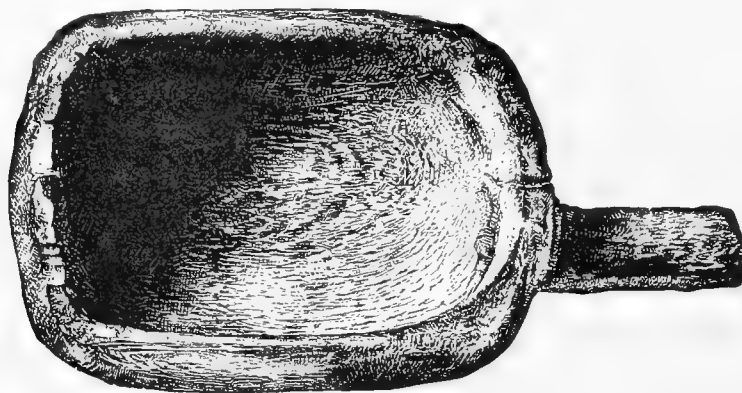
Wooden vessel, $\frac{1}{2}$.

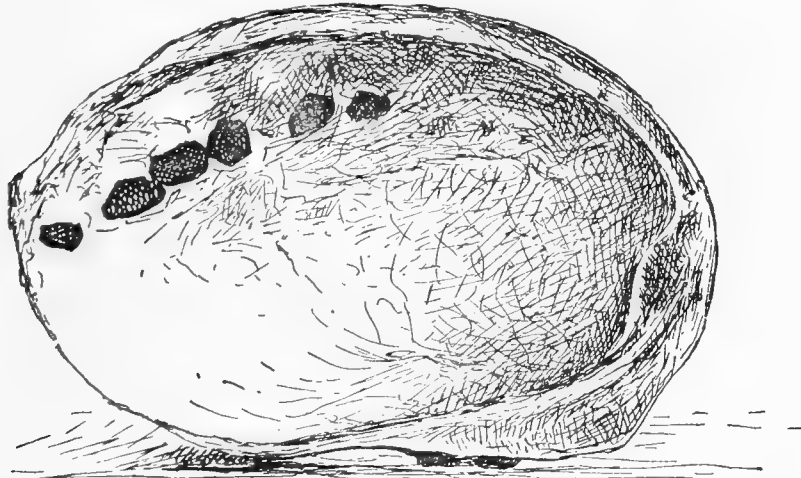
Fig. 36 represents the wooden vessel to which we have just referred. It is irregularly quadrangular in shape, the sides being quite straight and parallel, but the ends are unequally curved outward. The sides are quite thin and of uniform width. The bottom, while flat upon the outside, is curved interiorly. At one end, and much nearer one side than the other, is a narrow handle projecting from the vessel about 2.5 inches. This wooden

ladle or dipper, as it may be called, has been figured and described by Dr. Rau as "a wooden bailing-vessel, with a short handle, *fitting in a rectangular hole cut into the vessel.*"* A careful examination of the specimen leads me to consider this last statement a mistake, and that the handle is part and parcel of the ladle or dipper, and was carved at the same time with the body of the implement from the one piece of wood, and is not an addition thereto. It would be of great interest to know the exact date of the carving of this interesting specimen; for if made previously to the introduction of metals, it reflects great credit on the skill of the stone-age workman, as it is apparent that, although more yielding, wood is probably harder to shape and hollow with flint knives than is stone; but with whatever tool this vessel has been made, it reflects credit on the skill of the maker.

This wooden vessel or ladle measures 5.8 inches in length; 3.6 inches in width at the top; and is 2.4 inches high, measured exteriorly. Locality: Santa Cruz Island, California. P. Schumacher. (National Museum.)

Besides the vessels of stone and this of wood, there occurs a form of dish, or receptacle, which is simply a utilized shell of the abalone (*Haliotis*).

FIG. 37.



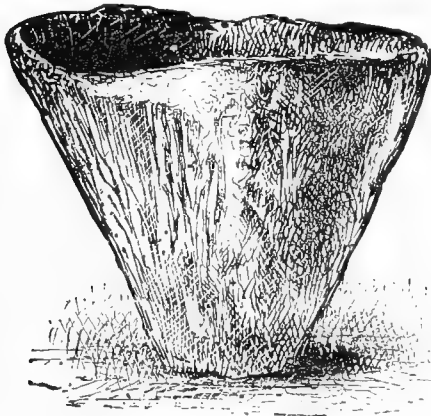
Dish made of a shell.

To render these available as dishes the series of holes or "eyes" in the shell has been carefully closed with asphaltum, and a convenient dish is thereby obtained (Fig. 37). A large shell of this kind, taken from

* Smithsonian Contributions to Knowledge, No. 287, p. 88, Fig. 314.

the graves at La Patera, was filled with seeds which Dr. Rothrock* has shown to be those of the *Salvia Columbaria*. These utilized shells do not appear to be altered in any way other than as mentioned above. Dr. Rau,† in referring to the occurrence of shells in ancient Californian coast graves, remarks, concerning the ancient inhabitants of this locality, “that they utilized the unaltered shells of *Haliotis*, *Cardium*, *Pecten*, *Patella*, *Spondylus*, and *Panopæa* as the receptacles for asphaltum is demonstrated by a number of shells, still filled with that substance, which were obtained from graves on the Santa Barbara group of islands.” Shells of the above-named genera were also found by Dr. Yarrow’s party, and contain various substances, principally the red and black pigments. Dr. Yarrow also informs me that

FIG. 38.



Cup made from vertebra of a fish.

some of the *Haliotis* shells found were placed, on top of the crania in the graves.

In connection with the small receptacles of various kinds, should be classed the cups made from vertebræ of large fishes, inasmuch as the majority of such bone cups, of which many have been found in the graves, are filled with substances evidently intended for use in savage decoration.

One of these cups, of about the maximum size, is represented in Fig. 38. Similar cups made from fish-bones were evidently used for other purposes, as shown further on, where a peculiar ornament is described as partly made from a vertebra of a fish.‡

* See page 80.

† *L. c.*, p. 67.

‡ The explorations of the Santa Barbara Islands have brought to light several more of these singular cups of various sizes. It is of interest in this connection to recall to memory the “large drinking-cup made from the vertebra of a whale” which was found on the Isle of Eday, Orkney, and figured in WILSON’S Prehistoric Annals of Scotland, vol. 1, p. 113.—F. W. P.

THE METHOD OF MANUFACTURE OF SOAPSTONE POTS.

BY PAUL SCHUMACHER.*

IN my investigations among the remains of the aborigines of the Pacific coast, south of San Francisco, I was always rewarded by finding the *olla*,† one of the most beautiful utensils of genuine aboriginal workmanship. The pot is usually of globular form, with a narrow opening on the top; sometimes pear-shaped, and others of the Mexican form, with a wide opening. Illustrations of the principal types are given in Bancroft's "Native Races of the Pacific States," Vol. IV, page 693, from my own drawings. The stone of which this utensil for culinary purposes, and some other articles of our Indians were worked out, has been well known and in use for like purposes since the classic times of Theophrastus and Pliny. The Magnesian stone (*μαγνητικὸς λίθος*) and the kind quarried at Siphnus and Comun, the *lapis ollaris* of a later period, of which in ancient times vessels were hollowed out in the turning-lathe and carved, coincide in nature and composition with the pot-stone of our Indians. The stone is a steatite, usually of a greenish-gray color, sometimes showing hexagonal prisms in stellated groups, with pearly lustre and greasy touch, especially when reduced to powder. It changes in some portions of the same ledge into a more flaky and micaceous character, while in neighboring deposits, as at Santa Catalina Island, it exists crystallized in stellated groups of well-developed hexagonal needles of glistening apple color, which are easily detached from the weathered surface. The living rock is not as bright or shining as are the fragments of pots that had been exposed to heat; it loses its greasy character the more a utensil has thus been in use, and the color

* Extracted in advance from the 11th Annual Report of the Peabody Museum.

† *Olla*, from the Latin *olla*, a pot; Mexican pronunciation *óya*.

is changed to a bright metallic lead color. Some years ago I showed a potsherd, the color of which had thus been changed by fire, to a mineralogist, who pronounced it Magnesian mica.

The first information I gained of the locality of quarries of pot-stone, or where pots were made, was from a venerable Spanish lady while exhuming in Nipomo rancho, San Luis Obispo County, in the spring of 1874. She recollected a narrative of her mother, according to which the Indians had brought ollas in canoe-loads from the islands in Santa Barbara channel to the mainland, which they exchanged for such necessities as the islanders were in want of.* Two years later, in Santa Barbara County, I received similar information from an old Mexican, then my guide. While making researches among the islands, at the joint expense of the Smithsonian Institution and the Peabody Museum, I gained the assurance, during my short stay on Santa Catalina, that the stone exists in certain places on that island, but did not then succeed in finding the quarries. But during my last expedition to that locality, made at the expense of the Peabody Museum, I made the discovery, finding pits, quarries, and tools, together with unfinished articles. I noticed that the softer stone usually obtained in the pits, which is of a more micaceous character, was used for pots, while the close-grained rock of darker color, serpentine, was mainly used for the weights of digging-sticks, cups, pipes, ornaments, etc.

While in camp at Little Springs, my attention was first arrested by a small mound of silvery hue, which same hue also extended over the adjoining ground. The mound is in front of a large outcropping rock of pot-stone, which I found to be an impressive witness of the tedious labors of the aborigines, it being entirely covered with marks where pot-forms had been worked out or left in various stages; some even were only begun and abandoned, while others were nearly worked out in rough outlines, but still united with the living rock. At the foot of the bluff is a burrow in which, and among the débris forming the mound, many potsherds, a broken pot of which the outside had already been well worked and even the hollow started, and a pot-form as broken from the mother rock, were brought

* This statement is corroborated by Dr. Yarrow, who was informed of the same circumstances by the Señora Welch at the Dos Pueblos ranch, the principal articles of barter given in exchange for the ollas being grass-seeds, furs, skins, acorns, and roots of different kinds.—F. W. P.

to light, with many tools of hard slate in the shape of chisels, and scrapers of quartz.

From the Little Springs we followed the cañon to the northward, and crossed the pass, easy of access from this side, into Pots Valley. It is a wide hollow cañon, in which pot-stone, silicious slate, and "float"-quartz are found abundantly. The pot-stone is found especially below the small spring, which makes out near the base of a very conspicuous, isolated, large rock, which stands nearly in the centre of the valley; while the slate, of which the chisels are made, crops out boldly, higher up near the pass. Several hundred yards below the spring, at the ravine to the right going down, is found a pit; and the ledge of pot-stone close by forms a face in the ravine, which shows the same marks of the chisel as at Little Springs. About eight distinct marks cover the lower face, while others are obliterated by subsequent mining. One, having only been commenced, shows the outlines of a pot-form in a circle worked to a depth of only an inch, and measures 16 inches in diameter. Between this place and the second ravine, about 50 yards to the northwestward, is another pit of larger dimension—about 15 feet in diameter and still 5 feet deep—where, too, among the débris, potsherds and quantities of slate fragments and quartz are found; some of which had evidently been used in working the mine and making the pots. Besides these places there are many more pits in the valley, and a quarry especially prominent about four hundred yards to the eastward from Pots Valley boat-landing, close to the steep ocean shore. In fact, on entering the cañon by the pass, as we did, when the grand rock near the spring, the lesser cliffs, and the scattered boulders can be overseen, I was struck, on examining the locality through a field-glass, by the discovery of so many silver-hued mounds, the débris of pits, the rock quarries, and the open-air workshops, so that I believed I had found the main factory of the *ollas* of the California aborigines. Even those not interested in aboriginal remains cannot fail to notice the manufacturing propensities of the people that formerly roamed here, and the locality was appropriately named.

In examining the slate quarry I found the rock had been first broken into accidental shape and size, and such pieces as were best adapted for chisels were then selected and trimmed. The scrapers, usually made of

milky quartz, found in abundance all over the island, are sometimes quite well chipped, but oftener simple flakes. I will mention here that we detected among the chisel-marks on the living rock, as also on several pot-

FIG. 39.

Chisel of slate, $\frac{1}{2}$.

sherds, distinct signs of metallic tools having been used. These were probably of iron, and like those which we frequently found in the burying-ground on the Isthmus.

Fig. 39 illustrates a chisel made of slate (P. M. 13411), half its natural diameter, and Fig. 40 a scraper made of quartz (P. M. 13412), of natural size. I also

FIG. 40.



Scraper of quartz.

give a sketch, Fig. 41, of a part of the bluff near the boat-landing, which gives a better idea of how the rough work of detaching the rock was carried on.

After the pot-form had been worked out, it was broken from the living rock by working under it and by the gradual pressure of the chisel around the base. The detached pot-boulder was next rounded into proper form; it was then hollowed out until a certain thickness

of the pot was reached, and was finally carefully finished with the scraper. As the thickness of the *olla* increases toward the bottom—it usually thickens from about half an inch at the rim to one and a half at the bottom—it requires skill to attain this evenly. No mechanical apparatus was used for this purpose (as shown by certain irregularities in the form of the pot), but simply the touch of both hands in antiposition, one gliding outside the already finished surface, while the other worked inside toward the guiding

hand. In this wise, with some practical experience, a greater accuracy is attainable than at first might be supposed, especially if the work proceeds

FIG. 41.



Sketch of a portion of the steatite ledge, showing the method of detaching the pot-forms.

from a known thickness, to which reference can be taken, which is here the case, as it progressed from the rim.*

*It is of special interest, in connection with the manufacture of these pots on the coast of California, to note that the Indians of the Atlantic coast adopted the same method, though the pots made were of a different shape, being generally oval and shallow, and having knobs for handles at each end. This interesting fact I recently had the opportunity of observing on the land of H. N. Angell, in the town of Johnston, near Providence, R. I. At this place Mr. Angell has uncovered an old soapstone quarry, from which hundreds of these pot-forms have been taken in former times, as shown by the deep excavations made in the soapstone ledge, and the remains of the pot-forms, the broken vessels, rude stone implements, etc. Since this note was written other ancient quarries of the same character have been found, particularly one in Virginia and another near Washington.—F. W. P.

ARTICLES MADE OF WOOD.

BY C. C. ABBOTT.

ATTENTION has already been called to a beautifully made vessel of wood. (See Fig. 36.) Its size, shape, and general appearance are such as to indicate that it was put to some useful purpose; but such examples of the use of wood, instead of steatite or sandstone, for making domestic implements of any kind are, as yet, of rare occurrence; and, so far, we cannot determine whether or not their origin dates previous or subsequent to the period of contact of the native Californians with the Spaniards. If these specimens of wood-working are of comparatively recent date, of course much of their interest is gone. That they should be of recent date, either from the fact of the known rapid decay of wood, or their general absence from localities where stone implements occur, does not necessarily follow; for it is well known that wood was largely used by savages both for making weapons and domestic implements, and that under favorable circumstances, such as might readily occur at times, wood has proved to be as imperishable as stone.

It may not be out of place to here call attention to a curious wooden implement which was found under circumstances indicating great age. This artificially shaped implement of wood, as it appears to be, was found on the east of the Connecticut River, near Hartford, Conn.* It was found, apparently *in situ*, in a deposit of blue clay, over which extends a deposit of loam of several feet in thickness. The writer of the article in the report, to which we have referred, infers that the clay-bed wherein the implement was found is not a river deposit, but "an older formation than the loam, but not so old as the unmixed clay in the neighboring hills," and also "that the implement, having been found partly imbedded in the clay, and having

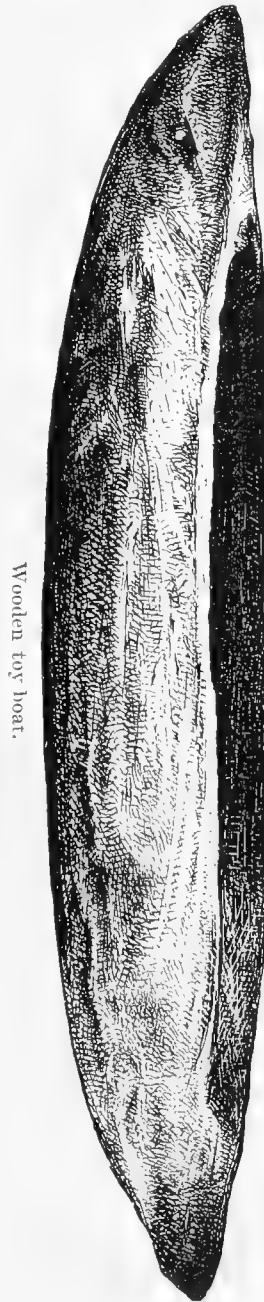
* Smithsonian Annual Report for 1876, p. 445.

presented characteristic marks of condition identical with those of other associated wood similarly placed, its burial was coincident with that of the other wood.”

Admitting the inferences drawn, as above stated, to be correct, and there is little reason to question them, it is evident that wooden implements are of very great antiquity; and the examples found in the graves of Dos Pueblos are probably as old as any of the associated stone implements and weapons, though the fact that many articles obtained from the early Spanish visitors to the coast were found in some of the graves of course throws a doubt on many of the objects being of a greater antiquity than the period of Spanish contact.

Fig. 42 represents a canoe-shaped wooden vessel, which may be simply a toy boat, as has been suggested, or a receptacle for food, such as some of the saucer-shaped stone vessels are supposed to have been. At one end of this article a hole has been drilled either for suspending the object, or, if a toy boat, for attaching a cord, whereby the little vessel might be drawn over the water. It is difficult to determine to what extent toys, as miniature representations of articles in common use, were made by this and other extinct tribes of Indians, although it is well known that such toys are made by some existing tribes. Whether an article for use or a toy, Fig. 42 represents a well-finished piece of work, particularly if made solely by the aid of flint or obsidian knives.

Fig. 42 is of actual size, and other similar boat-shaped articles have been collected of both larger and smaller dimensions. This specimen was collected by Schumacher from a grave on Santa Cruz Island, California (National Museum, No. 18178.)



Wooden toy boat.

FIG. 42.

Another example of wood-work, which was obtained from the graves at La Patera, consists of a series of small slabs of red-wood, so joined as to form a triangle, with a broad base, made of several pieces of the same wood. These are joined together by rivets of asphaltum. Holes have been drilled at the several junctions of the strips forming the object, and these have been filled with asphaltum, which overlaps so as to form rivet-heads, thus holding the structure together. This is practically the same plan as we have seen was adopted in mending the steatite vessels.

A wooden sword with an ornamented handle is described in another place, and is probably one of the best pieces of work of this material.

Objects of wood manufactured in ancient times by the Indians of the Atlantic coast have not often been found, and we can only recall the large wooden mortars formed by hollowing a section of a trunk of a tree, and portions of canoes or "dug-outs." One of the latter, of great antiquity, was discovered* "while digging a canal on one of the rice plantations on the Savannah River."

Those who were personally engaged in excavating at La Patera and Dos Pueblos were struck with the almost entire absence of articles of wood, the principal object being represented by the almost decayed canoe at La Patera. This was of red-wood, which it is well known is almost as indestructible as red cedar, and yet it was nearly rotted away. Some of the burial places were indicated by red-wood posts which had almost entirely decayed.

*JONES, *Antiquities of Southern Indians*, p. 53.



FIGS. 1-4 FROM SOUTHERN CALIFORNIA
PLATE VII

SMOKING-PIPES OF STONE.

BY C. C. ABBOTT.

FROM the general character and use of smoking-pipes and the probability that every Indian either fashioned his own or obtained it by special barter—that is, not from a professional pipe-maker—it is not strange that so little in common is seen in the ordinary stone and clay pipes found in the Eastern States. In the region once occupied by the mysterious Mound-builders there have occurred, in their numerous earth-structures, certain pipes representing entire animals, or heads of animals and of men. These are small, and generally have a thin, flat base, through which extends a small perforation. This flat base, projecting more or less beyond the carved object constituting the bowl of the pipe, was probably used as a mouth-piece; but such a form, however, cannot be considered as exclusively Mound-builders', and it is known that that people also had other pipes of widely different pattern. In all these patterns of smoking-pipes there is either a combination of bowl and stem carved from one piece of stone or so shaped in clay; or a bowl only, to which a stem of other material, as a hollow reed, was attached. An extensive series of specimens, however, shows such great variation in the two patterns that the opinion, elsewhere expressed,* that a division might be made of stemmed and stemless bowls, is not warranted. It is certain that but few pipes, however carved or otherwise decorated, can be referred without doubt to a particular tribe of Indians or section of our country. The small "animal" pipes of the Ohio Valley are nearest to being peculiar to a certain people; and next, the pipes from Dos Pueblos and neighborhood, which are of quite a uniform type, being cylindrical tubes, or, more properly, "of an elongated, conoidal shape."

* Nature, vol. xiv. June, 1876.

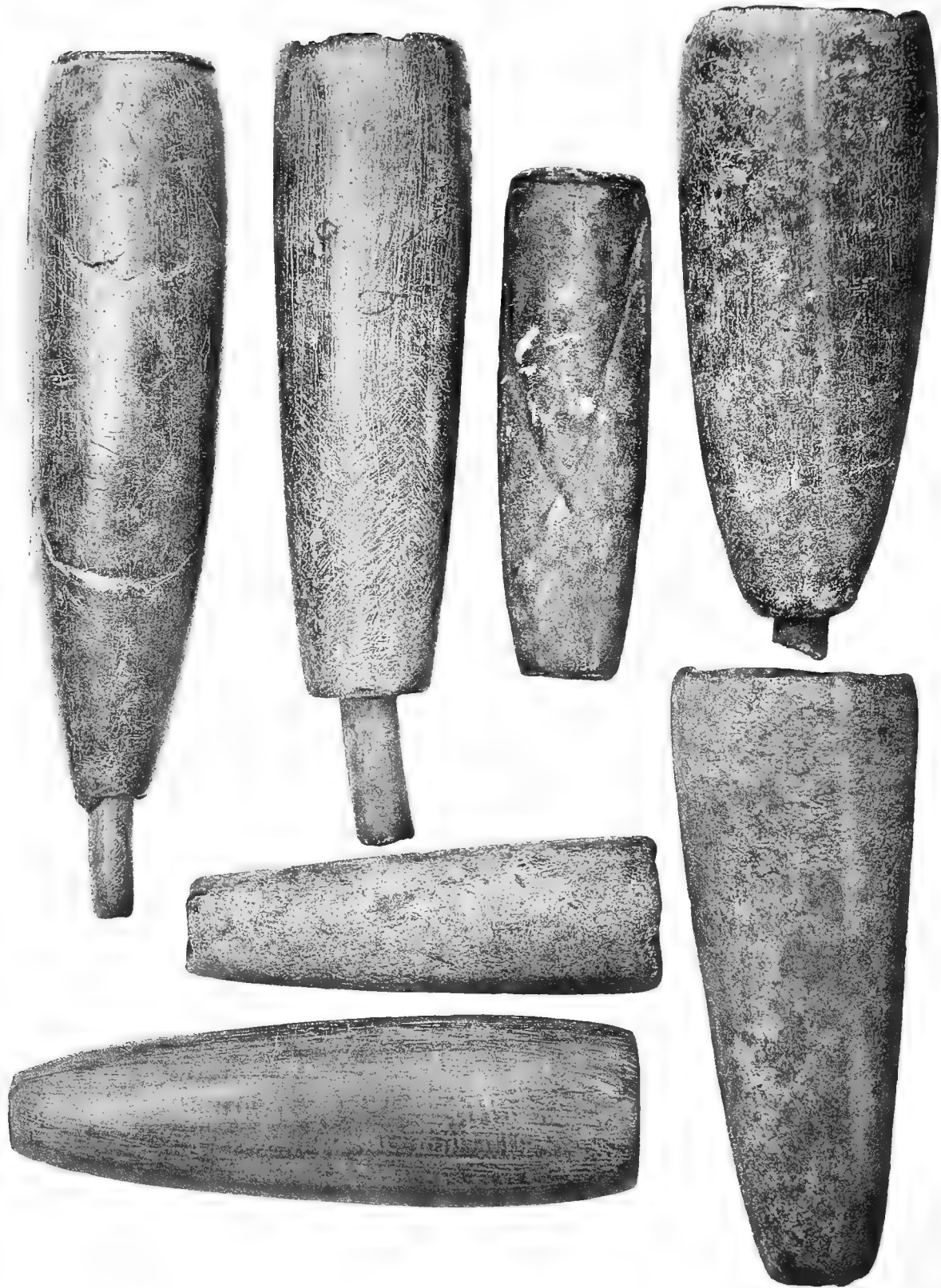
Sixteen of the pipes collected from the graves at Dos Pueblos and La Patera by Dr. Yarrow's party are represented on Plates VII, VIII, IX, and it will be seen that they are more uniform in design and finish than the same number of pipes from any other locality would prove to be. Their principal variation is that of size; the largest specimen measuring $10\frac{1}{2}$ inches in length; the smallest, $3\frac{1}{4}$ inches. They are made of steatite, talcose-slate, or of serpentine.

Fig. 3, Plate VII, may be taken as a type of this peculiar pattern of smoking-pipes. Like the majority of the series, this specimen is made of steatite. It has a smooth, uniform, perfectly plain surface, circular at the larger end or mouth, which orifice is margined with a narrow, slightly-projecting rim. From the mouth of the pipe extending backwards for about one-third of its length, exclusive of the bone stem or "mouth-piece," the diameter is very nearly uniform; thence it decreases gradually to the smaller end or base, where the diameter is about one-third that of the opposite end. As a mouth-piece, for the more comfortable contact with the smokers' lips, there is a section of long bone of a bird, securely attached by means of asphaltum, which attachment is aided by the roughness of the bore at this part of the tube. This pipe measures 9 inches in total length, and has a diameter of an inch and a half at the mouth.

Fig. 2, same plate, does not materially differ from the preceding. It is a fraction of an inch less in length, and has no projecting rim at the mouth. The diminution in diameter, unlike the preceding, is uniform from end to end, the variation being from $1\frac{3}{8}$ inches to half an inch. There is in this specimen, also, a bone mouth-piece, fitted very closely to the pipe, but the asphaltum used in securing it is wanting, and there is no trace of any considerable quantity having been used.

A curious feature of this specimen is the presence of a fragment of hoop-iron, about 2 inches in length and 1 in width, placed obliquely in the mouth of the pipe, and projecting from it about one-fourth of an inch. From accumulation of rust apparently, more than through design, this piece of metal has become quite securely fixed.

Fig. 4, same plate, represents a third specimen of plain steatite tube-



STONE PIPES FROM SOUTHERN CALIFORNIA.
FULL SIZE

pipes. It is not as symmetrical as the preceding and is more nearly cylindrical in shape. Interesting features are the presence—in this case, at some distance from the mouth—of a small piece of hoop-iron, that is also rust-bound, and the fracture at the small end, where a piece has been broken off and the orifice subsequently closed by a mass of asphaltum. In such condition, it is difficult to conceive of any use to which it might be put.

Fig. 1, same plate, represents a beautifully-wrought and highly-finished pipe made of serpentine. In shape and finish it is like the preceding, and is somewhat larger than the two perfect pipes represented on the same plate. The base has been slightly broken and the bone stem or mouth-piece is wanting.

Besides these four large specimens there are five others of the same general pattern, varying somewhat in size, but not in shape or finish. Among them is the largest pipe of the lot, measuring $10\frac{1}{2}$ inches in length. This specimen is made of steatite, is smooth but not polished, and ornamented at the mouth with two parallel, narrow, raised rings. It still retains a fragment of the bone mouth-piece, secured by asphaltum. The others present no noteworthy variation from those already described.

Fig. 1, Plate VIII, represents a smaller specimen of the same pattern of smoking-pipe as that given on the preceding plate (Fig. 1). It is made of dark, greenish-black steatite, is highly polished, and ornamented with a slightly projecting, narrow, marginal rim at the mouth. This pipe has a well-preserved bone mouth-piece, secured by asphaltum. It is very nearly 6 inches in total length. The diameter of the mouth is 1 inch; that of the base, one-half of an inch.

Fig. 2, same plate, represents a pipe in all essential features the same as the preceding. The sides are thicker, and there is less difference in the diameters of the mouth and base respectively. The bone mouth-piece is slightly curved; a feature of interest, if it is not an accidental one, as this curvature gives the bowl of the pipe a slight upward position, when the stem is held between the lips, thus approaching the relative position of stem to bowl in the ordinary forms of Atlantic coast stone pipes and of modern smoking-pipes.

Fig. 4, same plate, represents a still shorter and broader specimen of the same pattern of pipes. This example is made of light, bluish-gray steatite, and formerly had a high polish. The diameter of the mouth is $1\frac{1}{2}$ inches; that of the base, one-half an inch. We have in this instance these proportions brought more nearly than in any of the preceding to the same proportional measurements of most of the pipe-bowls found in the Atlantic coast States and in the interior of the country.

Fig. 7, same plate, is of a much softer mineral, without polish, and is somewhat irregularly shaped. The capacity is greater than some others of the same exterior dimensions; but the sides of the pipe, although of less width than usual, are of uniform thickness. It is not as carefully finished as the other pipes found in the graves. A fragment of the bone mouth-piece still remains in the base of the pipe.

Figs. 3 and 5, same plate, represent the two smallest examples of these tubular smoking-pipes. They are of the same general appearance, but one is more artistically finished than the other. Fig. 3 has a narrow raised rim about the mouth, and two incised lines extend obliquely down nearly the whole length of the pipe. These lines are cut in opposite directions and cross each other near the base of the pipe. It is probable that they are intended as an ornament. Fig. 5 does not show the slight convexity in outline noticed in Fig. 3.

Fig. 3, Plate IX, represents a dark-blue steatite pipe of high polish, but wanting the regularity of outline so marked in the majority of these articles. This example is not circular in section, but distinctly flattened. It is slightly convex on one side, while the surface shown in the plate is slightly flattened. The base has a roughened mass of asphaltum surrounding it, through which projects the broken bone mouth-piece. This exterior mass of asphaltum, which has much the appearance of an acorn-cup, is not a common feature of these pipes. Usually that material is simply used as a means of securing the bone to the base of the pipe; but in this case it is apparently intended as an ornament also. So considered, we have in this example a decorated pipe, and thus dissimilar to those previously described. Although there is little now to indicate the fact, it is probable



STONE PIPES FROM SOUTHERN CALIFORNIA.
FULL SIZE.

that this exterior mass of asphaltum may itself have been covered with minute fragments of abalone shell, which were extensively used for decorating many objects in common use.

Fig. 1, same plate, is another example of a plain pipe that has an exterior coating, in places, of asphaltum, as shown in the figure. A very interesting feature of this specimen is the remains of two bands of asphaltum, each nearly an inch in width, one within a short distance of the mouth or larger end; the other just above the middle of the pipe. Of itself, this material could scarcely have been considered an ornament, and probably was used to secure the attachment of pieces of shell or other material.

Fig. 2, same plate, represents a very elaborately ornamented pipe. Like the preceding, it has asphaltum encircling the body of the pipe near the mouth or larger end, which is further ornamented by a well-defined rim, having on it a series of closely-made, incised oblique lines. The asphaltum, in this instance, is in a series of narrow bead-like lines, and not a nearly uniform mass, as in the preceding. Near the middle of the pipe there is, in bold relief, a broad band, bounded on each side by a narrow one. This central band is itself ornamented with nearly equi-distant, deeply-incised cross-lines, forming diamond-shaped figures that are very pleasing in effect. When we consider that this pipe was probably decorated at the mouth of the bowl with brilliant fragments of pearly shell, and that the body of the pipe is highly polished, it is seen that it was really an artistic production. Of the series here described it is the most noticeable specimen, except in the one feature of length and corresponding massiveness.

Fig. 4, same plate, represents another example of an elaborately-carved pipe; but although even more has been attempted than in the preceding, the workmanship is inferior, and this failure to execute artistically the evident design makes the specimen of far less pleasing appearance than the preceding. The prominent feature of the carving consists of a series of eight prominent ridges, with concave interspaces of different widths. The continuity of these ridges is broken by an irregular transverse incised line that is duplicated over one-half of the series of eight ridges, as seen, in part, in the illustration.

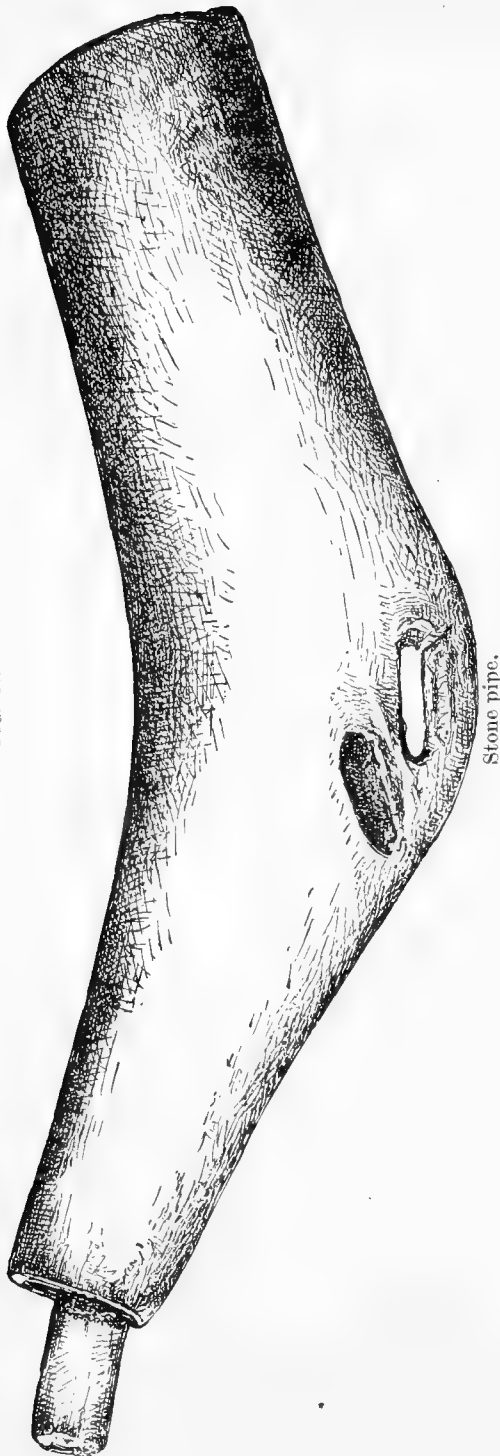


FIG. 43.

Stone pipe.

Fig. 43 represents a very marked specimen of these tubular pipes, not in being highly decorated or elaborately carved—it is, on the contrary, perfectly plain in this respect—but in its variance in the direction of the usual character of the pipes found in the interior of the country and along the Atlantic coast, where we find, as a rule, the bowl and stem of smoking-pipes, not in a continuous line, but at an angle. Of all the pipes here described, this comes nearest to the form for comfortable smoking as judged from a modern smoker's standpoint. The bowl proper projects at an angle of about 45° when holding the stem or smaller end in a horizontal position. At the junction of the bowl and stem, on the under or outer side, is an elongated oval hole cut in the pipe very near the surface, leaving a narrow exterior band by which by means of a cord the pipe could be readily suspended to the dress or person of its owner when not in use. At the bottom of the bowl, on one side, is an elongated oval hole, which has the appearance of being a flaw in the mineral rather than the result of accident when shaping the specimen, or of long usage. It has been closed with asphaltum. This pipe has also the characteristic bone mouth-piece

retained in the majority of the specimens. It was collected by Mr.

S. Bowers at Santa Barbara, Cal., and is now in the National Museum. (No. 20218.)

Although there is not the same artistic skill displayed in the shaping, finishing, and ornamentation of these pipes, that is exhibited in the carving of the animal pipes of the Moundbuilders and of some more modern Indian tribes, the ingenuity exercised in successfully producing these elongated, conoidal-shaped pipes was very considerable, and a study of the series as such with reference to the probable method of drilling or otherwise perforating these stone tubes is desirable.

The material of which they are made, whether steatite, talcose slate, or serpentine, is not difficult to work, and is, we believe, more easily cut and worked when newly quarried than after long exposure. From the fact that many large vessels of the same material were made by the same people, and that many of these pipes are of unusual lengths, it is probable that newly-detached masses of bed-rock were chosen exclusively. Even at present these articles are easily cut with flint flakes, and the material readily yields to the rotating motion of a flint drill. Presuming that the makers of these pipes were not in possession of any metal implements, which, in fact, would scarcely be better adapted to the purpose, it is probable that in the pipes we have an explanation of the uses to which some of the flint knives already described (Plate IV) and the large drills, as Figs. 13 and 14, were put.

From the finished exteriors of Fig. 6, Plate VIII, and Fig. 5, Plate IX, it will be seen that the pipe was first shaped, and subsequently drilled, inasmuch as these two specimens are symmetrically finished, and even polished; yet the drilling has been only partially completed; in Fig. 6, Plate VIII, being scarcely more than an inch in depth; in the longer example, for about one-third of its length. These specimens are instructive, in reference to the method of manufacture, in thus showing that they were first shaped; and the series of short incised lines, extending longitudinally, yet crossing each other at irregular distances, are evidently tool-marks. The stone, thus cut from time to time, and subsequently rubbed, would soon be reduced to the desired shape, but the final polishing has in every instance failed to wholly obliterate the last marks of the flint knife that probably was used.

Having progressed thus far, the drilling was commenced; and to effect this it would appear that a stone drill, and not a hollow reed, was used. The tool-marks, especially in the unfinished cavities of these two specimens, are very distinct, and the hole is conical in shape, without a trace of a projecting nipple at its base, as when a reed with sand and water is used. Such a drill as that represented by Fig. 13 would, I think, readily effect a perforation throughout the entire length of either of these specimens without being materially dulled by the operation.

The perforations are not of uniform diameter throughout. In all there is a marked difference in the diameter of the hole, from the mouth of the bowl extending downward about two-thirds of the length of the pipe, and the remaining third was apparently bored by a slender drill from the base until the hole through that portion met the longer cavity, which is the bowl proper. They are thus somewhat like other pipes found in the interior of the country, and approach in character modern smoking-pipes, as they only require an angle at the junction of the two perforations to make them practically the same.

Considering that the stem or mouth-piece, in all cases of bone in those here described, is in a direct line with the bowl, it is not very easy to determine how such pipes could be used in smoking tobacco or other vegetable substitutes, if such tobacco or other material in any way resembled that used by smokers of to-day. There appears to be no way of retaining the material burned unless the smoker rested on his back and smoked in that star-gazing attitude; or worse, threw his head backward at a dangerous angle with his body, and thus essayed to draw comfort from the cumbrous stone pipe, that needed the additional strength, in many cases, of his arm to support it.* Still no other use than that of smoking-pipes can be suggested for these implements; although as such they are far behind the not less remarkable productions of the Moundbuilders and Indians, whose works in the same direction, so far as convenience and, we may add, luxury are con-

* Bancroft, in his "Native Races of the Pacific Coast," states, vol. 1, p. 394, that the Central Californians "use a species of native tobacco of nauseous and sickening odor." And also that "they burned the avalone shell for the lime, to mix with their tobacco, which they swallowed, to make them drunk."

Mr. Schumacher has, with other notes sent to the Peabody Museum, given the following: "The pipe is a funnel-shaped tube like a thick, enlarged modern cigar-holder, with an opening usually over an inch at the wide end, which narrows to one-third of an inch toward the other one of corresponding decreased thickness. The hole was drilled from both ends, but only to a short distance from the smaller,

cerned, have hardly been improved upon by the still later productions of civilized nations.

We have spoken of these tubular smoking-pipes from Santa Barbara as peculiar to that locality, but in so doing the intention was to assert their being the only form from that locality, and not that the same form did not occur elsewhere, as in the interior and in the Atlantic coast States. With one exception, these Dos Pueblos pipes are straight, *i. e.*, with the bowl and stem in line, and not at an angle, and such straight or tubular pipes have also been occasionally in use elsewhere. Some, if not all, of the shorter stone tubes found in the Eastern States were smoking-pipes, and tubes of clay, stone, and copper, found in mounds in Ohio by Professor Andrews, approach in many respects the Santa Barbara pipes, although they have some important differences. The curator of the museum, in commenting on these specimens from Ohio, remarks:*

“These tubes of stone, clay, and copper described by Prof. Andrews approach so near to the long tube-like pipes made of stone and still used by the Utes, that I can hardly refrain from classing them with pipes. The principal difference consists in these tubes having what would be the mouth-piece made by the termination of the pipe itself, while in the stone tubes that are unquestionable pipes the mouth-piece is probably made by inserting a hollow reed or a bone. These tube-like pipes have been found in number in the old burial places of California, and there has recently been one received at the Museum, which was collected in Massachusetts. Dr. Abbott has also found fragments of similar pipes in New Jersey. In Squier and Davis' ‘Ancient Monuments of the Mississippi Valley,’ several of these stone tubes are described, one of them identical with one collected by Prof. Andrews, and the authors of that work suggest that these tubes may be pipes.”

Those found in New Jersey by the writer† are of stone and of clay; and while the one of stone ($6\frac{1}{8}$ inches long, with a circular, uniform, and direct hole drilled through) is exteriorly much the same as a California pipe, there is not that variation in the diameter of the perforation to which

and the mouth of the pipe was then enlarged by scraping parallel with the longer axis. As a mouth-piece, which protrudes about an inch, a piece of a wing or leg bone of some bird was inserted and tightly secured with asphaltum. The pipe was usually made of steatite, and is sometimes neatly finished. Among the Klamaths of the present day a pipe of a like form is smoked; and it amused me to see them bending back their heads to bring the pipe in a vertical position so as not to lose any tobacco (which I found a sickening narcotic, they smoke still the native tobacco, *Nicotiana attenuata*) while taking a long draught which was inhaled to longer enjoy the short opportunity, as the pipe must be passed on.” See, also, note on page 25 of this volume, referring to Dr. Rothrock's discovery of *N. Clevelandi* on the shellheaps.—F. W. P.

* Tenth Annual Report Peabody Museum, p. 73. Cambridge, 1877.

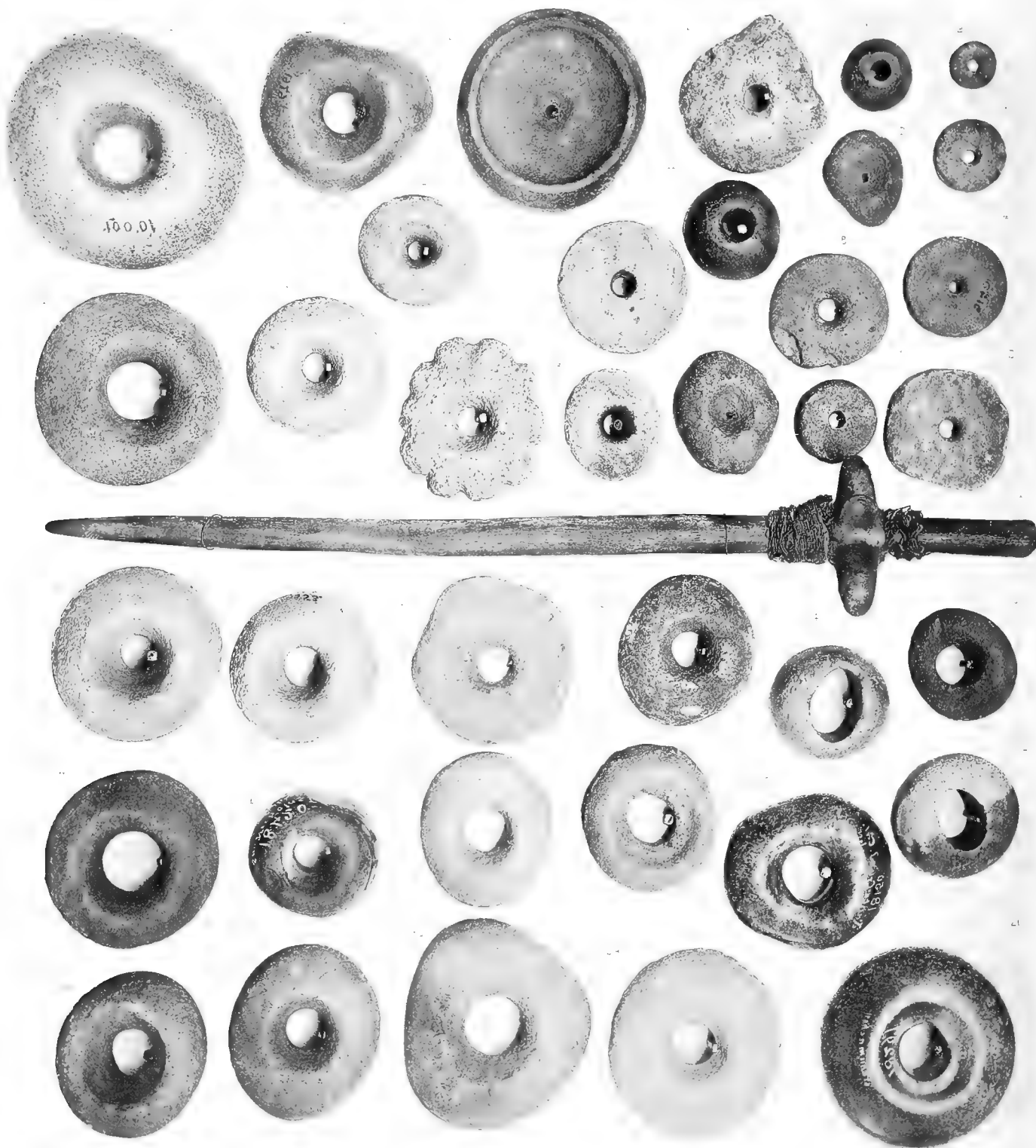
† Nature, vol. xiv, p. 154, with figures.

I have referred as characteristic of those from California. Those of clay are also of uniform diameter, but they are too small to have been available for smoking; and yet do not appear to have been simply pipe-stems, which they somewhat resemble. While, therefore, the stone tube, which had a perforation of half an inch in diameter, may have been used as a pipe, the clay specimens must have been for some other purpose. On the other hand, an unquestionable pipe from New Jersey* is practically of the tubular pattern, inasmuch as the hole for the insertion of the stem is directly opposite the main orifice, or mouth of the bowl. Pipes of this shape are not uncommon in New Jersey, but the hole for the stem is, as a rule, in the side of the bowl, near the base, and not *through* the latter. When in the side the stem is at an angle, and we have the common eastern form; when in the base, the bowl and stem are in line, and we have an exceptional form in the East, but which on the Pacific coast is the common form.

It may therefore be concluded, I think, that while tubular pipes are characteristic of the California coast Indians, the smoking-pipes of the interior and Atlantic coast tribes were of a very different pattern; and that among the relics of both occur certain tubes of stone, and in the interior, of clay (and copper), which, while having the general appearance of tubular pipes, were in all probability used for other purposes, such as "medicine tubes," for example, to which I have elsewhere referred in detail; and, also, that pipes in no way distinguishable from those obtained at Santa Barbara were also in occasional use among other and far distant tribes.†

* Smithsonian Annual Report for 1875, p. 341, fig. 179.

†Among the articles received by the Peabody Museum from the last exploration of the islands of San Clemente and Santa Catalina by Mr. Schumacher, are a number of these tubular pipes, most of which are made from a different material from those found on the mainland. At first I thought that these pipes were made from mixed clay, and should be classed as articles of pottery, but a careful examination shows that they are made from a natural clay-rock, which is of a red color and very soft. That they were cut from a mass, and not formed by hand while the material was in a plastic state, is shown by the condition of several unfinished and broken specimens. One of these red clay pipes is of large size, measuring 9 inches in length, by $2\frac{1}{2}$ in diameter at the opening of the bowl. One of the smallest of the lot shows signs of having been bored out in a different manner from the others, perhaps by a metallic tool, and is only 2 inches long by $1\frac{1}{4}$ in diameter. Another, which is $1\frac{1}{2}$ inches long and not quite an inch in diameter, has two grooves cut around, forming a rude ornamentation. With these is a small pipe cut from steatite, and only 3 inches in length, which shows the peculiar circular lines within the bowl, and equal diameter of the boring, that indicate a metallic tool.—F. W. P.



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WEIGHTS, WHORLS, ETC.

FIG. 1. BRONZE HEAD MOUNTED ON WOODEN HANDLE, FROM PERU.

FIGS. 2. 21. OF STONE, FROM VARIOUS COUNTRIES.

FIGS. 22. 38. OF STONE, SOUTHERN CALIFORNIA.

$\frac{1}{8}$ DIAMETER.

PERFORATED STONES.

PERFORATED stones, of the character of those considered in this chapter, have been found in such abundance on the mainland and islands of Southern California that they are now prominent objects in all collections gathered from that region. Many have been taken from graves where they were associated with other articles, while many more have been obtained from the ancient refuse-heaps and shellmounds, particularly from those on the islands.

Similar stones have been found in other parts of the world, and have been classed as hammer-stones, weights for digging-sticks, club-heads, net-sinkers, or as spindle-whorls.

The particular uses to which these California stones were put will probably always remain conjectural, though it is evident that the wants or necessities they were intended to supply must have been very common, since they are found to be widely distributed among uncivilized tribes. As it is more than probable that the same wants, under similar conditions, gave rise to the same means of satisfying them, we are justified in looking to the use made of similar stones by savage tribes of recent times for some explanation of the purposes to which they were applied by the Indians of California. In this connection it is of interest to note that it is to the negro tribes of Africa we must look for information in relation to one class of these stones. Mr. William J. Burchell, in the account of his travels in the interior of Southern Africa,* has given a figure of an implement used by the Bushmen, and the following information in relation to it: "We were visited by two natives * * * out in search of wild roots * * * . The other carried what my Hottentots called a *graaffstok* (a digging-stick), to which there was affixed a heavy stone to increase its force in pecking up

* Vol. ii, p. 29, and figure on p. 45, 1824.

bulbous roots. The stone, which was 5 inches in diameter, had been cut or ground very regularly to a round form, and perforated with a hole large enough to receive the stick and a wedge by which it was fixed in its place." The Rev. J. G. Wood also gives a figure of a digging-stick in his account of the Hottentots,* of which he writes: "This is nothing more than a stick of hard wood, sharpened at one end, and weighted by means of a perforated stone, through which it is passed, and which is held in its place by a wedge. With this rude instrument the Hottentot can break up the ground faster than might be imagined, but he oftener uses it for digging up wild plants and unearthing sundry burrowing animals than for any agricultural purposes." Mr. E. L. Layard, in his remarks on the Stone Implements of South Africa,† mentions that perforated round stones, of various sizes, found all over the country, are said to have been used by Bushmen of late days for the purpose of weighting their bulb-digging sticks. In the same journal are recorded the remarks by Mr. C. L. Griesbach, on the weapons of the Kaffirs and Bushmen of South Africa,‡ as follows: "A singularly-shaped tool is employed by the Bushmen, consisting of a rounded stone perforated for the passage of a stick, which is used for digging up roots, and may also be employed as a weapon." Prof. J. W. P. Jenks, of Brown University, pointed out to me, among the specimens in the museum of the University, a large perforated stone, weighing over three pounds, which he had received from Southern Africa, with the statement that it was used by the natives as a weight to their wooden spades—"the person digging letting the stone fall down the handle of the spade, the force thus imparted to the blade driving the spade into the earth." I take this statement, however, with some allowance, as Professor Jenks was not sure that his informant had seen the stone used as he described. On Plate X, Fig. 18, is represented one of these African stones now in the Peabody Museum (6761), which was received several years since from the South African Museum, with the following description attached: "Stone perforated by tribes of Bushmen, now extinct, and used as a weight to give greater force to the blow of the wooden stick used in digging up roots and bulbs."

* Natural History of Man, vol. i, p. 254.

† Anthropological Journal, vol. i, p. c (Proceed. Ethn. Soc.), 1871.

‡ *L. c.*, p. cliv.

That these stones were used for any purpose for which they were handy, or easily adapted, is confirmed by the following statement by Mr. Stevens:* “In the Christy collection are some perforated stone disks, $5\frac{1}{2}$ inches in diameter, used for crushing or grinding grasshoppers, spiders, &c., by the Buchuanas of South Africa, who regard these insects as forming a valuable article of food. When digging wild roots they put this stone upon the digging-stick to give it greater weight. A specimen of such a digging-stick, with the stone attached, is in the Museum of the Missionary Society of London.”

In illustration of the common use of the digging-stick in Africa, the following myth, expressing the Zulu theory of the origin of Apes, is of interest: “The Zulus still tell the tale of an Amafeme tribe who became baboons. They were an idle race who did not like to dig, but wished to eat at other people’s houses, saying, ‘We shall live, although we do not dig, if we eat the food of those who cultivate the soil.’ So the chief of that place, of the house of Tusi, assembled the tribe, and they prepared food and went out into the wilderness. They fastened on behind them *the handles of their now useless digging-sticks*, these grew and became tails, hair made its appearance on their bodies, their foreheads became overhanging, and so they became baboons, who are still called Tusi’s men.”†

Mr. V. Ball has shown ‡ that perforated stones of the same character as those found in Africa and America were also formerly used in the central provinces of India, and gives a figure of the single specimen which had come under his notice. This stone was found on the surface at the Mofáni coal mines, and is described as “a water-worn pebble of basalt weighing 1 pound 10 ounces. The central perforation is bevelled away to both faces.” The figure shows the stone to be from 4 to $4\frac{1}{2}$ inches in diameter and $1\frac{1}{2}$ inches in thickness, with a central perforation nearly two inches in diameter on either face, and about three-fourths of an inch in the centre. In every respect this stone is identical with many specimens from California. Mr. Ball suggests that as it was too heavy for a spindle-whorl, it may have been used

* Flint Chips, p. 95.

† Tyler, Primitive Culture, vol. i, p. 376.

‡ On an ancient perforated stone found in the Satpura Hills. Proceedings Asiatic Society of Bengal, March, 1874, p. 96, pl. v.

as a hammer by being held in the hand, or as a "knuckle-duster, or for flinging, like a quoit, at small animals." Mr. Evans* mentions another specimen from the central provinces of India, found in 1866, and recorded in the *Journal of the Asiatic Society of Bengal* for that year.

At the sites of the ancient lake dwellings in Switzerland, numerous perforated disks of stone, pottery, and horn have been obtained in connection with the many thousand relics which these old dwelling-sites have yielded to Dr. Keller and the other archæologists who have so carefully investigated them. With these more or less flattened disks and, sometimes, conical and bead-shaped articles of stone and pottery, there have been found other perforated stones more like the majority of those of medium size from California, which, like their American representatives, are generally made of hard stones, often of circular pebbles, and highly polished. In general terms, these disks and perforated pebbles from the Swiss lakes have been called net-sinkers, spindle-whorls, and, occasionally, hammers. It can hardly be doubted that many of the pottery disks and those made of sandstone and other soft materials, which are generally flat and not very thick, were spindle-whorls, whilst some of the irregularly-shaped examples of soft stone and of easily-perforated pebbles may have been used for weights of various kinds and as net-sinkers; but it is not likely that perforated stones costing so much labor, as did many of these disks, would have been made simply for net-sinkers, when any beach pebble or piece of stone could have been easily notched so as to answer the same purpose, as is clearly shown by figures in Keller's *Lake Dwellings*.† I may also add that similar notched stones are very common at many stone-age fishing-stations in the United States, and are generally classed as net-sinkers.

On Plate X, Figs. 2, 3, 4, 5 represent four of the thirty examples of flat disks from the stations of St. Aubin and Concise, on Lake Neuchatel, now in the Peabody Museum. These are of the form that seems best adapted for use as a spindle-whorl. Fig. 5 may represent an unfinished specimen, as it has the appearance of a stone that has been ground flat and bored, but not yet finished on its edges.

* *Ancient Stone Implements of Great Britain*, p. 207.

† Plate xxiv, figs. 1 and 2, Lee's translation, 2d ed.

M. Troyon, in his report on the researches made at Concise in 1861,* mentions that there were obtained "twelve stone disks, from 13 lines to 2 inches in diameter, and from 2 to 8 lines in thickness, which have a funnel-shaped hollow on each side or face. The incomplete hollows on two of them enable us to perceive the workman's mode of procedure. He commenced by cutting away the stone by gentle strokes of an angular instrument, working first on one side of the disk or plate and then on the other, and when the two hollows met he finished the boring by turning a punch—of silex, no doubt—rapidly round and round, until he had smoothed away all the inequalities left by the first operation. The use of these plates or disks of various kinds of rock is doubtful as yet. They may have served as spindle-whorls or as weights for a net. A small pebble, oval in form and pierced on both sides so as to be suspended from a string, would seem rather to indicate the latter as their use."

A typical "spindle-whorl of very hard stone," from the lake of Varese, is figured in Keller's *Lake Dwellings*.† Another of sandstone, from the lake of Bourget, is represented in the same work.‡

Of the irregular or rude forms of perforated disks found in the Swiss lakes, and corresponding with many found in the United States, there are some from the lake of Neuchatel, which are described in M. Louis Rochat's report, translated by Mr. Lee, by whom the figures are reproduced § Of the specimen represented by his Fig. 5, M. Rochat writes: "An irregularly-shaped pebble, pierced with a great hole. If intended as a hammer, it must have been a very inconvenient one." M. Rochat also doubts the adaptability of many of the perforated stones as spindle-whorls. Certainly such rude and eccentric specimens as his Figs. 4 and 5 represent can hardly be regarded as anything more than simple stone weights, possibly for fish-nets, for which purpose it seems more likely they were used than the larger and carefully-made implement figured by M. Figuier|| as a net-sinker. Professor Desor had previously figured just such a specimen as the one last mentioned, and stated that he believed "such stones to have

* Translated in the *Smithsonian Report for 1861.* § *L. c.*, pl. ciii, figs. 3, 4, 5.

† Lee's translation, 2d ed., pl. clxii, fig. 13.

|| *Primitive Man*, fig. 79.

‡ Pl. cliii, fig. 5.

been spindle-whorls rather than weights to fishing-nets.”* The form of the implements just mentioned is like that represented on Plate X, Figs. 17, 19, 33, &c., the stone being of considerable thickness and the hole countersunk on each face.

I now have to note another form of these stones from the lake dwellings in the Atter See (Upper Austria) as described and figured in Mr. Lee's second edition of Dr. Keller's *Lake Dwellings*.† This stone very closely resembles the one from California represented on Plate X, Fig. 34, and, like the California specimen, it has the hole of nearly the same size throughout. Count von Wurmb's description is as follows: “There was a very peculiar round stone ball of polished serpentine found here, which had a well-formed hole in the middle for a handle. It must have been too costly for a net-sinker, or for any object of daily use. We may probably consider it as a weapon or a mace.” With these views as to this stone being probably the head of a mace I am inclined to concur, and also to consider of the same character the specimen found at Robenhausen and described by Dr. Keller.‡ Of this last Dr. Keller writes: “A very singular stone implement. It is made of tough stone like serpentine, with a round hole in the middle” The figure given represents this implement as a thin flat disk, about four and a half inches in diameter, with a sharp cutting edge, and a hole in the centre about three-quarters of an inch in diameter. The very close resemblance of this stone with one now forming the head of a club from Queensland, which will be described farther on, is such as to suggest the probability that it was used in the same way.

Such perforated stones as are now under consideration are, apparently, not very abundant in the north of Europe, though there are fifteen specimens in the Peabody Museum, obtained from Denmark, contained in the “Rose Collection.” Several of these are represented on Plate X, Figs. 6, 8, 9, 11, 13, 14, and 17. Of these the two represented by Figs. 14 and 17 are thick oval stones, with countersunk holes, and in every way like examples from the Swiss lakes and from California, and also like the one

* An illustration of one of these stones is given in the translation of Professor Desor's *Memoir*, contained in the *Smithsonian Report* for 1865, p. 365.

† Abstract of an account by Count von Wurmb, p. 624, pl. cxc, fig. 6.

‡ *Lake Dwellings*, Lee's second edition, p. 58, pl. xii, figs. 4, 5.

described by Professor Nilsson* as a hammer-stone, "in which the usual indentures have been carried through the stone." Another specimen (Plate X, Fig. 11) is made of a very hard and heavy black stone, probably basalt, with a straight perforation through its longest diameter. It is difficult to consider such a stone as this as having been made for any other purpose than as a weapon of some kind, and the small hole suggests that the stone was fastened to a handle by means of a thong of hide. Mounted in this way it would form a formidable weapon like a "slung-shot." Two other specimens in the collection, one of which is beautifully polished, must be regarded as of the same character as the one first described. Fig. 8 of the plate represents one of the rudest specimens in the lot, and consists of a discoidal pebble of quartz schist, which has been perforated. A stone like this may have been used as a net-sinker, or for any ordinary purpose where a small weight was required, as it seems too rude and rough for a spindle-whorl, and it is not heavy enough for a club-head or for a hammer. Two of the Danish specimens, Plate X, Figs 9 and 13, are identical with the thin flat examples from the Swiss lakes, and may well be considered as spindle-whorls. With them should be classed the bead-like specimen represented by Fig. 6, which is probably made of baked clay. In connection with these Danish specimens, I was much interested by finding four which illustrated the method of manufacture, and showed that much labor was expended in the production of the largest and best made of these perforated stones. These examples showed that the desired form, either spherical or discoidal, was attained by first hammering the stone roughly into shape and then polishing. A close examination of all the larger perfect specimens from Denmark shows that they were thus finished, and that they were not simply perforated pebbles. The same is the case with most, if not all, of the best finished of the California specimens. One of the Danish stones appears to have been ornamented by numerous incised lines, but this is the most weathered of the lot, and, although made of a hard stone, its long exposure to atmospheric action has so disintegrated its surface as to nearly obliterate the markings. Several of the Californian stones show similar rude attempts at ornamentation by incised lines

* *The Primitive Inhabitants of Scandinavia*, English edition, 1868, p. 16, pl. i, fig. 12.

In Great Britain numerous perforated pebbles or artificially-shaped stones of quartzite and other hard materials have been found, several of which, identical in shape and size with some from California, have been beautifully represented by Mr. Evans.* He classes them as a group under "Perforated Hammers," which, by an easy transition, passes into "Perforated Axes," all of which have the common character of a perforation presumably for the purpose of hafting the implement. While there can be little doubt as to the use of many of these British perforated implements, both as axes and hammers, the series runs, as in other localities, into several forms of doubtful use; and in the case of the hammers passes into the simple pebble, either with a straight or a countersunk hole, which may or may not have been used as a hammer. Perforated disks of stone, some of which are ornamented, have also been found in Great Britain, and are, I think, properly classed as spindle-whorls by Mr. Evans, who gives figures of four of this character.

It is of interest to note that Dr. Schliemann found many perforated stones during his extensive explorations at Hissarlik. Among his photographs there are twenty-five or thirty of them represented, and in his volume numerous references are made to "quoits," "weights," and "hammers" of hard stone of various shapes, though the majority represented in the photographs appear to be oval and circular pebbles. Thus, for instance, he writes: "Large and small hammers, axes, and balls, with a hole through the centre; * * * quoits made of granite and other kinds of stone, with a hole through the centre for throwing them." "The hammers do not all possess a perforated hole; upon many there is only a cavity on both sides about one-fifth to two-fifths of an inch deep." "Are clumsy hammers of diorite, but occasionally also hammers of the same or of green stone very prettily worked; some of them have a wide hole at both sides and a narrow one in the middle, and I cannot understand how a handle could have been fixed into them."†

In a recent conversation with General di Cesnola, he informed me that he had found two similar stones during his explorations in Cyprus. These

* Ancient Stone Implements of Great Britain, pp. 204-5, figs. 155, 156, 157, and on p. 372 are figures of four typical spindle-whorls.

† Troy and its Remains, pp. 163, 238, and 252.

were of serpentine, and about the size of the largest flattened specimens from California. He was unable, however, to give any information as to their use, but was surprised at finding only two during his explorations of over sixty thousand tombs.

As there is as much evidence that circular perforated stones were used by savages of modern times for heads of clubs, as there is of the use of the same kind of stones as weights for digging-sticks, it is very likely that many of the ancient stones were designed for weapons, as has already been suggested by several writers and noted in the preceding pages.

The rudest form of these clubs armed with stone is that described by Sir John Lubbock,* as used by the Australians. It, however, differs from all others, inasmuch as the club-head is not made of a perforated stone, but of two stones placed on opposite sides of the stick, and held together by a mass of gum. It is also stated that this club, or, as he calls it, "hammer used for killing seals and other animals and for breaking shell-fish," has a "handle from twelve to fifteen inches long, pointed at one end." In contrast with this rude implement or weapon is one in the Peabody Museum (No. 13945) received from Queensland,† Australia. This consists of a handle of hard wood three and a half feet long, one inch in diameter at its largest end, and tapering gradually to a sharp point. Two and a half inches from the large end there is fastened a disk of hard dark-colored stone, four and a half inches in diameter and three-quarters of an inch thick in the centre, where it has a straight perforation, and through this the handle passes. This stone is finely polished and worked to a sharp or cutting edge, which has been slightly abraded by use. The stone is prevented from slipping down the stick by three rings apparently made of split and braided bamboo. Above the stone is a similar ring, over which and covering the stick for the whole space above the stone, is fine braided work ending in a tuft of bright-colored feathers. Such an article as this might well be considered as a sort of baton; but after holding it in the hand for a moment it becomes evident that it would be as formidable as a weapon as it is ornamental as a badge of office. The elaborate finish of this weapon certainly

* Prehistoric Times, p. 441.

†I do not find any account of similar weapons from Queensland, and it is probable that this one was originally from New Guinea or some adjacent island.

precludes the idea of its having been intended as a digging-stick, though its pointed end would allow of its being so used. Mr. Evans* mentions similar weapons from "the southern part of New Guinea and in Torres Straits" as "sharp-rimmed perforated disks of stone, mounted on shafts so as to present an edge all round." In referring to the weapons of the Tahitians, Sir John Lubbock† states that they had "pikes headed with stone," which perhaps would imply a similar weapon to that above described. Mr. Stevens also states‡ that "similar drilled stones§ are used for arming clubs by certain savages, and one, fixed to the end of a stick, from the Solomon Islands, is in the Christy Museum. Mr. Robert Day, jr., of Cork, possesses another of these stone-headed clubs from San Cristoval."

While the proofs of these pages were in my hands I had the good fortune to receive from Mr. Appleton Sturgis, of New York, a club-like pike, of the character of those mentioned by the authors quoted in the preceding paragraph, and as the stone with which this weapon is armed so closely resembles many of the hard, circular, perforated stones from California, the weapon is of great importance in suggesting a very likely use of stones of this character wherever found. Mr. Sturgis informs me that this weapon was received with eight others, now in the American Museum, from the Island of New Britain, and that the others vary from this simply in the length of the staffs and the size of the stones, the latter being in a few instances from half to three-quarters of an inch greater diameter, and the longest staff is about five feet in length. The one before me (Peabody Museum, No. 20,000) has a staff of hard wood, which is four feet four inches in length, the largest end of which measures two inches across the top, but this size is gradually reduced to one-half of that diameter three inches down the staff, at which point the perforated stone is firmly fixed by means of a very tenacious gum. The staff below the stone is of a uniform diameter of 1 inch, with the exception of the last ten inches of its length, which form the long sharp point of the weapon. The stone is hard, and

* Ancient Stone Implements, p. 193. † Prehistoric Times, p. 477. ‡ Flint Chips, p. 95.

§ Mr. Stevens is here writing of the larger drilled stones, which have generally been called net sinkers, and calling attention to the necessity of caution in classing all the ancient specimens as such.

while it is not polished its rounded surface has become very smooth and black from use. The perforation was made by drilling from both sides of the stone, and the hole is a little more than half an inch wider on each face than in its centre, thus leaving a space between the staff and the stone which has been filled, above and below, with the gum by which the stone is held in its place. The stone is three inches in diameter and one and a half in thickness. The only attempt at ornamentation on this weapon consists of a single circle of small pieces of shell placed in the gum on each side of the stone.

Another instructive implement of modern times, taken in connection with the former use of these stones in California, is an Eskimo implement in the Blackmore Museum. This is described by Mr. Stevens* as "consisting of a stone ball with a drilled hole, through which a strip of raw hide is passed to serve as a handle."

Closely allied to the larger of these perforated stones, which were probably used as club-heads, are the two found in Scandinavia, which are furnished with several projections. One of these is figured by Professor Nilsson.† It has four points and an extreme width of about eight inches. The central perforation is straight and about one inch in diameter. Such a stone mounted on a strong handle would prove a weapon of no mean order, and it is classed by Professor Nilsson as a battle-axe, though, as he states, he and others once considered it as an anchor.

This form of perforated stones leads to the star-shaped club-heads of Peru and Chili, of which several have been described, made both of stone and of bronze. Mr. Thomas Ewbank, in his account of the antiquities of Chili and Peru,‡ describes and figures two of these heads of war-clubs, or six-pointed maces, made of bronze, and mentions another made of nearly pure copper. These were all found in a grave in the province of Cusco. They are about the size of the one from Scandinavia, which is made of stone, and figured by Professor Nilsson. The hole for the handle is about one inch and an eighth in diameter. One of these bronze mace-heads has one of the rays longer than the others and sharpened like a hatchet.

* Flint Chips, p. 499.

† Primitive Inhabitants of Scandinavia, p. 75, pl. ix, fig. 189.

‡ In U. S. Naval Astronomical Expedition to the Southern Hemisphere during the years 1849-'52, Lt. J. M. Gilliss, Supt., vol. ii, p. 133, 1855.

Closely resembling these is the weapon* from an ancient grave at Ancon, Peru, of which a representation is given on Plate X, Fig. 1. This club is provided with a handle of hard wood, which is twenty-one inches long and seven-eighths of an inch thick at its larger end, from which it tapers gradually to a sharp smooth point. Between three and four inches from the thick end, a bronze (or copper?) head with six rays is attached and held in place by narrow strips of cloth, now evidently somewhat changed from their original position. The bronze head has a straight perforation a little larger in diameter than the wooden handle, so that it requires the thickness of the cloth to keep it in place. This bronze head is about one inch thick, and the rays are of an equal length of one inch, with flattened sides and rounded points, some of which are a little battered by use. With a weapon like this a powerful blow could be given, and although the pointed end of the handle has suggested the possibility of its having been used as a digging-stick, it seems more likely that its primary use was as a weapon.

Mr. E. G. Squier† has figured a similar six-pointed bronze club-head in his description of articles found in ancient graves at Chimu, of which he says: "Several varieties of bronze war-clubs are found here as elsewhere." On one of the two plates of antiquities in Gay's History of Chili there is represented an elaborately made club-head of bronze, which has seven projections.

In the large private archæological collection belonging to Mr. William S. Vaux, of Philadelphia, there is a singular club-head of copper or bronze from Peru. This is $3\frac{1}{2}$ inches in diameter and $\frac{3}{4}$ of an inch thick, measured through the hole, which is straight and 1 inch in diameter. Its marked peculiarity consists in the six rounded projections, each of which represents a human head, the face on one side and the hair on the other, which features are reversed on alternating projections.

In the American Museum, New York, there is a seven-pointed club-head made of stone, also from Peru. This is $5\frac{1}{4}$ inches in extreme diameter and $1\frac{3}{4}$ inches thick. The hole is slightly contracted in its centre, and is $1\frac{3}{4}$ inches in diameter.

* Peabody Museum, No. 8767, presented by Mr. Alexander Agassiz.

† Peru, p. 177, 1877.

In Mr. Vaux's collection, also, there are two of these Peruvian club-stones with points. The largest is from Huatasani, near Lake Titicaca. This is made of a granitic mineral, and has six rounded projections. The hole is straight and a little over an inch in diameter. The stone is about $1\frac{1}{2}$ inches thick and $4\frac{1}{2}$ across, measured from opposite points. The other specimen is made of a much softer stone, and is from Solida. It is of the same shape as the first, but is a little smaller.

Mr. Evans* also mentions "a perforated spheroidal ball of hard red stone," of which he says this is "of a different type from any of those which I have described, and which came from Peru. It is about 3 inches in diameter, with a parallel hole an inch across. Around the outside are engraved four human faces, each surmounted by a sort of mitre. It may be the head of a mace"

In the Peabody Museum there is another of these stones with rays. In this instance the stone is very much weathered, but it is considered by Mr. Wadsworth to be *andesite*. The rays, ten in number, are short and thick, and do not project over one-quarter of an inch. They were evidently formed by notching the original circular outline in ten places at nearly equal distances apart. This stone is $3\frac{1}{2}$ inches in greatest diameter and $1\frac{1}{2}$ inches in thickness. The hole is countersunk, and only half an inch in diameter in its centre, where there is a sharp ridge, while at each face its diameter is $1\frac{1}{4}$ inches. This specimen (P. M., 9699) shown on Plate X, Fig. 16, is from Puntas Arenas, Central America, and was received with another (P. M., 9698) from the same locality, also represented on the same plate, Fig. 19. As will be seen by the figure, this second Central American specimen, which is made of a piece of compact *andesite*, is circular in outline. It is $2\frac{3}{4}$ inches in diameter and $1\frac{3}{4}$ in thickness. The perforation is $1\frac{1}{4}$ inches in diameter on each face, and tapers to the centre, where its width is half an inch less than on either face.

Mr. Vaux's collection contains four perforated stones from Costa Rica, which are of unusual interest. One of them is made of lava, and is 3 inches in diameter by $2\frac{1}{2}$ in thickness, and the periphery is so cut as to form a row of eight bosses. The perforation in this stone is about $\frac{3}{4}$

* Ancient Stone Implements of Great Britain, p. 207.

of an inch in diameter in the centre, and widens towards each face. The second stone is cut from a piece of colored lava of about the size of the first, but has a slightly smaller hole, and the surface is so carved as to form three rows of rounded knobs. The third specimen is nearly spherical, about $2\frac{1}{4}$ inches in diameter, with a small perforation widening to about an inch in diameter at each end; although the stone of which this is made is very hard, its surface has been carved to represent a human head with the eyes, nose, and mouth. The last of these interesting stones is of a white marble-like material of about the size and shape of the last mentioned, and has the surface very elaborately ornamented with deeply-cut and confusing lines, so characteristic of Central American work, among which the profile of a human face can be distinguished.

It is evident that all these specimens have been made from blocks of stone worked to the required size and shape. The elaborate ornamentation of several, their small size, and their small perforations, all point to these stones having been used as weapons rather than as weights to digging-sticks or as net-sinkers, while, in size, they are rather large for spindle-whorls, for which purpose they are also not adapted by the character of their perforations.

Mr. Darwin* states that near Santiago, Chili, he was "shown one of the perforated stones which Molina mentions as being found in many places in considerable numbers. They are of a circular, flattened form, from 5 to 6 inches in diameter, with a hole passing quite through the centre. It has generally been supposed that they were used as heads to clubs, although their form does not appear at all well adapted for that purpose. Burchell states that some of the tribes in Southern Africa dig up roots by the aid of a stick pointed at one end, the force and weight of which is increased by a round stone with a hole in it, into which the other end is firmly wedged. It appears probable† that the Indians of Chili formerly used some such rude agricultural instrument."

* Voyage of a Naturalist, New York ed., 1846, vol. i, p. 345.

† Mr. Bollaert, in his volume on Antiquarian and Ethnological Researches, etc., in South America, London, 1860, p. 178, in referring to the stone mentioned by Mr. Darwin, changes this supposition of Mr. Darwin's into the statement that these stones "were fixed on the ends of sticks, and formed a rude agricultural instrument." Of this he seems to have had no evidence, and it does not appear that he even knew of these stones except through the statement of Darwin.

In Molina's work on Chili,* referred to by Mr. Darwin in the preceding quotation, I find only the following mention of these circular stones: "In the plains and upon most of the mountains are to be seen a great number of flat, circular stones, of 5 or 6 inches in diameter, with a hole through the middle. These stones, which are either granite or porphyry, have doubtless received this form by artificial means, and I am induced to believe that they were the clubs or maces of the ancient Chilians, and that the holes were perforated to receive the handles." Thus Molina does not give any use for the stones from actual knowledge, though he particularly mentions that the Indians at the time he visited the country, about one hundred years ago, used a spade of hard wood, "forcing it into the earth with their breast."† Elsewhere he again states:‡ "One of their strongest men then attempts to harrow it by means of a machine formed of two large sticks of hard wood made sharp and fastened together, which he forces into the ground with his breast, and thus covers the seed." Among a people still having such primitive agricultural methods, it does not seem probable that the weighted digging-stick would have gone out of use if once employed, and though these large perforated stones may at some time have been used as weights to digging-sticks, yet the fact that they were not so used, a hundred years ago, by a people at that time retaining so many of their old methods of work, renders it probable that the stones were intended for some other purpose, or, if not, that they were used by a people anterior to the Chilean tribes occupying the country at the time of the Spanish discovery.

Among the specimens in the Peabody Museum is one from Chili (7079) and another from Chimbote, Peru (10001), which, judging from their size and the shape of their perforations, may possibly have been weights to digging-sticks, as suggested by Mr. Darwin. They are both represented on Plate X. Fig 21 is the one from Chili. It is not perfectly regular in outline, but was evidently worked out of a block of granite. It is about 4 inches in diameter and $2\frac{3}{4}$ in thickness. The hole is very large, being a little over 2 inches across on either face of the stone, and $1\frac{1}{4}$ inches in diameter in the centre. There is evidence of considerable wear on one side of the stone, as if caused by a long-continued vertical movement.

* Translation, American edition, 1808, vol. i, p. 55.

† Vol. ii, p. 14.

‡ Page 185.

Fig. 20 represents the Peruvian stone, which is the largest and heaviest of all these perforated stones that I have met with, weighing three pounds thirteen ounces. It measures $5\frac{1}{2}$ inches in its greatest diameter, and has a thickness of $2\frac{1}{2}$ inches measured on one side of the hole and 3 inches at the opposite side. The hole through the stone is $1\frac{1}{4}$ inches in its least diameter and 2 inches across its outer margins. This seems to have been made from a natural granite pebble. Its whole surface, with the exception of a few abrasions, is very smooth and polished, as if by long-continued use, and the same is the case with the perforation. Such a heavy stone as this would add great power to a digging implement, while it seems rather heavy and clumsy for a club-head, for which purpose one of smaller size and more nearly symmetrical would probably be equally effectual. A smooth circular stone made of serpentine (?) in Mr. Vaux's collection, and found near Lake Titicaca, is better adapted for a club-head than the large one mentioned above. This is about 3 inches in diameter and $1\frac{1}{2}$ thick, with a hole 1 inch wide.

As allusion has been made to the probable use of perforated discoidal stones as spindle-whorls, particularly in reference to some of those found in the prehistoric sites of the Lake Dwellers, it may not be out of place here to call attention to several discoidal and conical pieces of terra-cotta, bone, and wood, which are unquestionably spindle-whorls, and closely resemble in shape many of those to which allusion has been already made in this chapter. Indeed, Figs. 2, 3, 4, 9, 11, and 13 of Plate X correspond in size and outline with several of these.

The whorls to which I refer, some of which are attached to the spindles, are from Brazil and Peru. Some of them are of prehistoric date, while others were obtained from the present Indian tribes of those countries. The largest of those obtained from existing tribes is one (P. M. 7705) from Brazil, about which Mr. O. A. Derby writes to the Peabody Museum as follows: "This constitutes the spinning-wheel of the Brazilian Indians, and is still in general use. The cotton is rolled out loosely and attached to the notch at the longer end of the spindle. Then by rolling the shorter end along the leg it is set revolving and thrown to the floor, where it spins like a top while the cotton is played out between the fingers." The stick

forming the spindle is made of a hard wood, and is 2.3 inches long. The greatest diameter of the stick is just below the whorl, which is held in place by the increased size of the spindle, 4 inches from the lower end. The whorl is made of bone $\frac{1}{4}$ of an inch thick, perfectly circular in outline, and about $2\frac{1}{2}$ inches in diameter. The hole through which the spindle passes is $\frac{1}{4}$ of an inch in diameter and perfectly straight. The upper surface of the whorl is ornamented by eight incised lines forming four leaf-shaped rays, which start from the margin of the hole and meet a well-cut circle a quarter of an inch from the outer edge of the whorl. All these lines are filled with a black pigment. This is in every respect a well-made and symmetrical implement, and when set in motion spins well.

Very much like the disk of bone described above are portions of six perforated disks from a prehistoric station near Santarem, Brazil. These are now in the Peabody Museum (7972), and were collected by the late Prof. C. F. Hartt. Although these specimens are all broken, and now consist of halves and quarters of the original disks, they are of great interest, owing to their fine finish and elaborate ornamentation. They are all made of a compact red claystone. The largest shows a disk $3\frac{1}{4}$ inches in diameter, $\frac{1}{2}$ of an inch thick in the centre, and a little less at the edge. The smallest is $2\frac{1}{4}$ inches in diameter and $\frac{1}{4}$ of an inch thick. One is ornamented on both sides and the others only on one. The ornamentation on all consists of well-cut lines forming circles, spirals, and groups of lines crossing each other, all symmetrically arranged. The specimen with incised lines on both surfaces has those on one face more like hieroglyphics than simple ornamentation, and they bear some resemblance to the carvings on rocks in South and Central America. With the ornamented bone disks for comparison, it is almost impossible not to consider them as spindle-whorls. In the same collection also are two perforated disks of terra-cotta (7984). One of these is only $\frac{3}{16}$ of an inch thick and $1\frac{1}{2}$ inches in diameter, and is ornamented by a single incised line, making a circle about a quarter of an inch from the margin. The other is 2 inches in diameter, and about twice the thickness of the smaller specimen. The peculiarity of this consists in its having a double groove cut on its edge.

In the large collection of Peruvian antiquities in the Peabody Museum

are numerous examples of spindle-whorls with and without the spindle. One of them (8594), taken from a grave in Pisagua, Southern Peru, is made of bone, and is about $\frac{1}{4}$ of an inch thick and 2 inches in diameter. Another of about an inch in diameter is of terra-cotta. This is conical, with a flat, smooth base, and is $\frac{1}{2}$ an inch in thickness. The conical portion is ornamented by two circular depressions and a waved line in relief near the apex. Another specimen of terra-cotta, in the shape of a truncated cone, is 1 inch in diameter and about $\frac{1}{4}$ of an inch thick. This is without ornamentation, except that it has been coated with red pigment. This whorl was found in a grave in Southern Peru, still attached to its spindle, which is a slender stick 9 inches in length. A figure of this is given in the Eleventh Report of the Peabody Museum. In connection with these Peruvian spindle-whorls should be mentioned many small bead-like articles of various shapes, and made of dark baked clay, nearly all of which are elaborately ornamented with deeply-cut lines, forming circles, frets, and numerous other figures, which are generally painted white or red. With these are other specimens made of stone. If these peculiar relics had been found by themselves probably all archæologists would have classed them as beads. They are all small, being a half inch in diameter and from a quarter to an inch in length. They have, however, been found in such numbers mounted on the central portion of slender and pointed pieces of wood about eight to ten inches in length as to prove that they were made for that purpose, and as many of the sticks, with such bead-like articles, have more or less fine-spun thread wound over them, I believe them to be spools for thread.

There is also in the Peabody Museum a spindle-whorl of terra-cotta collected by Mr. Derby at the prehistoric burial-place on the island of Pacoival in the Amazon. This is spherical in shape, about 1 inch in height, measured through the hole, and $1\frac{1}{4}$ in transverse diameter. It is ornamented by incised lines over its whole surface.*

*Dr. Rau has given figures of two highly ornamented spindle-whorls of terra-cotta from Mexico, on page 87 of his important volume on the Archæological Collection of the Smithsonian Institution, and there has recently been received at the Peabody Museum a collection of similar whorls from Mexico. These are of various sizes; some are ornamented by carefully-carved lines and are well finished, while others were made in clay moulds, in which the ornaments had been cut and stamped, as shown by several moulds found with the whorls.

The Indians of Peru now seldom, if ever, make the elaborate spindles of old, and are content with rude spindles with rough wooden whorls, of which there are several examples in the Peabody Museum, presented by Mr. Alex. Agassiz. These are of interest in comparison with two similar spindles with wooden whorls, which were presented by Mr. John Blake, who took them from an ancient grave in Southern Peru. Though the recent wooden spindles are rudely made, the wooden whorls upon them are of the same forms as in ancient times. Several of them are discoidal and others are conical in shape. They are $1\frac{1}{2}$ to 2 inches in diameter, and from about $\frac{1}{4}$ of an inch to 2 inches in thickness. Two of them even have a slight attempt at ornamentation, inasmuch as four groups of four lines each are cut upon the under surface.

Turning our attention now to the perforated stones which have been found in various parts of North America, we find that several have been discovered which are similar to those we have mentioned from other parts of the world.

Mr. C. C. Jones* has given a figure of what is probably a spindle-whorl, found in a stone grave in the Nacoochee Valley, and remarks that it closely resembles the spindle-whorls found at Meilen and other places in Europe, though he is "inclined to the belief that it was probably suspended as an ornament." The specimen figured by Mr. Jones is about $1\frac{1}{4}$ inches in diameter.

In the Peabody Museum is a similar article consisting of a flat circular piece of white clay (11492) found by Mr. Charles B. Johnson on his farm in Lee County, Virginia. It is $1\frac{1}{4}$ inches in diameter. The hole through it is countersunk, and is about one-quarter of an inch in diameter. There is a slight groove cut around its periphery as if for a string, though it may be simply an attempt at ornamentation. This disk may have been used as a spindle-whorl, for which it is well adapted by its size and shape. It is, however, no larger than many disks of shell, such as we know are used as beads or ornaments, which are often found by hundreds in the burial-mounds of the Southwestern States.

Mr. Morgan, in his far-famed volume, "The League of the Iroquois,"

* *Antiquities of the Southern Indians*, 1873, p. 235, pl. vi, fig. 11.

p. 381, gives a figure of a fire-drill, consisting of a wooden shaft about 4 feet long and an inch in diameter. To the upper end of the shaft there is fastened a string with its bow, and towards the lower end there is "a small wheel" to add to its momentum. As Mr. Morgan states that this form of fire-drill is "an Indian invention of great antiquity," it may be possible that some of the perforated stones which have been found were used as whorls to such fire-drills. The heavy stones with small straight perforations would seem to be the form best adapted for this purpose.

A disk of sandstone, about $2\frac{1}{2}$ inches in diameter and one-third of an inch thick, with a slightly countersunk perforation of nearly half an inch in width, is probably a spindle-whorl. This stone (P. M. 1583) was found in a mound near Mount Sterling, Ky. It is rudely ornamented by an incised circle on each face about a quarter of an inch from the edge of the stone; and on one face there are four short lines cut from the circle towards the central hole at equal distances apart. The hole is smooth as if from long use; and if we have any right to draw deductions regarding the use of implements of prehistoric people from the knowledge we have of the use of apparently identical implements among present or recent nations of probably about the same stage of culture, we should consider this perforated stone from Kentucky as a spindle-whorl. There is now sufficient evidence that our Moundbuilders made woven fabrics of comparative fineness, and the finding of spindle-whorls in the mounds and ancient graves should not cause surprise. Indeed, the discovery of so few stones that can be so classed may indicate that, like the present Indians of Peru, this ancient people probably commonly used perishable whorls of wood.*

On Plate X, Fig. 15, is represented a "chungke stone," with a small central perforation. The specimen is made from quartzite, and, while agreeing in other respects with many well-made "chungke stones," which are so common in the Mississippi and Ohio Valleys, the perforation rather

* Since the above was written, the Peabody Museum has received ten small perforated stones which were taken from six different stone graves of the Southern Moundbuilders, near Nashville, Tenn. Several of these stones, from their small size, may possibly have been ornaments; but others which are larger seem to me to be spindle-whorls. Most of them are made with care, generally of limestone, and are smooth and symmetrical. They vary in diameter from 1 inch to 1.7, and in thickness from half an inch to one and a fifth. The hole in some, particularly in the larger specimens, is straight, and is .3 of an inch in diameter; in others it is countersunk on both faces.

indicates that it was put to a different use, though this would not prevent its being used for the game of "chungke," as described by Adair. This stone (P. M. 2299) was found in Marion County, Tennessee. Dr. Rau also figures two similar stones from Ohio.

Another of these perforated stones (P. M. 7803) is from Southeastern Missouri. It, also, is made of quartzite, but is not over one-half the diameter of the one from Tennessee. The outer portion is smooth and symmetrical. The concavity on each face begins close to the outer edge of the stone and terminates in an irregular perforation of about three-quarters of an inch in diameter. The irregularity of this stone is such as to suggest that it has been subjected to hard usage of some kind. Allied to this is a stone found in Chatham, Mass. (P. M. 2689, cast), which is probably simply a perforated pebble of a little over 2 inches in diameter, through which a hole has been pecked from both sides. Two similar perforated pebbles are represented on Plate X, Figs. 7 and 12. The locality from which the latter were obtained is not known, though they are probably from New England. They are of special interest, as being of the same character as one recently received from the island of Santa Catalina, which is the rudest of the perforated stones from California.

In the large and important collection of stone implements secured by Dr. Abbott in New Jersey are two small perforated stones. One of these is a sandstone pebble from $1\frac{1}{2}$ to 2 inches in diameter, with a hole about an inch in diameter, which was evidently bored, and not pecked, as in the stones last mentioned. The other is about an inch in diameter, and is made from a piece of steatite circular in form. The hole in this was also made by a drill. It is slightly countersunk, and is a quarter of an inch wide in its smallest part. It is very difficult to assign a use to these rude specimens. They may possibly be classed as sinkers, for which the heavier one would answer very well, though probably no better than a notched stone, which could be made with much less labor. The smaller one, however, may equally well be considered as a bead or ornament.

Mr. Jones, in his volume on the Antiquities of the Southern Indians, has described and figured * a number of perforated pieces of steatite which

* Page 337, Plate XIX.

he thinks were used in various ways as sinkers by the Southern Indians. Of these he writes: "All of the perforated sort I have seen, with one exception, were formed either of soapstone or of clay. Consisting generally of flat or rounded pieces of soapstone irregular in shape, they vary in weight from scarcely more than an ounce to a pound and upwards. The perforations are from a quarter of an inch to an inch in diameter, and are indifferently located either in the centre or near the edge of the stone." It seems very probable from their abundance on the banks of the Savannah River and other streams in Georgia that Mr. Jones has assigned the proper use of these perforated stones. A similar piece of steatite, with a central perforation (P. M. 2754) is shown on Plate X, Fig. 10. This is from East Tennessee, and the hole seems to have been made by cutting and gouging with a sharp point of stone, the marks of the cutting implement being still plainly visible.

Dr. West, of Stewart County, Tennessee, has recently presented to the Peabody Museum a perforated stone (18397), found on his farm, which, in size and shape and character of the large countersunk hole, resembles many of the stones from California, but it was made either of a very soft material or is greatly decomposed, and now has a greater resemblance to the rings of clay found in the Swiss lakes than to a club-head. It is nearly 3 inches in diameter and $1\frac{1}{2}$ in thickness.

Although perforated stones of the character represented by Figs. 22 to 38, on Plate X, are so common among the remains of the former inhabitants of Southern California, I have not seen any of the kind among the numerous collections of stone implements obtained from localities east of the Rocky Mountains. There is, indeed, one specimen in the American Museum, New York, which is without a special label, and may possibly have been found in the Atlantic States, though, as I understood two years ago, it was no longer possible to determine the locality whence it was obtained. I have, however, been informed by Mr. N. Vickary, of Lynn, that he had within a few weeks seen one of these stones in the possession of a farmer in North Amherst, Mass., who had several years since ploughed it up on his own land. As Mr. Vickary was looking at the California specimens at the time he made the remark about the Amherst stone, and pointed to

one between three and four inches in diameter with a large countersunk hole, as being "just like" the one he had seen so recently in Amherst, I have no doubt as to the character of the stone. Dr. Abbott has also recently informed me that there is in a private collection in New Jersey a perforated stone between three and four inches in diameter, which was found in Burlington County in that State, and is in every way like the smooth and well-made examples from California.

From the foregoing account of perforated stones of various kinds from other parts of the world we can better understand the peculiar character and probable use of those from California, but before describing these in detail I shall quote the views of Mr. Paul Schumacher, whose researches have added so largely to our information of all that pertains to the archæology of the Pacific coast of the United States.

In his account of the shellheaps and graves of the Santa Barbara Islands and adjacent mainland,* Mr. Schumacher states that he was told by an "*old vaquero*, with some Indian blood," that a perforated stone he had considered as a club-head was used "as a weight to the shaft of a wooden spade * * *, the half-breed was very positive, and earnestly tried to impress on us the idea by roughly making the implement used by his ancestors as a spade" Mr. Schumacher gives an ideal figure† of this implement, which consists of a stick with a flattened and pointed narrow blade, which passes into a rounded handle or shaft, near the upper end of which is placed one of the circular perforated stones.

In a short paper published after his explorations of the islands in 1877, made under the direction of the Peabody Museum, Mr. Schumacher gives his views about these perforated stones more in detail, as will be seen from the following quotation from the Eleventh Annual Report of the Peabody Museum:‡

"WEIGHTS FOR DIGGING-STICKS.—These implements—as are so many others that have a hole, a notch, or other means of fastening a line—are often considered as sinkers. One of the less frequent types of net sinkers, indeed, resembles the weight for a digging-stick, but yet there is as much difference between the two as between a mortar and an *olla*. The sinker is of a different material; is coarsely finished; the hole is much

* Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. III, No. 1, p. 41.

† *L. c.*, Pl. 22, b.

‡ Cambridge, 1878, pp. 265-268.

smaller and narrower in the middle; and is hardly ever drilled, or finished by drilling, but simply pecked. My first impression, on finding these perforated stones, was that they were the heads of war-clubs, to which those of a pear-shape especially seem to answer. By examining a large number of fragments, however, I found most of the stone-rings had been broken in two, parallel with the hole, which could not be caused by the side pressure of the club, but by a wedge-like action against the inner sides. The suggestion that these stones were weights for digging-sticks, such as are still in use among the Hottentots, I received from an aged half-breed while working on Santa Cruz island in 1875, and I have since become convinced that such was their use. If we examine a stone-ring which has done some service, we find the hole shows a polish and fine striæ running lengthwise, and wear on one end of the ring imparted by the hand while in use and in carrying the digging-stick where it naturally would rest, with its projecting stone weight, against the hand. I found some of the weights thus deeply worn, and by mounting one on a proper stick it fitted nicely to the grasped hand. I also noticed a specimen, among the many sent to the Peabody Museum, in which the hole had been enlarged in full width but in one direction only—making an elliptic hole—worn by the digging-stick while worked, when its own weight could only act against the sides of the stick corresponding to the flattened ends of the wooden spade. There were two methods by which the hole in the stone was made, both of which are illustrated by numerous specimens in the collection. In one instance the weight, almost exclusively of steatite, but occasionally of a harder stone, was first roughly worked into the desired ball or a more flattened disk; the hole was then chiselled from both sides until it met; it was then drilled out to an equal width throughout; and the weight was finally finished by working the outside in a symmetrical form. The more elaborate weights, however, were finished in outline before the hole was bored. The hole was made, no doubt, with a flint point; the *striæ* are deep and the width of an unfinished hole decreases towards the centre. A drilling apparatus might have been used, for the streaks of the drill are well defined and in full circle, which could hardly be attained by turning the borer simply between the hands.

“Among the weights for digging-sticks we find many of small sizes and inferior make, which could not have been of any practical use for this purpose, and often deviating so much in form as to make it doubtful if they were designed as weights. The same deviation from the practical size we find sometimes among mortars—not meaning the paint-cups—the pestles, and frequently among the *comales* (the flat stone plates for baking *tortillas*) which were formerly extensively in use, judging by the many specimens collected. Such articles we may safely bring under the head of children’s play-things, in whose graves they are usually found.”

Thus on the evidence of the half-breed Mr. Schumacher is strongly inclined to consider that at least one use of the perforated stones was identical with the use of similar stones by the natives of Southern Africa. It is therefore important to note that the present Indians do not make any use of stones of this character, and that unless we give full credence to the story of the half-breed we are surrounded by the same mystery regarding these perforated stones in California as in Chili, though we know that in

California they were used for some purpose after contact with the Spaniards during the sixteenth century, as they have been found in connection with iron and other articles of European manufacture.

Mr. Powers, in his work on the California Indians,* gives a figure of two of these perforated stones connected by a cord, of which he writes: "In the accompanying sketch † are figured two implements, which may have been only net-sinkers, but are said by an old pioneer to have been used formerly as *bolas* are in South America, being tied together with raw hide and hurled at the feet of an enemy to entangle him and throw him down. To me it seems more probable that they were used rather like a slung-shot." From the statements I have made in the following pages it will be seen that I incline to the belief that many of these perforated stones from California were used somewhat after the method of "slung-shots," or as club-heads fastened by pieces of hide. I may mention, however, that Lieut. A. W. Tbackara, of the U. S. Navy, who had just returned from the Strait of Magellan, informed me that at Sandy Point he saw one of these perforated stones, which was about 4 inches in diameter, and he was told by an old resident of the place that it was a *bolas*-stone. Unfortunately the stone he saw was not then actually forming part of a *bolas*, and I have not noticed any account of perforated stones being used by the Patagonians for that important weapon. There is a *bolas* in the Peabody Museum, and another in the Peabody Academy of Science at Salem. Each of these is made by enclosing three round imperforated stones in strips of raw hide, which are braided and united together.‡

On page 433 of the same work, Mr. Powers writes: "In the collection of Mr. A. W. Chase, of the U. S. Coast Survey, there are spindle-whorls of stone. Some of these were found in mounds raised by extinct tribes, and others found among the Klamath Indians and the Noamlakki in gravel-mining claims. The Indians of this day use no such implement for any purpose whatever. Near Freestone, Sonoma County, I saw in possession of the finder what was probably a spindle-whorl of pottery, the only instance of the kind I know of."

* Page 53.

† Of weapons of war of the Yurok.

‡ Dr. CUNNINGHAM, in his Notes on the Natural History of the Strait of Magellan, 1871, p. 148, describes the *bolas* as made of either two or three round balls of stone, iron, or brass covered with leather.

I also find in Mr. Powers, instructive and valuable volume on the habits of the California Indians the following references to the digging-sticks as now used. In his account of the Indians of the Eel River Mountains (p. 130), he writes: "Armed with her 'woman-stick', the badge of her sex, which is a pole about 6 feet long and $1\frac{1}{2}$ inches thick, sharpened and fire-hardened at one end." Again, when writing of the Modok (p. 256), he says: "With a small stick, fire-hardened at the end, a squaw will root out a half bushel [of kais roots] or more in a day."

From the foregoing it will be perceived that the digging-stick of the present Indians is not weighted, and although one tribe may have had very different methods of work from others adjoining, it seems hardly probable that such an implement as a weighted digging-stick would have gone entirely out of use in fifty to a hundred years, had it been common before then; though the negative fact that the perforated stones are not now used at all is no more an argument against their having been used as weights to digging-sticks than for any other purpose. In connection with the form of digging-stick described by Mr. Powers, the use of similar implements by some of the Pacific Islanders is of interest, and I, therefore, quote the following from Sir John Lubbock's "Prehistoric Times":

"The digging-sticks [of the Figians] are made of a young mangrove tree. They are about the size of an ordinary hay-fork, and the lower end is tapered off on one side after the shape of a quill toothpick. In digging this flattened side is kept downwards. When preparing a piece of ground for yams, a number of men are employed divided into groups of three or four. Each man being furnished with a digging-stick, they drive them into the ground so as to enclose a circle about two feet in diameter. When by repeated strokes the sticks reach the depth of eighteen inches they are used as levers, and the mass of soil between them is thus loosened and raised."—Page 455, quoting from Williams, "Fiji and the Figians," vol. 1, p. 63.

The only instrument for tillage used by the Maories of New Zealand was "a long narrow stake sharpened to an edge at one end, with a short piece fastened transversely at a little distance above it, for the convenience of pressing it down with the foot."—Page 462.

The Tahitians for cultivating the ground "had instruments of hard wood, about five feet long, narrow, with sharp edges and pointed."—Page 471.

On Plate X, seventeen of the perforated stones from California are represented under Figs. 22 to 38, and on the upper half of the plate,* which

* This plate was arranged, as will be seen by the position of the pins upon which the stones were hung when photographed, to be printed in such a manner as to make what is now the right side of the

is divided by the Peruvian club, with its bronze, star-shaped head, are shown a number of perforated stones, of various sizes and shapes, from North and South America, Europe, and Africa, all of which have been specially referred to in the preceding pages. It is, therefore, only necessary to call attention to the very close resemblance between several of these foreign specimens and those from California, as for instance Figs. 14 and 17 from Denmark, Fig. 18 from South Africa, Fig. 19 from Central America, Fig. 20 from Peru, and Fig. 21 from Chili.

At the time this plate was photographed comparatively few stones of this class had been collected in California; hence several interesting examples from later explorations, which would have added much to the value of the plate in showing their great diversity in size, shape, and ornamentation, are not included. Several of these are, however, shown in the following figures in the text.

A careful study of the hundred examples of these stones from California, now before me, has confirmed my belief that they were used for various purposes by the old Californians, and that while some may, possibly, have been used as weights for digging-sticks and for net-sinkers, as Mr. Schumacher believes, it would certainly be going too far to include all the specimens in these two groups, even should we agree with Mr. Schumacher in regarding many of the smaller specimens as toys for children. Dr. Yarrow has kindly given me his views as to the probable use of these stones, the substance of which is as follows:

It seems inconceivable to me that any one who has examined carefully any number of these larger perforated stones can for a moment hold to the theory of their being primarily used for digging-weights. That they may have been occasionally used as such is possible, but their probable use was more likely similar to that to which the Eskimos put their perforated stones—as a club, with a loose or flexible handle. If they were used for digging-sticks, how is it that not a single example of these sticks has ever been found, not even a trace? For instance, at Dos Pueblos we found ollas, mortars, pipes, cups, iron hatchet (Spanish), China cup and saucer (modern), a few articles of wood, and perforated stones in juxtaposition; is it not likely that digging-sticks as a necessary article for use in the next world would also have been found if in such common use as is indicated by the great number of the stones in question? I see

plate its top. The reference numbers to the figures have the appearance of having been placed at random over the plate, but the *nearest number to the upper margin* of each figure is its indicator, notwithstanding the fact that in several instances the number is close to some figure to which it *does not* refer.

nothing improbable in the statement that these stones may have been used as net-sinkers. A net large enough to fish outside the beach on this coast must have taken a long time to make, and may have been the property of the town, or of several individuals, and it seems to me that the same care might have been devoted to the necessary stone sinkers that was given to the construction of the net.

Among these hundred specimens from California are several which, by their battered and fractured surfaces, show that they have received hard usage. Others are smooth, and many are even highly polished over a more or less extended surface. Still others are rudely ornamented, either by incised lines similar to the markings on pottery in the early stages of the development of the ceramic art, or by deeply-cut grooves. Of a few there are only fragments, and as the fractured portions of these are often as much weathered as the rest of the stone, there can be little doubt that these examples were broken while in use. Most of these broken specimens are halves of stones, which, apparently, have been broken by a pressure exerted in the central perforation, thus causing the stone to split. A few, however, are fractured transversely to the perforation, as if caused by a blow the force of which was exerted upon the outer edge of the stone. In shape and size, and in the character of the perforations, there is great diversity, and although the intermediate forms prevent a strict classification, the specimens now before me can be approximately arranged in several groups by their shape, such as conical, globular, and flattened.

The first to be described is from the island of Santa Catalina (P. M. 13420). This is made from a piece of chlorite-schist, which has been hammered and ground into a shape unlike any of the other specimens. It has a flattened base and a somewhat conical top above its five flattened sides. The surface of the stone has been rubbed very smooth, and considerable labor must have been expended in manufacturing this implement, the use of which is problematical. It is 4 inches in diameter by $2\frac{1}{2}$ in height, and weighs forty-five ounces. The hole, which is through the centre, was bored probably by a stone drill, and this was most likely mounted so as to give a full revolution, as the well-defined and continuous circular lines made by the drill can be seen. That the hole was made entirely by the drill is shown by the circular striæ coming out flush with the surface of the stone at each end of the hole. The boring of the hole was started from the flat-

tened portion or base, where it is $\frac{7}{8}$ of an inch in diameter, and carried through the stone, gradually decreasing in size to $\frac{5}{8}$ of an inch at the opposite end. The size and weight of this stone are against its having been used as an ordinary spindle-whorl, though it would be none too large for use as a whorl for a bow-drill. The hole is too small to allow of the supposition that it was a weight to a digging-stick, and the same objection would apply to its having been mounted on a handle as a club. We seem, therefore, reduced to regard this either as a net-sinker, a whorl to some large fire-drill or boring implement, or as a club-head which was fastened to a handle by means of a withe or a strip of hide.

Of the conical forms there are several modifications. One (P. M. 13422), which is of impure steatite, was found in "Pots Valley," the locality on the island of Santa Catalina where pots and other articles of steatite were extensively manufactured. This specimen is $1\frac{1}{2}$ inches high and 3 inches in diameter, and while it might be classed with the group that I have called flattened or ring-like, as its transverse diameter is twice its height, yet it is so decidedly conical in shape that it seems most appropriate to mention it in connection with the other more or less conical forms. The concentric striæ, formed by the boring implement, are very distinctly seen on the sides of the hole, which was started by pecking from both sides of the stone and afterward bored, making a perforation which is only $\frac{1}{2}$ an inch in diameter in the centre, while it widens to about twice the size at each face of the stone. From this brief description it will be seen that this stone, with its half-inch perforation, so far as can be determined from known uses of similar stones, would have to be classed as a club-stone, a whorl, or a sinker, and to me it seems best adapted for use as a club-head fastened by thongs to a handle.*

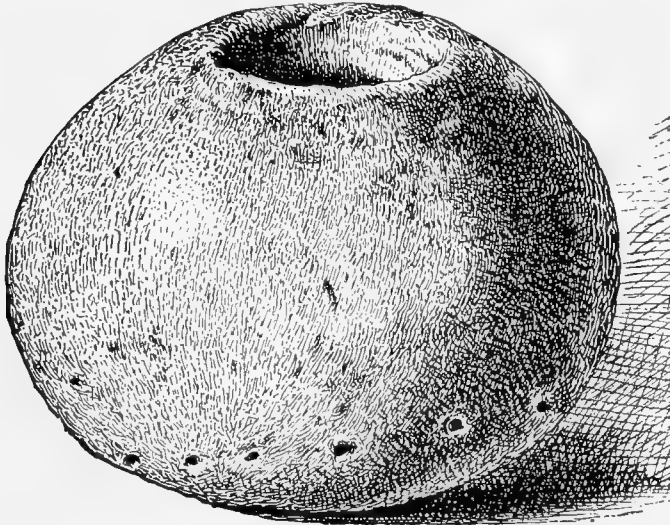
Of the globular-conoid form, there are two specimens from the island of Santa Cruz, which are of nearly equal size, and both have large holes. They are probably made of an impure and rather hard steatite.

Figs. 44, 44*a*, and 45 represent one of these specimens of actual size

*Since this chapter was written I have received the account of Mr. Bower's explorations on the island of Santa Rosa, Report of the Smithsonian Institution for 1877. Mr. Bowers there states that he found a "conical disk, which was probably used in spinning." From the context I judge that this "conical disk" is of stone, and probably similar to the one I have described above.

(P. M. 9296). Fig. 44 does not show the exact outline of the stone, as the artist has tilted the specimen forward so as to give a view of the upper end of the hole, and thus

FIG. 44.

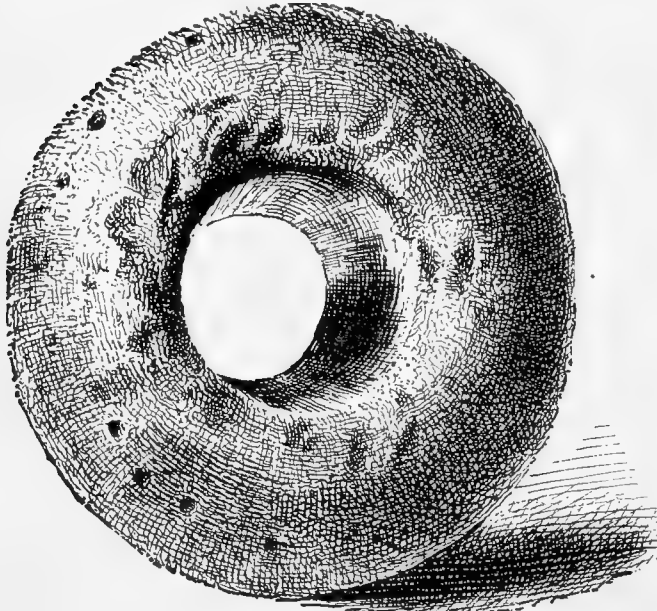


Perforated stone from island of Santa Cruz.

represented the stone as more globular than a direct view would have shown. Fig. 44a is a diagonal view of the under side of the stone, showing the nearly straight and smooth perforation, and also several of the small punctures, seventeen in number, which form an irregular row around the lower

portion of the stone, as seen in the three figures. Fig. 45 is a view looking directly into the hole from the under side, where it is $1\frac{1}{2}$ inches in diameter, while at the top, as shown in Fig. 44, the hole is $\frac{1}{4}$ of an inch smaller.

FIG. 44a.



Perforated stone; side view of hole of Fig. 44.

of the hole, and thus represented the stone as more globular than a direct view would have shown. Fig. 44a is a diagonal view of the under side of the stone, showing the nearly straight and smooth perforation, and also several of the small punctures, seventeen in number, which form an irregular row around the lower portion of the stone, as seen in the three figures. Fig. 45 is a view looking directly into the hole from the under side, where it is $1\frac{1}{2}$ inches in diameter, while at the top, as shown in Fig. 44, the hole is $\frac{1}{4}$ of an inch smaller.

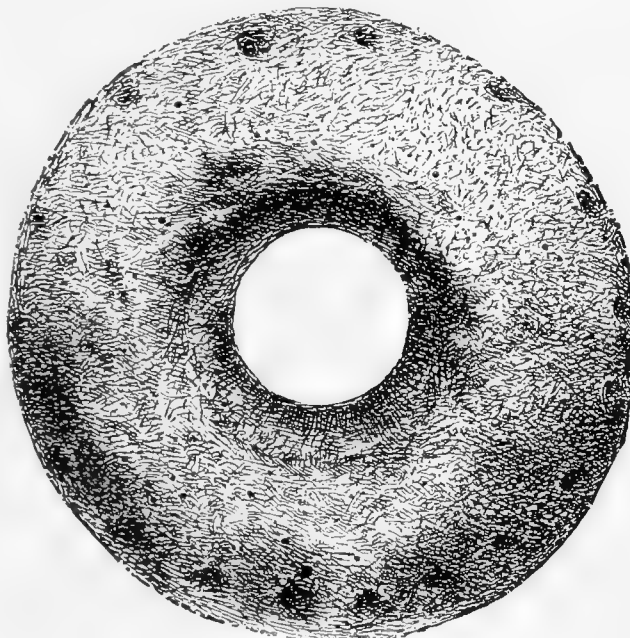
The other specimen (P. M. 9298) from Santa Cruz differs from the one just described in being slightly more conical in outline, and in having a groove cut around the upper margin of the hole, thus forming a rim not quite a quarter of an inch wide. The surface of each of these stones has been carefully smoothed.

Another example (P. M. 13692) of this form is from the island of San Miguel. It is $3\frac{1}{4}$ inches in diameter and $2\frac{1}{4}$ inches high. The hole is of the same size and shape as in the two preceding specimens. Portions of the surface of this stone are much battered, and several fractures have resulted from the hard usage to which the implement has been subjected. The mineral is much decomposed, but is probably basalt. The fractured portions and the sides of the hole are, like the rest of the stone, very much weathered.

These three stones are so admirably suited by their shape, size, and large perforations, for hafting and for use as heads of clubs that I am inclined to consider them as such; and the fact that two of them are rudely ornamented is favorable to this view, as is also the rough usage that one of them has received.

Among the most remarkable of the conical forms are three which, while they vary slightly in outline, are yet so much alike that they form a little group by themselves, and their close agreement in size is so remarkable as to suggest that they were made after a particular and established pattern. Two of these are from the island of Santa Cruz and the other is from the island of Santa Rosa. Dr. Rau, in his account of the archæological collections in the Smithsonian Institution, figures (p. 90, fig. 320) another specimen of the same type, but does not give the locality whence it was obtained, though it is probably from the island of Santa Cruz. There is also a specimen* in the Smithsonian collection from Santa Cruz

FIG. 45.

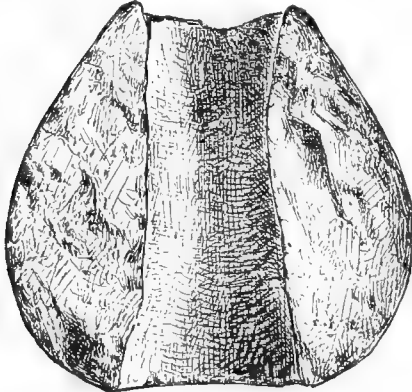


Perforated stone; bottom view of Fig. 44.

* The specimen here alluded to may be the one figured by Dr. Rau.

(S. I. 18289) which varies but slightly in size from the one in the Peabody Museum from that island. Like another specimen from the same island

FIG. 46.



Perforated stone from island of Santa Cruz.
Section showing hole, $\frac{1}{2}$.

(P. M. 9297), it has a slight rim cut round the hole at the pointed end. One of these stones, of which only a half is preserved, is shown in section by Fig. 46. The two other specimens now before me, and the one I measured belonging to the Smithsonian Institution, differ from the figure here given only in having their greatest diameter nearer the base, and hence are not so globular. The measurements taken of these several specimens are of interest in showing

their close agreement, and are as follows :

1. P. M. 9295, Santa Cruz; height, 4 inches; diameter, $4\frac{1}{2}$ inches; weight, 43 oz.
2. S. I. 18289, " " " $3\frac{4}{5}$ " " $4\frac{1}{4}$ " "
3. P. M. 9297, " " " $3\frac{7}{8}$ " " $4\frac{1}{4}$ " (Fig. 46.)
4. P. M. 13810, Santa Rosa; " $3\frac{1}{2}$ " " $4\frac{1}{4}$ " weight, 40 oz.

The perforations in all four are very nearly of the same diameter, and in the three other specimens are more nearly straight than in the one shown in section by Fig. 46. The diameter of the holes measured across the opening on the lower face is about $1\frac{3}{4}$ inches in each, while, measured at the opposite end, it is $\frac{1}{2}$ an inch less, and in the centre it is from 1 to $1\frac{1}{4}$ inches. In two of these stones, which weigh forty and forty-three ounces, respectively, the sides of the perforation show many fine longitudinal striations and a smoothness of surface indicative of long-continued use, as does also the smooth and polished surface about the upper or pointed end. Mr. Schumacher has suggested that the polished portion on many of these stones was occasioned by carrying the stone in the hand when, as he considers, it was fastened to a digging-stick; but it seems to me impossible to account for the polishing in that way, as many of the specimens exhibit as high a polish in the little fractures just within the margin of the hole as on the surface about it, which certainly could not have been caused by handling. The high polish given to many of these stones, generally on only half the surface, particularly on those made of the dark steatite and allied min-

erals, was probably purposely produced as a finish. Others, however, as is the case with the large specimens now under particular consideration, were evidently burnished by long-continued rubbing while in use—such as would be caused, for instance, by the stone being attached to a handle by means of hide or leather which enclosed its pointed end; and as the three stones now before me have their most prominent or bulging part more or less battered as if by use, while the polished portions are not injured, we may have a good reason to regard these particular stones as club-heads. The great uniformity of the four stones of which I have given the measurements is also favorable to the theory that they were designed as club-heads of an established form, while the amount of labor bestowed upon them is against their use for inferior purposes.

The next group to be considered consists of three cylindrical stones with large perforations. One of these is of a hard material—probably quartzite—and, like so many other examples, bears considerable polish at one end and a slighter finish about the margin of the hole on the opposite end. This implement is slightly over $2\frac{1}{2}$ inches thick, and is $3\frac{1}{4}$ inches in its transverse diameter. The sides are but slightly bulging, and as the smallest diameter of the nearly parallel perforation is a little over an inch and a quarter, they are nowhere over an inch in thickness. As in the majority of the specimens, the hole was made by working from both ends of the stone, and the central portion was afterwards considerably enlarged. It is from the island of San Clemente, whence it was obtained with eighteen others of different shapes by Mr. Schumacher, and is numbered 13521 in the Peabody Museum. There are no perceptible signs of battering on the surface, and while the worn and smooth sides at the narrowest portion of the hole, which has been made slightly oval, apparently show that it has been in long-continued use on a handle of some kind, there is no more reason for considering it as a club-head than as a weight for a digging-stick, if any of these stones were applied for the latter purpose, as stated by the half-breed Indian to Mr. Schumacher. If, however, we accept the theory that special wants of man will result in the use of corresponding methods of supplying them among people of the same degree of development living under similar conditions, we must accept the prob-

ability of these stones being in part applied to the same purpose in California as elsewhere; and as they are known to have been used for several purposes, among others as weights to digging-sticks, in other parts of the world, some may have been so used in California, as stated by the Indian to Mr. Schumacher. Still, the simple statement of this Indian should not be received without due caution until it is confirmed by other evidence.

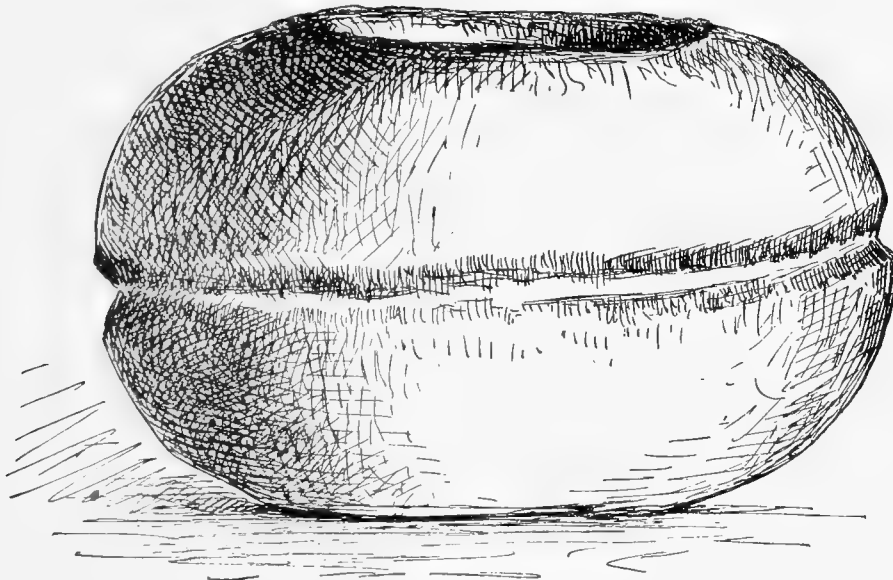
The second stone of cylindrical form (P. M. 14799) is from the island of Santa Catalina, and is of talcose slate, or "serpentine." In diameter it is a quarter of an inch larger than the one just described. The hole is also slightly larger, tapers but little towards its centre, and shows signs of long-continued use. The surface at one end of the hole is highly polished. In weight this stone is about equal to the one last described, and they were both probably used for the same purpose.

The third example of this group (P. M. 14801) was found with the one last described; but it differs from it in several particulars, and is of much smaller size, as it is only $1\frac{1}{2}$ to 2 inches in diameter and about 2 inches in height, measured from end to end of the perforation, which is rudely made, and tapering, and in its narrowest part is only one-half of an inch wide. It is of the same kind of steatite as that of which the large cooking-pots were made, but is not formed with the degree of symmetry characteristic of most of the specimens; and unless made for some such purpose as a net-sinker, its small size and rude workmanship may indicate that it was a toy, or, perhaps, the first attempt of an inexperienced workman.

From the graves on the island of San Clemente Mr. Schumacher obtained twenty-two of these perforated stones, one of which (P. M. 13520, Fig. 47) is unlike any of the others, inasmuch as it is oval in form, and has a groove about a quarter of an inch wide and half as deep cut around the central portion of its surface. As in so many of the other specimens, about a third of the surface of one end around the hole is much polished, and this part is stained by the red pigment, of which a considerable quantity was obtained from the graves. The stone is hard quartzite, and must have been difficult to work into its present symmetrical form. The perforation does not show signs of having been made by boring, which would have been a difficult matter, and it was probably made by pecking and

scraping. The hole tapers from both faces, where it is about 2 inches in diameter, to its centre, where it is not over an inch wide. The central ridge in the hole, caused by the meeting of the tapering perforations from both surfaces, has been worn smooth, and is even polished, showing that there was more or less movement of the stone upon its handle. The greatest diameter of this implement is $4\frac{1}{4}$ inches, and its thickness, measured through the perforation, is $2\frac{1}{2}$ inches. The use to which this stone was put is, of course, conjectural, but the polished portion on one face and the encircling

FIG. 47.



Perforated stone from the island of San Clemente.

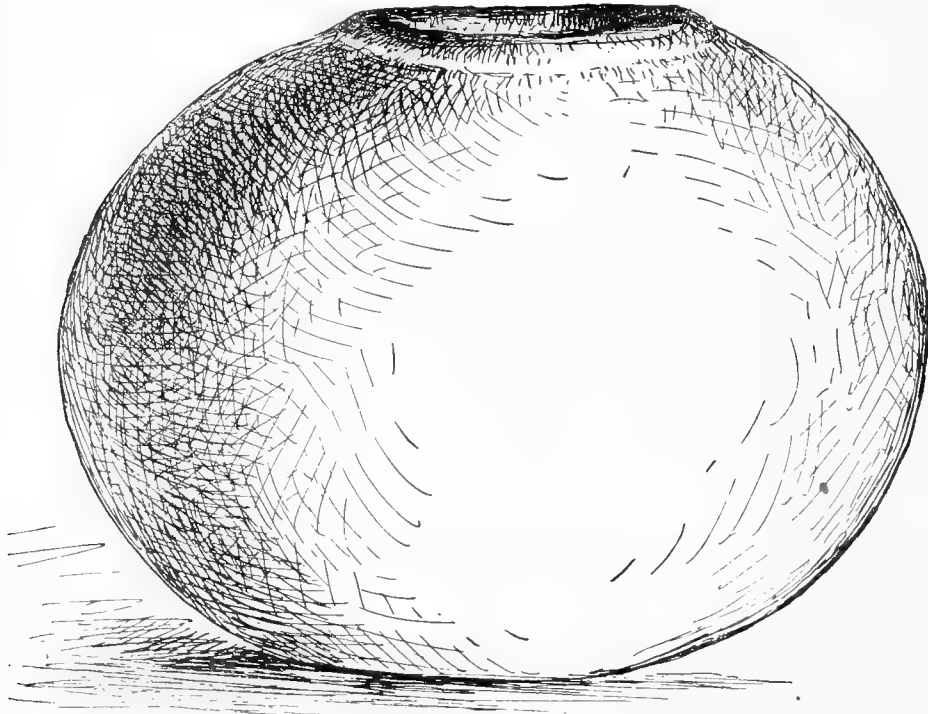
groove may be connected with the method of mounting it on a handle, and it seems proper to class this specimen with the large ones of conical shape, already described as club-heads.

Specimens of the next group, of which there are now before me no less than twenty-four, are more or less depressed globular in shape, and vary in size from 2 to $4\frac{1}{2}$ inches in diameter, and from $1\frac{1}{2}$ to $3\frac{1}{2}$ inches in thickness. In weight they vary from a few ounces to over $3\frac{1}{2}$ pounds. They are all well made, generally symmetrical, and of various minerals. The perforations vary in size and shape, and while there is a general resemblance in the lot, it will be necessary to subdivide the group for the pur-

pose of description. Several of these are highly polished, and a few are ornamented by incised lines. The amount of labor which must have been bestowed on many of them in order to give the perfect finish which they possess, and the fact that some are rudely ornamented, suggest their having been devoted to an important use; and while some may possibly have been weights to digging-sticks, and others whorls, as a group they seem better adapted for club-heads than for any other purpose.

The largest (Fig. 48) and best made of these globular stones is from

FIG. 48.



Perforated stone from the island of Santa Catalina.

“Pots Valley,” island of Santa Catalina (P. M. 13419). It weighs fifty-eight ounces, is of steatite, and has been smoothed and finished with care. Its symmetry is as near perfection as could be expected, and around the upper or polished end of the hole there is a slight rim, about an eighth of an inch wide, formed by a groove. This portion, which I call the top of the stone, is highly polished, the polishing also extending down the sides and including about one-third of the surface. That this polishing is the

result of use is shown by the partial obliteration of the groove forming the rim. The stone is $4\frac{1}{2}$ inches in diameter and $3\frac{1}{2}$ inches in thickness. The perforation starts from each face with a diameter of $1\frac{3}{4}$ inches, and tapers to the centre, where it is only 1 inch. The sides of the hole are smoothed by the action of the handle. Such a carefully-finished and symmetrical implement as this would hardly have been made for use as a digging-stick, and it seems eminently proper, notwithstanding its size, to regard it as a club-head. That it was not used as an ordinary hammer is, I think, shown by the sides not being battered.

Another specimen (P. M. 13358) is from the same island, but was found, with twenty-three others of various sizes and shapes, in a refuse-pile or shellheap. It is of nearly the same size as the one last mentioned, and is made of the same material. It differs from that, however, in not being so symmetrical, and the hole is a quarter of an inch greater in diameter. There is an irregular incised line encircling the hole on top, and this portion of the stone is highly polished. Its most interesting peculiarity consists in the fact that the perforation is worn smooth on one side only, while the rest of the hole is nearly as rough as when the stone was first put to its use. This peculiar wear of one portion of the hole would be favorable to the view that this stone was a weight to a digging-stick, as Mr. Schumacher suggests.

A third stone (P. M. 13155), of the same material, and originally of about the same size, but having an old fracture, from which cause nearly a quarter of the stone is missing, was found in a grave on the same island with the last two mentioned. Like the others, this is polished around one end of the hole, which is very smooth from use, and is $1\frac{1}{4}$ inches in diameter in its smallest part.

In the preceding descriptions I have noted the fact that two of the large globular-shaped and most of the conical specimens have grooves cut about the holes at the polished ends; but this is not the case with any of the others, though several that are yet to be mentioned are rudely ornamented.

Another specimen (P. M. 13358), from the shellheap of Santa Catalina, is also of steatite, and is a little smaller than the one from the grave,

being about 3 inches thick and $3\frac{1}{2}$ in diameter. The top is polished, and the hole is smoothed by long-continued use. It differs from the last three described in the character of its perforation, inasmuch as the hole is straight and of nearly a uniform diameter of about $1\frac{1}{2}$ inches from end to end.

Another of these, also from a shellheap, and of "serpentine," is fashioned from a block of stone that was not quite large enough to enable the worker to carry out a symmetrical design of the size he desired, and hence there is left a flattened and indented portion on one side. This is of about the same size as the specimen last mentioned; but the hole is much smaller and tapers from both ends to its centre, where it is only three-fourths of an inch wide; and although the sides of the hole are considerably worn the marks of the boring-tool are visible.

Still another from the shellheap is made of dark talcose slate or serpentine, which is capable of receiving a high polish, as is shown by the lustre covering about a third of the surface of this example. This stone is $2\frac{1}{4}$ inches thick and $3\frac{1}{2}$ in diameter, and in shape, approaches the much-flattened forms which will be described further on. The polished surface of one end extends over the edge of the perforation, which is also very much worn and smooth throughout, and was made by boring and pecking from opposite ends. A longitudinal section through the perforation shows that the diameter in the centre of the hole is $1\frac{1}{8}$ inches, and that it is regularly increased to about $1\frac{3}{4}$ inches at each end; and yet the wear on the sides is nearly the same in the widened portions at the ends as in the centre, which could hardly occur if this stone had been simply placed on a rod of wood, for in that case the wear would have been confined to the narrowest portion of the hole, as is the case with many of the specimens. If, on the contrary, the stone had been fastened by a material like leather, or even by strips of raw-hide or other more or less pliable substances, passing through the hole, the wear would be nearly equal on all its parts, as is shown to have been the case in this specimen.

The two smallest of these depressed globular forms are from the island of Santa Catalina. One is from Pots Valley, and is made of basalt. Only one-half of this specimen was found. It is $1\frac{3}{4}$ inches thick and $2\frac{1}{2}$ in diameter. The perforation was made by working from both ends, though its

narrowest part is within half an inch of one end of the hole, and is not over half an inch in diameter. The fragment is much weathered, but is evidently a portion of a carefully-worked and symmetrical implement. The other and slightly smaller example is from the shellheap, and is made of steatite. This is a symmetrical little stone, and would naturally be called a spindle-whorl. The hole has been bored from both faces, is one-half an inch in diameter in its smallest part, and does not show any signs of wear.

One of the specimens from the island of San Clemente is made of basalt, and is of the same thickness as the one just described, and about half an inch greater in diameter. The surface is much decomposed and somewhat battered. The hole is five-eighths of an inch in diameter in the centre, and widens to about an inch at each end. This would have been serviceable as a whorl, a small club-head, or as a "slung-shot." Three others from San Clemente do not differ in size and shape from those already described from Santa Catalina. One is formed of a brown cellular basalt; another is of steatite. Of these two, only half of each was found. That of steatite shows as much weathering on its fractured portion as on other parts of the stone, and the part that was formerly polished is still smooth. The third example (P. M. 13521) is of large size, being about $2\frac{3}{4}$ inches thick and $4\frac{1}{2}$ in diameter. It is of a hard and somewhat cellular basalt, and weighs forty ounces. The perforation was made from both ends, and has been worn to a slightly oval shape in its centre. The surface about one end of the hole is polished as in the examples made of softer material.

On the island of Santa Cruz Mr. Schumacher collected a number of these perforated stones of depressed globular form, most of which are in the Smithsonian Institution, and not now before me. One of them, however, is represented on Plate X, Fig. 22. The particular interest attached to this specimen is due to the probability that it was fractured and a large piece broken from one side. The fractured surface was afterwards smoothed over. The sides of the hole are nearly straight. Two others from Santa Cruz are in the Peabody Museum (9299, 9390). They were made of a compact basalt, though now it is considerably decomposed. The hole is

in each about $1\frac{1}{4}$ inches in diameter. In the larger specimen, which is $2\frac{1}{4}$ inches thick by $3\frac{1}{2}$ in diameter, the perforation was made by boring, and the sides of the hole are now parallel and considerably worn. In the other, which is $1\frac{3}{4}$ by $2\frac{3}{4}$ inches, the hole is slightly bell-mouthed at each end, though its sides are nearly straight.

There is also in the Peabody Museum (13761) a beautiful example of these perforated stones from the island of Santa Cruz, found by Mr. S. Bowers. It is more flattened than the others, and differs from those heretofore described in being polished on both ends, and even a portion of the intervening surface shows polishing in places. The hole is slightly bell-mouthed, with straight sides, and is highly polished throughout. A deep notch on one side near the hole, caused by a flaw in the stone, is as much polished as the surface adjoining, which, as mentioned in other instances, seems favorable to the theory that these stones were sometimes fastened to shafts by hide or leather thongs. Certainly the polished surface on this stone could not have been brought about simply by handling, for the natural cavity on its side and the edges of the hole through its centre could not have been reached, much less rubbed smooth, by the skin of the hand during any ordinary use of the implement as a weight to a digging-stick. This specimen is 2 inches thick by $3\frac{1}{2}$ in diameter, and the hole is $1\frac{1}{4}$ inches wide.

From the island of San Nicholas numerous examples of these depressed globular stones have been obtained by Mr. Schumacher; two of them are in the Peabody Museum, and others are in the Smithsonian Institution. On Plate X, Figs. 33, 34, 35, 36, and 38 are taken from San Nicholas specimens.

Fig. 34 represents one now in the Smithsonian Institution (18420). It is of a soft stone, probably a clay slate, and is 2 inches thick by $2\frac{1}{2}$ in diameter. The hole tapers from both ends.

Fig. 36 is taken from another Smithsonian specimen (18444). This is symmetrical, and is well made from a hard stone, probably basalt. It is about $2\frac{1}{2}$ inches thick and $3\frac{1}{2}$ in diameter. The hole, as is well shown in the figure, is deeply countersunk on both faces.

Fig. 33 is from one in the Peabody Museum (9353), and is very much

like that represented by Fig. 36 ; but, while it is a little smaller, the hole is larger, measuring about $\frac{7}{8}$ of an inch across the central portion, from which it widens towards each end. The material is probably basalt, and has been worked into a symmetrical implement. Though not polished, as are so many others, one end is much smoother about the margin of the hole than the other. The central portion of the hole has also been worn smooth.

Fig. 38 shows another (P. M. 9354) of the same material as the last. It differs from the rest in having the hole 2 inches wide at the surface on one face, and, as shown in the figure, the tapering is not so gradual towards the centre as is usual. In the centre the perforation is a little over an inch in diameter. At the other end, the hole is not over $1\frac{1}{2}$ inches wide. The surface adjoining the widest end of the perforation has been considerably battered as if by use.

From the island of San Miguel I have seen three specimens which were collected by Mr. Bowers and are now in the Peabody Museum (13692). As these were received from the Smithsonian Institution, there are probably others of the same character in that museum. The three before me are made of what is probably basalt, although its character has been so greatly changed by decomposition as to appear now more like a sandstone. They are each about 2 inches, or a little more, in thickness, and vary from $3\frac{1}{2}$ to 4 inches in diameter. The smallest part of the hole is, in each, about an inch in diameter, and it increases in width at both ends, though in the largest the sides of the perforation are straighter than in the other two, and the hole is more nearly of equal diameter throughout.

In all the specimens described in the foregoing pages the perforations are circular in form. There are, however, six of these stones that have come under my notice in which the holes are oval. They are all of soft material, and it seems probable that the shape of the hole in each is due entirely to the wear of the sides of the stone in a particular direction, owing to some peculiar method of use. Two of these stones with oval holes are shown on Plate X.

Fig. 23 is a representation of one now in the Smithsonian collection (20367), and was obtained at Dos Pueblos by Mr. Schumacher. It is

made, as Mr. Wadsworth has informed me, of talc schist, containing grains of chromite. The talc, being very soft, has worn away and left the chromite projecting. The thickness of this specimen is about $1\frac{1}{2}$ inches, and its diameter is nearly 3 inches one way and a quarter of an inch less the other. The stone has been carefully fashioned and the sides of the hole are straight from face to face. The diameters of the hole are 1 inch and $1\frac{1}{2}$ inches.

Fig. 24 represents one obtained by Mr. Schumacher on the island of San Nicholas (P. M. 9352). It is of dark steatite, and of nearly the same size as the one from Dos Pueblos, being $1\frac{1}{2}$ inches thick and about $2\frac{1}{2}$ in diameter. The hole is an ellipse, 1 inch by $1\frac{1}{2}$ in its diameters; its sides are perfectly straight, and show many parallel and longitudinal striations. One face is smoother than the other, though it is not polished. That shown in the figure is uneven as if broken by use. As a weight to a digging-stick this stone is too light to be of service except to a child, and the great amount of use it has had is not favorable to that conclusion. As a whorl it is also obviously not adapted; and it seems more likely to have been used for some purpose which required that it should be moved loosely up and down on a shaft of wood or bone. Another, with an oval hole, is from the island of San Clemente (P. M. 13525). In this the perforation is not quite an inch wide by $1\frac{1}{4}$ in length, and has straight sides. This specimen is $3\frac{1}{2}$ inches in diameter, but its original thickness can only be approximated, as it has been broken, and probably is not now over half its original thickness, the fracture having been nearly transverse to the perforation. The character of the fracture, which is an old one, favors the view that this stone was used as a club-head.

Another specimen from San Clemente, also collected by Mr. Schumacher, is of steatite, and is $1\frac{1}{4}$ inches in thickness and $2\frac{3}{4}$ in diameter. The elliptical hole has two straight sides, and is $\frac{7}{8}$ of an inch wide by $1\frac{1}{4}$ in length. One face of this stone is more level and smoother than the other.

A third specimen from the same lot as the last (P. M. 13522) is also of steatite. It is 2 inches in thickness and $3\frac{1}{4}$ in diameter. One face is flattened, perfectly smooth, and slightly polished. Surrounding the hole on this face is a depressed portion, about half an inch wide, which is perfectly smooth. The perforation is egg-shaped in outline, and of the same

size throughout, as in the others. The portion of the stone nearest to the small end of the egg-shaped perforation is not so thick as the rest, and this may have caused the peculiar shape of the hole, which was probably circular at first and afterwards worn into its present shape by use.

The last of those with oval holes is from the shellheap on Santa Catalina Island (P. M. 14804). It also is of steatite, and of the flattened form, 1 inch thick by $2\frac{3}{4}$ inches in diameter. The surface of the stone is decomposed, but there are signs of one face having been polished. In this specimen the perforation, which is $1\frac{1}{4}$ inches in its largest diameter, has parallel sides, and passes through the stone at a slight angle.

Among these Californian stones which have been described on the preceding pages are a few that have a more or less well-defined rim about the hole on the end which is polished, and this I have considered as a slight attempt at ornamentation, though in some of the conical forms it may also have been made with reference to the mounting of the stone upon a handle of some kind. Be this as it may, there are now to be mentioned nine of these stones, five of which are from the shellheap on the island of Santa Catalina, one from Pots Valley on the same island, two from the island of San Clemente, and one from the mainland, all of which are undoubtedly ornamented by incised lines more or less deeply cut and of several designs. Similar rude attempts at the first stage of savage decorative art have been noticed on the dishes, cooking-pots, pipes, etc., by the same people, and will also be mentioned further on when describing the several masses of pigment found in the graves of the former inhabitants of California.

The two specimens from San Clemente (P. M. 13522) are of the depressed globular pattern. One is of steatite, 2 inches thick and $3\frac{1}{2}$ in diameter, with a straight circular perforation 1 inch in diameter. One face is smooth, but can hardly be called polished, though the stone is considerably weathered and this may have destroyed the polished surface. The ornamentation on this stone consists of a simple line cut around the central part of the surface.

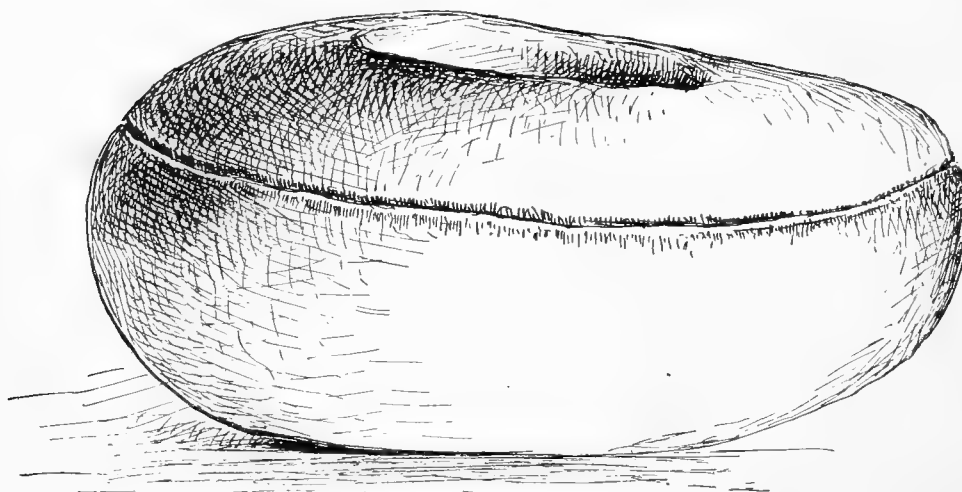
The other specimen from this island is made of a talcose schist, containing grains of chromite, which stand out on the weathered surface of the stone. This stone is 2 inches thick by 3 in diameter, and the straight perforation

is about $1\frac{1}{4}$ inches in diameter. There are still some traces of the polished surface on one face of the stone, and on this face four pairs of nearly parallel lines, about a quarter of an inch apart, extend at equal distances from the margin of the hole to about the central portion of the sides of the stone.

From Pots Valley Mr. Schumacher obtained a small perforated stone of steatite, which in two places on each face has small notches cut from the margin of the hole. This stone is only 1 inch thick and 2 inches in diameter. The hole was made by boring from one face through to the other, and tapers throughout. At the smallest end it is a little over half an inch in diameter.

Of the five specimens from the shellheap on Santa Catalina Island, one is a ring of serpentine, highly polished on one face, and over this polished portion are ten nearly obliterated short lines diverging from the margin of the hole. The hole has straight sides, and is about 1 inch in diameter. The stone is $1\frac{1}{4}$ inches thick and $2\frac{1}{2}$ in diameter.

FIG. 49.



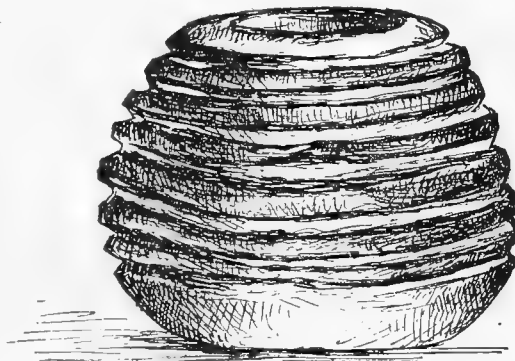
Perforated stone from island of Santa Catalina.

A larger stone of steatite $2\frac{1}{4}$ inches thick by $3\frac{1}{4}$ in diameter, and with a nearly straight hole about $1\frac{1}{4}$ inches in diameter, has a similar ornamentation on the polished end; but in this instance there are about thirty lines, each about half an inch in length, diverging from the margin of the hole (P. M. 13358).

One of the largest and most nearly symmetrical of the ring-like stones is from the shellheap, and is made of serpentine. This specimen (P. M. 14798) is $2\frac{1}{4}$ inches thick and $4\frac{1}{2}$ in diameter. The perforation is nearly of the same size throughout, with straight sides, and nearly $1\frac{1}{2}$ inches in diameter. As will be seen by Fig. 49, there is a deeply-cut line around the centre of the stone. All the surface above this line is highly polished, while the portion below it, though smooth, is without a polish.

A much smaller example (P. M. 14803), cut from a block of steatite, was found in the shellheap, and was broken in three pieces. This is $1\frac{3}{4}$ inches thick by 2 in diameter. The hole is three-quarters of an inch across in the centre, and widens towards each end to about an inch. The ends are smooth, but not polished. Seven deeply-cut grooves, at nearly equal distances apart, run around the surface of the stone and thus form six ridges, above the upper of which is a wider portion around the hole, and on the bottom the space left is about twice the width of that on the upper portion. The character of this ornamentation is well shown by Fig. 50.

FIG. 50.



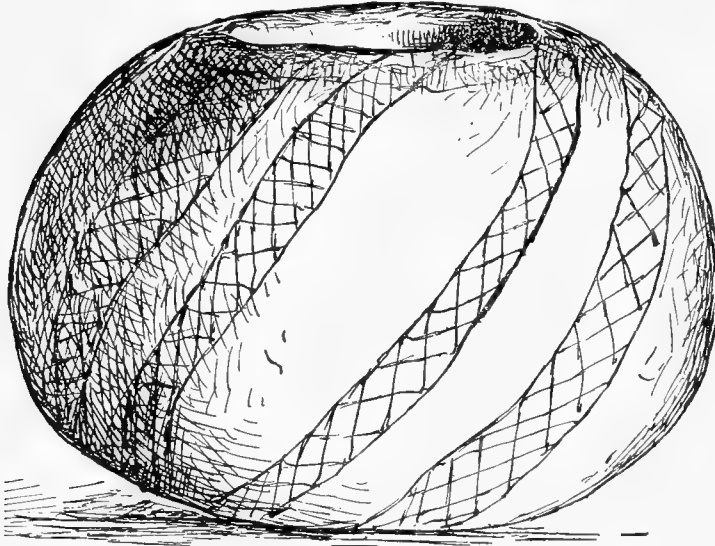
Perforated stone from island of Santa Catalina.

The last of the five from the shellheap is of a depressed globular form with a large perforation. This ornamented specimen (P. M. 13358) is also of steatite. It is about $2\frac{1}{2}$ inches thick and $3\frac{3}{4}$ in diameter. The hole was made by working from both ends, and the central ridge was afterwards removed, the hole being now nearly straight, and $1\frac{1}{2}$ inches in diameter. Both faces of the stone are polished, and on nearly one-half of the surface, extending diagonally from the margin of the hole on one face to the margin on the opposite face, are six sets of nearly parallel lines with cross-lines between them, making six bands of a lozenge-shape pattern, as will be seen by reference to Fig. 51. Between these bands are plain spaces.

A specimen from Santa Barbara, now in the Smithsonian Institution (20362), collected by Mr. Schumacher, and of which Fig. 52 is a representa-

tion of one face, of natural size, is of steatite, and has four of the lozenge-figure bands extending from the hole to the sides of the stone.

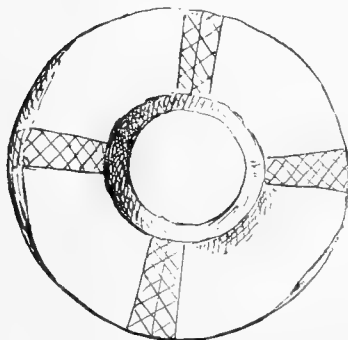
FIG. 51.



Perforated stone, with incised lines, from island of Santa Catalina.

pebble has not been disturbed, but the remaining portion has been hammered into the shape desired, leaving the stone about 2 inches thick by from 3 to 3½ in diameter.

FIG. 52.



Perforated stone, with incised lines, from Santa Barbara.

Taken by itself this stone would probably be considered as simply a rude hammer, but studied in connection with the two other specimens, showing further stages in the process of manufacture, and compared with perfectly made examples of the same material, I have not the slightest hesitation in considering it as showing the first stage in the manufacture of a perforated stone of ordinary size. The second stage of manufacture is shown by a mass of serpentine of the same dimensions as that of mica schist just mentioned. This mass still has its original surface on one face. All the rest of the stone has been pecked by a pointed implement, after having been first brought nearly to its present form by blows which detached larger masses than the secondary pecking. The stone is now in the stage immediately preceding its perforation.

The method of making these perforated stones is well illustrated by three specimens obtained by Mr. Schumacher in Pots Valley, island of Santa Catalina. One of these (P. M. 13425) is a pebble of indurated mica schist. The natural surface of about half of the

pebble has not been

ration. The third stage, or the perforation of the stone, is exhibited by the third example, which consists of a mass of serpentine about 4 inches in diameter and $2\frac{1}{2}$ in thickness. This has been hammered and pecked into its present shape, and has the perforation begun from both sides. These two cavities, which are each $\frac{3}{4}$ of an inch deep and $1\frac{1}{2}$ in diameter, have been made by pecking with a hard stone. A borer, made of quartz, such as are shown by Figs. 14 and 15, could now be easily used in completing the perforation thus begun, or the hole could be made by continued pecking, and the central portion then enlarged and made even by a borer or by cutting. The perfect specimens show that all three of these methods have been followed. After the stone has been perforated, the last stage in its manufacture would consist in simply rubbing the surface on another stone until the desired smoothness was obtained.

The next group of these perforated stones consists of numerous specimens which differ from those I have designated as of a depressed globular form simply in being still more flattened. They are of many sizes and of several different minerals; some approximate the globular form so closely as to be equally well classed with either group, while others are of extreme flatness, and the series runs into small stone rings that may have been used entirely as ornaments, and as such could be appropriately classed with the stone beads described further on.*

For the purpose of description, I shall further subdivide these flattened stones into several groups, and first I wish to call attention to the symmetrical circular stones made from masses of basalt and other hard minerals, with double bell-mouthed holes. These vary in size from 1 inch in thickness by $2\frac{1}{4}$ in diameter, to 2 inches in thickness by $4\frac{1}{2}$ in diameter. Three of this group are represented on Plate X.

* Mr. Bowers, in his report on Explorations of Santa Rosa Island, in the Smithsonian Report for 1877, p. 319, states that among the specimens obtained from the graves and shellheaps were "perforated disks from the size of a silver half dollar to 5 or 6 inches in diameter. These were used in games. It required either three or four to play a game with these disks. Two individuals, standing at a given distance, rolled the disk rapidly upon the ground between them, while one or two others stood at the side with sharpened sticks and caught the disks as they were whirled rapidly by."

A game similar to this was in vogue by the Indians of the coast, as mentioned by Bancroft (Wild Tribes, Vol I, p. 393), but it was played by a *hoop*, through which an attempt was made to *throw a stick*. It is to be regretted that Mr. Bowers has not given his reasons for the statement he has made, which, in its present form, can only be received as offering a *possible* use of some of the stones.

Fig. 37 on the plate is from one found by Dr. Yarrow's party in one of the graves at Dos Pueblos. It is of basalt, now very much decomposed, and apparently was long used. Its present weight is nineteen ounces. It is nearly 2 inches thick by 4 in diameter. The hole is larger than usual, being 2 inches in diameter at each face, whence it tapers toward the centre, where it is $1\frac{1}{2}$ inches wide.

Fig. 29 represents a similar stone from the island of San Nicholas, and is now in the Smithsonian collection (18426). This is about $1\frac{1}{2}$ inches in thickness by 4 in diameter.

Three of like character (P. M. 13521), varying from $3\frac{1}{2}$ to $4\frac{1}{2}$ inches in diameter, were obtained by Mr. Schumacher on the island of San Clemente.

A smaller specimen from San Nicholas is represented on Plate X, Fig. 28. This stone has been much changed by decomposition, and the character of the original perforation is from this cause much altered in shape.

Another specimen, now about $2\frac{1}{2}$ inches in diameter, collected by Mr. Bowers on the island of Santa Rosa (P. M. 13809), is so much weathered and decomposed as to make it impossible to decide upon its original shape, which may possibly have been globular.

From the island of San Miguel Mr. Bowers obtained a small example made of basalt and not much decomposed. A large fragment has been broken from one side, and the fractured surface exhibits as much weathering as the rest of the stone. This example is about 1 inch in thickness and $2\frac{1}{2}$ in diameter.

Closely allied to the several last described are some which consist simply of flattened and more or less oval pebbles of basalt, and other hard rocks, that have been perforated by pecking the hole through from both sides. Stones of this class may have been used as sinkers, and they seem to be better adapted for that purpose than for any other of the several uses attributed to the various forms of these perforated stones.

The largest of these perforated pebbles measures 4 inches in its longest diameter and 2 inches in thickness. The hole is 2 inches in diameter measured across its ends, and $1\frac{1}{4}$ inches in the centre. It was obtained at the island of San Miguel by Mr. Bowers (P. M. 13692). A similar stone, but of smaller size, is from San Nicholas Island, and was collected by Mr. Schu-

macher. It is now in the Smithsonian collection, and is represented on Plate X, Fig. 35.

Another specimen closely resembling the last, but not over an inch thick, is shown by Fig. 31 of the plate. This was found on the island of San Nicholas by Mr. Schumacher (P. M. 9350)

Two others in the Peabody Museum (13521, 13524) are of the same character as the last, but somewhat larger, being $3\frac{1}{2}$ and 4 inches in diameter. These were collected on the island of San Clemente by Mr. Schumacher.

Fig. 27 of the plate represents another perforated oval pebble from San Nicholas Island, also obtained by Mr. Schumacher (P. M. 9355).

A perforated pebble from Santa Rosa Island was obtained by Mr. Bowers (P. M. 13809). This is $1\frac{1}{4}$ inches thick and 3 inches in diameter. Another, still smaller, was received from Mr. Schumacher, and came from the island of San Clemente. It is 1 inch thick and $2\frac{1}{2}$ inches in diameter (P. M. 13523).

A pebble somewhat triangular in shape, $1\frac{1}{4}$ inches thick and $4\frac{1}{2}$ inches in its longest diameter, has a large and evenly pecked hole through its centre. This hole is $1\frac{1}{2}$ inches across its narrowest part and widens to 2 inches at each face of the stone. This sinker, as I am inclined to regard it, is represented of $\frac{1}{3}$ its diameter on Plate X, Fig. 32. It was found on San Nicholas Island by Mr. Schumacher, and is now in the Peabody Museum (9349).

Another rather irregularly-shaped specimen is shown by Fig. 30 of the plate. As will be seen by the figure, this stone has a five-sided outline, which is probably in part the natural shape of the pebble. It is a little less than 4 inches in diameter, and not over $\frac{3}{4}$ of an inch in thickness. This may be a sinker. It is from the island of San Nicholas, and is in the Peabody Museum (9356).

I have now to notice twenty or more of these flattened stones, which differ from the others in their mineralogical character and in the shape of their perforations. These are of steatite, serpentine, and allied minerals, with one exception, which is apparently made of a very soft claystone. They are all smooth, and several are polished. In most, the hole is

straight; in a few, it is slightly tapering. Three of the lot show the concentric striæ on the sides of the hole made by the boring instrument; in all the others, the sides of the hole have been more or less worn, and, in many, longitudinal striations can be seen. One has evidently had hard usage, and probably about half of it has been lost by a blow, which caused a fracture diagonally across the stone. This stone is 4 inches in diameter, and the hole, slightly oval, with straight sides, is about 1 inch in width. The specimen was obtained on the island of San Clemente by Mr. Schumacher (P. M. 13524).

A finely-polished example (P. M. 13597), circular in outline, but of unequal thickness, is made of serpentine. It is $3\frac{1}{4}$ inches in diameter and $1\frac{1}{2}$ in its greatest thickness. The hole, made by boring from one side, is 1 inch across on one face and tapers to $\frac{3}{4}$ of an inch at the opposite end. This was obtained by Mr. Schumacher from a grave at the same place where Dr. Yarrow excavated on the mainland near Santa Barbara, and is of particular interest from the fact that the whole surface of the stone is polished.

Two others, of the same material and size as the last described, are from the island of Santa Catalina; one (P. M. 13362) is from the shellheap, and the other (P. M. 13421) is from Pots Valley. They differ from the Santa Barbara example in having larger and perfectly straight holes 1 inch in diameter, and in being polished over half of the surface only.

Two smaller specimens of steatite (P. M. 13359, 14800), which seem to have been exposed to heat, are from the shellheap on the island of Santa Catalina. They are symmetrical and well made, with large straight holes, which have been much worn and are now over 1 inch in diameter. A still smaller specimen (P. M. 13359), also from the shellheap, and made of steatite, is $2\frac{1}{2}$ inches in diameter and $1\frac{1}{4}$ in thickness. The hole was probably bored, and is slightly tapering from one end to the other.

One of the same diameter as the last, but not quite so thick, and with a hole not quite as large, is also of steatite, and was obtained by Mr. Schumacher on the island of San Clemente (P. M. 13523).

A smaller specimen made of steatite was obtained by Mr. Schumacher,

probably from Dos Pueblos or La Patera, and is now in the Smithsonian collection (20365). It is represented by Fig. 53.

A fine specimen, made of serpentine, and polished over half its surface, was found in one of the graves on Santa Catalina Island, associated with articles of European make. This is 2 inches in diameter and 1 inch in thickness. The perforation is straight, $\frac{3}{4}$ of an inch in diameter, and is much worn (P. M. 13156).

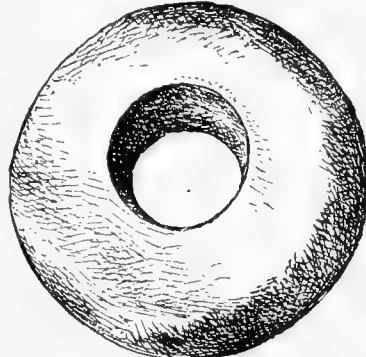
Another specimen of steatite from a grave on Santa Catalina may well be called a stone ring, as it is $2\frac{1}{4}$ inches in diameter and only half an inch thick, while the hole is about 1 inch wide (P. M. 13293).

Fig. 54 is a representation, of full size, of the smallest of these regular circular stones. It is from Santa Catalina (P. M. 13350); is made of steatite, and has been polished over its whole surface. This little ring, which might as well be classed with the stone beads or ornaments as with the group of stones now under consideration, is only $1\frac{1}{8}$ inches in diameter and not quite $\frac{1}{2}$ inch thick. The perforation is $\frac{1}{2}$ inch in diameter.

Among the perforated stones formed from basalt and other hard minerals are some which are simply perforated pebbles of oval shape. In the lot now under special consideration, made of softer materials, are many of irregular and of oval forms, which seem to have been made simply by perforating pebbles, or irregularly-shaped fragments of stone. The largest of these is shown on Plate X, Fig. 25. This is of serpentine, and is polished over its whole surface, with the exception of a narrow band around the edge, which is slightly battered, as if by use. The hole is $1\frac{1}{4}$ inches in diameter, with straight and polished sides. The stone is $3\frac{1}{2}$ inches in diameter by 1 inch in thickness. This specimen was obtained by Mr. Schumacher on the island of Santa Cruz (P. M. 9301).

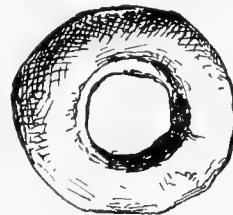
Fig. 55 represents a small and somewhat oval pebble of steatite,

FIG. 53.



Perforated stone from near Santa Barbara.

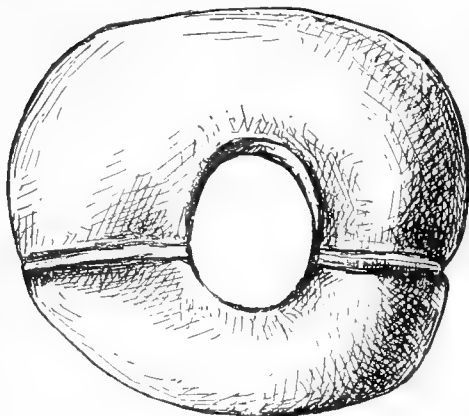
FIG. 54.



Perforated stone from the island of Santa Catalina.

which has been perforated, and has a deeply-cut line running around one side, as if an attempt had been made to cut the stone in two. This specimen, which is shown of full size in the figure, was found by Mr. Schumacher in one of the graves at the isthmus on the island of Santa Catalina.

FIG. 55.



Perforated stone from the island of Santa Catalina.

Six others of these small steatite pebbles of irregular shape are in the Peabody Museum. They are from 2 to $2\frac{1}{2}$ inches in greatest diameter and from $\frac{3}{4}$ of an inch to 1 inch in thickness. The perforations are 1 inch or less in diameter. They are all from the island of Santa Catalina; some from the graves and others from the shellheap.

An irregularly-shaped stone, which, probably, should be considered as a large bead of steatite (P. M. 13656), was found by Mr. Schumacher in a grave at the isthmus on Santa Catalina Island. It is 1 inch thick and $1\frac{1}{4}$ in diameter. The hole was made by boring, and is nearly $\frac{3}{4}$ of an inch wide. There are a few deep scratches on one side, and two notches are cut on the margin of the hole on one face.

From the island of San Miguel Mr. Bowers obtained a perforated circular mass of clay, which is the only example of the kind that has come under my notice from California. It is $2\frac{3}{4}$ inches in diameter by about $\frac{3}{4}$ of an inch in thickness, and has a hole, with straight sides, nearly 1 inch in diameter. The use to which this specimen could be put is beyond my powers to define. The soft and easily broken substance of which it is made seems to preclude the idea that it was designed for the same purpose as the others, and as it has not been burned we cannot regard it as a support to a cooking-pot, as similar clay rings were probably used by the Lake-dwellers of Switzerland.

Another interesting specimen, unlike those I have already mentioned, was obtained by Mr. Schumacher from the graves at Dos Pueblos. This is shown of full size by Fig. 56, which represents the stone as seen from one

end. The hole in the centre, as will be seen in the figure, is very small, and was made by boring from both faces. The mineral is probably serpentine. As the specimen belongs to the Smithsonian Institution, and is not before me as I write, I cannot give a more detailed description.

Among the perforated stones found by Mr. Bowers on the island of San Miguel are three (P. M. 13691) oval pebbles, which have not only been perforated, but their sides have been more or less flattened. One of these, a worked pebble of basalt, is shown of actual

size in Fig. 57. This has been worked smooth and flat on both faces, as well as on the sides, and its perforation is large, regular, and smooth, though slightly tapering to

the centre. This stone is 1 inch thick by about $2\frac{1}{2}$ inches wide and $3\frac{1}{4}$ in length.

The second specimen is a granite pebble, about $\frac{1}{4}$ of an inch thicker, $\frac{1}{2}$ inch wider, and 1 inch longer than the last. The sides are not so even and the hole is not so large nor so well made. Mr. Evans, in his exhaustive work on the Stone Implements of Great Britain, has figured* a very similar perforated pebble, which was found in Cambridgeshire, and mentions several other English specimens of this character.

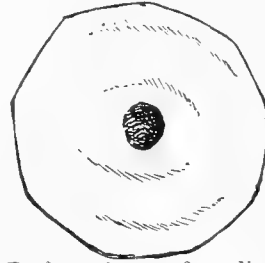
The third example is also a granite pebble, with a perforation $\frac{3}{4}$ of an inch in diameter at its contracted part. It is thicker than either of the others, and the ends of the stone have not been flattened.†

The last of the perforated granite pebbles which I have to mention

* Page 204, fig. 156.

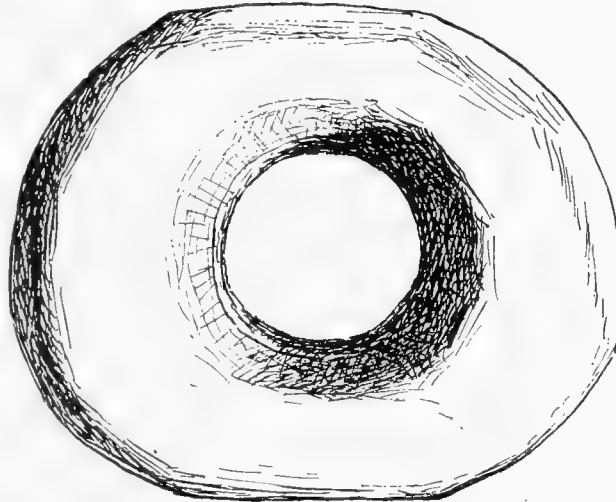
† Since this page was put in type, Mr. Evans has kindly given to the Peabody Museum a perforated pebble from the north of Ireland which closely resembles this California stone.

FIG. 56.



Perforated stone of peculiar shape from Dos Pueblos.

FIG. 57.

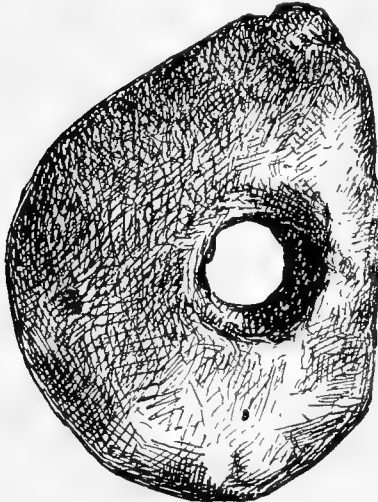


Perforated pebble from island of San Miguel.

(P. M. 13596) is in shape like a large hen's egg. Its long diameter is $4\frac{3}{4}$ inches, transverse $3\frac{1}{2}$, and measured through the hole, it is $3\frac{1}{4}$ inches. The perforation is $1\frac{1}{2}$ to $1\frac{3}{4}$ inches at each end and tapers to $\frac{3}{4}$ of an inch in diameter at the centre. The surface of the stone does not exhibit the least signs of battering, and the perforation looks as if it had not been made to the full size intended.

There now remain to be mentioned three rough pieces of steatite from the island of Santa Catalina, which may be rude sinkers. One of these (P. M. 13361) was found in the shellheap by Mr. Schumacher, and is shown

FIG. 58.



Rude sinker from the island of Santa Catalina.

of full size in Fig. 58. This stone is of unequal thickness, but nowhere exceeds $\frac{1}{2}$ an inch.

The second piece of steatite (P. M. 13423) was found in Pots Valley. It has the appearance of a water-worn pebble of irregular shape, and a large piece has been split off from one face while in use. The perforation was made by pecking on each face of the stone, and where the two pits meet the hole is not over $\frac{1}{8}$ of an inch in diameter. This rude specimen is very much like the two represented on Plate X, Figs. 7 and 12, though larger, as it is about 1 inch thick and 3 by $3\frac{1}{2}$ inches in diameter.

The third rough piece of potstone (P. M. 13426) was also found by Mr. Schumacher in Pots Valley. It is apparently one-half of a large rude sinker like those from Tennessee, of which one is shown on Plate X, Fig. 10.

Two perforated stones, of which figures are given (p. 189), were found in the shellheap on the island of Santa Catalina. They are unlike any that have been recorded in the preceding pages, and probably were intended for entirely different purposes, but as so many forms of unknown use have been mentioned in this chapter it will not now be out of place to include these at its conclusion. Fig. 59 represents an ovoid piece of talcose slate, which has been carefully and symmetrically shaped, as will be seen by the figure. It is flat on one surface and slightly convex on the opposite, and the edges are smooth and rounded. This stone (P. M. 13387) was broken

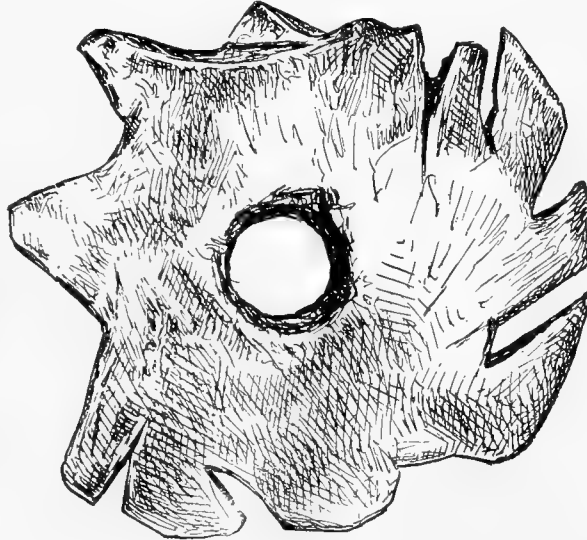
in several pieces, but all were secured except a small portion of one side, as shown in the figure. In length it is $5\frac{1}{2}$ inches, in width $3\frac{3}{4}$, and in thick-

FIG. 59.



Perforated stone, of unusual shape, from the island of Santa Catalina, $\frac{3}{4}$.

FIG. 60.



Perforated disk, with notched edge, from the island of Santa Catalina.

ness is nowhere over $\frac{1}{4}$ of an inch. The hole through the stone is about $1\frac{1}{2}$ inches in diameter, and the sides are smooth and rounded to each face.

The other unique and singularly-shaped stone (P. M. 13375), obtained by Mr. Schumacher at Santa Catalina Island, is of steatite. The two faces are polished and regularly convex, and the hole, which is perfectly straight, is $\frac{5}{8}$ of an inch in diameter and $\frac{1}{4}$ of an inch in length. The thin edge of the stone was probably of a regular outline at first, but was afterward cut and notched in such a manner that its present shape will be best understood by reference to Fig. 60.

MISCELLANEOUS OBJECTS MADE OF STONE.

BY C. C. ABBOTT.

UNDER this heading we have brought together descriptions of several implements and other articles made of stone, the uses of some of which it is impossible, at present, to determine. Certain suggestions as to the use of a few can be obtained from the evident adaptability of the articles themselves to certain purposes, or from the knowledge that articles of a similar character are still in use by savage tribes.

Fig. 61 represents a perfect specimen of a large tube of stone. It is made of a comparatively soft clay slate of a dull gray color. This tube measures $10\frac{1}{2}$ inches in length, and is almost perfectly cylindrical from end to end, with a variation of an $\frac{1}{8}$ of an inch in diameter. At the end having the groove about it (Fig. 62), the perforation is $\frac{3}{4}$ of an inch, while at the other end (Fig. 63) it is one inch in diameter. The exterior surface of the tube is perfectly plain, except a possible attempt at ornamentation at one end, where the surface for a width of about 1 inch is slightly depressed. This may, however, have been connected with the use or uses to which the implement was applied. The hole has been partially drilled, as seen by the well-marked circular striæ, which extend one-third of the length from the larger end of the tube. In the remaining two-thirds of the perforation there are irregular deep grooves or cuts apparently made by a sharp flint implement. These incised lines are very close to each other, but do not quite cover the whole surface, and the circular striæ cannot be detected on the intervening smooth spaces. It is thus evident that the perforation was made by two different implements, or that the wider orifice was drilled by a revolving borer, after a perforation of uniform calibre through the entire length of the tube had been made by the cutting tool.

These stone tubes have been the objects of much conjecture on the part of archæologists. To two of the suggested uses, in all probability, they

were never put: that suggested by Schoolcraft, of their being telescopes for the better observance of eclipses; also, that they were trumpets for producing far-reaching sounds, or as veritable musical instruments. On the other hand, the suggestion, based upon certain passages in the writings of various early travellers in North America, that they were medicine-tubes, seems to us the one plausible explanation of these laboriously-wrought stone implements.



FIG. 61.

Mr. C. C. Jones,* in describing certain specimens of these tubes, varying in no important feature from that here figured, remarks that—

“These authorities confirm our impressions that tubes—like those we have been considering—were medicinal in their uses, and materially assisted the primitive physician—at once quack and conjurer—in performing his wonderful cures. * * * By the circular opening at the larger end, the seat of pain could have been conveniently covered. The weight of the instrument enhanced its efficiency and rendered more facile its preservation in the desired position. While under treatment, Indian patients were compelled to assume more than a recumbent position. They were obliged to lie flat down, now on the back, and again on the stomach. If we go one step farther and suppose the cavity next to the flattened end [*in our specimen, simply smaller, but cylindrical*] filled with punk, dried tobacco-leaves,

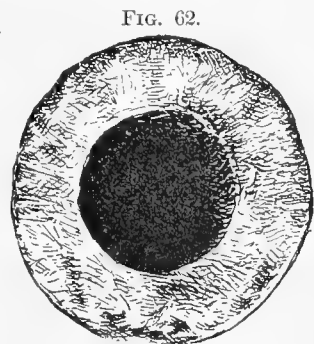


FIG. 62.

Actual size of upper end of tube.

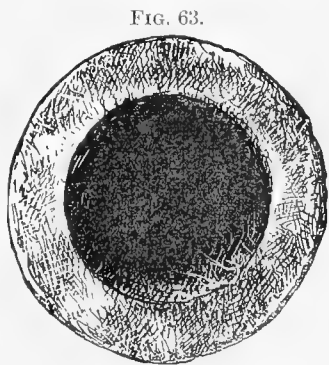


FIG. 63.

Actual size of lower end of tube.

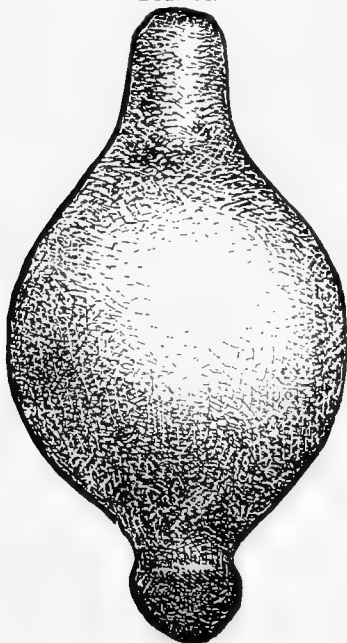
or some combustible material, the other end of the tube being firmly applied to the part affected, which had been previously scarified, we will perceive, when the contained substance was ignited, how readily this tube would have answered the purposes either of cauterization or cupping. In the one case the particles of burning matter dropping through the central opening would have blistered and burnt the diseased spot; while in the other, the active fire kindled in the upper portion of the tube—the ashes by a simple contrivance being prevented from falling through the narrow portion of the bore below—would have created and maintained, during its existence, a vacuum in the lower part of the tube, thus causing the blood to flow freely from the incisions made in the flesh.”

* Antiquities of the Southern Indians, p. 364, New York, 1873.

While this description calls particular attention to the contracted bore at the middle of the tube—a feature that is scarcely noticeable in the specimen here figured—it is certain that the specimen from Dos Pueblos is equally available for the purposes mentioned in the above quotation.*

Stone tubes, and allied articles made of clay, are not characteristic of any one locality in North America, although the most elaborately wrought and largest specimens have been found in or near the mounds of the Ohio Valley and throughout the known, or supposed, range of the so-called Moundbuilders. As is the case with very many forms of stone implements, the size largely determines the probable use; and we here find that these tubes of several inches in length, and with a tapering bore, are undoubtedly simply smoking-pipes; while other short

FIG. 64.



Plummet-shaped implement of stone.

tubes with a uniform bore were merely ornaments. Indeed, a regular unbroken series can be made, from the diminutive bead to the beautifully drilled and polished tube a foot or more in length.

It has been suggested that inasmuch as certain Indian conjurers and medicine-men pretend that disease is caused by the presence of certain foreign substances in the body or affected part, such as small animals, birds, bones, pebbles, feathers, worms, etc., which they withdraw by sucking, these tubes would afford a ready means of concealment for such things.

Figs. 64, 65, 66, and 67 represent four specimens of probably one class of implements, to which various names have been given, and which, considering the slight variations in their shapes, may have been put to several and widely different uses. It is quite impracticable to determine the one particular purpose for which any one of these specimens may have been made, especially as nothing connected with their discovery throws any light upon their history. Fig. 64 (S. I. 21875) is made of serpentine,

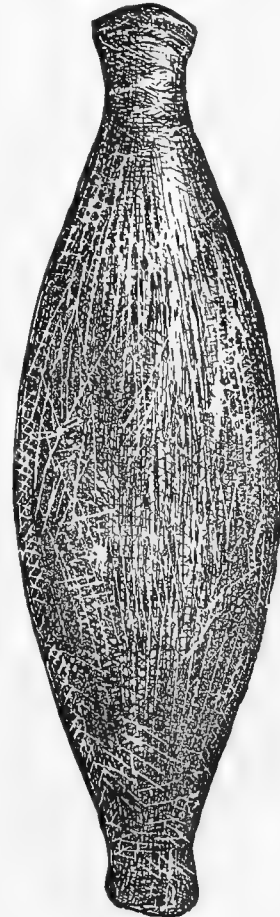
* In this connection see a quotation from Venegas on page 25 in relation to the use of medicine-tubes by the Californian Indians.—F. W. P.

has been smoothed rather than polished, and is noticeable, like the following (Fig. 65), in having a well-defined groove at one end, and simply terminating in a blunt point at the other. This specimen is broader for its length than the majority of those I find recorded from the various localities throughout the country where these implements occur. If it were not for the terminal tapering point this implement would be identical with the generality of so-called "sinkers" found on our Atlantic coast; and for any of the purposes suggested to which such an implement might be applied it is difficult to see what advantage this slender ungrooved termination would give.

Fig. 65, from a grave at Santa Barbara (S. I. 21873), differs from the preceding in being much more slender in proportion to its length. This variation in shape possibly arises from their being shaped from ordinary oval water-worn pebbles, the carefully-wrought ends being completed. The pebbles otherwise were not materially altered in shape or reduced in bulk. This specimen is made of greenstone, and, like the preceding, is carefully smoothed, but not highly polished; but many, both of this and other materials, have been brought to as high a polish as was possible to produce on the mineral. The presence of the groove at one end of both this and the preceding indicates that but one end was intended to be attached to a cord, whether that cord was a fishing-line or a plummet-string, as has been insisted upon by various writers.

[Three other of these implements from the graves at Santa Barbara, collected by Mr. Bowers, and now in the Peabody Museum (13591), are made of a talcose slate, and are in general character like the two figured above; one being long and slender like Fig. 65, though slightly longer originally, but now broken at one end. The two others are more like Fig. 64 in being short and thick. One of these is broken at one end, and it is now

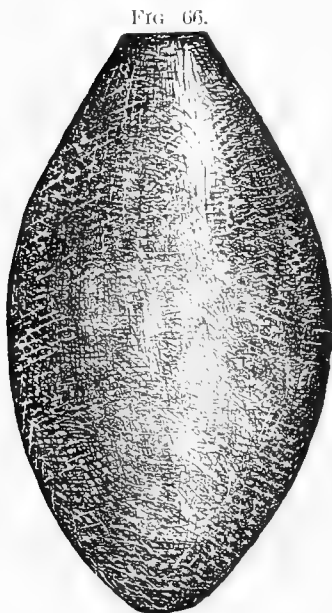
FIG. 65.

Plummet-shaped implement
of stone.

impossible to state if that end were pointed or not. The other, though much battered on its sides, is perfect at both ends, and, like the majority of similar implements from the Atlantic coast, is only provided with a stem-like portion at one end. The number of fractures on the surface of this specimen, evidently the result of use, leads to the suggestion that implements of this character may have been used in some way as light hammers or club-stones as well as for other purposes.—F. W. P.]

An implement, in every way similar to the one shown in Fig. 65, is described by Stevens* as “a plummet-like object of talc, grooved at one end, and with the other end worked to a corresponding blunt point; Ohio.”

Fig. 66 represents what I judge to be an implement for much the same purposes as the preceding; and yet if finished, it is difficult to see how it could be used at all unless held in a net-work or skin bag. The specimen is as carefully shaped and smoothed as either of the others. It is made of serpentine, and was obtained by Mr. Schumacher near Santa Barbara (S. I. 15182).



Plummet-shaped implement of stone.

In an article in the *American Naturalist*† on these so-called “plummets,” the author suggests that “they might have been used as sling-shots, a string being attached to the weapon and to the wrist, while the implement itself was grasped in the hand.” This refers to the specimens, like the preceding, which have a groove at one end; but suggests to the writer the possibility of such a specimen as Fig. 66 being encased in skin and fastened to a flexible handle, thereby making a war-club, that, properly wielded, would have been a formidable weapon. In the absence of all information that might throw light on its use, we consider it best to class this specimen, although wanting the all-important groove, with the preceding plummet-shaped stones.

* *Flint Chips*, p. 500, fig. 92, London, 1870.

† *American Naturalist*, vol. vi, Nov., 1872. Notes on “Plummets,” by J. G. Henderson.

Fig 67 represents an allied specimen from Dos Pueblos of these ungrooved, pear-shaped weightls. It is made from a fragment of coral rock, and apparently pecked or hammered into shape; but this is by no means certain, and an interesting feature of the specimen is the uncertainty of the method employed to thus correctly shape this material. The whole surface is quite rough, and exhibits no attempt at polishing at any point.

A similarly-shaped implement, made of serpentine and well finished, was obtained by Mr. Bowers at San Miguel Island (P. M. 13671)

A photograph of a series of these "weights," collected by Mr. Schumacher at various localities in California (P. M. 7655), represents seven specimens of various shapes, but all of one general form. One of these, 7 inches in length, is quite similar to Fig. 67, but is not as acutely pointed at one end, and is more bluntly terminated at the other. These specimens are all labelled "Spindle-whorls, or weights for distension of thread."

An editorial note at the conclusion of Mr. Henderson's paper, from which I have quoted, gives, as it seems to me, an admirable résumé of our present knowledge of this class of implements, and I quote it entire:

"These 'plummets' or 'sinkers,' as they are more commonly called in New England, are of quite common occurrence in the vicinity of Salem, Mass., and we have in the collection of the Peabody Academy a number of specimens varying in size from an ounce or two to several pounds in weight, but all made on the general pear-shaped pattern, though they exhibit about as many modifications within the shape, as shown by the hundreds of varieties of the pear itself. Local archaeologists here in general consider them as 'sinkers,' principally from their shape and from the fact that they are more often found along the seashore than in the interior, though not unfrequently met with at a distance from the coast. The very large size of some of the specimens would perhaps indicate some different use from any proposed by Mr. Henderson, and in fact some of them run so decidedly into the group of implements classed as 'pestles' that it is almost impossible to draw the line between the two groups, which are well marked by their extremes. The peculiar shape of these instruments has also caused them to

FIG. 67.



Plummet-shaped implement of stone

be regarded as weights used to stretch the thread in spinning. This supposition is rendered very probable by the fact that stone weights have been used in spinning, and from the statement (made to me, in conversation, by Dr. Palmer, of Washington, I think) that similar stones are still in use among the Indians of the Northwest. As it is generally accepted that the Mound Builders were informed in regard to the spinning of fibre of some kind, and certainly of the *twisting* of materials which they could manufacture by some process akin to weaving, the use of these implements as weights seems very probable, and as household implements they would often be more or less elaborately finished or carved. For my own part, I have for some time considered them as representing, to a greater or less extent, according to size, material, shape, and finish, 1st, pestles; 2nd, sinkers; 3rd, spinning-weights; 4th, ornaments. That their principal use was as 'plummets' may be perhaps questioned, as there are far too many of them found, and of too great a variation in size, to lead us to infer that they were used mainly for that purpose. Though if it were necessary, in ancient architecture, to establish a perpendicular line, the implements were at hand as 'weights' with lines attached.—F. W. PUTNAM."

Inasmuch as the specimens here figured were all found in graves immediately on the sea-coast of California, and near a creek that doubtlessly afforded excellent fishing, I am disposed to consider that the Dos Pueblos specimens were probably more or less elaborately finished sinkers for fishing-lines.

[Since the preceding pages were written by Dr. Abbott large collections from the graves and shellheaps on the coast and islands of Southern California have been received at the Peabody Museum. Among the numerous

FIG. 68.



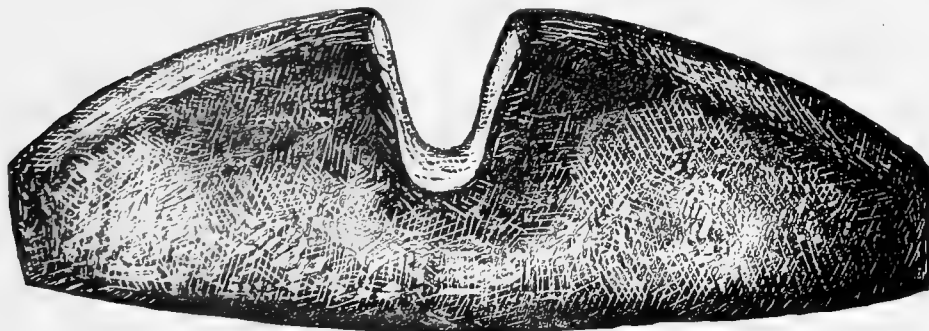
Sinker made of stone, with asphaltum at the ends.

articles made of stone are several which, there seems to be little doubt, were used as sinkers, and by their shape are allied to the implements Dr. Abbott has described on the preceding pages. Two of these are of great interest, as they still show the method by which they were fastened to fishing nets or lines. They are all, however, of coarse material and finish, being

made of the same hard stone used for many of the pestles and mortars. Two of these sinkers, collected on the island of San Miguel by Mr. Bowers, are more or less cylindrical, and somewhat pointed at each end. The smallest (P. M. 13672) is represented of full size by Fig. 68. Both of the stones were fastened to lines or nets by means of asphaltum. This asphaltum has preserved a portion of the twine which was wound around each end of the stone, and it is evident that in this way the string was held in place on the sinker, which was thus easily attached to a line or net. The larger (P. M. 13673) of these two interesting specimens is about 8 inches in length by nearly 2 inches in its greatest diameter, and is somewhat flattened on one side. A small stone of the same shape and material as the one represented by Fig. 68 was probably used in the same way as a sinker, but there are now no signs of asphaltum on its ends. This little sinker (P. M. 13295) is only $2\frac{1}{4}$ inches in length by $\frac{3}{4}$ of an inch in diameter at its centre, from which it tapers toward each end. It was obtained from the island of Santa Catalina by Mr. Schumacher. From the same island Mr. Schumacher also collected a small plummet-shaped stone (P. M. 13274), $2\frac{1}{4}$ inches long by 1 inch in thickness, which differs from the last in being pointed at one end only, and this pointed portion is very smooth, while the rest of the stone is rough and with an irregular surface.—F. W. P.]

Figs. 69 and 70 represent a top and side view of an interesting form

FIG. 69.



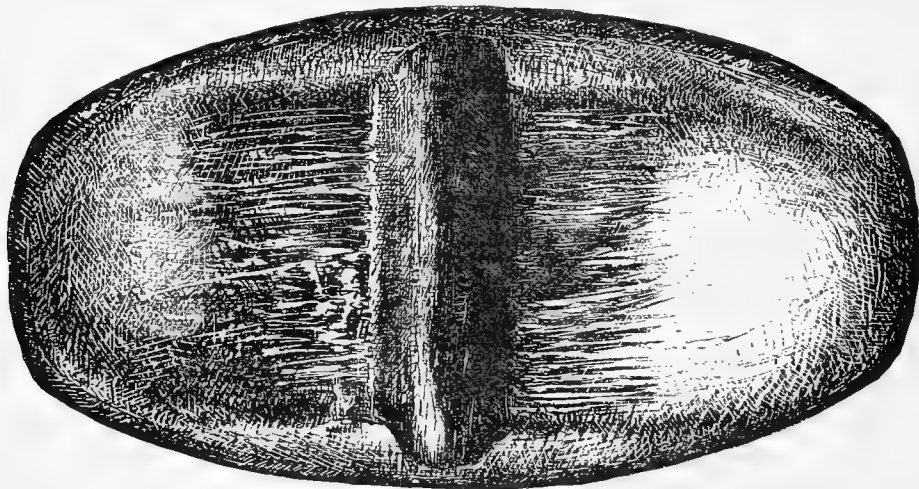
“Arrow-straightener.”

of implement which is supposed to have been used in straightening arrow-shafts, by Mr. Schumacher, who collected the specimen (S. I. 18341) fig-

ured on Santa Cruz Island, and I translate what he has written concerning it, as follows:*

“The aboriginal warrior was well aware of the advantage of a straight arrow-shaft over a crooked one, and when, therefore, nature did not provide the desired perfection, ingenuity was resorted to, by which it was attained. The way it was accomplished I learned from living witnesses, and by the many implements found which were used for the purpose of straightening the arrow-shaft. The twigs were cut into the proper length, worked by scraping into the desired thickness, and were left to dry in the shade. When partially dry such bends and crooked parts which resisted the common practice of straightening were subjected to the action of the arrow-straightener. This utensil

FIG. 70.



“Top view of arrow-straightener.”

is made of steatite, a rock that well resists the destructive power of the fire to which it is subjected during the process of straightening the shafts, and retains the heat long. It is usually oval in shape, and slopes toward both ends and sides, and has a flat base, upon which it rests when in use. Across its ridge passes a groove (sometimes two and even three), corresponding in its width to the thickness of the arrow-shaft, while in depth it varies, often to twice its width, according to the service it rendered, by which the grooves are deepened and its width enlarged. The size varies from the one illustrated to about 5 inches in length and $2\frac{1}{2}$ in width. [Which is the size of the one represented by Figs. 69, 70.] Into the groove of the heated implement the crooked part of the shaft is pressed, and by heating, or steaming, the wood becomes very flexible, and is easily bent and straightened, which position it will retain when cooled off. It is the same principle now employed in the manufacture of furniture, wagon-wheels, etc., of bent wood, brought into almost any shape by the process of steaming.”

In a conversation with Dr. Yarrow regarding these implements he informs me that he has seen similar stones used by the Indians of Southern

*Archiv für Anthropologie, vol. vii, page 263 *et seq.*

Utah to polish their arrows. The stone, however, was not heated, but held in the hand and rubbed up and down the shaft of the arrow with considerable rapidity. He therefore thinks the term "arrow-smoother" would be better than "arrow-straightener," and thinks that the longitudinal striæ in the grooves are such as would be made by rubbing the arrow-shaft with the stone. Many of the specimens also—especially those of serpentine—show no action of fire on their surfaces. In all that I have seen the grooves retained their polish, which, probably, would not be the case had they been exposed to fire. The shape of many of these articles is obviously intended to conform to the hand; and to hold one of these stones in the hand, heated sufficiently to straighten an arrow-shaft, would not be an easy task. Admitting that they were not held in the hand, their shape seems to preclude the idea that they could be retained in any particular position with any degree of fixity. One specimen obtained by Mr. Schumacher is in the form of a double cone with rounded points; such a shape as this could hardly have been chosen to serve as a straightener. An examination of Figs. 69 and 70 will indicate the different points regarding side wearing of grooves and shape of implement. Professor Powell has informed me that he has seen Indians straighten their arrow-shafts by heating them and then holding one end of the shaft between the teeth, straightening with the fingers. Sometimes a bone or a horn straightener is used, but the shaft, not the implement, was heated.

These grooved stones are not peculiar to the Pacific coast. Mr. C. C. Jones* gives a figure and description of a similar implement from Georgia, which has two grooves crossing each other at right angles. The writer has met with a single specimen from New Jersey that could safely be classed with these Pacific coast implements. This form of implement does not appear to occur in Europe, but Evans† figures a "rubbing-stone" found in one of the Wiltshire barrows, and refers to others. He says of them, "These instruments vary but little in shape, size, or character, being usually of a truncated half-ovoid form, with a rounded groove along the flat surface, and formed of sandstone."

* *Antiquities of the Southern Indians*, p. 366, pl. xxii, fig. 1.

† *Stone Implements of Great Britain*, p. 241, fig. 185. London, 1872.

Figs. 71 and 72 represent a specimen from Santa Barbara (S. I. 15188) which, though closely allied to the preceding, varies in two particulars; the principal one being the hole through it at one end; the other difference being the much shallower groove. The perforation in this instance

FIG. 71.

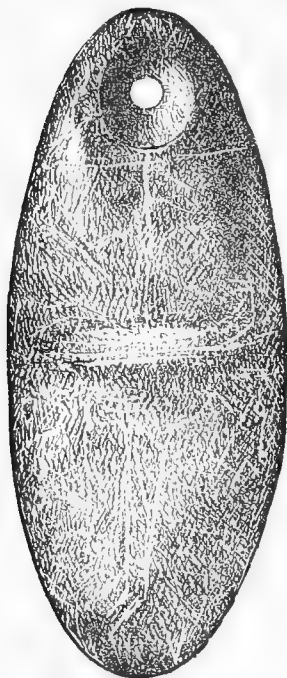


FIG. 72.



probably has nothing whatever to do with the use of the implement, but was intended simply to enable a cord to be securely attached to the stone that it might the more easily be carried, and the danger of being lost lessened when not in use.

[The later collections made by Mr. Schumacher for the Peabody Museum embrace many of these grooved implements of various forms. They are nearly all made of steatite, which in several is more or less changed in character by heating. The largest (P. M. 13288) of a lot of sixteen now before me, from the shellheaps and graves on Santa

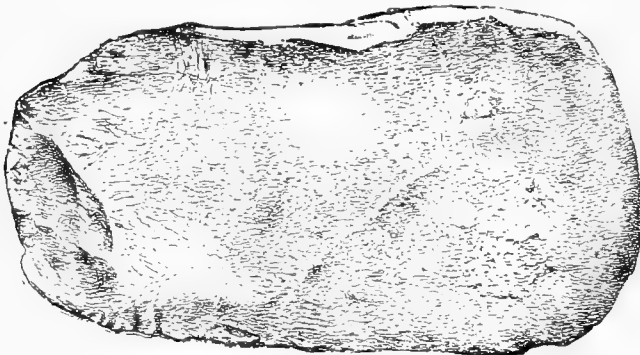
Catalina, is 8 inches in length and 3 in width. This stone has a flat base and pointed ends, increasing in thickness to the centre, across which is a deep groove. Another specimen of about the same size and shape (P. M. 13388) has a hole through one end for suspension. Another example is also furnished with a hole at one end. This last (P. M. 13428) is of the same length and width, and, seen from above, of about the same outline as the one represented by Fig. 70, but it is much thinner, and the under surface is hollowed so that the deep groove on the upper has but a thin portion of the stone under its central part. A specimen from the island of San Clemente is of a similar shape, and also has a hole for suspension. Still others of the Santa Catalina specimens (P. M. 13332 and 14797) have been made by cutting the groove across the bottom of irregularly-shaped little vessels

of steatite, the articles thus serving a double purpose. One of these implements (P. M. 13335), evidently made from a fragment of a large *olla*, is of particular interest, as it has two deep grooves cut upon the rounded surface. These grooves, while at right angles, do not meet, and only one of them could be used at a time. One circular and roughly cut mass of steatite, from Santa Catalina (P. M. 13414), has a deep groove across one surface, while the opposite is roughly cut out and forms a small cup about 1 inch deep and 2 inches in diameter. A triangular piece of steatite (P. M. 13339), with a hole in one corner, which may also have been used as a small *comali*, has a groove a little over 3 inches long on one surface. From these examples it is evident that while implements were often made with care for the particular purpose for which these stones were used, it was far more usual to make the required groove in any piece of steatite that was at hand. Several of the flat pendants, similar to those mentioned further on, are also provided with grooves which sometimes cross each other (P. M. 13168 and 13420), and although some are too small to be of use for smoothing arrow-shafts, they may have been used for similar purposes. One oval and water-worn pebble of hard sandstone, from a grave on Santa Catalina Island (P. M. 13170), has a roughly-cut groove across its centre. The structure of this stone would not allow of its being used in a heated state, and this fact, with the roughness of the groove, may indicate that its proper use was for sharpening or rubbing articles of bone and shell. Stones similar to this are known from the Atlantic States.—F. W. P.]

Figs. 73 and 74 represent a piece of pumice-like stone that bears considerable resemblance to an ordinary celt or ungrooved axe, such as are common on the Atlantic coast. Six and one-half inches in length by nearly $3\frac{1}{2}$ in width, this specimen has a flattened base worn smooth by rubbing, and on its superior surface it is very evenly and uniformly sloped from a dorsal ridge. This ridge at one end slopes downward at the same angles as the sides; while the base in front slopes upward at about the same angle. Another trace of use, besides that of a rubbing-stone for skin-dressing, which was very likely the principal use of the implement, is noticeable in a few deep and narrow grooves along one edge. These recall the grooves characteristic of the so-called sharpening-stones of the

Eastern States; but it is very doubtful, considering the very friable character of the mineral, if this specimen was ever used in any way connected

FIG. 73.



Polishing-stone, ? 1.

with the sharpening or polishing of other stone implements, although it might have been employed in polishing articles of bone, shell, or wood.

In the collection made by Dr. Yarrow's party are two sandstone celts, one of which, from La Patera, is

FIG. 74.



Polishing-stone, ? side view, 2.

of peculiar interest, as it still has adhering to its base a quantity of asphaltum, showing that by the use of this material a handle had been attached. The edge of this specimen is still well defined, and shows a considerable degree of polish. The material is a moderately dense sandstone, but, as exemplified by the celt itself, not capable of sustaining much hard usage. Although quite symmetrical in shape the specimen can in no wise compare with similar celts of porphyry and other minerals found in the Central and Eastern States.

The accompanying specimen from Dos Pueblos, being devoid of anything like a cutting edge, and smoothed but little, if any, upon its sides, might readily be considered a chance-shaped water-worn pebble were it not that its sloping edge gives some indication of having been once a polished cutting edge now crumbled away. The mineral is now so light, porous, and friable, that a cutting implement could not be made of it; but as these conditions are probably the result of long exposure to intense heat, this stone implement may originally have been as well formed as the other.

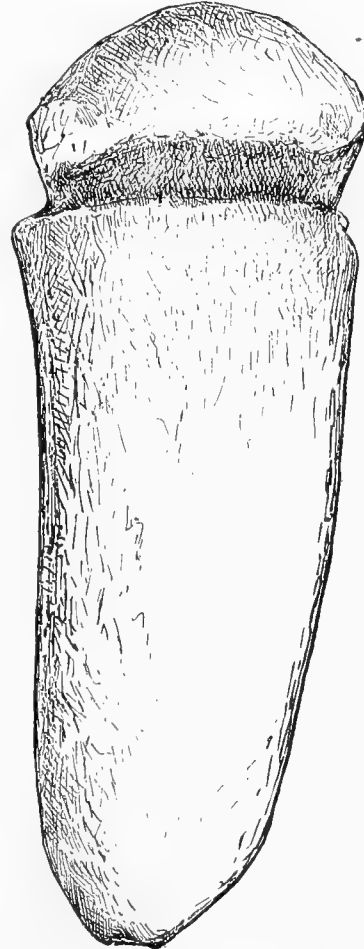
[Among the many interesting articles obtained by Mr. Schumacher in Pots Valley (the place where the extensive manufacture of the soapstone pots was carried on) on the island of Santa Catalina, there is a large

grooved axe (P. M. 13431) identical in form with many found in the Atlantic States, and, so far as I am aware, the first implement of this character from California. It was made of a very hard stone by pecking, hammering, and polishing, in the same way as those on the Atlantic coast were formed.

Fig. 75 is a reduced representation of the axe, and shows its peculiar shape. The specimen is 10 inches in length, $3\frac{1}{2}$ in width along the groove, and $1\frac{1}{2}$ in thickness at the groove. The head is slightly bulging and the lower portion is pointed. The surface of this implement is smooth and greasy to the touch, owing to the particles of steatite which have become firmly united to the stone. This fact, taken in connection with the place where it was obtained, is pretty conclusive evidence that the implement was used for working upon the steatite in the manufacture of the many articles made from that material, and, although it would be naturally classed with the stone axes, its use was unquestionably more as a pecking than a cutting instrument.—F. W. P.]

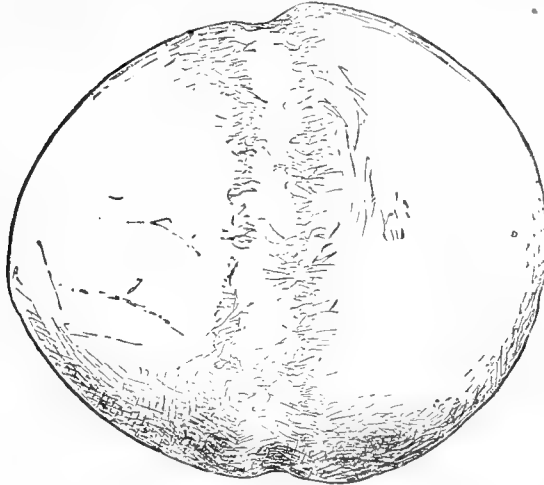
Figs. 76 and 77 represent examples of common grooved pebbles, such as occur everywhere where stone implements are found. As is the case with several other patterns of stone implements, a great many uses have been suggested for these stones, and it is very likely from their general adaptability that they were in some instances used as weapons and in others as implements for several different purposes. Consequently they have been designated as club-heads, slung-shots, net-weights, sinkers, and hammer-stones. They are known as net-weights and hammers in the Eastern States, and occur in great abundance in New Jersey. That they were in common use as net-sinkers is shown by the fact that numbers of them are still occasionally found in the beds of

FIG. 75.

Grooved axe of stone, $\frac{1}{2}$.

creeks, as though the net had been lost or forgotten, or possibly carried away by a freshet. The perishable net having long since rotted away,

FIG. 76.



Grooved stone.

figured, are described by Evans* from Great Britain, by Nilsson† from Scandinavia, by Jones‡ from Georgia, by Rau§ from Rhode Island, and by the writer|| from New Jersey.

FIG. 77.



Grooved stone.

Fig. 78 represents a simple hammer-stone, with no other trace of usage or work upon it than the well-battered edges. It in no way differs from like specimens found along the Atlantic coast. From their abundance on the former sites of arrowhead-maker's workshops it would appear that these small hammer-stones were in some way used in the manufacture of chipped-flint implements; at least their associa-

tion with cores, chips, broken specimens, and unfinished arrow-heads leads to this conclusion. The specimen here figured and other smaller ones accompanying it are all of a hard stone, but like many of the Dos Pueblos specimens appear to have been subjected to great heat. Those that are

* Ancient Stone Implements of Great Britain, p. 211, fig. 159. London, 1872.

† Stone Age in Scandinavia, pl. xi, fig. 216. London, 1868.

‡ Antiquities of the Southern Indians, pl. xix, figs. 7 and 8. New York, 1873.

§ Smithsonian Contributions, No. 287, page 27, fig. 107, Washington, 1876.

|| American Naturalist, vol. vi, p. 226, fig. 83. Salem, Mass., 1872.

smaller and more nearly globular, like many from California, were possible sling-stones, though the history of this weapon is so involved in obscurity that it is scarcely safe to classify any globular or grooved pebble as such. It must be remarked that two of the specimens, found in the graves, bear no marks of use, nor do they appear to have been artificially brought to their present shape by any pecking or grinding, and they may be simply water-worn pebbles.

[A large amount of material, illustrating the various forms of hammer-stones and sinkers, has been received from the ancient village sites in California since Dr. Abbott wrote the above.

Among the most interesting is a round grooved stone of the size shown by Fig. 77, that still has a portion of a cord made of twisted fibres, which was wound round the stone in the groove and held in place and preserved by asphaltum. This stone (P. M. 13291) was taken from a grave on the island of Santa Catalina. The presence of the small cord secured by the asphaltum is pretty good evidence that this stone was used as a sinker. Another form of sinker is probably represented by a stone nearly 3 inches long and $2\frac{1}{2}$ wide, which has a deep notch at each end and a groove cut from side to side on one surface within an inch of one end. This sinker (P. M. 13499) was found by Mr. Schumacher in the shellheap, at San Clemente. Another stone which was probably used as a sinker was found in Pots Valley, Santa Catalina Island (P. M. 13429). It is an oval mass of basalt, much changed by long exposure, about 6 inches long and 3 in its opposite diameter. The groove extends lengthwise round the stone.

Among the specimens which, most likely, were used as hammers, are several circular masses of flint from Santa Barbara (P. M. 13580), and three pieces of hard stone from the island of San Clemente. Of these last, one (P. M. 13514) is evidently simply a water-worn pebble weighing four

FIG. 78.



Hammer-stone.

pounds, upon opposite faces of which "thumb-and-finger" cavities have been pecked out, and, to still further aid in holding this large stone, portions have been broken out into which the ball of the thumb and the lower joint of the second finger nicely fit when the stone is held in the right hand. One of the two smaller of these hammer-stones (P. M. 13517) has evidently been carefully worked into its present cylindrical shape, while the other was used as found. They both show the marks of long-continued service in their battered ends. Several specimens of hammer-stones of different sizes, with the thumb-and-finger pits similar to those so common all over the country, are also in the later collections received from California.

In relation to the different uses to which grooved pebbles may have been put, it is of interest to note in particular three specimens now in the Peabody Museum. Two of these were obtained by Mr. J. A. Allen, of Cambridge, while among the Sioux Indians on the Yellowstone several years ago. One is a large oval pebble weighing three pounds and nine ounces, with a groove cut across it a little nearer to one end than to the other. Around the groove extend two pieces of some easily bent wood, tightly lashed together by sinews, and with their ends lashed, by a cord made of twisted and braided sinews, to two pieces of tough wood, which are flattened on their inner surface and rounded on the outer, forming the substance of a handle 13 inches long. Over this wooden frame, and also covering the stone except about its lower third, was stretched a piece of raw-hide, which was firmly sewed, with a strip of the same, along the back of the handle and over the top and front of the stone, and further tightened by several stitches on the under side, where the stone came nearly in contact with the ends of the wood that forms the handle. By this method this large stone was held firmly in its place, and as the handle was simply lashed to the portion that passed over the stone and held in place by the elastic hide, a heavy blow could be given with the stone without causing much of a jar to the arm that wielded the implement. The stone itself, while much battered on the exposed end, is perfectly smooth over the rest of its surface, and as many of the grooved circular stones found throughout the country show the same effects of use on one end only, it is very likely that they were mounted in a similar way

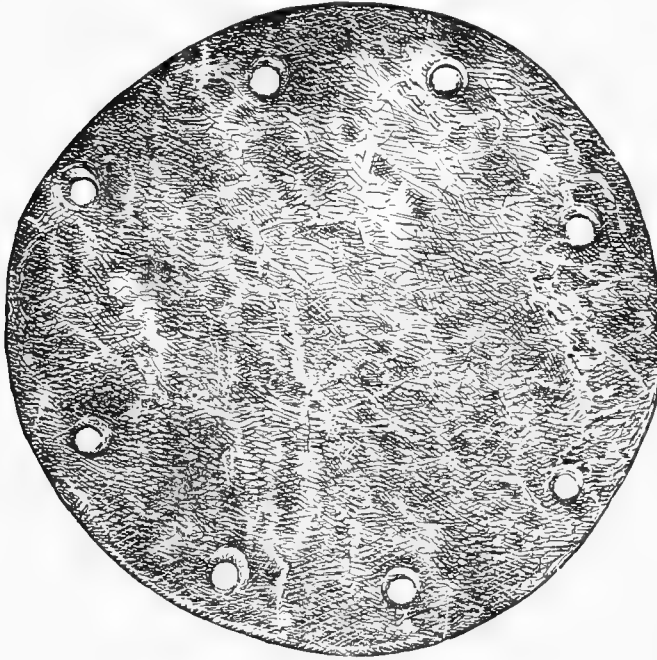
as hammers. Others, however, exhibit battering at both ends, and may have been secured to a handle by a withe passing round the groove, thus leaving both ends of the stone free for use. The Sioux hammer or club, which is here described, is furnished with a small loop for suspension, at the end of the handle. The other Sioux hammer is much smaller, the handle being only 4 inches long, and the stone weighing less than a pound, but it is secured to the handle in the same manner as the large one. Mr. H. W. Henshaw, while among the Apaches, saw several clubs of a similar character to the Sioux hammers or clubs here described; but he informs me that they were made as follows: A piece of raw-hide was slit towards its centre, forming several ribbons extending from the central portion, in which a smooth stone was placed and the ribbons were folded over and sewed with sinews; the ends of the ribbons were then wrapped around a short handle of wood, to which a wrist-loop was attached.

The third grooved stone, to which I have alluded above, is used for an entirely different purpose, and is one of the valuable contributions to the Peabody Museum received from Dr. Edward Palmer during his ethnological researches in Mexico conducted for the Museum. This stone weighs just a pound, and is suspended by a small string, which passes round the groove, to one end of a balance-stick 16 inches in length. On the other end of the stick there is a simple loop of string with a few notches cut in the wood indicating various weights that could thus be readily determined by holding the stick by a string in its centre, thus forming a rude and primitive balance or "steelyard." Dr. Palmer states that this balance is in common use by the Indians and half-breeds of San Luis Potosi.—F. W. P.]

Fig. 79 represents a circular thin plate of serpentine quite carefully worked upon both sides, and perforated by eight holes, placed nearly equidistant around the edge. (S. I. 20421, Santa Barbara, Schumacher.) For want of positive knowledge in the matter, this and similar specimens are classed as ornaments. Such an ornament was perhaps fastened by the aid of the marginal holes to that portion of the dress covering the breast, and when newly made and exhibiting a high polish might justly be considered

as a decoration, even by civilized eyes. Smaller but otherwise similar specimens of circular stone ornaments, found in the interior of the country and along the Atlantic coast, are as a rule ornamented with lines, rows of dots, semicircles, carvings of the human face, and other designs. These usually have but a single perforation, for suspension simply. The most perfect of these, found in New Jersey by the writer, has a human face quite artistically cut upon it, but the incised lines and depression representing the

FIG. 79.

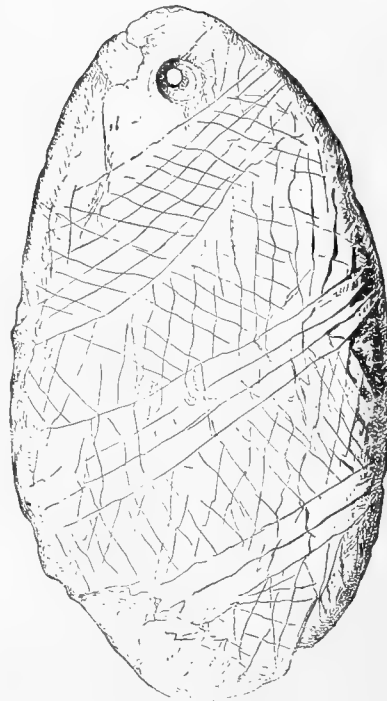


Disk, with perforations.

mouth are so shallow that some bright pigment was probably used to make the design of the artist more plainly visible. Of the same general character as the preceding is the large oval slab of steatite (S. I. 20422), with a single perforation, and ornamented with lines running obliquely across it, and in portions of it, in opposite directions, thus dividing the surface into small diamond-shaped spaces. This specimen, Fig. 80, is much larger than the generality of these oval pendants, and otherwise differs from eastern specimens in having the edges unworked and somewhat irregular. It measures over 7 inches in length by 4 inches in greatest breadth, and is the largest of its class of which I have knowledge.

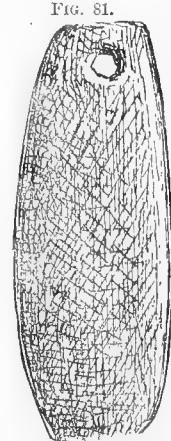
mouth are so shallow that some bright pigment was probably used to make the design of the artist more plainly visible. Of the same general character as the preceding is the large oval slab of steatite (S. I. 20422), with a single perforation, and ornamented with lines running obliquely across it, and in portions of it, in opposite directions, thus dividing the surface into small diamond-shaped spaces. This specimen, Fig. 80, is much larger than the generality of these oval pendants, and otherwise differs from eastern specimens in having the edges unworked and somewhat irregular. It measures over 7 inches in length by 4 inches in greatest breadth, and is the largest of its class of which I have knowledge.

FIG. 80.

Incised pendant of stone, $\frac{1}{2}$.

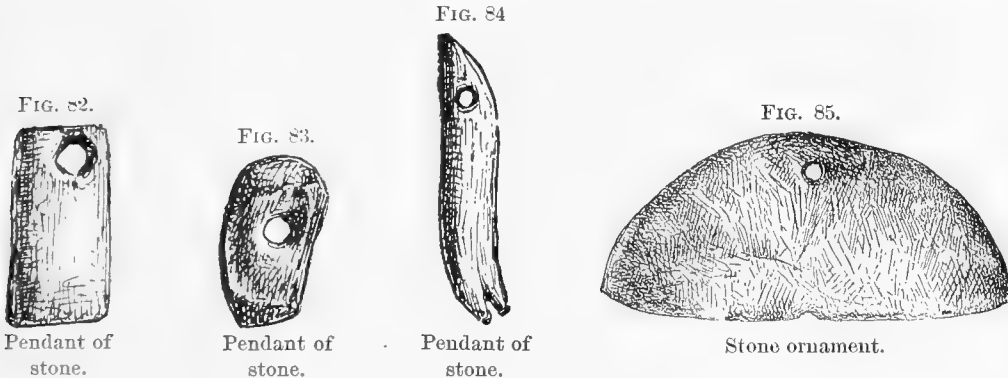
A large specimen, of the same general character of ornamentation, but with two perforations, is figured in the Smithsonian Annual Report for 1875 without any history being given of its origin other than that it was found in New Jersey.* A beautiful specimen, approaching Fig. 80 in size, but much more carefully finished, is figured and described by Dr. Rau,† from Connecticut. Squier and Davis have also described a similar specimen from Ohio,‡ and the writer one from New Jersey.§

Fig. 81 represents a small pendant made of serpentine without any incised lines upon its surface. It is carefully made and well finished, and its size suggests that it was perhaps a central pendant to a necklace. This was found in a grave on the island of San Clemente (P. M. 13504).



Pendant of stone.

Figs. 82, 83, and 84 represent, of natural size, three other forms of



several small ornamental pendants found in the graves on the island of Santa Catalina during the explorations of Mr. Schumacher. Like most of these small ornaments of stone, they are made of serpentine and of talcose slate.

Of the same general character as these pendants are certain thin pieces of stone which are perforated, and may be considered ornamental stones. The two specimens from the graves at Dos Pueblos, here figured,

* Annual Report of Smithsonian Inst. for 1875, p. 331—foot-note—fig. 169. Washington, 1876.

† Archaeological Collection of National Museum; Smithsonian Contributions, No. 287, p. 52, fig. 205. Washington, 1876.

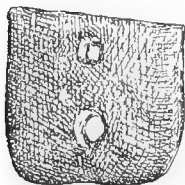
‡ Ancient Monuments Mississippi Valley, fig. 136, No. 11. Washington, 1847.

§ American Naturalist, vol. vi, p. 226, fig. 82. Salem, Mass., 1872.

are of serpentine, very thin, and highly polished. Fig. 85 is a semilunar-plate, one-eighth of an inch in thickness, and without any attempt at ornamentation. At the middle of the curved margin is a small circular hole, very neatly drilled, and of nearly the same size throughout. The perforation in this specimen was drilled only from one side, and probably by the aid of one of the slender spiculæ of flint, such as has already been noticed and figured on a preceding page. Opposite the hole in this specimen, at the middle of the straight margin or base of the gorget, is a shallow notch, which may have been a hole drilled through the centre of the stone, when a perfect disk, which subsequently has been broken in half, and the fractured edge carefully smoothed down. We have frequently found fragments of various patterns of ornamental stones thus preserved by drilling a new hole for the suspension of the specimen after being broken. A small oval pendant from Santa Catalina (P. M. 13153) is an illustration of this. In this case four holes have been used at different times, only one now remaining perfect.

Fig. 86 is a fragment of a quadrangular ornament of the same general character, having two perforations, which vary greatly in size.

FIG. 86.



Stone ornament.

Such perforated tablets of stone are common over the whole of North America, and much conjecture has been indulged in as to their probable use; but there is little reason to suppose they are other than simple ornaments. Specimens found in ancient graves in New Jersey show, from their position, that they were placed upon the breast of the corpse when buried; and from this it is safe to infer that they were simply ornaments.

Allied to the above are the separated laminae of a square piece of mica neatly perforated by numerous small holes, to secure, we presume, its attachment to the clothing. Similar small pieces of this mineral occur on Indian village sites in New Jersey, and have been often found in graves and mounds in other parts of the country. Like the Dos Pueblos specimen, many are thus perforated. Another use for these plates of mica, when large enough, is believed by some to be that of mirrors. In treating of the Southern Indians Mr. Jones* remarks of this material, "large plates of isinglass

* Page 376.

are frequently found in the sepulchral tumuli of Georgia, associated with articles of use and ornament, the property of the dead at the period of the inhumation. * * * Being thick, and readily reflecting the opposed image, they answer tolerably well the purposes of looking-glasses." The California specimen is quite too small, being but little more than an inch square, to use as a mirror, and it is seldom that a fragment occurs in New Jersey larger than 3 inches each way. As this mineral is usually so charged with other materials that it seldom reflects an image, it seems more likely that its brilliant display of prismatic tints was the cause of its adoption for ornaments.

Other specimens of ornamental wrought stones are cylindrical and pointed, such as shown by Figs. 87 and 88, which have well-defined heads and points; the former having a carefully-drilled hole. The specimens, indeed, suggest a needle; but we are inclined to consider them pendants, probably placed on strings of beads forming necklaces. Two specimens from Dos Pueblos are perfect. They are made of serpentine, dark in color, highly polished, and symmetrical. One is a little larger than the other, and proportionately thicker. They measure, respectively, $1\frac{1}{2}$ and $1\frac{1}{8}$ inches in length.

Associated with these pendants is a curiously wrought and perforated stone, Fig. 89, that has much the appearance of four beads which have not been cut apart. The illustration so clearly exhibits its peculiarities that further description is unnecessary. The mineral is the same as the small needle-like pendants.

[Another carved stone, which must for the present be classed as an ornament, is shown of its full size in Fig. 90. This carving, which is of serpentine, looks as if designed to represent the rattle of a rattlesnake. It was found by Mr. Schumacher in Pots Valley on the island of Santa Catalina (P. M. 13439).

FIG. 87.



Stone pendant.

FIG. 88.



Stone pendant.

FIG. 89.



Stone ornament.

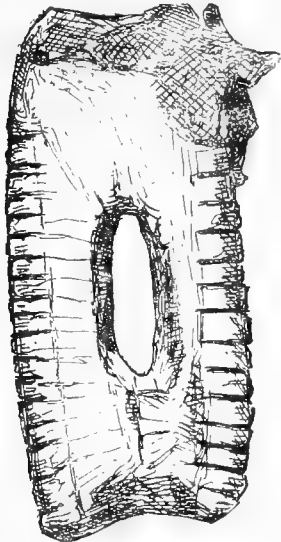
FIG. 90.



Ornament of stone.

From a grave at the isthmus on the island of Santa Catalina, at a place called "Cabrillo's Rancheria," Mr. Schumacher obtained an interesting

FIG. 91.



Ornament of stone with
cloth attached.

ornament (P. M. 13269) cut from a piece of steatite. The shape and markings of this stone are well shown in Fig. 91. The tablet is about a quarter of an inch thick, and is slightly concave on its ornamented surface and smooth and convex on the opposite. The incised lines on the surface of the stone represented in the figure are continued on the edges, and at one end are two very small holes through which a string has been passed for fastening or suspending the ornament. At this end of the stone, as shown in the figure, a small portion of finely-woven cloth has been preserved by contact with an iron implement, which was found much decomposed in the grave. Thus, while this ornament was unquestionably of Indian workmanship, it was retained by

its owner as a valued article after European contact had furnished the tribe to which he belonged with ornaments of glass and implements of iron.

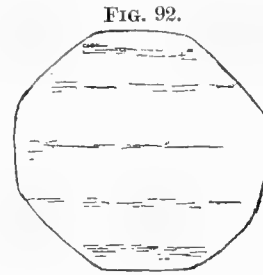
A triangular piece of steatite, about 3 inches long, and possibly a portion of a large pot or *olla*, had formerly a small hole at one corner, probably for suspension. From this corner two deeply-cut lines, a quarter of an inch apart, run parallel across the convex surface of the stone, and from each of these lines several others, about an inch long, run out obliquely. This example of rude ornamental art came from the island of San Clemente (P. M. 13490).

A fragment of what was probably a pendant of steatite, 3 or 4 inches long, is ornamented on each side with numerous longitudinal and transverse lines. This was found by Mr. Schumacher in Pots Valley (P. M. 13438).

In a grave at Johnson's Place on the island of Santa Catalina, Mr. Schumacher found an oval piece of polished serpentine (P. M. 13275) nearly 2 inches long and $\frac{3}{4}$ of an inch wide. This stone has a notch cut at each end and a groove about its centre, and on one side there are two

furrows, each an inch in length. Perhaps designed for a similar purpose as the last-mentioned ornament, or implement, is a little pebble (P. M. 13513) of steatite, about $1\frac{1}{2}$ inches long and 1 in width, which has a small deeply-cut groove around its centre. With this little pebble is another stone from San Clemente which may be classed with it (P. M. 13502). It is made of an impure steatite in the form of a cylinder, $1\frac{1}{2}$ inches long and nearly 1 inch in diameter, and has a groove around it about half an inch from one end. Another stone, of singular shape and unknown use, from a grave on San Clemente Island (P. M. 13500), is a piece of serpentine which has been carefully cut, but not polished, into a three-cornered form, with sides about 2 inches long, one of which is straight and the other two are concave.

Fig. 92 is an outline of a nearly regularly hexagonal-shaped stone which was obtained near Santa Barbara by Mr. Schumacher, but of which a description was not taken while the specimen was temporarily in my possession. It is now in the Smithsonian Institution.



Hexagonal-shaped stone.

Another class of stones, of which many examples have been found during the later explorations on the islands, corresponds to the smooth "slick stones" of the Atlantic States. They are of various sizes and shapes, and are generally made of smooth pebbles, one face of which has been rubbed flat. Many of them are very small—being less than an inch in length—while others are so large as to have some resemblance to large flat grinding-stones, of which several examples are also in the collection from California. Similar small stones are now used by the Indians of Mexico in giving a polish to their pottery before it is burnt, as shown by the collection made by Dr. Palmer; and those from California may have been used for polishing the many articles made of serpentine and allied minerals.—F. W. P.]

Water-worn pebbles, when found of the desired globular and oval shapes, were undoubtedly used as ornaments, and occasionally some of these little pebbles were made into pendants by grinding the stones to a slight angle at one end and making a hole through the narrowed portion.

Other specimens show no trace of alteration of their natural surface, and their use as ornaments becomes somewhat doubtful. Might they not rather have been the toys of children? A single specimen in the collection, however (Fig. 93), throws some light on the use of the smaller pebbles. This



FIG. 93.
Acorn-like ornament.

specimen is an admirable imitation of an acorn, and consists of a small pinkish pebble of quartz carefully inserted into a portion of the vertebræ of a fish, which has been rubbed or cut down in size until it resembles an acorn-cup in shape. With these pebbles and the "acorn" ornament, there are five specimens of fish vertebræ of different sizes, but much larger than that illustrated in Fig. 93. With one exception, they have been much cut or ground down to their present cup-shaped condition.

In some of the graves at Dos Pueblos, and at other places, were found small lots of ordinary quartz crystals of moderate size. These have in no way had their natural surfaces intentionally altered; but the sharp defining lines of the several faces of each crystal have been worn away, indicating that for a long time they have been subjected to violent rubbing action as though constantly jostled together in a bag. For what particular purpose these quartz crystals were gathered cannot be determined, but they may have once formed the mysterious contents of the bags of "medicine-men," or the choice play-things of children.

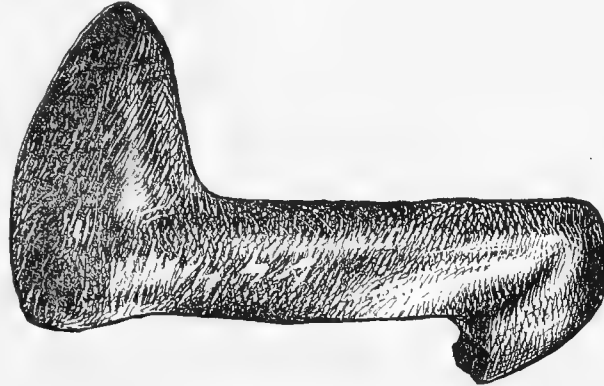
[A number of peculiar implements unlike any heretofore described, to my knowledge, have been obtained from the graves in the vicinity of Santa Barbara, and the adjacent islands, but until implements of similar forms are noticed in actual use, or are found under such conditions as may suggest their application, it is hardly worth while to do more than call attention to them. That they are implements and not ornaments is apparent from the signs of use which they all more or less exhibit. Among the most interesting of these are several hook-like implements which vary in size and also somewhat in their form, but they all have a hook-like projection at one end, with the opposite end more or less thickened, as if intended for a handle. Fig. 94 is a representation of one of the three largest. It is made of serpentine, and has been highly polished. The hook-like projection on the under side has been broken off the specimen figured. A top view of this

implement, showing its width, is given in Fig. 95. This was presented to the Peabody Museum by Dr. Yarrow, and was obtained by Mr. Bowers in the vicinity of Santa Barbara, as was also another, which is made of steatite (P. M. 11074), and is about one-third longer than the one figured. Another, in size between the two above mentioned, also made of steatite, is of a more decided hook-shape than the others, having a pointed projection $1\frac{1}{4}$ inches long. This specimen (P. M.

13276) was found in a grave at the isthmus on the island of Santa Catalina by Mr. Schumacher, who also obtained three much smaller examples of these peculiar implements (P. M. 13154) from other graves at the same place. Fig. 96 is a representation of one of the small specimens, which are made of the same kind of slate of which some of the pipes and other articles were manufactured. The one figured is the best finished and only perfect one of the lot. This has been polished, and has a small hole drilled through the portion I have called the "handle." It also differs from the others in having the "hook" on the under side much smaller. The second specimen of this lot is nearly $2\frac{1}{4}$ inches long, and has a pointed projection $\frac{1}{2}$ inch long, forming the hook. The third specimen was much smaller, probably less than $1\frac{1}{2}$ inches in length, but only the hook portion was found.

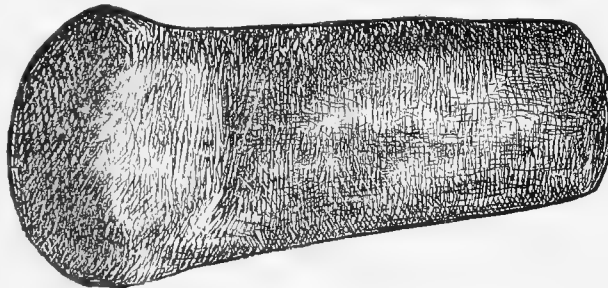
Designed, perhaps, for a somewhat similar use as the preceding is the small implement (P. M. 13503) made of serpentine, which is represented in

FIG. 94.



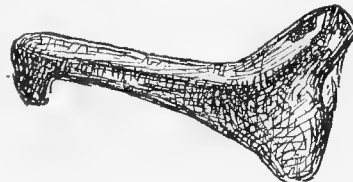
Hook-like implement of stone.

FIG. 95.



Hook-like implement of stone, top view.

FIG. 96.

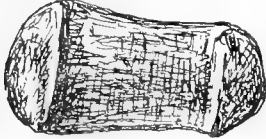


Hook-like implement of stone.

Designed, perhaps, for a somewhat similar use as the preceding is the small implement (P. M. 13503) made of serpentine, which is represented in

Fig. 97 This was found in a grave on the island of San Clemente by Mr. Schumacher. It is a thin piece of serpentine, less than $\frac{1}{4}$ of an inch in thickness, with a smooth surface and rounded edges.

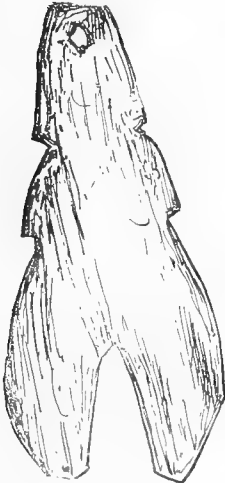
FIG. 97.



Implement of stone.

The under portion has been partly cut away to the depth of about $\frac{1}{8}$ of an inch, as shown in the figure, leaving a corresponding projection at each end. Around the centre of the stone, which is slightly concave at this point on the upper surface, a small string has been held in place by asphaltum, as shown by minute portions still adhering to the stone.

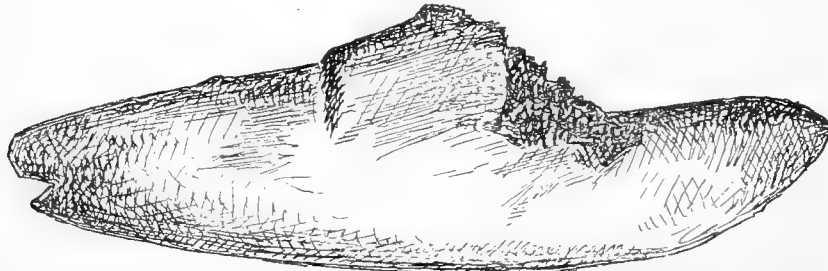
FIG. 98.



Implement of stone.

Another kind of implement, as I am inclined to regard the specimen, notwithstanding its general appearance is rather that of an ornament, is a thin piece of slate, not over $\frac{1}{8}$ of an inch in thickness, and is represented by Fig. 98. This was found in a grave on the island of Santa Catalina by Mr. Schumacher (P. M. 13440). A mass of asphaltum on one side of the stone at the perforated end may indicate that the implement was inserted in a handle, in which case the object of the perforation is not apparent, and it is more likely that the asphaltum is due to accidental contact. The deep notch at the opposite end of the stone has evidently been utilized to a considerable extent for some purpose which has caused the formation of several little parallel grooves and many striæ, and even, on one side, the wearing away of the stone to a considerable extent at the base of the notch.

FIG. 99.



Implement of stone.

A much larger implement (P. M. 13378), made of serpentine, is shown by Fig. 99. This also was found in a grave, either the same or near the

one containing the implement last described, and although so unlike the last in shape it seems to have been similarly used. The small notch at one end of the stone exhibits the same kind of striæ and grooves at its base as in the other specimen, and the stone has been worked down to a thin edge at that part. The opposite end of the stone was deeply notched to near its central portion (further than shown in the figure, as the asphaltum partly covers it), which is here nearly $\frac{3}{4}$ of an inch in thickness. The implement has, however, been broken in this portion, and one side is now missing, the fractured part being covered with asphaltum.—F. W. P.]

SCULPTURES.

THE former Indians of California were unquestionably superior workers in stone, and often finished their weapons and utensils made of that material with care, but they cannot, as a people, be regarded as sculptors in the ordinary acceptance of the term. Yet we find that they had made a beginning in ornamental art, the further development of which was probably prevented by the intrusion of the white race. Both north and south of the Californians, sculpture early attained its highest development on the continent. Thus on the Columbia River and northward on the coast we find tribes, here and there, who were, and in some instances still are, skillful workers in stone, bone, and wood, and also sculptors of considerable ability. The results attained were in great part the imitation of natural forms, but with these were combined the grotesque, and a peculiar style of grouping, which is often expressive of savage humor, with a symmetry of design and execution that could hardly be attained without long experience in the art. At the south, in Mexico and Central America, we also find a similar barbaric art, in very many respects agreeing in its forms with that of the north; but here, associated with a comparatively high plastic art, we have massive work in stone, and the sculptors not only taking isolated portions of the human body for their model, but often treating their subject in a conventional manner, and generally surrounding the chief objects in their design with a profusion of ornamentation which, though detracting from the force of their work, is evidence of the high stage they had reached in its mechanical execution. The Californians were without knowledge of the plastic art, and therefore, like their northern neighbors, could not derive ideas from that; but like them they were provided with soft or easily worked stone, and it is in a variety of serpentine, capable of a high polish,

and in the easily cut steatite of the region, that their best work in carving was done.

In the preceding pages attention has been called to rude ornamentation on various articles made of these soft stones. Generally this has consisted of parallel and cross lines cut upon the surface of the stone, like the rude ornamentation on early pottery, but by a reference to Figs. 2 and 4 of Plate IX it will be seen that ornamentation by carving in relief was not only attempted on the two pipes represented, but was successfully accomplished. It is, however, to sculpture "in the round" that I wish particularly to refer, in connection with three examples which have come to my personal knowledge as the work of the Southern Californians.

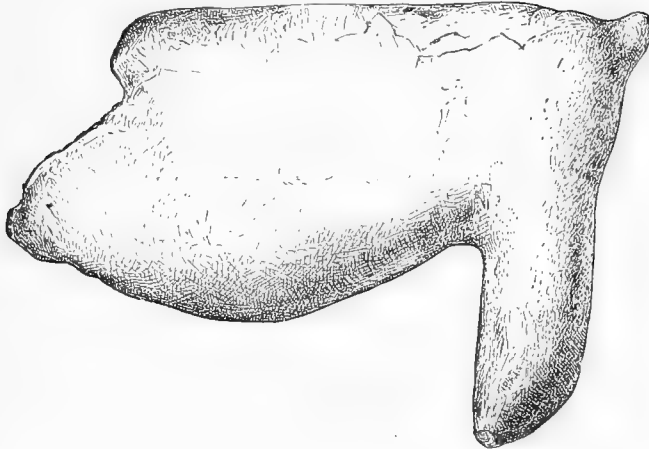
Taken in connection with the marked difference which exists between the crania from the island of Santa Catalina and those from the other islands of the group, as will be seen by reference to the special account of the crania further on, for which I am indebted to Mr. Carr, it is of interest, and perhaps of some ethnological importance, to dwell upon the fact that these three carvings are from the island of Santa Catalina, or the island on which the dolichocephalic people, whom I believe to be of northern ancestry, were the leading type.*

All three of these sculptures were collected by Mr. Schumacher during his several trips to the island, but of one, now in the Smithsonian Institution (No. 18360), and of which Fig. 100 is a representation, I only have the record that it was obtained on Santa Catalina Island. Of the others, however, we have the special information that they were taken from graves at Johnson's Place on the island. In the several graves opened at that place were found the fine boat-shaped dish of steatite, one of the hook-like implements, and several other well-worked stones, with articles of bone, shell,

* Mr. Schumacher, in his account of the exploration of San Nicholas Island (Bull. U. S. Geological and Geographical Surveys, vol. iii, No. 1), mentions that he found sculptures in serpentine representing sea-lions, fishes, and birds; and in a letter to me he states that these carvings were sent to the Smithsonian Institution. It is therefore probable that they are the carvings now in the National Museum, to which Mr. Henshaw has kindly called my attention. These, Mr. Henshaw states, are two (20426, 20427) representations of cetaceans, one (20428) of a seal or sea-lion, and two specimens (20387, 20400) of objects which he regards as of doubtful determination. These specimens are, however, now labelled "Santa Barbara," and while I can hardly doubt that they are the carvings referred to by Mr. Schumacher, their authenticity must be ascertained before they can be regarded of importance in relation to any difference that may have existed between the tribes on some of the islands and those of the mainland about Santa Barbara.

and wood, red paint, and glass beads; the latter giving conclusive evidence that the burial of at least one of the bodies was after the period of Euro-

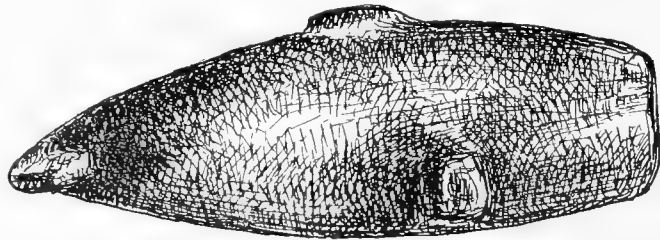
FIG. 100.



pean contact. Only two skulls were obtained from these graves, and their measurements can be had by reference to Nos. 13286 and 13287 of the Cranio-logical Record of the Peabody Museum. One is dolichocephalic, and the other is orthocephalic.

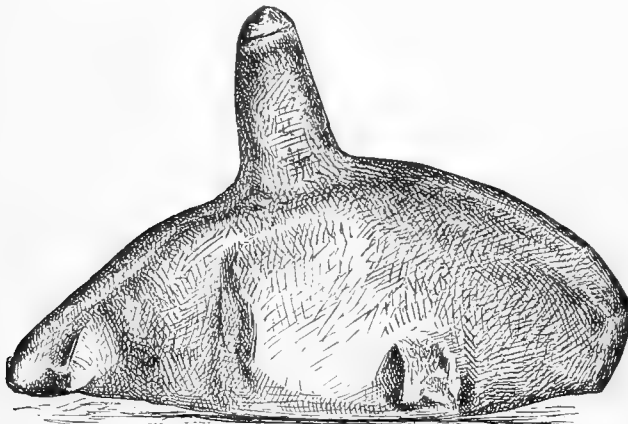
The first of these sculptures is only a fragment, as will be seen by reference to Fig. 100, which is one-half the diameter of the original. It is, like the others, cut from a bluish-gray steatite, and probably represents the hind quarter of some animal. It is not nearly so good a piece of work as the two others, but it may have been of a more difficult design.

FIG. 101.



Carving in stone, representing a whale.

FIG. 102.

Carving in stone, representing a whale, $\frac{1}{2}$.

The smallest of the three sculptures (P. M. 13272) is shown of its full size in Fig. 101. It is a very good representation of a whale, with its square head, flippers, low dorsal fin and flat tail. It is well and symmetrically cut, and the surface has received nearly as high a polish as the material would allow.

Fig 102 represents, of one-half the length of the stone, a much larger piece of sculpture (P. M. 13271), which, judging from the prominent dorsal fin, is probably intended as a representation of the cetacean known under the name of "fin-back." The flippers are not so prominent as in the smaller sculpture, but they may have been broken, as their ends are not smooth like the rest of the carving. The tail is well formed. In order to fully present several little points of resemblance to the animals intended, which are observable when the sculptures themselves are viewed from different positions, several views of each would be necessary, but the figures on the preceding page are correct in outline.

IMPLEMENTS AND WEAPONS MADE OF BONE AND WOOD.

BY C. C. ABBOTT AND F. W. PUTNAM.

THE range of variation in the forms of implements made of bone, wherever found, is much more limited than that of stone. As weapons, with few exceptions, they were not so effective as similar forms chipped from flint or obsidian. On the other hand, for certain purposes, bone was found particularly well adapted; and for these, the world over, it has been largely used. The articles made of bone represented by the collections from Dos Pueblos and the adjacent islands, include nearly every form characteristic of other localities, and embrace needles, awls, fish-hooks, harpoon-points, knives, swords, and, also, a variety of ornaments.

Figs. 1 to 3, Plate XI, represent three beautifully-wrought bone fish-hooks, of a peculiar pattern, with sharp points and barbs. These hooks are flattened, and are longer than wide. The outer, or convex, outline of the hook is rounded, but the concave, or inner, line is flat and sharp at the angles. Extending lengthwise with the straight portion, or shank, is a deeply-cut groove for attaching the line. This was further secured by the liberal use of asphaltum, as shown in Figs. 2 and 3. The barbs in these specimens are, judged by fishermen of to-day, on the wrong side for a good fish-hook, and the point is much too near the shank. By having the line so fastened that the point of tension is at the notch at the base of the shank (see Fig. 1), instead of at the extreme end of the stem, the defects of the design of the hook would be somewhat remedied, as the barb would be forced down, so that it might possibly catch itself in the lower jaw of the fish that had taken the hook; but, however used, although well made, it can hardly be considered as a well-designed fish-hook. These specimens were collected by Mr. Schumacher on Santa Cruz Island (S. I. 18188 and P. M. 13707).



THE ENGRAVING COMPANY, 225 BROADWAY, N. Y.

ARTICLES OF BONE, SOUTHERN CALIFORNIA
FULL SIZE.

Bone fish-hooks of somewhat different patterns occur in various parts of the world, as more rarely do similar hooks made of flint. Nilsson* figures a bone fish-hook from "one of the old peat-bogs in the south of Scania." The barb in this specimen is on the inner side and near the point, and while it is not finished more artistically than the California specimens, it is, certainly, a better fish-hook.

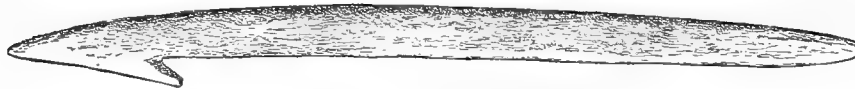
Another interesting form of fish-hook, although made of shell, can be appropriately noticed here. It was first discovered by Mr. Schumacher on the island of Santa Cruz; and that gentleman has, in Vol. VIII of the *Archiv für Anthropologie*, given a description of the implement itself, and also of the method of its manufacture. It is made of the thick portions of the shell of *Haliotis*, which are first cut into circular pieces of an inch or more in diameter, and then perforated, the margin of the hole forming ultimately the inside of the hook. This is then cut and rubbed into the required shape, and that portion of the shell, between what is to form the shank and the barb of the hook, is finally cut away, and the hook is made complete in all its parts by polishing. In arranging the plate of ornaments of shell from Dos Pueblos and La Patera, these fish-hooks were included, as they were at first thought to be ornaments. Plate XII, Fig. 27, is a photographic representation of a piece of shell after it was bored, and Figs. 24, 25, and 26, three of the hooks of different sizes, and of slight variation in form. From the later explorations by Mr. Schumacher and Mr. Bowers many specimens of these shell fish-hooks have been received, illustrating the several stages of their manufacture. The largest one is $2\frac{3}{4}$ inches in length and 1 inch wide at the middle of the shank. This, with several smaller specimens, came from Santa Catalina (P. M. 14846). Many specimens were also obtained from the islands of San Clemente, San Miguel, and Santa Cruz, and from the mainland about Santa Barbara, accompanied by the stone implements used in their manufacture.

A form of bone implement used in capturing fish and large marine animals, and one which is found in many and widely separated countries, is the barbed harpoon-point, such as shown by Fig. 103. One of this character, from which the figure is taken, was obtained by Mr. Schu-

* *Stone Age in Scandinavia*, 2d ed., London, p. 21, plate 11, fig. 30.

macher, and is in the Smithsonian collection (No. 20527) labelled "Santa Barbara". This harpoon-point, nearly 9 inches in length, is made of a

FIG. 103.

Bone harpoon or fish-spear, $\frac{1}{2}$.

portion of a rib of a cetacean. There are now no distinctly defined tool-marks upon it. The slight curvature of the implement is that of the bone in its natural condition. As shown in the figure, it is long and rather slender, of nearly uniform width, tapering at the basal portion where it was inserted into a shaft, and somewhat acutely pointed at the barbed end. At a distance of $1\frac{7}{10}$ inches from the end is a well-defined barb $\frac{3}{10}$ of an inch in length.

Harpoons of bone similar to the above are quite common in Greenland, and also in Northern Europe. Nilsson* mentions that implements, "sharp pointed, with barbs on one side, are occasionally found in our ancient peat-bogs in Scania." Usually these harpoons have more than one barb. Dr. Rau† figures specimens from Alaska and Michigan, with three barbs, and in both instances there is a perforation at the base for securing the shaft. Some of those found in Scandinavia were simply notched for the attachment of a cord which was also fastened to the shaft, but not so as to keep the point and shaft together when the weapon was withdrawn from the body of the animal struck. Of such an one, Nilsson remarks, "this harpoon-point appears, like those from Greenland, to have been fastened to its long shaft in such a manner as to be disengaged therefrom, when it stuck fast in the harpooned animal, because above the point of attachment is a projection over which the strap or line seems to have been tied." Nilsson further adds: "It is very remarkable that among the objects which Messrs. Christy and Lartet have found in the caves of Perigord, and which may be considered as being among the most ancient traces of man in Europe, are harpoons of bone, which seem to have been helved in the same manner"; and also

* Page 29, plate iv.

† Page 64, figs. 240 and 241.

“a great number of bone harpoons, more or less like this one [and that from California] are to be seen in the British Museum, all from Tierra del Fuego labelled *Heads of Fishing-Spears used by the Natives of Tierra del Fuego*. We thus see that these bone points are really fishing-harpoons. They are alike both in length and shape, and there is therefore every reason to assume that they were destined for nearly the same purpose. But we are not aware how they were used in Tierra del Fuego, whether they were shot from a bow, thrown by the hand, or used for striking, because we have not seen in the British Museum or elsewhere any specimen having a shaft.” To the above remarks of Professor Nilsson is added an important footnote, which we also copy, as follows :

“Captain Werngren informs us that the savages in the islands of the Pacific are in the habit of fishing sometimes with hooks and at other times with well-made nets, and that they occasionally *shoot the fish* with arrows from their canoes ; when the fish rise they pierce them with their javelins, then jump overboard and secure their prey. It seems that the harpoons of this kind found in Scania may also have been used by fishermen, while sitting in their boat, to shoot or transfix the fish, especially as these harpoons have been discovered at the bottoms of bogs which have formerly been small lakes, where the skeletons of gigantic pike are occasionally found, which may have been proper objects of such fishing with harpoons.”

Harpoons of bone, such as above figured, are not common on the Atlantic coast, but smaller ones have been occasionally found in the shell-heaps. The Southern coast tribes used another material for making a similar weapon, and Mr. C. C. Jones, jr.,* quoting from Brickell's Natural History of North Carolina, informs us that “the North Carolina Indians have *Fish-gigs* that are made of the Reeds or *Hollow Canes*; these they cut and make very sharp, with two Beards, and taper at the Point like a *Harpoon*.”

Barbed harpoon-points made of bone are evidently of rare occurrence in Southern California and on the islands, for notwithstanding many articles made of bone have been received from the later explorations by Mr. Schumacher, we have only seen from California the harpoon-point, figured above, and one other, also in the Smithsonian collection, which was obtained at the same time. On the Northwestern coast, implements of this character are in common use to this time, both as javelin and arrow points. Sometimes these bone points are permanently

* Antiquities of Southern Indians, p. 329.

fastened to the shaft, and in other instances they are fitted into sockets and held to the shafts by strings. In some thirty specimens, principally from Alaska, belonging to the Peabody Museum, there are many varieties and sizes of barbed points of bone with their accompanying shafts; and in many instances the barbs are on one side only of the bone, though they are often several in number. These bone points vary much in size, and are from 1 to 6 or 7 inches in length. One bone implement 8 inches long, which evidently once fitted into a socket, has a hole at its base for the string, and is of special interest from the fact that it has three barbs on each side, and also has the point of the bone tipped by a sharp point of shell. To accomplish this the bone point was cut away so as to allow the shell point to be firmly lashed, and at the same time to place the lashing below the surface of the bone. Similar bone points are in the Museum, and are like those described and figured in Mr. Dall's instructive memoir on the "Tribes of the Extreme Northwest." There are also three long bone points in the Museum from Terra del Fuego. Two of these bear a close resemblance to two of the figures given by Mr. Dall. The rudest very closely resembles Mr. Dall's No. 16063 with a single barb, while the second has two barbs on each side; and although at least twice the size of Mr. Dall's 13023*a*, it is of the same pattern. The third is about 10 inches long, and has thirteen barbs on one side. In the New England shellheaps there have been found many small, pointed and barbed bones, which may have been arrow-points, as they are very much like the arrow-points of bone from the Northwestern coast.

Bone was also largely used by the California Indians for certain domestic implements; and these, as has already been remarked, are in many respects identical with implements of the same material found elsewhere. Fig. 9, Plate XI, represents a very beautifully-wrought pointed bone, with a double groove and triple collar at the head instead of a perforation or eye, as if for the attachment of a thread. Articles of this character may be sewing implements, and in that sense needles; but they so closely approach what are apparently awls or perforators that it is difficult to dissociate the two forms. This implement was found at San Miguel Island (S. I. 18322).

Figs. 10, 11, 12, of Plate XI, represent specimens of what may be perforators, or awls, pointed at each end; but after a study of a number of fish-hooks from Alaska, in the collection of the Peabody Museum, which have long barbs made of pieces of bone pointed at each end, and so lashed to a wooden shank as to permit the projection of the pointed ends of bone above and below the lashing, we are inclined to regard these double-pointed bones from California as the barbs of large fish-hooks. At all events, they could not be distinguished from the Alaskan barbs were the latter removed from their lashings. Those from California vary in size, and to a slight extent in quality of finish, but they are essentially the same form of implement. The same material, however, is not always used. Many of the smaller ones are of much denser material, and appear like, and may possibly be of, ivory; while others, such as Fig. 12, are simply splinters of a very porous bone, subsequently smoothed, sharpened, and pointed. On the one represented by Fig. 12 there are traces of asphaltum. Fig. 11 is made of a dense material like ivory, and is very beautifully worked with remarkably sharp points at each end. It was collected by Mr. Schumacher, and is labelled "Santa Barbara" (S. I. 20539).

Figs. 13 to 17, inclusive, of Plate XI, and Fig. 104, of the text, repre-

FIG. 104.



Pointed implement of bone, $\frac{1}{2}$.

sent a series of perforators of the same general character, though with some variation in the details of finish. Fig. 14 has been drilled at the base; but the perforation is of such large size that it was more probably intended for suspending the implement when not in use, thereby avoiding the risk of loss, rather than as an eye to a needle. Indeed, the great width of the base, of itself, indicates that the point only was used, like the one shown in Fig. 15, which is not perforated at the base, but has had, apparently, a head of asphaltum. Perhaps that substance was used to attach a handle to the implement.

Figs. 16 and 17 are probably awls, or perforators, though their shape suggests the spear and arrow point. Fig. 16 is simply a splinter of bone

with one end ground to a sharp point; while Fig. 17 has been worked over the entire surface and is pointed at each end. These specimens were collected on the mainland. Fig. 104 represents a long pointed implement from the island of San Clemente (P. M. 13533).

Figs 18 to 21, Plate XI, inclusive, are taken from specimens found at Dos Pueblos and La Patera, and represent other forms of perforators. They are all more or less worked fragments of long bones of mammals and birds, with more or less well-defined points. Fig. 18 is cylindrical, tapering, and worked over its entire surface. The fragment is too small to determine anything concerning it. Fig. 19 is identical with the larger bone awls wherever found. Jones, in his work on the Southern Indians,* figures a similar specimen, of which he writes: "It is made of a deer's tibia, and is $7\frac{1}{2}$ inches in length." Similar specimens are in the Peabody Museum from the Swiss Lakes and other places. Fig. 19 was longer in its entire condition than now, as the base is broken off abruptly. The surface is much decayed, but the specimen appears to have been very carefully polished over its entire surface. Similar perforators of bone are not uncommon in the Atlantic States, especially in the shellheaps on the sea-coast, and many of like character have been found in the burial-mounds of the South and West. Fig. 20 is a fragment of a bone implement similar to Figs. 13 and 14, except that it is cylindrical. The entire surface has been worked with great care and gradually brought to a point, as in Fig. 13. Fig. 21 is a fragment of an implement similar to Fig. 19.

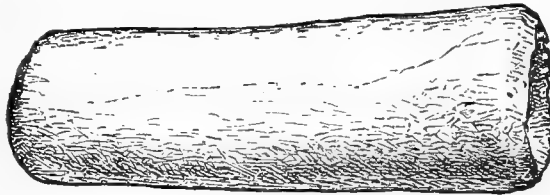
In most collections of implements or weapons, be they of stone or bone, there will be some specimens of an indefinite character; and it is not surprising that articles of curious shapes, and others of no apparent use, should occur in the graves at Dos Pueblos. Figs. 22 and 23, of Plate XI, are examples of this kind, and consist of masses of bone which have been cut and ground down as shown by the figures. Figs. 24 and 25 are probably mouth-pieces used in connection with the ponderous smoking-pipes of stone, already described, and are simply the hollow bones of birds.

Fig. 105 represents a section of a bone of some mammal which has

* Page 292, pl. xvi, fig. 1.

been hollowed and somewhat worked on the exterior surfaces; but it offers no evidence in its present condition of having had any particular use. It is introduced here as a bone tube. Dr. Rau* has remarked of a somewhat similar specimen, that it "may have been a receptacle or a part of a tool, an unfinished whistle, or, perhaps, an appendage to the dress. There is a possibility, too, that it was the sucking instrument of a medicine-man, made to replace one of the stone tubes which are known to have been employed among the Californians in curing the sick."

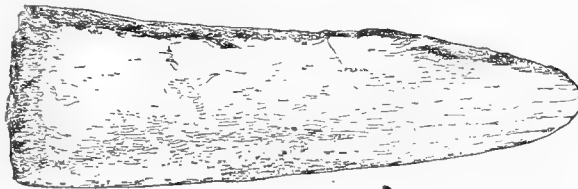
FIG. 105.



Tube of bone.

Figs. 106, 107, and 108 represent a form of massive bone implements of a wedge-like shape, varying in length from 3 to 6 or more inches, and common in the graves and on the shellheaps of the islands and mainland.

FIG. 106.

Wedge-shaped implement of bone, $\frac{1}{2}$.

They appear to be made from portions of the ribs of large cetaceans. They are all bluntly pointed, but many have smooth cutting edges, and the rounded portion is often very smooth. A few have their thick or blunt ends much battered, as if they had been used as wedges; but in most, the thick ends are square and even, and as some of these latter are slightly curved from end to point, it is possible that they were fastened to handles of wood and used as knife-blades. Other implements, somewhat similar in shape, but much larger, may have been used as clubs or blunt-edged swords. Of the latter form is one 15 inches long, which was obtained by

FIG. 107.

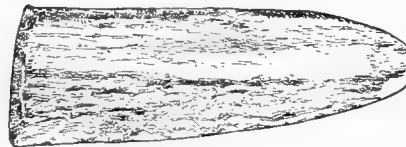
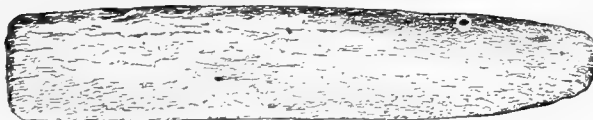
Wedge-shaped implement of bone, $\frac{1}{2}$.

FIG. 108.

Wedge-shaped implement of bone, $\frac{1}{2}$.

* Smithsonian Contributions to Knowledge, No. 289, p. 65.

Mr. Dall on San Miguel Island (P. M. 13737), and several others of nearly the same size obtained by Mr. Schumacher on the island of San Clemente (P. M. 13539).

Another form of implement, of which there are several examples among the later collections from San Clemente, is a sort of polishing bone (P. M. 13532) identical in shape with those from the sites of the ancient

FIG. 109.



Smooth bone implement.

habitations on the Swiss Lakes. These vary in length and width from the exam-

ple here represented (Fig. 109) to three times that size. They are smooth and often highly polished at each end, and appear to be made from the small ribs of cetaceans and other animals.

An interesting pin-like article, shown in Fig. 110, was obtained by Mr. Schumacher from a grave on the island of San Clemente, and is of particular importance from its resemblance to similar articles made of shell, often found in the mounds of Tennessee.

FIG. 110.



A bone pin.

The later collections from the islands have also brought to light several implements made of the hollow bones of large birds. One of these from San Clemente (P. M. 13531) is represented by Fig. 111. Mr. Schumacher thinks that implements of this character were "marrow-extractors."

FIG. 111.

"Marrow-extractor" made of bone, $\frac{1}{2}$.

They are made simply by sharpening one end of the bone, as shown

in the figure. In this single example the opposite end has a groove cut around it as if for the attachment of a string.

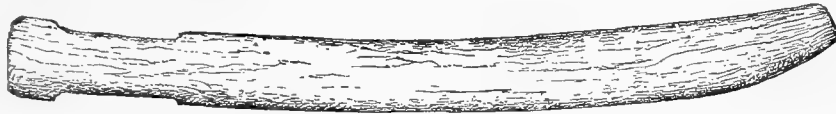
Many other bone implements more or less allied to those here described have been received from the later explorations. The most interesting of these are three thin-pointed bones (P. M. 13129), each perforated at the broad end by a small eye, and which, there is hardly any reason for doubting, were used as needles.

The early writers who have left us brief accounts of the weapons of the Californians have mentioned that they had swords made of bone and of wood, and of these materials are several found in the graves, both by Dr. Yarrow's party on the mainland, and by Mr. Schumacher and others on the islands.

Fig. 112 represents a sword made from the ribs of a large cetacean. In shaping this weapon the natural curvature of the bone was retained; the convex

FIG. 112.

portion was ground down to form the

Sword made of bone, $\frac{1}{2}$.

cutting edge, and the back was left of a uniform thickness of about half an inch. Toward the point the bone has been ground away on each side. This sword is 17 inches in total length, and the portion cut out for a handle is $2\frac{1}{2}$ inches long, with a terminal knob or hilt of about 1 inch in length. The handle certainly suggests that either the owner of the sword had a very slender hand, or else, what is perhaps more likely, that the indented portion of the bone was for the purpose of attaching a wrapping of hide or some other substance in a manner similar to that on the sword-like clubs of bone of which there are two examples from Alaska in the Peabody Museum. This sword was obtained by Mr. Schumacher, and is now in the Smithsonian collection (No. 20477). In massiveness it has some resemblance to the Alaskan weapons referred to above, but it is in some respects a transition form between them and the thinner-bladed swords of which the next figure is a representation.

Several specimens of these swords with thin blades were found in the graves explored by Dr. Yarrow's party, and others were collected on the islands by Mr. Schumacher. They vary in length and width, and each is made from a bone of the lower jaw of a porpoise. Fig. 113 represents the slightly convex

FIG. 113.

Bone sword, $\frac{1}{2}$.

sides of one of these swords, the opposite surface of which is concave—a character due, entirely, to the natural shape of the bone, which has been

but slightly altered, except toward the point, where it has been cut or ground away so as to make a rather sharp point and double edge, which is better adapted for thrusting than for cutting. The later explorations on the islands have furnished so many specimens of these weapons as to prove that they were formerly in common use. From the graves on the island of Santa Catalina alone over twenty specimens were obtained by Mr. Schumacher (P. M. 13125-13126). Several of these have small holes on the margin of the bone at the "hilt," and it is hardly to be questioned that these blades, made of porpoise-jaws, were mounted in handles, very likely of wood. One small jaw about 6 inches long (P. M. 13392) has been worked into a regular dagger, and when furnished with a handle must have been an efficient weapon. Similar dagger-like blades made of other kinds of bones are also in the Peabody Museum; one obtained by Mr. Bowers on the island of Santa Cruz (P. M. 13766) is a good example of these.

A fine specimen of a wooden sword was obtained by Mr. Schumacher from a grave on the island of Santa Cruz, and is now in the Smithsonian collection (No. 18312). It is shown, of one-quarter of its length, in Fig.

FIG. 114.

Wooden sword, with an inlaid handle, $\frac{1}{4}$.

114. The blade is very thin and not quite 2 inches in width at its widest part. The total length of the weapon is $18\frac{1}{2}$ inches, of which the handle forms about one-fifth. The blade is well and symmetrically pointed, and its edge was formerly sharp. It is probable, however, that the weapon was used, like the thin swords of bone, more for thrusting than for cutting. Additional interest attaches to this weapon on account of the elaborate ornamentation of the handle, as indicated in the figure. Many pieces of brilliant abalone shell, each about $\frac{1}{10}$ of an inch wide and $\frac{4}{10}$ of an inch long, are arranged side by side, in seven rows on each side of the handle. This inlaid work is neatly done, and the pieces of shell are held in place by a thin cement of asphaltum, the whole forming a piece of ornamental work of considerable excellence.

On Plate XII, Figs. 30, 31, 32, are shown pieces of shell set in asphaltum, which, very likely, are the remains of a similar piece of inlaid work, and Mr. Schumacher has sent to the Peabody Museum a portion of a handle of wood inlaid with shell very like that of the wooden sword above described. This fragment (P. M. 13127) was found in a grave, at the isthmus, on the island of Santa Catalina, and a note attached to the specimen indicates that Mr. Schumacher considers it to be the remains of a handle of one of the swords or dagger-like weapons of bone, which was too far decayed to be saved.

Several other articles made of wood were found by Dr. Yarrow's party, but they were so much decayed that only fragments could be saved. They are, however, in a few cases, of interest as showing the important use made of asphaltum. In one instance, two pieces of wood, probably a portion of a canoe, had been joined by a withe of bark or hide, and melted asphaltum had then been poured over the place to make it tight and firm. In another piece of wood a sort of asphaltum bolt had been formed.

MUSICAL INSTRUMENTS MADE OF BONES.

BY C. C. ABBOTT.

THE production of measured sounds, both by means of the voice and by a variety of instruments, principally as an accompaniment to certain motions—often as violent and ungraceful as the sounds are shrill and cacophonous—is common to all savage races. Such sounds we are led to call “music,” thinking we have in them the origin of the developed harmony of civilized races; and such movements we call “dancing,” as nearest resembling that graceful amusement of modern times and of advanced peoples. In thus tracing back the triumphs of modern civilization to the customs of savages, we find, in certain of the rude productions of the Pacific coast tribes, the primitive forms of our modern fife and flute.

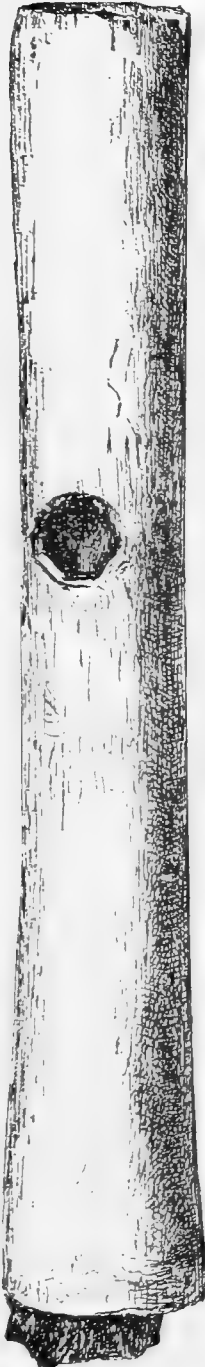
Musical instruments of this simple pattern are, or were, common, probably, to all the native tribes of America. Bartram,* in writing of the Southern Indians, remarks, “These people like all other nations, are fond of music and dancing: their music is both vocal and instrumental; but of the latter they have scarcely anything worth the name; the tambour, rattle-gourd, and a kind of flute, made of a joint of reed or the tibia of the deer’s leg; on this instrument they perform badly, and at best it is rather a hideous melancholy discord, than harmony. It is only young fellows who amuse themselves on this howling instrument.” It is probable that the “music” obtained from the whistles and other instruments found in the graves in California was of a similar character to that described by Bartram.

Fig. 115 represents a large example of what we must consider a bone whistle, although, in its present condition, it would not be of use, even in

* Travels through North and South Carolina, Georgia, and Florida, Dublin, 1793, pp. 502-3.

a musician's hands. As will be seen in the illustration, the end farthest

FIG. 115.



Bone whistle.

from the lateral hole is closed, the material, as usual, being asphaltum, applied in a soft state, which closes perfectly the irregularly oval opening of the bone at this end. The opposite opening is more nearly circular, and is now without any obstruction. The two ends have been cut or sawed off, and the edges are very smooth and even. The instrument, therefore, was never longer than at present. It is made of a portion of a leg-bone of some large mammal, and is $6\frac{1}{2}$ inches in length. The lateral opening, which is nearly an inch nearer one end than the other, is $\frac{1}{2}$ inch in diameter. The external surface is smooth and even somewhat polished.

Fig. 116 represents a smaller, but otherwise

FIG. 116.



Bone whistle.

similar whistle. In this instrument, however, the end nearest the lateral opening is closed with asphaltum, and there is a ridge of asphaltum within the tube opposite the side hole. This is an important feature in this style of whistle, as we shall see when referring to a more modern implement of a similar character. The closing of one end, however, in the instruments above noticed, and in others from the graves, is an important difference between the two forms. This smaller specimen measures $3\frac{4}{10}$ inches in length. It was obtained by Mr.

FIG. 117.



Bone whistle.

Schumacher at Santa Cruz Island, and is now in the collection of the Smithsonian Institution (No 18323).

In most respects similar to the above, and yet differing in the one important feature of being open at each end, is a longer and more slender bone whistle, which, although apparently perfect, will not give forth any sounds, however carefully, gently, or violently it may be blown. This whistle is represented in Fig. 117. As is shown by the dark shadings in the figure, it has been coated with a black pigment, and has a glossy surface. It is made of a long bone of some animal, and is simply an irregularly oval tube, *open at each end*. At about 2 inches from one end there is a square hole cut in the bone, and directly beneath this lateral opening there is a transverse ridge of asphaltum. It measures $6\frac{1}{2}$ inches in total length, and is also from Santa Cruz Island (S. I. 18162).



Bone whistle
of Sioux In-
dians, $\frac{3}{4}$.

Fig. 118 represents a "war-whistle of band of Big Dogs, a society among the Sioux. It is used in making the charge" (P. M. 7883). As will be seen on comparing the two illustrations, there is an identity of pattern between this Sioux whistle and the preceding. It is simply the wing-bone of a bird, probably of the sand-hill crane, and, like the preceding, has a lateral opening, opposite which is a rounded ridge of gum occupying about one-half the hollow interior of the implement. When blown with a quick, strong blast, there results a very keen, piercing, fife-like note of great power. Persons accustomed to the use of various wind instruments, in experimenting with this whistle, have been able to produce a louder and more piercing note than upon an ordinary fife. If the similar "war-whistles" found on the Pacific coast produced as shrill notes as the Sioux whistle here introduced for comparison, the opinion of Bartram concerning those of the Atlantic coast Indians is applicable to them; the sounds produced being "a hideous, melancholy discord," and the whistles "howling instruments."

Associated with these simple whistles are other musical implements made of bone, but of a somewhat different pattern, of which Fig. 119 is a

FIG. 119.

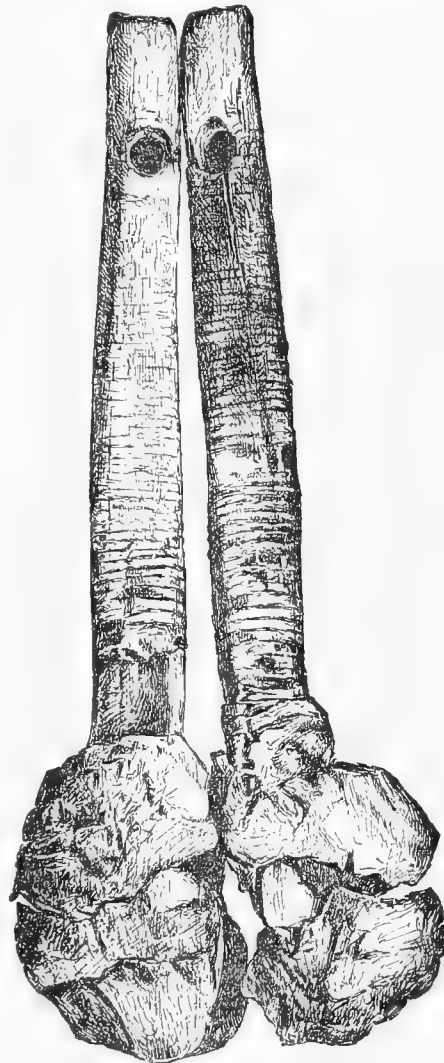


Bone fife.

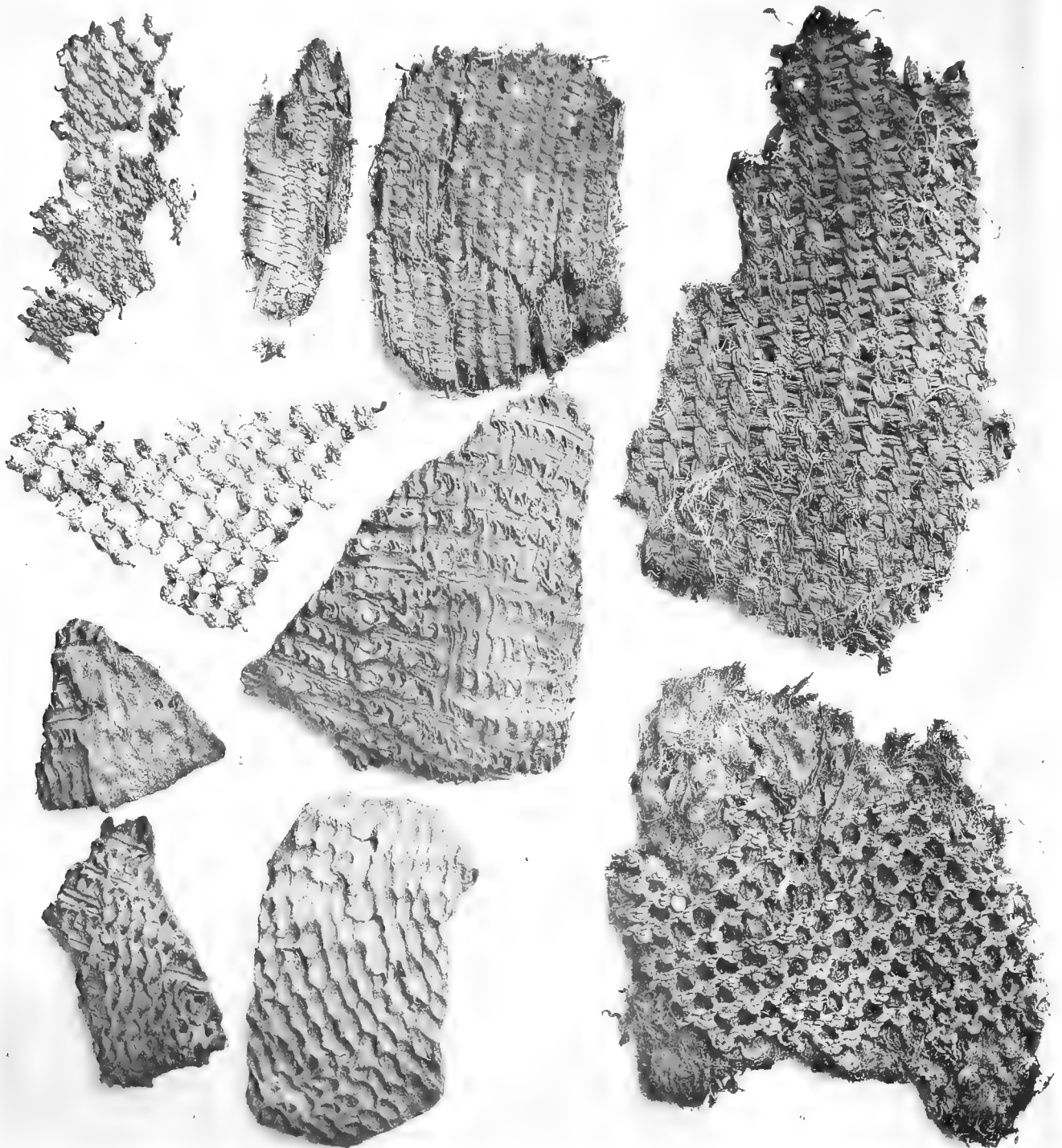
representation. This specimen is probably made from the femur of a bird. It is very white, highly polished, and uniformly hollowed out. As will be seen on reference to the illustration, there are four holes instead of one, and so it may be called a fife or flute, for doubtlessly these four holes were intended to produce a series of sounds different from the shrill notes of the whistles. This was obtained from a grave by Mr. Schumacher at the same place where Dr. Yarrow's party were at work (S. I. 20532).

[From the graves at the isthmus, on the island of Santa Catalina, Mr. Schumacher obtained eight whistles of a different form from any found during the early explorations, and from a grave on the island of San Clemente he secured another of the same kind. These instruments are made from the tibiæ of the deer, two of the bones being required to form the perfect instrument. As shown in Fig. 120, the two bones were placed side by side and held in position by a large mass of asphaltum at one end, and by carefully winding thin strips of bark around the bones. This lashing of bark was covered by a light coating of asphaltum, and extended nearly the whole length of the

FIG. 120.

Double whistle, made of two bones united, $\frac{1}{2}$.

instrument. Inside the tube, formed by scraping out the cellular portion of the bone, and opposite the lateral opening, a mass of asphaltum has been placed in such a position and of such size as to leave but a small space above or below the lateral opening. In using this instrument both tubes were probably blown into at the same time. The figure of this interesting double whistle gives a better idea of its character than can be conveyed by further description. On some of the specimens large pieces of shell have been partially embedded in the mass of asphaltum, probably for ornament; and on one there is a small string of shell beads wound round the base of the whistle (P. M. 13116-21, 13529, 14830). A single whistle, also, made of the tibia of a deer, but with the mouth-part at the opposite end, was obtained by Mr. Bowers on Santa Cruz Island (P. M. 13769). The graves at the "Isthmus" were particularly rich in small whistles (P. M. 13122-3) made of bones of birds, and having a single lateral hole, which in some was near the mouth-end, and in others near the centre of the instrument. Most of these have one end of the bone closed with asphaltum; in a few both ends are open. They are all provided with the asphaltum "stop" opposite or just below the lateral opening. Many of these small whistles are more or less coated with asphaltum, and several have been ornamented with small shell beads, like those shown in Figs. 3, 4, and 5, of Plate XII. Whistles of this same character, of which Figs. 116 and 117 are representations, were also obtained from the island of San Clemente (P. M. 13530) by Mr. Schumacher, and on the mainland at Santa Inez (P. M. 13822-3) by Mr. Bowers.—F. W. P.]



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It is probable that of the natural materials which man has adapted to his requirements, he early made use of the flexible twigs of trees, stems of reeds, stalks of long grasses, and the tough, pliable leaves and roots of various plants, which he bound together, and in different ways united, for temporary or permanent convenience. However long the time may have been for the progress of primitive man to the state corresponding with that of the lowest form of savagery as now known, he, apparently, had then everywhere acquired the knowledge of the use, and adaptability to his requirements, of many natural materials. The particular kind of vegetable fibre, or of bark, grass, etc., that has been or is now used, of course has varied with the natural conditions surrounding man in his distribution over the world, and while one race or nation has made use of palm-fibre, another has used flax, and so on through a long list of plants.

Among the earliest traces of textile substances in the remains of the settlements on the Swiss Lakes, flax has been found in such quantity, and made into so many articles, as to prove that its use was general and extensive, although other materials, such as bast, grasses, and reeds, were also utilized. What the flax was to the lake-dwellers of Europe, the several species of *Agave* and *Yucca* are to the present Indians of all the great southwestern portion of our continent; and other plants are similarly used by man in other regions.

Mr. Davidson* has given an account of the twine made by the Indians of British Columbia, of which he writes:

*Proceedings California Academy Science, vol. v (1874), p. 400.

“The twine is well made and strong, and is formed from the fibrous covering of the tall, rank nettles which abound around all their villages. They collect the nettles, strip off the leaves, dry the stalks, and when brittle beat them until the woody parts are separated from the fibre. * * * They also make twine from the inner fibrous bark of the *Epilobium angustifolium*.”

Of the Indians of California Mr. Powers* likewise says :

“There are two plants used for textile purposes. One is a kind of tule-grass or small bulrush (*Juncus*), which they hatched with flints or with their finger-nails, bleached, and wove into breechcloths. For strings, cords, and nets they used the inner bark of the lowland milkweed (*Asclepias*). When it is dry the Indian takes both ends of a stalk in his hand and crushes it in his teeth, or else passes it over a stone while he gently taps it with another, then strips off the bark and twists it into strands, then into cords.”

Dr. Palmer has, also, during his several explorations under the direction of the Peabody Museum, collected much information in relation to the plants used for textile and other purposes by the Indians from Utah to the Pacific Ocean, and has recently published a summary of his observations, from which I extract the following:†

“*Yucca baccata*.—This is one of the most useful plants to the Indians of New Mexico, Arizona, and Southern California. Its fruit is eaten while fresh and in the dry state. It grows from 2 to 18 feet in height, and becomes a tall tree further southward, varying in diameter from 8 to 20 inches. The bodies of these plants are very fibrous. The Indians and Mexicans, when in want of soap, cut the stems into slices, beat them into a pulp, and mix them with the water in washing, as a substitute for soap, for which it answers finely. The leaves are generally about 2 feet in length, and are very fibrous. In order to remove the bast, the leaves are first soaked in water, then pounded with a wooden mallet, at the same time occasionally plunged into water to remove the liberated epidermis. Then if not sufficiently clean and white it is returned to the water for a time and again put through the beating process; generally the second course is sufficient. The fibres of the leaves being strong, long, and durable, are adapted for Indian manufactures, and the savages of Southern California make therefrom excellent horse-blankets. All the tribes living in the country where this plant is found use it to make ropes, twine, nets, hats, hair-brushes, shoes, and mattresses.

“The Diegeno Indians of Southern California have brought the uses of this plant to notice by the various articles they make from its fibres to sell to white settlers. In preparing a warp for the manufacture of saddle-blankets, it is first loosely twisted; then when wanted it receives a firmer twist. If the blanket is to be ornamented, a part of the warp during the first process is dyed a claret brown, oak bark being used for that purpose. The loom in use among the Indians of to-day is original

* Proceed. Cal. Acad. Sci., vol. v (1874), p. 373; also, Tribes of California, p. 426 (1877).

† American Naturalist for Oct. 1878, p. 646.

with themselves, and not borrowed, as some suppose, from the Spaniards. It is a simple affair, consisting of two round, strong, short poles, one suspended and the other fastened to the ground. Upon these is arranged the warp. Two long wooden needles with eyes are threaded with the filling, which is more loosely twisted than the warp in order to give substance or body to the blanket. Each time that the filling is thrust between the threads of the warp by one hand, the Indian female, with a long, wide, wooden implement in the other hand, beats it into place. This tool resembles a carving-knife, but is much larger and longer. One edge is thin, and in this is made a number of teeth or notches not so sharp as to cut.

“*Y. whipplei*.—This plant in bloom is one of the finest garden ornaments, very common over most parts of California. The young flowering stems, while in their tender condition, are eaten either raw or roasted by the Indians. The seeds are gathered, ground into flour, and eaten. The leaves yield a very soft white fibre, which is capable of being made into very nice thread. Indians use this fibre to form a padding to their horse-blankets, the outer part of which being made of the fibre from the *Yucca baccata* is very rough. A wooden needle is threaded with twine made from the same fibre, and the lining is firmly quilted to the saddle-blanket, forming a soft covering, without which it would injure the animal's back.

“*Agave deserti*.—This is on the whole one of the most useful of natural productions to the Indians of Arizona, New Mexico, and Lower California. The heart of the plant, after being roasted, is a nutritious article of diet. From it is distilled a strong liquid called *mescal* by Mexicans; the seeds are ground into flour and eaten; the leaves are long and very fibrous, and are cleaned like those of *Yucca baccata*. Sometimes after the leaves are dead and quite dry they are pounded until the epidermis is separated. The fibre thus cleaned is not so smooth and white as that first soaked in water, but very strong and durable ropes, mats, nets, and sewing-thread are made therefrom. This is a very abundant plant, covering many thousands of acres of land unfit to grow anything more useful.

“*Willow trees*.—Those along the Colorado River, Arizona, yield abundance of long, soft bark, from which the Indians on this stream make ropes and twine for domestic purposes, as well as sandals and mats. The females generally dress scantily; only that part of the body from the waist to the knees is hidden from view. This custom is observed by most of the Indian females living along the Colorado River. They strip off the bark from the willow trees and bury it in blue mud for a few days, after which it is taken out, washed clean, and dried. It is now soft, pliable, and easily handled. Being cut into requisite lengths, they are fastened very thickly to a belt of the wearer.

“*Apocynum cannabinum*.—The Indians of Southern Utah, California, and Arizona use the fibre prepared from the stems of this plant to make ropes, twine, and nets; and before the advent of Europeans it was used in the manufacture of various articles of clothing. In order to remove the fibre the woody stems are first soaked in water, the bast with the bark is then easily removed. The latter being washed off leaves a soft, silky fibre of a yellowish-brown color, which is very strong and durable. I have seen ropes made of it that have been in constant use for years.

“*Urtica holosericea*.—The fibre of this plant is used by the Indians of Southern California to make their bow-strings. In order to separate the fibre, the plant has to go

through the same process as hemp, its fibre resembling that of the latter, being equally strong and durable.

"*Cowania mexicana*.—This tree before the advent of Europeans was the great source from which the Nevada and Utah Indians obtained the materials for their dress goods. The outer bark is rough, but the inner is soft, silky, and pliable, and of a brownish color. It is removed in long strips, varying in width, a desirable quality in a bark that is used in the manufacture of clothing, sandals, and ropes. These articles were formerly made by braiding strips of bark together, or woven with the hand-loom. Females made skirts from strips of this bark by braiding a belt, to which they suspended many strips of the same material, hanging down to the knees like a long fringe; the rest of the person was naked in summer. Mats were also made from this bark, which were used as beds."

Turning our attention now to the textile fabrics found in the graves at Dos Pueblos and La Patera, and on the islands, we find that they correspond with the native work of the present tribes of Central and Southern California, and, with the exception of the linen cloth found in the Swiss Lakes, that there is a marked resemblance between the articles from the graves in California and those from the lake habitations of Switzerland, as can be seen by comparing specimens side by side in the Peabody Museum.

From the graves of California several examples of the ancient fabrics have been preserved in consequence of their having been charred by partial burning, probably at the time of their burial, while a few other fragments have been found in the ashes of ancient fires on the shell-heaps of Santa Catalina Island, or have been otherwise preserved under exceptional conditions. Other specimens, again, have been preserved by contact with iron and copper articles placed in the graves, which, of course, show that such burials followed European contact. Not only have unquestionable fabrics of native work been preserved by contact with iron and copper, but also other fabrics, woven of linen and of wool, in regard to some of which there can be no doubt that they were made after European contact. The latter, however, may have been in part the work of native weavers after the missions were established on the mainland by the Jesuit fathers.

One very interesting lot of articles (P. M. 13189) taken from a grave, at the isthmus on the island of Santa Catalina, by Mr. Schumacher, con-

sists of a large copper dipper, 8 inches in diameter, with its contents and attachments, which have been preserved by the action of the copper.* Attached to a portion of the bottom of the dipper, on the outside, is a fragment of the skin of some animal with long light hair; over this, in patches, are fragments of a thick coarsely-woven woollen cloth. This woollen cloth, which may or may not be of native make, was probably wrapped about the body of the person buried, and also over the dipper, which was placed on the head over the basket-cap. With the cloth is a fragment of a net with meshes nearly an inch in width, made with a mesh-knot which is identical with that in the pieces of nets from the Swiss Lakes. This is evidently of native workmanship, and the material is probably the fibre of the *Yucca* made into a tightly-twisted cord of two strands. Inside the dipper, about its edge, is a piece of stout linen (?) cloth, and under this cloth, in the bottom of the dipper, is a small basket of native work, identical in material, shape, and method of manufacture with the small baskets of the present Indians of some parts of California. (A piece of similar basket-work is shown on Plate XIV, Fig. 3.)- Inside of the basket, which was unquestionably placed on the head as a cap, are fragments of the human scalp with well-preserved straight black hair. In the dipper, and in some places still attached to its sides, are the remains of a long string of small shell beads like those figured on Plate XII, Figs. 4-6. There are about 50 inches of this string still intact; and as twenty beads occupy 1 inch in length, there are at least 1,000 of them now with the dipper, and many more were taken from the same grave. In addition to the articles already mentioned are three fragments of twine, of two strands and about one-eighth of an inch thick, probably made of twisted bark-fibre. In other graves at the same place copper articles have preserved fragments of similar fabrics, and, in addition, on one copper platter was a handful of the long stems of a species of *Juncus*, such as were split for the basket-work. Other fabrics (P. M. 13135) of interest, from these graves at the isthmus, are a small coil of fibre made from the inner bark of some tree, a mass of twine of two strands, made of the same kind of fibre, well twisted

* See page 38, where Dr. Yarrow mentions that a similar copper vessel was found over a skull at La Patena.

and about a tenth of an inch in diameter, and two pieces of bark rope, about half an inch in diameter, composed of three large strands. One of these pieces of rope, 4 inches long, is wound with a fine twine, which is probably also made of the bark-fibre.

A piece of cord, about 10 feet in length, was obtained in a charred condition by Mr. Schumacher on the island of Santa Cruz. This (P. M. 9311) is made of three closely-twisted strands, apparently of bark-fibre, though it may possibly be the fibre of a *Yucca*.

The graves on Santa Cruz Island have yielded to Mr. Schumacher several fragments of twisted and plaited fabrics made from the long, flat and tough eel-grass (*Zostera*). A piece of rope of this character (P. M. 9309) is now about 6 inches long, and was made by bending a cord of two thick strands upon itself, then by twisting all together a strong rope, half an inch in diameter, was formed. The most interesting of the articles made of eel-grass are several small pieces of coarse plaited work. In these pieces the strands in one direction are of a simple twist, while those in the opposite direction are divided, one half passing under and the other half over the single strands.

During the excavations at Dos Pueblos and La Patera, Dr. Yarrow's party were fortunate in obtaining the remains of fabrics of several kinds, which, although very brittle and much decayed, are represented of their natural size in the photographic copy, Plate XIV. Of these, the piece marked on the plate as Fig. 2 is of special interest, from the manner in which it has been woven, for it seems to me that this example, so far as it goes, is confirmatory of the statement made by Dr. Palmer, that the Indians of Southern California possessed the hand-loom. The substance of which the cloth is made is probably the fibre of a species of *Yucca*. A loose mass of slightly-twisted fibres, apparently the same as those of which the fragment of cloth is made, was also obtained by Dr. Yarrow, but from another grave. What I consider as the warp in this specimen are the fibres which run from right to left in the figure, while the woof is made of two strands crossing the warp in such a manner that the strands alternate in passing over and under it, and at the same time enclosing two alternate strands of the latter, making a letter *x* figure of the warp, united at

the centre of the x by the double strand of the woof, as is well shown in the figure.

Fig. 5 of the same plate is a small piece of a net made of a fine-twisted fibre, very likely of the *Yucca*; and Fig. 6 is a piece of a similar net from another grave, both at Dos Pueblos. The illustrations are such perfect representations of these specimens that further description is unnecessary, and I will simply call attention to the resemblance which these fragments of nets have to the fishing-nets from the ancient graves at Ancon, in Peru, and also to those from the remains of the Swiss lake-dwellers; the mesh-knot in all being the same.

Fig. 1 of the plate represents a fragment of what I take to be a coarse cloth made on a hand-loom. Its condition is such as to make it impossible to determine the fibre, though it is probably that of the *Yucca*. That this piece of cloth was made after contact with the Europeans is evident from the fact that a small bead of blue glass is woven in the cloth, as shown on the left of the figure.

Among the fragments from the graves at Dos Pueblos are two bits of twine, probably of twisted *Yucca*-fibre, which are formed by evenly braiding four strands, and not simply by twisting, as noticed in the case of the rope made of eel-grass. It is also of interest to note that the fragments of net from Dos Pueblos are in close contact with a mass of fur, as shown in Fig. 6, as if the net had been lined with the skin of some animal.

Figs. 7-10 of the plate are taken from portions of a utensil evidently made for holding liquids. There are other parts of the same vessel, found in a grave at Dos Pueblos. The various portions of this utensil show it to have been a bottle-shaped basket made of grass and reeds, and covered inside and out with asphaltum. Fig. 7 shows a piece with the asphaltum still in place on a portion of the outside, while on the left of the figure the impression of the basket-work lying between the two coats of asphaltum can be seen. In Figs. 8 and 10 the asphaltum has been broken away from the outside, leaving the remains of the charred basket-work. Fig. 10 is a piece of the curved bottom of the bottle; its base is at the right of the figure. In Fig. 9 is shown a portion of the asphaltum. The surface represented was in contact with the inside of the basket.

The top of this vessel is also preserved, and shows that the basket had a narrow bottle-shaped neck of about 1 inch in diameter, on which was a flaring mouth 2 inches wide, thickly coated with asphaltum. Portions of a similarly-made vessel were also obtained by Mr. Schumacher from a shell-mound on the island of Santa Catalina (P. M. 13399). On one of the fragments of the latter there is a large circular piece of abalone shell, which is held in place by the asphaltum.

Mr. Henshaw has called my attention to the following statement by Humboldt,* relating to the Indians about Santa Barbara at the time of the establishment of the missions in 1769: "They constructed large houses of a pyramidal form close to one another. They appeared benevolent and hospitable; and they presented the Spaniards with vases very curiously wrought of stalks of rushes. M. Bonpland possesses several of these vases in his collections, which are covered within with a very thin layer of asphaltum, that renders them impenetrable to water or the strong liquors which they may happen to contain."

Mr. Bancroft,† in his account of the Indians of Southern California, also mentions, on the authority of Mr. Reid, that "the vessels in use for liquids were roughly made of rushes and plastered on the outside and in with bitumen or pitch, called by them *sanot*." It is undoubtedly the remains of such vessels as these that were found by Dr. Yarrow and Mr. Schumacher.

I now have to call attention to the few remains of baskets that have been obtained from the California graves. It has already been mentioned that among the articles preserved by the copper dipper taken from a grave on the island of Santa Catalina, there was a small basket found in it, which was evidently used as a cap, and was still in a good state of preservation. Portions of similar fine basket-work were also obtained from other graves at the same place (P. M. 13133), and a few fragments were found in a charred condition in the shellheap on the island (P. M. 14854).

There is also in the Peabody Museum (9312) a small fragment of a basket, identical in character with the one found in the dipper. This was

* New Spain, vol. ii, p. 297.

† Native Races of the Pacific States, vol. i, p. 408. The account by Mr. Reid is from the Los Angeles Star. A similar basket, made water-tight by a covering of pitch, was obtained from the Ute Indians by Dr. Palmer.

found by Mr. Schumacher during his early explorations on the island of Santa Cruz.

Dr. Yarrow's party were fortunate in saving a few fragments of baskets found in the graves at Dos Pueblos and La Patera. They were very much decayed, but two are shown on Plate XIV, Figs. 3 and 4. The basket, of which Fig. 4 represents a portion, was probably filled with the small black seeds, or *chia* (*Salvia Columbaria*), which must have formed an important article of food with the old Californians, judging from the abundance of the seeds in the graves. These seeds were placed with the dead in various receptacles, such as stone pots, shells, and baskets as in this instance.

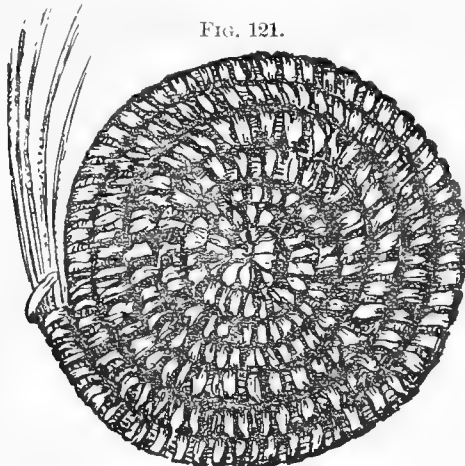
That basket-making is a very old art cannot be doubted, and while it was probably practised to a greater or less extent by all, or nearly all, the Indian tribes of America, it is of importance to note that these oldest known baskets from the graves in California are not only made in the same manner, and with the same materials, as those now employed by the present tribes of the State, but that they are the same in method of construction, and of closely-allied materials, with those from the graves and tombs of Peru, as shown by many examples in the Peabody Museum.

Mr. Schumacher has sent to the Peabody Museum an account of the manufacture of baskets by the present Indians in Southern California, with an instructive series of specimens representing the materials used, and also the basket-work in its several stages. As this account is applicable to the method employed by the former tribes of the coast, I copy the following from his manuscript, and also introduce two illustrations taken from his drawings :

“The manufacture of baskets I also observed among the Techáhet, a tribe of the Cahuillos, at Agua Caliente, Los Angeles County, California, while making researches for the Peabody Museum during the last year, and also on a previous occasion in Northern California and Southern Oregon while in the employ of the United States Coast Survey. Substantially the same method is employed in these several regions, though the material slightly differs, and likewise existed in former times among the Coast Indians of California, as is demonstrated by fragments found in their graves.

“The Techáhet use the reed-grass (*Juncus robustus*), which I found growing in the small fresh-water marshes and creek-eddies at the beginning of the desert, and the tall thin grass (*Vilfa rigens*) found thriving with the *Yucca*, which flourishes in such great varieties in that neighborhood; both are used in the dried state. The former species is used for binding the body of the basket, which is made of the latter. The reed-

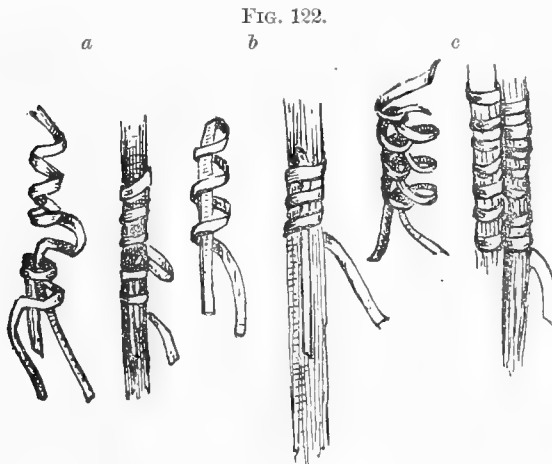
grass is split, and some of it is dyed in different shades, usually brown,* with which to produce the figures, mostly straight-lined or zigzag. The grass of which the body is



Bottom of a basket.

made is worked in its natural state. The basket progresses from the centre of the bottom, as shown in Fig. 121, which represents that part of natural size for baskets not exceeding a foot in diameter, while the thickness of the coil of larger ones is slightly increased by adding more of the grass of which it is made. The beginning of the stitch, for which the hole is made by a common bone needle or borer, is shown in Fig. 122 *a*, and is made by fastening one end of the binding by the succeeding overlying stitches, and is thus neatly disposed of on the inside of the basket. Fig. 122 *b* shows the manner in which the coils and stitches are arranged and the way they are bound together. When the length of the binding is used up, the end is similarly secured as at the

beginning, Fig. 122 *c*, or, at the finishing of the basket, under the preceding stitches. The shape of the basket is easily formed by lengthening or shortening the circuits of



Method of winding the grass in basket-work.

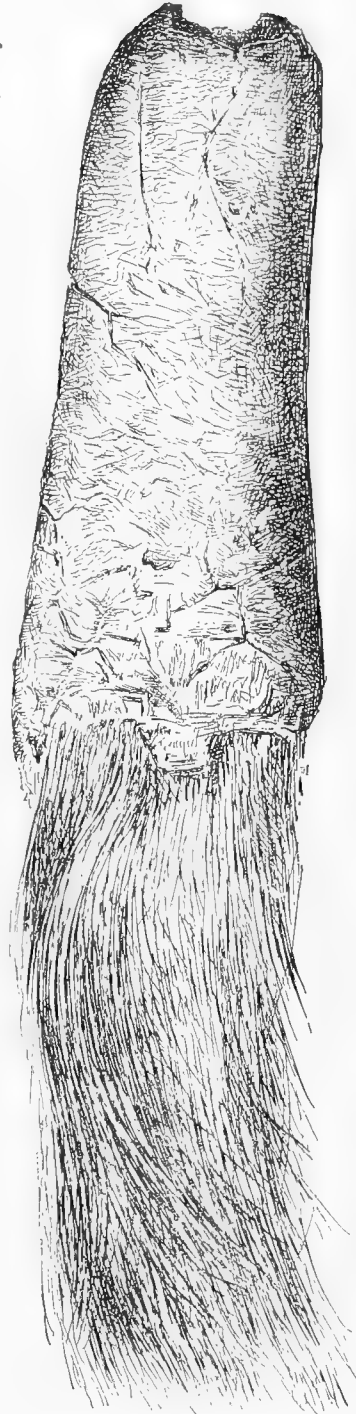
the coil, and by changing the stitches slightly towards the side of the concavity to be formed. In forming the bottom of the baskets the split twigs of a shrub [probably *Rhus aromatica*] are generally employed in place of the *Juncus*, probably for the greater strength. Often this material is used for the sides as well as the bottom, but generally the *Juncus* is used after about a dozen or twenty coils have been made. The *Juncus* is also used without splitting, from which is made a coarse basket with loose meshes similar to a net, but without knots."

The Indians from Southern Mexico to Northern California make for their use hair-brushes of very much the same character, and as several of these brushes have been found in the California graves a brief notice of

*Dr. Palmer informs me that the Indians of Southern California make a black dye by steeping in water plants of the *Sueda diffusa*, and that a yellowish brown dye is derived in the same way from plants of the *Dalea Emoryi* and *D. polyadenia*. Both of these dyes are, according to Dr. Palmer, used by the Indians at Agua Caliente for dyeing the rushes of which baskets are made. See also Dr. Palmer's notes on plants used for dyeing, in *American Naturalist* for Oct. 1878, p. 653.

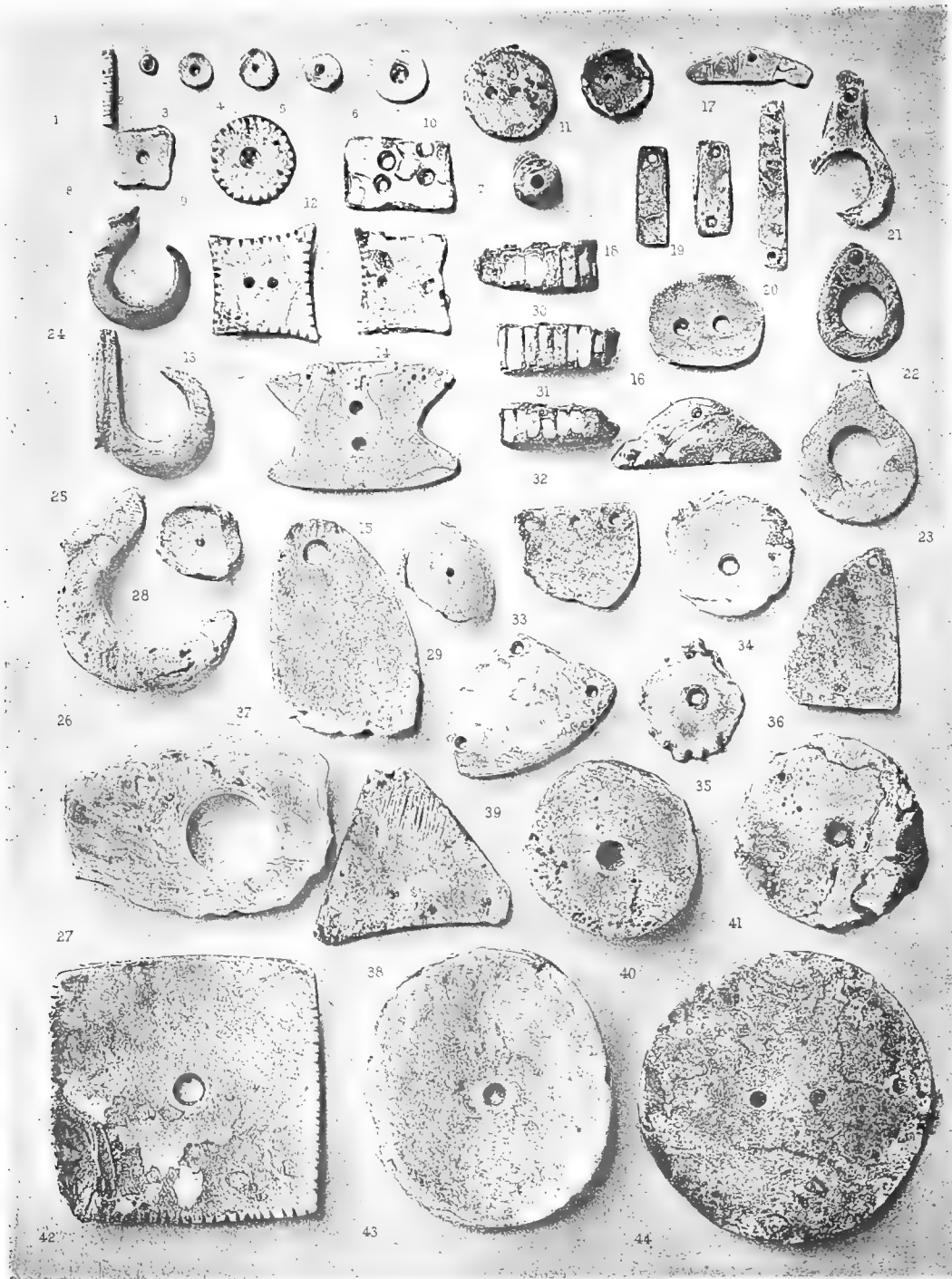
them will not be out of place here. As will be seen by reference to Fig. 123, these articles of the Indian's toilet closely resemble in shape our modern shaving-brushes. Those from the graves, not only at Dos Pueblos and La Patera, but also from the islands of Santa Cruz (P. M. 9305 and 13847) and San Clemente (P. M. 13188) are all made of the same material, after the one pattern, and vary little in size. On comparing the material with the root-fibres of the plant commonly called soap-root in Southern California, it will be seen that the brushes from the graves were made of the little fibrous rootlets, and that the Indians of old times used the plant as those in California do to-day. Dr. Palmer (in Amer. Nat. Oct. 1868, p. 649) writes of this plant as follows: "*Chlorogalum pomeridianum*, common soap-root of California, and called by Indians and Mexicans *Amole*. It produces a large bulb, which yields a great quantity of saponine, very good for washing, for which purpose it is much used by poor people and the Indians of California. The rough covering of the root is formed into bunches, tied up, and used for hair-brushes by the Indians." As the fibres, when pulled from the old roots, are somewhat like so many long separate bristles, some method had to be devised by which they could be held together at one end and allow the other to be used as a brush, and for this purpose the ever-ready asphaltum was adopted by the former Indians of Southern California. All the brushes which I have seen from the graves have a handle of this substance like the one represented in Fig. 123.

FIG. 123.



Brush made from soap-root, with handle of asphaltum.

At the present time the Indians of the region about White Water, in Los Angeles County, also make hair-brushes of the tough fibres of the stalk and root of the *Agave*, which are bent and tied upon themselves, bringing the ends of the fibres together to form the brush portion, the handle consisting of the part where the fibres are bent and tied. A brush of this character, about 4 inches long, is in the Peabody Museum (No. 14943). Dr. Yarrow informs me that brushes of this character are used by the Pueblo Indians, especially by the squaws, for washing the hair. Similar hair-brushes are now made from the same material and are in common use by the Indians of Mexico (P. M. 17687), but they are made with more care than those from California, often having a mass of soft fibres surrounding those which are thicker and stiffer in the centre of the brush, and they are also generally bound with twine made of the *Agave* fibre, in such a manner as to tightly bind the fibres together and form a handle of about one-third or one-half of the brush. This binding is also often ornamented with a figure in bright colors. Dr. Palmer has brought from the Pah Ute Indians hair-brushes (P. M. 12103, 9419) of a similar, though ruder, character. These are made of the coarse fibres of the *Agave Utahense*. A handful of the fibres are securely bound with sinew which passes two or three times around the bundles 2 or 3 inches from the end to be used as the brush, and this binding is smeared with pitch. One of these brushes is made of fibres about a foot in length. The Brazilian Indians also make brushes, for the hair and for other purposes, of this shape, but of a different material.



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SHELL ORNAMENTS SOUTHERN CALIFORNIA.
FULL SIZE.

ORNAMENTS.

UNDER this heading I have brought together, for brief description, a large and varied collection of articles obtained from the graves on the coast and islands of Southern California, nearly all the forms of which were found by the officers of the Survey during the excavations at Dos Pueblos and La Patera, and are represented on Plates XII, XIII. In fact nearly every large collection which has been made on the coast and islands since Dr. Yarrow's party first explored the region about Santa Barbara, so far as I am aware, shows that the forms of the articles and the materials used for their production are, with slight variations here and there, the same throughout the region designated. Particularly is this the case with the objects made of shell, of which material the Californians have been lovers from the time of the burial of the "Calaveras skull" (in which was found a shell bead identical with those found at Dos Pueblos) to a few years ago, when a horse could be had in exchange for a single shell of *Haliotis rufescens*. It is well known that since the settlement of the State some shells, particularly *Dentalium*, in their natural condition, and others which were cut and ground into various shapes, had, like the "wampum" of the early days in New England, a well-understood standard of value in all transactions of trade with the Indians.

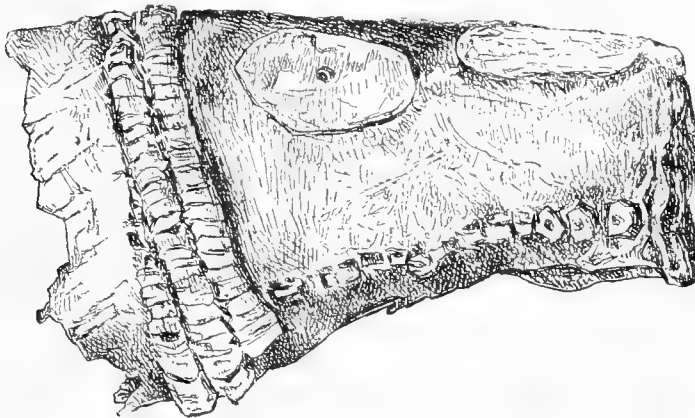
While from the shells of mollusks, as here intimated, ornaments of various kinds were made in great number by the California Indians of former time, other materials were also used to a considerable extent for the same purpose, particularly stone, from which were made beads, pendants, and other articles for personal ornament; and even asphaltum, so often mentioned in the preceding pages in connection with its varied application, was also employed for ornamental purposes. The claws and teeth of animals, and objects made of bone, were also choice possessions and articles for personal adornment. In addition to these were the little trinkets, of which

fragments only have been found, though possibly some of these may have been children's toys. I have also included under this general term of "ornaments" the materials used as paint, which, judging from its abundance in the graves, was largely employed to decorate the bodies of the Indians of ancient as well as of recent times.

The fact that the Indians of California, in common with savages generally, often decorated their implements and utensils with the same materials which they employed for personal ornament, is proved by articles collected from the graves; as, for instance, the decoration of the rims of the large stone mortars, on which, held in place by asphaltum, are pieces of the pearly shell of *Haliotis*, or, sometimes, the perfect shells of two or three beautiful species of *Cyprea*; *C. spadicea* particularly being employed on the mainland. Another method of ornamenting the rims of these mortars consisted in cutting away the dorsal portion of the shells of *Cyprea* and fastening them to the mortar, by their cut surface, with asphaltum, so as to exhibit the lips of the shell, with their serrated edges. Such a cut shell is represented on Plate XIII, Fig. 52.

On a previous page a figure has been given of a wooden sword, the handle of which was inlaid with small pieces of pearl shell, and on Plate XII, Figs. 30, 31, 32, are represented portions of such inlaid work of shell, which probably once formed part of a handle of a sword buried with its

FIG. 124.



Handle with shell ornaments.

owner in a grave at La Patera. Mention has also been made of a portion of another inlaid handle of a sword from a grave on Santa Catalina Island.

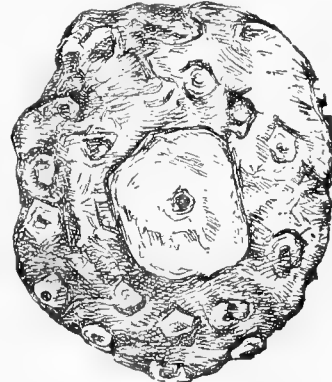
Fig. 124 is an engraving of another handle, very likely of

a knife or sword, found by Dr. Yarrow's party in a grave at Dos Pueblos. It consists of a mass of asphaltum placed over the wooden handle of the imple-

ment, which has decayed except where preserved by direct contact with the asphaltum. Around the upper part of this handle, and partly embedded in the asphaltum, a string of beads has been twice wound. Both ends of this string are shown in the figure. These beads are small disks of shell resembling, except in size, the one shown on Plate XII, Fig. 6. Dividing the handle lengthwise into two equal portions, are two rows of the small shell beads set in the asphaltum, as seen on the under portion of the figure. Between these rows, on each side, there are two perforated disks of *Haliotis* shell partly embedded in the asphaltum. The end of the handle is flat and smooth, as if there had once been a piece of shell on that portion.

From the same locality as the interesting handle just described was obtained the circular mass of asphaltum of which Fig. 125 is a representation of natural size. This mass is flat on its under surface, convex above, and about half an inch in thickness. In the centre above, as shown in the figure, there is a circular, perforated piece of *Haliotis* shell, and around this are two rows of the small shell beads like those shown on Plate XII, Figs. 3, 4, 5. This probably once formed the end of a handle similar to Fig. 124; but it may have been of the same character, on a larger scale, as the little ornament obtained by Mr. Schumacher from a grave on Santa Catalina (P. M. 14550). This latter consists of the articulating portion of one end of a leg bone of a small mammal, cut off nearly flat; the cut surface being covered with a thin coat of asphaltum, in which are embedded six small shell beads like those in the larger specimen above figured. This little globular ornament is $\frac{1}{2}$ an inch in diameter.

FIG. 125.



End of a handle? with shell ornaments.

In connection with the description of the whistles on a preceding page, it has already been stated that small shell beads were fastened by asphaltum, on some of the instruments, simply for ornament.

A very interesting little ornament from Dos Pueblos is shown on Plate XIII, Fig. 68. This consists of three teeth of a small rodent,

held side by side in a mass of red paint mixed with an adhesive substance, of which mention will be made further on, and in the mass are nine minute shell beads arranged in three rows, as seen in the figure. The upper portion of this peculiar little pendant is perforated for the passage of a small string. Fragments of two other, in all respects, similar little pendants were obtained from the same grave with the one figured on the plate.

A few shark's teeth were obtained in the graves opened by Dr. Yarrow's party, but they do not now exhibit any signs of having been utilized; though the fact that a tooth of a shark found in a grave on Santa Catalina (P. M. 14856) has two holes through its base is proof positive that, in common with many other ancient people, the Californians used such teeth for ornaments.

From a grave on the island of San Clemente there was obtained a little pendant (P. M. 13538), which I think is made from a small tooth of a cetacean. This tooth has been rounded, and has a groove cut about one end. In its present state it is $1\frac{1}{2}$ inches in length and $\frac{1}{2}$ an inch thick.

The present Indians of the Rocky Mountain region, as is well known, have necklaces in which the claws of the grizzly bear and other large animals form the most conspicuous objects. Such a necklace, from the mouth of the Yellowstone, is in the Peabody Museum (7885), and consists of fifteen large claws of the grizzly bear, alternating with large beads of blue glass, all of which are strung on a piece of soft deer-skin. These claws have been slightly altered from their natural shape by cutting away portions of the bone at the perforated end, and also by scraping the under portion so as to make a flat surface, which, with the bone and skin at the perforated end, has been covered with red pigment. In the graves at Dos Pueblos were found several perforated claws of animals, probably bears and panthers. Some of these have been slightly altered in shape, like those of the grizzly bear above mentioned, and it is reasonable to suppose that they once formed part of a necklace. On Plate XI, Figs. 5, 6, 7, are represented three of the claws from Dos Pueblos, one of which has not been perforated. Fig. 8 of the same plate is from a specimen found on Santa Cruz Island by Mr. Schumacher (S. I. 18202), and still has the horny covering. Dr. Rau has figured one of the

same lot, which he has identified as the claw of a panther (*Felis concolor*). The Peabody Museum (13398) also has two claws like Fig. 7 of the plate, which were found in a shellheap on the island of Santa Catalina, and also several claws of a different animal (P. M. 13303), from a grave on the same island. Fig. 4 of the same plate represents a piece of bone, which has been cut in such a manner as to imitate a claw, the upper portion being enclosed in a mass of asphaltum.

Ornaments of bone seem seldom to have been made by the Californians, and with the exception of the vertebral epiphyses of cetaceans, of which disks there are a few examples with central perforations, and a few fragments of worked bones, which may have been either ornaments or implements, I can only refer to the carved bone, probably representing a claw, as indicating the occasional use of this material for ornamental purposes.

While bone was rarely employed in the manufacture of ornaments, stone was often used, and numerous articles, particularly in the form of pendants and of beads, were made by the Californians of early times. Several such objects have already been mentioned under the heading of "Miscellaneous articles made of stone," and a number of beads made of stone are described further on by Dr. Haldeman. It is therefore only necessary here to mention that similar specimens to those described by Dr. Haldeman, and figured on Plate XIII, have been found during the later explorations on the islands of Santa Catalina, San Clemente, and San Miguel. Several of these beads, although made of the same minerals, are, however, much larger than those from Dos Pueblos and La Patera.

Portions of two well-made rings of talcose slate (P. M. 13152) were found in the graves at the isthmus on Santa Catalina. The stone is carefully worked down to a thickness and width but slightly exceeding $\frac{1}{4}$ of an inch, while the diameter of the ring is 2 inches.

As already stated, by far the largest number of articles that can be classed as ornaments were made of shell, and for these the shells of two or three species of *Haliotis*, and of the large bivalve, *Tivola*, were well adapted. As they were easily obtained on the coast, they were used more than all other kinds for beads, pendants, and other articles of ornament. As will

be seen by the figures on Plate XIII, other shells were, however, used for special purposes, particularly several univalves, from some of which the lips, and from others the central spiral portion forming the columella, were cut; in both cases the object made being a pendant. Other species of small univalve shells, like the *Olivella*, Fig. 66, Plate XIII, were used, nearly in their natural state, as beads, the apex being ground off for the purpose of stringing. Small rings were also made by cutting through the shell, around the natural hole, of the limpet shown on Plate XIII, Fig. 67. Such rings are thus far known to me only from Santa Cruz Island, where they were collected by Mr. Bowers (P. M. 13776), although the shell figured on the plate was found in a grave at Dos Pueblos. Of the shell beads generally, in the form of short and of long cylinders, perforated lengthwise, it is only necessary, here, to state that they were principally made from the thick shells of *Tivola*. Some are, however, nearly spherical. Beads were also made in immense numbers by cutting the small circular pieces from the body of the shells of the little *Olivella biplicata* (Plate XIII, Figs. 28, 29), a species to which Mr. Stearns has particularly called attention as having an important bearing upon the question of the route of trade or of migration of Indian tribes from the Pacific coast.*

Referring to the notes on the shell beads by Dr. Haldeman on a subsequent page, I shall simply here introduce a figure of an Indian woman of Central California, for the purpose of calling attention to the profuse use of shell money as ornaments by the California Indians even of the present time, and to state that the shell disks strung and hung about the neck of "Captain Tom's wife" are of the same kind and made of the same species of mollusk shells as those found in such abundance in the graves on the coast and islands. This figure, 126, is kindly loaned by Prof. J. W. Powell, from the volume on the "Tribes of California" by Stephen Powers.†

* Mr. R. E. C. STEARNS, of San Francisco, has for several years paid particular attention to the interesting subject of "Aboriginal Shell Money," and has published several important papers containing a great amount of valuable information, particularly relating to America. In his paper above referred to, *American Naturalist*, June, 1877, p. 344, he has covered the subject of California shell money in a brief and admirable manner, and the paper should not be overlooked by all interested in the subject. See, also, an important and suggestive note by him on p. 473 of the same journal.

Dr. L. G. YATES, also in the same volume, p. 30, gives a short notice of shell ornaments from California.

† Contributions to North American Ethnology, Vol. III, Department of the Interior, U. S. Geogr. and Geol. Survey of the Rocky Mt. Region, J. W. Powell in charge, Washington, 1877.

Mr. Powers* has given an interesting account of the shell money of the Nishinam tribe, with a notice of the comparative value of the several forms and the names by which they are designated. He states that "Captain Tom," a Nishinam, was provided with nearly half a bushel of shell money and trinkets, having a value of \$458. From this statement it is not singular that the shell ornaments should be found in such abundance in the graves. Plate XII, Fig. 40, from Dos Pueblos, is a disk like those about the neck of Captain Tom's wife, Fig. 126, and is by the Nishinam tribe called "hawock." They are cut from the large, thick clam-shell, *Tivola*, which is, according to Mr. Stearns, peculiar to the southern coast of California.† The small pieces of shell attached to the woman's girdle, as seen in Fig. 126, are like the thin, more or less triangular pendants, made of the shell of *Haliotis*, from Dos Pueblos and La Patera, shown on Plate XII, Figs. 36, 37, 38, and are called "uhllo." According to Mr. Powers, the perforated shells of *Olivella biplicata* compose the "cheap jewelry" of the women, and are known as "colcol."



FIG. 126.

A Nishinam woman of Central California, with shell money and ornaments such as are found in the graves in the vicinity of Santa Barbara.

A glance at Plate XII will convey a general idea of the forms into which the thin shells of the *Haliotis*, or "abalone," are cut. Many of these are circular pieces of various sizes, with a single central perforation, as Figs. 34, 35, 43, or with two holes, as Figs. 10, 11, 16, 44; others are square, or nearly so, with one, two, or even four perforations, as Figs. 8, 12, 13, 14, 42. Fig. 15 varies from this shape by being deeply notched on two opposite sides. Other pieces, which were probably securely sewed to some garment, have the holes for the passage of the thread near the edge, as Figs. 33, 39. Another form, also probably intended for close attachment

* Contributions to North American Ethnology, Vol. III, p. 335.

† This clam having been identified for me as *Tivola crassatelloides*, I have retained that name in these pages. Mr. Stearns, however, refers it to the genus *Pachydesma*.

to some article, as a belt or head-dress, are the small thin pieces represented by Figs. 17, 18, 19, 20. Still another group were probably strung as pendants; such are shown in Figs. 21, 22, 23, which are made with care, while more common forms of pendants are shown by Figs. 36, 37, 38. These irregular pendants are made by simply perforating, at one end, any piece of abalone shell (all parts of which are utilized), and thus easily making a brilliant and more or less pearly ornament. Many of these irregularly-shaped pieces are six or more inches in length and from one to three inches in width; others are of sizes between these large specimens and those shown on the plate. All the forms of these articles are often more or less notched or marked around their edges, as shown in Figs. 9, 13, 35, 42. Another kind of pendant was sometimes made from the thick shell of the *Tivola*; such a one from the island of San Clemente (P. M. 13527) is of an oval shape and nearly three inches in length. Another similar pendant, but less regular in shape, is cut from the shell of a *Pecten* (P. M. 13301), and was found in a grave on Santa Catalina Island.

A number of specimens of singular little pendants (P. M. 13397), unlike any others I have seen, were found by Mr. Schumacher in a shell-mound on Santa Catalina. These are from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in length and about $\frac{1}{8}$ of an inch in greatest width. They are apparently cut from a small univalve shell in such a manner as to retain the natural curvature of the shell, which gives a concave portion to one-half of the pendant.

On Plate XIII are shown a number of pendants of a different character. Fig. 65 is made by detaching the overlapping thick rim of the shell of a large *Haliotis*. This form of ornament is very common in the graves, both on the mainland and islands. The pieces vary according to the size of the shell from which they were cut. Often such a piece as that shown by Fig. 65 has been cut into three or more portions, of which Fig. 53 would represent one, and sometimes these shorter pieces are perforated at each end. Many of these pieces are ornamented along one edge by a series of carefully-cut v-shaped marks about a tenth of an inch long.

Another form of shell ornament, and one much less common than any heretofore mentioned, is made from the columella—the central spiral portion—of a univalve shell. Such a columella roughly cut from a shell, evi-

dently for the purpose of making a pendant like Figs. 58 and 59, was found at Dos Pueblos, and is represented by Fig. 60. A columella of this character was ground down to the required size and shape and made into a pendant by boring a hole through the large end. In order to make this pendant still more attractive, the spiral groove was filled with asphaltum, or a mixture of that material and red pigment, as is the case with the specimen represented in Fig. 55. Sometimes the spiral groove was so nearly, or even wholly, obliterated in the process of grinding the columella into shape, as to make it necessary to enlarge, or even to recut the groove, in order to make a place for the much-loved asphaltum. Pendants of this character are shown in Figs. 54, 55, 56, 58, 59. Still another form of ornament, made from the columella of a different shell, is shown in Figs 61, 62, 63, 64 of Plate XIII. In making these, great care has been taken to obtain a smooth and symmetrical ornament. The spiral whorls of this shell are loose and open, so that a natural tube exists throughout the length of the spire; at the same time the spiral groove in this central portion is very narrow; consequently it has been artificially enlarged for the insertion of the asphaltum, which thus winds spirally about the shell, as is well shown by the black bands in Figs. 63 and 64. As the natural orifice at the large end of the shell seems to have been too large for properly adjusting and confining the ornament as desired, this difficulty was overcome by inserting a small shell of *Dentalium*, as shown in Fig. 63, or by making a little plug of shell, which was carefully fitted and bored, as shown in Fig. 61. A fourth form of pendant was made by cutting out the serrated lips of the shells of *Cyprea*, as shown by Figs. 47, 48, 49, 50, 51. Fig. 52 of the same plate represents one of the species of *Cyprea* used for this purpose, from which the dorsal portion of the shell has been cut.

Fig. 57 shows a long and slightly (naturally) curved and rounded piece of shell cut from the great clam (*Tivola*) of the coast. This is a common form of ornament, and pieces of this shape, generally with a flattened surface on one side, at each end, have been found of various lengths, most of which are perforated lengthwise. The drilling of the small hole through so long a piece of hard shell must have been a difficult operation, and one which required great skill and patience, as many of the pieces are 4 to 5

inches in length, while the hole is no larger in diameter than an ordinary pencil-lead. From the shorter pieces of this character, the passage is easy to the small cylinders of shell, and to the beads.

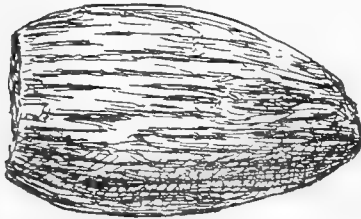
Mr. Bancroft, in his volume on the "Wild Tribes of the Pacific Coast," has mentioned many instances of tattooing and painting the face and various parts of the body by the different tribes of California, as noticed by the early writers; and Mr. Powers, in his "Tribes of California," has shown that the custom is still followed; particular designs, principally tattooed on the chin and cheeks, being characteristic of each tribe. From the prevalence of the custom in modern times, and resemblances in other respects, we have every reason to believe that the former tribes of the islands and coast of Southern California followed the same method of adornment of the person; and that red and black paints were used to a very great extent by the earlier tribes is conclusively demonstrated by their abundance in the graves which have been explored.

Mr. Bancroft quotes from Mr. Hugo Reid that red ochre was used by the Indian women of Los Angeles County to protect their complexion from the effects of the sun. Dr. Yarrow also informs me that at the present day, in New Mexico, Arizona, and Southern Colorado, the Mexican women and Pueblo squaws smear the face with the juice of red berries and sometimes with a paste of white clay. This procedure is said to protect the complexion from the sun, and also to greatly improve the appearance of the skin. Mr. Bancroft also quotes a passage from Viscaino, who saw natives on the southern coast painted blue and silvered over with some kind of mineral substance. From the graves of every locality thus far explored on the southern coast and adjacent islands, *masses* of red ochre* have been obtained. These masses are sometimes loose and crumbling, but more often they are cut into various shapes. Many are in the form of square, oblong, round, and conical pieces of about 1 inch to 3, or 4, or more inches in length or diameter. Sometimes several of these cakes have been found carefully placed in a small stone pot, made of serpentine or steatite, or in one of the small stone mortars. In several instances large *Haliotis* shells have served

*This has often been mistaken for cinnabar. I submitted specimens from Dos Pueblos to Dr. M. E. Wadsworth, of Cambridge, and he has kindly given me the following note in reply: "The specimens of the so-called cinnabar are red ochre (Hematite, ferric oxide)."

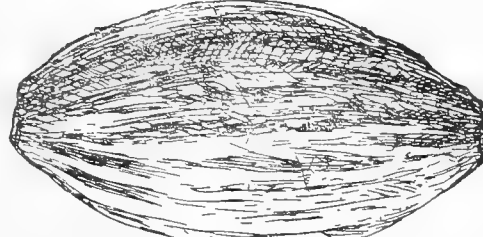
as the receptacles of this valued substance. In addition to being carefully cut into various shapes, these cakes are often ornamented with lines and

FIG. 127.



Cake of red paint.

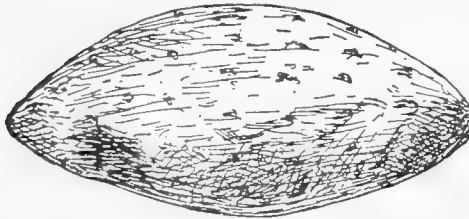
FIG. 128.



Cake of red paint.

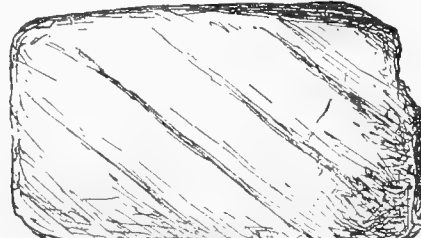
punctures. Several of these cakes from the graves at Dos Pueblos and La Patera are shown of actual size in Figs. 127, 128, 129, 130, and 131.

FIG. 129.



Cake of red paint.

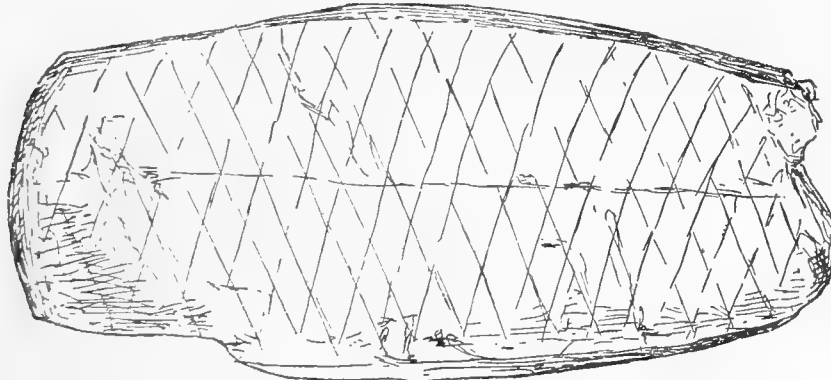
FIG. 130.



Cake of red paint.

Small pebbles, with one face cut and artificially smoothed, often more or less discolored by the red ochre, have been taken from the graves, and

FIG. 131.



Cake of red paint.

it seems probable that they were used for rubbing the paint when mixed with water, or other substances, before being employed.

Another kind of paint, bluish-black in color, is also abundant in the graves. This is a prepared material, and is sometimes found in small irregularly-shaped masses, which were probably hardened while in shells, or in such a little ball as Fig. 132, from Dos Pueblos, or still more carefully

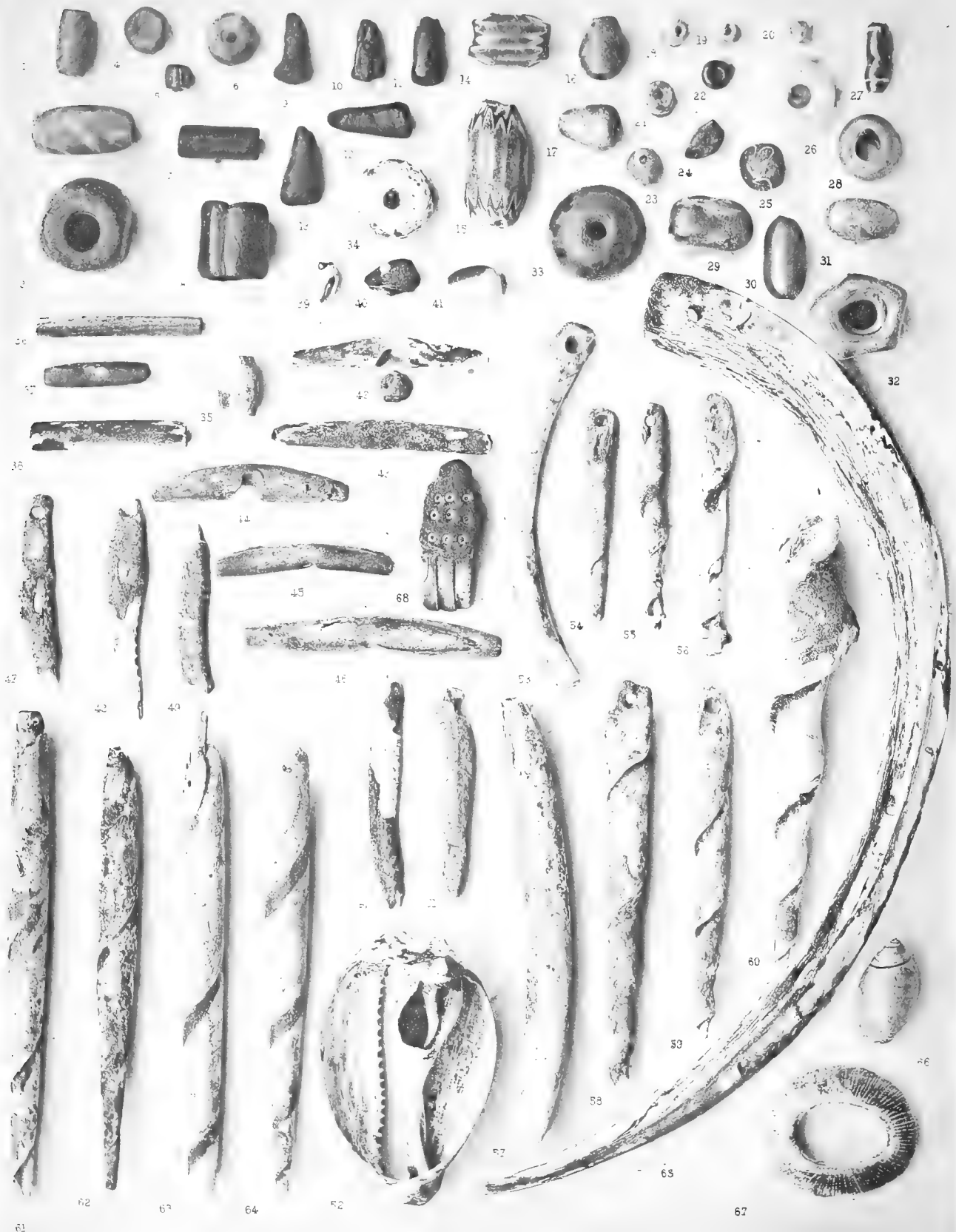
FIG. 132.



Ball of black paint.

moulded into conical forms and ornamented with punctures like some of the cakes of red ochre. More frequently, however, this prepared paint, when taken from the graves, is in receptacles of various kinds. The very small cups made of serpentine are often filled with this paint, and the little conical cups formed from the vertebræ of large fishes seem to have been often used as receptacles for this particular kind of paint. These little vessels have already been referred to, and are figured on a previous page. By far the most common receptacles for this paint, however, are the smaller shells of *Haliotis*, several common bivalves, and the larger limpets of the coast. The paint itself is probably that mentioned by Viscaino as blue and silvery, and consists of a mixture of *wad* with some resinous substance. In its present state it can be softened by heat, and if burnt gives off a peculiar pitchy odor. At first I supposed that the *wad* was mixed with asphaltum, but this does not seem to be the case. A mass of the *wad** in its natural state (P. M. 13139) was found by Mr. Schumacher in a grave at the isthmus, on the island of Santa Catalina, and its determination by Dr. Wadsworth led to the proper understanding of the character of the black paint.

* Of this mass Dr. Wadsworth says: "The black material given me is *wad* or hydrous oxide of manganese (bog manganese), with some hematite, specular variety."



THE HULLTYPE PRINTING CO. 220 DEANMAN ST. BOSTON

ORNAMENTS OF STONE, GLASS & C. SOUTHERN CALIFORNIA.
FULL SIZE.

BEADS.

BY S. S. HALDEMAN.

BEADS have been extensively used in ancient and modern times by savage and civilized nations, which gives them a value in ethnology. Upon the western or Vesperian continent certain forms are spread from ocean to ocean, particularly such as are made of molluscous shells, and constitute wampum. Among the materials used are seeds, nuts, and other vegetable productions; fossils with natural perforations, such as encrinites; worked stone, burnt clay, metal, bone, claws of beasts and birds (the latter sometimes made into rings by inserting the points successively into the open bases until the ring is closed); teeth of men, deer, bears, wildcats, peccaries, monkeys, alligators, sharks, &c. ;* wing-cases of beetles, and the shells of mollusca, univalves of various sizes being strung entire, † the larger, together with bivalves, being shaped into disks, cylinders, and irregular pieces used as gorgets. Besides these, during the last three centuries, Venetian glass beads have been widely spread, their varieties of color, form, and size making them attractive. Even when these occur in mounds and graves, they are not to be regarded as older on this continent than the Columbian discovery, notwithstanding several of the patterns are ancient Egyptian, Assyrian, and Phœnician, whence the manufacture was somehow inherited by modern Venice, perhaps in connection with Rhodes, where Græco-phœnician

*The Caribs of Guiana "decorate themselves with beads made of fishes teeth." . . . Henry Boringbroke, *A Voyage to Demerary*, 1807, p. 145. "Women [of the Indians] wear a little apron of glass beads," p. 153.

The Fingoes of S. Africa use wolf teeth as ornaments. Mrs. Harriet Ward, *Five Years in Kaffirland*, 1848, vol. i, p. 251.

An Abyssinian necklace in my collection is composed of European beads, cowries (*Cyprea* shells), a triangular plate of brass, two small copper coins, small spheric brass buttons, carnelian, date seeds, numerous cloves pierced through the side, a fragment of wood, a bit of cane, and an Arab phylactery.

†See Lartet and Christy, *Reliquiæ Aquitanicæ*, B. plates v and xi. C. C. Jones, *Southern Indians*, chapter xxii, pl. xxx.

examples occur as early as B. C. 500–850, a period suggested to me by Mr. A. W. Franks, of the British Museum.

The early date of A. D. 1500 is connected with the appearance of beads on the western continent, for in that year Cabral discovered Brazil and purchased supplies with “beads, bells, and such trinkets.”

The beads collected at Dos Pueblos and La Patera include some interesting examples.

(1.) The first of these is a stout bead of the rare material copper, probably native,* bent from a beaten strip originally 14 millimetres in width, this forming the length of the bead. The diameter is somewhat less than the length, the form cylindric, with the edge of the terminal angles rounded off. Plate XIII, Fig. 8, actual size. Copper beads formed of curved flakes occur in mounds of the Mississippi region,† and in graves in Eastern Pennsylvania.

(2.) Several dark gray, cylindric, or barrel-shaped specimens of talc slate from $\frac{1}{4}$ to $\frac{7}{8}$ inch long, and from $\frac{1}{2}$ to $\frac{3}{4}$ in diameter; perforation from $\frac{1}{8}$ to $\frac{1}{4}$ inch. Plate XIII, Fig. 3. Dos Pueblos.

(3.) A single specimen of polished stone resembling a pale-green feldspar, $\frac{1}{4}$ of an inch long, shaped like the preceding figure. La Patera.

(4.) Resembling black serpentine with yellowish veins; cylindric, surface polished; length about $\frac{1}{2}$ inch, diameter nearly $\frac{1}{4}$ inch, Plate XIII, Fig. 7. I have a larger ancient Peruvian specimen ($\frac{5}{8}$ inch) of polished, light-blue stone, but with the perforation contracted at the middle. See description of No. 8.

(5.) Blue fluorite, some with pale bands; subcylindric, varying in length from $\frac{3}{16}$ to $\frac{3}{4}$ inch. In some of the shorter examples the hole is countersunk at both ends, Plate XIII, Figs. 1, 2, 4, 5, 6. La Patera and Dos Pueblos. Mr. Lorenzo G. Yates‡ mentions beautiful cylindric beads of what he thinks a magnesian silicate, banded or mottled in white, brown, and

* John R. Jewitt (*Adventures*, ed. 1824, p. 170) mentions copper arrow-points at Nootka, 1803.

† R. J. Farquharson, *Exploration of Mounds near Davenport, Iowa*. *Proceed. Am. Assoc.*, vol. 24, 1875, p. 297, pl. 6. Jones (*Southern Indians*, 1873, pp. 47 and 520) mentions gold beads and copper pendants as occurring in Georgia. In a mound in Ohio a lot of about five hundred copper beads were found and are now in the Peabody Museum (8992), where are also several other lots from mounds in the South and West. See Tenth Report Peabody Museum, pp. 60, 65, 1877. Small beads of copper were used by the ancient Egyptians.

‡ *American Naturalist*, Jan. 1877, pp. 30–31.

yellowish. With these we may compare allied stone specimens collected by Mr. E. A. Barber in the ancient pueblos of the Pacific slope *

Shell beads for ornament or money have been and are still in use, either unaltered, or ground into shape, varying greatly in length, from short disks to long cylinders, made on the coast from species having the requisite thickness of shell, or from fresh-water mussels (*Unio*) in the interior. Mr. Yates mentions that the disks represented by his figure B (about $\frac{1}{2}$ inch in size) are valued by the Indians at eighty for a dollar.

The most popular Atlantic species of wampum-shell was the clam (*Venus mercenaria*), and on the Pacific the *Tivola crassatelloides*, of which the former has parts where the white is varied with blue, and the latter with blue externally and brown within, giving a pleasing variety to the resulting work. Mr. Yates figures a specimen (C) made of *Haliotis* and shaped like a keystone, resembling a mound example in silver (but without a curved side) figured by Brett.†

(6.) Includes disks about $\frac{3}{16}$ inch thick and 1–1½ in diameter of white shell. In some cases the perforation is out of centre, but not marginal. Plate XII, Fig. 40. Dos Pueblos and La Patera. Mr. Yates figures a Californian bead like the preceding, about $\frac{1}{2}$ inch in diameter, with the hole countersunk on each side, a form which occurs in mounds in Missouri and West Virginia, and Mr. Thomas Masterson (Columbia, Pa.) has it from graves in Tioga County, Pennsylvania.‡ There are also many hundred of these in the Peabody Museum from the burial mounds and caves of Tennessee.

(7.) Disks, short cylinders, and nearly spheric forms of shell, the surface disintegrated by age (Plate XIII, Figs. 34, 35). In one spheric specimen, about $\frac{1}{2}$ an inch (12 millimetres) in size, the hole is bushed at one end with a small (3 millimetres) cylindric bead as if to diminish the size as made by the boring-tool. La Patera.

(8.) Shell cylinders (Plate XIII, Fig. 38) from about an inch to nearly 2 inches long and $\frac{3}{16}$ to $\frac{5}{16}$ in diameter; surface decayed; largest specimen

* American Naturalist, May, 1877, p. 273, fig. 6a.

† Indian Tribes of Guiana, London, 1868, p. 440.

‡ See Mr. Stearns on "Aboriginal Shell Money," American Naturalist, June, 1877; and Dr. Rau on the Archæological Collection of the National Museum, Washington, 1876, p. 69.

bushed at one end, but narrowed about the middle by the shape of the boring-tool, the workman being satisfied with any perforation that would permit a string (commonly a sinew) to pass. An irregularity of perforation in which the two parts are not in line is common in perforated stone beads, and often to such an extent as to forbid the passage of a needle. The smallest of the shell cylinders (about $\frac{3}{16}$ inch diameter and $1\frac{1}{4}$ long) has a perforation but little more than a millimetre (or less than $\frac{1}{16}$ inch) in diameter, and the difficulty of making it must have been very great. Cut from *Tivola*. La Patera and Dos Pueblos.

(9.) Several curious subcylindric beads, cut from *Tivola*, and exhibiting the blue and white coloring. The longest is $1\frac{3}{8}$ inches long, about $\frac{1}{4}$ diameter in the middle, and tapering to each end except on one side, which is rectilinear. The perforation (of about 1 millimetre) is so small that it would be difficult to pass a thread, and probably on this account a rounded notch occupies the middle, where more than half the thickness has been cut away as if to free the perforation and permit threads to be passed from each end and knotted separately or together at the middle. In a second specimen the notch nearly reaches the perforation; in the third the notch is quite superficial, and does not reach the centre.* In some cases the notch may be due to the fact that the borings from each end did not meet. Plate XIII, Figs. 42, 43, 44, 45, 46 La Patera.

(10.) Slender blue subcylindric shell beads made of *Tivola*. Plate XIII, Figs. 36, 37. La Patera and Dos Pueblos.

(11.) Small thin wampum disk beads (Plate XII, Figs. 3, 4, 5), from about $\frac{1}{8}$ to $\frac{1}{4}$ inch in size; cut from univalve shells, and therefore slightly concave and convex on the opposite sides. One specimen is not completely rounded, and the unfinished perforation has been commenced on one side. A few are flat as if worked from the solid shell. Plate XII, Fig. 6. La Patera and Dos Pueblos.

* Other examples of this form received since the beads were examined by Dr. Haldeman show that the notches were subsequently filled with asphaltum even with the surface of the shell. One specimen with the asphaltum filling removed from the notch, and shown under the figure, is represented by Fig. 42 of the plate; and a second specimen with a bunch of asphaltum in place, the outline of which can be distinctly seen by using a lens, is shown in Fig. 43. Figs. 44, 45, and 46 exhibit the three specimens referred to in particular by Dr. Haldeman, in two of which the notch has been but partly cut to the intended depth.—F. W. P.

(12.) Akin to the preceding, $\frac{1}{4}$ to $\frac{3}{8}$ inch, convexity and concavity greater, giving the appearance of little saucers.* Plate XII, Fig. 7.

(13.) Whitish cup-shaped fragments about $\frac{5}{8}$ inch in size. Plate XII, Figs. 28, 29. They are roughly shaped from the univalve shell of *Olivella buplicata*, specimens of which (Plate XIII, Fig. 66) occurred with the beads; hole central, varying in size. Similar beads have been figured by Yates.† The shell itself, with the apex ground off, is strung for ornament by the natives of Oregon.

(14.) Several small univalves (probably *Oliva*), $\frac{3}{8}$ inch long, with the apex rubbed off to allow them to be strung lengthwise. Plate XIII, Figs. 39, 40, 41. Dos Pueblos. Small allied specimens treated thus are found upon the string in old Peruvian tombs.

A small *Marginella* (*M. apicina*) of the Atlantic coast occurs in graves in New York and in mounds in Western Virginia, Tennessee, and Missouri, the side of the apex being rubbed off to make an opening. The occurrence of an Atlantic species in Missouri shows an extensive commerce.‡ The popularity of a small white oval Venetian bead among the aborigines may depend upon its general resemblance to such small marine univalves.

(15.) *Dentalium indianorum* and *D. hexagonum* (as labelled by the late Mr. Anthony): Santa Barbara, La Patera, Dos Pueblos. Mr. Yates (already cited) figures a species, and says they are imported from Europe for trade. In the Adventures of John R. Jewitt, we are told that at Nootka the ifewaw "forms a kind of circulating medium among these natives, five fathoms being considered as the price of a slave—their most valuable species of property." He describes the laborious native method of fishing for them. This was in 1803.

(16.) Apparently very small perforated wampum disks ($1\frac{1}{2}$ to 2 millimetres diameter) aggregated in little cylinders, but too regular for hand-

* The small shell beads, referred to by Dr. Haldeman as belonging to his groups 11 and 12, have proved to be a very common form in California, and the later explorations have resulted in the collection of many thousands from the graves, particularly on the Santa Barbara Islands. From the graves at the isthmus on Santa Catalina alone Mr. Schumacher has sent to the Peabody Museum (13282) nearly a bushel of these small beads.—F. W. P.

† American Naturalist, Jan. 1877, p. 30, fig. G; the shell, fig. F.

‡ See Dr. Rau on Ancient Aboriginal Trade of North America, in the Smithsonian Report, 1872, pp. 372-83.

work. They are probably branches of a recent crinoid or other radiate. Plate XII, Figs. 1, 2. Dos Pueblos.

(17.) Cones of brown asphaltum roughly moulded as if by hand, about $\frac{1}{2}$ inch long, the base about $\frac{1}{4}$ inch in diameter, the truncate apex $\frac{1}{8}$ inch or more, with a small hole down the axis, but not reaching the base. Plate XIII, Figs. 9, 10, 11, 12, 13. They seem to belong to the class of pendants used on fringes, and being probably moulded upon the string which was to suspend them; the decay of this would leave an opening. Abundant in the excavations at La Patera and Dos Pueblos,* but an uncommon form of ornament. Some of these clove-shaped asphalt ornaments were found by Dr. Yarrow's party, in the holes of which were small pieces of what were supposed to be dried grass.

Glass beads from $\frac{1}{8}$ to 1 inch in size, of various shapes and colors (transparent, translucent, opake), were found abundantly in the excavations at Dos Pueblos and La Patera. These, with perhaps some exceptions, are Venetian, green and red being the predominant colors.

Among the articles shipped in England for trade on the Northwest coast, Jewitt (already quoted) mentions, as part of a cargo in 1802, "looking-glasses, beads, knives, razors, &c., which were received from Holland"; and when Cabral discovered Brazil in 1500 he mentions using beads in trade with the natives. They are found in Indian graves on both sides of the continent and in many interior localities.

(18.) The figure (Plate XIII, Fig. 18) represents an oval bead of white glass or enamel, which occurs in graves at Dos Pueblos and Santa Cruz Island. Another specimen is modern Ute, got in Colorado by E. A. Barber, 1875. Mr. W. H. Holmes, of the Geological Survey of the Territories, found one with the polish nearly removed by time among the *débris* of ruins on the Mancos River, Southwest Colorado, and both Drs. Rothrock and Loew, of the Geographical Surveys West of the 100th Meridian, have found them in ruined pueblos in Colorado—a possible evidence that this deserted locality was occupied since the Columbian discovery, although it must be admitted that the specimens may have been dropped by recent Indians.

* These singular ornaments (?) have also been collected from graves on the island of San Miguel by Mr. Bowers (P. M. 13728).

(19.) Known as the "coralline d'Aleppo"; has a great range over the world. It is a spheric or cylindric Venetian bead of many sizes, externally red, with a white, whitish, yellowish, or pink interior; spheric. Length, $\frac{3}{8}$ inch diameter, or little more. A single bead, among others, from Dos Pueblos and La Patera. A specimen ($\frac{3}{4}$ inch long, $\frac{3}{8}$ diameter) was found by Mr. W. H. Holmes in 1875 near the trail on the Mancos River, South-west Colorado.

(20.) Akin to the preceding, outside red, inside black. Dos Pueblos and La Patera. Plate XIII, Fig. 22.

(21.) Small yellow; glass fresh looking. Same locality

(22.) Small white; fresh. Same locality.

(23.) Two beads about $\frac{3}{8}$ inch long, $\frac{1}{2}$ in diameter, of deep blue glass, one alone retaining its polish, with four pentagonal facets at each end, meeting in a central, transverse zigzag line. Same locality. I have this variety from graves near Columbia, Pa.

(24.) A five-sided dark glass bead, $\frac{5}{8}$ inch long and wide, surface somewhat worn. Plate XIII, Fig. 32. Dos Pueblos.

(25.) Fragment of a large deep-blue oval bead somewhat oxidized and the fracture not fresh; medial diameter $\frac{3}{4}$, length probably $1\frac{1}{2}$ inches. Dos Pueblos.

(26.) Spheric, $\frac{3}{4}$ inch diameter, of dark-blue glass; polish deteriorated. La Patera. A smaller specimen of the same character is represented on Plate XIII, Fig. 28.

(27.) A trifle smaller than the preceding, surface with more polish, mottled with light brown; these parts oxidized upon one side. Plate XIII, Fig. 33. La Patera.

(28.) A flat bead of bluish translucent opalescent glass, $\frac{1}{2}$ inch diameter. Plate XIII, Fig. 26. La Patera.

(29.) Various specimens from La Patera and Dos Pueblos, exhibiting oxidation of the glass from lying in the soil, perhaps for several centuries. Three of a conical shape are represented on Plate XIII, Figs. 16, 17, 23, and three others of an oval form in Figs. 29, 30, 31.

(30.) A blackish purple cylindric bead about an inch long and $\frac{1}{4}$ inch diameter. La Patera.

(31.) Small ruby-colored beads of irregular shapes, spheric, oval, and faceted. Plate XIII, Fig. 24.

(32.) Spheric, ruby-colored, $\frac{1}{4}$ to $\frac{3}{8}$ inch in size, marked with white foliate lines. This and the next example are of well-known Venetian patterns. Plate XIII, Fig. 25. Dos Pueblos and La Patera.

(33.) Slender, about $\frac{1}{2}$ inch long, dark blue, hooped with raised lines of white or yellow. Plate XIII, Fig. 27. La Patera.

(34.) Two star-pattern, polychrome, cylindric beads. Plate XIII, Figs. 14, 15. A pattern called "rosetta" at Venice, where spheric and cylindric forms of it are still made. The larger is nearly 1 inch long and $\frac{3}{8}$ diameter. They are composed of glass or enamel of several colors, one surrounding another, so that they are visible only at the ends, until these are rounded or ground in sloping facets, when all the colors appear. The inner colors are arranged to form a star or zigzag line in section, the edge of the rays of which often appear through the translucent exterior color in longitudinal lines of a paler blue when the exterior of the bead has this color, and the outer rays of the star are white. The Venetians seem to have inherited the art of making them, for they are known to Egyptian and Phœnician antiquity; they occur in graves in Europe and America. On this continent they have been found in Canada, New York, Pennsylvania, Florida, and California. The Smithsonian Institution has specimens from New York, Santa Barbara, Cal., and one from a mound in Florida, in connection with which I have given various details and bibliographic references.* In the archaic specimens I have seen in Europe and America the outer layer is blue, the modern Venetian examples being blue, red, green, and yellow, the last striped with black.

The Smithsonian Institution has recently secured a collection of about five hundred varieties of modern Venetian beads. That Institution and also the Peabody Museum at Cambridge have many specimens from aboriginal natives and their graves, and collectors would do well to add to those collections from all sources. Interesting examples occur in the Cesnola and Egyptian collections of the Metropolitan Museum, New York, and my own

* Since published in the Smithsonian Report for 1877, p. 203, fig. 1.

cabinet includes specimens illustrating this branch of the ethnology of various ancient and modern nations.

(35.) Numerous glass beads of various shapes and colors from La Patera and Dos Pueblos. Plate XIII, Fig. 19, cylindric, pink color; Fig. 20, round, green; Fig. 21, cylindric, green.

IRON IMPLEMENTS AND OTHER ARTICLES OBTAINED BY CONTACT WITH EUROPEANS.

THE ancient cemeteries thus far examined on the coast and islands of Southern California, furnish indisputable evidence that the native tribes, whose remains are found in that region, not only came in contact with the early Spanish explorers of the coast of California, but, also, that they, for a long period after they were known to the white race, continued to bury their dead in the same manner and in the same tribal or village cemeteries as before. In consequence of this continued use of a burial place, and the admixture which has taken place by the disturbance of old graves to make room for the new, it is now impossible to separate, in most instances, the articles which came from the very old graves from those of comparatively recent date, so that while a large number of the graves are known by their contents to have been made since European contact, others in the immediate vicinity belong to an indefinite period of the past.

The only object of metal which has the appearance of being native work is the single copper bead obtained by Dr. Yarrow and figured on Plate XIII, Fig. 8. This may be of native copper, and perhaps was obtained by trade or warfare with other tribes. Articles made of copper, bronze, brass, silver, and iron are, however, of very frequent occurrence in the graves, and many such were not only of unquestionable value to the Indians with whom they were buried, but also to their previous white owners. The peculiar forms of the bronze cups, goblets, platters, and many other articles, leave little doubt of their having been brought from Europe during the early years of Spanish exploration. Of a later period, probably, are the silver spoons and four-pronged forks; the brass thimbles, which have been per-



IMPLEMENTS OF IRON, SOUTHERN CALIFORNIA.
REDUCED ONE SIXTH.

forated and strung for necklaces, many of the glass beads, and particularly, the tin can found at Dos Pueblos. The majority of the articles, however, are of old Spanish forms, and among them should be particularly mentioned the brass buckles, portions of bits and other parts of the accoutrements of horses. Some old china cups, and a piece of red pottery stamped and glazed, with numerous brass buttons and other objects, have also been found in the graves, but they do not furnish any particular evidence as to the time they were obtained by the Indians during the three hundred years of contact which they had with white people of various nations. A small leaden crucifix was also found at Dos Pueblos, near where the comparatively modern china tea-cups were found, and was very likely obtained from one of the Missions.

Of ordinary pottery, similar to the bowls more or less common to nearly all the Indian tribes of the region east and south of the southern coast of California, a few specimens have been found and are in the Smithsonian Institution and the Peabody Museum. A few fragments in the Peabody Museum (13738) were obtained by Mr. Bowers on the island of San Miguel, associated with a bronze cup. A bowl was found by Mr. Schumacher (P. M. 13215) on the island of Santa Catalina, in one of the graves at the isthmus, in which were also many articles of iron, bronze, brass, &c., of European make. This bowl has the appearance of rude, wheel-made pottery, and is unquestionably of a late date. As far as can be proved from the large collections made by the officers of the Survey, and the gentlemen who have explored the region under the auspices of the Smithsonian Institution and the Peabody Museum, the Indians of the coast of California have always been without the art of making vessels of clay.*

Many articles of iron have been found in the graves, particularly in those on the isthmus of Santa Catalina, from which were obtained several axes of early form, an old-fashioned grubbing-hoe, knives, heads of boarding-pikes, a small sword, nails, pieces of gun and pistol barrels, small cannon-balls, and many other objects of like character. Among the most interesting of these implements of iron are a few which show that they have been

* Recent letters from Mr. Bowers and Mr. Schumacher confirm the statement here made, that all the pottery that has been found on the islands and also on the mainland opposite is of late date and insignificant in amount. See foot-note, p. 14.

adapted to native requirements and customs. Of such is a fragment of a short knife-blade, probably made out of a piece of hoop-iron, which has been inserted in a wooden handle by the use of asphaltum. This was found at La Patera; and from the same place is an iron nail over the head of which a mass of asphaltum has been placed, so as to permit the nail being held in the hand, probably for use as a boring instrument.

From Santa Cruz Island there was obtained a small triangular piece of iron, like an arrow-point, which was inserted in a piece of wood and probably served as a knife (P. M. 9313). This iron point is represented of actual size in Fig. 8 of Plate IV, for comparison with the stone knives of the same shape.

Another adaptation is shown by Figs. 1, 2, 3, 4 of Plate XV. These short blades are probably made from hoop-iron, in imitation of the short swords of bone of which a description has already been given. They may, however, have been forged into their present shape by the early traders with the Indians, for the purpose of supplying a desired form of implement. At all events, they are tolerably common in the graves; and that they were highly prized seems to be shown by the fact that they were either enclosed in a cloth or a fur-lined scabbard, or that they were carefully wrapped in these materials at the time of burial. The photographic figures on the plate, taken from specimens from La Patera, are good evidence of this, inasmuch as the fur and woven cloth, preserved by the action of the iron, can be distinctly seen. Another of these iron blades, also from La Patera, is represented by Fig. 133.

FIG. 133.

Iron sword, $\frac{1}{2}$.

At the time of its burial, this blade had also been enclosed in cloth, the remains of which can be traced on the sides near the rounded end and in such a manner as to lead to the belief that these blades were not inserted in wooden handles, a view which is sustained by the fact that of all the specimens of this character in the Peabody Museum not one shows signs of having been in contact with wood, although many other of the iron implements have portions of the wooden handles preserved.

In connection with the adaptation of foreign metallic articles to their

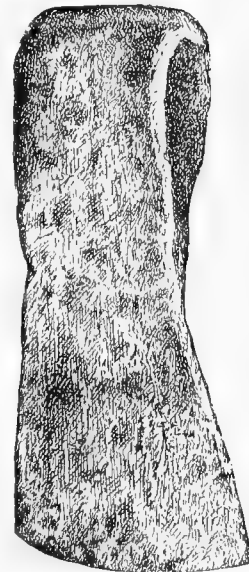
own native designs, should be mentioned an ornament from the isthmus (P. M. 13205), which is made of two thin concavo-convex and circular pieces of copper or bronze, 3 inches in diameter, perhaps once forming ornaments on an old Spanish horse-bridle. These pieces have been fastened together with native-made twine passing through holes which have been roughly punched at the edges of the plates, so as to form a double-convex object. One surface of this has been coated with asphaltum and closely covered with seven concentric rows of small shell beads. In this manner a large ornament, with a hole for suspension, has been formed, closely resembling the little article made of bone, and the larger one of asphaltum, which were also ornamented with shell beads, and of which descriptions have been given under the head of "Ornaments" on a previous page.

Fig. 134 represents a small iron axe found in a grave at La Patera. Several axes of this and allied forms were also found in the graves at the isthmus on the island of Santa Catalina.

Another form of iron axe from La Patera is shown on Plate XV, Fig. 5, and is of particular interest, as the oxidation of the iron has preserved the form of the feathers over the surface shown in the figure, and the structure of cloth on the opposite side, in such a way as to prove that this valuable article was either carefully enclosed in a fabric made of coarse cloth and feathers, or was in contact with such materials forming part of the dress or coverings of the body with which it was placed in the grave.

It will be remembered that several of the copper axes found in the mounds in Iowa, a few years ago, furnished undoubted evidence that they had been wrapped in cloth at the time of deposit, and it seems very natural that all valuable articles, particularly cutting-tools of metal, should be deposited with care by the surviving friends for the use of the departed in his future state. To the firm and wide-prevailing belief that such

FIG. 134.

Iron axe of European make, $\frac{1}{2}$.

articles as were of value on earth would be required in the after-state, we owe the opportunities that are now given us, not only of learning much of importance in relation to many nations of whom history does not make mention, but also of carrying back the record of tribes and nations of modern times far into the dark prehistoric past.

OBSERVATIONS ON THE CRANIA FROM THE SANTA BARBARA ISLANDS, CALIFORNIA.

BY LUCIEN CARR,

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THE series of Crania from the Santa Barbara Islands numbers about three hundred and fifteen specimens,* and is divided somewhat unequally between the Peabody Museum of Archæology at Cambridge, Mass., and the Army Medical Museum at Washington City. In the former of these institutions there are over one hundred and thirty skulls representing Santa Cruz of the northern, and San Clemente and Santa Catalina of the southern, group of islands, while in the latter and larger collection are to be found numerous specimens from the mainland, from San Nicolas of the southern and San Miguel of the northern group of islands, as well as from Santa Cruz. Thus it will be seen that, to a certain extent, these collections supplement each other; and although it is with the former that I shall chiefly have to deal, yet, thanks to the publications of the Army Medical Museum and to the personal kindness of its curator, Assistant Surgeon George A. Otis, U. S. A., there is abundant material for a comparison of the results arrived at by a careful study of the crania from each one of these different localities. To simplify this as much as possible and at the same time to make future reference comparatively easy, the average measurements are here reproduced and tabulated, not only according to the place from which the crania were originally obtained, but also according to the collection in which they are now to be found.

* This estimate is limited strictly to adults from the islands. In it the specimens in the Army Medical Museum are put down at one hundred and eighty-two, though, in point of fact, they largely exceed that number. My estimate was taken from the Check-list published in 1876, since which time that collection, including the crania found on the mainland, has probably been doubled.

TABLE I.—MEAN MEASUREMENTS OF CRANIA FROM THE SANTA BARBARA ISLANDS, CALIFORNIA.*

Number.	Locality.	Number of specimens.	Capacity.	Length.	Breadth.	Height.	Index of breadth.	Index of height.	Frontal.	Depository.
1	Santa Cruz.—Males.....	73	1,302	177	140	134	.789	.750	.....	Army Medical Museum.
2	Females.....	62	1,175	170	135	128	.791	.752	.....	Do.
3	San Miguel.—Males.....	18	1,318	176	140	131	.794	.738	.....	Do.
4	Females.....	18	1,246	172	137	128	.805	.747	.....	Do.
5	San Nicolas.—Males.....	7	1,326	181	137	132	.760	.730	.....	Do.
6	Females.....	4	1,253	173	140	124	.808	.718	.....	Do.
7	Santa Cruz.—Males.....	45	1,365	178	138	132	.776	.741	.90	Peabody Museum.
8	Females.....	35	1,219	172	134	128	.778	.748	.86	Do.
9	San Catalina.—Males.....	26	1,470	189	133	130	.704	.690	.95	Do.
10	Females.....	12	1,279	178	130	124	.729	.696	.92	Do.
11	San Clemente.—Males.....	9	1,452	186	137	131	.740	.702	.94	Do.
12	Females.....	6	1,315	179	135	125	.754	.706	.90	Do.
13	Average of males.....	178	1,372	181	137	131	.760	.725	.93	
14	Average of females.....	137	1,248	174	135	126	.777	.727	.89	
15	Average of the whole.....	.....	1,310	177	136	128	.768	.726	.91	
	Maximum.....	315	1,747	195	154	145	.....	.....	1.05	
	Minimum.....	.....	990	137	122	116	.....	.....	.80	
	Range.....	.....	757	38	32	29	.....	.....	.25	

* These measurements are given as follows: Capacity in cubic centimetres; length, breadth, and height in millimetres.

Historically speaking, there is but little that can be learned about the people who formerly inhabited these islands, and with whose skulls we have been making somewhat familiar. In the brief summary that Mr. Putnam has elsewhere given, this coast is shown to have been occupied by numerous tribes, living in different villages, speaking different languages, or different and scarcely intelligible dialects of the same language, and closely resembling, in these respects at least, the Indians of the Atlantic seaboard at the date of the first settlements in Virginia and New England. This, with now and then a small and imperfect vocabulary, comprises the sum and substance of all that the early chroniclers have told us about these people for the two centuries immediately succeeding the discovery of this country by the Spaniards, and it is so very meagre and unsatisfactory that we turn, with a certain sense of relief, to the study of their crania and of the other contents of their tombs in the hope that some further light may be thrown upon a subject that otherwise must forever remain shrouded in darkness. But while this revelation of the spade and pickaxe—infal-

lible so far as it goes—enables us to reproduce truly the phase of civilization to which these people had attained, it does not aid us, except perhaps in a negative way, in forming a correct opinion as to the precise period of time at which they lived and flourished. Indeed, so far as the evidence of the graves is concerned, there is no reason for assigning a very great antiquity to any of these remains.

Among the crania themselves there is, of course, nothing to indicate that they represent different phases of civilization; and the implements and ornaments of native manufacture, found buried with glass beads, brass rings, cannon-balls, and other articles of European origin, do not differ, either in degree or kind, from those taken from graves in which there is no such evidence of intercourse with the whites. As the one class of interments undoubtedly belongs to the people inhabiting these islands subsequent to the Spanish conquest, there can certainly be no good reason why the other should not be assigned to the same people, though, of course, it is possible, and even probable, that, taken together, they cover a period of time of long duration. Indeed there can be but little doubt of this, in view of the decayed condition of many of the skulls—so much so that their removal was impossible—and of the fact that the articles of European workmanship were found in graves of a comparatively late date. How long these people were in possession of these islands before the coming of the Spaniards, we can never know; but we do know that, be that period long or short, so far as the testimony of the graves is concerned, there was, from first to last, no advance in any of the arts by which we are wont to estimate the progress of a people in civilization. Bearing these facts in mind, we shall be better prepared to examine some of the points in which these crania are found to agree or disagree among themselves and with those from the mainland, and thus, perhaps, to arrive at a more correct understanding of the ethnology of this section of the Pacific coast.

Assuming, for the present, unity of race in the people formerly inhabiting these islands, and dividing the skulls according to the features that distinguish the sexes, it will be seen that there are one hundred and seventy-eight that are probably those of adult males and one hundred and thirty-seven of adult females. The average capacity of the former is 1,372^{cc}, and

of the latter 1,248^{cc}, showing a difference of 124^{cc} in favor of the males. The largest skull in the collection—Peabody Museum No. 13550, from San Clemente Island—has an internal capacity of 1,747^{cc}; while the smallest*—Army Medical Museum No. 1327, from Santa Cruz—is less than two-thirds of that size, reaching only to 990^{cc}. Of the whole number there are sixteen that range above 1,500^{cc}, and fifteen that fall below 1,100^{cc}. The mean of the whole, or, more properly, the mean of the averages from the islands, is 1,310^{cc}, which is less than that of the American Indian, 1,376^{cc}, as given by Dr. J. Aitken Meigs,† the Tennessee Moundbuilder, 1,341^{cc},‡ the Eskimos of Greenland,§ 1,392^{cc} and of the Northwest coast,|| 1,404^{cc}; but is somewhat larger than the ancient Peruvian,¶ 1,230^{cc}, and the Australian,** 1,224^{cc}. Proceeding a step further in our classification, we find that the index of breadth†† is .768, and of height, .726, which brings the entire collection within the class of orthocephali‡‡ and of platycephali; *i. e.*, the average cranium is neither long nor short, but occupies the middle position between the two, and its breadth is greater than its height. These resemblances and differences, however, can be seen to better advantage when the measurements are brought together in tabular form, and, to this end, I have arranged the following table, which may be found

* Check-list, Army Medical Museum, p. 49, Washington, 1876.

† Catalogue of Human Crania in the Collection of the Academy of Natural Sciences of Philadelphia, by J. Aitken Meigs, p. 10.

‡ Eleventh Annual Report of the Peabody Museum of Cambridge, p. 224. Jones' Aboriginal Remains of Tennessee, p. 110, Washington, 1876.

§ Check-list of the Army Medical Museum, Washington, 1876.

|| Check-list of the Army Medical Museum, Washington, 1876.

¶ Fourth Annual Report of the Peabody Museum, p. 18, Cambridge, 1871. Dr. J. Aitken Meigs, *l. c.*, p. 17, Philadelphia, 1857.

** The Native Races of the Pacific Ocean; a paper read before the Royal Institution of Great Britain, by Prof. W. H. Flower, of the Royal College of Surgeons of England. In this connection it may be well to say that, in measuring the internal capacity, Professor Flower used mustard seed, the Army Medical Museum, No. 8 shot, and the Peabody Museum, selected pease. To any one familiar with the discrepancies in the results obtained by using these different methods of measurement, it is needless to say that absolute accuracy cannot be claimed for either one of them, though all three can be made to approximate sufficiently close to the truth for purposes of comparison, especially when taken in connection with the length, breadth, and height.

†† The index of breadth = $\frac{\text{breadth} \times 1000}{\text{length}}$. Substituting the height for the breadth and the same

formula will give the index of height.

‡‡ I adopt the classification of Dr. Thurnam and other English authorities:

I. Dolichocephali, or long skulls with index at or below .739.

II. Orthocephali, or oval skulls with index from .740 to .799.

III. Brachycephali, or broad skulls with index at or above .800.

not wholly devoid of interest, though it is not claimed to be of any great value as the basis for an inductive argument. It is limited, as will be seen, to crania from North and South America, and, as far as possible, the distinction based upon sex has been kept up. This, however, has not always been possible, as in some instances the records from which I have copied have made no difference in this particular, but have massed the two sexes together and given the mean measurements conjointly instead of separately. Where this is the case the comparison is to be instituted with the mean of the whole number of crania, as given in No. 15, Table I, or it may be omitted altogether without any very great sacrifice of craniometrical lore; but in all other instances males are to be compared with males and females with females. By pursuing this latter method, approximately accurate results may be obtained.

TABLE II.—MEAN MEASUREMENTS OF CRANIA.*

Number.	Locality.	Number of specimens.	Capacity.	Length.	Breadth.	Height.	Index of breadth.	Index of height.	Frontal.	Remarks.
1	Santa Barbara.—Males	178	1,372	181	137	131	.760	.725	.93	Islands.
2	Females	137	1,248	174	135	126	.777	.727	.89	Do.
3	Total Santa Barbara.....	315	1,310	177	136	128	.769	.726	.91	Do.
4	Santa Barbara.—Males	46	1,285	175	138	133	.777	.754	.....	Mainland.
5	Females	40	1,195	170	135	129	.793	.762	.....	Do.
6	San Luis Obispo Bay.—Males.....	10	1,288	174	139	133	.789	.761	.....	Do.
7	Females	6	1,137	160	140	130	.863	.807	.....	Do.
8	Navajo.—Males.....	17	1,428	174	141	137	.817	.786	.....
9	Females	5	1,348	170	142	132	.839	.781	.....
10	Apache.—Males.....	19	1,355	170	146	132	.861	.776	.....
11	Females.....	10	1,267	166	140	123	.847	.742	.....
12	Greenland Eskimo.—Males	55	1,433	186	132	141	.710	.755	.....
13	Females	21	1,275	180	127	133	.709	.741	.....
14	Alaskan Eskimo.—Males	31	1,440	177	148	131	.835	.743	.....
15	Females	10	1,281	170	141	127	.836	.747	.....
16	Pah Ute (Shoshonee).—Males	13	1,323	178	136	128	.771	.720	.....
17	Females.....	3	1,212	175	136	127	.773	.725	.....
18	Huron.—Males	39	.....	187	139	139	.743	.743	.....
19	Females	18	.....	179	132	131	.757	.731	.....
20	Tennessee Mounds.—Males	43	1,401	164	146	145	.891	.886	.95	Flattened posteriorly.
21	Females	34	1,301	159	142	140	.893	.871	.90	Do.
22	Peruvian.—Mixed	50	1,204	155	143	126	.924	.814	.92	Do.
23	Algonquin, Canada.—Mixed	32	.....	184	141	136	.766	.739	.....
24	Algonquin, New England.—Mixed...	30	.....	179	136	136	.759	.759	.....

* In this table, Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 are taken from the Check-list of the Army Medical Museum. Nos. 18, 19, 23, 24 are taken from Prehistoric Man by Dr. Daniel Wilson, London, 1876. Nos. 20, 21, 22 are from the records of the Peabody Museum, and are not intended for comparison save in those measurements that have not been affected by the posterior flattening to which the crania have been subjected, such as capacity, width of frontal, and, later on, the facial measurements.

Up to this point in the effort to assign the typical skull from these islands to its proper class the averages of the two collections of Washington and Cambridge have been taken. In what follows, however, owing to a difference in the methods of measurement employed, my observations must be limited to the collection in the Museum at Cambridge. Fortunately this is quite large, and as the crania from the islands, as well as from the mainland, now in the Army Medical Museum, agree very closely, both in shape and size, with those now held in Cambridge from the same group of islands, it is safe to assert that the conclusions drawn from a study of the one collection will apply with equal force to the other. Supplementing, then, the results heretofore obtained from a consideration of the two series by the additional measurements taken of the specimens in Cambridge alone, and continuing the process of classification, it will be seen that the mean breadth of frontal,* at the narrowest point on the temporal ridge, is 91^{mm}. This is a little less than that of the Peruvian from the coast,† though the average capacity of the skulls now under consideration is greater. Its deficiency in this quarter, as well as in breadth, seems to be more than compensated by the increased development of the occipital portion of the head. In one hundred and twenty-two out of one hundred and fifty-one specimens examined, or 81 per cent., the distance between the temporal and frontal bones, measured along the line of the speno-parietal suture, was found to be more than half a centimetre, thus forming what Dr. Broca calls the *Ptéron in H*, which, according to the same high authority, is the normal condition in European skulls. In thirteen it was less than half a centimetre; in one the two bones were in contact, and in fifteen there were small, extra (“epipteric”) bones in the upper part of the great wing of the sphenoid. Turning now to those peculiar conditions that strike the eye, but of which no measurement can give us a correct idea, we find that in fourteen of these crania wormian bones were developed in the lambdoidal

* In the Eleventh Annual Report of the Peabody Museum, p. 368, the mean frontal diameter of one hundred and three “crania from Santa Barbara” is put down at 98^{mm}. This was a clerical error, as the diameter is much less. Information received since the publication of that report assigns most of these crania to Santa Cruz Island, and in Table No. I they will be found correctly placed and the measurements accurately given.

† Average of Tables II, III, IV, V, VI, and VII, in Fourth Annual Report of the Peabody Museum, p. 14 *et seq.*

suture, five of them being in the form of epactals or "Inca" bones. In two the interparietal suture was still open, and in three, or 2 per cent., metopism, or persistence of the frontal suture, was present. Among Europeans this latter peculiarity is stated to exist in one in seven, or a little over 14 per cent.

In thirty-five, or 23 per cent., of these skulls, there is evidence of posterior flattening, due without doubt to cradle-board pressure, though in no case was it sufficient to interfere with the accuracy of our measurements. As a rule, it is limited to a slight flattening of the parietals at the obelion, much as if a small slice had been taken off the skull at that point. Rarely, if ever, does it extend down as far as the inion, though the lambda is not unfrequently included. Sometimes one or even two, and in one instance three, small depressions were found on this flattened surface. These may have been caused by some unevenness in the wad or pillow upon which the child's head rested. In only four specimens (and in these it was so slight as scarcely to exceed the limits allowed in cases that merely show a marked want of symmetry) was found that form of occipital flattening so common among the Moundbuilders' skulls, in which one or the other of the parietals is pushed forward and the whole of the posterior portion of the head is forced out of shape. In three of these it was the right parietal that had been so deformed. This was probably accidental, though it is worthy of remark that in a large majority of the crania from the mounds in Tennessee that have been so flattened, it is the same side of the head that has suffered. In a hundred of these, taken at random and including males and females, it was found that fifty had the right parietal so distorted, twenty-eight the left, while in twenty-two the skull was either normal or the pressure had been so evenly applied as not to cause any perceptible difference. In one case two crania taken from the same grave* were found to be distorted to about the same extent, though on opposite sides. This is believed to be decisive of the point so far as the Moundbuilders are concerned, and it is hardly probable that any special significance should have been attached by the Santa Barbara Indians to the results of a process that is shown to have been accidental among the people among whom the practice was far more common.

* Peabody Museum, Nos. 17281 and 17282.

The great difference in the position and extent of this flattening, as seen in these two peoples, is believed to have been caused by the character of the board on which the baby was strapped, and possibly it may also have been influenced by the length of time during which the child was so confined. A solid board, to which a child is strapped, neck and heels, affords but little room for growth or expansion in any part of the body with which it comes in contact, while on the contrary a frame-work of twigs,* such as is sometimes used, even now, by the squaws, as a bottom to their cradles, furnishes just as little resistance to the growth of the child. In the one case the back of the head, pressing upon a hard, inelastic substance, is absolutely prevented from attaining its full development in that particular direction, while in the other, its growth is more or less interfered with, it is true, though to nothing like the same extent. Both of these forms of cradle are to be found to-day among the Indians of Arizona and the California coast, the former being in general use near military posts and in other quarters where planks or boards suitable for the purpose can be easily obtained. Among the wild Indians, however, or those situated at some distance from the white settlements, and beyond their influence, the latter or aboriginal form is still preserved† in much the same shape in which it probably existed among the people whose crania I am now considering. Separating these crania according to the islands from which they were obtained, this process or custom does not seem to have been confined to any one of them in particular. The dolichocephali of Santa Catalina practised it as extensively as the orthocephali and brachycephali of Santa Cruz, though among neither was the deformation so general or so great as among the Moundbuilders and Peruvians.

Thus far my observations have been confined to the calvaria alone, and the measurements are believed to be sufficient to give a correct idea of their outlines and dimensions, with some of their individual peculiarities. The facial measurements are now to be considered‡; and as they are regarded as of much importance in indicating racial characters, I have pre-

* A Pah Ute cradle now in the Peabody Museum, No. 12112.

† Dr. E. Palmer is authority for this statement.

‡ These and other measurements of the crania in the Peabody Museum were taken by Miss Jennie Smith, assistant.

pared a table of them, and, for the sake of comparison, have included the same measurements upon a series of crania from the mounds of Tennessee.

TABLE III.—FACIAL MEASUREMENTS.

Number.	Locality.	Number of specimens.	Prognathic index.	Orbital index.	Nasal index.	Length of face.	Zygomatic diameter.
1	Santa Cruz.—Males.....	45	101	91	49	69	135
2	Females.....	35	101	93	49	65	126
3	Santa Catalina.—Males.....	26	99	93	49	73	135
4	Females.....	12	99	95	53	70	127
5	San Clemente.—Males.....	9	97	92	47	71	135
6	Females.....	6	97	93	47	68	128
7	Tennessee Mounds.—Males.....	43	98	90	50	74	139
8	Females.....	34	98	92	51	69	129
9	Average from Santa Barbara Islands.—Males.....	80	99	92	48	71	135
10	Females.....	53	99	93	49	67	127
11	Total average from Santa Barbara Islands.....	133	99	93	49	69	131
12	Total average from Tennessee Mounds.....	77	98	91	50	71	134

By reference to the above table it will be seen that the average length of face* in our typical skull is 69^{mm}, and that the zygomatic diameter amounts to 131^{mm}, in both of which respects it is somewhat smaller than the average Mound skull. The gnathic index† is found to be 99, the nasal‡ 49, and the orbital§ 93, or, translating these numerical expressions into their scientific equivalents, that the face is mesognathic, mesorhine, and megaseme.||

Summing up these results and adding those peculiarities that are apparent to the sight, but of which the calipers cannot take cognizance, we find

* Measured from the centre of the nasal suture (*Nasion*) to the alveolar point.

† If the index is between 98 and 102, the face is mesognathous; if below 98, orthognathous; if above 102, prognathous. In a very well-formed English skull the gnathic index is as low as 92.—*Flower, Native Races of the Pacific Ocean.*

‡ The general mean of all races is given by Broca as 50. Those skulls in which the index varies between 48 and 52 are said to be mesorhine; if below 48, leptorhine, or narrow-nosed; if above 53, platyrhine, or broad-nosed.—*Recherche sur l'Indice nasal, Revue d'Anthropologie, Tome I, 1872.*

§ The general average of all races is given by Broca as 86, or mesoseme; if above 89 the skull is megaseme, or has a large open orbit; if below 83, it is microseme, or has a low orbit.

|| These terms are some among the valuable contributions of Broca to science. For a full account of these contributions and of the methods of arriving at the facial indices, etc., see *Mémoires de la Société d'Anthropologie de Paris, Revue d'Anthropologie, and Bulletins de la Société d'Anthropologie de Paris, etc.*, in which these papers have at different times been published.

that the typical or average skull of this collection is small and low and of medium length as compared with its breadth; that it has a retreating forehead, a prominent occiput, and is slightly scaphocephalic or roof-shaped along the sagittal suture. Its chief development is in the occipital region; so much so, indeed, that a plane perpendicular to the horizon drawn through the auricular openings would divide the skull into two unequal parts, of which the posterior portion would be much the larger. The face is small and narrow, even as compared with the Peruvians. It is more prognathic than the white man, though it by no means reaches the extreme in that respect. The nasal opening is of medium size, while the orbit is large. The malar bones are broad and slope back from the median line of the face, differing widely in this respect as also in the prominence of the nasal bones from the Greenland Eskimo, whose face is flat.

Tried by any craniometrical standard, this cannot be said to be a high order of skull; but if judged by the contents of their graves, this people, except in their ignorance of the manufacture of pottery, had reached a phase of development equal to anything found on the eastern slope of the continent. Certainly their work in chipped and polished stone and in shell is not surpassed by anything yet revealed by the mounds; while their large stone mortars (portable mills), and their steatite *ollas* and *comalis* used for cooking purposes, indicate an advance in the domestic arts that, so far as is yet known, is peculiarly their own.*

Compared with the other collections of crania in Table II, it will be found that in the indices of breadth and height this skull approaches somewhat closely the Pah Ute and what Dr. Wilson calls the Algonquin (Canada) type, though smaller than the latter in every way, when its measurements of length, breadth, and height are considered absolutely and not relatively. From the broad, high, square head of the Moundbuilder, with its rounded, dome-like crest, it is separated by an impassable barrier. Between the Eskimo of the Northwest coast and those from Greenland, considered solely with reference to the index of breadth, it occupies a medium position, though

* See introductory chapter by Mr. Putnam, pages 17, 18, for the reasons for placing the Californians in the "lower status of barbarism," notwithstanding their want of knowledge of the potter's art. Also, pages 14 and 273 in relation to the absence of pottery.

its relations with the former are, perhaps, closer and more clearly defined. It is true the one skull is decidedly orthocephalous while the other is brachycephalous, and that in the entire lot of three hundred and fifteen crania from the islands only $4\frac{1}{2}$ per cent. reach the very moderate grade of brachycephalism of the typical Alaskan, and under these circumstances it does seem like straining a point to claim that any resemblance at all exists between them; still, as a matter of fact, there are individual crania in this collection with an index even higher than that of the Alaskan; and, from the most dolichocephalous to the opposite extreme, they shade into each other by a series of almost imperceptible gradations. With the typical cranium of the Greenland Eskimo, Nos. 12 and 13, Table II, however, the differences are of a more radical character, as, besides being smaller in every way, the one skull is platycephalous, or broader than it is high, and the other strongly hypsicephalous, or higher than it is broad. These conditions seem to be very general in the two collections, as out of the seventy-six Eskimo crania there are eight, or 11 per cent., in which the breadth is greater than the height, while of the three hundred and fifteen crania from the California Islands, there are but eighteen, or 7 per cent., in which it is *not* so. In the facial bones, too, especially those of the nose and cheek, these skulls are found to differ as essentially as in the size and form of the calvaria. In view of these fundamental differences it is impossible to assign these crania to one and the same class, even if our comparison be limited to the dolichocephali from Santa Catalina; and for the same reasons, so far as they relate to the indices of height and breadth, the same remark will apply *a fortiori* to the *averages* of the two branches of the Eskimo, as given in Nos. 12, 13, 14, and 15, Table II. That they indicate a difference in species, using this term in the sense in which it is usually employed in Zoölogy, it would be premature to affirm, as the range of individual variation, even among peoples of a presumably pure race, is found to be very great, and affords a convenient alternative to any one desiring to escape this conclusion. That they do, however, represent a very marked differentiation—call it species, race, variety, or what you will—is believed to be beyond cavil; and this may be admitted, be it understood, without carrying with it the full acceptance of the polygenistic theory. The uniformity with which the Greenland

Eskimo, the Algonquins of Canada, the Moundbuilders of the Cumberland Valley, and the Peruvians from the coast adhere to their respective and widely differing types is decisive upon this point; for while it is undeniably true that in a collection composed exclusively of either kind of these crania there will usually be found a percentage, be it great or small, of skulls that differ from the "typical" form, yet it is equally true that, after making all due allowance for the range of individual variation, the one form will be found to be so overwhelmingly predominant that the presence of any other at once suggests an intruder or gives good reason for doubting its authenticity.

Upon this point it is probable that a study of the present collection may throw some light; at all events a comparison of the series from the different islands with each other will show how sharply marked are these differences, and within what narrow geographical limits they sometimes occur. Taking the collections from the islands, and those from Santa Barbara and San Luis Obispo Bay—stations on the mainland—as a whole, and it will be found to be, as stated above, decidedly orthocephalic; but if the specimens be divided according to the cephalic index there will result fifty-five dolichocephali, two hundred and nineteen orthocephali, and one hundred and twenty-four brachycephali, as in the following table:

TABLE IV.

Number.	Locality.	Dolichocephali.	Orthocephali.	Brachycephali.
1	Santa Cruz	7	53	17
2	Santa Catalina	31	8	0
3	San Clemente	6	9	0
4	Santa Cruz	5	75	54
5	San Miguel	0	17	16
6	San Nicolas	1	6	4
7	Santa Barbara, mainland	4	44	26
8	San Luis Obispo Bay	1	7	7
		55	219	124

Examined with reference to the individual variation, and it will be found that the cephalic index ranges from .654, Peabody Museum, No.

14249, from Santa Catalina, to .890,* Army Medical Museum, No. 1351, from Santa Cruz. This is certainly a wide gap to be bridged over, and yet so closely are these skulls connected with each other that if the space separating them be measured by intervals of 10 each, there are skulls in the Cambridge collection alone that will cover each one of the intervening steps. Regarded from this point of view, it would be difficult, if not impossible, to draw any line of distinction between these crania, and say that here one race ends and another begins; but if we proceed a step farther and subdivide these skulls according to the islands from which they were obtained, we shall find other factors entering into the calculation that cannot be explained save on the hypothesis that different races occupied these two groups of islands at the time represented by this collection. Take, for instance, San Miguel of the northern group and Santa Catalina of the southern—extreme cases, it is true, but all the better for my purpose. In the collection from the former of these islands there are sixteen brachycephalous and seventeen orthocephalous crania—not a single dolichocephalous specimen among them; while in the latter there are thirty-one dolichocephali and eight orthocephali, but no brachycephali. Eliminating the orthocephali as common to both, and we have in one case sixteen short skulls against thirty-one that are long in the other. This condition of affairs is not reconcilable with the theory of a difference in cranial forms among people of the same race. If it were, then we ought to find on each of these islands crania belonging to the opposite class; *i. e.*, among the dolichocephali there ought to be some brachycephali, and *vice versa*. Especially would this be the inference in view of the fact that on each of these islands we do find orthocephalic skulls, a form that is supposed to have resulted from an admixture of the other two, and also because on Santa Cruz and the other islands *the three forms are found*, but in different proportions. If, on the other hand, it be admitted that a difference in the form of the head indicates a difference in race, then the presence on these two islands of one distinctive form of cranium to the exclusion of its opposite takes its place at once as a fact in the natural order of events. So, also, in those cases in

*There is one cranium with an index of .901 from the mainland; but I prefer to confine my figures to the collection from the islands.

which the two extremes of crania are found together, or in which their coexistence is a legitimate inference, the presence of the stranger is explicable on the theory of adoption or intermarriage, or by any of the other customs by which the Indians in other portions of the country were in the habit of recruiting their ranks. The third form, orthocephalic, or intermediate would then follow as a result of the union of the two extremes. Plausible as is this explanation, it acquires additional force from the fact that it accords with the historical account of the existence of numerous tribes along this coast, speaking different languages, as given in all of the early chronicles, and especially since this account is confirmed by the philological researches of Mr. Albert S. Gatschet,* who shows that the people formerly living on the mainland opposite Santa Cruz, spoke a different language from those living immediately to the south, just opposite the southern group of islands. Basing his conclusions upon the very incomplete vocabularies that have come down to us from the Spanish Fathers, and also upon the more recent and satisfactory researches of Dr. Horatio Hale of the United States Exploring Expedition, and of Dr. Oscar Loew, he calls one of these tongues the "Santa Barbara" (a dialect of which was also spoken on Santa Cruz of the northern group of islands), and the other he claims as a dialect of the widely-extended Shoshonee stock of languages. With this conclusion I certainly do not take issue, for though it does not by any means definitely settle the question as to what language was originally spoken on Santa Catalina Island, yet it does show that the language in use on the mainland, opposite, differed from that spoken by the Santa Barbara Indians, who lived on the same shore, immediately to the north, opposite Santa Cruz. As the people on this island spoke the same language as those on the mainland just opposite, it is not improbable, to say the least, that the inhabitants of the southern islands spoke the same language as the people living on the coast opposite them, and therefore differing from that spoken on the northern islands.

Thus it will be seen that these lines of argument reënforce each other, and the difference of race between the people inhabiting these two groups of islands, rendered probable by a study of the languages, is made com-

* Annual Report of the Geographical Surveys west of the 100th meridian, Lieut. George M. Wheeler, U. S. Army, in charge, p. 330. Washington, 1876. See also map in Contributions to American Ethnology, Vol. III, in which the same linguistic distribution is adopted. Washington, 1877.

paratively certain by the presence of the two different forms of crania under the peculiar circumstances under which they are shown to have existed.

While admitting fully this conclusion, and believing that the original inhabitants of Santa Catalina were of a different race from those of Santa Cruz, I do not wish to be understood as asserting that they were of the same race or spoke the same language as the people living on the mainland opposite. Indeed, the evidence of the crania is decidedly opposed to this view, and in this respect there is a very marked difference between the people found on the two groups of islands. Between the crania found on Santa Cruz Island, and those from Santa Barbara on the mainland (Nos. 1, 2, 7, and 8, Table I, and Nos. 4 and 5, Table II) there is little or no difference. Practically they are of one and the same form, and belong to a series that may be styled orthocephalic, with a very strong infusion of brachycephalism. This is as it should be among peoples shown by their idioms to belong, probably, to the same race. But between the crania from Santa Catalina and those from the mainland there is no such uniformity. The one skull, as has been shown, is decidedly dolichocephalous; and while it is impossible to say what the typical form of the Shoshonee skull may eventually turn out to be, yet so far as now known it is decidedly orthocephalic (Nos. 16 and 17, Table II),* and differs but little, if at all, from the average cranium of the northern group of islands. This difference in form marks a break in the line of argument that connects the inhabitants of Santa Catalina with the Shoshonees of the mainland, and while it increases the doubt as to whether these two peoples spoke the same language, it does not affect the conclusion as to the difference of race between the inhabitants of the two groups of islands. In other words, the question is not, who were the people of Santa Catalina, and what language they spoke, but, were they of the same race and did they speak the same language as the inhabitants of Santa Cruz?

Granting, then, the existence of two different races on these two groups of islands, and the question at once arises as to which of the two is the more ancient. Upon this point nothing is known historically, and we are therefore reduced to a study of the crania for a solution of the problem. In themselves, as has been said, they do not help us, but in so far as they indicate relation-

* The Pah Ute are classed as "Shoshoni" on the Map showing the Distribution of the Indian Tribes of California, to illustrate Reports of Stephen Powers, esq. Washington, 1877.

ship with the tribes from the mainland they throw a flood of light upon the matter. Referring again to Table II, it will be noticed that there is a great similarity between the collections of crania from the northern group of islands and those from the mainland. Especially is this noticeable in the case of the Pah Ute, a member of the great Shoshonee family. All are orthocephalic or of a low grade of brachycephalism; and this form, so far as known, prevails up and down the coast, and as far inland as the hunting-grounds of the Apache and the Navajo. Nowhere except on two of the southern group of islands, and on them in differing proportions, do we find the dolichocephali in such numbers as to justify the conclusion that they were ever the prevailing race. Everywhere else they are, when found at all, in such limited numbers as to give the impression that they were the survivors of a people in course of rapid extinction rather than the precursors of an incoming race of conquerors. Even the prevalence of the orthocephalic type of skull, on the northern group of islands, and its presence in such large proportion on the Santa Catalina group, where the dolichocephalic type so distinctly prevails, taken in connection with the powerful leaven of brachycephalism and the small percentage of dolichocephalism on the mainland, speaks of battle and defeat and the wholesale appropriation of women by the victors. Read in the light of history, we probably have here the story of a contest in which the original dolichocephalic possessors of the soil were worsted by their brachycephalic invaders and driven back, somewhat as the Basques were in Northwest Spain, until they were finally circumscribed within the narrow limits of San Clemente and Santa Catalina, with nothing but the broad expanse of the ocean between them and the Hawaiian Islands, hundreds of miles away. Here, unable to retreat farther, shut in between "the devil and the deep sea," they were found at the time the Spaniards overran California, and here they lingered—a miserable remnant—until about the beginning of the present century, when they were removed to the mainland by the Catholic Fathers and collected around the different Missions. In this new home and with their mode of life changed they were soon reduced to a condition of peonage in which conquerors and conquered alike became the "hewers of wood and drawers of water" to a superior people.

APPENDIX TO PART I, VOL. VII.

TRANSLATION FROM THE SPANISH OF THE ACCOUNT BY THE PILOT FERREL OF THE VOYAGE OF CABRILLO ALONG THE WEST COAST OF NORTH AMERICA IN 1542.

WITH INTRODUCTORY NOTES BY H. W. HENSHAW.

IN the following pages is presented a translation of the diary of the voyage of Cabrillo made in 1542 along the west coast of North America. Although accounts of this voyage appear in Spanish, notably that of Herrera, of which Burney* gives a brief *résumé*, it is believed that it is now for the first time published in English.†

The translation was made by Mr. Richard Stuart Evans from a volume which consists of a collection of documents made, by Buckingham Smith, from one of the public libraries at Madrid. The full title of the volume is as follows: *Coleccion | de varios documentos | para la historia de la Florida | y tierras adyacentes. | Tomo I. | En La Casa de Trübner y Compania, | Núm. 60, Paternoster Row, | Londres.*

The chief value of this manuscript to the student of ethnology and archæology is due to the fact that it contains an account of the earliest contact of the white race with the Indians of California. Additional interest is given to the narrative in its present connection from the fact that the intercourse of the Spaniards with the natives was principally with the tribes inhabiting the Santa Barbara Islands and the adjacent mainland, or the people to whom the first part of this volume relates; while the descriptive portion of the narrative is closely connected with the places where were made

* A Chronological History of the Discoveries in the South Sea or Pacific Ocean, by James Burney. Vol. I, pp. 220, 225.

† The following is a list of works, kindly furnished by Mr. H. H. Bancroft, of San Francisco, Cal., which contain more or less extended references to Cabrillo's voyage: Brown, Explorations of Lower California, pp. 18-19.—Capron, Hist. Cal., pp. 2, 121-2.—Farnham, Life and Adventures in Cala., p. 127.—Findley, Directory, I, p. 314.—Forbes, Hist. Voy., p. 448-9.—Fuguet, La Cal., p. 9-26.—Gleeson, Hist. Church, I, p. 70-2.—Greenhow, Oregon and Cal., pp. 61-3.—Herrera, Hist. Gen., dec. VII, lib. V, cap. III-IV.—Hutchings, Cal. Magazine, III, p. 146; IV, p. 547; V, p. 265.—De Mofras, Explorations, I, p. 96; Montanus Neuwe en Onbekende Weereld, p. 210-1.—Murray, Travels in North Amer., II, pp. 79-80.—Payne, in *Loi Mex. Geog.*, II, pp. 199-209.—Roubaud, H., *Les Régions Nou.*, p. 26.—Saint Amount, *Voy. Cal.*, p. 393.—Sutil y Mex., introd., XXIX-XXXVI.—Taylor, in *Cal. Farmer*, April 18, 1862; May 4, 1860; May 15, 1863; Aug. 14, 21, 1863.—Clavigero *Storia*, I, p. 154-5.—Laet, *Novus Orbis*, p. 306-7.—Tytler, *Hist. Discov.*, p. 78-9.—Burney's, *Voyages*, I, p. 221-5.—Humboldt, *Essai Politique*, I, p. 329.—Marchand, *Voy.*, vol. I, p. viii.

the investigations of the expedition, the results of which are given in the present volume.

Notwithstanding the accounts given of the natives and their habits are often meager and unsatisfactory, it is chiefly to this narrative that the ethnologist must turn for information bearing on the history of the Indians of California prior to the destructive influences of civilization, especially fatal as they appear to have been among these inoffensive tribes.

The diary throughout presents evidence that the supposed narrator, Ferrel, was a sailor, probably with but little education, and by no means overzealous in gathering facts concerning the tribes encountered. Hence, not unnaturally, the events chronicled with most minuteness are the number of leagues sailed each day, the appearance of the coast, depth of water, and direction of the winds; in fact, those matters appealing more particularly to the interest of the mariner, while incidentally appear his observations on the natives and the manner of their reception of the strangers. These, however, when combined are sufficient to enable general deductions of considerable value to be made.

The account, in the main, appears to have been intended as a straightforward and honest narration of events, and, although statements occur that it is difficult or even impossible to reconcile with the now known facts, the discrepancies apparently result from a commingling of things seen and accounts imperfectly understood from the Indians, but probably fully believed, and are, perhaps, not greater than was to have been expected from the attending circumstances. As, for instance, when cows and sheep are spoken of, in the course of the narrative, the account must be considered somewhat apocryphal, and attributed to the natural desire of the Spaniards to discover as many good things as possible in the new land, so as to enhance its value as a possession of the Spanish Crown. It should be remembered, too, that all the information received from the Indians was obtained wholly by signs—an extremely hazardous method at best, and one peculiarly liable to confuse and mislead the unskilled.

To present Ferrel's narrative without an attempt to identify and fix with precision the various points visited and named by the Spaniards, was deemed little less than useless, and accordingly an effort was made in this direction by Dr. H. C. Yarrow and the writer. It was soon perceived that to accomplish this in a satisfactory manner our efforts must be supplemented by the aid of some one who was personally and intimately acquainted with the coast and who also possessed a sufficient degree of nautical knowledge to follow the not always perfectly intelligible courses laid down. For this no one could be more fully qualified than Lieut. Commander H. C. Taylor, of the Navy, whose long service on the west coast in connection with the labors of the Coast Survey has made him perfectly familiar with nearly every cape and anchorage from the Columbia River to Cape St. Lucas. Commander Taylor entered with a hearty coöperation into the work, and it is to his aid that the results here given are largely due.

As discovery and exploration formed important objects of Cabrillo's expedition, the plan followed by the Spaniards naturally was to coast along close enough to land to afford a good view of its nature and capacities. The dangers of an unknown shore, with its rocks and shoals, were fully guarded against by anchoring each night, which course added materially to the closeness of the examination, while the small size of the vessels and the danger of parting company made this precaution doubly necessary. It

follows that the coast was examined with a considerable degree of minuteness, and a fair percentage of the anchorages made are described with sufficient accuracy, even when considered without reference to the distances and latitudes given, to enable them to be identified. Examples are Cape St. Lucas, Puerto de San Pedro [Magdalena Bay], Isle of Zedros [Cerros Island], Isla de Juan Rodriguez, or de Posesion [San Miguel], Cabo de Galera [Point Concepcion], and others.

While perhaps of itself of no special importance that each and every point visited by the Spaniards should be determined, the certain identification of a sufficient number of these to enable a proper check of latitudes and distances to be established was all-important, since only in this way could the most northerly point reached by the discoverers be ascertained.

That the latitudes designated throughout the narrative were erroneous to a greater or less degree has been well known, but no systematic attempt appears to have been made to ascertain the amount of error and apply the corrections. Burney prefaces his *résumé* of Herrera's account of Cabrillo's voyage with the statement that they—*i. e.*, the "material parts of Cabrillo's navigation"—"afford no other than a general agreement with the present charts," seeming thus to imply the futility of any attempt to closely follow him. It is probable that had Burney's acquaintance with the coast described by Cabrillo been more intimate, his attempt to trace the route and follow the distances given would have met with greater success, and the above statement have been correspondingly modified. However, when giving the probable identity of the island of Santa Cruz and Cape Mendocino, he notes a probable discrepancy in the reckoning of about two degrees in excess. This result it is found necessary to reduce by about half a degree.

Upon applying the latitudes laid down in the diary to such points as could be fixed beyond reasonable doubt, it was found that after leaving Cape St. Lucas, for which the nearly correct parallel of 23 degrees was given, an error of about three-quarters of a degree at once crept into the results. Thus the Point of Trinidad (Cape Tosco), the first anchorage after rounding the cape, is placed in 25 degrees instead of, as correct, about 24 $\frac{1}{4}$. This error was found to increase at a tolerably regular rate until near Point Concepcion, and to the northward the discrepancy reached its limits of a full degree and a half.

It was occasionally found necessary to make considerable allowances in the distances given between the various ports and islands touched at, as well, too, in the dimensions of several of the latter, which are too large. It is quite possible, however, so far as the latter are concerned, that certain of them have decreased in size very materially since the date of the narrative, and that in this way the statements made are to be reconciled with the present state of things. In support of this supposition, as Lieut. Commander Taylor informs me, it is a well-known fact that at least one islet, the existence of which was attested by its presence on an Admiralty chart of less than fifty years ago, has been entirely swept away by wind and wave, its former site being now indicated only by a corresponding shoal.

It is to be remarked, too, that very great precision in respect to distances was hardly to be expected, and, indeed, was evidently not intended by the Spaniards, since the statements in leagues are frequently qualified by the term "about." Assuming, however, the league to represent three nautical miles, it will be found necessary to make in most cases nothing more than a reasonable allowance for errors, while not infrequently

the correspondence will be seen to be remarkably close. In the general facts indicated by the descriptions of the shores along which the Spaniards sailed, there is to be noticed a remarkable coincidence between the state of things then and now; and it thus appears that the three centuries and more that have elapsed have witnessed comparatively slight changes in the natural aspect of the country. This fact is of no little interest, since the evidence thus afforded is directly opposed to the popular belief, especially as regards the former presence of heavy coniferous forests along the shores and on the islands of the southern portions of California. As indirect proof of this the possession by the Indians of an abundance of large canoes has been frequently cited. But it by no means necessarily follows that the trees which furnished the material for these grew on the spot. In fact, the narrative of Cabrillo contains evidence implying the contrary, for in several places attention is called not only to the canoes, but to the presence on the shores of the islands and near San Diego of "thick and large trees" which "the sea brought ashore"; this drift-wood, in fact, being to the explorers one of the chief indications of the "great river" flowing from the interior, for which they so eagerly sought. These trees are described as like "cypresses" (probably redwoods), and as being "more than 60 feet in length, and of such thickness that two men could not clasp one of them". The dimensions here indicated would, of course, more than answer the requirements of the largest canoe, and doubtless we have in these logs the source of the islanders' boat material. The stranded trees mentioned probably came from the Columbia or some other of the large streams to the northward, which now, as then, at certain seasons, carry down immense quantities of drift. The islands are described as clothed simply with cedars, as at present (that is, *Juniperus*), although it is likely that then, as now, the cañons furnished cottonwoods of large size. Nor does there appear to be anything in the accounts of the other early Spanish explorers subsequent to Cabrillo implying that any very marked change in the amount of timber along the coast has taken place. Upon Vizcaino's chart, it is true, "trees" are indicated about San Diego, which locality is certainly not now a well-wooded one. From this fact authors have argued an extensive deforestation here. But Ferrel not only notes the presence of trees in this locality but is particular to inform us that they resembled "silk-cottonwood trees" (probably cottonwoods), which certainly never grow as extensive forests. In fact, upon the Pacific slope the forests are usually composed almost exclusively of the conifers, and had these been found, either about San Diego or upon the islands, it appears almost certain that Ferrel would so have stated, especially as he appears to have been careful to mention the presence of timber wherever seen, usually, indeed, endeavoring to particularize the kind.

Nearly all the names bestowed by Cabrillo upon his discoveries are given upon present maps; but it is evident that none of them have been adopted with reference to their original application, as they appear haphazard anywhere along the coast. Vizcaino, in 1603, certainly renamed many of the points discovered by Cabrillo, and most of the remaining appellations are probably traceable to the Spanish settlers and priests, by whom they were doubtless given without the intention of perpetuating the names of Cabrillo, or perhaps the slightest knowledge of their prior use by him. In christening their discoveries the early Spanish explorers, as also the priests and settlers, kept in mind the same objects, viz, to honor the saints and the titled patrons of

the expeditions. Hence the remarkable duplication of names observable on all the early charts resulting from Spanish exploration.

The difficulties met by the Spaniards after leaving Cape Concepcion to the south, which they did late in October, very faithfully reflect the experience of the mariner of to-day on this coast. A succession of foul winds with cloudy weather and heavy fogs are to be expected in the natural order of events, while, in addition, as is evidenced by the account of snow-covered mountains thus early in the winter, the Spanish explorers had to contend against the serious disadvantages of an unusually early winter. Under such untoward circumstances, with their small and unwieldy vessels, one being without a deck, upon a strange coast, with a crew worn and disheartened by the privations and sufferings they had already undergone, and, added to all, the loss of their captain, it is simply a matter for wonder that they carried perseverance so far and achieved such remarkable results; for remarkable they must be esteemed when are considered the means by which they were attained and the circumstances which attended them. With reference to the latter, as remarked by Burney, it seems singular that a voyage having for an object the examination of such high latitudes should have been begun so late in the season, when, even with the imperfect knowledge of the seasons on this coast possessed by the Spaniards, its partial failure on account of winter's storms might readily have been predicted.

It is in the account of the latter portion of the voyage around the Santa Barbara Islands, and particularly after passing Point Concepcion, that the narrative becomes more or less confused and difficult to follow, and that several conflicting statements occur. Several of the Santa Barbara Islands were intentionally renamed, San Miguel, for instance, receiving no fewer than three distinct appellations. Furthermore, the Spaniards, in beating about, appear to have been misled by approaching the same islands from different quarters, and thus to have been induced to rename as fresh discoveries several of the group—facts which will sufficiently account for the somewhat confused statements that occur in the relation, and occasionally render it almost impossible to fix with certainty the particular island mentioned.

Passing to that portion of the narrative which applies to the coast north of Point Concepcion, it is easy to understand how the narrow Golden Gate, which permits access to San Francisco harbor, may have been passed unperceived in a storm or fog. But how it was possible for the Spaniards to overlook such a marked indentation as the Bay of Monterey, to say nothing of the several minor harbors and anchorages of this part of the coast, is beyond comprehension, especially when, as the narrative states, they ran along all the coast, point by point, from Cabo de Pinos (Point Arenas) to them (*i. e.*, the San Lucas Islands, Santa Barbara group), and they found no harbor, so that of necessity they had to return to the said island (San Miguel). To run along, "point by point," in careful search of an anchorage without finding one or more of those indenting this coast, which, contrary to Ferrel's statement, was well populated by Indians, as indicated by recent archæological discoveries, seems so highly improbable as to demand some other explanation than the one of mere ordinary oversight. It appears probable that, relying to some extent upon the fact that nothing like a bay was observed on the upward trip, which, it will be remembered, was made with foul winds, which compelled them to keep to sea much of the time, the downward passage was really made hastily, and under the natural desire to speedily reach a known and

safe port, where could be had the necessary water and provisions. Hence the declaration that no harbor could be found was possibly made in all honesty and sincerity; but, whether so or not, was evidently, from the care evinced in the statement, intended to serve as an explanation, and, if necessary, an excuse, for the temporary abandonment of the voyage of discovery.

With reference to the most northerly point reached by the Spaniards, there can be no doubt but that the latitude "about 44 degrees," as given in the narrative, is considerably too high. On the other hand, there is reason for believing that Cape Mendocino, which has usually been considered as marking about the turning-point of the expedition, is somewhat too low. Deducting a full degree and a half from the figures above given, which, from a careful analysis of the distances sailed in connection with the localities identified, appears to represent the most probable error, a point near the southern border of Oregon is indicated, or $42\frac{1}{2}$ degrees. It was just about here that the storm was encountered that caused them to finally put about and abandon the further discovery of the coast. That Cape Mendocino was doubled there can be no possible doubt.

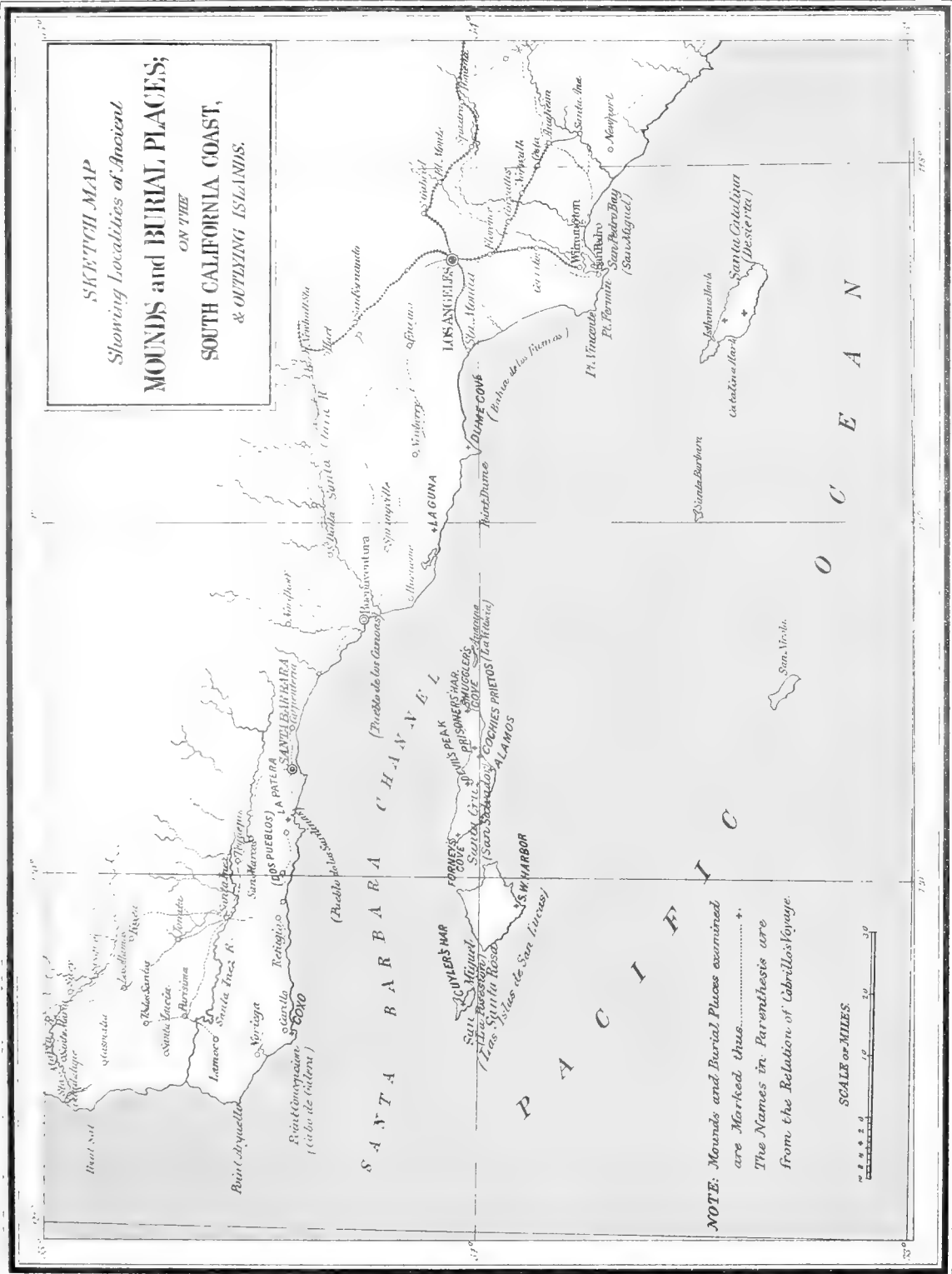
Of the character and motives of the voyage of Cabrillo little need be said. Unlike many of the expeditions sent out by the Spanish grandees, it appears to have been prompted by a desire to extend geographical discoveries, with doubtless the primary purpose of adding to the possessions of the Spanish Crown, and not by the insatiate thirst for gold which urged the "conquerors" on their usual paths of rapine and bloodshed. Cabrillo appears to have well deserved the character of "good man" as well as "skillful navigator" bestowed upon him by his contemporary Herrera, and his conduct towards the natives was marked by a moderation and good-will that had their full effect in securing for him from this naturally inoffensive and well-disposed people a full return in kind. His untimely death doubtless had its effect in retarding the full exploration of the coast, while probably his own account of the voyage, had he lived to write it, would have been in every way more complete and satisfactory.

Throughout the narrative the identification of the localities visited by the Spaniards as made are given in brackets, with, occasionally, such short notes as appear to shed light upon the subjects mentioned, or as are rendered necessary by the doubtful nature of the identification. These, however, have been made as brief as possible, the diary being left to tell its own tale in its own way. It was deemed preferable to make the translation a literal one, it being thought that whatever was gained by a rendition into good English would be lost in other ways.

A sketch is appended to show the position of the burial places near Santa Barbara in which excavations were made by the expedition, as also the location of many other ancient burial-places and shellheaps* along the coast and on the islands, of which the greater portion have been examined with more or less thoroughness. Numerous as these are, it is probable that many more are still to be discovered.

It only remains to express the great obligation the expedition is under to Lieut. Commander Taylor for the assistance which, not alone upon this, but upon other occasions, his courtesy has prompted him to extend.

*The term "mound" as used upon the map is to be understood as applying only to shell mounds and refuse heaps, and not to true mounds in the sense of the term as applied to the tumuli of the Mississippi Valley.



SKETCH MAP
 Showing Localities of Ancient
 MOUNDS and BURIAL PLACES;
 ON THE
 SOUTH CALIFORNIA COAST,
 & OUTLYING ISLANDS.

NOTE: Mounds and Burial Places examined
 are Marked thus.....+.
 The Names in Parenthesis are
 from the Relation of Cabrillo's Voyage.

SCALE OF MILES
 0 10 20 30

This port is in $28\frac{1}{2}$ long degrees, (a little over $28\frac{1}{2}$ degrees); the land is high and rugged and bare; from California to this place we have seen no Indian.

Wednesday, on the 2d of the said month, they departed from this port, and the wind was contrary, and they proceeded beating; they cast anchor at an island which is 4 leagues [*actually 3*] distant from the southeast side of the island of Zedros, and they named this island San Esteban [*Natividad*]. With the extremity of the point of the mainland running east and west, the coast is northwest and southeast; it is a league from the mainland; from this point [*Point Eugenio*] the mainland turns the coast towards the northeast and makes a large creek, so that the land does not appear. Between the island and the mainland there is a good channel, and they had to pass close to the island, for there are shoals which extend in a ridge from the point for a quarter of a league. There is much vegetation on the water, which grows from the bottom and is tangled beneath the surface [*kelp*]. This island [*i. e. Natividad*] runs with San Pedro Vincula northwest and southeast; this island has 3 leagues in compass. We were at this island with the wind contrary until the following Saturday, the 5th of the said month of August. It has a good port on the side of the southeast. There is much fishing with a hook, and many birds are found.

They departed from the island of San Esteban Saturday, the 5th of August, and anchored at the island of Zedros [*Cerros Island*], where they remained until Thursday, the 10th of the said month, taking in water and wood. They found no Indians, although they found some sign of them. The leeward point of this island on the south side is in 29 degrees, and it has on this south side good ports and water and wood, and it is on this part bare, as it has only some small shrubs [*so at present*]. The island is large and high and bare, and runs almost east and west [*at present north and south*], and is on this side of the south 12 leagues in length [*the island is much smaller than is here given*].

They departed from the island of Zedros on Thursday, the 10th day of the said month of August, to pursue their voyage, and proceeded on the side of the mainland, sailing to the north. They went this day about 10 leagues, and the following Friday cast anchor in a port which they called Puerto de Santa Clara [*Playa Maria Bay*]; it is a good port. They landed and found four Indians, who fled. This port is in 30 degrees scant; it runs with the island of Zedros, northeast and southwest, and this coast runs from the port towards the creek north-northwest and south-southeast. The coast is clean and soundable; the land is bare and is not rugged. It has plains and valleys. They were in this port until Sunday, the 13th of the said month, on account of foul winds.

Sunday, the 13th of the said month, they departed from this port and went sailing along the coast with slack winds, anchoring each night; and the following Tuesday they cast anchor on a point which forms an inlet, which is in $30\frac{1}{2}$ degrees⁴; it affords very little shelter; they called it Punta del Mal Abrigo (Point of Bad Protection) [*Point Canoas*].

The Wednesday following they were sailing along the coast, and had a heavy northwest wind, which was contrary, and they lay by at night without making any progress; and the following Thursday they held on with heavy rains and adverse winds and calms, so that they made no headway, and this following night they had much wind from the west-northwest, and lay by; and the following Friday they pro-

ceeded with fair winds, and they found themselves to windward of the Point of Mal Abrigo 6 leagues; and so they held on until the following Saturday, the 19th of the said month, when they cast anchor off a small island which is half a league from the mainland. It may be 10 leagues from the Point of Mal Abrigo; it is in $30\frac{1}{2}$ degrees; it has good anchorage and good shelter; they called it San Bernardo [*Geronimo Island*]; it extends one league north and south [*actually one mile*]. The coast of the mainland runs north-northwest and south-southeast, and is a clean coast. The land within is of very good appearance and level, and there are good valleys and some trees, and the rest is bare. They did not find these days a sign of Indians.

Sunday, the 20th of said month of August, they departed from the island of San Bernardo, and approached Punta del Engaño (Point Deception), which is seven leagues from this island, which point is in 31 degrees. [*This point noted, but no name on present Coast Survey charts.*]

The coast of the point toward the island runs north-northwest, south-southeast. On Punta del Engaño the land is not high, and appears in itself a good and level land. The ridges are bare. We saw no sign of Indians; and so they continued sailing until the next Monday, following the coast to the north and the northeast; and about 10 leagues from Punta del Engaño they discovered a good port, in which they anchored, and took in water and wood. It is in $31\frac{1}{2}$ degrees. It is a port suitable for making some repairs for the ships, placing them under the mountain.

The following Tuesday the captain, Juan Rodriguez Cabrillo, went on shore and took possession of it in the name of His Majesty and of the most illustrious Señor D. Antonio de Mendoza, and gave it the name of Puerto de la Posesion [*Port St. Quentin*]. He found a lake which has three large* ———; and they found some Indian fishermen, who immediately fled. They took one of them, and, giving him certain presents, they released him, and he went off. The land in the interior is high and rugged and has good valleys, and appears to be a good country, although it is bare. They were on shore here until Sunday, the 27th of said month, repairing the sails and obtaining a supply of water; and Thursday they saw certain smokes and went there with the boat and found about thirty Indian fishermen, who were peaceable, and they brought to the ship a boy and two Indian women, to whom they gave clothing and presents and let them go; from whom they could understand nothing by signs.

The following Friday, going to take in water, they found at the watering-place certain Indians, who were peaceable, and these showed them a pond of water and a salt pit which contained much, and they said by signs that they had not their habitation there, but in the interior, and that there were many people. This same day, in the evening, five Indians came to the shore, whom they brought to the ships, and they appeared intelligent Indians; and entering in the ship they took note of the Spaniards who were there and counted them, and made signs that they had seen other men like them, who had beards, and who brought dogs and cross-bows and swords.†

* An equal blank in the original. Reference probably made to "three large" villages.

† See also many other similar references beyond. As there was no expedition in the interior contemporaneous with Cabrillo's it is evident that the Spaniards were misled as to the date of presence of these "bearded" white men, of which they here for the first time received notice, as they doubtless were, too, in their evident belief that the Indians were eye-witnesses of what they narrated, the sign-language here, as elsewhere, leading to error. Ulloa's and Alarcon's explorations in the Gulf of

The Indians came anointed with a white bitumen on the thighs and body and arms, and they had the bitumen applied in the manner of slashes, so that they appeared like men in slashed doublets and hose; and they made signs that five days' journey thence were the Spaniards. And they made signs that there were many Indians, and that they had much maize and many parrots.* They came covered with deer-skins, and some had the deer-skins dressed in the manner in which the Mexicans dress the skins which they carry in the cutters. It is an advanced and well-disposed people. They carry bows and arrows like those of New Spain, the arrows tipped with flints. The captain gave them a letter, which they should carry to the Spaniards who they said were in the interior.

They departed from this Puerto de la Posesion, Sunday, the 27th of the said month of August, and sailing on their course found an island 2 leagues from the mainland; it is uninhabited; there is a good port in it; they gave it the name of San Agustin [*St. Martin*]; it contains 2 leagues in circumference; and so they held on along the coast with slack winds, plying to windward, until the following Wednesday, the 30th of said month, which gave them much wind from the northwest, which made them put into the island of San Agustin. In this island they found some sign of people, and two cow-horns [see foot-note, page 307], and very large trees which the sea had cast there, which had more than 60 feet in length, and were of such thickness that two men could not clasp one of them; these appeared to be cypresses, and there were cedars. There was a large quantity of this wood; it contains nothing else. If a good port, it is not a valuable island; they were in this island until the following Sunday.

On Sunday, the 3d day of the month of September, they departed from the said island of St. Agustin, and proceeded, sailing on their course, and the following Monday they cast anchor about 7 leagues distant on the weather shore, on a coast running north and south; and immediately they set sail and held on their course with fair and light winds, on a coast running north and south until Thursday, the 7th day of the said month of September, when they cast anchor in a creek which the land forms [*Todos Santos Bay*]; and here ends the coast, which runs north and south and turns to the northwest. On this creek there is a large valley, and the land is level on the coast, and within are high ridges, and rugged land good in appearance. All the coast is bold and with a smooth bottom, as at half a league from land they were at anchor in 10 fathoms; here there is much vegetation on the water [*kelp*].

On the Friday following, on the 8th of the said month, they held on with slack winds, plying to windward, and they found here contrary currents; they cast anchor at a point which forms a cape, and affords a good shelter from the west-northwest; they

California, 1539 and 1540, the latter of whom sailed some distance up the Colorado, may have furnished these Indians the first meager accounts of the existence of a race of men different from their own. With little doubt, however, it was to the expedition of Coronado in search of the seven cities of Cibola in 1540, discovered the year previous by Friar Marcos de Niza, that these special references were made. The horses and strange weapons, as well as the savage warfare waged by Coronado against the opposing tribes, were well calculated to make a deep impression; and no one aware of the celerity with which news is transmitted by means of Indian runners will be surprised that the full knowledge of such important events had long before reached the coast tribes, but four or five hundred miles distant.

* The Pueblo Indians are now, and doubtless were then, in the habit of keeping birds in captivity, chiefly birds of prey, to obtain the feathers for ornamental and ceremonial purposes. The birds indicated were doubtless not "parrots," whatever they were, as this region is entirely out of the range of the parrot family.

gave it the name of Cabo de San Martin [*apparently no name for this cape at present*]; there is an edge of land on both sides; here some high sierras which come behind throw out spurs and begin other small sierras. There is a large valley and many others; in appearance it is good land; it is in $32\frac{1}{2}$ degrees, and is a clean port and soundable; it runs with the island of San Agustin north and south.

Being at this Cabo de San Martin, they went on shore for water, and found a small lagoon with sweet water, where they procured water, and at this watering-place came forty Indians with their bows and arrows; they could not understand each other; they came naked; they brought roasted agaves to eat [*probably either Agave Shawii or Yucca Whipplei, both being indigenous to this region*] and fish; it is an advanced race; here they took possession; they were at this cape until the following Monday.

Monday, on the 8th of the said month, they departed from Cabo de San Martin and sailed about 4 leagues on a coast running from north-northeast to south-southwest,⁵ and thence the coast turns to the northwest. The land is lofty and bare; and the day following they sailed also with foul winds about 4 leagues on a coast running from northwest to southeast. On the land there are high and broken sierras; and the following Thursday they cast anchor at about 3 leagues in advance at a point which projects into the sea, which forms a cape on both sides; they called it Cabo de Cruz; it is in 33 degrees; there is no water nor wood, nor did they find any signs of Indians.

Having departed from Cabo de la Cruz, they found themselves the following Saturday 2 leagues from Cabo de la Cruz on account of the foul winds on a coast from north-northwest to south-southeast, and on shore they saw Indians in some very small canoes. The land is very lofty and bare and dry. All the land from the extremity of California to this place is sandy like the sea-beach. Here begins land of another character, as it is a country of beautiful vegetation and better appearance, like orchards.

Sunday, on the 17th day of the said month, they set sail to pursue their voyage, and about 6 leagues from Cabo de Cruz they found a good port well inclosed, and to arrive there they passed by a small island which is near the mainland. In this port they obtained water in a little pond of rain-water, and there are groves resembling silk-cotton trees, except that it is a hard wood. They found thick and tall trees which the sea brought ashore. This port was called San Mateo [*San Diego Bay*]. It is a good country in appearance. There are large cabins, and the herbage like that of Spain, and the land is high and rugged. They saw herds of animals like flocks of sheep, which went together by the hundred or more, which resembled in appearance and movement Peruvian sheep, and with long wool. They have small horns of a span in length and as thick as the thumb, and the tail is broad and round and of the length of a palm.* It is in $33\frac{1}{2}$ degrees. They took possession of it. They were in this port until the following Saturday.

Saturday, the 23d of the said month, they departed from the said port of San Mateo and sailed along the coast until the following Monday, in which time they made

* The animal here described seems to have been the product of about equal parts of fact and imagination. Without the wool the account would apply tolerably well to the antelope (*Antilocapra americana*), which it probably was. The only animal with a woolly fleece indigenous to this region is the mountain goat (*Aplocerus montana*), but this animal inhabits only the highest mountains, and hence could not have fallen under the observation of the Spaniards. The last statement applies, too, to the mountain sheep (*Ovis montana*), the remarkable horns of which are besides not at all indicated in the foregoing description.

about 18 leagues. They saw very beautiful valleys and groves, and a country flat and rough, and they did not see Indians.

On the Tuesday and Wednesday following they sailed along the coast about 8 leagues and passed by some three uninhabited islands.* One of them is larger than the others, and extends 2 entire leagues, and forms a shelter from the west winds. They are 3 leagues from the mainland; they are in 34 degrees. This day they saw on land great signal smokes. It is a good land in appearance, and there are great valleys, and in the interior there are high ridges. They called them *Las Islas Desiertas* (the Desert Isles.)

The Thursday following they proceeded about 6 leagues by a coast running north-northwest and discovered a port inclosed and very good, to which they gave the name of *San Miguel* [*San Pedro Bay*]. It is in $34\frac{1}{2}$ degrees; and after anchoring in it they went on shore, which had people, three of whom remained and all the others fled. To these they gave some presents; and they said by signs that in the interior had passed people like the Spaniards. They manifested much fear. This same day at night they went on shore from the ships to fish with a net, and it appears that there were here some Indians, and they began to discharge arrows and wounded three men.

The next day in the morning they entered further within the port, which is large, with the boat, and brought away two boys, who understood nothing by signs, and they gave them both shirts and immediately sent them away.

And the following day, in the morning, there came to the ship three large Indians, and by signs they said that there were traveling in the interior men like us, with beards, and clothed and armed like those of the ships, and they made signs that they carried cross-bows and swords, and made gestures with the right arm as if they were throwing lances, and went running in a posture as if riding on horseback, and made signs that they killed many of the native Indians, and that for this they were afraid.† This people are well disposed and advanced; they go covered with the skins of animals. Being in this port there passed a very great tempest, but on account of the port's being good they suffered nothing. It was a violent storm from the west-southwest and south-southwest. This is the first storm which they have experienced. They were in this port until the following Tuesday. Here Christians were called *Guacamal*.

The following Tuesday, on the 3d day of the month of October, they departed from this port of *San Miguel*, and Wednesday and Thursday and Friday they proceeded on their course about eighteen leagues along the coast, on which they saw many valleys and much level ground and many large smokes, and, in the interior, sierras. They were at dusk near some islands, which are about seven leagues from the mainland, and because the wind was becalmed they could not reach them this night.

Saturday, the 7th day of the month of October, they arrived at the islands at

* If the islands here mentioned still exist they doubtless are *San Clemente* and *Catalina*, the latter of which always appears to the passing mariner as two islands on account of a depression, which has the effect of cutting it in two. Both these islands, however, were unquestionably inhabited by a considerable population, as is evidenced by the extensive collections of implements, etc., recently made here, many of them of considerable antiquity. Failing perhaps to discover smoke or other signs of human habitation, the Spaniards took it for granted they were "uninhabited," and hence passed by without landing.

† Reference probably here made to Coronado's expedition in 1540.

daybreak, which they named San Salvador [*Santa Cruz*] and La Vittoria [*Anacapa*], and they anchored off one of them, and they went with the boat on shore to see if there were people there, and as the boat came near there issued a great quantity of Indians from among the bushes and grass, yelling and dancing and making signs that they should come ashore; and they saw that the women were running away, and from the boats they made signs that they should have no fear, and immediately they assumed confidence and laid on the ground their bows and arrows, and they launched a good canoe in the water, which held eight or ten Indians, and they came to the ships. They gave them beads and little presents, with which they were delighted, and they presently went away. The Spaniards afterwards went ashore and were very secure, they and the Indian women and all. Here an old Indian made signs to them that on the mainland men were journeying, clothed and with beards like the Spaniards. They were in this island only until noon.

The following Sunday, on the 8th of the said month, they came near the mainland in a great bay, which they named la Bahía de los fumos [*Bahía Ona Bay; recently named Monica Bay*] on account of the numerous smokes which they saw upon it. Here they held intercourse with some Indians, whom they took in a canoe, who made signs that towards the north there were Spaniards like them. This bay is in 35 degrees, and it is a good port, and the country is good, with many valleys and plains and trees.

The following Monday, on the 9th day of the said month of October, they departed from la Bahía de los fuegos, and proceeded this day about 6 leagues, and anchored in a large inlet [*laguna near Point Mugu*], and they passed on thence the following day, Tuesday, and proceeded about 8 leagues on a coast northwest and southeast, and we saw on the land a village of Indians near the sea, and the houses large in the manner of those of New Spain; and they anchored in front of a very large valley on the coast. Here came to the ships many very good canoes which held in each one twelve or thirteen Indians, and they gave them notice of Christians who were journeying in the interior. The coast is from northwest to southeast. Here they gave them some presents, with which they were much pleased. They made signs that in seven days they could go where the Spaniards were traveling, and Juan Rodriguez was determined to send two Spaniards to the interior. They also made signs that there was a great river. With these Indians they sent a letter at a venture to the Christians. They gave name to this village of el Pueblo de las Canoas (the Village of Canoas). [*Near Buenaventura. "Pueblo de las Canoas" has usually been identified with Santa Barbara, but the distance places it below that point, while the beautiful valley described certainly does not apply to the location of Santa Barbara, which can scarcely be said to be in a valley at all. The Santa Clara Valley and mountains agree exactly with the description.*] They go covered with some skins of animals; they are fishers and eat the fish raw; they also eat agaves. This village is in 35½ degrees. The country within is a very beautiful valley, and they made signs that there was in that valley much maize and much food. There appear within this valley some sierras very high, and the land is very rugged. They call the Christians Taquimine. Here they took possession; here they remained until Friday, the 13th day of the said month.

Friday, the 13th day of the said month of October, they departed from Pueblo de las Canoas on their voyage, and proceeded this day 6 or 7 leagues, and passed two large

islands which extend 4 leagues each one, and are 4 leagues from the continent. They are uninhabited, because there is no water in them [*the account is doubtless in error here; these islands must be identical with others mentioned farther on as inhabited*] and they have good ports. The coast of the mainland runs west-northwest; the country is level, with many cabins and trees; and the following Saturday they continued on their course, and proceeded 2 leagues, no more, and they anchored opposite a valley very beautiful and very populous, the land being level, with many trees. Here came canoes with fish to barter; they remained great friends.

And the Sunday following, the 15th day of the said month, they held on their voyage along the coast about 10 leagues, and there were always many canoes, for all the coast is very populous, and many Indians were continually coming aboard the ships, and they pointed out to us the villages and named them by their names, which are Xucu, Bis, Sopono, Alloc, Xabaagua, Xotococ, Potoltuc, Nacbuc, Quelqueme, Misinagua,⁶ Misesopano, Elquis, Coloc, Mugu, Xagua, Anaebuc, Partocac, Susuquey, Quanmu, Gua, Asimu, Aguin, Casalic, Tucumu, Incpupu. All these villages extend from the first, Pueblo de las Canoas, which is called Xucu, as far as this place; they are in a very good country, with very good plains and many trees and cabins; they go clothed with skins; they said that inland there were many towns, and much maize at three days' distance; they call the maize Oep; and also that there were many cows.* They call the cows Cae; they also gave us notice of some people with beards, and clothed. They passed this day along the shore of a large island which is 15 leagues in length, and they said that it was very populous, and that it contained the following villages: Niquipos, Maxul, Xugua, Nitel, Macamo, Nimitopal. They named the island San Lucas [*Santa Rosa*]; it is from this place to Pueblo de las Canoas 18 leagues; the island is from the continent 6 leagues.

Monday, the 16th day of the said month, sailing along the coast they proceeded 4 leagues, and anchored in the evening opposite two villages [*Dos Pueblos*]; and also this day canoes were continually coming to the ships, and they made signs that further on there were canoes much larger.

The Tuesday following, the 17th day of the said month, they proceeded 3 leagues with fair weather; and there were with the ship from daybreak many canoes, and the captain continually gave them many presents; and all this coast where they have passed is very populous; they brought them a large quantity of fresh sardines very good; they say that inland there are many villages and much food; these did not eat any maize; they went clothed with skins, and wear their hair very long and tied up with cords very long and placed within the hair, and these strings have many small daggers attached of flint and wood and bone [*many of which were excavated by the survey party, in 1875, from the graves*]. The land is very excellent in appearance.

Wednesday, the 18th day of the said month, they went running along the coast until 10 o'clock, and saw all the coast populous, and because a fresh wind sprung up canoes did not come. They came near a point which forms a cape like a galley, and they named it Cabo de Galera [*Point Concepcion*], and it is in a little over 36 degrees;

*The animals here mentioned, and which were understood by the Spaniards to be cows, were doubtless bisons, which formerly ranged to the eastern foot-hills of the Sierras, and accounts of which, if not skins, must have reached the coast tribes. Although cows were introduced into the New World by Columbus, and into Mexico as early as 1525, it was not until many years afterward, upon the permanent settlement of California by the Spaniards, that these domestic animals found their way here.

and because there was a fresh northwest wind they stood off from the shore and discovered two islands, the one large, which has 8 leagues of coast running east and west [*Santa Rosa, but with only 5 leagues of coast running as described*], the other has 4 leagues [*San Miguel, with only 2 leagues*], and in this small one there is a good port [*Cuyler's Harbor*], and they are peopled; they are 10 leagues from the continent; they are called las Islas de San Lucas. [*The name is here applied to but two islands, but subsequently the whole group appears to have been thus designated.*] From the mainland to Cabo de Galera it runs west by northeast, and from Pueblo de las Canoas to Cabo de Galera there is a very populous province, and they call it Xexu; it has many languages different from each other; they have many great wars with each other; it is from El Pueblo de las Canoas to El Cabo de Galera 30 leagues; they were in these islands until the following Wednesday, because it was very stormy.

Wednesday, the 25th day of the said month, they departed from the said islands, from the one which was more to the windward; it has a very good port, so that from all the storms of the sea no damage will be suffered by those within its shelter; they called it La Posesion [*San Miguel previously with Santa Rosa called las Islas de San Lucas*]. This day they advanced little, as the wind was not favorable; and in the middle of the following night they had a wind, south-southwest and west-southwest, with rain, so that they saw themselves in difficulty, for it was a side wind and they were near the land, and they could not double the cape on one side or the other [*they were probably between Point Arguello and Concepcion*]; and the following Thursday at vespers the wind sheered off to the south, and they proceeded on their course 10 leagues on a coast running north-northwest and south-southeast; all this coast is inhabited and in appearance good land; this night they kept out to sea, for they had a side wind, and the Friday and Saturday and Sunday following they were beating about from one side to the other with foul winds, and could gain nothing, and they were in $36\frac{1}{2}$ degrees, 10 leagues from Cabo de Galera [*off San Luis Obispo*]; and in the same manner they held on Monday and Tuesday to the 31st day of the said month, the eve of All Saints' Day, beating about on one side and the other; and they wished to approach the mainland in search of a great river of which they had notice, which was on the other side of Cabo de Galera, and because there were on land many marks of rivers, and they found no river. [*The great river for which they were constantly on the watch, and of which they evidently received confused and perplexing accounts from the Indians, was probably the Colorado. Its proximity renders certain the supposition that the Indians were well aware of the wonderful river, its whereabouts being evidently wholly misinterpreted by the Spaniards.*] Nor did they anchor here for the coast was very bold. They found during this month on this coast the weather as in Spain, from 34 degrees and upwards, and with much cold mornings and evenings, and with storms, dark and cloudy weather, and the air heavy.

Wednesday, at midnight, on the 1st day of November, standing off, a heavy wind from the north-northwest struck them, which did not let them carry a palm of sail, and by the dawn of day freshened so much that they could do no less than seek shelter, and they took shelter under Cabo de Galera, and anchored there and went on shore, and because there was a large town which they call Xexo, and wood did not appear to be very much at hand, they agreed to go to Pueblo de las Sardinas [*Goletta Anchorage*], because there water and wood were very near and accessible; they called

this harbor of Galera Puerto de Todos Santos [*Coxo Anchorage*]. The following Thursday they went to Pueblo de las Sardinias, where they were taking in water and wood three days, and the natives of the country aided them and brought wood and water to the ships. This village of the Puerto de Sardinias is called Cicacut, and the others, which are from that place to Cabo de Galera are, Ciucut, Anacot⁷, Maquinanoa, Paltatre, Anacoat, Olesino, Caacat⁸, Paltocac, Tocane, Opia, Opistopia, Nocos, Yutum, Quiman, Micoma, Garomisopona. An old Indian woman is princess of these villages, who came to the ships and slept two nights in the captain's ship, and the same did many Indians. The village of Ciucut appeared to be capital of the other villages, as they came there from other villages at the call of that princess; the village which is at the cape is called Xexo. From this port to Pueblo de las Canoas there is another province which they call Xucu⁹; they have their houses round and covered very well down to the ground; they go covered with skins of many kinds of animals; they eat oak acorns, and a grain which is as large as maize, and is white, of which they make dumplings; it is good food. They say that inland there is much maize, and that men like us are traveling there; this port is in $35\frac{2}{3}$ degrees.

Monday, the 6th of the said month of November, they departed from the said port of Sardinias, and that day they made hardly any progress, and until the following Friday they held on with very little wind. This day we reached Cabo de Galera; through all this course they could not avail themselves of Indians who came to board them with water and fish and showed much good disposition; they have in their villages their large public squares, and they have an inclosure like a circle, and around the inclosure they have many blocks of stone fastened in the ground, which issue about three palms, and in the middle of the inclosures they have many sticks of timber driven into the ground like masts, and very thick; and they have many pictures on these same posts, and we believe that they worship them, for when they dance they go dancing around the inclosure. [See Introduction, Part I, page 27.]

The Saturday following, the day of San Martin, on the 11th day of the said month of November, they proceeded, sailing along the land, and they found themselves this morning 12 leagues from the cape, in the same place where they arrived first [*i. e. off San Luis Obispo*]; and all this day they had a good wind so that they sailed along a coast running northwest and southeast full 20 leagues; all this coast which they passed this day is a bold coast without any harbor, and there extends a chain (cordillera) of sierras along the whole of it, very lofty, and it is as high by the sea as on the land within; the sea beats upon it [*this description applies exactly to the coast between Cape Saint Martin and Point Sur*]; they saw no population nor smokes, and all the coast, which has no shelter on the north, is uninhabited; they named the sierras las Sierras de San Martin; they are in $37\frac{1}{2}$ degrees; the spurs of these and of the sierras on the northwest form a cape which projects into the sea in 38 degrees; they named it Cabo de Martin [*Point Sur*]. This same night of Saturday, at four o'clock in the night, being in the sea about 6 leagues from the coast, lying by waiting for the day, with a southeast wind, so great a storm struck them from the southwest and the south-southwest with rain and dark cloudy weather, that they could not keep up a handbreadth of sail, and it made them run with a small foresail, with much labor, all the night, and the Sunday following the tempest fell upon them with much greater violence, which continued that day and night until the following Monday at noon, and the storm was

as great as can be experienced in Spain. On Saturday night they lost sight of their consort.

Monday, the 13th day of the said month of November, at the hour of vespers, the weather cleared up and the wind veered to the west, and immediately they put on sail and went in search of their consort at the turn of the land, praying to God that they might discover her, as they much feared that she would be lost; they were running to the north and to the north-northwest with the wind west and west-northwest; and the following Tuesday at daybreak they had sight of the land, and they were able to hold on until the evening, and they could see that the land was very high, and they cruised along the coast to see if there was any port where they might take shelter; and so great was the swell of the sea that it was fearful to behold; and the coast was bold, and the sierras very lofty, and at evening they lay by at anchor; it is a coast running from northwest to southeast; they perceived the land at a point which projects into the sea which forms a cape, and the point is covered with trees, and is in 40 degrees [*Point de Arenas*].

Wednesday, the 15th of the said month, they had sight of their consort, for which they gave many thanks to God, as they considered her lost; and they came up with her and joined her at evening. They of the other ship endured more danger and risk than those of the captain's vessel, on account of its being small and having no deck. This land where they were sailing is to appearance very good, but they saw no Indians nor smokes. There are grand sierras covered with snow; there are many trees. At night they lowered the sails and lay by.

On the following Thursday, the 16th of the said month of November, at daybreak, they were upon a large inlet [*Bodega Bay?*], which came from a turn of the shore, which appeared to have a port and a river, and they went beating about this day and the night and the Friday following, until they saw that there was no river nor any harbor; and to take possession they cast anchor in 45 fathoms. They did not dare to land on account of the high sea. This creek is in a little over 39 degrees, and it is all covered with pines to the sea. They gave it the name of la Bahia de los Pinos [*Bodega Bay*]. The following night they lay by until the next day.

The following Saturday they were running along the coast, and they found themselves at night off el Cabo de San Martin. All the coast they passed from this day is very bold, and there is a great swell of the sea, and the land is very lofty; there are mountains which rise to the sky and the sea beats upon them. While sailing near the land it appears as if they would fall upon the ships; they are covered with snow to the summit. They gave them the name of las Sierras Nevadas [*the Sierra Nevada thus christened*], and the principal one forms a cape, which projects into the sea, which they named Cabo de Nieve [*not identifiable*]. The coast runs north-northwest and south-southeast. It does not appear that Indians inhabit this coast. This Cabo de Nieve is in $38\frac{2}{3}$ degrees, and always when it blew from the northwest it made the weather fair and clear.

Thursday, on the 23d day of the month, they approached on a backward course the islands of San Lucas [*the group collectively here meant*], and one of them named la Posesion [*San Miguel*]; and they ran along all the coast, point by point, from el Cabo de Pinos to them, and they found no harbor, so that of necessity they had to return to the said island, on account of having these days a very high west-northwest wind, and the swell of the sea was very great. From Cabo de Martin to Cabo de Pinos

we saw no Indians, because of the coast's being bold and without harbor and rugged; and on the southeast side of Cabo de Martin for 15 leagues they found the country inhabited, and many smokes, for the land is good; but from el Cabo de Martin as far as to 40 degrees we saw no sign of Indians. El Cabo de San Martin is in $37\frac{1}{2}$ degrees.

While wintering in this Isla de Posesion [*San Miguel*], on the 3d day of January, 1543, departed from this present life Juan Rodriguez Cabrillo, captain of the said ships, from a fall which he had on the same island at the former time when they were there, by which he broke an arm near the shoulder. He left for captain the chief pilot, who was one Bartolome Ferrelo, a native of the Levant; and he charged them much at the time of his death that they should not give up the discovery, as far as possible, of all that coast. They named the island la Isla de Juan Rodriguez.* The Indians call this island Liquimuymu, and another they call Nicalque, and the other they call Limu. In this island de la Posesion there are two villages; the one is called Zaco¹⁰ and the other Nimollollo. On one of the other islands there are three villages; one they call Nichochi, and another Coycoy, and the other Estocoloco. On the other island there are eight villages, which are, Miquesesquelua, Poele, Pisqueno, Pualnacatup, Patiquiu, Patiquilid, Ninumu, Muoc, Pilidquay, Lilibequé.

The Indians of these islands are very poor. They are fishermen; they eat nothing but fish; they sleep on the ground; all their business and employment is to fish. In each house they say there are fifty souls. They live very swinishly; they go naked. They were in these islands from the 23d of November to the 19th of January. In all this time, which was almost two months, there were very hard wintry storms on the land and the sea. The winds which prevailed most were west-southwest and south-southwest and west-northwest. The weather was very tempestuous.

Friday, the 19th day of the month of January, 1543, they set sail from the island of Juan Rodriguez, which is called Liquimuymu by the natives [*San Miguel*], to go to the mainland in quest of some supplies of provisions for their voyage, and in leaving the port a heavy storm from the west-northwest struck them, which made them put into the other island of San Lucas, and they anchored off the island of Limun, to which they gave the name of San Salvador [*Santa Cruz*], and they found it necessary to weigh anchor again because it had no port more under the shelter of the islands, and the wind veered round obliquely, and they sailed round these islands eight days with the winds very foul, sheltering themselves by the islands from the bad weather; and on the 27th day of the said month they entered the same port of the island of Juan Rodriguez where they were before. The greatest obstacle they had was because the winds were not fixed, but went veering about from one to another. Those which are most constant are from the west-northwest and from the west-southwest.

Tuesday, the 29th day of the said month of January, they departed from the island of Juan Rodriguez [*San Miguel*] for the island of San Lucas [*Santa Rosa here intended; although the confusion resulting from the Spaniards' having named and renamed certain ones of the group renders it difficult to fix them with precision*], which is in the middle of the others, to take up certain anchors which they had left in a storm, not being able to raise them, which they took, and took in water.

* The three centuries and more that have elapsed have witnessed great changes in the appearance of the island of San Miguel, evidently then well populated. It has become barren and desolate in the extreme by reason of the drifted sand, which lies on it to the depth of many feet, and which will doubtless always preserve the secret of Cabrillo's grave.

They departed from this island of San Lucas Monday, the 12th day of the month of February, which they could not do sooner on account of the bad weather, which gave them winds and much snow. It is inhabited, and the people are like those of the other island. The Indians call it Nicalque. There are three villages in it, which are called Nicochi, Coycoy, Coloco. This day they went to Puerto de las Sardinias [*Goletta Anchorage*], to take in wood and other things necessary for their voyage, as they were not to be obtained on those islands.

Wednesday, the 14th day of the said month, they departed from El Puerto de Sardinias, having taken a boat-load of wood, and they did not dare to remain longer there on account of the great swell of the sea; they did not find so many Indians as before, nor any fishing on account of the winter; the natives eat oak acorns and other seeds and herbs of the field without cooking. From this place they proceeded to the island of San Salvador [*Santa Cruz*], because they were there more secure from the storms, that they might be able to make sail and run along by the sea.

Sunday, the 18th day of the said month of February, they departed from the island of San Salvador with a moderate wind to the northeast, and they ran along to the southwest, because they were told that there were other islands toward the southwest; they were at dusk this day about 12 leagues from the island of San Salvador, and they saw six islands, some large and others small. [*The southern members of the Santa Barbara group, of which there are actually but five; but Santa Catalina has the appearance of being cut in two.*] This day a sailor died, and the following Monday, at daybreak, they were at sea about 10 leagues to the windward of the islands, and with the wind west-northwest they were standing off five days to the southwest, and after they had proceeded about a hundred leagues they found the wind more violent and the sea high; and Thursday, the 22d day of the said month of February, they again stood inshore to endeavor to reach Cabo de Pinos [*Point de Arenas*], with the wind south-southeast, which continued three days, and was increasing each day; and the Sunday following, at daybreak, they gained sight of Cabo de Pinos, and they were this day at dusk 20 leagues to windward on a coast running northwest and southeast, and it is bold and without harbor; there was no smoke seen on the land, and they saw a point which formed the extremity of the land which turned the coast to the northwest; in the middle of the night the wind suddenly shifted to the south-southwest, and they ran to the west-northwest until day, and in the morning the wind shifted to the west-southwest with great violence, which held on until the following Tuesday; they ran to the northwest.

Tuesday, the 27th day of the said month, the wind veered to the south-southwest, which held on all day; they ran to the west-northwest with the foresails lowered, for it blew violently; at the approach of night the wind shifted to the west; they ran all night to the south with but few sails; there was a high sea which washed over them.

The Wednesday following, the 28th day of the said month, at daybreak, the wind shifted directly to the southwest, and it did not blow hard. This day they took the latitude in 43 degrees. [*Allowing the necessary error of a degree and a half, this would place the ships somewhat above Cape Mendocino.*] Towards night the wind freshened and shifted to the south-southwest. They ran this night to the west-northwest with much difficulty, and Thursday at daybreak the wind shifted to the southwest with great fury, and the seas came from many parts, which harassed them much, and

broke over the ships, which, not having decks, if God should not succor them, they could not escape, and not being able to lay by, of necessity they ran aft northeast towards the land; and now, holding themselves for lost, they commended themselves to our Lady of Guadalupe, and made their wills, and ran thus until three o'clock in the afternoon with much fear and labor, for they saw that they were going to be lost, and already saw many signs of the land which was near, as small birds, and logs very fresh, which floated from some rivers, although from the dark and cloudy weather the land did not appear. At this hour the Mother of God succored them with the grace of her Son, and there came a very violent rain-storm from the north, which made them run all that night and the following day until sunset to the south, with the foresails lowered; and because there was a high sea from the south it broke over them each time by the prow, and passed over them as if over a rock, and the wind shifted to the northwest and the north-northwest with great fury, so that it made them run until Saturday, the 3d of March, to the southeast and to the east-southeast, with such a high sea that it made them cry out without reserve that if God and His blessed Mother did not miraculously save them they could not escape. Saturday at noon the wind moderated and remained at the northwest, for which they gave many thanks to our Lord. They suffered also in provisions, as they had only biscuit, and that damaged.

It appeared to them that there was a very large river, of which they had much indication, between 41 degrees and 43, for they saw many signs of it. [*Probably the drift from the Columbia was here noticed, although all the smaller rivers of this coast carry down more or less drift-wood.*] This day, in the evening, they recognized Cabo de Pinos [*Point Arenas*], and on account of the high sea which prevailed they could do no less than run along the coast on the return course in search of a port. They experienced much cold.

Monday, on the 5th day of the said month of March, 1543, at dawn, they found themselves off the island of Juan Rodriguez [*San Miguel*], and they did not dare to enter the port on account of the great storm which prevailed, which dashed the sea on the entrance of the port in 15 fathoms; the wind was north-northwest; the entrance is narrow; they ran into the harbor of the island of San Salvador [*Santa Cruz*] on the southeast side; and the night before coming with a violent tempest, with only two small foresails, the other ship disappeared, so that they suspected that the sea had swallowed it up, and they could not discover it any more, even after daybreak; they believe they must have been in 44 degrees when the last storm took them and compelled them to fall off to leeward. [*The allowance of a degree and a half would place the highest point reached in about 42½ degrees, or at about the southern border of Oregon, and it is believed that this is not far out of the way.*]

Thursday, the 8th day of the said month, they departed from the island of San Salvador, to stand in for the mainland in search of the other ship, and they proceeded to Pueblo de las Canoas [*Buenaventura*] and did not obtain news of the other ship; and here they took four Indians.

The Friday following, on the 9th of the said month, they departed from Pueblo de las Canoas and proceeded to the island of San Salvador and found no signs of their consort.

Sunday, the 11th of the said month, they came near Puerto de San Miguel [*Saint Pedro Bay*], neither did they find here their consort nor any news of her; here they

waited six days; here they took two boys to carry to New Spain for interpreters, and left certain signals in case the other ship should approach.

Saturday, the 17th day of the said month, they departed from the said Puerto de San Miguel; the following Sunday they arrived off Bahia de San Mateo [*San Diego Bay*] and found no more signs of the other ship.

Sunday, the 18th day of the said month, in the evening, they departed from this bay of San Mateo, and the Wednesday following, on the 21st of the said month, they arrived at Puerto de la Posesion [*Port St. Quentin*], and still obtained no news of their consort; they waited two days without entering the port, for they did not dare to enter it on account of the heavy northwest wind which blew, and, as it broke their cable, of necessity they weighed anchor.

Friday, on the 23d day of the said month, they departed from Puerto de la Posesion, and the following Saturday at midnight they arrived off Isla de Cedros [*Cerros Island*], and being there the following Monday, the 26th day of the said month, arrived the other ship off Isla de Cedros, at which they rejoiced much and gave many thanks to God; this ship put into La Isla de Juan Rodriguez [*San Miguel*], by night, passing over some breakers so that they expected to be lost, and the mariners promised to go in procession naked to her church, and our Lady delivered them.

On Monday, the 2d day of the month of April, they departed from Isla de Cedros on their return to New Spain, because they did not have a supply of provisions to renew their attempt to discover the coast. They arrived in El Puerto de Navidad Saturday the 14th day of the said month of April.

Came as captain of the ships, Bartolome Ferrel, chief pilot of the said ships, in default of Juan Rodriguez Cabrillo, who died in Isla de la Posesion [*San Miguel*]. The men came in the said ships.

Found without the name of the author, in the general archives of the Indias of Seville, in the letter of the time, among the papers brought from Simancas. File 9 of Descriptions and Populations.

Examined and approved.

MARTIN FERNANDEZ DE NAVARRETE.

Another copy in the collection of Muñoz, vol. xxxvi, in which he inserts after his certificate of approval: "At the head and on the cover of this narrative occurs three times, De Juan Paez." The differences which are noticed between this and that are, 4. 30° and $\frac{2}{3}$. 5. Northeast southwest. 6. The last two names are united thus: Quannuegua. 7. Anacoac. 8. Caacac. 9. Xuca. 10. Caco.

U. S. GEOGRAPHICAL SURVEYS WEST OF THE ONE HUNDREDTH MERIDIAN.
1ST LIEUT. GEO. M. WHEELER, CORPS OF ENGINEERS, U. S. ARMY, IN CHARGE.

PART II.—(VOL. VII—ARCHAEOLOGY.)

THE PUEBLO RUINS AND THE INTERIOR TRIBES.

BY

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INTRODUCTION.

DURING the progress of the survey of the territory west of the 100th meridian, several of the officers connected with the field parties in New Mexico, Arizona, and Colorado had opportunities for collecting a number of objects pertaining to the Indian tribes. They were also able to record many observations of considerable archaeological and ethnological importance and interest in relation to the ancient and present pueblos.

A few of the accounts were furnished by their authors for publication in the annual reports on the progress of the Survey, while others have remained at the office in manuscript. As there is yet wanting a full and correct account of the people who, while formerly more numerous than now, still inhabit the great interior portion of our country, principally included between the 32° and 38° of north latitude and from 104° to 113° west longitude, every addition that is made to the meagre history of this, ethnologically considered, important development of village life on the western continent is of interest.

Whence came this once numerous people? How long since they reached the high position of village and agricultural life? What has been their influence on the history of American tribes? All these are questions which are yet without satisfactory answers. Of speculations there have been many, but until a more thorough record of facts is obtained all theories are comparatively worthless. As yet we are hardly possessed of anything more than the preliminary observations which lead us to the belief that there is here an extensive field for research.

When an expedition, properly equipped, with no other than ethnologi-

cal and archæological work to perform, with plenty of time allowed for the work, shall have been over the region, it will be time to offer theories with some hope of their leading to satisfactory results. It is, therefore, with this feeling of the importance of placing on record every reliable fact and observation possible, in relation to the present pueblo tribes, and the ruins of the former more or less extensive towns, and probably communal houses, that the observations of the officers of the Survey are here incorporated, with short descriptions of a number of stone implements, pottery, and other objects found in the pueblos and about the ruins.

Various objects were also obtained by the officers of the Survey from the Indian tribes of the interior and are briefly referred to in the following pages, though, owing to the rapid disappearance of these from Indian life, their importance is such as to justify a more extended notice than it is possible to give in this connection.

NOTES ON THE PUEBLOS AND THEIR INHABITANTS.*

BY G. THOMPSON, *Topographer.*

IN figure and stature, the people of the pueblos are noble looking and beautifully formed. Generally of medium height, they have complete muscular development* without knottiness or sinewy appearance; their chests are full and deep. Standing easily and lightly on their feet they are erect and graceful. Their countenances are noble and dignified, and I have seen among the men those who were as courtly, polished, and hospitable in manner as a Spanish grandee of the olden time.

Judging from my own experience they are cordial and even jovial in manner toward a stranger. Although probably of one people, each pueblo has its own government. The Oraibe are offended if called Moqui, while the Jemez ridicule the Pueblo of Silla, and believe the Jemez to have been once the only great tribe, and delight to talk of their former numbers and greatness. Notwithstanding the pursuits of this people are of a peaceful and pastoral character, as warriors they have always been valued as allies and dreaded as enemies. For proof of their stubborn and desperate courage, one has only to learn of their resistance to Spanish usurpation, when many a doughty Spaniard went under at Jemez, Ildefonso, and around Santa Fé. Our own government found them invaluable as allies to act against the

* During the field-seasons of 1872, '73, and '74, Mr. Thompson had favorable opportunities for visiting eight of the inhabited pueblos in New Mexico, and of making examinations of the ruins of four of the ancient pueblos. While in Southern Utah, in 1873, he also met with indications of the former existence there of a people who were probably of the same stock with the pueblo tribes. The results of his observations were briefly recorded in a manuscript which is here printed.—F. W. P.

Navajos; and as a proof of their magnanimity, many Navajos are now living in the pueblos, intermarry with the people, and are even admitted to their ceremonies in the spring. Towards Mexicans they are exclusive, and at Isleta they are not allowed to live in the pueblo. Each pueblo has its own art or furnishes its peculiar product. Thus the Jemez do not own a single sheep, but raise fruit and corn. Cochiti is noted for its pottery, the Oraibe and Navajo are the weavers, while the Moqui are the song-makers. At Jemez, during a dance, a Moqui song was sung in the Moqui tongue, and it was learned that the song-leader of the Jemez went each year to the Moqui to learn new songs, for which he paid "money." On his return, previous to the time of the dance, he gathers the robust and sweet voices of the tribe, when the song is repeated after him until all are equally proficient. At the "Piñon Dance" in Jemez we were admitted to the dressing-room, and the leader was assiduously engaged in making the performers perfect. They are singing at all times, and it forms the greater part of their ceremonies. At Oraibe singing began with the first break of the day, but did not, however, last late at night, as they evidently are early to bed and to rise. At Nambé I went into one of the houses, and a singer entertained my companion and myself with several songs, each with different words, time, and melody, accompanying himself with beating on a small drum. One of the songs was so pleasing that I had him sing it three times. They are keen at a trade; and, though holding to their price, are not extortionate. They are honest and industrious, proud of working, and ridicule those Indians who live in wigwams and are lazy. They are found to be valuable workers in land office survey parties as flagmen, etc.

That they have a religion of some character, which is in some way connected with the *estufas*, seems probable. These *estufas* are circular and are found in all the inhabited pueblos and also in the ruins. They are generally regarded as sacred places, not to be entered except by a few. I have understood that in some there was an inner room, which only one priest once a year enters, and alone. At Jemez the use of the *estufas* seems to be less restricted than in some other of the pueblos, and has more the character of a council-house. I have heard that in former time fires were kept burning in the *estufas*, but it may be that the custom had more of a prac-

tical aid to every-day life than a part of their religion. This people have many traditions among them, which are of interest in reference to this matter, and some one should collect them.

Their belief is in Montezuma, who is to come to them again in the morning at sunrise, and at Oraibe Mr. Gibbons told me the people went upon the house-top and would sit looking to the east at sunrise. This has led some persons to regard the Pueblo tribes as sun-worshippers. It may be that they worship the sun and the moon, "the captain of the night," and the rain bringing the harvest. Mount Taylor they call "mother of the rain;" and it is a sacred mountain, where, as Hosta told us, "they go to pray to their gods that they may have rain and good harvests." Upon the summit of Mount Taylor is a small cave, which is used as an *estufa*. This cave is closed with large rocks when their meeting is over. Near it were found sticks of different patterns, ornamented with feathers, each pattern indicating the tribe offering it, and the herders told us that *little* bows and arrows, moccasins, plows, etc., were found after they had left. The Indians never allowed the herders to come near them during the time, but dancing and singing is believed to be the main part of the ceremony. Hosta hoped we had disturbed nothing, as we would have found only a cave. This ceremony takes place about the middle of June. These "mountain places of worship" seem generally to consist of an inclosure, occupying the highest part of the peak, and made of rocks piled up, against which earth is sometimes thrown. Leading from the inclosures are one, two, or three trenches, about 18 inches wide and a foot deep. The herders told me that the Indians danced in the trenches. Broken pieces of pottery, beads, and pieces of marine shells were found near them. I found a little bow on Mount Taylor, some pretty bits of marine shells on one of the Jemez peaks, and beads on the White Mountain at Camp Apache. On the mountain peaks in lower New Mexico there are indications of similar ceremonies having taken place as in the north, but as we do not know of such ceremonies among the Apaches it may be that these places in the south were simply "lookouts."

According to the tradition which we heard, Montezuma was born at Pecos, of a poor woman, a virgin; and as he grew up herded sheep; and an eagle came and kept him company. After awhile the eagle would place

himself before Montezuma as though he would have him sit upon his back. At last Montezuma did so, when the eagle flew without rest to Mexico, where Montezuma founded a great people. He is to return again, and at sunrise.* The eagle is regarded with peculiar veneration by them in consequence, and upon the roofs of the houses may be seen huge cages made of logs of wood and covered, containing eagles; and their feathers are used in the dances. I saw at Ojo Caliente an eagle so tame as to be loose about the house.

Hosta said, when telling of Montezuma, "the old people still believe all this, but the young people do not care."

I could not discover any method of recording events, and their history finally assumes the form of tradition. As a people they do not make many inscriptions, although I saw quite a number on the lava rocks near Santa Fé.

Their trails are remarkable, extending as they do in a straight line from one pueblo to another, and even traced from ruin to ruin. These deeply-worn paths, even on the rocks, passing without swerving to right or left, over valley, plain, or ascent of mesa—as though the trail was older than the mesas, or before the cañons, gnawed into the plateaus by erosion, had reached their pathway—speak more powerfully than all else of how old a people they are.

The character of the country and the habits of the people brought Scriptural stories continually to mind. The Mormons regard them as the lost tribe of Israel, and have, in their religious zeal, attempted their conversion. Tuba, an Oraibe, is a convert, and Jacob Hamlin, "Mormon Jacob," is regarded with great respect and affection. Mr. Gibbons told me that it was once understood that the Moqui language contained Welsh words, and when he went out to their towns Brigham Young sent a Welshman along to see if it were so. The Welshman gave a humorous report of his success, which I cannot recall.

*As a general account of the Pueblo people would not be complete without a reference to the "Montezuma legend" in some one of its many forms, the above rendering of the myth is here retained, although the legend itself probably refers simply to one or more great leaders of the Pueblo tribes at periods preceding the Spanish conquest. The name of the composite hero, and his final journey to Mexico, are so evidently due to early Spanish interpretations and additions to the original legend, that until the legend is known as it existed at the time of Spanish contact, its consideration is not of the least ethnological importance.—F. W. P.

Some of the Zuñi are very white, and seem to be a class by themselves. We found them at Ojo Caliente, a sort of summer resort for the Zuñi. I saw an albino at Oraibe, and also one at Jemez.

The Moqui bury their dead *upright*, facing the east, in any convenient place, and, I am told, with but little ceremony. The grave is closed by a flat rock, and other stones are placed at the sides. A person not knowing what these graves were would take them for feeding-places for sheep. The grave-stones were not marked. The same kind of graves I saw near Zuñi. At Jemez there is a regular grave-yard, which is walled in, and the graves have headboards—probably due to Spanish influence.

The towns are generally of one or the other of two ground-plans. The first being a single building, with one, two, or three sides, facing a plaza inclosed by a wall. I believe it will be found that this manner of building is used when the pueblos are in a plain without natural features of defense. Such buildings are sometimes four stories in height, each story facing the plaza, but falling back the width of the room below it. The Pueblo Pintado probably had towers at the angles of the wall. At Tule Spring the pueblo was a row of buildings facing the east and the spring. The second class is laid out in streets, sometimes with a plaza, as at Jemez. The present Pueblo of Jemez is built of adobe, while the houses of Old Jemez are of stone.

The Moqui towns were very irregular. The present Pueblo of Zuñi has the appearance of being built on a knoll, but the hill is really the dirt of the town, and as it accumulates the houses are carried up a story. In the court-yard of the ruin of Pueblo Pintado are large mounds from the same cause, and if dug over much of interest might be found. Isleta is very fine in appearance. It contains a large Catholic church, and the walls are covered with a light cream-colored stucco, adding much to its appearance.

I have never been able to find a fire-place in a ruined pueblo, and this may go to prove that the method of making a fire-place of adobe in the corner of the room after the walls are built, in the present pueblos, is also the old one. At the ruins of the Pueblo Pintado many of the windows are so small that they appear to have been loop-holes for defense.

In the inhabited pueblos sheets of mica are used in the windows as a

substitute for glass. The huge oval ovens for baking, sometimes placed upon the roofs of the houses, give to the towns a peculiar appearance. I never heard of any metal being found in the ruins. At the Moqui Towns there is a ruin on a mesa.

There is no doubt that the people were once more numerous than at present ; and I judge at one time there must have been quite an emigration, probably to portions of Mexico. Hosta told us that the Pueblo Pintado was deserted at that time. There may have been through trails from these towns to the Pacific Coast.

From personal knowledge there are indications at Pipe Spring, Utah, of houses built of stones, and Prof. A. H. Thompson has informed me that in the cañon of the Escalante, and in the Colorado cañon, there were remains of stone houses ; and Mr. Harris, a Mormon—some seventeen or twenty years ago (I understood)—went with an expedition sent out by Brigham Young into the country between Grand and Green Rivers, and found stone houses two stories in height in a country where now there is no water, nor has there been any within at least two hundred years. I judge that just north of the Colorado was the northern limit of this people.

To the south, there is a ruin at the Hot Springs on the Gila, which is south even of the ruin at Tule Spring and near Milligan's ranche—no doubt quite in old Mexico.

THE PUEBLO OF ACOMA.

BY DR. OSCAR LOEW.

[From notes by G. L. McGee.]

ACOMA is about 45 miles south of Old Fort Wingate, N. Mex. It is built on a barren sandstone mesa some 300 feet above the plain. As we filed around the base of the rock, the Indians, on their high perch, shouting in their peculiar wild notes, presented a scene more weird and savage than anything that I have ever seen before. The town can be approached only by two narrow and very steep paths. We ascended by the foot-path on the west side over a drift of sand which the wind has piled against the side to within 15 or 20 feet of the summit, and then by steps cut in the solid rock we reached the town. This town is built in the usual style of the pueblos of New Mexico. The houses are of adobe, and of two and three stories. There are neither doors nor windows in the first story, except in the roof, which is flat and reached by means of ladders. The town has about 600 inhabitants, and is divided by three parallel streets. The surface of the mesa on which the town is built comprises about ten acres. There are from 60 to 70 houses, the doors of the upper stories of which open to the south. The time was, unfortunately, too short to collect a vocabulary for comparison with the other Pueblo languages. Some of the Indians were able to converse a little in Spanish. Cooking is done in earthen pots of their own manufacture. We noticed spoons made of horn and of wood. Furniture is unknown, and the people sleep on sheep-skins spread on the floor.

The bread is unfermented, and resembles very thin wafers which are


rolled up. Most of the houses are clean and orderly, and some of them are whitewashed inside. There is no spring on the mesa, and the water is obtained from a large tank on the top of the mesa, which is filled with snow in winter, and in which the rain-water collects during the rainy season. This tank is about 150 feet long, 20 feet broad, and 4 to 5 feet deep.

The antiquity of the pueblo is unknown. The archives of the Mexican Government show that a Spanish Jesuit Mission was established in the place as early as 1687. The description of the topography answers to this locality, although no particular name is mentioned. The Jesuits' *régime*, however, has ceased, probably within the last forty or fifty years. In but very few of the pueblos have the Jesuits held their power up to the present day. The church is still there, but there is no use for it, and the surrounding yard is occupied by sheep and goats. The church is about 150 feet long, 30 feet wide at one end and 40 at the other. It has a tower about 40 feet high, and has two church bells, one of which bears the inscription "San Pedro, A. D. 1710." There is a grave-yard on the sandy portion of the mesa. The sand may have been carried up and placed in a depression at this point.

[The date, 1687, given above as the time when the Jesuit Mission was established at Acoma is not justified by the annals of the order, as shown by the following note, for which I am indebted to Mr. Ad. F. Bandelier:—"Not long after 1628, Fray Juan Ramirez, a *Franciscan* monk, founded the mission of San Estevan de Acoma, naming the place after Saint Sebastian on account of its rocky sides and the large number of pebbles accumulated on and about it (*por lo pedragoso*). Fray Ramirez returned to Mexico, and died there in 1664. His successor was Fray Lucas Maldonado, from Tribujona, Mexico, also a *Franciscan*. In fact, up to the uprising of the Indians of New Mexico, under Popé and Catité, in 1680, the *Franciscan* order controlled all the missions among the pueblos. On August 10, 1680, twenty-one *Franciscan* friars were murdered in various parts of New Mexico, and among them Fray Meldonado of Acoma. About twelve years later Vargas reconquered the territory, but for several years afterwards there were occasional disturbances and bloodshed. In 1687 there were no priests of *any order* among the pueblos.—Compare, Fray Augustin de Vetancurt (*Teatro mexicano*, Mexico, 1698, part 4, *Cronica de la Prov. d. Sto. Ev. de Mexico*, p. 101; also, *Menologio franciscano*, p. 86).—Also, P. Joseph Stöcklein (*Der neue Weltbott*, 1726, vol i)."—F. W. P.]

THE PUEBLO OF TAOS.

BY H. C. YARROW,* *Assistant Surgeon, U. S. A.*

WE were surprised to find that in this pueblo, in lieu of a single estufa, or council-chamber, as is usual in other pueblos, each headman had a private one of his own, there being five in all. For a small sum of money we were permitted to view the one appertaining to the capitan de la guerra, or war-chief, of the tribe. It was found to be a large circular chamber under ground, the entrance being through a small trap-door on top, surrounded by a circular stockade, containing numerous antlers of deer, and having a narrow opening. Descending to the chamber by a ladder, it was found to be probably 25 or 30 feet in diameter, arched above, and about 20 feet high; around the wall, at a height of 2 feet from the ground, was a hard earthen bench. On the floor in the center was an oblong pit, 2 feet deep and nearly 3 feet long. In this, it is said, the sacred fire is kept burning, and we were shown some live embers beneath the ashes. Behind the fire-pit is a sort of altar constructed of clay, in shape similar to the accompanying figure ; the use of this it was impossible to ascertain. From a peculiarly sweet aromatic odor, which seemed to fill the atmosphere of the room, we inferred that probably in their rites sweet-smelling grasses or wood are used as incense. The war-chief informed us that it should be considered a great favor to have been permitted to view the interior of this estufa, as such a favor was seldom shown to an American, and never to Mexicans.

The government of these Indians, who appear to be ruled by no single

* Abstract from general itinerary report for field-season of 1874. Annual Report of the Chief of Engineers for 1875. Appendix LL.

individual, is somewhat interesting. The cacique, or high priest, is the oracle and spiritual ruler, having the power to punish for irreligious acts and to solemnize marriage ceremonies; in fact, his consent must first be obtained before lovers may be betrothed. In the temporal affairs of the people he seems to be clothed with no authority. It is pleasing to note the great respect and reverence always paid to these aged men by the people; and a singular custom among them is that of drawing lots by the young men of the tribe to determine who shall support and take care of the cacique each year, and the successful competitor is deemed very fortunate.

The governor, or *alcalde*, of the village is in reality the ruler in all temporal affairs; he orders work, regulates the hours of labor, and in short performs all the functions of a chief magistrate. Unlike the cacique, who holds his office for life, the *alcalde* is elected yearly. The emblem of his authority is a cane, which serves the double purpose of a writ when offenders are to be summoned before the bar of justice, and as a weapon to inflict such punishment as may be ordained.

The *capitan de la guerra*, or war-chief, holds his office by hereditary right, is responsible for the defense of the town in time of war, and leads the fighting portion of the population. He seems to exercise the right of supervision over the common pasture-field, or "vega," and likewise claims the ownership of the hunting-grounds near the village. There are also several minor officials who act as constables and police, called *alguazils*.

Although these people are ostensibly Roman Catholics, there is no possible doubt but they are sun-worshippers, as each night and morning the greater part of them are to be seen on their house-tops chanting hymns of praise to this orb as he departs and reappears. These hymns are inexpressibly sad and mournful, though beautiful and melodious, and similar in character to the droning song in a minor key of the negro; the words appear to be a succession of monosyllables, with frequent repetition. In the event of any occurrence of interest to the people, a public crier announces it from a house-top. We had an instance of this in our own case, as before we were permitted to encamp near the village a council was held to decide whether to treat us as friends or enemies. The decision being in our favor, the fact was publicly made known in the manner indicated.

These people seem to be particularly fond of having near their houses birds of different kinds, and a number of hawks and eagles were observed. The latter bird is looked upon as having a sacred connection with Montezuma.

The character of the Pueblo Indian is singularly at variance with that of the other tribes of New Mexico, being affectionate and childlike, innocent in manner and very honest, exhibiting none of that brutal and ferocious element common to most of the nomadic tribes. These Indians are essentially a pastoral and agricultural people, tilling the soil with energy and industry. They claim a patch of land covering a radius of three miles from the center of their town, and this portion of the Taos Valley is most fertile, and a veritable garden-spot. On all sides were seen fields of corn, wheat, oats, and barley, interspersed with large numbers of fruit-trees.

Mr. Miller stated that he annually purchases of the Indians about 6,000 bushels of fine wheat. They claim that they desire nothing from the general government but protection against squatters on their lands, and appear to be abundantly able to take care of themselves. It was particularly pleasing to note the great degree of affection manifested by parents for their children, and also that they do not make beasts of burden of their women, as do the wild Indian tribes of the plains and mountains. Their laws in regard to thieving, adultery, and other crimes are severe, and offenders after trial are punished with commensurate severity.

Lieut. CHARLES C. MORRISON, Sixth Cavalry, in his report* for the field season of 1877, gives the following notice of the pueblo of Taos:

The next point of interest is the Taos pueblo, the most important, excepting perhaps Zuñi, of the Indian pueblos in New Mexico. With a history back to the first Spanish occupancy of the country, an existence dating indefinitely long before that time, a prominent center, in whose council chambers the plans of uprising took form in the first determined expulsion of the Spanish from the country, it can but be regarded with interest. Here they have raised their crops, herded their goats, manufac-

* Annual Report of the Chief of Engineers for 1878, Appendix NN.

tured their pottery, lived their apparently objectless lives for hundreds of years, seemingly with no ambition other than the privilege of existing. They have not changed; they are living proofs of the truth of the Spanish reports concerning them over three hundred years ago.

The same two principal houses stand which Vargas attacked in 1692, in all their quaintness, built of adobe, or sun-dried bricks, five or six stories high, each story receding the depth of a room, without doors, entered from above by ladders; they are faithful witnesses of the lack of change in this section, while ruins of similar edifices point to the great changes that have taken place farther south in the Territory.

We afterward passed through Picuris, an Indian town, dating back probably as far as Taos; it is smaller and more squalid-looking, but as intimately connected with Santa Fé's early history.

[The pueblos of Taos and Picuris are on the eastern side of the Rio Grande del Norte, in Northern New Mexico.]

THE PUEBLO OF SAN JUAN.

BY H. C. YARROW,* *Assistant Surgeon, U. S. A.*

THIS town differs materially from the Taos town, being built around a hollow square, the buildings rising two stories in height, instead of five or seven. In the vicinity the Indians own most of the fertile lands near the river, and raise excellent corn and wheat, and, besides, a great quantity of fruit; peaches, apples, and watermelons predominating. At this season of the year they abandon their villages and erect temporary structures in their fields, in which they live, to watch over their crops and protect them from unscrupulous trespassers. From the alcalde of the previous year an interesting vocabulary was obtained. It may be interesting in this connection to mention the Indian method here witnessed of thrashing grain. A suitable piece of firm ground is selected, perhaps 20 feet in diameter, and is carefully cleared of stones and gravel; water is then poured on it from time to time, and a herd of goats is driven round and round until the surface is as firmly packed as possible; a circle of posts is then driven into the ground, and the whole is inclosed with ropes, on which are hung old bags or rags. Into the inclosure ten or fifteen mares are introduced and driven around in a circle, the straw containing the grain having previously been spread out. In a very short time the grain is beaten out by their hoofs and is gathered into a heap, being afterward winnowed from the chaff when a sufficiently strong wind will admit of it. These thrashing-floors are called by the New Mexicans "era."

[The pueblo of San Juan is about 40 miles south of Taos and on the same side of the Rio Grande del Norte.]

* Abstract from general itinerary report of field season for 1874. Annual Report of the Chief of Engineers for 1875. Appendix LL.

THE CACHINA:

A DANCE AT THE PUEBLO OF ZUÑI.

BY FRANCIS KLETT,

Assistant, United States Geographical Surveys West of the 100th Meridian.

THE illustration forming the frontispiece to this volume is from an original sketch made during a visit to Zuñi, New Mexico, in 1873.

The meaning of the word Cachina is unknown. Vocabularies of the Zuñi language show a great many words terminating in *chee-nai*, although the preposition *ca* or *ka* is not observed. Davis, in his book, "El Gringo," makes brief mention of the Cachina as a dance suppressed "by the Spaniards when they first made a conquest of the country and forced their religion upon the nation." There is no doubt that the Zuñi Indians are very circumspect in regard to whom they permit to witness this dance, and perhaps for this reason the Cachina has not before been described to my knowledge.

The slow measure of the chant, the beating of drums, the rattling of gourds, and of shells of the land-turtle partly filled with pebbles, are mentioned by many writers as common to many tribes and nations in America, from the Atlantic to the Pacific.

The Cachina, according to the statements made by the prominent men of the tribe, is rarely danced, and is seldom witnessed by outsiders. It is only performed in time of great drought, and by order of the spiritual ruler of the nation, the cacique, through his official mouthpiece, the governor.

The dancers approached the place selected for the performance headed by a master of ceremonies, or leader, the men first, the "women," who are personated by young men, following, all in single file. Col. R. B. Marcy, in his book, "Thirty years of Army Life on the Frontier", pages 105-7,

describes a dance of the Moqui Indians, in which young men dressed as women took part.

The costumes of the dancers at Zuñi were extremely picturesque, and there is but little doubt that the various parts constituting the same are used only for this ritual dance or ceremony, since, during our entire sojourn at Zuñi, none of the various articles of dress used on this occasion were seen to be worn by any of the tribe. The blankets, tilmas, serapes, tunics, sashes, and feathers are of a far superior workmanship, fabric, and texture to those used for everyday home or outdoor life, and even in the design of their patterns and selection of colors show a superior artistic skill.

The costume of the leader, pictured in the center of the illustration, consisted of dark-blue knitted worsted-leggings, covering the calf from the ankle to the knee, leaving foot and knee bare. A sort of skirt, or kilt, of rich and harmonious colors, worn around the waist, fell in graceful folds from the hip to above the knees. A blue tunic, bordered with scarlet, with long flowing sleeves, exposing the arm to the pit, completed the costume proper. The only ornaments observed consisted of plumes made from eagles' feathers, dyed of a rich yellow hue. These feathers were, apparently, carefully selected from the down of young birds. Five or six feathers were tied in a knot or bunch, and fastened to the top of the head, forming a fine contrast with the long flowing jet-black hair. The insignia of the leader's office were a staff, adorned with similar, but smaller, yellow feathers, and a small earthen vase of basket form, painted and ornamented in black and brown, and containing flour.

The male dancers, as depicted on the left in the plate, were rather sparingly dressed in a small blanket, which extended from the waist to half-way down to the knee, and leaving the right leg entirely bare. These blankets were of a rich white woolen fabric, with a colored border of a diamond pattern. A green and red sash held the blanket about the waist, and to this was attached a bunch of white strings, which hung down the right leg, and, behind, a fox skin, the tail of which nearly reached the ground. On top of the head was a yellow plume like that worn by the leader, and over the face was a mask made of hide and painted sea-green, with a horse-hair beard attached. Around the neck was a skein of black

yarn with beads. Just below the knees were garters of the same color as the sash, and to the one on the left leg there was fastened a turtle's shell containing pebbles. Garlands of hemlock and fir, interwoven with berries and flowers, encircled waist and ankles. Each held in his right hand a gourd partly filled with pebbles, which were used as rattles. In the left hand some of the dancers held a bunch of hemlock and flowers.

The costume of the dancers representing women is shown by the figure on the right in the illustration. This consisted of blue worsted-leggings, a dark-blue blanket-gown, and a white tilma or serape, cut in the shape of a cape, with a wide colored border. On the head was a wig, very ingeniously constructed and made of long, fine glossy hair.* Their faces were also concealed by masks; and they had anklets of hemlock.

The dance itself is accompanied by a low rythmical chant and the beating of drums, which are constructed of large ollas, with a goat-skin stretched over the opening. The noise of the gourd carried by the dancers, and constantly shaken by them in time, resembles the sound of the castanet. The male dancers stood in a row, the "female" dancers facing them, the two rows being about four feet apart. The leader placed himself at one end between the lines, so that all who took part in the dance could see his movements and regulate theirs accordingly. He started the chant, which the others took up simultaneously, at the same instant lifting their right foot in a kind of stamping movement to the time of the chant. During the intervals between the verses of the song, the leader took a pinch of flour from his vase and scattered it in the direction of the four principal points of the compass, commencing at the east. This they believe will induce their tutelary deity to send them rain. The words of the song could not be obtained, and the information that it was in one of the Moqui dialects was only reluctantly given. Information from Mexicans and Indians show that there are various dances in use among the Zuñi, and some are said to be of a very obscene character.

During the field season of 1874, members of the survey had an opportunity of witnessing another interesting dance at the pueblo of Jemez,

* Similar wigs are worn by the "female" dancers among the Moqui, and are mentioned in a description of a Moqui dance by Dr. T. G. S. Ten Broeck, surgeon U. S. A. Schoolcraft, vol. II, pp. 73-77.

New Mexico. The dance is called Ko-petulé-tablá. According to Hosta, an ex-governor of the tribe, whom Lieutenant Simpson mentions in his book, Ko-petulé-tablá means the Dance of the Firs.

The Dance of the Firs resembles very much that of the Cachina, at least as far as the costumes are concerned, which are almost identical with that of the male dancers of the Cachina, with the exception of the addition of a peculiar head dress called *tablá*. This consists of a thin board, the upper end of which is of pyramidal form, and the lower end is cut so as to admit the head. A band passes over the forehead, and to this a kind of coronet of feathers is attached. The board is painted white, and is ornamented with symbolic and cabalistic designs, such as lightning-sparks, stars, and half-moons.

The female character is not represented, but instead a comic element is introduced by the presence of clowns or jesters, called *tab-oe*, or misery, as it was translated. These clowns do not really participate in the solemn dance, but imitate the same in a grotesque manner on one of the flat roofs in the neighborhood. They are dressed in similar fashion with the dancers, but instead of fine blankets they wear dirty rags, and have garlands of straw and sunflowers instead of fir and hemlock; their bodies are painted white with black stripes, outlining the ribs and the bones of the arms and legs, thus presenting from a distance almost the appearance of dancing skeletons.

The words of the song are, like those of the Cachina, in the Moqui dialect; the dialogue of the clowns in that of Silla.

The musical instruments are drums, gourds partly filled with pebbles, and notched sticks drawn across each other. The movement is somewhat different, beginning in the middle of the line and spreading towards both ends, with an occasional face about. This dance is performed thrice a day, at sunrise, noon, and at sunset, and is a kind of thanksgiving celebration. At the conclusion of the performance the jesters go from house to house and are liberally rewarded by donations of fruit and all kinds of provisions.

At the same pueblo of Jemez, I observed a peculiar custom or game, which I was told was always observed on the eve of the feast of San Juan. The young unmarried men of the pueblo parade the streets before dusk in

gay attire on horseback or burros, according to their wealth. Upon darkness setting in they appear again, this time entirely naked, and ride at a fast gait through the streets, while the dusky maidens watch them with great interest and show their particular favor by throwing water at and over them. This sport creates a good deal of amusement and is kept up till late at night.

REPORT ON THE RUINS IN NEW MEXICO.*

BY DR. OSCAR LOEW.

AMONG the few regions that were found, on the discovery of this continent, inhabited by people far advanced towards civilization, New Mexico, no doubt, occupies a leading place. The first notices of these people were published by Cabeza de Vaca (1536), who, during his adventurous and most remarkable wanderings from Florida to the Gulf of California, traversed New Mexico from east to west. All the Spanish records, though sometimes very untrustworthy, agree in one point—the large number of inhabited towns. If the statements of the Spanish writers are founded on truth, the number of these towns was ten times that of the present pueblos, or Indian towns, while, by a close examination, we arrive at a number only about four times as great. Some Spanish writers estimated the whole pueblo population at about 50,000; others, however, that of a single province at 25,000. As a proof of Spanish exaggeration, however, I may mention Castaneda's description of Acoma, a town which, according to his estimate, was inhabited by 5,000 persons, and was built in three parallel rows of houses. Now, I have visited this town and found the three rows of houses still existing; they extend from one side of a steep precipice to the other, occupying the entire width of the precipitous bluffs about 300 feet above the plain. But these rows of houses, which could never have been any longer, could not have held more than about 1,000 people. At present the population of the town is 800. Still it is an undeniable fact that New

* Abstract from the Annual Report of the Chief of Engineers for 1875, Appendix LL.

Mexico had a much greater Indian population formerly than now—a fact clear to any one on viewing the numerous ruins. If asked how this reduction was brought about, we can give but three reasons, viz: First, the change of climate that prompted emigration from certain parts of the country; second, the wars with the Spaniards, whereby wholesale slaughter was often ordered by the Spanish generals; and, third, a gradual mixture of Spanish and Indian blood, whereby the Indians lost their customs and language; Abiquiu, for instance, is such a town, where the characteristic Indian type still prevails, although they call themselves Mexicans. Such Mexicanized towns often received the name of a saint. The names of other pueblos, in which the inhabitants were not a mixed people, were, in a number of cases, also abolished, and those of saints substituted through the pious zeal of Spanish priests.

Looking over the names of towns mentioned in the Spanish reports, we found ourselves in many cases unable to locate them, not even ruins were found where, from the description, we would suppose they existed. Not only was this the case with the towns, but we often encountered the same difficulty with the provinces, as the name of each town in a province seems to have been used to designate the latter; often the province is named after valleys or after mountains. The truth is, the pueblos had no provinces, each town having its own government; the *maire* being elected every year. But if we would distinguish provinces, the language alone should be used as a criterion.

Marata, Acus, Totonteal, Acha, Tabasas, Sumas, Jumanes, Conchos, Pasaguates, Jerez, Piros, are names of provinces, the positions of which are difficult to determine; most of them were in Southern New Mexico. At present there is no pueblo existing there, except, perhaps, Isleta, below El Paso, which now belongs to Texas. But ruins are found here and there on the Rio Grande, Rio Gila, Rio Francisco, Rio Blanco, Rio Bonito, &c.

Hubates and *Tanos*, comprise the region of the Placer and Zandia Mountains and a portion of the Rio Grande Valley below Albuquerque. Ruins are quite numerous in these regions; for instance, those of Shi-na-na, San Lazaro, Guika, San Marcos, San José, Los Tanques, Guia, and of some buildings in the cañon of the Rio de Santa Fé near Cieneguilla.

Cicuye, *Querez*, *Cunames*, seem to signify one and the same region between the Rio Jemez and Rio Grande. At present five pueblos still exist here, but ruins of extinct towns are also seen near Silla and San Felipe. Diego de Vargas also applies the name *Querez* to Acoma.

Taos and *Picuris*. These two provinces are represented by two pueblos at the present day.

Tutahaco. Castaneda mentions (1542) eight cities of this province, the position of which is southeast of Mount Taylor. At present there still exist five pueblos, also several towns in ruins on the Rio San José, west of Laguna. The Mexican town Cebolleta was probably formerly an Indian pueblo. Mr. G. Marmon, school teacher at Laguna, informed me that ruins of a fortified place exist on the foot-hills of Mount Taylor near the pueblo of Pojuate, or Povate. The name *Tutahaco*, used by the Spaniards for this province, is not known there by the Indians, nor are the names *Tiguex*, *Cunames*, and *Cicuye*. They call themselves Tse-mo-é or Si-tsi-mé; the pueblo of Laguna, however, uses the name Kanayko to signify the inhabitants of their town (Ko-stété), while the pueblo of Acoma is called A-ko. I may mention here that there are two parties in this town (Laguna) the Ka-paits, who cling to their old rites and ceremonies, and the Kayo-masho, who have progressive, liberal, Protestant ideas. They are antagonistic to each other, and would once have come together in battle had not Mr. Marmon interfered at the right moment. The four other pueblos all belong to the Ka-paits.

Tiguex was a province in the valley of the Rio Puerco, northeast of the former, and was twice used by Coronado's army (1540-1542) as winter-quarters. At present, no pueblo exists in this region; ruins only—Poblation, for instance—are seen here and there. Castaneda reports twelve cities in this province, and that it was rich and fertile, and full of fine grass. At present the valley of the Rio Puerco looks poor and barren.

Tehua, or *Tegua*, is a province which, if the Spanish reports are correct, must have been situated in the Rio Grande Valley, about eighty miles south of the present seat of this tribe. A Tehua town, *Puara*, is often mentioned, but of which nothing is known at the present day; some old ruins near San Felipe might be related to it. There are still seven villages belonging to

this tribe—six in the Rio Grande Valley and its vicinity, and one upon the Moqui mesas in Arizona. How this emigration was brought about was explained to me by Hosta, the former gobernador (*maire*) of Jemez. These Tehuas had inhabited San Cristobal, in the vicinity of the Placer Mountains, but were driven off by Mexicans some hundred years ago, whereupon they, the Tehuas, were invited by the Moquis to live with them. Three miles above the Tehua town Tesuque is a town buried 3 feet below the present surface of the river bank. This stream, usually but a small rill, was once, several years ago, increased to a tremendous torrent by a cloud-burst, whereby much of the former river bank was carried off, and exposed a number of buried houses in the vertical wall of about 20 feet in height. The houses were of two stories, built of adobe, with walls double the thickness used nowadays. The fire-places were easily recognized. All the wood found was charred, and it would appear as though the houses were burned before they were gradually covered with sand. It may be that a neighboring hill had fallen in and thus covered the houses. In the vicinity, about two miles northeast, I discovered a mass of charcoal 6 feet below the ground, in a narrow gorge.

Quivira.—This province occupies the territory adjacent to the Manzana Mountains. Here we find the ruins of *Abo*, *Quivira* and *Quarro*; also several Mexican towns, which, according to Spanish writers, were probably once pueblos (*Manzana*, *Chilili*, *Toreon*). At Quivira, also, are seen the ruins of a Jesuit mission and of habitations of Spanish miners. When Coronado visited this province, it was, as he described it, very fertile; at present it resembles a desert.

Cibola.—This province embraces the Zuñi towns, of which seven once existed; at present there are four in ruins.

Tusayan embraces the six Moqui towns in Eastern Arizona. No ruins of towns are seen here.*

Aztlan.—This province embraces a portion of Northwestern New Mexico, the valley of the Rio San Juan and its tributaries. No pueblos exist there at the present day, but ruins of former fortified towns are quite numerous. The discoverer of the ruins in the Cañon de Chaco is Lieuten-

* Mr. Thompson states that there is a ruin on a mesa near the Moqui towns. See p. 324.—F. W. P.

ant Simpson, who made a reconnaissance in 1849, while we are indebted to Lieutenants Whipple and Rogers Birnie, both of the survey west of the 100th meridian, for the discovery of a number of interesting ruins on the Rio Mancos, Rio de las Animas, Rio San Juan, Cañon Largo, and Cañon del Gobernador. Some of the fortified structures had as many as five hundred rooms. Over the surrounding plain, solitary round buildings were profusely scattered. Lieutenant Whipple describes one of these ruins as being fifteen miles distant from any water; the climate, then, appears to have changed and become drier. Among the pueblos of New Mexico there exists a tradition in regard to these ruins. Hosta,* a very kind, intelligent old Indian, denies that these ruins were the result of Spanish wars, remarking that, the rain falling less and less, these people emigrated to the southward long before the Spaniards arrived in the country, being led by Montezuma, a powerful man, who was born in Pecos, and had settled with the Pueblos on the Rio San Juan. Montezuma was to return and lead the rest of the Pueblos also to the south, but he failed to come back.

During the expedition of 1874 I had occasion to visit the ruins of Pueblo Bonito,† at the head of Cañon de Chaco. The ruins consist of one large building with a yard surrounded by a wall, which forms a square, the sides of which are nearly 200 feet long; the doors of the building open on this yard. The walls are $1\frac{1}{2}$ to 2 feet thick, and are built of plates of sandstone, like those found in the immediate vicinity. The south and west sides of the square are formed by a three-story building, which descends in terraces toward the interior of the square. The lowest story is 7 feet high, the middle one 9, and the uppermost 6. The exterior row has ten rooms in length; these rooms are 20 feet long by 6 feet wide. Into some of the apartments no ray of light could enter, and they were probably rooms for

* Hosta informed Lieutenant Simpson, in 1849, that the Pueblo Pintado "was built by Montezuma and his people when they were on their way from the north towards the south; that, after living here and in the vicinity for a while, they dispersed, some of them going east and settling on the Rio Grande and others south into Old Mexico."—Simpson, p. 77 (Senate document). This tradition seems to me simply of value in expressing the belief held by some of the pueblo tribes, that the many ruined towns were once the homes of the ancestors of the present pueblo tribes.—F. W. P.

† This description does not agree at all with the Pueblo Bonito of Lieutenant Simpson, and it is very likely that Dr. Loew has followed Mr. Gregg in retaining the name of Bonito for the large ruin at the head of the cañon, described by Lieutenant Simpson under the name of Pueblo Pintado, and by the latter name it is generally known. In this connection see the notice of the Pueblo Pintado by Lieutenant Morrison, on page 366.—F. W. P.

provisions. The interior, or front, rooms of the first story were 20 feet long by 9 wide. We made out altogether one hundred habitable rooms in the building, forming two sides of the square. If we take it as probable that every room was inhabited by a family of four persons, the former population would have been 400. The rooms were all connected by openings in the walls, 3 feet by 2; the window-openings were about 2 feet square. The wood used for the construction of the doors and windows was juniper, which grows profusely on the sandy mesas, requiring but little moisture; it is in a good state of preservation. As no steps were found leading to the upper story, the ascent was probably made by ladders, as is still the custom among the Pueblos of New Mexico. In the southern corner of the yard are the walls of two cylindrical buildings, 20 and 30 feet in diameter, having six pillars on the periphery, equidistant, most likely remnants of the *estufas*. The bottoms of these buildings were about 3 feet lower than the surrounding yard. Pieces of painted pottery, an article seen in many localities in New Mexico, were found scattered about profusely. Similar fragments were also found by the survey parties on the heights of the Sierra Blanca in Arizona, on the Mogollon mesa, in the San Francisco Mountains, on Mount Taylor, in the Cañon de Chelle, and, in short, everywhere, in deserts as well as on the forest-covered peaks.

I searched the surrounding ground for the former burial-place, but in vain. No trace of former irrigating-ditches can be found in the neighboring valley of the Chaco, but there are traces of a former road to Abiquiu, sixty miles off, where ruins have also been found, two in the immediate vicinity and three between Abiquiu and El Rito. Dr. Yarrow made excavations in these ruins, and in the old burying-ground about four miles below Abiquiu, on the Chama.

The province of Jemez.—One of the most interesting pueblos is Jemez, on the river of that name, sixty miles southwest of Santa Fé. This town has a language of its own, and one which is unintelligible to any other tribe. About forty years ago the then existing pueblo of Pecos, on the Rio Pecos, used the same dialect, but the inhabitants, becoming reduced in numbers, joined the pueblo of Jemez, which is one of the most prosperous in New Mexico, having fine fields, large irrigating-ditches, and extensive

flocks of sheep. "If you wish to see," said the kind old Hosta, ex-governador of the town, "what a great people we once were (*que gran pueblo los Jemez eran*), you must go upon the mesas and into the cañons of the vicinity, where ruins of our forefathers are numerous. Our people were a warlike race, and had many fights not only with the Spaniards but also with other Indian tribes, the Navajos and Taos for instance, and were thus reduced to this pueblo of Jemez, which now forms the last remnant." Hosta's son led me to some ruins in the vicinity. A ride of six miles up the river brought us to the junction of the two great cañons, Guadalupe and San Diego. Where the mesa between these cañons narrows itself to a point are the ruins of two pueblos, one upon the lower prominence of the mesa, named *Batokvá*, the other upon the mesa proper, called *Ateyala-keokvá*, and only approachable by two narrow, steep trails, the mesa everywhere else being nearly perpendicular and 750 feet high. The view from the mesa is picturesque and imposing in the extreme; far beneath, to the right and left, a stream makes its way between the colossal walls of sandstone, which are penetrated by trachytic dikes; upon the narrow width of the mesa, near frightful precipices, are the ruins of a town of eighty houses, partly in parallel rows, partly in squares and partly perched between the overhanging rocks, the rim and surfaces of which formed the walls of rooms, the gaps and interstices being filled in artificially. Nearly every house had one story and two rooms; the building material was trachytic rock, as found upon the mesa. Broken pottery, charred corn, and millstones for grinding corn, were found in some of the rooms. The roofs had all fallen in, and so also had many of the sidewalls, in the construction of which wood was but little used. Piñon-trees have taken root within many of the former rooms. Upon asking my Indian guide whether the former inhabitants of this town were obliged to descend the steep and dangerous pathway every day to the creek to procure water, he replied that there were cisterns on the mesa, in which rain, formerly plentiful, was caught. He then called my attention to some conical heaps of stone along the rim of the precipice, which was the material for defense. Although the position upon this mesa appears impregnable, the Spaniards succeeded in taking it, probably forcing the inhabitants to surrender by cutting off water and

provisions. "When the Spaniards came up," said this Indian, "the despair of the people was great; many threw themselves headlong into the frightful depths below, preferring suicide to humiliating death at the hands of their conquerors. Suddenly the Spirit Guadalupe, who is the custodian of the cañon, made his appearance, and from this moment the people could jump down without any danger, and since this remarkable episode the image of Guadalupe has been upon the rocks." On descending, I viewed this image, which is a white figure, about ten feet in length, painted high up on the vertical bluffs, apparently a difficult task for the unknown artist. The only place from which the spot could be reached is a narrow prominence 30 to 40 feet below the picture. As there is a sort of halo around the head, such as we are accustomed to see in pictures of saints, I believe this image to be the work of a Spanish priest who desired to impose upon the people, for which purpose he might have secretly made this picture, which to them is a miracle. Again, in the valley, the Indian called my attention to a number of peach trees along the river-margin, which he said were planted by the former inhabitants of Ateyala-keokvá, but, from the fact that these trees still bear fruit, it would seem that the impositions on the credulity of these people by the Spanish priests are not of a very remote period.

The reports of the Spaniards frequently mention Jemez. Castañada, who accompanied Coronado on his marches through New Mexico, as early as 1541-'43, speaks of two great provinces in that vicinity, *Jemez*, and north of it *Juke-yunke*. He also speaks of strongly-fortified places difficult of access, and of a town, *Braba*, that was called by the Spaniards *Valladolid* on account of the resemblance of its situation with that of this Spanish town. I think that from this word is derived the name *Vallatoa*, used at the present day by the inhabitants of Jemez to signify their town. In the years 1692 and 1693 two war expeditions took place, under General Diego de Vargas, against the Jemez, who had destroyed the churches, murdered the priests, and declared themselves free from the Spanish yoke. In the Spanish account of these occurrences, it is mentioned that the Indians fled to a high mesa and there bombarded the Spaniards with a shower of stones. Trustworthy Mexicans told me that there are ruins of twenty-five or thirty towns upon the neighboring mesas and in the cañons, and

those of five large churches. In the vicinity of the Hot Springs (*Ojes Calientes*), twelve miles above Jemez, in the Cañon de San Diego, are the ruins of one of them. The walls are fully 7 feet thick, and the interior space 100 feet long by 35 feet wide, with a tower attached on the north side. The destruction of this church probably took place in 1680, at the time of the great Pueblo revolution against the Spanish priests and soldiers.

It may be added, with regard to the Pueblo people of the present day, who hardly number more than 8,000 souls, that, taking difference of language as a base, there are eight tribes, which occupy the following towns:

Zuñi.—Zuñi, Nutrias, Ojo de Pescado.

Moqui.—Hualvi, Tsitsumevi, Mushangenevi, Shongobavi, Shebaulavi, Orayvi.

Tanos.—Isleta, below Albuquerque; Isleta, below El Paso; Zandia.

Taos.—Taos (Indian name, Takhe), Picoris.

Querez.—Santa Ana (Indian name, Tomia), San Felipe, San Domingo, Silla (Indian name, Tsia), Cochiti.

Kan-ayko or *Sis-stsi-mé*.—Acoma (Indian name, Ako), Laguna (Indian name, Kanayko), Povate (Indian name, Kvishti), Moguino, Hasatch.

Tehua.—Nambé, Tesuque, Ildefonso, Pajoaque, San Juan, Santa Clara, Tehua (with the Moqui Pueblos in Arizona).

Jemez.—Jemos (Pecos, extinct).

The language of the Kanayko tribe resembles closely that of the Querez tribe; and, on the other hand, the languages of the Tanos and Taos tribes are closely allied to each other. With these two exceptions the languages of these tribes differ so much that, in order to understand each other, those speaking them have recourse to the Spanish language.

REPORT ON RUINS VISITED IN NEW MEXICO.*

BY LIEUT. ROGERS BIRNIE, JR., *Thirteenth United States Infantry.*

THE evidences that there were former inhabitants in localities now entirely depopulated were numerous, being observed along the Cañon Cerresal, Cañon Largo, Cañon de Chaco, and the San Juan and Las Animas Rivers. Traveling through the Cañon Cerresal, they were first observed as rude walls built upon the rocks, at the top of the walls of the cañon, where these latter were from 150 to 200 feet in height.

On September 16, 1874, I visited, with Mr. Rowe, a topographical station at the head of one of the branches of the Cañon Cerresal, where we found some very perfect specimens of old pottery, though no signs of any habitation. It is one of the highest points in quite a large area, a small-topped sandstone mesa about 100 by 40 feet, the upper terrace as it were of a series, and well-nigh inaccessible. It is difficult to conceive for what purpose this place could have been frequented, in the present aspect of the country, situated as it is probably twenty miles from any permanent source of water, unless, with the positions of the dwelling, it may tend to corroborate the idea that these people were driven out of the country by roving tribes of Indians, and sought refuge in these naturally-fortified places.

Returning to the party from this station, we visited one of the stone houses built upon the rocks above the side of the cañon. The ascent to the rock upon which it was built was by two pieces of wood about 10 feet long, with notches cut for steps and forming a rude ladder. There were

*Abstract from Annual Report of the Chief of Engineers for 1875. Appendix LL.

six rooms, some nearly perfect, the walls of rough stone and roof made of pieces of cedar stretched horizontally and covered with earth; patches of plaster remained upon the walls, but much of the roof had fallen in; the ceilings low, not more than 7 feet above the ground; doors very small. Broken pieces of pottery were scattered about.

On the next day I visited another of these ruins, making the ascent of the rocks with considerable difficulty. Several small dwellings were found, nearly covering the space upon the rock, which descended very abruptly on every side. In one of these houses, just above a fire-place, and upon sticks stretching across the room, supported by being imbedded in the wall on either side, I found the leg-bones of a man's skeleton; the remainder must have been carried away, as I could not find any of the other parts. Near the dwellings were several cavities in the rocks suitable for holding supplies of water, although they seemed to be natural formations. The rubbish on the floor was an inch or two thick.

In the Cañon Largo, a few miles from its junction with the San Juan River, we found in the valley a curious mound that had every appearance of having been constructed by man, from the heterogeneous substance that composed it as well as its shape, roof-like, with sloping ends, being about 100 feet long by 50 feet wide at the base, and 25 feet high. At either end were little circles of stones, and digging down through the sod a quantity of black earth was found, as though the place had been frequently used for fires.

The most extensive ruins met with were on the right bank of the Las Animas River, about twelve miles above its junction with the San Juan. I had been previously informed of this, my informant stating that he had counted 517 rooms in one pueblo. On visiting the ruins we found what had once been, apparently, quite a town, with two main buildings and numerous small ones about them. One of the main buildings, situated nearest the river, extended to and was built into a bluff separated a few hundred yards from the river by a flat. The plan was rectangular, with a small court on the south side, the court flanked on either side by two circular rooms or towers at the corners of the building; two more of these rooms at the other corners, and three through the center and parallel to

the longer side of the building; the walls supporting the towers on either side of the court were square-cornered, but had re-entrant angles. The remainder of the building was divided into rectangular compartments, apparently of three stories, the two upper ones nearly in ruins, on two sides of the building, which was about 150 by 100 feet; the wall was quite perfect and in places 25 feet in height still standing.* Entering a room nearly altogether in ruins, it was found connected with an interior one by a doorway 4 feet 4 inches by 2 feet 4 inches, cased with nicely-dressed soft sandstone in pieces about the size of ordinary bricks; the walls were 2 feet 4 inches thick, many of the stones being marked with crosses (+), &c., and some with inscriptions, though these latter were nearly obliterated. The interior room was 14 feet 4 inches by 6 feet 4 inches, and the roof fallen in. An entrance was found to a lower room, apparently one of the lower story, through a door of about the same dimensions as the other mentioned; the lintel was composed of small, round pieces of wood well cleaned, fitted, and bound together with withes; the dimensions of the room were 14 feet 4 inches by 6 feet, and 7 feet high; the walls, which were well plastered, remained nearly intact, and were covered on all sides with curious figures and signs scratched upon them. The floor must have been of earth; the ceiling was supported primarily by clean pine or spruce beams about 6 inches in diameter and 30 inches apart; these were crossed by smaller ones of the same kind, and across these latter were split pieces, small and half-round, and fitting closely together, supporting the earth above. The room was in good condition, though sand had washed in and partly covered the floor. No entrance could be found to the numerous other rooms constituting this floor, except in one case where an interior wall was found broken through. This room was like the other, but higher and without plaster, the floor covered with *débris* fallen from above. Near the center of the building was a rectangular shaft about 8 feet by 6 feet. Through a hole already broken in the roof, and by means of a rope, I descended about 12 feet to a flooring, the beams supporting which had given way and only part remained;

*A heliotype plate, made from a photograph of the interior of the building here mentioned, is contained in the Report of the Chief of Engineers from which this account is taken, and is here alluded to, as it gives the best presentation I have seen of the method of building the walls of these ancient structures.—F. W. P.

a little below loose earth filled the shaft, but whether resting on another floor or the ground I could not tell. No connection was found between this and any of the rooms. I regretted that I could not reach the bottom, as I had here hoped to find entrances to those rooms which appeared to have none from the outside. Holes, as if for ventilation, but not large enough to admit a man, and now filled with dirt, seemed to extend through the exterior walls of the building in places.

The other main building, which is the larger of the two, is about 200 yards to the west of this, and quite remarkable in plan. What was probably the principal part is on the north side, the roof fallen in and much *débris* about the exterior. We found a number of much larger rooms than in the other building, and interior walls at least 30 feet high. This portion of the building is about 200 feet long and regularly supported on the exterior by buttresses; from either end two wings connect and run out, making the interior angles about 100° ; these wings extend about 150 feet, then their extremities seem to have been connected by a circular wall, now entirely in ruins, but showing the remains of a gate-way. Above the buttresses, on the exterior wall of the main portion, the wall is quite perfect, and shows a very pretty architectural design. The masonry is not only built with courses of different thicknesses of stone, but also of different colors. There is seen a projecting cornice, plain, composed of three or four courses of very thin reddish sandstones, and again a course of nearly white stone, perhaps a foot thick, both very even, and then other courses of different shades and thicknesses alternate. In this building there are remains of three circular rooms, one at each of the angles above referred to, and one in the center of the court. A great deal of broken pottery was about, but confined to certain portions of the building, principally the extremities of the wings. Want of time prevented me from making measurements and obtaining much accurate data that I desired.

Many years must have elapsed since these buildings were in ruins, but some of the walls, where supported, are well preserved. Very heavy sagebrush was growing in many places upon the mounds of the ruins. The remains of a circular building were found midway between the two main buildings, and it has been supposed that these circular rooms were places

of worship. But little analogy could be observed between these and the Indian pueblo at Taos that I afterward visited; but stone ruins seen at Nacimiento and near other (now occupied) Mexican towns were very similar, except as to plan, to those described, the ruins about the towns being entirely different from any of the present habitations.

In many places along the San Juan River pieces of old pottery were observed and remains of several small stone houses. In one of these I found a very fine specimen of a stone hammer, of a natural oval stone, with the ordinary groove cut about it for attaching the handle. A number of important ruins were also observed along the Cañon de Chaco. None of those so minutely described by Lieutenant Simpson in 1849 were visited by us, as we did not follow his route only, perhaps, a very short distance. The Navajo Indians ascribed some of the figures and signs seen in the lower room of the ruins to Apaches and Comanches; but their explanations were very vague, principally from the difficulty of understanding them.

REPORT ON THE REMAINS OF POPULATION OBSERVED IN NORTHWESTERN NEW MEXICO.*

BY PROF. E. D. COPE, *Palæontologist of Expedition of 1874.*

WHILE encamped on the Gallinas Creek, at the point where it issues from the Sierra Madre, I occupied intervals of time in the examination of the traces left by the former inhabitants of this portion of New Mexico. Had time permitted, the exploration of these remains might have been much extended, but under the circumstances a mere beginning was made. The observations show that the country of the Gallinas and the Eocene Plateau to the west of it were once occupied by a numerous population. Now there are no human residents in the region, and it is only traversed by bands of the Apache, Navajo, and Ute tribes of Indians. The indications of this ancient population consist of ruined buildings, pottery, flint implements, and human bones. Broken vessels of baked clay are frequently found, and the fragments occur in all kinds of situations throughout the country. They are usually most easily discovered on the slopes of the hills and hog-backs of Cretaceous and Tertiary age, and, where abundant, generally lead to a ruined building standing on the elevation above.

The hog-back ridges, described in geological report (Appendix G 1), extend in a general north and south direction on the western side of the Sierra Madre, south of Tierra Amarilla. They vary from two to four in number, and stand at distances of from half a mile to three miles from the mountain range. The Gallinas Creek flows between two of them near their southern extremities for perhaps fifteen miles. At one point the hog-backs

* From Annual Report of the Chief of Engineers for 1875, Appendix LL.

of Cretaceous, Nos. 3 and 4, approach near together, and the creek flows near to the foot of the eastern front, or escarpment, of No. 3. The rock of this ledge is a hard sandstone, and resists erosion; hence its outcrop forms continuous sharp ridges, with distant interruptions, which are termed by the Mexicans the *cuchillas*, or *crstones*. The hog-back of No. 4, being composed of softer material, is worn by erosion into a succession of subconical eminences.

My attention was first called to the archæology of the region by observing that the conic hills just mentioned appeared to be in many instances crowned with stone structures, which, on examination, proved to be ruined buildings. These are round or square, with rounded angles, and from 15 to 25 feet in diameter. The walls are 2 and 3 feet in diameter, and composed of stones of moderate size, which have been roughly dressed, or built without dressing into solid but not very closely-fitting masonry. The walls remaining measure from 10 feet high downward. The floor inside is basin-shaped, or like a shallow bird-nest, and frequently supports a growth of sage brush (*Artemisia*) of the same size and character as that growing on the plains below, and other shrubs. Sometimes they contain piñon trees (*Pinus cembroides*) of 1 and 2 feet in diameter, which is the average and full size to which they grow on the adjacent ridges and plateaus. Within and about them fragments of pottery abound, while flint implements are less common. As these are similar in all the localities examined, they will be subsequently described. A building more or less exactly agreeing with this description was found on the summit of every hill of a conical form in the vicinity. Their form is probably due to the shape of the hill, as they were differently built on the level hog-backs. None of the circular buildings were found to be divided, nor were any traces of such buildings observed on lower ground.

The hog-back of Cretaceous No. 3 is the locality in question, only one or two hundred yards distant from the eastern of the hills just described, from which it is separated stratigraphically by a bed of lignite. At some points this stratum has been removed by atmospheric erosion, leaving a ravine between the hog-backs. Near the middle of a section of the hog-back No. 3 a portion of this formation remains, forming a narrow causeway

connecting it with the ridge just behind it. The eastern face is a perpendicular wall of sandstone rock of about 300 feet in elevation; the western face is the true surface of the stratum, which here dips about 45° to 55° west by north. The top of the ridge varies in width from 4 to 11 feet.

In riding past the foot of the precipice, I observed what appeared to be stone walls crowning its summit. Examination of the ridge disclosed the fact that a village, forming a single line of thirty houses, extended along its narrow crest, twenty-two of them being south of the causeway and eight north of it. The most southern in situation is at some distance from the southern extremity of the hog-back. I selected it as a position from which to sketch the country to the south and west. (See Geological Report, Appendix G 1.) It is built on the western slope of the rock, a wall of 12 feet in height supporting it on that side, while the narrow ledge forming the summit of the ridge is its back wall. It is square, 3.355 meters on a side, and has a floor leveled with earth and stones. Two stout cedar-posts probably once supported the roof; their stumps remain, well cracked and weathered. Bushes of sage, similar in size to that of the surrounding plain, are growing within the walls. The second house is immediately adjoining, and is surrounded by an independent wall, that on the lower side of the ridge being still 12 feet in height. The length of the inclosure is 4.69 meters and the width 2.68 meters; full sized scrub-oak and sage brush are growing in it. The stumps of two cedar posts remain, one 5, the other 8 inches in diameter. The third house adjoins No. 2, but is surrounded by a distinct wall, except at the back or side next the precipice, where a ledge of rock completes the inclosure. The latter is 4.02 meters long; it contains a scrub-oak of 3 inches diameter, which is an average size for the tree.

Beyond these ruins is an interval of 69 meters, where the summit of the rock is narrow and smooth, and the dip on the west side 55° . The walls of an oval building follow, which inclose a space of 4.69 meters. They are 2 to $2\frac{1}{2}$ feet in thickness, and stand 8 feet high on the western side; the eastern wall stands on the sheer edge of the precipice. A building adjoins, with the dividing-wall common to the preceding house. Its east and west walls stand on parallel ledges of the sandstone strata, whose strike does not exactly coincide with the axis of the hog-back. Diameter

of this inclosure 5.37 meters. A space of 15.4 meters follows, with precipices on both sides, when we reach house No. 6. The eastern wall stands 5 feet high on the summit of the precipice, from which a stone might be dropped to the ground, perhaps 350 feet below. Only 8 feet of the western wall remained at the time of my examination. The inclosure is 6.04 meters long, and not quite so wide, and is divided transversely by a wall, which cuts off less than one-third the length of the apartment. In one of the opposite corners of the larger room is the stump of a cedar post 5 inches in diameter. This house can only be reached by climbing over narrow ledges and steep faces of rock. House No. 7 follows an interval of 42.30 meters. Its foundation-wall incloses an irregular square space 4.70 meters long and 3.69 meters wide; it is 11 feet high on the western side, and very regularly built and well preserved; on the east side it is 8 feet high, and is interrupted by a door-way of regular form. From this a narrow fissure offers a precarious hold for descent for a considerable distance down the face of the precipice, but whether passable to the bottom I could not ascertain.

The crest of the ridge is without ruins for 52.34 meters farther; then a building follows whose inclosed space is an irregular circle of 4.70 meters diameter. A transverse summit-ledge forms its southern wall, but the remaining portion is remarkably massive, measuring 3 feet in thickness. Its western wall is 12 feet high, and contains many huge stones, which four or five men could not lift unaided by machinery. Several scrub-oaks of 3 inches in diameter grow in this chamber, and stumps of the cedar posts that supported the roof remain. Here follows a row of ten similar ruined houses, measuring from 3.35 to 6.24 meters in length. Of these, No. 13 is remarkable for containing a scrub-oak of 13 inches in diameter, the largest that I have seen in the country, and the species is an abundant one. In No. 14 the remaining western wall is 15 feet in height. There was a good deal of pottery lying on the western slope of the rock, but of flint implements and chips I found but few. All of these ruins contain full-grown sage-bushes. No. 18 is the largest ruin; the length of its inclosure is 8.62 meters, and the width 6.71 meters; its west wall is 6 feet high; the floor is overgrown with sage of the largest size. This building stood 51 meters from No. 17; 12.80 meters northward the ridge descends slightly

to the level of the causeway already mentioned. Here are five more ruined buildings of the same average size as the others, interrupted by but one short interval.*

From this depression, that part of the hog-back which is north of the causeway rises abruptly in a perpendicular face. It is composed principally of two layers of the sandstone, dipping at 45° W., which are separated by a deep cavity from a point 15 feet from the base upward. This niche has been appropriated for a habitation, for it is walled to a height of 8 feet from its base. The foot of the wall is quite inaccessible, but by climbing round the eastern face of the precipice a ledge is found at the base of the projecting stratum, which forms the east wall of the inclosure. This was scaled by means of a staircase of stones, a number of which were in position at the time of my visit. The remaining portion of the hog-back is elevated and smooth, and the foundation-stones only of several houses remain. One of these contain two stout posts, of which 4 feet remain above ground; the last house is near the end of the ridge, and is bounded by a wall 10 feet in height, which forms its western side.

The walls of these houses are built with a mortar of mud, mixed in many cases at least with ashes, judging from the abundant specks of charcoal which it contains. It is not of good quality, and has weathered much from between the stones. I could not discover any indications of the destruction of the houses by fire either on the stones or the cedar posts. The latter doubtless lost by weathering such indications, had they existed, and the combustion of the entire contents of such small domiciles could have effected their stone walls but little. I found no remains of bones of animals or men about them.

This town I called Cristone. The same hog-back recommences a little more than a mile to the north, rising to a greater elevation, say 600 or 700 feet above the valley. The east side is perpendicular, while the dip of the west side is 60° , and sometimes even a higher angle. On this almost inaccessible crest I could see from the valley the walls of ruined stone buildings, such as I have just described; but unfortunately my limited time

* In the Report of the Chief of Engineers from which this paper is taken, several illustrations are given, showing the form and position of the houses described by Professor Cope. I regret that the cuts cannot be reproduced here.—F. W. P.

prevented me from making a detailed examination of them. In the opposite direction I observed a similar ruin on an outlying hill adjacent to the southern portion of the southern hog-back. This one is of larger size than any of the others, but I was unable to visit it.

The position of these buildings is susceptible of the same explanation as that of the still inhabited Moqui villages of Arizona, so interestingly described by Lieutenant Ives in his report on his survey of the Rio Colorado of the West, and of the route from its cañon to Santa Fé. They were doubtless perched on these high eminences for purposes of defense, and they were conveniently located near a perennial stream, which permitted them to carry on a system of agriculture no doubt similar to that now practiced by the Moquis. The inhabitants of Cristone felt, however, one disadvantage not known to the Moquis; they were, so far as present indications go, without water on their elevated rocks, but were dependent for their supply on the Gallinas creek. I found no indication of cisterns which should furnish such supply in time of siege, although they doubtless could depend for a considerable length of time on rain-water, which they caught and preserved in the many vessels of pottery whose fragments are now so numerous about the ruins.

At this point the bluffs of the Eocene bad-lands are from nine to ten miles from the Gallinas creek. Here also the slopes are in places covered with broken pottery, and on the summits of some of the less elevated buttes circular walls indicate the former existence of buildings similar to those crowning the conical hills along the creek. The latter contains the nearest water to these ruins. In other localities ruined stone buildings occupy the flat summits of mesa hills of the bad-lands, often in very elevated and well-defended positions. It was a common observation that the erosion of the faces of these bluffs had undermined the foundations of the houses, so that their wall-stones, with the posts, were mingled with the pottery on the talus below. At one point foundation-walls stand on an isthmus, connecting a butte with the mesa, of which a width of 20 feet remains, but which is furrowed with water-channels. Here Eocene fossils, and pottery, including a narrow-necked jug, were confusedly mixed together. At another point the narrow summit of a butte, of nearly 200 feet elevation, is covered with

remnants of stone buildings which extend for a length of 200 yards. The greater part of them had been undermined, and the stones were lying in quantities on the talus at the time of my visit. At one end of the line the bases of two rectangular walls, perhaps of towers, appeared to have been placed as supports to the terrace. Very dry cedar posts occur among the ruins, and three such, standing upright on the summit of the butte, mark a spot as yet unaffected by the disintegration of the cliff. In another portion of the ruins a row of large earthenware pots was found buried in the earth. The slow movement of the marl-changes of level had already fractured them. At another locality I took from a confused mass of ruins the temporal bones of an adult person, the ilium of a child, ribs, and other bones. At a remote portion of the ruins, on a remaining ledge, I found a square inclosure formed of stones set on edge, three stones forming each half of the inclosure. I excavated this for the depth of a foot without finding any indication of its use. In some of these localities chips, arrow-heads, and thin knives of chalcedony and white flint were found, with similar implements of obsidian. The obsidian knives are similar to those which I have seen as commonly found in Mexico.

At the head of the Cañoncito de las Yeguas there are numerous low hills of the Eocene marl, covered with piñon forests of adult trees. On a low slope of one of these I found the burial place of one of the inhabitants, as indicated by his bones and trinkets, doubtless buried with him. His tibia was a marked example of the platycnemic type. Close to them were some good quartz-crystals, of course intruders in such a formation, a piece of *chalchuitl*, an apparently transported scaphite, some implements of obsidian, flint, &c., and a single perfect lower molar of a large mammal of the genus *Bathmodon*, attached to a piece of the jaw, which looked as though the ancient proprietor had not been ignorant of the peculiar products of the neighboring bluffs.

In traversing the high and dry Eocene plateau west of the bad-land bluffs, I noticed the occurrence of pottery on the denuded hills for a distance of many miles. Some of these localities are fifteen and twenty miles from the edge of the plateau, and at least twenty-five miles from the Galli-

nas Creek, the nearest permanent water. In some of these localities the summits of the hills had been eroded to a narrow keel, destroying the foundations of the former buildings. In no locality did I observe inscriptions on the rocks or other objects, which were, probably, the work of the builders of these stone towns; but I give a copy of figures (Fig. 135) which

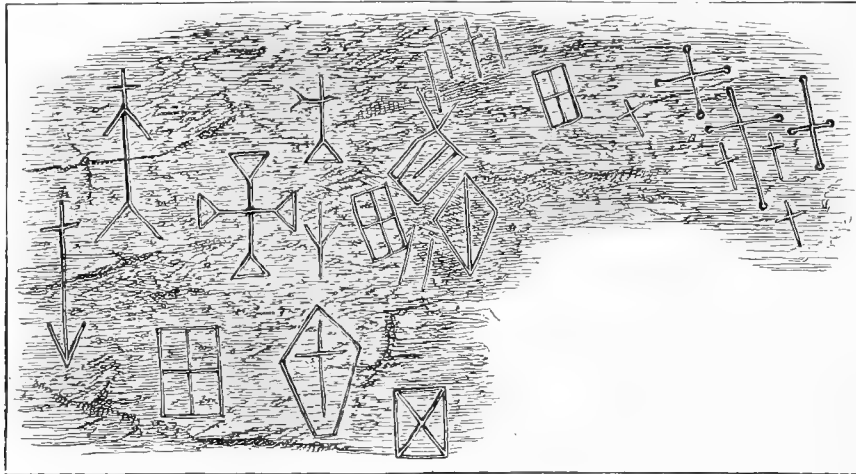


FIG. 135.—Rock-carvings on the Rio Chama.

I found on the side of a ravine near to Abiquiu, on the river Chama. They are cut in Jurassic sandstone of medium hardness, and are quite worn and overgrown with the small lichen which is abundant on the face of the rock. I know nothing respecting their origin.

It is evident that the region of the Gallinas was once as thickly inhabited as are now the more densely populated portions of the Eastern States. The number of buildings in a square mile of that region is equal to if not greater than the number now existing in the more densely populated rural districts of Pennsylvania and New Jersey. Whether this is the case to the south and west I do not know, as I was unable to devote the necessary time to the examination. I found, however, that without investigation it is very easy to pass the ruins by unnoticed, since their elevated positions, ruinous condition, and concealment by vegetation, render them almost invisible to the passing traveler. In general, I may say that the number of ruins I found was in direct proportion to the attention I gave the matter; where I looked for them I invariably found them in suitable situations.

Perhaps the most remarkable fact in connection with these ruins is the remoteness of a large proportion of them from water. They occur everywhere in the bad lands to a distance of twenty-five miles from any terrestrial source of supply. The climatic character of the country there has either undergone material change, or the mode of securing and preserving a supply of water employed by these people differed from any known to us at the present time. I found no traces of cisterns, and the only water-holders observed were the earthenware pots buried in the ground, which did not exceed eighteen inches in diameter. There is, however, no doubt that these people manufactured great numbers of these narrow-necked globular vessels, whose principal use must have been the holding of fluids, and chiefly of water. Nevertheless, it is scarcely conceivable that the inhabitants of the houses now so remote from water could have subsisted under the present conditions. Professor Newberry (Ives' Report) is of the opinion that a diminution in the amount of rain-fall over this region has taken place at no very remote period in the past, and cites the death of forests of pine trees which still stand as probably due to increasing drought. It is, of course, evident that erosive agencies were once much more active in this region than at present, as the numerous and vast cañons testify, but that any change sufficient to affect this process should have occurred in the human period, seems highly improbable. In other words, the process of cutting cañons of such depth in rocks of such hardness is so slow that its early stages, which were associated with a different distribution of surface-water supply, must have far antedated the human period.

Nevertheless, if we yield to the supposition that during the period of residence of the ancient inhabitants the water-supply from rains was greater than now, what evidence do we possess which bears on the age of that period? There is no difference between the vegetation found growing in these buildings and that of the surrounding hills and valleys; the pines, oaks, and sage-brush are of the same size, and, to all appearances, of the same age. I should suppose them to be contemporary in every respect. In the next place, the bad-lands have undergone a definite amount of atmospheric erosion since the occupancy of the houses which stand on their summits. The rate of this erosion, under present atmospheric influences,

is undoubtedly very slow. The only means which suggested itself at the time as available for estimating this rate was the calculation of the age of pine trees which grow near the base of the bluffs. These have, of course, attained their present size since the removal of the front of the stratum from the position which the trees now occupy, so that the age of the latter represents at least the time required for the erosion to have removed the bluff to its present position, but how much time elapsed between the uncovering of the position now occupied by the tree and its germination, there is, of course, no means of ascertaining. My assistant, an educated and exact man, counted the rings in a cut he made into the side of a piñon (*Pinus cembroides*) which stood at a distance of 40 feet from a bluff, not far from a locality of ruins. In a quarter of an inch of solid wood he found 16 concentric layers, or 64 in an inch. The tree was fully 20 inches in diameter, which gives 640 annual growths. The piñon is a small species, hence the closeness of the rings in an old tree.

At present it is only possible to speculate on the history of the builders of these houses, and the date of their extinction. The tribes of Indians at present inhabiting the region at irregular intervals can give no account of them. But it is not necessary to suppose that the ruin of this population occurred at a very remote past. On the Rio Chaco, not more than thirty miles from the Alto del Utah, are the ruins of the seven cities of Cibola, the largest of which is called Hungo Pavie. These have been described by General Simpson,* who shows that each of the towns consisted of a huge communal house, which would have accommodated from 1,500 to 3,000 persons. Their character appears to have been similar to that of the existing Moqui villages.

The "cities of Cibola" were visited by the marauding expedition of Coronado in 1540, which captured them to add to the viceroyalty of Mexico. In his letter to Mendoza, the viceroy, Coronado states that the inhabitants, on the fourth day after the capture, "set in order all their goods and substances, their women and children, and fled to the hills, leaving their town, as it were, abandoned, wherein remained very few of them." There

* Report of Lieut. James H. Simpson of an expedition in the Navajo country in 1849, Ex. Doc. 1st sess. Thirty-first Congress.

can be no doubt that the Eocene plateau and hog-backs of the Gallinas offer hills of the greatest elevation in the entire region, and it is highly probable, if the account quoted be correct, that some at least of the exiled Cibolians found a refuge in this region, and may have been the builders of Cristone. This would place the age of the ruins described at 335 years. Of course it is possible that they represent villages contemporary with and tributary to the seven cities.*

The inhabitants of the rock-houses of the Gallinas necessarily abandoned the communal type of building generally employed by their race, and appear only to have considered the capacities of their dwellings for defense. Yet the perils of life in Cristone due to the location alone must have been considerable. Infant sports must have been restricted to within doors, and cool heads were requisite in adults to avoid the fatal consequences of a slip or fall. Intoxication must have been rare in Cristone. There is no trace of metal in any of the ruins of the Gallinas, and it is evident that the inhabitants were acquainted with the use of stone implements only. I have already alluded to their pottery. It is usually of a bluish-ash color, but is occasionally black, brown, and more rarely red. It is never glazed, but the more common kind is nicely smoothed so as to reflect a little light. This pottery is ornamented with figures in black paint, which are in lines decussating or at right angles, or closing triangular or square spaces. Sometimes colored and uncolored angular areas form a checker-board pattern. The coarser kinds exhibit sculpture of the clay instead of painting. The surface is thrown into lines of alternating projections and pits by the use of an obtuse stick or the finger-nail, or it is thrown into imbricating layers by cutting obliquely with a sharp flint-knife. Thus the patterns of the ornamentation were varied according to the taste of the manufacturers, although the facilities at their disposal were few.

*Professor Cope here considers the Chaco group of ruins as the remains of the "Seven cities of Cibola" mentioned by Coronado. In this he follows Mr. Morgan (*North American Review*, 1869). On a preceding page Dr. Loew has included four ruined and three inhabited Zuñi towns in the province of Cibola, and the weight of evidence seems to be in favor of the Zuñi group. Lieutenant Abert (*Military Reconnaissance, New Mexico, &c.*, 1848) identifies Acoma and six other pueblos with Cibola. For further information on this point, reference is made to the authors quoted, and to the statements given by Mr. Bancroft in favor of Zuñi (*Native Races*, iv, p. 674).—F. W. P.

NOTICE OF A RUINED PUEBLO AND AN ANCIENT BURIAL-PLACE IN THE VALLEY OF THE RIO CHAMA.*

BY H. C. YARROW, *Assistant Surgeon, U. S. A.*

AN interesting discovery was made of an ancient pueblo and burial-ground in the valley of the Rio Chama, about three miles east of Abiquiu, on the top of a mesa, rising probably 100 or 150 feet above the level of the river. This mesa lies at the foot of the Jemez range of mountains, and has the appearance of a high foot-hill from the valley; seen from above, it is simply a promontory of land in the shape of a trapezoid, or frustrum of a cone. At its base in each side were the only means of approach—two narrow, steep cañons, worn away by the streams of water from the mountains above. In case of war, these approaches could have been easily defended. The front of the mesa is a sheer precipice, allowing of no ingress to the town in that direction, and it would appear that the builders of it chose this spot with a considerable degree of sagacity, and with a view to a good defensive position, although we were unable to determine where, in case of a protracted siege, the inhabitants could have obtained water. The Rio Chama flows through the valley at the foot of the mesa, the road running alongside of it. There are two arroyos, or ditches, in the sides of which graves were found. These ditches were formed in a similar manner to the

*This account is an abstract only of portions of Dr. Yarrow's General Itinerary for the Field-season of 1874. Annual Report of the Chief of Engineers for 1875, Appendix LL.

cañons, but subsequent to the occupation of the village. The town* was built in the shape of a double L, having an open area, or court-yard, on both sides, and with bastions or towers at the corners, one defending the western cañon-approach and the other the only entrance to the town. The front wall was 40 feet in length; the side wall, 50 feet; first rear wall, 30 feet; a prolongation of this, 40 feet; second rear wall, 80 feet; eastern side wall, 50 feet; the bastions being 10 feet in diameter; the estufa, or council-chamber, 20 feet. These walls had been built double, and the dwellings were between, divided up into spaces about 10 feet square. Upon the supposition that each of the spaces were occupied by one family consisting of, say, five individuals, and that the structure was two stories in height, we may imagine the population of this town to have been in the neighborhood of 250. If the houses consisted of five stories, like some of the pueblo villages of the present day, the population was doubtless much greater. The stones composing the walls are black basaltic lava, and have probably been brought from a considerable distance, as we were unable to discover any large deposit of this material in the vicinity. At the present time these walls are but 18 inches in height, and are gradually crumbling down, but enough *débris* is scattered about to show that an enormous quantity of the stone was used in the construction.

Interspersed with the stones are great quantities of broken pottery, exhibiting the same peculiarities of markings and colorations as the fragments found in other ancient dwelling-places in this part of New Mexico. In addition to the fragments of pottery, we found chips of black obsidian, of red porphyry, and carnelian, white and red; but not a bead, an arrow, a lance-head, nor an axe-head of stone or metal, rewarded our long and eager search, which may perhaps be accounted for from the fact that the present Pueblo Indians have a great degree of regard and veneration for ancient stone implements of all kinds, and treasure them with great care.

The estufa, or council-chamber, was carefully examined, and appeared to have been similar in its character to those at present used in modern

* A diagram showing the ruins of the town and its position on the mesa is given in the Report of Engineers from which this account is taken.—F. W. P.

pueblos. These chambers are formed by digging in the ground a circular pit from 10 to 20 feet in depth; a wall, in some cases of 2 or 3 feet in height, is built around the rim of the hole, and on this branches of trees or beams of wood are laid, forming a roof, which is covered with brush, and earth packed firmly on top. At the pueblo of Taos each head man has an estufa of his own, but in this ruin, and in other villages visited, only one appears to have been in use.

After carefully examining the remains of the village, we set out in search of the graves, and found that bodies had been buried within 30 feet of the walls of the town. The arroyos, as already stated, had been washed out by water, and the falling away of the earth disclosed the remains. The first skeleton found was in the right-hand or eastern arroyo, some 6 or 8 feet below the level of the mesa, and had been placed in the grave *face downward*, the head pointing to the south. As the body lay, we had a fine section of the strata of earth above it. Two feet above the skeleton we noticed two smooth black "ollas," or vases, which, when dug out, were found to contain charcoal, parched corn, and the bones of small mammals and fowls which had, doubtless, been placed therein at the funeral-feast; and the remaining earth to the surface contained nothing but pieces of charcoal. Not a vestige of clothing, no ornaments, implements, or weapons were found near the corpse, and apparently no receptacle had been employed to contain it. By carefully digging away the surrounding earth with our knives, we were fortunate enough to secure every bone belonging to this skeleton, and it has arrived in Washington in good order, and is now in the Army Medical Museum.

A further search in both arroyos revealed more bodies similarly buried, and we secured several skeletons, but in some cases the crania were wanting. Three or four skeletons of children were also discovered, but the bones were in such fragile condition as to crumble on exposure to the air, consequently we were unable to preserve them.

There seems but little doubt that at one time this part of New Mexico was densely populated, as in the valley of the Chama we have undoubted evidence of the existence of the ruins of at least six or eight towns which must have been sufficiently large, from present indications, to have con-

tained a total population of two or three thousand. General Simpson, in his valuable report, has made mention of his discovery of quite a number of these ruins south of the Jemez range on the Rio Chaco, a tributary of the Rio San Juan, the most interesting being called the Pueblo Pintado. This town, unlike those visited by our parties in the valley of the Chama, was built of compact reddish-gray sandstone in tabular pieces.

NOTICE OF THE PUEBLO PINTADO AND OF OTHER RUINS IN THE CHACO CAÑON.*

BY LIEUT. C. C. MORRISON, *Sixth United States Cavalry.*

OUR route lay to the south, our objective point being the pueblo Pintado,† an ancient ruin situated on the south side of the Chaco Creek; creek simply because it flows water in the rainy season, but perfectly dry nine months of the year. Its southern and western walls are still standing, showing in its present state at least four stories; the outlines of one hundred and three rooms are easily traced on the ground-floor. The walls on the east, south, and west sides have been at right angles to each other; that on the northern front facing the water has been an arc of an arch, with three large towers built so as to defile all the ground between the building and the stream. In the interior has been a court with several circular rooms, like the present *estufas*, or assembly rooms, of the Pueblo Indians of New Mexico.

The whole structure is of stone and wood; no evidence of iron is found. The masonry consists of thin plates of sandstone, dressed on the edges, laid in a coarse mortar, now nearly as hard as the stone itself. Every chink is filled. The usual stone is from half inch to an inch thick, with occasional layers of stone 2 or 3 inches thick occurring regularly every 15 to 18 inches interval, evidently to strengthen the masonry. The exterior

* Abstract from report for the field-season of 1875. Annual Report of the Chief of Engineers for 1876, Appendix J J.

† Lieutenant Morrison states that this ruin has been referred to in former Annual Reports of the Survey as the pueblo Bonito. He probably refers to Dr. Loew's notice of the Chaco ruin, concerning which see p. 341.—F. W. P.

face of the walls is as smooth as one built of brick and beautifully worked. At the base, $2\frac{1}{2}$ feet through, the wall at each story decreases in thickness by the width of a slight beam, on which rest the girders of the floor, the larger ones setting in the wall. There are no doors opening on the side away from the court, and the only means of light seem to have been through the inner rooms, and through some small port-holes opening outward on the stories above the first. There are no perfect arches found in the building; the only approach to such being the successive layers over the windows, where the stones extend one beyond the other till one stone can span the space. Usually the doors and windows were capped by lintels of wood, which were slight round poles, with their ends, as were those of the girders, hammered off, apparently by some stone implement. In one of the circular rooms was found what appeared to be an altar, built out from the side of the wall in the very center of the building; it was probably here that their worship, since lost or perpetuated in an altered form in the present Pueblos, was carried on.

The most striking peculiarities of the buildings were the wonderfully perfect angles of the walls, the care with which each stone had been placed, the perfection of the circular rooms as to their cross-section, and the great preservation of the wood. With an architecture so advanced in other respects, their glaring inability to tie joints in corners, each wall being built up against and not united with the others, makes it comparatively weak; indeed, it is to be wondered at that the walls are still standing, depending as they do each upon its own base, without abutments.

Usually the Chaco is dry; doubtless at one time there was plenty of water, for an apparent difference in the weeds and grass just above the building indicates that the ground was once cultivated. We found no implements other than a section of a *metate*, or hollow trough of stone, similar to those now used by the Indians and Mexicans, in which they grind corn and coffee. Innumerable fragments of pottery were found very similar, although none perfect, to that made by the present Pueblo Indians.

A few hundred yards down the stream, as also above the buildings, are found traces of other buildings, with, in some cases, the outlines of the walls easily distinguishable. In the cañon, which commences less than

three miles below, are seven or eight other ruins, equally well-preserved, on the cliffs above; these were, apparently, watch-towers.

South of the Chaco the country rises to a table-land, presenting on its southern and western slope, for about 30 miles, but two places to descend the cliffs, which are about 300 feet nearly vertical. On the southern face, probably 120 feet above the valley, with no visible way of getting up, nor could we reach them from above, we found several smaller buildings, probably coeval with the larger ruins, built under the overhanging walls of the cliff rocks.

On the level surfaces above were found numerous cisterns from $2\frac{1}{2}$ to 8 feet deep, hollowed out in the rock by the action of water, possibly aided by the hand of man.

Descending from the table-land, we camped on a small drain, tributary to the Chaco from the south. A mile north of us was the mesa Fachada, an isolated mass which looks like a grand old church and marks the outlet of the cañon Chaco. On another drain just west of this we found another ruin similar in the main features to the others, but differing in that it had a tower-like room running clear to the top, inclosed in rectangular walls, so that the perimeter of cross-section was a square on outside and circle internally, the segments where the wall was thickest being filled up by rubble-masonry. The ruin was on a slight elevation above the valley. From opposite the face of the former ran a built wall of earth, with stone revetment across the drain, possibly a roadway with bridge, more probably a dam, 10 feet across the top, 5 feet high, and 15 feet across the base. Here, as at the other ruins, was found much broken pottery. In one of the ruins on the main Chaco drain, the topographer entered a room now almost underground from *débris* of the falling walls. It was entirely destitute of furniture or tools of any sort, but was very interesting in that it showed the manner of making the floors; also that the interior walls were plastered with a mortar containing but little lime. In the walls were small square recesses, as if for shelves. The ceiling, which was the floor of the room above, consisted, first, of heavy poles about 5 inches in diameter placed at intervals of about 3 or 4 feet; on these, transversely, were placed smaller poles, and again across these in juxtaposition were laid small square poles,

all held down by withes. There was no evidence of the people leaving suddenly, for, though the hole was barely big enough to admit of a man crawling through, and had only lately been unearthed by the rains, there was no sign or trace of anything manufactured by man left behind; nothing but the bare walls. In this we were much disappointed, for it was but reasonable to suppose, if we could find a room in fair state of preservation, that some articles of household furniture might remain.

CLIFF-HOUSE AND CAVE ON DIAMOND CREEK, NEW MEXICO.

BY H. W. HENSHAW.

THE mouth of Diamond Creek, a tributary of the Rio Gila, is not far from Camp Bayard, New Mexico. On the first day's march up the creek, when perhaps eight miles from its mouth, the attention of Mr. Howell and myself was attracted by a wall of cemented rocks, which evidently had been raised to inclose a natural cavity in the rocks. The cañon at this point was very narrow, and the sides of volcanic rock rise perpendicularly to a height of perhaps 600 feet. The wall, which was perhaps 30 feet above the valley, was 15 or 18 feet long, and composed of volcanic *débris* plastered together with mud, and further strengthened and supported by stout timbers, which had been cemented into the interior face. Two principal openings had been left, one to serve as a doorway, through which we entered by stooping slightly, the other, perhaps a foot in diameter, which apparently answered the double purpose of admitting the light and serving as a loop-hole for the discharge of arrows. The position and strength of the wall indicated that the intention of the builders had been to provide a secure retreat in case of attack. On entering we found ourselves in a small room, about 14 feet long by 10 wide, out of which a second smaller apartment opened, the two being separated by a wall similar in construction to the first. The latter room had two small loop-holes or windows commanding the pass below.

To the right of this structure, which had the appearance of having

served as a permanent habitation, and perhaps 20 feet above, was the entrance to a large open cavern, and on making our way up to this we found that the rock had been broken into the semblance of rude steps. The floor of the cavern was inclined at an angle of fifteen or twenty degrees, and covered to the depth of probably 2 feet with the excrement of rats. Near the head we noticed a large pile of broken bows and arrows, upon which some heavy stones had been placed. An effort was made to dig through this in the expectation of finding skeletons, but, having only our hands and the small pieces of sticks composing the pile, we were compelled to desist without being able to satisfy ourselves whether the cave had been used as a burial-place or not. The arrows were made of reeds, with sharpened points of hard wood inserted in the ends. The points, however, of a few were slotted and wound with sinews, showing that regular heads had been used, one of which, of obsidian, was found united to its shaft. It is safe to say that in this mass there were over a thousand arrows broken into fragments of various sizes.

RUINS IN THE CAÑON DE CHELLE.

IN the Cañon de Chelle, New Mexico, there are many ruins of cliff-houses and pueblos which were first brought to notice by Lieutenant (now General) J. H. Simpson in his *Journal of a Military Reconnaissance from Santa Fé to the Navajo Country*, made with the troops under command of Brevet Lieutenant-Colonel Washington in 1849. Some of these cliff-houses or fastnesses are said to be at a height of 400 feet above the river-bed, and are now without any evidence as to the means by which they were reached. The Navajos who now inhabit the valley do not have any traditions relating to the former inhabitants or builders of these ancient places, all of which have long been in ruins.

The most interesting of these ruins is described by Lieutenant Simpson in the following words :

“Seven miles from the mouth we fell in with some considerable pueblo ruins. These ruins are on the left or north side of the cañon, a portion of them being situated at the foot of the escarpment wall and the other portion upon a shelf in the wall immediately back of the other portion, some fifty feet above the bed of the cañon. The wall in front of this latter portion being vertical, access to it could only have been obtained by means of ladders. The front of these ruins measures one hundred and forty-five feet, and their depth forty-five. The style of structure is similar to that of the pueblos found on the Chaco, the building material being of small, thin sandstones from two to four inches thick, imbedded in mud mortar, and chinked in the façade with smaller stones. The present height of its walls

A VIEW OF THE ANON DE CHELLE WEST OF 100TH MERIDIAN.



RUINS IN THE ANON DE CHELLE, NEW MEXICO.

is about 18 feet. Its rooms are exceedingly small, and the windows only a foot square. One circular estuffa was all that was visible.”*

Lieutenant Simpson gives on plate 53 of his volume a figure of the ruin taken from a drawing made by Mr. Kern, and on plate 54 represents in colors two fragments of pottery picked up at the ruins. This pottery is of the characteristic ancient pueblo type.

During one of the early expeditions of the survey a very fine photograph was made by Mr. T. H. O'Sullivan of the ruin described by Lieutenant Simpson, and is reproduced by the heliotype process as Plate XX of this volume. This ruin has now received the name of the Casa Blanca, or "White House." The description accompanying the photograph states that the Casa Blanca is 50 feet above the valley. Beneath it, by the riverbed, are the ruins of other houses, whose people were probably wont to retire by ladders to this high fortress in time of danger. The Casa Blanca is two and three stories high, and would accommodate many families. It is built of soft stone, split but not dressed, united by a mortar of mud, forming a smooth wall, to whose external surface has been applied a very durable white plaster or wash, the composition of which is not known. The overhanging rock is here about 800 feet high, and, as will be noticed in the plate, is furrowed longitudinally by the action of driving storms, and vertically by the dripping from above.

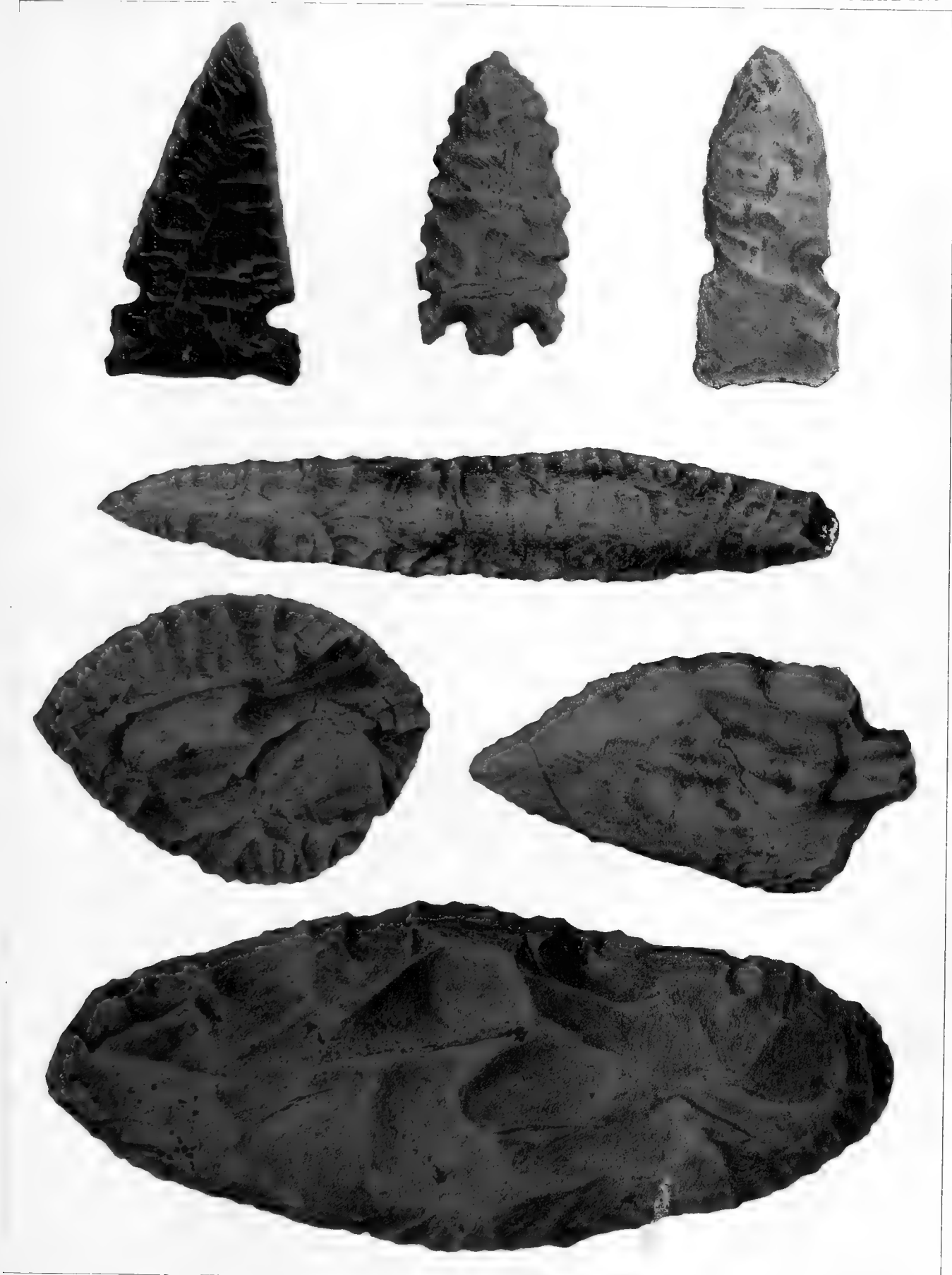
* Senate Document, p. 104, and special edition published by Lippincott, Grambo & Co. 1852, p. 75.

NOTES ON THE IMPLEMENTS OF STONE, POTTERY, AND OTHER OBJECTS OBTAINED IN NEW MEXICO AND ARIZONA.

DURING the several field-seasons, particularly those of 1873, '74, and '75, a number of valuable and interesting objects were obtained in New Mexico and Arizona, especially by the party to which Dr. Yarrow was attached, that gentleman being constantly on the lookout for objects illustrative of the archæology and ethnology of the region through which he passed. A portion of this collection was placed in my hands with a few brief notes, which are here reproduced with slight descriptive additions. Many other specimens, I understand, are contained in the collections of the Smithsonian Institution. A number of the objects collected were beautifully represented in water colors by Mr. H. J. Morgan, under the direction of Dr. Yarrow, and a portion of these have been accurately reproduced on the accompanying colored lithographic plates representing some of the forms of implements made of stone.

Plate XVI* contains representations, of natural size, of seven implements which can well be classed as knives and spearheads. Fig. 1 is a beautifully-chipped knife or spearhead obtained from the Pueblo of Taos

* Reference figures are not given on these plates; therefore, in referring to the plates, I have in each case designated the figure in the upper left corner as Fig. 1 and counted to the right and down the plate in natural order. The short description given of each object will make the reference clear in doubtful cases.



FRAGMENTS OF STONE, ANCIENT PUEBLOS
NEW MEXICO 1874.

Sinclair & Son.

by Dr. Yarrow. It is made of a piece of translucent chalcedony, of a yellowish tinge, exhibiting distinct bands when held towards the light. Its greatest thickness in the center is not over one-quarter of an inch, and its edges and point are thin and sharp.

Fig. 2 is a chipped implement, possibly an arrow point, with regular serrated edges, slightly thicker than the preceding, and is made of a yellowish jasper containing minute red spots. This implement was obtained by Dr. Yarrow from the pueblo of Santa Clara, a few miles from San Ildefonso, in New Mexico.

Fig. 3 represents what is probably a knife, with a long stem below the notches for attachment to a handle, and was obtained with the last mentioned at the pueblo of Santa Clara. Its surface is quite smooth, as if by long use, or weathering, the little ridges left in flaking seemingly having been worn away. The material is chalcedony, with similar red spots to those noticed in the chipped point with serrated edges.

Fig. 4.—The specimen represented by this figure is not among the objects forwarded to me. It is very likely a slender dagger-like knife, which was formerly mounted on a short handle.

Fig. 5 is a leaf-shaped knife of yellow jasper, about a quarter of an inch in thickness in the center and chipped down to a sharp cutting edge all around. In size, shape, and material this implement is like many that have been found in other parts of the country. It is a common form in New Jersey, as shown by the specimens like it in the Abbott collection of the Peabody Museum. This was obtained by Dr. Yarrow at the pueblo of Taos.

Fig. 6 represents a knife with a short stem, which has evidently been made from a large flake of the jasper. The edges and the stem have received slight secondary chipping. This is also a common form east of the Mississippi. It was obtained by Dr. Yarrow at the pueblo of Santa Clara, New Mexico.

Fig. 7 presents a form of large chipped implements common to nearly all parts of the country, which, while adapted for cutting, are not yet fully understood. They are often called large knives, spear-points, or "toma-hawks", and they may have been so fastened by the center to a handle as

to have permitted the use of both points. This specimen was secured by Dr. Yarrow at the pueblo of Ildefonso. Its worn and weathered surface may possibly indicate considerable antiquity. It is made of hard brownish quartzite.

A few other chipped implements from the same region as those figured on the plate are in the collection before me. One of these is a small drill, or perforator, the point of which is broken, with a broad flat base as if to give a firm hold for the thumb and forefinger. It is of a light-colored chert, and was obtained with the other specimens from the pueblo of Santa Clara. A well made arrowhead, about an inch and a quarter long, of a light-colored chert, with serrated edges, straight base, and notched on the sides, is from the pueblo of Taos. From this place was also obtained a leaf-shaped implement of about the same size, made of black obsidian. This may be an arrowhead, but, although it is finely pointed at one end, it is flat on one surface and the broad end is rounded and chipped, which gives it the appearance of a scraper. At Coyote Creek, near Black Lakes, New Mexico, Mr. J. C. Russell collected two chipped implements. One is of argillite, $4\frac{1}{2}$ inches long and about 1 inch wide in the centre, where it is $\frac{1}{2}$ an inch thick. It is rudely chipped to a point at each end, and has a close resemblance to many of the rude implements from the Atlantic States. The other implement is made of a piece of white chalcedony. This is oval in shape, nearly flat on one surface and convex on the opposite. It is about $1\frac{3}{4}$ inches long and half an inch thick. The chipping has been principally around the edges on the convex portion. Four small arrowpoints are also in the collection, without a special label. One is of white quartz, nearly three-quarters of an inch in length, with notched sides and straight base. The others are of obsidian, two of which are broken. The perfect one is less than half an inch wide and is three-quarters of an inch long. It has serrated sides and a notched stem.

The grooved "axes," eleven of which are represented on Plates XVII, XVIII, and XIX, are of more than ordinary interest from their marked peculiarities. Of these, eight, including six of those figured, are available for description. Three of these seem to have had cutting edges, but they are now so blunted that they appear to have been used more for giving



SECTION OF A FOSSIL, ANCIENT T. B. 1. 1.
CAL. N. DE ROSO ANI SANTA MARIA
NEW MEXICO, 1894

blows than for cutting purposes. They are of small size and may have been mounted for use as implements of war, similar to the iron tomahawk of a later date. Five others ought rather to be called axe-shaped hammers than axes, for they evidently never were furnished with anything approaching a cutting edge, and their rounded and fractured edges show that they have long been used as hammers. In this respect these axe-like implements differ widely from the sharp-edged axes of the country east of the Mississippi, nearly all of which were cutting implements, and some were probably used as weapons. These pueblo "axes" are highly polished. They are made of hard materials* of various colors and form a pleasing and striking contrast with the majority of similar implements which are so abundant in the Atlantic States. Another prominent character is shown in the manner of grooving the stones for the purpose of attaching them to handles by means of withes. This peculiarity will be best understood by examining the figures on the plates. It will be noticed that the grooves are not simple, as is usually the case with axes from the Mississippi valley to the Atlantic coast, but that they generally consist of two or three distinct indentures. In some, there is a principal groove which passes round the stone, and a second consisting simply of grooves on the opposite edges, as shown in Fig. 5 of Plate XIX. Another interesting variation from the simple groove is seen in Fig. 2 of Plate XVII, which in addition to the double cross-groove above has a deep notch on one side only. Fig. 4, of Plate XVIII, shows three well-defined grooves extending round the stone. Occasionally an axe with two grooves has been found in the Eastern States, but they are so rare as to be marked exceptions to the rule. Dr. Abbott has figured such an axe from New Jersey. In these pueblo specimens the but-end is rough or but slightly worked, while the rest of the implement is highly polished. This may indicate that the head was inclosed by some material when hafted.

Plate XVII, Fig. 1, represents, of natural size, an axe-like hammer with a blunt or much worn edge. This is of a grayish actinolite, with dark spots and lines, as shown in the figure. It was obtained by Dr. Yarrow at

* Dr. Wadsworth has informed me that these implements are made from highly metamorphosed rocks composed now chiefly of *actinolite*. Most of them contain magnetic or titaniferous iron, and part appear to be altered diabases.

the pueblo of Ildefonso, New Mexico. Fig. 3, of this plate, is taken from a somewhat larger implement of this character from the same place with the last. The head of this specimen is broken off, as shown in the figure. The fractured surface, however, is comparatively smooth, and the implement was probably used after its fracture. The two other specimens represented on this plate I have not seen, but they are very likely given of natural size, and are either from the pueblo of Ildefonso or that of Santa Clara.

Plate XVIII, Figs. 1, 3, and 5, represent three small implements with an approach to cutting edges, and double grooves. I have not seen the original of Fig. 1 and cannot state the exact place where it was obtained. Fig. 3 is the smallest of the axes in the collection and is from the pueblo of Taos. Fig. 5 was also obtained at Taos by Dr. Yarrow. These last two are made from a hard, reddish actinolite, which receives a high and beautiful polish. Fig. 2 of this plate represents, of one-third size, the largest of the grooved implements. It is $5\frac{1}{4}$ inches long, $2\frac{1}{2}$ inches wide, and $1\frac{1}{4}$ inches thick. Its edge is half an inch thick and rounded by use. This beautiful specimen is of the same mineral as the others, and is from Taos. Fig. 4, of the same plate, is remarkable from the character of its grooves, and apparently has a sharper edge than the majority of the specimens, but I have not seen the original and cannot give anything further about it.

Plate XIX, Fig. 1. This specimen is not in the collection before me. Fig. 5, of this plate, represents a beautiful little axe from Taos. It is of a mottled actinolite, and is figured of full size. The notches on this implement, just below the groove, are so near to the cutting edge as to give the impression that it was once much longer and has been reground after a fracture.

Two other grooved implements are unquestionably hammers. One from the pueblo of San Ildefonso is of the same hard mineral of which the other grooved implements are made. This hammer is 3 inches long, 2 inches wide, and $1\frac{1}{2}$ inches thick. It has a well-defined groove, and the edge is very much worn and rounded. The second has the appearance of being made from a thin, oval pebble, of the same mineral as the last,



IMPLEMENTS OF STONE, ANCIENT PUEBLOS
NEW MEXICO. 1874.

upon which little work has been bestowed beyond making the groove. It is in shape very much like the rude grooved sinkers, made of slate and other soft materials, found on the Atlantic coast. In this instance, however, the abraded edge shows the use to which the implement was put. It is from the pueblo of San Juan, on the Rio Grande. A somewhat similar but much thicker hammer, with the groove nearer the centre, was evidently mounted so that both ends could be used. This was obtained by Mr. H. W. Henshaw at an ancient pueblo north of Santa Fé, in New Mexico.

On Plate XIX, Figs. 2, 3, and 4, are representations of three grooved hammer stones similar to those found in other parts of the country. These were very likely mounted in a similar manner to the Sioux hammer, which has been described in detail on page 206 of this volume. These specimens are not among those placed in my hands, and I cannot give anything more regarding them than can be obtained from an examination of the figures.

Dr. Yarrow made every effort he could to obtain stone implements from the Indians of the pueblos, and nearly all that have been mentioned here were secured by him during the summer of 1874. He did not see any of the axes and hammers in use, and, so far as he could learn, they are not now made. Those which he obtained had been handed down for a long period, and the Indians were loth to part with them. None were mounted on handles, but he was informed that they were formerly attached to handles made of plaited skin and hair, like the Indian whip, or were fastened by withes of wood, thongs of leather, hide, or buckskin. Although grooved implements were carefully looked for by Dr. Yarrow among the ruins in New Mexico, none were found.

A singular object of unknown use was found by Dr. Loew in October, 1874, at a ruined pueblo below Albuquerque, on the Rio Grande. It is made from a mass of pumice (*Rhysolite*), and represents an ideal shell. From the end of the spire, which is formed of two whorls, to the furthest extremity of the lip it measures $6\frac{1}{2}$ inches, and is 4 inches in its largest transverse diameter. The aperture of the shell is cut to a depth of about half an inch. In this median groove there is a hole about half an inch in diameter, which has been bored almost to the centre of the object. Another hole of the same size and character has also been bored into the spiral end, and

nearly meets the one on the under side. It may be that these holes were simply the beginning of the excavation of the central portion of the object. I cannot conceive any use to which this piece of sculpture could be put, unless it was intended as an ornament. That it is a rude, and perhaps somewhat conventionalized, representation of a marine shell there can be no doubt. Thinking this was the case I submitted the object to Professor Hamlin, of the Museum of Comparative Zoölogy, who has kindly given me the following answer to my question :

“The maker of this specimen did not copy any known shell. The narrow longitudinal aperture merging into the canaliculated spire corresponds fairly to a cone like the well-known East Indian *marmoreus*, Lin., while the elevation of the spire may have been borrowed from the West Indian species *testudinarius*, Mart., to which, on the whole, it is most like. On the other hand, the sharp inner lip, situated where a wide and smooth columella is found in cones and most other marine gasteropods, the sudden bend in the lower part of the otherwise straight aperture, and the swollen lower portion of the shell, where cones taper regularly in a straight line, are, taken together, unlike a cone or any other known shell. The specimen is, besides, several times larger than any described recent or fossil cone that has been found in North America. It was apparently carved by one who had a good general conception of a dextral gasteropod shell, and was content to follow that in his work rather than the features of any individual specimen.”

Although the various members of the surveying parties noticed the great quantity of fragments of ancient pottery found along the old trails and in the vicinity of ruins in New Mexico, very little seems to have been collected.

Mr. T. O'Sullivan, while at a ruined pueblo on the San Juan River, New Mexico, in October, 1874, picked up a number of pieces of ancient pottery, eight of which are before me. Two of these fragments are red and the others are gray. The ornamentation on all is in black, and consists of the characteristic geometrical figures and parallel lines. On one fragment, between two groups of parallel lines which passed around the inside of the bowl, of which this fragment is a portion of the side, there is a band,

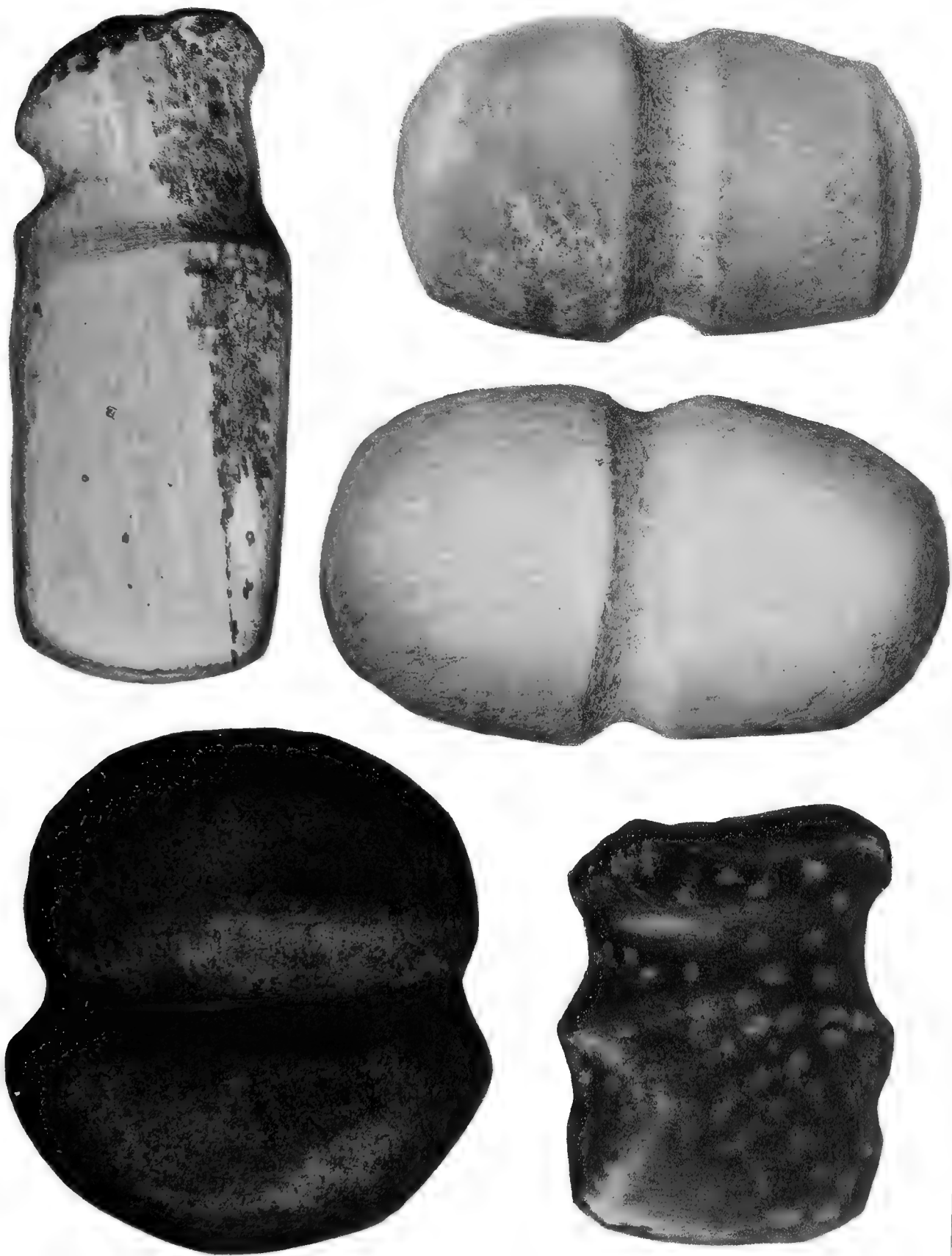


FIG. 1. Fossil, at New Mexico
New Mexico 1904

exactly an inch in width, which contains a series of connected half spirals of symmetrical arrangement. On the outside of the fragment there is a portion of a border which was made of lozenge-shaped and zigzag figures. Another fragment from this lot shows that both sides of a bowl were very prettily ornamented, and that its edge was also marked with squares, which united with the black line forming the upper edge of the border on the inside. As figures are necessary in order to give a proper idea of the patterns of ornamentation on this old pottery, I must refer to such as have appeared in several publications, particularly the plates in Lieutenant Simpson's volume and in the third volume of the Reports of the Pacific Railroad Survey.*

A comparison of this ancient pottery with that made by the present inhabitants of the pueblos shows that a great deterioration has taken place in native American art, a rule which, I think, can be applied to all the more advanced tribes of America. The remarkable hardness of all the fragments of colored pottery which have been obtained from the vicinity of the old ruins in New Mexico, Colorado, Arizona, and Utah, and also of the pottery of the same character found in the ruins of adobe houses and in caves in Utah, shows that the ancient people understood the art of baking earthenware far better than their probable descendants now living in the pueblos of New Mexico and Arizona. The gray clay seems to contain a large amount of siliceous material, which, on being subjected to a great heat, becomes slightly vitrified. The vessels made of the gray colored clay have apparently received a thin wash of the same, upon which the black ornamentation was put, before baking. The intense heat to which the vessels were afterwards subjected has vitrified this thin layer of clay, which now appears like a thin glaze. The polish is probably due to smoothing the surface with a stone before the thin wash was applied, as is now done by several tribes in the United States and Mexico. The black substance, uniting with the clay-wash, was burnt in and became a fast color. The red color was produced by the addition of a large proportion of red ochre, or oxide of iron, with the gray clay, and thus, according to the greater or less amount of iron used, the clay is more or less red throughout. To some vessels a

* The latest contribution to this subject is contained in the Report by Dr. Hayden for 1876.

thin wash of clay, containing a large proportion of the ochre, was applied before baking, which resulted in a deep red color, and in these the black ornamental lines were burnt in with the ochre-clay wash. The same method is probably followed by the present pueblo tribes, but as their pottery is not so well baked the colors are not as permanent, and the vessels made are generally far inferior in construction, as they are thicker and more porous than the ancient specimens.

Among the many fragments of ancient pottery that I have examined from the region named above, I have not seen a piece in which more than a single color was employed in its ornamentation. With very few exceptions, in which the ornamental lines are of a brownish color with a metallic lustre, the pattern consists of black lines and figures on either the red or the gray ground-color. In the modern vessels from the pueblos on the Rio Grande, the prevailing colors are white and black over a red clay. In some, however, the black figures are painted directly upon the red or primary color of the vessel.

It is a little remarkable that, both among the ancient and present pueblo tribes, the ornamentation on the vessels of clay should be so confined to figures expressed in color. I do not remember having seen a specimen of this class of smooth red or gray pottery on which incised work appears, and I may further remark that, so far as my examination has extended, I have seen, on pottery of this character, only expressions of geometrical figures. On the recent pueblo pottery there is now and then an attempt to represent natural forms, such as leaves, birds, and deer, but this realistic ornamentation is poorly executed, so far as I can judge from the limited material at my command. It is also worthy of remark that while the present pueblo tribes, particularly the Zuñi, often model vessels and other objects in clay, to represent men, birds, and other natural forms, so far as my knowledge extends only a single fragment of such a form has been found under circumstances indicating antiquity. This single exception consists of a portion of a small vessel which was made to represent some quadruped. It was presented to the Peabody Museum by Prof. N. S. Shaler, and is marked as having been found on the Rio Gila, in New Mexico. The gray clay of which it is made and the char-

acter of its ornamentation have a close resemblance to some of the bird-like vessels from Zuñi, and it is not so well baked as the fragments of undoubted ancient pottery. Probably belonging to about the same period between ancient and modern art with this fragment of animal form, is the nearly perfect mug, made of gray clay and ornamented with black lines, lozenge-shaped and other figures, which was "found by Mr. Francis Klett in 1873 at the ruins of Pueblo Viejo on the Rio Gila." In shape this is like an old flat-bottomed beer mug with a handle extending the whole length of the side. Portions of somewhat similar mugs have been found among the fragments of ancient pottery, but, so far as I know, none of these had a *broad and flat bottom*. The clay of which this vessel is made has been pretty well burned and is hard and firm, its thickness, however, gives to the mug a rude and clumsy appearance, such as is not seen in the older specimens. Another vessel, which I am inclined to regard as not very old, is a nearly perfect bowl of red clay about ten inches in diameter, which is said to have been obtained from a ruined pueblo in New Mexico. Although this vessel is very well made, it has not been burnt to that degree of hardness common in the ancient pottery, and its ornamentation is not so well done. In favor of its comparatively recent origin is the fact that the black lines are drawn over a white wash, as is the most common method of ornamenting the modern pottery made at the pueblos in the vicinity of Santa Fé.

There have been often found at the ruined pueblos and old cliff-houses, as well as in the mounds and caves of Utah, vessels made by coiling bands of clay upon themselves, but of this form specimens do not appear to have been collected by the surveying parties, although Professor Cope refers to pottery of this character in the account of his explorations of an ancient town given on a previous page of this volume. Many such have been found in the mounds formed by the ruined adobe houses in Southern Utah, and others were obtained by Dr. Palmer from caves in Utah. A number of perfect vessels and many fragments from these places are in the Peabody Museum.*

The most interesting object of clay obtained by the survey is the large

* Mr. Holmes has figured vessels of this character found in the cliff-houses, in his recent valuable paper contained in Dr. Hayden's Annual Report for 1876.

olla secured by Mr. Francis Klett at Zuñi, with which is the following memorandum: "The olla was found at the pueblo of Zuñi, where it was manufactured. Its age cannot be given. However, it is certain that it had not been used for a long time previous to my visit, and was found stored away among broken pottery and other objects." This olla is 14 inches in greatest diameter, which is at a line drawn through its upper third. From this portion above it is symmetrically rounded to its shoulder to which is joined the oblique neck, terminating in a slightly retroverted rim about its mouth, which is 8 inches in diameter. Below its widest portion it gradually decreases in diameter to within an inch and a half of the bottom, measured vertically, whence it rapidly decreases to its round concave base of only 4 inches diameter. The total height of the vessel is 12 inches. It is very nearly symmetrical, the slightly irregular outline of the rim being the only thing that catches the eye in this respect. There is much in the style of the colored ornamentation on this vessel that has a general resemblance to what is called Phœnician art, particularly to some of the patterns found by General Cesnola at Cyprus, which is of considerable interest in the study of corresponding developments among widely separated peoples. The vessel is made of a gray clay, is thin and light, and is well baked, approaching in these respects the character of the ancient pottery more than to that obtained from the pueblos in Eastern New Mexico. On its inside and around the rim is a slight red wash, probably consisting of a very thin mixture of red ochre and clay. Its base and about 3 inches of its under surface are also red, but the color is much deeper than on the inside. Above this red basal portion the vessel has received a thin but perfect wash of white clay, and this portion is divided into four zones, formed by parallel black lines, painted over the white, which are evenly drawn around the jar.

The upper of these zones is defined above by a narrow black line just under the lip of the vessel, and below by two bands, each of which is about one-fourth of an inch in width. These were painted on the shoulder of the jar, and the very narrow white line left between them adds much to the artistic effect produced. From some peculiar freak the decorator has left a very narrow white border, where the two ends of these

bands meet, carefully finishing the dark bands with this object in view. All the other bands about the jar are continuous, and do not show where they were joined. In this upper zone there are six geometrical compound figures, each of which is a copy of the others. These are carefully painted in black upon the white ground, and a small portion in each figure is filled in by narrow parallel lines in red.

The second zone is wider than any of the others, and occupies a vertical space on the jar of $3\frac{1}{4}$ inches. In this zone there is a procession of seven deer or elk, with branched antlers and male organs. These animal figures are represented in profile, without any attempt at perspective, and with little regard to proportion. The antlers, ears, and legs of both sides are shown by placing one in front of the other, and the double hoof is represented by two short parallel lines, one of which is *over* the other. The legs are remarkably straight and slender, the joints being indicated by slight protuberances. A white portion is left around the dark oval representing the eye, and another white crescent-shaped portion is left on the rump. Extending from the nose to over the fore legs is a dark line, outlined by the white ground, which terminates in a triangular figure, the centre of which is red. This evidently is intended to represent the heart and lungs of the animal and probably expresses life. Under this line from the nose are four white blotches which seem to have some connection with an idea of expressing a mouth and throat. In front of each of these animal figures, which are drawn in black and brown, there is a peculiar branched figure painted in red. This figure may be intended to represent a plant, but its regular, geometrical design makes it difficult to determine. It consists of five divisions branching from a root. Three of these branches terminate in coils to the right, one to the left, and the lowest branch of all is simple and short.

Between the two black lines defining the third zone, which is not much over half the width of those above and below it, there are eight deer, represented in the same manner as in the zone above, but they are not as large, and, in order to get the figures into the limited vertical space, the animals are represented with very short legs.

The fourth, or lowest of the zones, contains six more of the animal figures which are drawn in a similar manner and are of about the same size with those in the second division above, except that the figures of the male deer with antlers alternate with figures of females which are represented without antlers and with young. The foetus is drawn in profile, standing, with its head in the posterior portion of its mother's body. The figure of the young animal occupies the total length and width of the body of the parent. Between these male and female deer are branching figures of the same character and color with those in the second zone.

Altogether this vessel is a most interesting study and is of a style of ornamentation entirely unlike any other that I have seen. It is probable that others of a similar character will be obtained from the southern pueblos, as it is evidently a characteristic style of ornamentation.

A number of ollas and large and small bowls were obtained at Santa Fé by members of the Survey. These are all of a red-colored clay, thick and heavy, and not very well baked. In every respect this class of pottery is very much inferior to the large olla from Zuñi described above. They are generally more or less covered exteriorly with a thin wash of white on which figures of various kinds are drawn in black, principally consisting of circles, zigzags, lozenge-shaped figures and waved and parallel lines. Some of the bowls have the ornamentation on the inside; in these the interior is whitened and the outside is of its natural red color. In one or two the ornamentation is in black, painted on the red ground. Several of the vessels in this lot seem to have been slightly polished by rubbing the partly-dried clay with a smooth stone before baking, as is done by many Indian tribes. When well performed this method of polishing the vessel gives a fine lustre which resembles and has often been mistaken for a thin glaze, particularly in pottery from some parts of Mexico. None of this modern pueblo pottery, however, has been so highly polished as that to which I have alluded. On some of these modern bowls a rude attempt has been made at a little naturalistic work, such as the figure of a bird or of a vine

With these ollas and bowls there are a number of small objects of the same material and style of ornamentation, all of which were brought in

from Tezuque, Ildefonso, and other pueblos in the vicinity of Santa Fé. Among these smaller vessels are rude representations of birds with an opening on the back.

The collection also contains several small bowls, mugs, and pitchers made of red clay, some of which were probably designed after common Mexican forms. Several of these were apparently coated, before baking, with a thin wash of clay containing pounded mica, which has given to the objects an appearance somewhat resembling gilt-bronze.

A number of solid terra-cotta figures were also obtained from Santa Fé, among which are some ornamented with white and black, and others are coated with the pounded mica, as described above. These small figures represent birds, men on horseback, and nude men and women. Some of these have a tendency to obscenity, which is very likely the result of contact with the vices of civilization.

A water-bottle, of considerable interest from its shape, was obtained at the pueblo of Ildefonso. This is made of red clay, like the ollas and bowls of the same region, and is ornamented with black figures on a white ground. Three of the figures rudely represent large birds, one in profile and the others with the wings and feet extended to the right and left of the body, and the head turned so as to be shown in profile, while the tail is expanded.* The jar itself is evidently designed to represent a bird. The small neck terminates in a mouth, which may be regarded as the head of the bird. The tail is formed by a projection in the center of the jar opposite to the mouth, and the two handles on the sides probably represent the wings. When one of the smaller bird-like vessels is compared with this bottle its general resemblance to a bird is readily seen.

Several pieces of lustrous black pottery were also obtained at Santa Fé, and are supposed to have been brought in from the pueblo of Isleta on the Rio Grande. Many of the objects made of this black pottery which I have seen are imitations of ordinary cups and saucers, pitchers, etc., and it is very likely that the knowledge of giving the black color to the clay

* Many of the vessels in the Cesnola collection from Cyprus are ornamented with similar rude figures of birds, painted in black on a light ground.

was obtained from the Spaniards or Mexicans. In Southern Mexico a similar black ware is made by the Indians and sold in the towns for ordinary use. This, as shown by samples of the clay and coloring matter brought to the Peabody Museum by Dr. Palmer, is made black by the admixture of oxide of manganese. The black ware from Isleta, however, is colored by a coating of plumbago. Among the black vessels are two large ollas with covers, a shallow dish, and three small bird-like objects.

Lieutenant Russell, during the expedition of 1873, obtained from one of the Moqui pueblos, in Arizona, an object carved in wood and rudely representing a man. By the collector this was thought to be a doll or toy, which is probably the case, but by others, as I understand, it is considered as "a portion of a sorcerer's outfit for producing rain." The head, body, and legs, are cut from a single piece of wood. Although the body and legs are fairly carved, the head is represented by the conical termination of the wood into which small pieces have been inserted, probably intended for the ears and nose. The arms are made from separate pieces and are attached to the body by pegs. In one hand is a piece of wood which probably represents a rattle. The wood is painted red, yellow, green, and black, in a symmetrical pattern. Around the neck there is wound a small twig of pine. Hanging from the shoulders is a square piece of canvas upon which a border of red and black has been painted. The space between these borders on the outside has been covered with white paint. This peculiar object is entered in the Smithsonian Institution catalogue, under No. 31342, as "Dressed and painted Rain God."

Several of the little bows and arrows, ornamented sticks and other objects, such as are mentioned on preceding pages, were found at one of the "Sacred places" on the mesa upon which are the ruins of Old Zuñi. Of these objects only three are in the collection before me. They consist of sticks about six inches long to which eagle-feathers have been fastened.

Since the above was written I have seen three similar objects, found by Mr. G. Thompson on the top of Mount Taylor. One of them is a short stick to which feathers are tied, another is a twig which has been smoothed at each end, and the third is a short flat stick in which notches have been cut on each side. Mr. Thompson informed me that there were thousands of

similar objects on the peak of Mount Taylor, and that he understood that each tribe left offerings of a peculiar character at this "Sacred place."

In volume III, page 41, of the Reports of the Pacific Railroad Survey, there is a short account, with a figure, of one of these so-called altars at Old Zuni.

A number of articles of which extended descriptions would be of little value, unless accompanied with illustrations, were obtained from some of the Pueblos and from the Apache and Navajo Indians. Those before me are as follows :

17352.* War-shield of Hosta, an old chief of the Jemez, whom Lieutenant Simpson mentions as governor of the Pueblo of Jemez, and of whom he gives a full length figure in his report. Hosta is represented in this figure with a similar shield, the two differing slightly in their decoration. The shield before me, which was secured by Mr. Francis Klett in 1873, is made of thick leather and is painted on the outside. Across the centre is a broad band of red; above this band the shield is painted yellow, and below black. On the lower or black portion are two stars with a red centre and four rays of a yellowish-green color. Around the upper border and hanging down the sides is a piece of red flannel to which numerous feathers are attached, as represented on Lieutenant Simpson's plate. A cover of soft buckskin protects the shield when not in use. On the inner side are two long bands by which the shield was fastened to the arm or suspended from the shoulders.

17351. A similar leather shield was obtained by Dr. Yarrow at the Pueblo of Isleta, but is more elaborately decorated. The colors used are red, yellow, and green. The central design consists of a crescent on each side of which are two figures terminating in arrow-points, such as are usually regarded as symbols of lightning. Like Hosta's shield, this has a fringe of feathers fastened to red and purple flannel.

17350. A pair of child's moccasins, from the Pueblo of Santa Clara, New Mexico. Dr. Yarrow, 1874. These are neatly made, with soft buckskin uppers and a sole of undressed skin with the hair still remaining on the outside. The upper leather terminates behind in a fringe, and in front

* These numbers are those under which the objects are catalogued in the Smithsonian Institution.

is neatly ornamented with a few green colored lines. These moccasins are made as "rights and lefts."

17337. A bridle made of braided strips of raw hide and horse-hair, from the Pueblo of Nambe, New Mexico. Dr. Yarrow, 1874.

(47.) Eighteen iron-pointed arrows from Pueblo of Santa Clara, New Mexico. These are furnished with thin iron points varying from 1 to 2½ inches in length, on wooden shafts 2 feet in length, with three feathers.

In a bundle of thirteen arrows, marked Navajo, from near Fort Defiance, all with iron points, are five with wooden shafts like those from Santa Clara. The others are much longer; the short wooden shaft of 8 or 10 inches is inserted in a reed over 2 feet in length, giving a total length to the arrow of about 3 feet. The feathers on the reed shafts are not as long as those on the wooden.

17331. Apache bow, quiver, and ten arrows, from Arizona. Lieutenant Wheeler, 1871. The bow is 4 feet 8 inches long. The quiver is made from deer skin with the hair on the outside. The arrows are about 3 feet long. Four of the points are of light hornstone, with deeply-notched base and slight notches on the sides. These are held by gum in a notch cut in the end of the short wooden shaft, and made secure by sinew, which is wound round the shaft and over the base of the arrowpoint to the side notches. The wooden shafts are inserted in reeds, the same as noted in the Navajo arrows.

17327. Bow, bow case, and quiver, from the Pueblo of Santa Clara. Dr. Yarrow, 1874. This is a beautiful bow, covered on the upper surface and on the sides with raw hide lashed with sinew.

17333. Apache quiver of skin, Arizona. Lieutenant Wheeler, 1872.

17355. Apache saddle-bags, ornamented and fringed, New Mexico. Lieutenant Wheeler.

17359. Two Apache tunics, made of buckskin, richly ornamented with beadwork and fringed.

17356. Apache leggings, made of buckskin ornamented with beadwork.

17345. Jicarilla Apache leggings and moccasins combined, New Mexico. Lieutenant Wheeler.

NOTES UPON HUMAN CRANIA AND SKELETONS COLLECTED BY THE EXPEDITIONS OF 1872-'74.

BY MARK SIBLEY SEVERANCE AND DR. H. C. YARROW.

959, 964*. *Cranium, with the skeleton of a pappoose*, from a rock-grave, Beaver, Utah. On a hill-side east of Beaver is a collection of Indian graves of recent construction, half way up from the plain on which the town lies to the top of a barren hill of volcanic nature. These graves are formed of piles of lava rock, heaped to great size, and presenting somewhat irregular forms on the declivity where they are built. No particular shape nor direction could be discriminated, and no theory deduced as to their probable erection with axes directed toward a definite point of the compass. They were mere piles of irregular stones thrown together as any wild tribe would be likely to throw them for the concealment of property or the preservation of their dead. A growth of stunted cedars covers the hill-side on which they lay, and supplied the material for a part of their interior construction, as described below. Westward from the site of the graves is a long view across the valley, in which Beaver stands, to a rough range of sierras bounding the plain on the west and to receding mountains beyond—a picturesque outlook for this rude aboriginal burying-field.

The first grave opened was about 10 feet long, 8 feet wide, and 6 feet high, with the longitudinal axis pointing nearly north and south, and the

* These numbers refer to the Catalogue of the Army Medical Museum, and also to the following table of measurements.

general rounded form of a mound. Two feet below the top was found a layer of cedar trunks and boughs, somewhat regularly placed, inserted in the sides of the grave and supporting the superposed stones, which were of various sizes, from those of a few pounds to those of a quarter of a ton in weight. A space about 6 feet long, 4 feet broad, and 4 feet deep had been left below these cedar boughs, and in this were found the two skeletons numbered 959 and 964 in the Army Medical Museum catalogue, being those of a pappoose and a squaw, respectively. A buffalo-robe enveloped the skeletons, which still retained much of the clothing in which the bodies were buried. Around the skeletons, outside of the buffalo-robe, was a heterogeneous collection of tin pans, tin cups, knives, forks, spoons, blankets, and other articles of domestic use, with a looking-glass and carefully disposed piece of vermilion, for personal adornment in the Happy Hunting Ground.

The skeleton of the squaw lay underneath, on its back, with the feet pointing nearly directly to the west, and head slightly declined on its left side; this declination was evidently merely a result of superposition, the weight of the pappoose on the breast serving to deflect the head from the upright position. The covering of the skeleton of the squaw had mostly fallen to decay, while that of the pappoose was comparatively well preserved. The pappoose, from the nature of its burial, was the most interesting skeleton secured. It lay, tightly swathed in a wicker-hood peculiar to the Indians, on its back on the breast of the squaw, with feet pointing westward like the squaw's. A neat little pillow, 6 inches long by 4 wide, and about an inch thick, lay under its head, within the hood. A blue and white checked cotton shirt, covered its body, and a red flannel blanket, of originally fine texture, enwrapped the whole skeleton. A string of blue and white beads was about its neck, with a couple of nickel cents suspended on a string. I regret to state that this small coinage was stolen from the hood, as it lay outside my tent door in Beaver. My impression is that one of the cents bore the date of 1856, so recent a date that the story of the Mormons, to the effect that the skeletons were those of Pah-Utes, who had died from natural causes, appears entirely worthy of credence. The imperfect preservation of the wicker-hood and the envelopes of the

pappoose rendered it difficult to transport it intact as found, and the decay of the epiphyses and other tender parts of the skeleton marred its symmetry. The cranium is believed to be perfect.

960. *Mummified cranium*, of unknown tribe and date, secured in Gunnison, Central Utah, by Mr. Francis Klett, of the expedition of 1872, from a rock-grave on a hill-side west of Gunnison, similarly constructed to those near Beaver. The bones of the skeleton were too much scattered for collection.

961. *Unknown skull*, from Camp Apache, Arizona, secured by Mr. G. K. Gilbert, geologist, during the expedition of 1871.

962. *Miscellaneous bones*, from ancient mounds, Provo, Utah. Provo, a prosperous Mormon town, lies fifty miles south of Salt Lake City, on a broad plain between the Wahsatch Mountains and Utah Lake. West of the town, on its outskirts and within three or four miles of the lake, are many mounds, of various construction and in different states of preservation. Mormon farmers have leveled some of them, plowed into others on the edges, and removed from others the rich soil for use elsewhere; in no case has there been a special attempt at exploring them. Those examined were on low ground, almost on a level with the lake and with Provo River, a mile distant on the north. Overflows from both the river and the lake sufficient to inundate the area of country occupied by the mounds are not at all unlikely to have occurred during the long lapse of time since the building of the mounds, though at the present time the climatic character of the region is such that overflows are of rare occurrence; not infrequent to a mild degree, however, after the melting of the snows in the lofty Wahsatch Range, from which Provo River issues. This fact of periodic overflows is mentioned as bearing on the question of the origin and use of the mounds in which the miscellaneous bones of No. 962 were obtained. Mounds of various sizes and shapes, in different parts of the plain, were dug into and examined, and these miscellaneous bones found at all depths, and in every mound entered, scattered without order, and without evidence of careful arrangement or systematic distribution. Some of the larger bones were found near the skeleton numbered 965.

963. *Cranium, with part of the skeleton of a Pah-Ute brave*, from a rock-

grave, Beaver, Utah. The particulars of the burial and finding of this skeleton differ but little from those attaching to Nos. 959 and 964, already described. The Mormons give *Nabbymunck* as the name of this brave.

The rock-pile, from one end of which the skeleton was taken, was about 25 feet long, 20 feet broad, and 10 feet high, with the longitudinal axis pointing north-northeast. It lay on the same hill-side, about 5 feet above the grave of the pappoose and squaw already mentioned, the lower edges of the two graves merging into each other. The southwestern corner alone was opened, and the same character of structure discovered as in Nos. 959 and 964; cedar trunks and boughs supported the rocks and inclosed the open space in which the skeleton was found. The body lay on its right side, with knees slightly bent and feet pointing in a northwest direction. Decomposed clothing, an old gun-barrel fallen from its stock, a bridle bit of Spanish make, several bullets, a cloth containing a mass of red paint, and other relics were found near the skeleton.

965. *Cranium, with part of a skeleton*, found in the outer edge of an ancient mound, Provo, Utah, about a foot below the level of the surrounding fields. Of unknown date and tribe.

Northwest of Provo, on the level fields mentioned in describing No. 962, half way from the town to Utah Lake, is a field containing a number of mounds more or less perfectly preserved; some are entirely untouched, except on the outer edges, where the Mormons' grain patches encroach upon them; others have been almost completely leveled with the surrounding field. The skull had been dug up by a farmer while engaged in digging the shallow irrigating ditch, and presented to Lieutenant Wheeler on his arrival in Provo. Guided to the spot where it was exhumed by the farmer himself, digging was commenced where he directed, and the remainder of the skeleton was brought to light after a few minutes' work. Mounds 1 and 2 are higher and less disturbed than Nos. 3, 4, 5, and 6, which are almost entirely demolished. The excavation made in mound No. 1 was continued for about 12 feet from the outer limit, with a breadth of about 8 feet. The mound was 45 feet in width, 60 feet in length, and 10 feet high in the middle. A few pieces of pottery and broken bones were also found. Across the shallow ditch, and only a few inches below the surface of the

ground, the remainder of the skeleton was discovered, with many bones of animals scattered near it in the soil. The skeleton was apparently lying on its right side, with feet pointing about northwest. There was not a remnant of clothing nor a trinket to testify to the age of its burial.

It is proper in this connection to remark that the Mormons tell of an Indian battle about twenty years ago between two rival bands very near this field of mounds, and of their opening the old mounds in order to bury their own braves who fell in this fight. This may be true or not. If so, the position of this skeleton on the very edge of the mound, and so lightly covered, might point to its belonging to one of these recently-killed Indians rather than to those of a more ancient date. The Utes and Mormons coincide in their entire ignorance of the origin of these mounds, which are scattered numerously through Utah. The former say that their oldest men remember them in youth, and that their fathers had told them nothing in regard to them. The fact of this recent fight and probable utilizing of the old mounds for modern burial is mentioned for the sake of candor, and for the perfect understanding of all the facts in the case, rather than to cast doubt upon the antiquity of this particular skeleton.

1171. *Cranium of unknown race*.—This specimen was found in 1869 at the abandoned town of Gran Quivira, seventy miles west of Fort Stanton, New Mexico. Tradition ascribes to the Spaniards the building of this town, and states it was abandoned by them on account of an Indian insurrection, and that the town was built of cut and hewn stones and not of the ordinary brick adobes. The remains of a carefully constructed aqueduct are still to be seen, and it evinces, from the skillfulness of its workmanship, a higher order of civilization than that possessed by either the Indians or the present race of New Mexicans. It has been rumored that at the abandonment of this town much treasure was buried, and several attempts have been made to recover it, but without success as far as known. Secured by Dr. J. Symington, and presented to Dr. J. T. Rothrock.

1172, 1173. *Crania of Mexicans* removed from near foundation of the old cathedral of Santa Fé, N. Mex. In removing a part of the foundation wall of the old cathedral to make way for that of the new edifice a number of skeletons and crania were exposed, and the two specimens in

question were secured by Prof. E. D. Cope and Dr. H. C. Yarrow. They are supposed to be very old.

1174. *Cranium of Pedro, an Apache Indian.*—This individual was the leader of the massacre at old Camp Grant, Arizona, in the spring of 1874. His head was brought into the San Carlos Agency three or four months after by Indian scouts. Collected by Dr. J. T. Rothrock.

1175. *Cranium, supposed of Ute Indian.*—Found on divide 20 miles south of Colorado Springs, Colo., by Dr. F. F. Gatchell, and by him presented to Dr. H. C. Yarrow.

1176. *Cranium of Apache Indian,* secured at Camp Bowie, Arizona, by Dr. Freeman, and by him presented to Dr. J. T. Rothrock.

1177. *Part of cranium of supposed Ute Indian.*—Collected at Pagosa Springs, Colo., by Mr. C. E. Aiken.

1178. *Cranium of supposed ancient Pueblo Indian,* from a burial-place without the walls of a fortified town, discovered three miles east of the town of Abiquiu, N. Mex., in the valley of the Chama River. See page 362 for description of this town. Collected by Dr. H. C. Yarrow, Prof. E. D. Cope, and R. H. Ainsworth.

1179. *Skeleton,* almost complete, from same locality as last. This specimen is the most interesting of any exhumed, for the reason that it was found *in situ*, face downward, the head to the south. No coffin or surrounding of stones had been used to inclose the body, but just above it were found the remains of funereal urns, in which had been placed charcoal, and the bones of small mammals and birds, showing clearly that food had been prepared for the journey to another land. No ornaments of any kind were found in this grave. It is interesting to note the peculiar flattening of the occiput in this specimen. Collected by the same persons as the preceding specimen.

It is greatly to be regretted that the crania of three other skeletons could not be secured. The bones were found as they were originally placed, but the crania had dropped out from the sides of the arroyas and were probably covered with a *débris* of perhaps 20 feet in thickness. A number of skeletons of very young children were discovered, but in such conditions as to prevent removal.

Measurements of crania noted on the preceding pages, taken at the Army Medical Museum.

Tribe.	Sex.	Museum number.	Capacity.	Length.	Breadth.	Breadth of frontal.	Height.	Index of—				Circumference.	Length of—			Zygomatic diameter.	Facial angle.	Name of collector.	Remarks.	
								Breadth.	Height.	Foramen magnum.	Frontal arch.		Parietal arch.	Occipital arch.	Longitudinal arch.					Frontal.	Parietal.	Occipital.
Pah-Ute.	♂	959	150	122	100	813	864	718	412	290	341	237	367	516	116	135	174	M. S. Severance.	Child; imperfect.	
Do	♂	960	1435	177	153	122	127	804	412	290	341	237	367	516	116	135	174	Francis Klett.	Mummified; hair on.	
Unknown (from Camp Apache).		961																G. K. Gilbert	Imperfect; weather-worn.	
Pah-Ute.	♂	962																M. S. Severance	Bones; none of cranium.	
Do	♂	963	1435	171	145	119	132	848	772	386	295	337	228	356	502	126	130	180	do	Skeleton complete.
Do	♀	964	1185	171	137	109	131	801	766	415	284	309	225	347	494	121	114	175	do	Do.
Unknown (from Provo, Utah).		965	1145	160	138	117	122	862	763	394	283	306	207	324	476	115	122	165	do	Do.
Pah-Ute.	♂	966	1350	180	135	118	133	750	739	383	292	313	235	360	500	117	127	183	H. C. Yarrow	Wah-Ker; Ute chief.
Do	♂	967																do	Boy; imperfect.	
Do	♂	968	1070	164	132	102	114	805	695	439	248	363	292	323	400	106	123	153	do	Child.
Do		969	1450	178	146	118	129	820	725	404	288	320	231	347	513	123	124	189	do	Do.
Do		970	1240	180	135	114	125	750	694	433	283	297	232	353	504	122	129	173	do	Do.
Do		971	1085	170	134	107	127	788	747	406	275	303	223	333	479	117	123	163	do	Do.
Do		972	1150	171	129	108	126	754	737	409	269	299	235	340	482	113	123	166	do	Do.
Do		1016																J. T. Rothrock	Imperfect.	
Do		1017																do	Do.	
Navajo.		1085	1450	180	146	124	135	811	750	411	304	329	229	370	517	133	136	181	H. C. Yarrow	Do.
Do		1086	1560	187	142	120	145	759	775	417	307	333	245	368	521	125	130	182	do	Do.
Do		1087	1230	172	140	115	138	814	802	395	291	325	232	356	492	115	123	180	do	Do.
Do		1088																do	Do.	Imperfect; time-worn.
Apache.		1171	1280	175	137	113	138	783	789	423	300	322	227	361	495	126	130	169	J. T. Rothrock	From Gran Quivira, N. Mex.
Unknown.		1172	1300	176	140	117	133	795	756	455	288	327	240	365	505	120	137	175	H. C. Yarrow and E. D. Cope	From Santa Fe, N. Mex.
Mexican.		1173	1370	181	136	109	143	751	790	420	291	326	262	370	510	126	135	183	do	Do.
Do		1174																J. T. Rothrock	Broken; Arizona.	
Apache.	♂	1175	1565	193	141	123		746										H. C. Yarrow	Imperfect; from Colorado Springs, Colo.	
Ute (supposed).		1176																J. T. Rothrock	Imperfect and time-worn.	
Apache.		1177	169	156	129	136		923	805	462	306	348	235					121	C. E. Aiken	Imperfect; left vertical half wanting.
Ute (supposed).			178																	Imperfect; child.
Pueblo (ancient).		1178	1245	151	138	110		914											H. C. Yarrow, E. D. Cope, and R. H. Ainsworth.	Imperfect; child.
Pueblo.		1179	1380	153	156	128	142	1,020	928	333	316	370	238	338	506	115	130	163	do	Do.

U. S. GEOGRAPHICAL SURVEYS WEST OF THE ONE HUNDREDTH MERIDIAN,
1ST LIEUT. GEO. M. WHEELER, CORPS OF ENGINEERS, U. S. ARMY, IN CHARGE.

APPENDIX.

LINGUISTICS.

PREFACED BY A CLASSIFICATION OF WESTERN INDIAN LANGUAGES.

BY

ALBERT S. GATSCHET.

WASHINGTON, D. C., *April 5, 1878.*

DEAR SIR: Your request that I should arrange the linguistic material gathered by members of your Survey in harmony with the principles of science, and preface it with an introduction appropriate to the subject, gives me the welcome opportunity of presenting to the public the first *comprehensive* classification of the extensive family of Numa or Shoshoni dialects ever attempted, and hence I comply with pleasure. Portions of the linguistic collection which are offered to scientists in your volume are very valuable on account of their novelty. The Pa-Uta branch of Numa, for instance, of which no less than six vocabularies are given below, is a linguistic field new to investigators, and I do not know of any publication in existence treating of these dialects, with the sole exception of the Chemehuevi.

Respectfully submitted.

ALBERT S. GATSCHET.

Lieut. GEO. M. WHEELER,
Corps of Engineers, in charge.

CLASSIFICATION INTO SEVEN LINGUISTIC STOCKS OF WESTERN INDIAN DIALECTS CONTAINED IN FORTY VOCABULARIES.

BY ALBERT S. GATSCHET.

The languages spoken by the Indians of the eastern part of the United States have in more recent times been studied industriously, and partly reduced to writing, but of the languages spoken on the Pacific coast and in the western territories, scarcely more than a superficial knowledge has been attained. The forty vocabularies, with the appendix, given below will therefore form a welcome addition to the linguistic material published previously, and help to elucidate many points that heretofore have remained doubtful. These word-collections were made by various members of the Expedition during six field-seasons (1871 to 1876) from information of trustworthy Indians, in portions of our territory widely separated from each other. About two hundred of the most current terms, comprising the words applied to the parts of the human body, for the degrees of consanguinity, some objects of nature, the adjectives of color, the numerals, the pronouns, and twenty verbs, were taken down with the earnest endeavor to overcome the difficulties of fixing alphabetically even the most unwieldy of the dialects studied.

Not only is the linguist aided by such evidence in establishing phonetic and other grammatic rules for each of the dialects, but quite as important must be considered the help afforded the ethnologist in investigating tribal connections and affinities, and in studying the psychology of Indian life. This latter purpose, however, can be attained only by a close

and rigid comparison of the terms with others throughout all the dialects of the same linguistic stock, which convey to our mind related ideas, or even with terms taken from other stocks; and to reap all the information that can be derived from this source, the etymologic dissection of the terms, according to approved rules of Indian phonetics, is a point which cannot be neglected.

The manual which served as a guide to the collectors of the forty vocabularies was *George Gibbs' "Instructions for Research relative to the Ethnology and Philology of America,"* Washington, 1863. (Smithsonian Miscellaneous Collections, No. 160.) Some of the collectors, especially those of European birth, have also availed themselves conscientiously of Gibbs' scientific alphabet given below (pp. 22-24), while others have used English orthography, being more familiar with it. To render linguistic comparisons easy it certainly would have been preferable, had all used one and the same scientific method of notation; for any subsequent transliteration cannot always be made by others with a perfectly satisfactory result. Persons born on the continent of Europe have some advantage over English-speaking people in initiating themselves into the use of Gibbs' system, or into any other scientific alphabet; for all of these are based upon the value of the letters, as sounded on the continent of Europe, or large portions of it. From this the historical English alphabet deviates much, especially in its vocalic elements.

Where accuracy is sought for, scientific alphabets must be used in writing down foreign unwritten languages, and *each sound* in them must be represented *by one and the same letter only*. We may safely say that in this collection the vocabularies of Dr. Oscar Loew form the nearest approach to a scientific notation of the Indian dialects, the strange utterances and the nasalized vocalization of which often seem uncouth or even barbaric, and are repugnant to the ear trained to European speech only. Study and experience can teach the correct use of any scientific alphabet; but there is another quality required of the successful Indian word-collector, viz. "*a good Indian ear*"; this necessary adjunct is certainly more the gift of nature than of studious concentration of the mind, for it is, in fact,

a well-developed natural faculty for the apperception of sounds of a specific character.

DIVISION INTO LINGUISTIC STOCKS.

The former unsatisfactory state of western linguistic topography has of late been remedied effectually by an abundance of new and reliable data, and therefore, availing myself of the labors of the most diligent of my predecessors in this vast field, I am enabled to present the following classification :

LIST OF TRIBES AND THEIR DIALECTS.

Tribe and dialect.	Location.	Date.	Collector.
1. Arivaipa	Camp Grant, Arizona	December, 1871	G. K. Gilbert.
2. Arivaipa	Arizona	September, 1873	Dr. O. Loew.
3. Návaajo	New Mexico	June, 1873.	Do.
4. Jicarilla	Tierra Amarilla, N. Mex	September, 1874	Dr. H. C. Yarrow.
5. Shoshoni	Utah and Nevada.....	August, 1872.....	Do. [W. Loring.
6. Shoshoni	Hyko, Nev.....	Summer of 1871	E. M. Richardson and Fred.
7. Pa-Uta	Las Vegas, Nev.....	September, 1871.....	Theo. V. Brown.
8. Pa-Uta	do	do	Francis Klett.
9. Pa-Uta	do	1871.....	Dr. W. J. Hoffman.
10. Pa-Vant	Utah.....	November, 1872.....	Dr. H. C. Yarrow.
11. Southern Pa-Uta	California and Nevada.....	September, 1875	Dr. O. Loew.
12. Pa-Uta of California.....	do	do	Do.
13. Chemehuevi	do	do	Do.
14. Uta.....	Utah	September, 1872.....	M. S. Severance.
15. Capote Uta.....	Tierra Amarilla.....	September, 1874	Dr. H. C. Yarrow.
16. Uinta Uta.....	Utah.....	December, 1874	Do.
17. Moqui Pueblo	Arizona.....	July, 1873.....	Dr. O. Loew.
18. Takhtam	Southern California.....	June, 1875.....	Do.
19. Kaurúya	do	do	Do.
20. Gaitchim (of San Juan Capistrano).....	do	do	Do.
21. Tobikhar (of San Gabriel)	California.....	do	Do.
22. Kechi (of San Luis Rey).....	do	April, 1876	Lieut. Eric Bergland.
23. Mohave	Arizona.....	September, 1871.....	E. M. Richardson.
24. Mohave	Arizona and California.....	August, 1875.....	Dr. O. Loew.
25. Hualapai	do	do	Do.
26. Hualapai	Arizona.....	October, 1872.....	M. S. Severance.
27. Tonto or Gehun	do	September, 1873.....	Dr. O. Loew.
28. Diegueño	California and Arizona.....	August, 1875.....	Do.
29. Yuma or Katchán	Fort Yuma, Ariz.....	March, 1876.....	Lieut. Eric Bergland.
30. Isleta Pueblo	New Mexico.....	1873.....	Dr. O. Loew.
31. Tehua on Moqui Mesa.....	Arizona.....	July, 1873.....	Do.
32. Tehua, Los Luceros Pueblo.....	New Mexico.....	August, 1874	Dr. H. C. Yarrow.
33. Tehua, San Juan Pueblo.....	do	July, 1873.....	Dr. O. Loew.
34. Taos Pueblo.....	do	August, 1874	Dr. H. C. Yarrow.
35. Jemez or Vallatoa Pueblo.....	do	June, 1873	Dr. O. Loew.
36. Acoma Pueblo.....	do	November, 1873	Francis Klett.
37. Acoma and Lagana Pueblo	do	September, 1874	Dr. O. Loew.
38. Silla Pueblo	do	do	Do.
39. Wintán	Colorado (original home Northern California).	August, 1874.....	Do.
40. Kasuá at Santa Barbara	California	June, 1875	Do.

The forty vocabularies printed in this volume *belong to seven linguistic stocks*, and subdivide themselves as follows :

- I. *Tinné stock* : four vocabularies, Nos. 1-4.
- II. *Numa stock* : eighteen vocabularies, Nos. 5-22.
- III. *Yuma stock* : seven vocabularies, Nos. 23-29.
- IV. *Stock of Rio Grande Pueblos* : six vocabularies, Nos. 30-35.
- V. *Stock of Kera Pueblos* : three vocabularies, Nos. 36-38.
- VI. *Wintún stock* : one vocabulary, No. 39.
- VII. *Santa Barbara stock* : one vocabulary, No. 40.

AREAS AND DIALECTS OF THE SEVEN LINGUISTIC STOCKS.

THE TINNÉ STOCK.

The Tinné family of languages, or as it was formerly called, the Athapaskan, extends over one of the widest areas known to belong to any of the American stocks. The hunting occupation and erratic habits of the Tinné tribes confined them to inland countries, and nowhere do we see them touch the sea coast, except at the outlet of Atna or Copper River and around Cook's Inlet, Alaska. The ancient and principal habitat of the Tinné race, which we may call a truly northern race, was the western part of British America and Alaska's interior. The tribes found to reside or rove within the boundaries of the United States or Mexico must have detached themselves, in prehistoric epochs, from the main stock inhabiting the ridges of the Rocky Mountains north or south of the Polar Circle, and the endless rolling plains north of Saskátchewan River. We cannot here undertake to enumerate all the northern Tinné tribes, nor those which have migrated to the Pacific coast between Puget Sound and Mad River in Northern California, but we subjoin a list of the more important Tinné tribes now wandering through or settled in the south, as having special reference to the vocabularies given below.

This southern branch of the Tinné race detached itself in early ages from the Chipewayans or from such other tribe in their vicinity, to which

the dialectic affinities of both may direct us after a close investigation. They followed the buffalo herds along the eastern base of the Rocky Mountain ridge to the Pecos River; and then took possession of the arid regions along the Upper and Lower Rio Grande and the Gila River. Before the Apaches were brought on Indian reservations, they mainly subsisted by hunting and raiding, and through their rapacity have always been the scourge and terror of the Texan, Pueblo, Yuma, Pima, Ópata and Mexican Indians, of the Spanish colonists settled in Mexico and on its northern borders. Of all their tribes, the Lipans have reached the southernmost points in their predatory excursions, and are now roving along the Rio Grande; the Mescaleros and Chiricahuas have caused the most trouble to the United States troops, while the warlike, self-reliant Návajos, numerically the strongest tribe among the southern Tinné, have acknowledged the authority of the American Government only after long-contested struggles. The southern Tinné tribes are all comprehended under the general denomination of *Apaches*, a Yuma term meaning “*men*”.

Three of the northern or British Tinné dialects have of late been elaborately studied and made public by the Rev. E. Petitot. But of the Western and Southern Tinné we do not yet possess anything besides long lists of disconnected words and a limited amount of grammatic data contained in H. H. Bancroft, “Native Races,” III, part 2. All Tinné dialects have a profusion of laryngeal and guttural sounds, some of difficult utterance; phonetic rules exercise important functions in the southern as well as in the northern dialects. The noun undergoes a few inflectional variations only, but the conjugation of the verb is exceedingly rich in forms. The negative particle *to* or *to . . . ta* (“not”), in its doubled form, will be noticed in a few compound words of the Apache vocabularies.

The principal Apache tribes are as follows:

Arivaipa, settled with the Piñal Apaches on San Carlos Agency, Arizona. The population of both tribes is stated, in the Report of the Indian Commissioner of 1877, to be 946. Their dialect was studied by Messrs. G. K. Gilbert and O. Loew.

Coyotero, settled with the Chillon Apaches on San Carlos Agency, and counting, in 1877, 1,560.

Chiricahua, on same agency, and with the Cochise Apaches numbering, in 1877, 285.

Mescalero, on Mescalero-Apache Agency, in New Mexico, west of the Rio Grande; in 1877, 1,400.

Lipan, real numbers unknown, because roving; a few have been gathered with Tónkawa Indians on a reservation near Fort Griffin, Shackelford County, Texas.

Návajo, on a very spacious reserve in Northwestern New Mexico and Northeastern Arizona, on the Cañon de Chelle and other streams; in 1877, 11,868 Indians and 26 mixed-bloods.

Jicarilla, in 1877, 326, on Abiquiú Agency; 442 on Pueblo, formerly Cimarron Agency, in northern part of New Mexico. Their dialect has been investigated by Dr. H. C. Yarrow.

THE NUMA STOCK.

For the first time a *considerable* number of Shoshoni dialects is here presented to the student of linguistic science. Equally useful for rapid reference and ready comparison, this comprehensive table of eighteen vocabularies will be of interest to the lexicographer as well as to the investigator of the phonetic laws of these dialects.

Instead of *Shoshoni*, the term *Numa* has recently been suggested as a comprehensive designation for the whole race and its language. In its several dialectic forms it means "*people*," "*men*," and is found in most of our vocabularies under "*man*," "*Indian*," and "*people*;" scientists will therefore scarcely hesitate to approve its choice.

The Numa race of aborigines is an inland race extending over a large portion of the great interior Basin from Middle Idaho southward to the Colorado, the Colorado Chiquito, and the Rio San Juan; one of its subdivisions, the Comanche tribe, has overrun the vast plains extending between the Arkansas and the Rio Grande, while another branch has in early days occupied portions of Eastern and Southern California. This is the only Numa offshoot which, as far as we know, has settled on the shore of the Pacific Ocean.

The interest taken in this great inland race is increased in a peculiar manner by its linguistic connection with the Nahuatl languages of the Mexican States. The Nahuatl race includes not only the various tribes of the Aztecs and of the historical Toltecs, but also the cognate mountain

tribes to the north—Tepeguanas and Tarahumaras, Coras and Cahitas; further on the Yaquis, Ópatas, and Eudeves, and the southern neighbors of the Yuma race: the Pápagos and Pimas in the Pimería alta, of which the southernmost part of Arizona forms a part, the Sobaipuris, and the Pimas in the Pimería bája, forming a portion of the Mexican State of Sonora. Numerous discrepancies between the Numa tongues as the northern, and the Nahuatl as the southern portion of the stock tend to obscure their common origin, so that their affinity becomes apparent only after a close investigation of the subject. The coincidence of a number of radicals which cannot be simply borrowed, joined to that of grammatic affixes or formative syllables and to the remarkably vocalic character of all dialects in both sections, removes the doubts concerning a common parentage, though they are now separated from each other by a wide belt of territory, inhabited by the Yuma, Tinné-Apache and Pueblo races. From all that it would be, nevertheless, preposterous to conclude that the Aztec civilization came from the north; but we gain the evidence that the originators of the national Aztec legend, which professes this people to have issued from seven caves in the north, were cognizant of the affinity of their nation with some tribes living north of Anahuac.

As far as known, all Numa dialects (though not the Nahuatl) possess a plural in the verb, the substantive, adjective and pronoun. They prefer the deep vowels a, o, u to the clear-sounding e and i; softening into ä, ü, and nasalizing of vowels is not unfrequent, and the phonetic structure of these languages is, without exception, as sonorous and vocalic as that of many Nahuatl languages. None of the dialects seem to incorporate the subject- or object-pronoun into the verb, as it is done in Aztec.

As the result of information gathered of late from various sources I present the following classification of this most important of our *western* linguistic families:

A. SHOSHONI.—This appellation is most generally applied to the north-eastern group of the Numa race, residing in Northern Utah, some parts of Wyoming, along the Snake River of Idaho, and in Eastern Nevada. This group comprises the following subdivisions:

Washaiki, on Wind River, ranging towards Green River, Wyoming.

Hokan-tikara, or Diggers, on Salt Lake, Utah.

Tussáwehe, or "White Knives," chiefly residing in Eastern Nevada
Paviótso, or "Athlets," in Western Nevada (on Pyramid Lake Reservation), partly called Payutes.

Bannock, or Panaíti, now mostly located on reservations in Southern Idaho.

Gósiats, commonly called Goshi-Utes, Goshoots, from Salt Lake to Eastern Nevada.

Tuka-ríka, "Mountain-sheep-Eaters," or Salmon River Snakes, Idaho.

B. SNAKE.—The designation *Snake Indians* applies to their former settlements on Snake River of Idaho; it is confined now to the northwestern group of the Numa race, ranging between Snake River and the Cascade Range of Oregon, and comprises also most of the Indians of Numa origin settled on Malheur and Klamath Agency, Oregon.

Wihinast, a term used by Horatio Hale to designate the Western Shoshonis or Snake Indians of Owyhee River and west of it; this name has now become obsolete.

Walpápi and Yahúskin, formerly hunting in southern and eastern parts of Oregon; since 1864 they were partially settled on Klamath Reservation, around Sprague River.

To make a more detailed classification of groups A and B possible more information must be obtained regarding their tribes and tribal subdivisions.

C. PA-UTA.—The section of country from which the Pa-Uta (Payute, Pa-Yutah) have spread into several adjacent countries is Central and Southern Nevada. The singular form of this name is Paiuta-at, meaning *a Payute man*. It is their custom to live in small bands, and the most populous of these in Nevada are the following:

Pa-Uta, on Moápa Reservation, on Muddy River.

Parániguts, or Paránagats, in Parániguts Valley; 171 souls in 1873.

Tsauwárits, in Meadow Valley.

Nuáguntits, in Las Vegas Valley; 161 in 1873. This subdialect was investigated by Messrs. Francis Klett, Theo. V. Brown, and Dr. W. J. Hoffman.

Mowíats, on Cottonwood Island, in Colorado River.

Chemehuevi, or, as they call themselves, Täntawats, mainly on Cottonwood Island. Vocabulary by Oscar Loew.

The Pa-Uta of Arizona are settled on Shivwits Plateau, in the Uínka-rets Mountains, and numbered 284 souls in 1873.

The Pa-Uta of Utah Territory consisted, in 1873, of 528 Indians, divided into eight tribes, among which that of the Kaívawits is the most populous.

The Pa-Uta (Pyedes, Piutes) of Oregon were partly settled on the Malheur River Agency; the Report of 1876 gives 462 Indians.

D. PA-UTA OF CALIFORNIA.—The Californian Pa-Uta hold the longitudinal valleys of the Sierra Nevada in Mono and Inyo Counties. Their language differs considerably from the Pa-Uta of Nevada, and, in fact, from those of all other Numa tribes, and if a suitable *national* name were found to exist, they should be distinguished by it from the other Pa-Uta. The languages of the Panamint and Ké-at Indians have not yet been investigated, and hence they are excluded from the subsequent enumeration:

Pa-Uta of Bernardino County.

Pa-Uta of Owens River Valley, comprising also the majority of the Mono County and the Kozábi Pa-Uta.

Pa-Uta of the part of Mono County, west of Owens River, between $36^{\circ} 40'$ and $37^{\circ} 40'$. They call themselves Nut'has.

Pallegawonáp, east and southeast of Tulare Lake, on southern spurs of the Sierra Nevada, which they have conquered from the Yókuts Indians in the valley.

Tillie and P'hallatillie, in southwestern portions of Kern County.

E. UTA.—Tribes of the Uta reside in Eastern Utah, Western Colorado, and in Northern New Mexico. The valleys drained by Green and Grand Rivers, affluents of the Colorado, most probably formed the ancient habitat of the race. Exclusive of the nomadic Uta, the Report of the Indian Commissioner for 1877 gives 2,900 Uta Indians for Colorado, 1,207 for New Mexico, and 773 for Utah; 134 Pa-Vants were not under an agent. The singular form of the name is Utáwat; the plural form, Utawátsu. The Uta dialects do not differ very considerably among themselves, and Mr. Edwin A. Barber, who has given comparative tables, states that the Weminuche, Capote-Uta, and the Muache speak one and the same dialect.

Some of the principal tribes are:

Pa-Vant, in Corn Creek, near Fillmore, Utah.

Uinta, on Uinta Valley Reserve; 650 in 1876.

Weber Uta, northeast of Salt Lake.

Yámpa, on Bear or Yámpa River. Their full name is Yámpa-tíkara, or "root-eaters"; they associate with the Grand River (or Middle Park) tribe.

Weminuche or Wiminú-ints, on Los Pinos division of the Confederated Uta Reserve and north of Tierra Amarilla.

Muache, on Los Pinos Agency.

Tabewache, on Los Pinos Agency.

Capote, in southeast angle of Utah Territory, on Confederated Uta Reserve and on Tierra Amarilla (Abiquiú Reservation), New Mexico. This dialect was studied by Dr. H. C. Yarrow.

Tash-Uta, in Arizona, north of the Moqui mesas.

F. MOQUI.—The Moqui Indians, or, as they call themselves, Shínumo, inhabit six pueblos or villages located on the top of four high, steep mesas in Arizona, north of the Colorado Chiquito. They selected these bluffs to be their natural bulwarks against the raiding Apaches, Návajos—perhaps, also the Comanches—and they cultivate the few patches of agricultural land situated below the precipitous cliffs. The Moqui language is certainly Numa, but seems to contain many archaic words and forms not encountered in the other dialects; and many vocables of its own. One of the Moqui towns, the seventh in order, called Háno or Hánoki, speaks Tehua; the inhabitants came from the Rio Grande. *Moqui* is an opprobrious nickname taken from their own language, originally referring to one of the towns only (*móki*: dead, stinking). Shinumo, hópi Shínumo, Shē-noma, or "towns-people," is the name they give to themselves, answering somewhat to the Iroquois term ónkwe hónwe, "real men, true men". In Pacific Railroad Reports, Vol. III, part 2, page 13, the Moqui and Zuñi names of the seven towns are given. Population, according to Report of 1874, 1,409; of 1877, 1,339.

G. KAUVUYA.—The various Kaurúya tribes of California are settled in a few portions of the counties of San Bernardino, San Diego, and Los Angeles. Their dialects differ considerably from the inland Numa dialects, and no less among themselves, as far as the coast tribes or "Playanos" are concerned. The term *Kaurúya* is the orthography adopted by Oscar

Loew for the name of one of the "Serrano" or mountain tribes. This group subdivides itself into:

Kauvúya, on the oases in Cahuillo Valley, at the Gorgonio Pass, at Temecula, and in the Jacinto Mountains; written also Cahuillo and (incorrectly) Coahuila.

Takhtam or *men*—called Serranos or *mountain Indians* by the white population—in the vicinity of San Bernardino, Colton, and Riverside; dialect almost identical with Kauvúya.

Dialect of San Luis Rey (de Francia) Mission, founded in 1798; formerly called Kechi dialect. Vocabulary taken by Lieut. Eric Bergland.

Dialect of San Juan Capistrano Mission, founded in 1776, formerly called Netéla dialect; Oscar Loew calls it Gaitchim (*houses*). The Juaneño Indians inhabit six or eight villages in the interior.

Dialect of San Gabriel Mission, founded in 1771. Called Kizh dialect with that of San Fernando Mission by former investigators; O. Loew calls the tribe of San Gabriel: Tobikhar.

Dialect of San Fernando (Rey de España) Mission, founded in 1797. Said to be closely related to the San Gabriel dialect.

H. COMANCHE.—A division of the Numa race wandering in company with Kiowas and Apaches through Northern Texas and on both sides of the Rio Grande. After many bloody contests with whites of Spanish and Anglo-Saxon descent, portions of them have recently surrendered to the authority of the United States, and have been settled on the Kiowa and Comanche Agency, Indian Territory, where, in 1877, they numbered 1,545. The ancient range of this tribe of equestrians extended from Nebraska and Northern New Mexico to Durango and Zacatecas (22° Lat.), in Mexico, and of about twelve subdivisions the national names have been transmitted. Their language is closely related to that of the Shoshoni of Wyoming, Idaho, &c., and *kómass* means *estranged, severed off, separated*; two facts which indicate a comparatively recent secession from some Numa tribe further north. They call themselves *Némue, the living ones, the people*.

THE YUMA STOCK.

The dialects which in their totality form the Yuma language extend not only over the valley of the Lower Colorado, the western and interior

sections of Arizona, and over Southern California, but are spoken also in the larger portion of the Californian Peninsula, and most probably through the whole of it. The Cochimí vocabularies of Dr. William M. Gabb and Mr. Robinia, of Guaymas, forming part of the Smithsonian collection of linguistic material, furnish satisfactory proof that Yuma dialects are in use in the Peninsula as far south as the 26th degree of latitude.

The seven Yuma vocabularies presented in this volume do not, however, go beyond the latitude of the mouth of Colorado River. Readers will soon perceive, in glancing over them, that in the eastern dialects the vocalic element prevails largely, while it diminishes when going westward. Diegueño (and Cochimí) have indeed elided their vowels to some extent, and thus rendered their speech consonantic; clusters of consonants are gathering chiefly in the final syllables. The Yuma dialects inflect the noun by means of cases and postpositions, and the verb possesses a so-called *plural* form.

The term Yuma adopted for designating this linguistic stock was taken from the Yuma or Kutchán tribe living at the junction of Colorado and Gila Rivers, around Fort Yuma. The term Apache is frequently used in designating some Yuma tribes, as Mohave-Apaches, Tonto-Apaches, Yuma-Apaches, and the Kutchán Indians call the Yávipai and Tonto: Apahuatche or "*fighting, warlike men*". Apache means *man, Indian*, and is composed of ipa, epa, *man*, and a suffix -tch appended to substantives in the Colorado River dialects of the Yuma stock. This word becomes Ap-ahwa-tche through the incorporation of the term ahwa, ahua, *war, warfare*; thus the compound word Apahuatche distinguishes the bellicose, indomitable tribes of the sierras from Apache as the more peaceable and numerous Indian populations of the Arizonian valleys. Both terms are correctly applied to tribes of the Yuma as well as of any other race; but to avoid the utmost confusion in ethnologic, linguistic, and historic publications, we must confine the terms Apache and Apahuatche either to Tinné tribes, as is generally done, or drop them altogether.

A list of the dialects of the Yuma stock follows, to which are added various historical spellings of the tribal names and the *earlier* habitat of the Yuma tribes, before they were settled on reservations. The ending -pai, -pa, occurring in most Yuma tribal names, means "*people*."

Yávi-pai (Yám-pai, Yábi-pai) west and northwest of the Aztec Mountains, west of Prescott, Arizona.

Kónino (Cosino, Cochniemo), a tribe inhabiting Cataract Creek, a southern affluent of Colorado River, and calling themselves Avēsú-pai, "*people down below*." A locality called Kónino Caves lies in the Tonto Basin.

Tonto (Locos, Kó-un, Gohun) in the valleys of the Rio Salado and Rio Verde, northern affluents of the Gila River. They call themselves Tolke-páya, Kó-un.

Marico-pa (Coco-marico-pa), an agricultural tribe, the friends and allies of the Northern Pimas (Pimas altos), with whom they have inhabited the Middle Gila River for centuries.

Huála-pai (Wálla-pai, Hawal-co) from Lower Colorado River to eastern end of Black Mountains and to the Cerbat and Aquarius Mountains. Associated with Chemehuevis. Their dialect has been investigated by M. S. Severance and O. Loew.

Mohave (Hamukh-hábi; Spanish, Mojáve, Amuchába), the most populous Yuma tribe; in portions of California desert and on both sides of Lower Colorado, between Kutchán and Huala-pai. Studied by E. M. Richardson and O. Loew.

Kutchán (Yuma, Yuma-Cuchán; Spanish, Cutgánes), a populous tribe living in a wide circuit around Fort Yuma. Studied, in 1876, by Lieut. Eric Bergland.

Cocó-pa (Cucá-pa) on mouth of Colorado River. Distinction has to be made between the River Coco-pa and the savage Mountain Coco-pa.

Comoyei (Spanish: Quemeya, Comeya), including all Yuma dialects spoken in the arid country between the Lower Colorado and the Pacific Ocean, between 32° and 34° latitude. They are the Diegueño around the roadstead of San Diego, the Comoyei in the country east of it, the Comoyei near San Tomas Mission (Hta-ä'm, San Tomaseño, Kíliwi), and other dialects and subdialects.

Cochimí, occupying northern and middle part of the Californian peninsula.

STOCK OF RIO GRANDE PUEBLOS.

The languages spoken by the Pueblo Indians of New Mexico (for Moqui Pueblos of Arizona, see *Numa Stock*) have to be classified into three

linguistic families: Zuñi, Kera, and Rio Grande. The Rio Grande Pueblo languages cover an area somewhat larger than that of the Quéres or Kera Pueblos, and offer many characteristic peculiarities not found to occur elsewhere. A leaning towards the Numa dialects is perceptible in many instances, though more in the lexicon than in the grammatic elements.

The most remarkable characteristics of these dialects, which have prompted me to separate them from all surrounding ones, and to unite them into *one* linguistic family, are as follows :

1. They agree most generally in their radicals in the following important terms: head (*pe*), hair, face and eye (*tché*), bone (*ko, go*, also occurring in forehead, arm), tooth, beard, neck (*kauwa*, of Numa origin), hand, finger and nails (*ma*), chest (*po, pî*), foot and toes (*en, un*). The majority of the dialects also agree in the terms for man, woman, sun, water (*pa*, of Numa origin), fire, wind, knife, hatchet.

2. All show a tendency towards monosyllabism ; this tendency is even perceptible in the Tâos dialect.

3. The numerals from *one* to *ten* agree generally, but *one, two, three*, and *four* more than the other numerals. Jemez shows the most discrepancy.

4. In corresponding words of the *different* dialects the consonants, especially the mutes, undergo a sort of mutual alternation, or "sound-shunting" process.

5. *Na* is demonstrative pronoun, personal and possessive pronoun of first person, and, when connected with nouns, the definite article. In Taos *-ná* seems to be a postpositive definite article.

6. Final *-i* is found in most adjectives designating colors.

7. Some dialects use a strongly emphasized final syllable, *-dā'*, *-odā'*, in nouns designating relationship, animals, and phenomena of nature. It is found suffixed to such terms, as suggest the idea of locomotion or change.

8. Syllables and words usually end in vowels.

Oscar Loew subdivides the stock into four groups of subdialects, to which I have added Piro as the fifth.

I. Taño, comprising Sandía above Albuquerque, Isleta below Albuquerque, and Isleta in Texas, near El Paso.

II. Taos, comprising Picuri and Taos ; in Indian, Tákhe. Investigated by Dr. H. C. Yarrow.

III. Tehua (Tegua, Téwa), “houses”, comprising the pueblos San Ildefonso, Los Luceros near Plaza del Alcalde, San Juan, Santa Clara, Pojoaque, Nambé, Tesuque, and the Tehua town on one of the Moqui mesas.

IV. Jemez, comprising Jemez (or Gemez, Hemez, Vallatoa) and Pecos Pueblos on Jemez River. O. Loew derives Vallatoa, which is the national name of these Indians, from an ancient Spanish settlement in New Mexico called Valladolid.

V. Piro, of Sinecú, in Mexico, in the State of Chihuahua, near El Paso, and on the border of Rio Grande ($31^{\circ} 40'$); obtained by Mr. J. R. Bartlett. The dialect given is not more closely connected with Tehua than with Jemez, Taño, or Taos, but remotely with all. It shows that this stock has extended far down south, along the Rio Grande, and may possibly be traced further into the interior of the Mexican States. The majority of the words—even some verbs—end in the accentuated *-é*, which is evidently either a declarative particle or a demonstrative pronoun.

STOCK OF KERA PUEBLOS.

The Indians speaking Quéra or Kera dialects are settled on a tract on the Upper Rio Grande, where they hold both shores of the river, and on its western tributaries: the Rio Jemez and the Rio San Juan in its middle course. The dialects known to us do not differ considerably among themselves, and hence should be appropriately termed *subdialects*. A few words are held in common with Tehua, while others agree with terms in the Zuñi, Tinné, and Numa languages. The sounds l, th, b, d, f do not occur in O. Loew's collections, and r is rarely met with. But the structure of the words shows a greater capacity for consonants than the Rio Grande stock, and only one-half of the words end in vowels. The system of numeration is in both families based on the number ten. Many of the adjectives given terminate in *-atse*, a term corresponding to our adverb “very”.

A historical sketch of the Kera population (and of the other pueblos) in New Mexico was published by Oscar Loew in *Petermann's Mittheilungen*, 1876, pages 209–216, accompanied by an ethnographic map. Loew divides the stock into a northeastern and a southwestern portion. The former is by him called—

Quéres: it crosses the Rio Grande at San Domingo, a town formerly called Ge-e-wē (Simpson); the other pueblos on the western side of the river being Santa Ana, formerly Tomíya; Silla (Cía), in Indian: Tséa; San Felipe, anciently Kalistcha; and Cochití.

Sitsimé or Kawaíko is the name by which the inhabitants of the southwestern pueblos call themselves, viz. those of Moguino, Povuate, Hasatch, Laguna, and Acoma. Acoma is the "rock pueblo," the Acuco of the Spanish invaders in 1540-1543. Vocabulary No. 36 was taken at Acoma by Mr. Francis Klett, while O. Loew collected No. 37 at Laguna, collating it afterwards with Acoma.

THE WINTÚN STOCK.

The Wintún race of Northern California was not visited in its own domain by any party of the Expedition; one of the members, while passing through the south of Colorado, happened to find a colony of Wintún settlers at Huerfano Park, and, seizing the opportunity, took down some 220 words of their vernacular.

The Wintún and their congeners, the Patwín (both terms mean *men*), hold the western part of Sacramento Valley from the river to the Coast Range, and from Suisun Bay to Shasta City; northwards from there they extend over both sides of the Sacramento up to Mount Shasta, the Lower Pit River Valley, and Upper Trinity River, and are also found on Feather River. Of this extensive area the Patwín form the southern, the Wintún the northern division according to Stephen Powers, to whom we are indebted for the first thorough ethnologic investigation of the Central Californian Indians. Powers gives about twenty-five names of bands and tribal subdivisions of the race, and supposes the Daúpum Wintún or "Valley Indians" on Cottonwood Creek to form the nucleus of the northern division (Overland Monthly, June, 1874, pages 530-540.)

The words of O. Loew's vocabulary, when compared with the other Wintún dialects, show most affinity with those of Teháma and Trinity River, and hence we may safely conclude that the colonists seen by him had come from the northwestern abodes of the Wintún race. The language is sonorous, not unpleasant to the ear, lacking d, f, and th, but showing instead a

few sounds of difficult utterance. The plural is formed by the suffix *-t*, preceded by the reduplicated vowel of the radical syllable; this points to a law of vocalic harmonization observed also in other Central Californian languages and not unlike the one observed in the Dravidian and Uralo-Altaic language-families of Asia.

THE SANTA BARBARA STOCK.

In want of a national historic name applicable to all the tribes that speak these dialects, I have used the above as a momentary help. The uncertainty in which we are concerning the geographic area and the subdivisions of this stock renders the publication of O. Loew's vocabulary in its present form doubly desirable, for none of the materials published heretofore could be fully relied on by competent investigators. The phonetic habitus of the language is rather consonantic, and most words end in consonants; the distributive plural in the verb and in the substantive is formed by duplication of the first syllable.

In the Annual Report of 1876, Appendix H 16, I have given my reasons for believing that San Antonio (Telamé) and San Luis Obispo may possibly belong to this same family, for out of fifty or sixty words known, about fourteen were found to agree with corresponding terms of Kasuá, Santa Barbara, and Santa Cruz Island.

As far as known the dialects are as follows:

La Purísima, spoken around the Mission La Purísima Concepcion de la Virgen, on Sa Inez River, founded in 1787.

Santa Inez, spoken by the Alahulapas around Santa Inez Mission, which was founded in 1804.

Santa Barbara, the dialect of the Silpalils, Aswalthatans, &c., along the coast and around Santa Barbara Mission, founded in 1786 by the Padre Palou.

Kasuá, the dialect of Indians living at Kasuá or Cieneguita (*"little marsh"*), three miles north of Santa Barbara Mission.

Mugu, spoken at Point Mugu, on the outlet of Canada Creek, Lat. 34° 8'.

Santa Cruz Island, an isle once inhabited by Indians related to those of the adjoining mainland. It is probable that dialects of the same family were formerly spoken in the whole northwestern part of the archipelago, though we have no historical evidence to that effect.

REMARKS ON THE MISSION INDIANS OF CALIFORNIA.

After the abolition of the order of the Jesuit Fathers, in 1767, the missions established by them in the Peninsula of California were abandoned, and the order of Franciscans entrusted with the conversion of the natives in Alta California, or what is now the State of California. From that epoch down to 1833, the year of their secularization, twenty-six missions were established by the Franciscans on the coast of Southern California, or at a short distance inland. By persuasion and by military force they prevailed upon the Indians of the vicinity and the interior to settle around the mission buildings, and in concert with their families to work on certain days of the week for their spiritual advisers. Some of the missions reached a high degree of power, wealth, and influence, and the most flourishing of them all was that of San Juan Capistrano.

To render their christianizing efforts more efficacious, many of the Fathers acquired the language of their numerous Indian converts, and to some of them we are indebted for the preservation in writing of dialects which seem to have disappeared since. They gathered Indians from many districts of the interior; herewith the ancient distribution of the languages became disturbed and changes in the extent of their areas were produced. We know that a Yuma dialect, probably the Comoyei, was once heard at San Luis Rey and further to the north; that the whole aboriginal population has now disappeared from Santa Cruz Island; that Tatché Indians of the Yókuts stock lived around San Antonio Mission; that Nopthrinthres Indians, also of Yókuts origin, were settled at San Juan Bautista, among the Mutsun tribes; that the San Luis Obispo vocabulary is largely mixed with Mutsun words, and that the lexicon of the Mutsun tribes on the northern shore of San Francisco and Suisun Bays became to some extent mixed with elements from the languages of the neighboring Indians.

But though at the present time the reduced Indian population of these tracts shows a mixture of languages and indistinctly traceable linguistic areas, many other tribes have remained in their old homes and retained their paternal dialects. This can be said of the Diegueños, of most Indians of the Kauvúya branch of Numa, and of the natives at Kasuá; and though the ancient order of linguistic distribution has been disturbed, the diction-

aries composed by some industrious Padres are of great assistance to us in establishing the outlines of the areas as they existed at the beginning of the nineteenth century. They give us five linguistic areas in which missions were established, or four if we consider the San Antonio to form one stock with the Santa Barbara. Going from south to north these are as follows:

Yuma, with a mission near San Diego (and one among the Maricopas in Arizona).

Numa, with several missions mentioned above, under Kauvúya.

Santa Barbara, with the missions of Santa Barbara, Santa Inez, &c.

San Antonio, with San Antonio, San Miguel, and San Luis Obispo Missions.

Mutsun, extending from the vicinity of San Antonio to San Rafael Mission, north of San Francisco Bay.

CONCLUDING REMARKS.

Having discussed the phonetic and other grammatic features of most of the languages spoken of in your Annual Reports of 1875, pages 180-187, and of 1876, pages 330-343, students of the forty vocabularies will have to refer constantly to them, and, in fact, these "Analytic Reports" form an essential and integral part of this present Introduction.

The linguistic material of this volume is *a faithful reproduction of the orthography of the original vocabularies.*

To enable the investigator to comprehend fully the mode of pronunciation in O. Loew's vocabularies, I subjoin the scientific alphabet of Gibbs, recommended by the Smithsonian Institution, and followed by O. Loew in all but a few particulars. The few additions and changes made by him he describes in the following remarks:

"For nasal vowels I have substituted for n superior (aⁿ) the more conspicuous circumflex (ā, ū), and the dumb nasalized sound between o and u I have expressed by ū̄. tch was preferred to ch; ny to the Spanish letter ñ. The rh is the vocalic r occurring in Sanscrit,* and zz is s pronounced with a buzzing sound. An apostrophe within or after a word indicates arrested sound or sudden stoppage of the voice; p'a, *water*; ko', *bone*."

* This is a slight mistake. By the digraph *rh* O. Loew sought to express the uvular *r*, and not the vocalic *r* of Sanscrit, which sounds almost like *r* in *bittern*, *slatternly*.

G. GIBBS' ORTHOGRAPHY.*

VOWELS.

- a as long in *father*, and short in German *hat* (nearly as in English *what*).
- e as long in *they* ("long a" in *face*), short in *met*.
- i as long in *marine*, short in *pin*.
- o as long in *go*, short in *home*, *whole* (as generally pronounced in the Northern States).
- u as long in *rule* (*oo* in *fool*), short in *full* (*oo* in *good*). *u* as in *union*, *pure*, &c., to be written *yu*.
- â as in *all* (*aw*, *au* in *bawl*, *taught*).
- â as in *fat*.
- û as in *but* (*o* in *love*, *oo* in *blood*).
- ai as in *aisle* ("long i" in *pine*).
- au as *ow* in *now*, *ou* in *loud*.

The distinction of long and short vowels to be noted, as far as possible, by the division into syllables, joining a following consonant to a short vowel, and leaving the vowel open if long. Where this is insufficient, or where greater distinctness is desirable, a horizontal mark above, to indicate a long vowel, a curved mark a short one, thus: \bar{a} , \check{a} , \bar{e} , \check{e} , &c. A nasal syllable, like those found so commonly in French, to be marked by an index, *n*, at the upper right-hand corner of the vowel; thus o^n , \check{a}^n , a^n , u^n , will represent the sounds of the French *on*, *an* or *en*, *in*, and *un*, respectively.

CONSONANTS.

- b as in English *blab*.
- c not to be used excepting in the compound *ch*; write *k* for the hard sound, *s* for the soft.
- d as in English *did*.
- f as in English *five*.
- g as in English *gig*, never for the soft sound, as in *ginger*; for this use always *j*.
- h as in English *how*, *hoe*, *handle*.

* Instructions for Research Relative to the Ethnology and Philology of America, by George Gibbs; Smithsonian Miscellaneous Collections, No. 160 (1863), pp. 18, 19.

- j as in English *judge*.
 k as in English *kick*.
 l as in English *lull*.
 m as in English *mimic*.
 n as in English *noon*.
 p as in English *pipe*.
 q not to be used: for *qu* write *kw*
 r as in English *rear*.
 s as in English *sauce*.
 t as in English *tight*.
 v as in English *vow*.
 w as in English *wayward*.
 x not to be used: write *ks* or *gz*, according to the sound, in *wax, example*.
 y as in English *you, year*.
 z as in English *zeal, buzz*.
 ñ as *ng* in English *singing*.
 sh as in English *shall, shoe*.
 zh as *z* in *azure*, *s* in *fusion*.
 ch as in English *church*.
 th as in English *thin, truth*.
 dh as *th* in *the, with*.
 kh a surd guttural aspirate, the German *ch* in *ach, Loch, Buch*, and sometimes approaching that in *ich, recht, Bücher*.
 gh a sonant guttural aspirate (Arabic *ghain*); other compounds, like the clucks occurring in Chinook, &c., to be represented by *kl, tkl, tlk*, &c., according to their analysis.

	Tribe and dialect.	1. Man.	2. Woman.	3. Boy.	4. Girl.
1	Arivaipa	n-dyē*	ū-stun-ē	esh-kin'	et-ye'-den
2	Arivaipa	n-te	es-tsann	ish-kin	i-tin
3	Návaro	ti-ne	es-tsonne	shi'-ke	e-te/ke
4	Jicarilla	tin-dèh	tchek-kèh	ith-chin-yà	teh-chin-yà
5	Shoshoni	tur-nup'			
6	Shoshoni	ta-watz	ma-ma	i-petz	nēi-intz
7	Pa-Uta	tow-watz	mam-mou	i-petz	nine-tz
8	Pa-Uta	tau-waz	ma-mau	i-petz	nai-ntz
9	Pa-Uta	na-po (<i>old man</i>)	ma-mau	i-petz	nei-ntz
10	Pa-Vant	tow-ats'		i-peds'	nan-zitch'
11	Southern Pa-Uta	tau-vats	ma-ma'	ai-bits	na'-intsi
12	Pa-Uta of California	num	oube'-a	na-a-tse'-e	natsi
13	Chemehuevi	tau-vats	ma-ma'	ai-bits	nantch
14	Uta	to-wats'	ma-mats'	to-wats'-in	nan'zits
15	Capote Uta	to-wàts-chee	mah-màts-chee	i-patch-ee	nà-chits-chee
16	Uinta Uta	tah-wàhts	mah-sah-wàhts	i-pèds	nan-tchitch
17	Moqui Pueblo	ta'ha	vu'ete	tchai-o	manan-hia
18	Takhtam	vutchitch	nurt	tsi-tsint	nasi
19	Kauviya	nakhantch	ni'etchil	tiat	nau-ishmol
20	Gaitchim (of San Juan Capistrano)	ti-itch	shumal	amayamol	nu'-itmol
21	Tobikhar (of San Gabriel)	voroy	to-kor	ui-ti	tak-ha'ikh
22	Kechi (of San Luis Rey)	na-han-is	no-wi'-kup	ke'-mul	no-is'-mal
23	Mohave	hámük-áva	hinya'-aga	ho-o-ma'ra	hómär-hi'nchinger
24	Mohave	i-pá-h	hanya-aga	humara	masahaya
25	Hualapai	pa	pogi-i	haman	gamutum
26	Hualapai	hon-sip			
27	Tonto or Gohun	mo-ho-ave	ma-ke	h-me'	h-me'
28	Diegueño	i-gutch	sing	i-gutch	limam
29	Yuma or Kutchán	e-pa'h	sín-yo'ck	hoh-ma'l-eno-ka	hoh-ma'l-e-chin
30	Isleta Pueblo	si-a-ni-da'	kle-o-na-da'	o-va-o-da'	o-peō-ō-dc' †
31	Tehua on Moqui Mesa	shen-him	kvi-hia	cy-ē	cy-on-ke
32	Tehua, Los Luceros Pueblo	sèh	quee'	a-loo-ghè	a-gun-ghè
33	Tehua, San Juan Pueblo	se'	kui	e-niu	a'-niu
34	Taos Pueblo	seh-ah-nàn-na	klây-ton-ah	òth-thah-sah-nah	klây-an-ah
35	Jemez or Vallatoa Pueblo	shi-o-tesh	ti-osh	ki'-ush	umpekule
36	Acoma Pueblo	hächá-za	kō-hō	iatzl	ū-āk
37	Acoma and Laguna Pueblo	hatch-tche	ko	i-atch	
38	Silla Pueblo	hatch-tche, u-mo	ku-o	i-uas	
39	Wintún	u-eta	büg-ta	u-eta-ela	büg-ta-ela
40	Kasúá at Santa Barbara	oho-ikh	e'neke	dup-nektch	e'neke

* y, as consonant.

†ō = o nasal.

‡rh = peculiar uvular r.

5. Infant.	6. My father (said by son).	7. My father (said by daughter).	8. My mother (said by son).	9. My mother (said by daughter).	10. My husband.	
mes-chē'	tschě-ta	tschě-ta	tschě-ma	tschě-ma	mbit-slas - cheu' da.	1
	pe-trka' †		mā		shī-à §	2
au-vā	shī-tchi-ai		nā-shu-ma'		sbō-kā	3
peh-ne-is-khun-e-heh.	chi-kah-èh	chi-kah-èh	chin-nèe		chee-àh	4
						5
nā-pit	mointz		pee-atz		coo-mam	6
pappoose			ma-man-bitz			7
					koo-mon	8
			pe-ades'			9
bi-sho-tsi	mo-am				ku-man-ma	10
she-rum	o-na'ua		bì-a		i-i-tavi'n	11
bi-sho-tsi	mo-am		bi-an		ku-man	12
me-pōts	na'na co-mas ||	na'na pi-a'ts			na'na to-wats	13
me-à-po-witch-ee	mo-oh		pa'i		nina tah-wàts-chee.	14
						15
pe-sitz	nènàh moòh ||	nènàh mooh	nè-nàh pie	nènàh pie	nènàh tah-ah-pol	16
ti-bush	i'na-a		in-ga-a		ivo-u-shing-va	17
nina'	no'e				nu'atchau	18
	na'na		ni-ya		no-u-al-eso'	19
ame'etekelen	ni-na		ni-yo		ni-itckka	20
ko-ar	ni-nak	nu'n-na	ni-o'-ok		ni-a'shun	21
pul-je-nis	nu'n-na	nu'n-na	nej-jo	nej-jo	no-cong	22
hō-mari-qui'lvā	h'nai (i)-cōdā		e'nt-ai	e'nt-ai	h(er)chow-ya	23
	nagutk		hintaik		hi'tchuik	24
	talega		titsi'e			25
						26
	gi-ta		ti-ti		na-vi	27
anail			atailgh		ni-gutch	28
hou-ma'h-rah	en-e-koh		en-thigh		en-va'ph	29
up-i-ra-da'	pea-ka-a'		ing-ke-a'		lin-sau-ve-e	30
e-bi-le	ta-ta				navi sho'	31
a-gün	na-vi tah-rah		na-vi yèh-ah		na-vish-yoh	32
e-pi-e	navi ta-ra'		navi yia		navi zo'	33
o-yu-ün-ah	àn-tom-mah-ah	àn-tom-mah-ah	un-càn-ah		tooth-e	34
kingz	tā-ē		yi-ā		o-pē-ā	35
ũitzina						36
o-ak	nai-shtia		nai-ya		sa'tche	37
o-ak	has-ti		yai-a		sa-tche	38
ela	ta-ta		tchu-tchu		net-vi	39
ts-ta'nugh	ko-ko		kho'ne		ku-ni-vue	40

§ shī: my, pron. poss.

|| nana, nina, nun-nu, (in Pueblos; navi,) before names of relationship: my, pron. poss.

	Tribe and dialect.	11. My wife.	12. My son (said by father.)	13. My son (said by mother.)	14. My daughter (said by father).
1	Arivaipa	tschê-at'	tzi-zhâ'-ha	tzi-zhâ'-ha	
2	Arivaipa		shi-sa-se		shi-tsi
3	Návaro	sha-at	shi-ye'	se-tse'	
4	Jicarilla	chee-san-êh	shee-zâh		shee-zah-se-êh
5	Shoshoni				
6	Shoshoni	pee-wam	too-watch		pah-cheum
7	Pa-Uta	pe-one			
8	Pa-Uta	pe-one			
9	Pa-Uta	pe-one			
10	Pa-Vant				
11	Southern Pa-Uta	pi-vuan			patchin-ma
12	Pa Uta of California	i-ovik-va	i-tua		
13	Chemehuevi	pi-van	bi-bisho-an		na'-na-a
14	Uta	na'-na pih-wan'	na'-na to-wa'ts-in	na'-na to-wats'-in	na'-na nan'-zits
15	Capote Uta	nina pè-wee	nina to-wats		nina pah-chits
16	Uinta Uta	nênâh p'hew	nè-nâh to-wahts	nênâh to-wahts	nênâh pah-tchitch
17	Moqui Pueblo	i-vu'-ete	i-ti		i-ti-i
18	Takhtam	nu'-ingtava	numay		
19	Kauvúya		no-mailyo-a		
20	Gaitchim (of San Juan Capistrano)	nishumake	nigam		ni-shuam
21	Tobikhar (of San Gabriel)		ni-ikok		ni-a'rur
22	Kechi (of San Luis Rey)	nun-nu wi-ka	nan-na ah-ko-wa	nan-na ah-ko-wa	na-tel-ma
23	Mohave	nik-ni-yâ'ga	ê-keeja	ê-keeja	üz'-bômári
24	Mohave	nanya'-ak	hintchienk		
25	Hualapai	louva-va	kva-tova		
26	Hualapai				
27	Tonto or Gohun	na-man-ya		vi-tye	vi-tye
28	Diegueño	nia'-nitch			
29	Yuma or Kutchán	en-que'r-ack	ho-ni'yse		ha'h-pah-check
30	Isleta Pueblo	hin-u-ve-e			
31	Tehua on Moqui Mesa		navi e ^w	navi e ^a	navi ey-on-ke
32	Tehua, Los Luceros Pueblo	na-vi sh-so	na-vi êh		na-vi an-ick-ah
33	Tehua, San Juan Pueblo		navi e ^w		navi e', navi a'
34	Taos Pueblo	seê-ton-ah	yu-kü-yo		an-no-wy-e
35	Jemez or Vallatoa Pueblo		m-king	ka-ai	
36	Acoma Pueblo				
37	Acoma and Laguna Pueblo	san-kve	sa-mut'e		sa-ma-ak
38	Silla Pueblo	san-kve	sa-mut'e		sa-ma-ak
39	Wintún	net'-bûg-an	net-go-rash		net-te-hesh-bûg-ta
40	Kasú at Santa Barbara		kta'nu		gsha'-ae

15. My daughter (said by mother).	16. My elder brother.	17. My younger brother.	18. My elder sis- ter.	19. My younger sister.	20. An Indian.	
	si-kisn	si-kisn	tshi-la	tshi-lá	ã-pá'chê	1
	shi-ntá-ye	shi-ti-she'	shi-te'	shi-ti-she'		2
	shi-nai	se-tse-la	she-la	et-et	kin	3
	chee-na-le-la-hè	e-keh-hè	shee-lá-he-la-hè	she-lá-e-keh-è	que-an-èh	4
						5
	páh-wim	chā-cle'tch	pah-chim	nā-mintz	ne'owh	6
						7
						8
					na-rue	9
						10
	pa-pim	tcha-gits	patsin		na ^a	11
	i-pavii		shea-gue			12
	yo'be-an				nau ^a	13
na'na nan'zits	na'na pai-bi'ts-in	na'na sko'chin	na'na na-mi'chin		nōnts	14
	nina tchà-kats	nina tchà-kats	páh-chits	páh-chits	po-gáh-reh	15
nénah páh-tchitch	nah-náh po-pah-witch	nenah to-e-carim-pah-witch	nah-náh po-patch	nenah to-e-carim-patch	noonts	16
	i-va-va		i-ko-kha			17
	ni'pre-it		nepar		takh-ton	18
	ni-yo'ol		neapas		khentil*	19
	ni-pa'ash	ni-be'et	nage'e-es	nebi-it	atakh	20
	ni-pa	ni-pe'ets	ni-okho	ni-pi-its	takhat	21
na-tel-ma	num-mers	na-kan-ye-nea	no-ah-hal-le	no-ah-hal-le	ah-tab-ha	22
	hâh-vee'que	so'hjâ	hu'n-chee-ennâ	I'nyââkâ	hâh-mûk-âva	23
	hintchi-enk					24
	gin-ya		gi-mesi'a			25
						26
	ni-ya	ni-ya	gin-ya			27
	kuin-yo-ay		i-tchen			28
	en-che'ng	souch-nook'	en-che'ng	en-yock	cu-cha'ng	29
	hin-pa-ve-e		hin-to-te-e		tai-o'da'	30
	navi vi		navi kâ-kâ			31
	ne-pâr-ah				sâh-veh	32
	na-vi pa-re'	na-vi pa-re'			o-un-â	33
	páh-pah-nah	âh-tras	tu-tû-nah	um-be-ûn-ah	seh-ah-nan-ah	34
	ba-bo-ye	ko-õ				35
	sat-tum		stâno			36
	o-ma		sa-kvits			37
	sat-yo		sa kvits			38
	ley-gut		lay-gut		vin-tu	39
	ga-me	gitch-itch	ga-mute	ga-mute	gu	40

* Adopted from the Mormons, who founded San Bernardino in 1851.

	Tribe and dialect.	21. People.	22. Head.	23. Hair.	24. Face.
1	Arivaipa	hā-kai'	si-sit'-ziu'	si-sit-zi'l	shin-nī
2	Arivaipa		si-tsin	si-tsil	si-nī
3	Náwajo	khā	tsi-tsin	tsi	ne'
4	Jicarilla	tah-an-sò-tin-tèt-éc	tsits-tzèc	tsits-tzee-gáh	chin-nèh
5	Shoshoni	neo-wo'wh	taw-tchif	pom-py'	coh-wap'h
6	Shoshoni			tort-chou-āwe	
7	Pa-Uta				
8	Pa-Uta		zo-jě	zo-pev-jě	
9	Pa-Uta				
10	Pa-Yant		tot-se-in'	tots-si'b-a-wub	ko-bub'
11	Southern Pa-Uta		to-tsv	to-tsbu-av	kovav
12	Pa-Uta of California		kau-vo'		
13	Chemehuevi	ava'no-oab	to-tsv	to-tsv-av	kovav
14	Uta	tu-wi-cho'-von	tu-chif'	tu-chiv-uf	ko-ve'rf
15	Capote Uta	co-quát-chee	tsoots-sèh	tot-sib-eh-wáh	co-vèe
16	Uinta Uta		tohts	tohts-sibi-wah	kwove
17	Moqui Pueblo		ko'te	he'ni	tai-hua
18	Takhtam		no'uilkot	no'ayo	ne-bób
19	Kauvúya	neke-e	ni-yulu-ka'vama	ni-yuluk	neabush
20	Gaitchim (of San Juan Capistrano)	ata'khum	ni-yu	yu-ul	nipulum
21	Tobikhar (of San Gabriel)		apo-a'n	po-ar	a-ho'ho
22	Kechi (of San Luis Rey)	ah-tah-ham	nu'ju	nu'ju	nu'-pus
23	Mohave	mah-ty'-erum	chook'-sha	mük-körä	hee'tho
24	Mohave		tchuk-sa	mogora	
25	Hualapai		hu-u	ko-au	yu-u
26	Hualapai		kom-pai'-ya	ker-wo'-wa	
27	Tonto or Gohun		ko	ko-vau-va	ho
28	Diegueño		il-ta'	kha-lta'	
29	Yuma or Kutchán	cham-mil	it-chuck-su-va'h	eh-èh	eh-dōh
30	Isleta Pueblo	tū-ai'	p'-e'	p'-a	tchū-a
31	Tehua on Moqui Mesa		pong	p'-ho	navi-tche'
32	Tehua, Los Luceros Pueblo	oh-hèm-de	pù-ok	om-bèc	tsèh
33	Tehua, San Juan Pueblo		navi-po'	p'-o	tse'
34	Taos Pueblo	i-e-re	bè-e	cab-ah-yèar-ah	cu-vè-wah
35	Jemez or Vallatoa Pueblo	hē-i	s'-ñsh	fo-la	tso-la
36	Acoma Pueblo		nascā-èn	hā-kān	hō-āpēn
37	Acoma and Laguna Pueblo	kau-ay-ko-me	nash-gain	ha-tchen	ho-auin
38	Silla Pueblo		nash-gain	ha-tchan	ho-auin-han
39	Wintún		pay-ok	ta-moi	ga-va
40	Kasná at Santa Barbara	gu	knosh	okvo'-n	shtüg

* ã = u as in but; i. e., with dumb sound.

25. Forehead.	26. Ear.	27. Eye.	28. Nose.	29. Mouth.	30. Tongue.	
shin-ta	shi-ja'	shind-ā'	shin-chi'	süz-ë	suz-ā	1
tā-yiss	teha'	in-tā	tchi, i-tchi	i-tse'	i-sad	2
kalye	teli-a	na	tsi	se	tso	3
tsits-sah-gäh	shits-shäh	shin-däh	shit-shiz	tsec-söh	tsec-sah-tèh	4
moo-tocka	nank	poo-weep'h	no-be'	teum-bap'h	ah-omp'h	5
	nan-g-owam	pu-ävi	mo-bib			6
		po-e-fjê				7
						8
						9
	nan-kub-bah'	poo-ove'				10
mutagav	nangavav	po-uib'h	mo-vibs	te-umbab	ta-rhumb	11
	i-nak	i-vush	i-vüvi	i-tub'e	i-e'ugh	12
motakam	nangavam	po-uim	mo-o'vim	fü-umba-am	a-rho-om	13
me't-o-ka	ni-ka'-bum	po-i'm	mo-vi'-tum	a-wump'	ta-wump'	14
mus-tach-äh	leh-kè-we	pue-eyi'	me-wit-te	tapò-ie	a-gwum-pe	15
muh-tach	nan-kaaf	po-ee	mo-ühv	temb	ah-och	16
ka'la	na-ko-vo	pu'-shi	ya'-ga	ba-gni-bu-ë	le'ng-i	17
nekhe'	neaga'v	no'-ova	no'mape	ne'khitch	ninang	18
nu-vuy-ye-e	nenaka-a	neabush	na'mu	nu-ta'm-a	hen-nang	19
nakuey'-um	nanakum	nepu'lum-netle'-ule	numu'gum	no'tum	nuve'gum	20
a-konin	ana'nakh	atso'tchon	amo'rpin	ato'nin	ano'nin	21
na-ku-o	na-na'-ka	nu'-pus	nu'-mu	na-tam-u	nu'n-nu	22
thüm-ö-poolä	ismá/hl-ká	ee'tho	ëe-hoo'	ee'yäh	hee-päh'lä	23
	smailga	i'do	ihu	iya	ipaylya	24
imbula	smatriga	yu-u	yai-ya	ya-a	i-pal	25
			ya'-ya			26
po-la	shmar-ga	yu	hu	ya	pala	27
akhualkh	khu-malkh	hi-ye'u	khu	a'	anepa'ikh	28
dowh-ku-ljeh-mo'y	schmalk	ey-doh	e-hoh	e-ya'h	ch-pelh, ch-pal	29
pap-fo-a	t'-a-khlo-a	tchi	pü-ai	tla-mo	y-ë	30
tche-ko	o-ye	tchi	tkho'	sho-ko	heng	31
see-go	o-yèh	tsè-eh	chü-u	sò-oh	hà-ah	32
tchi-go	o-oye'	tse'	shiu'	ung-va	hä	33
cu-ve-wah	dah-se'h-ah-tah	che'-han	ò-hui	kook-äl		34
vā-pe	vash-tyesh	sesh	fo-se	tie-kva'	ë-il	35
hō-pén	hūe'-pén	hō-än-nā	hu-i'sh	hui-can	hūatshi'n	36
skop	vuy-pin	shka-na, ho-ana	vuy-shin	ha'-us	ko-atch	37
shko-op ho-pin	yo-pen	ho-ana-an	vuy-shin	shku-ik-a	ua-tchin	38
tei	mat-at (pl.)	tu-mut (pl.)	so-no	khol	ta-hal	39
pikh-si	'tu	ptu-gh	nokh-sh	ng'h	el-e-ugh	40

† kh = guttural aspirate.

	Tribe and dialect.	31. Teeth.	32. Beard.	33. Neck.	34. Arm.
1	Arivaipa	<i>schü-vo</i>	<i>schí-da'-va</i>	<i>shí-cös'</i>	<i>shí-cun'</i>
2	Arivaipa	<i>go</i>	<i>ta-rha</i>	<i>i-guss</i>	<i>gan</i>
3	Návaajo	<i>ko</i>	<i>takha'</i>	<i>se-na-khan</i>	<i>khan, gan</i>
4	Jicarilla	<i>shee-gõh</i>	<i>shit-tâh-gah</i>	<i>see-cös</i>	<i>shee-kâh-neh</i>
5	Shoshoni				
6	Shoshoni	<i>ta-wamp</i>	<i>mon-chump</i>	<i>coo-rap'h</i>	<i>eng-awap</i>
7	Pa-Uta		<i>mosu-évi</i>		
8	Pa-Uta	<i>taw-amp</i>	<i>mo-zop</i>	<i>cur-rabee</i>	<i>ana-bob</i>
9	Pa-Uta				
10	Pa-Vant				<i>poo-rets'</i>
11	Southern Pa-Uta	<i>ta-vuamb</i>	<i>nu-shuim</i>	<i>kura-am</i>	<i>anga'-vu-um</i>
12	Pa-Uta of California	<i>i-tava</i>	<i>i-mushui</i>	<i>i-kut</i>	<i>i-vu'ta</i>
13	Chemehuevi	<i>tau-vamb</i>	<i>montsob</i>	<i>hoyo'ngo-tso-on</i>	<i>anga'vu-um</i>
14	Uta	<i>ta-waun'</i>	<i>me-chu'k-wa</i>	<i>kõ'-rup</i>	<i>po'-ram</i>
15	Capote Uta	<i>tâh-wan</i>	<i>mûts-up</i>	<i>cõo-ree</i>	<i>puh-ree</i>
16	Uinta Uta	<i>tõw-e</i>	<i>muntz</i>	<i>kwuhr</i>	<i>pü-e-re</i>
17	Moqui Pueblo	<i>da'-ma</i>	<i>sho-üi'-tchi-mi</i>	<i>kva'-pi</i>	<i>ma-ata'</i>
18	Takhtam	<i>ni-tam'am</i>	<i>nia'-gang-am</i>	<i>ne-mue</i>	<i>ne'-ama</i>
19	Kauvüya	<i>na-tama</i>	<i>niul-tamam</i>	<i>nake'-ile</i>	<i>nema</i>
20	Gaitchim (of San Juan Capistrano)	<i>tomat</i>	<i>numush</i>	<i>noklum</i>	<i>nima</i>
21	Tobikhar (of San Gabriel)	<i>ata'tam</i>	<i>ape'han</i>	<i>aku'tchan</i>	<i>ama'mam</i>
22	Kechi (of San Luis Rey)	<i>chem-tüm</i>	<i>nu-mu-sum</i>	<i>na'kul-je</i>	<i>chum-nõ-su'k-a</i>
23	Mohave	<i>hee'-thou</i>	<i>yutto-quõ-thâh'</i>	<i>mül-ä-klây-kõ-mët</i>	<i>hee-vee'</i>
24	Mohave	<i>ido'</i>	<i>yavume</i>	<i>male'kay</i>	<i>i-sa'lya</i>
25	Hualapai	<i>yo-o</i>	<i>yaveni-me-e</i>	<i>i-puk</i>	<i>thuti-i</i>
26	Hualapai	<i>yoh</i>	<i>ya-bin-i-mi'</i>		<i>hu-di</i>
27	Tonto or Gohun	<i>yo</i>	<i>ya-ni-mi</i>		<i>vu-ye-boka</i>
28	Diegueño	<i>i-ya'o</i>	<i>aleme'</i>	<i>i-puk</i>	<i>i-salgh</i>
29	Yuma or Kutchán	<i>eh-doh</i>	<i>yah-vow-mo'yh</i>	<i>em-el-aktch</i>	<i>es-rah</i>
30	Isleta Pueblo	<i>u-ë</i>	<i>ad-pa</i>	<i>k'-auva</i>	<i>ka'</i>
31	Tehua on Moqui Mesa	<i>vã</i>	<i>shobo'</i>	<i>ye-kõ</i>	<i>ko</i>
32	Tehua, Los Luceros Pueblo	<i>mù-wâh</i>	<i>sho-wõh</i>	<i>kay-ë</i>	<i>cõ-ee</i>
33	Tehua, San Juan Pueblo	<i>va</i>	<i>so-vo</i>	<i>k'ë</i>	<i>ko</i>
34	Taos Pueblo	<i>koðk-al-meh</i>	<i>sah-pân-ah</i>	<i>pes-quây-so</i>	<i>qual-go'-e</i>
35	Jemez or Vallatoa Pueblo	<i>kvã</i>	<i>tã-fã</i>	<i>to-ta</i>	<i>ha</i>
36	Acoma Pueblo	<i>hâtshên</i>	<i>hãmoshã</i>	<i>howi'n</i>	<i>yõ-mîn</i>
37	Acoma and Laguna Pueblo	<i>s-tsia-tcha</i>	<i>sta-musha</i>	<i>sh-kau</i>	<i>stsiu-mi</i>
38	Silla Pueblo	<i>stia-atch</i>	<i>sta-musha</i>	<i>sh-kau</i>	<i>yo-min</i>
39	Wintún	<i>si</i>	<i>moa-tse-ke</i>	<i>tchiss</i>	<i>kh'-e'te</i>
40	Kasú at Santa Barbara	<i>sa'</i>	<i>sats-ûs</i>	<i>p'ni</i>	<i>pu</i>

35. Hand.	36. Fingers.	37. Thumb.	38. Nails.	39. Body.	40. Chest.	
.....	shin-dla	shin-dla-cho	shin-dla-kā	sitz-I	shi-til	1
la-tā	la-shush	.....	la-gan	si-tchi	ki-on	2
la	laya'	.....	las-gan	si	tche'	3
shil-lāh	shil-las-kan	shil-lāts-tso	shil-las-ah	shits-is	shee-it-teo	4
.....	.....	.....	.....	.....	.....	5
māw-of'h	ma-co-y-yeuf	ma-tawf	mā-cee-chomp'h	sa-peurf	ning-a-wap'h	6
.....	.....	.....	.....	.....	.....	7
ma-oeb	.....	.....	.....	.....	.....	8
.....	.....	.....	.....	.....	.....	9
mu-ninch'	pan-a'-mah	.....	.....	.....	.....	10
mo-om	ma-se'-um	mato-om	mase'-tchumb	ne-nav	ne-vu-am	11
ivu-ē-la	ivu-yu'ge	i-ma-tog-va	i-mashi-tu	i-nu'-um	i-nu-na've	12
mu-um	mashu-um	mato'-rhon	mashi-tsu-um	nou-an	nuna'ko-ovan	13
mōhm	ma-shum	awa'-tum ma-chu'no	zet'-sum	no'h-wam	ni-a'-bum	14
mu-ūn	ma-shin	a-wat-to-ma-shin	sèe-chu	no-ivè	peh-in	15
mō, mo-ū, mu'-u	mah-se'-uf	pe-em-tomb	sègtch	no-eh	nin-onf	16
makh-de	ma'-la-tchi	maku'm-la-tchi	shu'-ki	tchung-e'	ta-u'its-ka	17
.....	.....	.....	no'-uvatchim	nitakha	nitunu	18
nemato'e	.....	.....	n'sa'lo	n'takh-au	netau	19
nema'vutchaig	vutchaig	.....	nush	natakbau	na-a'lum	20
aman	.....	.....	atchu'tchur	atcho-on	atu'nun	21
num-ma	las-las	a'h-ju	nu'-shu-lu	sup-po-lep	chum-ta	22
sāal tho'rāpā	sāal-quo-tho'rāpā	sāaltā-cūbātāh	sāal-cūlū-hō	hee-mah'tā	yūt-ō-ku'rā	23
hathbink	salgo-haraba	.....	salgo-lyo-ho	.....	.....	24
sal	salti'dya	salgu-vete-e	sete-ho'-a	mat	tigo-oga	25
.....	.....	.....	.....	.....	hi-wa/ye	26
sha-la	sha-la-gay-te	.....	sha-la-huo'	.....	ba	27
i-sāgh	enepul	.....	selke-shau	ama't	i-tchikh	28
is-rahI	is-rahI-kah sah-rap'h.	is-ra'hI-cheb-at-tah	is-rahI-kah-yoh-ho'h.	ee-ma'th	ee-wah (heart)	29
man	ma-kū	.....	ma-shi-er	ka-to-a-ve-e	po-au-va	30
mang	mang-kō	mang-ko-shoyo'	ma'lye	tu	ping	31
mah	mang-hū	.....	mān-yah	tu-odh	.....	32
mā	mang-ko	mang-ku-so	ma-nya'	to-o	pī	33
man'e-nah	wem	quāl-we	fay-tchāl-was	se-ah-nan-nah	pah-wheél-e	34
mā-tash	mā	.....	mā-e-sho	kvā	pe-lo	35
hāmāsh-te	kāmāsh-tē	kāmāsh-tē-chichin-ish.	hā-ūitshā	tshin	ska-uitzin	36
sh-ka-mas-tsi	sh-ka'-ma-tcha'tchi	.....	sh-tsau-i-tch	.....	sh-kau-i-tsi	37
sh'-ka-mas-tsi	shka'-ma-p'	.....	sh-tsau-i-tch	.....	sh-kau-i-tsi	38
sem-ut (pl.)	ka-hait (pl.)	tche-tche-muk	ka-hat (pl.)	tu-un	ten-en	39
pu	.....	.....	gsi'-khua-e	g'amon	ko'ugh	40

	Tribe and dialect.	41. Belly.	42. Female breasts.	43. Leg.	44. Foot.
1	Arivaipa	shī-pit	i-pš	shī-chā	shī-kū
2	Arivaipa	til	i-bit	tchat	ki-e'
3	Navajo	bit	be	tchat	ke'
4	Jicarilla	shee-pee'	shee-pōh	shit-shee-ā-pch	shit-schēk
5	Shoshoni	shap	pee-ee'pe	you-oo ^h	em-pa'h
6	Shoshoni	sa-peurf	pee-ee'pe	you-oo ^h	nam-bap'h
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	ye-ōm .....	.....
9	Pa-Uta .....	.....	.....	.....	.....
10	Pa-Vant .....	.....	.....	.....	nampf'
11	Southern Pa-Uta	sabu-um .....	.....	yu-u'um, yu'av	namba-am
12	Pa-Uta of California	irh-o'he .....	.....	i-sha'e	i-gu'g'
13	Chemchuevi	sa-pun	pe-in	punga'van	na-amp
14	Uta	tsa'puh	pich-o-pu'rab	to-bu'ram	na'm-pulp
15	Capote Uta	sa-pū-ah	peh-in	toe-wy	nah-pan
16	Uinta Uta	sah-why	pe-e, ta-to	uh	namb
17	Moqui Pueblo	bu-no	bi-he	ga-shi'	gū-gū
18	Takhtam	nitur .....	.....	ninaika	ninav
19	Kauvuya	neti-i .....	.....	na-e	ne-eto'e
20	Gaitchim (of San Juan Capistrano)	nele'um .....	.....	ne'o	ne-e-nope'le-e
21	Tobikhar (of San Gabriel)	akho'nan	api-pi'tchu	ahorkuk	aneb
22	Kechi (of San Luis Rey)	nō-sha-eh	nup-pe	nuf-ta-je	nu-ūch-che
23	Mohave	hee-tho'w	ny-ma'h	hēm-mē'h	mē'quo-lápūlápū
24	Mohave	ito .....	.....	methi'lya	i-me
25	Hualapai	toka-a .....	.....	methil	mi-e
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun	ya-ga	ma-no-na	bata	nan-yo
28	Diegueño	ita'u .....	.....	i-uilgh	i-mil
29	Yuma or Kutchán	eh-to'h	en-yeh-māh	may-seel	em-may-quil-yep-uh-yi'p
30	Isleta Pueblo	tō .....	.....	kō-be	en
31	Tehua on Moqui Mesa	shi-ko	vala	bo'	ūng
32	Tehua, Los Luceros Pueblo	tsee'	wah-āh	poch	an
33	Tehua, San Juan Pueblo	si	gu-a	po'	ā
34	Taos Pueblo	tch-yān-ah	cū-tchu	ky-ah-bēh-eh .....	.....
35	Jemez or Vallatoa Pueblo	vad-lo .....	.....	ve-to	hō-tash
36	Acoma Pueblo	skōnāтчēš	hā-āshdin	hāmā	hāsh-tē
37	Acoma and Laguna Pueblo	sh-ko-na-tse .....	.....	sh-kam	sh-ka-stsi
38	Silla Pueblo	sh-ko-na-tse .....	.....	shka-ma	shka'tsi
39	Wintún	te-sble	gan-so	ma-it .....	.....
40	Kasú at Santa Barbara	gag-she'ue	sgut-et .....	.....	ulgh

45. Toes.	46. Bone.	47. Heart.	48. Blood.	49. Town, village.	50. Chief.	
shī-kā-kān	ai-tzin	shī-chī'	sh-ū-tl'	ti-chī(n)'	nun-tan'	1
li-e-shush	i'tsin	i-tchi	tikh		na-tan	2
ke-tchu	tsen	li-et	tikh		na-ta-ni	3
shee-kees-kān	shit-sen-its-èn	shits-sèh	tich	tchah-èm-bi-gāh	nan-tan	4
		pe'	pweep		ty-gwu'n-up	5
ta-cheup'h	ō-ōp'h	pee-up'h	pah-ūp	camina-arrup'h	towendum	6
						7
						8
		pee-in'	p-wap'		capitano	9
tashu-um	a-o'y	bi-im	pa-ub-d	aba'khan	ne-ab'	10
	i-o'ho	i-vi'vu-e	a-pa'g'		po-hina've	11
tashu-um	o'oan	pe-o'an	pa-ub-d	avatkan	to-ondum	12
tat-suro-wam	erbf	pain	pah'up	ka-ni-ge	ni-ab'	13
tah-see'weo	pah-wò-ke	mo-wò-gah	pah-puy'	khan	ne-àbe	14
piér-tomb	on-av	pü-ye	päh-ap	khan-neh-and	nee-av	15
voko'kve-kvo-shi	ho-kia'eo-ka	ue'nang-va	ũng-va		mung-vi	16
nomam		nohun	nũ-ertũ		kika	17
	n'ta'e	neson	an-vil		ne't	18
		nushun	an-ul		not	19
	a-e'n	ahu'u	akhain		tomear	20
sas-las	nut-te-ih	nu-shũn	eh-ð-wol	kish	ter-chin'-was	21
mē'qũo-thórápá	yě-sáiká	hee'wáh	nik-whátáh	ábáchá	k'yápá	22
	ua'niga		neghoata	tsoko-arik		23
tid-ya	ti-a'ga		tigval		hanethalya	24
						25
						26
mi-gay-te	ku'e-va-ta	y-hu-aya	hua-ta		ma-ta-va	27
		i-tchikh	akheat	vo-akhin		28
em-may-kah-sáh-ra'p'h	en-shah-sah-ra'ck	ah-er eh-wah	njah-whit'	e-pah qua-tau-yah-see	e-pah tah-hon-na'h	29
ē-kō	ũ	be'a	ng-a	na-tũ-ai	uit-la-ve-da'	30
ũng-kō	kō-pe-kō	vā-kō	i-a-kom		toy-ũ	31
ũng-hab	pech-ũng	pe-è	ungh	om-wè-hea	tu-yoh	32
ũng-ka'	pe-khō	pi'p	ũ	ou-ne'	tuyo'	33
	tu-ab-fwale	tom-o'-why-e	tksu-ah-meh	päh-an-ah	chah-bac-ah-weh	34
ũ-tchue'	hũ, hō	pe'el	ō-ba		fuish, fu'	35
		yā-kirk-sèn	mā-atzē	tea-ācũn (?)	hō tshin	36
se-mutch	hash-gan	se-uin-osh-ka	ma-tse	kan-aik	ho-tsen	37
se-mutch	hash-ga-shu	uin-osh-ka	ma-a-tse	ha-ash-titch	ho-tchen	38
may-shie-khleles	bak	po-rus	shak	po-la-kau-a	tchak-to	39
	se'	santugh	akho'les		shnogsh	40

	Tribe and dialect.	51. Warrior.	52. Friend.	53. House.	54. Skin lodge.
1	Arivaipa	na-nyo'dē	shī-dek'ē	ko-wa'	it-yēl'(m)a-kowa ..
2	Arivaipa .....	.....	shīe-ke	kō-va .....	.....
3	Návaro .....	.....	si-kis	ho-o-khan	ya'ti-e-khl
4	Jicarilla	nah-gunts-sò	shīt-teh-kēh	kon-ghà	yan-eh-ko-ghà
5	Shoshoni .....	.....	hanch .....	.....	.....
6	Shoshoni	sobarron	te-gee-ben	cahn .....	.....
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	.....	.....
9	Pa-Uta .....	.....	.....	.....	.....
10	Pa-Vant .....	.....	tig-a'-boo	kahn	wahn
11	Southern Pa-Uta	narhukinu	mata'vik-yi	gan .....	.....
12	Pa-Uta of California .....	.....	i-ha'-itch	novi .....	.....
13	Chemehuevi .....	.....	sumbu-an	gane' .....	.....
14	Uta	na-u'-cho ni-a'b	tig-a-bu	yu-big-kan	pu'hr-kan
15	Capote Uta	nah-wò-quoy	tig-ēh-bu	cah-nè	coh-tsūn-pin-e
16	Uinta Uta	nauch-nee-av	tig-uf	kah-an	moh-ūve-khan
17	Moqui Pueblo	na-goi-ya	i-kva'-tsi	ki-hā	a-ba'
18	Takhtam .....	.....	ne'puyu	kitch .....	.....
19	Kaurvya .....	.....	.....	gish .....	.....
20	Gaitchim (of San Juan Capistrano) .....	.....	nepeu	gitch .....	.....
21	Tobikhar (of San Gabriel) .....	.....	ni-e'ya	gigh .....	.....
22	Kechi (of San Luis Rey)	na-ah-wil	ne-pe'oh	kish .....	.....
23	Mohave	quan-ō-mec'ya	nōwhā	abā-k-sayn'tik	māk-ō-bōbāh
24	Mohave .....	.....	novo-aghk	ava' .....	.....
25	Hualapai .....	.....	novoa'haga .....	.....	.....
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun .....	.....	no-ā-hā	niu-vā .....	.....
28	Diegueño .....	.....	kungu-ay	in-yu-a' .....	.....
29	Yuma or Kutchán	e-pah vah-hān-nah-quin-ne-mage	nich-trah-kāh-week; me-to-so'-pos	uh-va'h .....	.....
30	Isleta Pueblo	kom-nin	in-poey-va-e	nad-hū	ko-mō
31	Tehua on Moqui Mesa	tibi-ta-han	gi-ema	gi-eye	ba'
32	Tehua, Los Luceros Pueblo	nah-vish-son-dā-roh	kāh-mah	thā-wah .....	.....
33	Tehua, San Juan Pueblo	akono'-tuyo'	k'ema	te-hua .....	.....
34	Taos Pueblo .....	.....	poo'-wy-u	tcha-men, tah-men .....	.....
35	Jemez or Vallatoa Pueblo	pa-la-fui'	gya'bo, ābo	dō-yo	pō
36	Acoma Pueblo	kau-aipe	s'an-kīn	sd-am .....	.....
37	Acoma and Laguna Pueblo .....	.....	s-tau-gin	i-tchi-ni .....	.....
38	Silla Pueblo .....	.....	sau-gin	a-tchi .....	.....
39	Wintún	kli-ko-pu-ra	shu-ma-na	kau-el .....	.....
40	Kasúá at Santa Barbara .....	.....	gi'-tchanteg	a'p-h' .....	.....

55. Kettle.	56. Bow.	57. Arrow.	58. Ax, hatchet.	59. Knife.	60. Canoe.	
i-sa	ikh-kē*	kā	pō-sen-dt	pesh		1
	il-kiā	kā		pesh		2
tsa'	as-kiā	k'ā	tche-nikh1	pesh	tsena-el	3
boh	ich-ken-e-tshā	kah	tscn-ōh	pech	nah-kun	4
wit-to'-ah		oo-pah'-zuts-ski	oo-han'	we-its		5
pahm-buen	arche	hōo	woo-kabini-num	wee	pah-ra-wanum	6
				wu-ay		7
				wae-eh		8
				wee		9
	ads	pan-no'w	que-pan'-nump	wei-teh'		10
bambu-un	atch	hu	vuka'ni-nanu'mb	vui'		11
vni-tuva	e'de	pa'ga	sakan	vui'-he		12
	a'tch	hu		vui	parh-a'ba-anumb	13
kut-su'-buk	atz	ow	ku'-pa-nab	wits	a'-tum-pur	14
pah-poon'-ah	āt-che	ono	que-pān-nump	wo-ni'tch	ca-noa	15
fimb-wim-bam-boon	a-āds	ōū-o-u	mc-puch-pan-nump	ū-weetch	ū-wee-sak	16
shi-vatch-kap-ta'	tio'-hia'	ho-hā	pi-kai-vua	pu-yu	vu-nashi-vu	17
	nepatchk	nohu		nigav		18
	tchukenupsh	huyal		nitokova		19
	gu'tupsh	hul		nap		20
	ni-pay-tulkh	tchu-ar		pakhut		21
ba-ca	nu-uj-i-ta-wah	huj-jel	acha (<i>Spanish</i>)	tuk-was	ē-val	22
tūa-kee'-nā	ōtee'-sā	ec-pa'h	tok-ya't	hā-quee'	guilhō-chā/wā	23
tashge'-ene	uti-sa'	i-pa'	tok-ya't	akh-kvu-o		24
	hopo-o	apa'a		kva-a		25
kwo-gai'kē		a-pa		ak-wa'		26
	ho-po'	a-pa		a-kva'		27
	atim	ba'l		akh-goal		28
vurs-kin	ōh-tūs	ech-pa'n	tah-kee-yōt	ahrk-to-ko-viekt	quill-hōh	29
bo-ro	hue're	tlo-a	shi-a-ko-a	shi-ya	tlat-ē	30
kve-ushe-eo	en-oke-ele	shu'	ku-ele	tchi-iyō	pe-me-hele	31
qua-gūm-beh	ah	su	ku-ū-whe	tsee-ōh	coo'-phe	32
ko-a'-kum-be'	a'	su	ku-uy	tsi-yo	ko-f'-hem-be	33
	tsah-men	tsah-men	quān-nah	tchāy-ah-na	tsah-mu-no	34
gin-ta	ō	shti-ā	hēl	kiush-ti	tie'/to-ba	35
ātā-ōsh	shtiaka	eshtua	o-cupain	hish		36
	shtia-ka	i-sto-a	op-kaun	hi-ishgai		37
	hiu-shtia-ka	ish-to	oko-pan-a'ni	hi-ishgai		38
bo-lok	kol-sa	nat	tche-ha-mos	to-bosh	to-le-tel-ok	39
sama'vuin	akh	ya'		o'-uvā		40

* kh = German ch in *lachen*.

	Tribe and dialect.	61. Moccasins.	62. Pipe.	63. Tobacco.	64. Sky.
1	Arivaipa.....	kē-or-kyē	nā-tos-tē	nā'to	yā, nyā
2	Arivaipa.....	sike	nato-stse'	nato	ya-til-khil
3	Náwajo.....	tkhe'	nato-stse'	nato	ya-tekh-likhl
4	Jicarilla.....	t-keh	nah-tso-sèh	nah-to-shi'n	koos
5	Shoshoni.....		un-to'	pan-mo'e	
6	Shoshoni.....	par-rap	chung-ooop	co-áp	too-goom-py-afp
7	Pa-Uta.....		zoon-ooop'	tōquop	
8	Pa-Uta.....				
9	Pa-Uta.....			to-wa-ca-koo-ab	
10	Pa-Vant.....		t-so'ng	qu-ap	
11	Southern Pa-Uta.....	barh-ab	tchung-ub	to-kvab	tu-u'mba-yav
12	Pa-Uta of California.....	mok	to-ish	pa'h'mo	to-u'vtava't
13	Chemehuevi.....	pats	tchung-ub		to-rhumb
14	Uta.....	pa't-sum	tsong	tok-wap'	ker-wat'-wa
15	Capote Uta.....	patch	tsoots-e	quáp-e, toe-quáp-we	to-go-pè-yah
16	Uinta Uta.....	pats	tsung	quo-áp-e	tu-wum-pe-av
17	Moqui Pueblo.....	to-tchi	kui-tsingva'	bi-va	tok-bela'
18	Takhtam.....		vuykt		tokuvtch
19	Kauvúya.....	nuvaka	yulil	pivat	tokovas
20	Gaitchim (of San Juan Capistrano)		nohu'-hukup	nepiv	tu'-ubitch
21	Tobikhar (of San Gabriel)				tu-gu-pan
22	Kechi (of San Luis Rey)	wa'-kut	i't-chit	bi'-wat	tuk-was
23	Mohave.....	hum-en'yò	mal'hó	á-oubá	my'ya
24	Mohave.....	nima-haruya	mail-ho'	a'-uva	amaya
25	Hualapai.....	mahinyo'o	malu'-u	hu-uva	amaya/a
26	Hualapai.....	ma-hin-yo'	mal-ho' (?)	u'-ba	
27	Tonto or Gohun.....	na'yo		ova	o-k-ve'
28	Diegueño.....	mokuin	ub		may
29	Yuma or Kutchán.....	ham-nay'-oh	mel-ho'h	ah-ooch'	my
30	Isleta Pueblo.....	kā-av	pe-en'	tle-e	nava-puy-ú
31	Tehua on Moqui Mesa.....	ang	ey-ye	sha'	to-oba
32	Tehua, Los Luceros Pueblo.....	ári-toh	tsáh-co	t-sah	mah-koá
33	Tehua, San Juan Pueblo.....		sa-ko	sa	ma-ko'a
34	Taos Pueblo.....	ky-ah-bèn-ah	chák-wa-ap	tsa-men	el-tah-mèn-ah
35	Jemez or Vallatoa Pueblo.....	e-in-dnish	fui-tsau-a	tió-ye	vā-pā
36	Acoma Pueblo.....	hā-shūūn	shā-áko	tabacco	ō-áká
37	Acoma and Laguna Pueblo.....	ha-shuim	atch-kan	ha-mi	ho'-a-ka
38	Silla Pueblo.....	ha-shuim	shia-ko	ha-mi	ho'-a-ka
39	Wintún.....		ha-lok	lal	k'-altse
40	Kasná at Santa Barbara.....	e'ke-ne'mo	u'-ash	sho	a'lapa

65. Sun.	66. Moon.	67. Star.	68. Day.	69. Night.	70. Morning.	
chig-o-na-ai'	klē-o-na-ai'	slin-snō-sa	piñ, ping	kle-o	ka-o	1
tchuna-ai	kli-una-ai	zzos	tchi ^a	tle'	a-pe'	2
tchuna-ai	ol-tche	sō	tis-tchi ^a	tcha-hokh-hel	a-pen-ta	3
choo-nah-ēh	klee-nah-ēh	soons	t-chēe	t-kleò	yis-kah	4
tab-by'	man-e' goots				po-eech'-i-co	5
	mai-rō-pitz	pogee, pōt-si-wi	ta-wai	toog-wan	eur-jeuk	6
					uh-chuc	7
					urtch-uk	8
				tu-bits - ah - uk - a - muck.		9
tab-by'	my-toge'	poo-chi'ts		to-ca'n	po-e' chi-co	10
tauva'-bits	miara-robits	po-tsi'v'b	tavay	tu-von	ui-tchuk	11
ta'-ve	mu-a	tatsi-nu'b	tave-va'no	ara-amosh		12
tava'-buts	miara-robits	potsiv'b	tu-i	to-vab'h	tash'e'-ang'vh	13
ta'-bi	mah-tōch'	po-i'-tich	ta-bi	ta-wahn'	wits-kuch'	14
ta'b-be	mah-toe-wāch-chee	poōts-e	tāb-bi-a	toe-wāh-nee	witch-quo	15
te-av	mah-toe-pūts	poots-ūhf	two-gwèrry	two-gwān	wee-chuch	16
ta'hua	muy-yau-e	sho-he	pē-i	dāb-ki	kāb-o	17
tam-yat	moatch	ho'	atuk	gnits-guva	mota'va-em	18
tam-yat	man-yil	so'o-vetum	tamyat-bik	tuk-meabs	motul-akna'a	19
temet	manil	shu'ulum	tcho-on-temet	tu'uk-met	omu'poto'okole	20
tamet, tame-at	mo-ar	sosiot	poku-tamet	yauke	yanden	21
tam-yet	mun-nil	su'ul	ip (?)	tuk-ma-che	ha'-bas-bū'k-ke	22
n'ya'h	hūl-yāh	hum-o-say'	n'yāh sayn'tik	teen'yump'	mē-tha'bē	23
anya'	halya'	hamose'	anyato-o'ruk	tin-yamk	anya'-bilk	24
inya'a	hala'a	hamosi	naval-iga	yahaba'ga	tu-uyga	25
ni-a'-ha	ha-la'	ha-mi-si				26
nyā	b-la'	am-shi'	na-she-ta	he-pa	he-pa-teke	27
inya'	khil-shia'	knil-khab	inya	khil-shia'	numesab	28
en-yā'h	en-yah-too-obuck ; hel-yah	hum-mūs-ra'y	en-yam-mu'ck	vin-yam-muck	en-yāh-pelk	29
to-ri-da'	p'a'-i-da'	a-khū-tlal	tō-i-da' *	nū-i-da'	tom-da'	30
tang	b-ō	a-gayo	ke-vi	nat-ke-lo'	tan-te	31
tah-ān	po-ōh-sen-lo	ā-go-yoh	tāh-ree	koon-deè-ree	her-ēn-dee	32
pan-sen-do	p'o	a-go-yo	ui-ta'	nakhu ^a	na-te'	33
tah-tah	kāh-nah	bah-shis-lah	thee-ēy-ban	pay-ān-ye	i-lu-wan (?)	34
p'e	p'a	vo-bā	bō-shur	ta-ha-ā	se-ta-le	35
ozzatz	tū-uat		kā-stā-i	cā-pish	nā-tchām	36
o-shatch	tau-atch	shi-tit	se-tcho-ma	kop-sho	na-tcha-ma	37
o-satch	tau-atch	shi-ki-it	sai-i-tcho	noy-ya	tcha-ma	38
sash	tche-petcha-nokhl	tkhlu-yuk	sa-ne	tche-bu-e'	hontche-be	39
a'lish	a'-vueigh	ake'-vua	alish	sul-kukh	vash-na'khiet	40

* a pronounced as the á of Gibbs.

	Tribe and dialect.	71. Evening.	72. Spring.	73. Summer.	74. Autumn.
1	Arivaipa	wi-ā-ō	ktong-go	tjing-go	
2	Arivaipa	oy-ā	tā-yo	tu-nas-ni-kho	
3	Návaro	e-i-ā-go	tā-go	shi-go	
4	Jicarilla	cli-e-ā	tah-gos-tèh	shee-gos-tch	tah-keh-los-kèh
5	Shoshoni		tah-mu'n	tads	te-ah'-bun
6	Shoshoni	eur-gap-i	tah-man	tah-arch	you-wan
7	Pa-Uta				
8	Pa-Uta	wish-upa-pay			
9	Pa-Uta	wish-up-up-pa			
10	Pa-Vant				
11	Southern Pa-Uta	tashe'aba'		tats	yavan-taman
12	Pa-Uta of California	mi'		tazzava'no	
13	Chemehuevi	ū-gab-u-ē		taru'-ukvay	
14	Uta	to-wur're	tah'mun	tah'ats	yu-wun
15	Capote Uta	tab-è-e-i-quay	tah-màn-ch	talts-chee	u-wàh-nee
16	Uinta Uta	te-ave-e-y-aky	tam-man	tah-ads	u-vàn
17	Moqui Pueblo	ma-shim-hi	ta-mung-va	dala-a'	
18	Takhtam	ye'hak		etche-tamyat	
19	Kauvúya	tamyat-bakhkon		seom atsa-e	
20	Gaitchim (of San Juan Capistrano)	poyu'-ukuk		ta'-ashk	
21	Tobikbar (of San Gabriel)	asi-ama		ororibe	
22	Kechi (of San Luis Rey)	puj-hù-i'k-ke	je-miss	ta'm-me-valh	
23	Mohave	n'y'e'-tho'rubk	hetwáh-sōuk	nik-ā-pilk'	ah-see-yūk
24	Mohave	anya'havk		nya-kabilk	
25	Hualapai	tigu-ve'iga		anya-atuyga	
26	Hualapai				
27	Tonto or Gobun		pe-tu-vo-hoye		
28	Diegueño	tanay			
29	Yuma or Kutchán	en-yah-yoursk	no-co-tem-pilk	pil-kee-namp'h	nok-en-temp-ha-churg-ah
30	Isleta Pueblo	ki-mi-en	avre-lui	tā-ui-ni-da' *	
31	Tehua on Moqui Mesa	na-ki-eng	ta-ven-te	yo-ke-tish	
32	Tehua, Los Luceros Pueblo	teh-èr-e	tàh-an-dee	pan-u-e-ree	poh-yeh-ree
33	Tehua, San Juan Pueblo	na-te'e	ta-an-de	pa-yo-ere	
34	Taos Pueblo	hah-lo-pay-àn-e	hah-lò-wy-chè-wan	hah-lo-àn-ye	why-toe-e'-que
35	Jemez or Vallatosa Pueblo	hō-mak-ye	tem-tem-ho	p'esh, p'e	
36	Acoma Pueblo	cā-jō-cē			
37	Acoma and Laguna Pueblo	s-tchap-ka	koi-mi-kai-shta	a-to'-ma-tse	k'ok
38	Silla Pueblo	tchap		ka-sha-it	ko-ok
39	Wintún	keno-ana	al'tebo	ba-a-bela	khai-la-na
40	Kasú at Santa Barbara	sta'p-in		shi-sha'vuy	

* da' = suffix indicative of change or spontaneous motion.

75. Winter.	76. Wind.	77. Thunder.	78. Lightning.	79. Rain.	80. Snow.	
hai-go	i-nyür	id-i-di'	ä-di-kish	na-wi-kih†	iz-zes	1
kbai-go	il-tehi	i-ti-nti	ha-ta'-ti-tla'	natl-ti		2
khai-go	ni-yol	i-ni	tse-ni-tlish	natl-tin	s'-as	3
hi-los-keh	nee-e-lötl	e-tich-nee'	e-tas-chiitl	kuh-nah-ckèe	zas-nah-ckèe	4
tome	nee-e-lötl	too-yah'-kay			tuck-e'-bit	5
to'amb	new-af ^b	o-warri-ar-rai	o-warri-to-nan	ou-warrh	neu-babe	6
						7
						8
						9
		o-nö-nint			nu-wa'p-py	10
tom	nü-ar	ya-rhan	u-vo'ro-tu-non	u-vo'r	neovav	11
to-o-va'no	akvab	to-o-ya-gave	tagu-e-gisi'va	pa-yu-a've	neva've	12
sho-o-to'oi	nar	ova'ri-a-an	tonanok-ovar	ova'nutsuk	novab	13
tuhm	ne-uh'	o-wat'-sip	u-nu'-no-pa-ga	pah-er-wuhr	ner-wurrp'	14
toe-möh	währ-e	u-nü-nu	pah-lox-kò-seh	numah	neh-wäh-we	15
thom	ne-ere	u-nü-neh	wahr-en-ton	päh-weh	ne-wah-weh	16
teme-e'	hü-gang-oi	ü-mu-e-gi	da-lui-pi-ki	yo-gi	ho-nau-e'	17
akopnetche	shavuüt	ta-ertch		vu'-ungaiflch		18
yuin atsa-e	ya'e	memlokon		ve'-vonkon		19
shovo'-ut	hung-al	pong-ro'-oy	tomat	gva-asht		20
otcho'-tchibe	ahi'kain	ta-er		akva'kin	yua't	21
	sü-wu'l	tan-su'm-ma	te-wil-te-wil-las	äh-wö'-wo-ne	eh-jü'ja	22
hä-chörk	müttä-hy'-ik	hö-káthä	cörává	cö-wáwá	hopácá	23
hobaga	mot-ha'	uka'tha	huraba	ko-vauk	oba'ga	24
	matahe'ga	vu-u'ga	lathega	kui-voga	hanaba'tiga	25
						26
a-tiu-te'	ga-ves-iti	vo-o'e	vo-ta-be	ki-vo		27
khi-tebur	yaib	shulgh-tau	o-tau	i-kvuy		28
hah-churg-ak-ta-han-wa'h	mah-tah-hy-ack	höh-ku'sk	ah-rah-buck	ah-ouck	pah-hah-nah-patchk	29
to-ni-ni-da'*	uä-i-da'	ko-a-ni-da'	o-pi-ni-da'	flo-ri-da'	pa-ni-da'	30
te-tno-ti	vä	i-kve-tä-la	tchi-ko-eno	i-kva-ä-ä	ki-e'	31
teh-nü-ree	tee	quan-tàn	tseh-gom-weno	quan	pò-ok	32
te-nu-re	uä	gua-tä	tchi-ua-ano	ti-kuä-nä	ti-p'o	33
sah-o-fè-chwa		tah-wéh-uf	satch-che	pah-ah-mù-wah		34
täl	tou-ya	tö-kvi	num-kva	to-ka'	ge-o-vä	35
						36
gui-mi-gais-tai	gu-na-tehatch	ka-mots	pes-tats	k'ats	kau-e-ta-ta	37
gaish-tai	ko-yo-tau	ka-au-mots	po-tcho-oish-te	ka-atcha	kau-eta-ata	38
bo-me-she-na	ka-ha	ke-moks	vai-lo-ka	lo-hä	yo-le	39
su-a'y-in	sakh-kä't	sokh-ko'	skunta'-hua	shtu'huigh	shka'lun	40

†Slightly aspirated.

	Tribe and dialect.	S1. Fire.	S2. Water.	S3. Ice.	S4. Earth, land.
1	Arivaipa	kō, kwō	tū	kip, kü	flezh
2	Arivaipa	kō'	to .....	.....	tkhlish
3	Náwajo	kō'	to'	tin	tkhlesh
4	Jicarilla	kuhn-sklà	kuh	e-lòh	ncè
5	Shoshoni	koo-nah'	pah .....	.....	shog-up'
6	Shoshoni	cone	pah	tēu-ash-up	teu-weep
7	Pa-Uta	coon	pah .....	.....	.....
8	Pa-Uta	coon	pah .....	.....	.....
9	Pa-Uta	koon	pah .....	.....	.....
10	Pa-Vant	koo-nah'	pah	tesh-pa'h	tee-wee'p
11	Southern Pa-Uta	kun	p'a	para'-ashub	tu-vib
12	Pa-Uta of California	kosh	pa'ya	ku-tushiva	tovib
13	Chemehuevi	ku-un	p'a	pare'-eshib	tovib
14	Uta	ku'ne	pah .....	.....	.....
15	Capote Uta	ku-nah	pah	pah-àr-se	te-wit-poo
16	Uinta Uta	qkoon	pah	pah-cup	te-weep
17	Moqui Pueblo	t ² -vua	kui'	to-tcha'	tú-vua
18	Takhtam	gut	pa'tch .....	.....	te'vetch
19	Kauvúya	kot	pal .....	.....	temol
20	Gaitchim (of San Juan Capistrano)	gut	pal .....	.....	e'khal
21	Tobikhar (of San Gabriel)	tchabo	p'ar	yuat	o'lchor
22	Kechi (of San Luis Rey)	koót	pal	hju-ju-lun	hüt-ta-ho'n
23	Mohave	ah'wa	ā-hāh	h'nōpa'chē	hūm-ā-tāh
24	Mohave	a'aua	akha	athi'	amata
25	Hualapai	tuga	aha'a .....	.....	mat
26	Hualapai	u'ho	a'ha .....	.....	a-mat'
27	Tonto or Gohun	ho-o	a-ha' .....	.....	ma-ta
28	Diegueño	a'ua	akha' .....	.....	mat
29	Yuma or Kutchán	ah-tah-rahk	ah-hāh'	eh-sah .....	.....
30	Isleta Pueblo	pa-a-i-da'	p'a	p'a-shi-er	nam
31	Tehua on Moqui Mesa	a-kā	p'ō	tang-ko-le	a-kang
32	Tehua, Los Luceros Pueblo	pah	pē-oh	o-yeé	nah
33	Tehua, San Juan Pueblo	p'a'	p'o	oi-yi	nā
34	Taos Pueblo	fah-qu-āh-mo	mah-ān-eh	pah-ān-eh	nah-pah
35	Jemez or Vallatoa Pueblo	fua'a	p'a	va-sī	ho'ng
36	Acoma Pueblo	hā-gan	z-itiz .....	.....	.....
37	Acoma and Laguna Pueblo	ha-gan	tsits	ku-is-tsia-ma	ya-ai
38	Silla Pueblo	ha-gan	tsits	ha-auve	yau-o-ni
39	Wintún	p'o	mem	ke-ke	b'om
40	Kasúá at Santa Barbara	nū	o'	shik-shep-shu	shugh-p

85. Sea.	86. River.	87. Lake.	88. Valley.	89. Prairie.	90. Hill, mountain.	
tū-ě-sl	tū-en-chū	tū-ě-klā-go	(n)go-skai	to-dě-tě	tzitl, konis-chil	1
	tō-li			ku-til-kō	tsikh-l-nas-ā	2
pe-kiť				ni		3
yhat-la-páh-chlu-le- héh.	kuhn-léh	kut-lá-sich-káh	tsats-its-tsò	klut-tsá-its-sah-kéh	his-kec-tòh	4
					to-yab-by	5
jalt-seep	pah-rah	pah-woo-nap	yo-no-ip	yeu-too-womp'h	cuy-ip	6
			you-ah-bey		kibe	7
			ua-bee		ca-ib	8
			eu-a-be		kibe	9
					ki-ba'h	10
satsib	pa-huitch	tu-rumb	yu-nu'-ni-b		ka'iv	11
	hub	patsiat	me-gv'ub'		toya'vo	12
	pa-rha		yo'noib		ka'ive	13
						14
ah-val- pah-à-le	pah	pah-láh-gee	ter-rah-o-wit-chee	ne-wo-pò-witch ter- à-wah.	pet-ton-a-chit- tsee.	15
pah-ahl-e	pah-nu-quint	pah-ahl-e	u-avf	u-avf	pi-avf	16
pa-tó-ba			pe-she	tesh-kua	tū-tū-kvi, sis-kia	17
mo'umiet				bavaika	kaitch	18
	vanis				kauish	19
noimt	vunuitch		pal-vintch		kanitch	20
no met	otcho'o				khaikh	21
ma-mut	wha'n-nish	heljis	wo-o-jo-hun	je-pos	pa-(ap-o)-ah-pit	22
hath-ō-e'lyá	hávee'lyá	hün-yō-thay	gün'áquá	gu'nak-chee-veel' chee-vee'lk.	há'bee'	23
		amaya	koan-a'kva		avi'	24
	hagi-u'ya		mat-akva-ta		ovi'e	25
					wi	26
	ha-hele			hal-tya'te	vuy-taya	27
kha-silgh	akha'kvan			amata-tchikvara	umate-te'	28
hah-tah'buck	hah-vill	hah-yoh-co-pee-tan- yah.	coo-choh-pah-chuh		hah-beek	29
p'a itla	p'a-itla		ui-pa'	pā-ai	na-p-yan, pe-yan	30
				a-ko	ma-he'kvi	31
po-shò-weh	pe-òh-eh	po-què	po-tsa-sò-geh	a-cò-no	pe-è-na	32
o-ku-e ²	po-k'e'			a-ko-no	kē-ū	33
peh-ah-se' pah-àn- neh.	pah-am-pah	pah-àh-pu	que-eh-àh-pu	wam-pu	beh-an	34
pa'shtyo	pa'kva		pe-tā	va'gi	to-ta	35
e-o-mitzén						36
shkak-o'e	tchu-na			si-na-tsats	got-gh	37
shkank-oye'	tchi-na			si-na-tsats	go-oto	38
bohe mem	uoket		kha'eb	al-kha'eb	po-yuk	39
skhamin	sakh-ta'takh		stau-a'yek		mi-polomol	40

	Tribe and dialect.	91. Island.	92. Stone, rock.	93. Salt.	94. Iron.
1	Arivaipa	kon-di-e-go-ze	tzè	is-chè	pěsch
2	Arivaipa .....	.....	tse'	i-shi ^a .....	.....
3	Návaro .....	.....	se'	a'-shi	tse-pesh (<i>!</i>)
4	Jicarilla	hal-láh	tsèh, tseh-an-háh	ish-shòns	pesch
5	Shoshoni .....	.....	.....	oun-e'-bit	poo-e'-weo
6	Shoshoni	pah-ro-no-quitich	teum-pe	owap'h	pa-na-kat
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	.....	.....
9	Pa-Uta .....	.....	.....	.....	.....
10	Pa-Vant .....	.....	timpf	oh-ab'-bit	pan-a'-ka-ra'
11	Southern Pa-Uta	paro'-nukuitch	tump	asump, u-av .....	.....
12	Pa-Uta of California .....	.....	tu'b'-c	ova've .....	.....
13	Chemehuevi .....	.....	tu-ump	asump .....	.....
14	Uta .....	.....	.....	.....	.....
15	Capote Uta	pan-à-se-ah (<i>Span.</i>)	tem-pee	yah-be	pah-náh-car-ro
16	Uinta Uta	pan-ah-se-ah (<i>Span.</i>)	timp	uwav	pan-náh-kah
17	Moqui Pueblo .....	.....	ua'	e-unga'	shi-ba
18	Takhtam .....	.....	tu'muet	tchu-guat .....	.....
19	Kauvúya .....	.....	kauish	ingil .....	.....
20	Gaitchim (of San Juan Capistrano) .....	.....	to't	e'ngil .....	.....
21	Tobikhar (of San Gabriel) .....	.....	to-ta'	ung-o'r .....	.....
22	Kechi (of San Luis Rey) .....	.....	kau-wis	he-u-wal	whim-je-hon
23	Mohave	má-to'ck-ò-wal	kò-nahl'yèh	n'the'è-tah	nan-qua-roo
24	Mohave	khato'	avi'	ath-e'ta .....	.....
25	Hualapai .....	.....	uvi-ge'tya	athi'e .....	.....
26	Hualapai .....	.....	o-wi-i'-be .....	.....	.....
27	Tonto or Gohun .....	.....	vuy	i-si .....	.....
28	Diegueño	khato'	u'-uil	silgh .....	.....
29	Yuma or Kutchán	hah-kooch-tah	ch-bee'	ess-ee'	sur-reh-wack-quer- rah-quer-rack.
30	Isleta Pueblo .....	.....	hi-au	pā-tli	ku-y-yo-a
31	Tehua on Moqui Mesa .....	.....	ku	i-shung	ku-e-eko
32	Tehua, Los Luceros Pueblo	po-yáh-re	kuh-ùh	an-yáh	quák-ko
33	Tehua, San Juan Pueblo	poya-ro	k'u	an-yā	goa'-ko
34	Taos Pueblo	mah-àm-pu	ch-yan	bach-kèn-ye	sah-qu'in
35	Jemez or Vallatoa Pueblo .....	.....	kea-ā	ke-ā-vo	ging
36	Acoma Pueblo .....	.....	yā-nin	min-nā' (<i>Span.</i>) .....	.....
37	Acoma and Laguna Pueblo .....	.....	henat-tyi	miua (<i>Span.</i>)	ku-mash-got-gh
38	Silla Pueblo .....	.....	henau-et-tyi	mina (<i>Span.</i>)	tche-mush-tchai
39	Wintún	al-ta-ba	son	u-a'khish	til
40	Kasúá at Santa Barbara	shna-khal'mo	khup	tip	no-o'tso

95. Forest.	96. Tree.	97. Wood.	98. Leaf.	99. Bark.	100. Grass.	
tzi(n)-tziā	tzin-tun-i	tzi	pít-a-tziā		chil	1
tchi ^a	tsi ^a	tchish	tchil tu-tlishi		tkhlo'	2
t-is	khai	tchish	tat-ā		tkhlo'	3
hat-lāh	tzets-zò	tchits	tsets-sòh-wee-fān	kats-fas-o-cheè	t-klo	4
		ho-pit			sho-nee'p	5
mah-ry'p ^h	mah-howb ^h	coquap	nan-kabk	ah-ce'akh	ogueb	6
						7
		cu-quoeb			hu-quist	8
	páh	ku-quub			hu-gwib	9
		o-pi't			oh-wee'p	10
	kokvab	kokvab			o-o'siv	11
		vo've	shu-nav	vo-akave	pau-ā-hāve	12
		kokvab		ase'ak	pau-a'shump	13
						14
sow-wit-tee	pu-lum-chi-qua-wè-ne'	o-witch-chee	sah-wāh-āl-ce	ko-pò-que	oh-weè	15
mah-uvf	mah-uvf	uvf	nank-uvf	seeve	o-gwiv	16
si-he-ve	les-tavi	kvoh-he	shi-la-ko-bue'	khoh-bu-e'	tú-shaga	17
	vua'mat	kotchāt	a'kav		hamd	18
		kelauet			samot	19
yumi'itch	gula'ut	kelauet	panak		shāmt	20
	basha'kit				mama'har	21
wa-ah-um	pah-ot-ul-la	kla-a-ut	pū-quin-num	chal-lal	sū-wal	22
ha'hāch-mōtūm	u-hūh	ā'ee'	ha-hōmāhlyā	ha-nowthqueely	chee-vee'ly	23
	a-i'				vonat-kovoa'	24
	i-i'e				i-vuil	25
		e-yi'			wil'luh	26
	i-i	i-i	vi-la-sho-a		vi-la	27
	akhakunau	il			samai	28
yah-a't-ich	ah-quant	ee-ee'	ah-hah-mite	navh-hi	hah-tah-mah-jah	29
nag-ai	tla'	tla'	kai	tlā-kui	nā-tli	30
te'	pe'sha	shong	ko-o-a	hō-kvi	ta'	31
kū-weh	bch	peh	kah	kōh-ah	pen-yāh-vee	32
na-ka-na	na-be'sa	te-be'	kō-a	ū-ā'	pen-ya'-ve	33
bah-an	po-lo-lu	sah-a'n-nch		sah-cool-ah	bah-ān-ne	34
to-ta	poi-ye-lo, bú-i-lo	(kvi-ē) shti-e'	hā-ā	tā-tash	fō-ya	35
	hā-pau	kotz	mā-s-n	itshūn-nan		36
tchitch-p'	ki'ua	kots	ti-is-ka-ma	ua-shi	ku-peo-vats-i-si	37
tchi-tehu-pi	ki-ua	ko-ots	tiska-ma	ua'ka	a-shan-nyi-tse-e	38
ba-ke	bohe me	tchus	ba-le	la-ne	tša-ruk	39
tup-tu-up	po'n	po'n	skap		tsu'-eg'e	40

	Tribe and dialect.	101. Pine.	102. Maize.	103. Squash.	104. Flesh, meat.
1	Arivaipa	in-dō(l)-chil	nyā-tā	pé(l)-kūn	i-tzi
2	Arivaipa .....	.....	na-tā	pei-kan	i-tsi
3	Návaejo	te-sstsin	na-tā	na-yi-se	e-tsi ^b
4	Jicarilla	e-yets-chin	nah-tàn	nah-gee-zèh	its-zeh
5	Shoshoni .....	.....	.....	.....	un-to'ke
6	Shoshoni	you-weemp	how-eep	pah-rang-ar	to-quaif
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	.....	tu-cu-ab
9	Pa-Uta .....	.....	.....	.....	to-coo-ab
10	Pa-Vant	om-pec' .....	.....	.....	to-qua'b
11	Southern Pa-Uta	yuvimb, hosi-svab	hau-vivgh	pa'rangar	tuku'avi
12	Pa-Uta of California .....	.....	mais .....	.....	kuts
13	Chemehuevi .....	.....	hau-ib	pa'rangar	toko-av
14	Uta .....	.....	.....	.....	.....
15	Capote Uta	te-wà-ap	co-mè	cara-was	to-quò-ah
16	Uinta Uta	o-wump	com-mirhe .....	.....	to-quàv
17	Moqui Pueblo	te-va-e'	gā-e'	bā-kna	shi-kvi
18	Takhtam	to'vuat .....	.....	.....	carne (<i>Span.</i>)
19	Kauvūya	tova't	bakha'vishlum	nekhuet	huminot
20	Gaitchim (of San Juan Capistrano)	tova't	mais .....	.....	va'atch
21	Tobikhar (of San Gabriel)	ushi-a'gar	mais .....	.....	.....
22	Kechi (of San Luis Rey)	quin-jil .....	.....	calahas (<i>Span.</i>)	wa'es
23	Mohave	h'wali	tee-chā-hi	māt-arrh	chē-thōwgh ^b
24	Mohave	o-a'lya	tari'tcha	akh-mata	i-mata
25	Hualapai .....	.....	.....	.....	mata
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun .....	.....	ya-la .....	.....	ye-ma-ta'
28	Diegueño .....	.....	.....	.....	ko-kvaib
29	Yuma or Kutchán	hah-wal	tah-ditch	hah-ma'h-tah	que-quivo'
30	Isleta Pueblo	u ^a -i	i-ya	p'a	to-a
31	Tehua on Moqui Mesa	ta-n	ko-ote	bo'	to
32	Tehua, Los Luceros Pueblo	tòh	ku-ùng	poh	peè-wee
33	Tehua, San Juan Pueblo .....	.....	kō	po'	pi-vi
34	Taos Pueblo	tsà-an	yàh-ho	pàh-ah	to-àn-nah
35	Jemez or Vallatoa Pueblo	kuan-tesh	po-ō	mu-ē, han-ash	kiu-ne
36	Acoma Pueblo .....	.....	ya-kā	tan	shēan
37	Acoma and Laguna Pueblo	ha-ni	ya-ga	ta-n	i-shi-ane'
38	Silla Pueblo	ha-ani	ya-ga	ta-n	i-shi-ane'
39	Wintún	o-leme .....	.....	.....	nub-tchile
40	Kasúá at Santa Barbara	to'molgh	mais .....	.....	sa'man

105. Dog.	106. Buffalo.	107. Bear.	108. Wolf.	109. Fox.	110. Deer.	
cl'n-chā-ni		tsch-ās	m-ba-cho	m-ba-rotl-jō	m-pī	1
li-tcha-ne	mo-ka-shi	shosh	m-ba' (<i>coyote</i>)			2
khe-tcha-e		shosh-in	mai-tso'	mai-e ⁿ	tcha-te'	3
klits-teh-èn	e-yan-èh	shass	bits-zòh	seh-làh-kay-à	peh	4
sar-ry'	kood-sin'	oo-rets'-ey	e-chup'		shock-e'-re-ah	5
bun-gotz	co-och	par-pow			too-ee	6
						7
						8
bon-gutz						9
sar-rich	quit-se'n	queo-ga'nd	ye-oge'	tab-boon'-zits	te-ah'	10
pung-guts		pa-pa'o	shi-nav	hon-tsi	te-rhi	11
pu'-gu		pa-havits	itsa'-a		tu-huya	12
pung-gutch		pa-pau	shu-na-av			13
						14
sah-ritch-chee	que-chin-ah	que-àr-amp	se-nàh-weh	tah-wàh-zits	te-ih, teih	15
sah-ritch	quots	que-rant	yo'-o-vits	tab-won-tits	teh-e	16
bu-gu		ho-nau-e ⁿ	ku-eu-e ⁿ	i-shau-e ⁿ	tcha-viu-e ⁿ	17
kuitchi		honut	vo-ahé'	kautchatch	hogua't	18
anal		hunuet	is-uet	tokuet	sogat	19
anal		hunut	is-ut	kauve'-u-utch	pa'shuput	20
voshi'		unar	i-shot	khau'rat	shugat	21
ah-wa'l		hun-nut			suk'-kat	22
há-chōwk		me-hwátā	nōmēt	cōq-ghō	quákā	23
akhatchora		makho-hata	hu-ksara	go-go	ago'-aga	24
akhat		na-go'a	ge-sat		ago'-aga	25
						26
tsa-ta	gua-ka-ta'	na-ka-tya'	mba'			27
khat		namuil-khitch			kvo-ak	28
hah-cho't-choke		mah-whi-vat, nah-wah-tah.	hah-tel-way, nah-tel-a-wah.	mat-quah-va	ah-quack, quah-ka.	29
kui-ya-ni-da'	si-bu-lo-da'	ku'-ai-da'	ya-ri-da'	to-vash-shū-ú-da'	pi'-i-da'	30
tchi-e			kō-yo	pay-en-a'	tong	31
tseh	kō-oh	kē-eh	kūn-yoh	hu-mah-tin-eh	pāh-en	32
tse'		ki-e'	ku-yo'	hu-ma-tu-ge	pāe, bāe	33
tsū-den	kāb-nen	keh-ān-nah	kāl-en	to-wah-choól-e	peh-āh-nem	34
kia-no	to-tiesh	va-lo	an-yo	ton-kan-o	kia-lesh	35
	cūhia			liānī-shā		36
gi-ya		kv'-aya	ka-gan			37
gi-ya		kv-hay	ka-gan			38
kanti-shuku		ue-ma	tcharo-va	hau	nob	39
tsu-un		khus	knu-ie'gh	khus		40

	Tribe and dialect.	111. Elk.	112. Beaver.	113. Rabbit, hare.	114. Tortoise.
1	Arivaipa	pi-na(l)-te	chā	gā	wis-tya
2	Arivaipa .....	.....	.....	ka-tcho' .....	.....
3	Návaejo .....	.....	.....	gv', ka' .....	.....
4	Jicarilla	pin-tsò-pe-tèh	tchah	gah	tsohns-kè-el
5	Shoshoni .....	.....	.....	to-se'-cumb .....	.....
6	Shoshoni	pah-rec	e-bee'-na	cahm	ai-i
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	.....	.....
9	Pa-Uta .....	.....	.....	.....	.....
10	Pa-Vant	par-ri'-ah	pow-i'nch	shuc-cùm .....	.....
11	Southern Pa-Uta .....	.....	i-pina	ta-vuts	ay
12	Pa-Uta of California .....	.....	.....	gam	ay
13	Chemchuevi .....	.....	.....	tavuts	ay-ay
14	Uta .....	.....	.....	.....	.....
15	Capote Uta	nah-gàts-chee	pah-winch-chee	tàh-woots	è-yah
16	Uinta Uta	pah-re	pah-wintch	cah-am .....	.....
17	Moqui Pueblo .....	.....	.....	so-vui .....	.....
18	Takhtam .....	.....	.....	tör-huok .....	.....
19	Kauvúya .....	.....	.....	tavut	ayil
20	Gaitchim (of San Juan Capistrano) .....	.....	.....	to'-osht	pa'-al
21	Tobikhar (of San Gabriel)	bashgat .....	.....	toshokhot	pa-ar
22	Kechi (of San Luis Rey) .....	.....	sò-üt	sū-is	ai-il
23	Mohave .....	.....	hür-páyná	hülyáwá, h'coo'-la	cá-páyt
24	Mohave .....	.....	.....	o-o'love .....	.....
25	Hualapai .....	.....	.....	gula .....	.....
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun .....	.....	.....	ako-la' .....	.....
28	Diegueño .....	.....	.....	khilkhao	khnalgh
29	Yuma or Kutchán .....	.....	ah-pen, ah-ten-hah	hal-yaugh, nil-yah-wah	cah-pet'
30	Isleta Pueblo	tu-u-uidá'	p'a-tchan	pe-ui-da'	p'-ag-uara'
31	Tehua on Moqui Mesa .....	.....	.....	ku-eng .....	.....
32	Tehua, Los Luceros Pueblo	tah	o'-yoh	pò-oo	o'-kuh
33	Tehua, San Juan Pueblo	da'	o-yo	p'-u	o-ku
34	Taos Pueblo	èh-an .....	.....	pee-ù-win	è-yah
35	Jemez or Vallatoa Pueblo .....	.....	.....	o-ò	a-po-la
36	Acoma Pueblo .....	.....	.....	.....	.....
37	Acoma and Laguna Pueblo .....	.....	.....	ti-et-gh .....	.....
38	Silla Pueblo .....	.....	.....	te'-tgh .....	.....
39	Wintún	ko-let	ma-tokhl	pat-keles .....	.....
40	Kasúá at Santa Barbara .....	.....	ol-ko'-osh	ku'n	shag'-a

115. Horse.	116. Fly.	117. Mosquito.	118. Snake.	119. Rattlesnake.	120. Bird.	
kh ^a	tō ^a	tō-ās-tā-se	klīsh-nē-zho-zhē	klīsh .....	.....	1
tkhli ^a	tō'	tchush	tkhlish*	tkhlish-li-pā'	tlō	2
rkhli ^a	be-ka-shi .....	.....	tkhlish	tchat-il-kush	tsi-ti	3
klay	tseè-ch	tsats-o-sèh	chos-kè-et-èh	koo	tsee-tèh	4
ben-ge' .....	.....	mom-po'o .....	.....	.....	.....	5
wah-rap	mo-pitz	mo-wurp	nin-eurnap	quee-atch	wee-cheetz	6
woo-allop .....	.....	.....	.....	.....	.....	7
o-roe-bah, wa-a-lup .....	.....	.....	.....	.....	.....	8
.....	.....	.....	.....	.....	.....	9
te-ah, ka-va'h-u .....	.....	moh-ap' .....	.....	to-ab' .....	.....	10
kva-a'rov, pungu'	mubits	mo-av	o'rogo	kuyats	ui-tsits	11
kavayo	mu'ivi	anivi	torho'kva .....	.....	tsi-i-ba'a	12
o-a'rov'h	mobitch	ob'h	puyats	pitsi-tchi-rhi-in	ui-tsits	13
.....	.....	.....	.....	.....	.....	14
ca-vāb	mu-āv-e	a-vān-it-pit-u	pas-seè-n	to-āb-a-we	we-chit-se	15
kah-va'h	mu-pitch	mo-whav	to-wav	to-wap	we-cheetch	16
kau-vai-o	to-vi .....	.....	tchu-ash .....	.....	tsi-i	17
pa'akhkvat	pi'tchutchā	hauvauvam	hōnkt .....	.....	tepatch	18
pa'shogat	a-ava't .....	.....	pokauet	se'uet	vi-gitmol	19
na-a'atch	kva-amol	lu-gu'utch	shu-ti', pakha'	sho'-ut	ehe'n-mol	20
kavay	pi'tchukvar .....	.....	vakhorkhat	sho'-ot	khu'nikh	21
pa'sh-a-kūt	ko-al	mum-muk	so-whut	so-whut	wa-guek-mal	22
hátoo-wāliway	hīl-ya-mō	sām-poel'-gā	āhuý .....	.....	chee-ye'ra	23
ahato-o'love	hiliagh-mo'	sambuilga	ave'	ave'	atsi-ye'ra	24
o-olo'a .....	.....	humburga	aluy-e .....	.....	ki-pay	25
.....	.....	.....	.....	.....	.....	26
khata	m-burga	i-la .....	.....	lu-vi	ti-sha'	27
khat .....	.....	mitch-kapul	uvuy .....	.....	asha	28
meh-seen	hah-smaw	soom-pulk'	hah-mah-veel'	hah-va'h', ah-bahh	hah - see - quah (blackbird).	29
ga-ni-da'	tchi-kui-ron	puy-un	pi-nun	tcha-ral	ka-shi-ra	30
sha-ni-ya	pō-oyo .....	.....	pe-eyo .....	.....	tchi-e	31
quān-yeè	pūn-yne	hū-gō	paū-yoh	quam-pun	tseè-ree	32
kavayo	shu-go'	shu-go-e'	pa'nyo	uam-pō	tsi-re	33
kah-ah-win	tchee-in	yah-āh-ten .....	.....	peh-tchin	su-leèn-ah	34
ka-vaýo	fu-ya, fu-yesh	tso-ku-ye	pa'-ha-ly-a	ki-a-pē-lo	se-ye, se-yush	35
cavallo .....	.....	.....	.....	.....	.....	36
kavayo	tsa'pi .....	.....	shu-i .....	.....	kaya'-tanish	37
kavayo	tsa'pi .....	.....	shu-u-i .....	.....	ei-i-sek	38
shuku	kil-it	yus .....	.....	tlāk	tchil-tchil	39
kni-su'tap	akhl-pes	pu'-u-u'	tso-ko'igh	khsab	tchui-vue	40

* kh = a harsh guttural.

	Tribe and dialect.	121. Egg.	122. Feathers.	123. Wings.	124. Goose.
1	Arivaipa	ū-gēz	it-ā	bit-ā	nas-ē-sē
2	Arivaipa	a-ni-te	i-tsa	tsa	na-e-gli
3	Návaejo	tsi-ti-ye'-shi	t-a'	a-tsa'	see-gēh-tso-ki
4	Jicarilla	oh-he-pee-a-gè	ta-ah	pee-tah-sēh .....	.....
5	Shoshoni .....	.....	.....	.....	.....
6	Shoshoni	no-pap'h	per-eurp'h	wee-see-ung	ōbā'n-unk
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	.....	.....
9	Pa-Uta .....	.....	.....	.....	.....
10	Pa-Vant	no-pu'b	pee'b (ee long) .....	.....	.....
11	Southern Pa-Uta	no-ba'vo	pu-ub	vuysiab	ho-vanank
12	Pa-Uta of California	ano'yo	agash .....	.....	nu-g'u't
13	Chemehuevi	no-ba'b'h	vuy-shi-aung	vuy-aman .....	.....
14	Uta .....	.....	.....	.....	.....
15	Capote Uta	nah-pāh-be	qua-sē-ab	weē-hee	o-wāh-u-ru
16	Uinta Uta	no-pav	we-seh-av	que-seh-av	ū-vāh-muck
17	Moqui Pueblo	ne-hú	hō-ma-sha	kva-hú	pā-vui-ga
18	Takhtam	aba'num	apo'	auvuka .....	.....
19	Kauváya	panyit	vuykil	hinkon .....	.....
20	Gaitchim (of San Juan Capistrano)	pa'-anum	upe'	po'-uk .....	.....
21	Tobikhar (of San Gabriel)	akha'khni-et	amamshan .....	.....	.....
22	Kechi (of San Luis Rey)	pa'n-nit	pum-pi'-ih	pa-woa-ke'h	sen-na-il
23	Mohave	chee-thōgo	see-vee-lā	hee-vēe .....	.....
24	Mohave	goyo-o'nya	si-vi'lya .....	.....	nya-go-e
25	Hualapai	sakaua	se-gual-a .....	.....	.....
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun .....	.....	mata	sha .....	.....
28	Diegueño	o-vuy .....	.....	.....	.....
29	Yuma or Kutchán	naw-kee-lee-yau	e-pawh'	mel-lah-hoh'	yah-luck, kas-sin-yoh
30	Isleta Pueblo	b'-a'-gue', pa'-gue	ki-ye	ki-a-va'	gu-a-pu-nin
31	Tehua on Moqui Mesa	hua	k'ung	tche'	ho-ping
32	Tehua, Los Luceros Pueblo	wōh-ah	kung	kung-hu	po-keep-ēh
33	Tehua, San Juan Pueblo	gua'	su-fig-ū	kū-kū .....	.....
34	Taos Pueblo	ee'-gan	ee'-lap	beē-and	beē-and-lillo
35	Jemez or Vallatoa Pueblo	va-te-lō	sey-hua	ke-a-tā-ho-ho	hū-la, gi'-a-tash
36	Acoma Pueblo .....	.....	.....	.....	.....
37	Acoma and Laguna Pueblo	shui	ho-sin	si-a'ta	shi-ot
38	Silla Pueblo	shui	ho-sin	si-ya .....	.....
39	Wintún	tkhlu-yut	ba-gos	an'	lak
40	Kasúá at Santa Barbara	stu'mon	skab	skam	ua'-nau'kh

125. Duck (mallard).	126. Turkey.	127. Pigeon.	128. Fish.	129. Salmon.	130. Sturgeon.	
tū-tlō	kā-jī	ā-gū	klok, klak			1
	tlo-i-sho		pi-shi ^a			2
			tkh-lo'			3
nah-leh-lèh	a-shee-tah-tche-shit-teh.	ye-chit-klè	tah-ko-chèe		tkhi-kets-tsi	4
			pan-gwi'tch			5
cheur-eurk		hee-ope	pah-gitz			6
						7
						8
						9
tsig			pan-gwi'tch			10
tchugh		maka'yov	pa'gutch			11
pa'yu			pa'gu-è			12
rehug		maka'yov	pa'gutch			13
						14
seh-gàts-chee	qua-nàts-see	yah-pùts-see	pàh-geh	tschontch (<i>trout</i>)	u-vàh-geh	15
tsüg		i-üv	pah-gè			16
						17
			kehu'm			18
sasa'ymol			ki-yul			19
ga'atgat			kiyul			20
tchi-ikh		veangar	ki-ur			21
kan-wis-so'il		ma-hje'l	eu-jul	tu-cho'a		22
nà-mo'wh	oöröwtä		chee'	chee-háhnä	chi'm - è - cöölä (<i>trout</i>).	23
		hoshgi-iva	atsi			24
						25
	mal-ya'		i-tyo', i-tyi'			26
			ga-sau			27
auh-roh-tah		cos-keangh	ah-chee'			28
						29
a-pi-an	to-ti-ron	pay-pa'ti-ra	pú-ù-ida'			30
ni-ile'						31
o-wee	in-deè	peen-tseè-reh	pàh-ah	pan-tùn-gha		32
o-vi ^a		palomo (<i>Span.</i>)	ba'	pi-pa'ye (<i>trout</i>)		33
pah-and	tchu-u-làh-pah-bo	tchu-u-làh	e-yàn-ah			34
kin-tà, hua-shi-shi			p'o			35
						36
vay-os	tsi-na	ho-oga	shga'-ash			37
	tchi-ina	ho-oga	shga'-ash			38
kat-gat		puy-gun-go-bok	tche-rut	no-rut	ye-tso-nash	39
ol-khuosh-ko'loigh			ali-limugh	go'uocho		40

	Tribe and dialect.	131. Name.	132. White.	133. Black.	134. Red.
1	Arivaipa	ta-laun-zè	tle-kai		tle-chi
2	Arivaipa		tle-kay-i	tikh-ikhl	tli-tchi
3	Návaro	ten-lye	sha-kai, sha-gai	tkhli-shin	fkhli-tchi
4	Jicarilla	shee-zhèe	klick-kè	klee-sghèe	klee-chèe
5	Shoshoni		to-sèe-bit	to-e'bit	an-ke'bit
6	Shoshoni	nee-ah	to-shai	to-pai ^b	ung-rai
7	Pa-Uta				
8	Pa-Uta				
9	Pa-Uta				
10	Pa-Vant	ne-ate'	tsharr	to-gue'r	an-ka'r
11	Southern Pa-Uta	ni-a'y, ni-ar'and	to-sagharum	to-bagarum	anga'-garum
12	Pa-Uta of California		toshava-nagi'te	to-humunu-gi'te	astavana-gi'te
13	Chemehuevi		tosar	tobagar	anga'r
14	Uta				
15	Capote Uta	nè-ah	tu-sàh-gah-reh	to-que-reh	an-kàh-gah-reh
16	Tinta Uta	ne-ah	to-sàh-gah	to-que	an-kar-eh
17	Moqui Pueblo	i-i	kol-tsa'	kolm-vi	ba-lang-bu-e
18	Takhtam		ye'ranka	tu-na'-ankum	khiri'-inkum
19	Kauvúya		tevisniksh	tulniksh	selniksh
20	Gaitchim (of San Juan Capistrano)		va'i-khant	yevat-hant	koya'-kvi-itsh
21	Tobikhar (of San Gabriel)		ra'uro	yu-bi'kha	kvaho'kha
22	Kechi (of San Luis Rey)	nut-ta'h-oh	wy-ch-hon	tul-niks	quat-toqu'at-is
23	Mohave	moo'-lyá	máh-sárm	nay-eel'-ik	h'-wáh-túm
24	Mohave		nimesam	vanilgh	agho'-athum
25	Hualapai		nimesav	nya'gh	kokhoa't
26	Hualapai				
27	Tonto or Gohun		n-shava	n-ya'	kal-yo
28	Diegueño		nomosha'b	nilgh	khoat
29	Yuma or Kutchán		huh-malk'	nee-eelk'	chee-whit'
30	Isleta Pueblo	kā-a	p'-a-tuy	po-ni-i	pay-mu-i
31	Tehua on Moqui Mesa		tche-i	pi-ing-i	pi-i
32	Tehua, Los Luceros Pueblo	kang-wèh	tsà-e	pèn-e	pè-e
33	Tehua, San Juan Pueblo		tsa-i	hen-ti, fen-ti	pi-i
34	Taos Pueblo		ah-thùm-ah		fe-cù-lu
35	Jemez or Vallatoa Pueblo		kiu-shu-lo	hō-shu	hō-shulo
36	Acoma Pueblo				
37	Acoma and Laguna Pueblo	ko-aka-shits	tch-tsa-muts	mish-ts-s	ko-ugan-e'
38	Silla Pueblo		ga-shia, ka-muts	mu-e-na'-ga-an	ko-ugan-e'
39	Wintún		kha-ya	tcho-lo-let	te-te
40	Kasú at Santa Barbara	ktu	o'-uokh	akhi'ma	'ta'-sen

135. Light blue.	136. Yellow.	137. Light green.	138. Great, large.	139. Small.	140. Strong.	
te-tlzh	tl-tzok		'n-chū	as-te-tzō	nal'i-gyūd	1
tu-tlish	tli-tsu	to-tli-sha	ntch-kha'	al-tse-se	nal-gut	2
to-tlish	si-tsu, se-tso'	te-nō-tlish	ni-tsas	al-tchi-si	bi-tsil	3
tah-klee-itsh	klee-tsō	tah-klēe	nits-sah	ants-tsits-sēh	nah-igō	4
em-bo'o-c-bit	o-we'e-bit	sha-go'e-bit	peah-up'	te-titch'	nar-re'ent	5
sa-warra	oh-assacca	sa-warra	pee-up	mee-o'-pitz	moo-choon-tem	6
			pea-up	ni-putz		7
				ne-putz		8
	wah-ke'r		ah-ba't	me-poodge'		9
sava'-garum	ova'-garum		okont	mi-a'buts	mutchunt	10
puhivana-gi'te	oahani'te	tsā-vue	pavai'	tu-utsi'e	o-ho'va	11
savagar	oa'sagar	pa-rhet	pa-ant	mi-i'-obutch	mutchunt	12
						13
sah-wāh-gah-reh	wah-kēr-reh	pah-sāh sah-wāh-gah-reh.	a-vah-teh	un-pū-wit-chee	te-witch-mu-chee	14
sah-āhr-eh	wah-ke	sah-āhr-eh	ah-wat	mē-pitch	tin-seè-geh	15
sas-kvan-bu-e	gas-ka-vi	she-he-vi	vuc'pa'	tchai-o*	co-kala	16
ra'-unkan	khakhi'tchin	auvake	akupnita'e	anyi'-itchi	okopō'-raukht	17
tokvish-niksh		teset-niksh	amlauot	inyi'-sikil	ivuak, i'vok	18
mulum-litch	kono'kinitch		magat	olu'-umul	a'lritch	19
ta-ka'pi		taka'pi	yu-nit	tchi-nuigh	hu-u'rka	20
o-wo-ha'-vis	kun-nu-ka'n-is	wha-wo-ha-vis	i-un-nis	ō-gul-ja	la-ō-lā-as	21
f'-wāh-soo'k	gūāth-ūm	hŷ-lm	wālyāh	hi-tō-wook'	heth-pērūm	22
havesug	ago-athum	havesug	vataim	ita'-uk	ith-perum	23
ashu-nga	ago-athega		vate'ga	ketiga	gi-ge'iga	24
						25
ave-shu-ve	kua-se	il-vi	ve-te	gat-ye	gi-gye	26
kaposhu	akhoas	kaposhu	igu	il-tik	se-pir	27
hab-vah-sook'	quisk	hoo-mark' (?)	mah-tai-ak	naukt	spa'y-ruck	28
shu-li-iē	tcho-ri-i	ba-ku-i	na-tla-mū-i	yur-u-u	kua'mi-i	29
tcha-a-vuey	tche-i	te	te-hey	hi ^a -yei	a-ki-cle	30
tsāng-wch	tsen-e	po-seē-we	hāy-e	hien-yāh-e	kih-e	31
tsā-uay	tse-yi	p'ō'-si-vi	gā-hay-i	hi ^a -nya'i	na-kye'	32
foōn-ah-zoon	tchu-lee	tchāl-quay	yah-ah'	yah-ah'tel	kee-ah-wāh-lo	33
	hō-yo-shulo	va-yo-shulo	ya-be-ō		va-ūn	34
						35
ku-ishk	ko-ka'nish	gshta'tim-atse	tsi-ya	tsu-is-tish	tehats	36
ku-ishk	ko-o-tchi-ni	gsh-ti'm-atse	me-tsi-a	ro-osh-kish	tchi-shats	37
tsa-ro-ge		tsa-ro	ba-he	pe-t'cl	a-te'sha	38
siō'lini	suon-to'ti	khsu-lap-san	kha-akh	tstan-e-ugh	shush-gal	39
						40

* Means also *boy*.

	Tribe and dialect.	141. Old.	142. Young.	143. Good.	144. Bad.
1	Arivaipa	as-ti	un-dī-nā-vā	un-(d)zū	dun-(d)zū-na
2	Arivaipa	has-ti ^a	hā-fla-te	n-shō, ni-shō	n-tchō
3	Návaro	khas-ti ^a		ya-to	to-ya-shō-ta
4	Jicarilla	has-ke-yèh	tchich-klèh	ne-sy-ñn	ne-tòon
5	Shoshoni	tsoo-goo'-pet-sy		tshant	k-gent
6	Shoshoni	nā-po	arg(e)noo	ah-ōpéne	eur-weur-peni
7	Pa-Uta				
8	Pa-Uta				
9	Pa-Uta			ha-ub	
10	Pa-Vant	etum		att	kad-zat'
11	Southern Pa-Uta	na-apo	tau-ats	a'-bone	ovn'bone
12	Pa-Uta of California	va-itch	nanai-gvi'e	tsan ^a -it	gap'
13	Chemehuevi	nana'po	abits-its	torhoyak	ova'yune
14	Uta			at	kats'-at
15	Capote Uta	na-nah-pù-witch-chee	ava-pùt-chee	i-ye	nah-gáh-me
16	Uinta Uta	nan-nap	to-wick-kah	att	katz-ing-whah
17	Moqui Pueblo	vuc'-taka	taka	luma'-shin	to-toye
18	Takhtam	voche'-vuetch	mutu-tushint	a'-aetchtak	gekha'nishtak
19	Kauvúya	nakhalo-ol	pashualis	atsa-e	mukan (<i>sick</i>)
20	Gaitchim (of San Juan Capistrano)	nakha'nmol	amayomol	polo'-ov	hitchi-guta
21	Tobikhar (of San Gabriel)	era'kh-bu	pu-vatchun	ti-hurko	ma-ha'ikh
22	Kechi (of San Luis Rey)	nis-lu'-vnl	bis-wu'l-lis	eh-cha'-eh	öl-öl'-is
23	Mohave	guáraa'-ga	mū-high	a'-hōwtk ^a	hē-chēmi-yāk
24	Mohave	kvora-aga	i-pa	akhotk	alaik
25	Hualapai	pata'-iga	heme'-iga	akha'nega	hiano-maga
26	Hualapai				
27	Tonto or Gohun	vel-he	ba'	ka-ne	kal-ye'-ve
28	Diegueño	uma'u	itmam	khan	iku'-tsikh-litch
29	Yuma or Kutchán	neg-co-viack'	wee-pee'-ug	hant-ne-quits	
30	Isleta Pueblo	ku-au-ayi	o-u-a-da'	ku-ni-i	ne-k-un
31	Tehua on Moqui Mesa	she-eno	shing	o-e-na-bo'-vimo	na-he'
32	Tehua, Los Luceros Pueblo	tsen-dòch	tsam-bèe	he-wùd-ee	cor-peò
33	Tehua, San Juan Pueblo	sen-to	e-nu-ke	hi-no'-te	
34	Taos Pueblo	thus-lee	o-sas-leèn-ah	co-ò-wap	hèl-moh
35	Jemez or Vallatoa Pueblo	va-bā	ō-ma	vo-ā	vo-me
36	Acoma Pueblo	hāsh-tš		ta-u-atze	cōsh-tān
37	Acoma and Laguna Pueblo	has-tchi-tcha	mu-ti-atsa	tan-a'-e	tsiu-a-sa
38	Silla Pueblo	me-tchi-tcha	vi-i-tchi-tcha	rau-a'-tsa	tsiu-va-sa
39	Wintún		ba-ui-nto	tcha-la	tcheb-ka-la
40	Kasná at Santa Barbara	pag-o'-uvash	tupneksh	me-pshuma'vuish	pinlh-pan

145. Dead.	146. Alive.	147. Cold.	148. Warm, hot.	149. I.	150. Thou.	
da-stzā	tai-en-da	uz-cā-zo	cāz-tūk'	shi	nī	1
tas-tsā	inta'-hinta'	gas-gos	ku-is-tuk	shi	ni	2
azzizz-kush		gos-gas-e'	khots-to	shi	ni	3
tast-sān	hin-tāh	cos-kāts	cos-tōh	shee	dee	4
te-i-i'			ear-rint'			5
ya-i-qua	now-wug-ga	stoo-wint, stoo-wy	ta-rowi	neur-ne	eur-me	6
						7
		shet-oid	tar-oid			8
		che-toid	ta-roid			9
e-i-i'			coo-too'-rich	ick		10
ye'-kve	nu-uyga	shi-tuy	tagu-ay	nuni	um	11
ya-e'-epa	karuya-et		uru ^a -u ^t	nu ^a -u ^a	u ^a -u ^a	12
i-a'ykva-a	nu-uyga	shu-tuy-kvayok	taru'-utch	nu ^a	umi	13
						14
e-i-quay	kāhr-rhee	tu-wits-chee-e	tu-wits-tu-quo-wits-chee	ne	u-me	15
e-i-qneh	pan-neh	steè-e	u-āh-reh	ne	em	16
pe'-ve	ty-yo	yo-oho	ūtū-bū-ū	nū-ū, ne	omi, um	17
amumke	mutatchan-a'ne	utchi'-agub	akup-etché	nu	omi	18
mukish	goa'bekon	yu-yuma	se'-ungma	ne'	e'	19
atkva'ikh	uh'i'ka	li-yuak	ha'lok	no	om	20
	yait	otso'o	oro'o	noma	o'ma	21
ka-o-wis	hu-un		ha-tin-gun			22
nāyoutchipoo'k	me-pāytik	hāthou'wik	hee-peelk'	nā-yōūthōō	māhnyēr	23
i-paik	amaiki-nyak	hatchu-urk	matai-mibuik	ini-epa	manya	24
api'ge	akha'niga	munig	ya-a-tuvuk	anya'a	ma-a	25
						26
ne-va'ye	no-ga	mu-ni	tu-ye	nya-a	ma-a	27
meley	akhan	kitchur	ura'u	inyau	nyau	28
ah-pourek	ham-mah-verē	lah-churg'	pilg-e-namb'	ēn-yans'	manch	29
p'ay-a-de	na'e	na-shi-em	na-tli-ram	nā	i ^a	30
na-yo-ko	ino	na-ti-e	na-tchū-va	nā	ō-o	31
pab-nee	woh-eē	ke-ē	tsang-weh	nah	un-wāh	32
na-tchu'	na-na'mo	na-ti	na-tsa'-na	nā	ō-o	33
pi-u	wāp-u	flu-vwi-ve-wah	klè-lah		eh	34
kea-pa	kve-e	no-ōsh	tchi-la	ne	ung-va	35
		fō-matzēn	ātū-matzēn			36
ko-os-to	tsia-an	ga-ish-tai	a-to-ma-tse	hi-no-me	hi-shu-me	37
ko-os-to	tsia-an	ga-ish-tai	ka-a-tche	hi-no-me	hi-shu-me	38
me-nel	ma-rok-boha	tima'	takh-tcha	ne	mi	39
alk-shan	santuk	sakh-ta'takh	sientsu	no'o	bi'i	40

	Tribe and dialect.	151. He.	152. We.	153. Ye.	154. They.
1	Ariwaipa	a-kūn	no-khī, no-shī		no
2	Ariwaipa	a-guan	u-te	no-khi	an-khuan
3	Náwajo	ai-ge	al-tso'		tkhi ^a
4	Jicarilla	a-gūn	dah-chè	a-gūn (?)	a-gūn-she-a-tè
5	Shoshoni			hīm	
6	Shoshoni	ee'-ing	tahw	neur ^m	ma-um, māng
7	Pa-Uta				
8	Pa-Uta				
9	Pa-Uta				
10	Pa-Vant			em	
11	Southern Pa-Uta	mang	mām		
12	Pa-Uta of California	i-i		nashu-mu-e	
13	Chemehuevi	mang	ku-ma'vatch		
14	Uta				
15	Capote Uta	u-me	cu-mas-seè-nee	ne	cu-màs-see
16	Uinta Uta	ing	tan	yeem	mam
17	Moqui Pueblo	ai-ge', bam	ita-mú	ñ-ma-a'	mi-na'
18	Takhtam	hauvash-takht*			
19	Kauvaya	e'	tchemem		be-em
20	Gaitchim (of San Juan Capistrano)	vunal	teha'-a-am	vona'-alam	
21	Tobikhar (of San Gabriel)	mane'ma	yo'muma	mamum-omo'ma	mamum - u r u r a - omo'ma.
22	Kechi (of San Luis Rey)	öh'öh	chum-mum	y-ah-was	um-mum
23	Mohave	hó-wáhm-yér	tee-yémpf	py-kee-yem	hówa'nyer-é'ptch- um.
24	Mohave	huvá'nya	huatch-va		
25	Hualapai	nyu-e'-e			
26	Hualapai				
27	Tonto or Gohun	kay-a			
28	Diegueno	itcham	ikhin	vuya'u-khumau	kitcha'muyu'
29	Yuma or Kutchán	suh-wah-chork	suh-wach-en-yäch'	maw-sah-kah-veek'	huh-veek'
30	Isleta Pueblo	uim-ā	nā-tchim-ba	tehim-ba-i ^a	tehim-ba
31	Tehua on Moqui Mesa	ne-i	nā-ō, na-inta	ne-in-to-a	o-e ^a
32	Tehua, Los Luceros Pueblo	nah-eè	nāh-è	mit-tung-ùn-dah	un-nah
33	Tehua, San Juan Pueblo	ō-o (?)	nā-e	ō-o	na ^a
34	Taos Pueblo		föhn-sah		en-tom-mah-tah
35	Jemez or Vallatoa Pueblo	na-ā	nesh	ni-esh	o-mesh
36	Acoma Pueblo				
37	Acoma and Laguna Pueblo	hau-ip-ta, ishk	ha-no		
38	Silla Pueblo	hau-i-pu-ta	ha-no		
39	Wintún	be-ya	neta ^a -ro	ka-at	be-ha ^a -ro
40	Kasúá at Santa Barbara	gugsh	gikh-gu-u	mea-gai-gikh-gu	gug-shuo'-uno

* "Another man."

155. This.	156. That.	157. All.	158. Many, much.	159. Who.	160. Far.	
ti	ā-wi	tam'o-wa	ksā'o	hon'lä	'n-zäd	1
			shosh	ti ^u	ni-sad, ni-zzat	2
ti	na-rhai	it-al-tso	okh-ay-yui	kha-te	ni-sad, ni-zzad	3
ting	a-yü	tah-ah-tsü	tkläh	kah-un-chée	an-däh	4
	ick	o-yate'	shout			5
aitch	mā-he	ma-nō-ni	ah-wah-tem	hangh, hah	mee-one	6
						7
						8
			pe-up			9
	inch	mah-no'nah	hah-va'n			10
itch		manok	avan	hang-i	nu ^u	11
			e-vua'y		gvay-na'	12
itch	makayukvay	manok	ava'atum	lunga'yungay	miot	13
						14
e-nè	cu-mash	mān-u-nu	ah-vān-nee	e-nāh-ar-mah	mè-e	15
inch	mah-re	māh-nun-ch	ah-van	ang	me	16
i-i†		sho-shoyo-ma'	shūkh-pan-ta'	hak-i	hak-a	17
puyun	pe'	puy	akovu'vuram		kopuyan	18
i-vi	pe'	omum	mete-etchim	hakh-e	pe'p-i	19
u-vi	vunal	tcho'o-onum	muyukum	hakh	vua'am	20
mine'	pe-e'	o'e	a-yoin	akim-be'ma	po-a'ne	21
ih-ih		pu-ta'am	mut-itch	hah	wa'um	22
wee'than-yō	dis-sān-ō-wāk	pŷ	üttyk	mük-kā-che'e	hoo'-wee	23
vi-tanya	ho-va'nye	paya	a'taik	makati-tum	ami-itchk	24
vi-ya'a		paya	atik	maka'a	ogu'tume	25
						26
		pay-te-me	na-ko-ta		to-vay-ye	27
pi-ya'a	pu'	khamerei	umau	map'o	okur	28
with-thaw'	nam	cham-mil-yah'	ah-taig'	may-keu'	korror	29
nun	ua-uim-hu	tehimba	uay-am	pay-u ⁿ	ku-au-ay	30
		te ⁿ gi	ti-mai'ye	to-a	kā-i	31
nah-è	oh-è	thā-kce	heh-yān-yo		kan-yè	32
	ha'i	vaye-ko	va-i-ki	tō-ā	ga-ny-i	33
	wāh-tah	jew	pe'as-si		wah-tah	34
o-vā	na-a	sho	ke-e-la, ge-la	ke-shel	yam-bā-nio-o	35
						36
ti	vay-i	hau-p'a	tsi-gan-o	tsi	tye'	37
ti	vay-i	hau-p'a	tsi-gban-o	tsi	tye'	38
eo	bo-be	ka-at	buy-ya'	he-ket	gel-el	39
he'e	ho	yu'la	u-hu	a'-yi	mu'ukhk	40

† Means also name.

	Tribe and dialect.	161. Near.	162. Here.	163. There.	164. To-day.
1	Arivaipa	ā-hā'ni	tzā	ā'-wi-o	ti-chi
2	Arivaipa	akh-a-ne	n-tsā-ge	a-koy-ya	ti-tchi ^u
3	Návajo	aka-kha'-tye	ti	n-la-te	ti-tchi
4	Jicarilla	a-han-dèh	tsa-èh	un-e-yèh	tah-tee-chèe
5	Shoshoni .....	.....	.....	.....	.....
6	Shoshoni	cha-rāy-nunk	e-wah	ma-wah	ah-roop
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	.....	.....
9	Pa-Uta .....	.....	.....	.....	.....
10	Pa-Vant .....	.....	.....	.....	.....
11	Southern Pa-Uta	tcha-ub	i-an, i-vay	ti'-nye, ma'-vanto	a'ub
12	Pa-Uta of California	tsa-gi-i	iu-nu'hu	o-gva-na'gva	taveva'no
13	Chemehuevi	tcha-aibitch	ivantum	uv-h	ayravay
14	Uta .....	.....	.....	.....	.....
15	Capote Uta	sah-gàts-chee	è-ana	o'-wan	a'-gu-veh
16	Uinta Uta	sah-rat-chiv	e-veh	mah-val	a-af
17	Moqui Pueblo	ha-e-po'	ye-pe	aya'ka	pū-ū
18	Takhtam	kopibs	e'-epan .....	.....	ama'i
19	Kauvúya	suntchi	i-pinga	pi-ikon	ivokh
20	Gaitchim (of San Juan Capistrano)	netch-ki'n	u-va'	vuna'	hu-ti-inakh
21	Tobikhar (of San Gabriel)	mo-moa'	i-kva'	mu'ru	yamde
22	Kechi (of San Luis Rey)	a'm-me-o	ch-we'o	ah-wa'h-o	ip
23	Mohave	'thówk	'ny-áwāh	hò-beè	peè-tha
24	Mohave	hi-pauik	ni-a'ava .....	.....	bikha
25	Hualapai	nyal	ví-yak .....	.....	vam
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun	hi-be'	ni-ua'ke	ni-ua .....	.....
28	Diegueno	khailye-pai .....	.....	.....	pui
29	Yuma or Kutchán	hay-pun'	with-tha'	en-yun-yah'	en-yah-val-thu'n
30	Isleta Pueblo	yau-a-tin	nun .....	.....	yan-t-hú
31	Tehua on Moqui Mesa	he-e'te	ne ^o	oh	ney
32	Tehua, Los Luceros Pueblo	he-nà-nah	nèh-wee	oh-o-wèh	ne-hāh
33	Tehua, San Juan Pueblo	hi ^a -re	na'-ue	ya-ho'	ba-mo
34	Taos Pueblo .....	.....	tah-a'h-tah	wan-tah	tu-vè-ban
35	Jemez or Vallatoa Pueblo .....	.....	no-no	to-bo	ka-la-shur
36	Acoma Pueblo .....	.....	.....	.....	.....
37	Acoma and Laguna Pueblo	hau-e'ko	ti-i	vay-i	vay-i
38	Silla Pueblo	hau-e-e	ti-i	vay-i	vay-i
39	Wintún	tcho-ke'	a-e-ni'n .....	.....	bo-sonne
40	Kasúá at Santa Barbara	mutekh	i-ite	ho	gu-puel a'lishau

165. Yesterday.	166. To-morrow.	167. Yes.	168. No.	169. One.	170. Two.	
kä-ges-kau	es-ka-go	au	do-ta	da-tlä	na-gö	1
i-ni	es-kä-go	ha-au'	ä'	ta-khla'	naki	2
a-to-na	es-kä-go	au'	to-ta	a-khlai	a-ki	3
a-tan-täh	is-kah-gò	a-ò	to-täh	tah-ehleò	nah-keo	4
		oos	kay	sim-i'-tich	wat	5
heu-owh	tah-ik	eur-eur	cächo	shou-i	wai-i	6
		ugh-ugh	cotch			7
		uh-uh	cocteh			8
		uh-uh	kotch	cheet-up		9
		oo-ah'	katz	soos	wy-ü-ne'	10
ko'-au	ta'-ik	e ⁿ -e ⁿ	gatch	shui	vay	11
yu-mo'	au-va'hu	hu ⁿ -u ⁿ	karu-u	shu-mu'-ue	voa-hay	12
ku-auv	ta-ayk	ü-ü	katch	sho-oy	vay	13
						14
chi-amo	wets-chu	u-wy	katche	sòò-is	wy-ü-ne*	15
ke-ev	we-chnc	üv-eh, ü-üing	katz-he-he	so-ois	wy-üne	16
ta'-voko	ka-vo	o-üi	gai	shukb-ga	le-i, lei	17
ivin	o'-a	a'-ay	no'-u	auk-pe'ya	vürm	18
toko	paye'pa	he'-e	ki-il	sople	vuy	19
tnkum	poto'-okole	oho'	kai	sopul	vue'	20
po-a'na	hi-amne	e'-he	khai	pu-gu'	ve-he'	21
tu'k-ko	tuk-ko-mai	hō-öh	kaj	sup-löj	whi-i	22
tō-näi-yä	yim-ä-thäm	e'h	cävárrö	a-sayn'tik	há-weèk	23
tonaya	yamba-tham	e ⁿ	gavarik	ase'-entik	havik	24
maga-inya'-ham	hi-a'gum	e'-e	o'pa	si-tik	hovak	25
						26
	nye'gso	ey	o-me	si-si, shi-ti	ua-ke	27
gínai	me-tin-ya'ilgh	pil	ara-khamau	khink	o'-ak	28
ton-nigh'	kullee-yo'm	towt	koy-va'rack	thin-tay-kay	hah-vick'	29
u-ki-yan	kom-da'	a-ä	in-ta'-a	uim-a	ui-se	30
tchan-di	tan-di	boy	yo	vuy-i	vuy-ye, vu-ye	31
tsan-yè	tah-än-de	ha-an	yoh, wo-na-peò	we-è	we-yè	32
tsä-nde	ta'-nde	ä	yo	vuy-i	vuy-ye, vu-ye	33
		ha, hna	ho-ën-ah	wem-tem	wáy-en-ah	34
hom-ba, ho-üm-ba	se-di-le	yi	ä	pú	vue'sh	35
				ish-ke	uju-vai	36
so-a	na'tchu-ma	ha-a	tsa'	ish-ki	tiu-ve	37
so-a	na-ka'go	ha-a	tsa'	ishk'	tio-ä ⁿ	38
len-da	hi-ma	ho, o-mem	e'l'o	ket-et	bal-el	39
gsh-ta'-pin	nash-na'khiet	ho	se'-uilgh	pa'-ga	i-shgo'mo	40

* ü = French u.

	Tribe and dialect.	171. Three.	172. Four.	173. Five.	174. Six.
1	Arivaipa	ta-gě, ka gě	ti-đ	est-li	go-sto ^a
2	Arivaipa	rha-ge	ti-i ^a	ash-tla'	us-trhan
3	Návaejo	ka	te ^o	as-tla'	us-tá
4	Jicarilla	ki-eè	tin-eè	ats-chleè	cos-cón
5	Shoshoni	pite	wat-su'-et	man-a'-get	nav-iti
6	Shoshoni	pah-i	wa-chou-i	man-ök	nā-wā
7	Pa-Uta				
8	Pa-Uta				
9	Pa-Uta				
10	Pa-Vant	pi-une'	wats-u'-ene	man-i'-gin	nav-i-une
11	Southern Pa-Uta	pay	vatchu'-e	manigi	na-vay
12	Pa-Uta of California	pa-hi'	voa'tsa-gve'	manegi	napa'hi
13	Chemehuevi	pay	vatchu'-e	manuy	navay
14	Uta				
15	Capote Uta	pi-ü-ne	wats-sü-ü-ne	man-e-gin	nav-e-ü-ne
16	Uinta Uta	pi-üne	sü-üne	man-eh-gin	na-ve-üne
17	Moqui Pueblo	pah-hio	nā-le	tchibu-te	na-vai
18	Takhtam	pahe	voatcham	ma-hatcham	pa-ahave'
19	Kauvüya	pa	vuitchiu	namu-kuanon	kuan-sople
20	Gaitchim (of San Juan Capistrano)	pahe	vosa'	maha'-ar	auva'-khanuetch
21	Tobikhar (of San Gabriel)	pa'-hi	va-teha'	maha'r	pa-va'he
22	Keechi (of San Luis Rey)	pa-a	wit'-cho	num-mu-guan-o	sup-löj-nam-e-hon
23	Mohave	ha-möke	zumpapk	thörapk	my-sayn'tik
24	Mohave	hamok	tchung-babk	harabk	si-yinta
25	Hualapai	hamok	hoba'	hata'buk	tasbek
26	Hualapai				
27	Tonto or Gohun	mo-ke	hō-ba	sa-ta-be'	gesh-be'
28	Diegueño	hamok	tchibabk	selkbakai	niugushbai
29	Yuma or Kutchán	hah-mowk'	thowm-papk'	sar-ra'p'h	hom-hok'
30	Isleta Pueblo	ba-tcho-a	ue-an	pan-to	mā-tli
31	Tehua on Moqui Mesa	poy-ye	sho-no	pa-no	shi
32	Tehua, Los Luceros Pueblo	oh-yè	yoh-on	an-nèh	se
33	Tehua, San Juan Pueblo	po-o-ye	yo-no	pa-no	si
34	Taos Pueblo	bi'yoh	wè-an	un'-yan	mol-tla
35	Jemez or Vallatoa Pueblo	tā	vil	pen-to	miesh-tye
36	Acoma Pueblo	cha-mā	dian	tam	shish-ta
37	Acoma and Laguna Pueblo	tche-me	tsian	ta-ma	sh-tsis
38	Silla Pueblo	tchi-am	gi-a'na, tia'n	ta-ama	sh-tsis
39	Wintán	ba-nokhl	tla-uit	tsan-sem	se-ba-nokhl
40	Kasná at Santa Barbara	mas-gh	sgu'm	yí'ti-paga	yiti-shgo'mo

175. Seven.	176. Eight.	177. Nine.	178. Ten.	179. Eleven.	180. Twelve.	
g̃-sted-ò	s̃-pi	'n-go-sta	'n-ēz-nun	t̃lā-da-ta	ñ-gē-dā-tā	1
us-tsi-ki	tse-pi	ng-gos-tai	gu-tes-non	khla-ta-ta	naki-ta-ta	2
sus-tsit	si-pi	nas-tai	nes-tua	khla-ta-ta	nake-ta-ta	3
cos-set-eh	tsa-peè	nus-te-è	co-nez-nàn	klats-t-tch-eh	nah-keè-tsats-eh-eh.	4
tat-su'it	ny-wa't-su-it	shim-er'o-me'n	shim-mer'	shim-mer-sim-er-titch-ma-do-ick.	shim-mer-wat-ma-do-ick.	5
moqnesi	na-antz	you-weep	ma-tshou-i			6
						7
						8
						9
tat-su'ene	ni-wat-su'ene	sur-rom-su'ene	tom-su'ene	tom-su' - ene-soos'-spinko.	tom-su'ene - wy-une-spiuko.	10
mu-kuishe	nantchui	yu'vibe	mashu'	hugu-tchiping-va.	voihagu-tchiping-va.	11
ta'tsu-u	voshu'	kvanik	shu'van	shumu'tsuvuy-gut	voahama-tsuvuy-gut.	12
mukuishe	nantchui	yue'pa	mashu'	hugu-tchiping-va.	voihagu-tchiping-va.	13
						14
nah-rè-chi-ù-ne	wah-wats-su-ù-ne	so-oro-o-sù-ù-ne	to-wu'm-su-ù-ne	soos-quòs-spinko	wah-quòs-spinko	15
na-ve-kev-ù-ne	wats-su-ù-ne	su-mah-rum-su-ù-ne	tòm-su-ù-ne	sooks-spingua	wats-spingua	16
tseng-ge-e	nan-al	pe-ve	pak-te	sbukh-ga-a	ley-ga-a	17
voatch-geve	vo-a'otch	ma-akove'	voa'-hamatch	voa-hamatch-kopouk.	voa-hama-tch-vürm.	18
kuan-vuy	kuan-pa	kuan-vuitchiu	nami-tchumi	pata-sople	pata-vuy	19
se'ula						20
vatcha'-kabya'	vehesh-vatcha'	mahar-kabya'	vehes-mahar	puku-hurura	vehe-hurura	21
						22
m̃kò-weè-kān	m̃kò-mòkān	èllyou-thouk	r̃appōwik	r̃appōwik - osayn-tne-thwik.	r̃appōwik - h̃ā-wik-y-thōw.	23
vi-iga'	mu-uga'	pa-aya	ara'-aba'	ase'-entik-nitauk	havik-nitauk	24
hoa'geshbe	hamu'geshbe	hala-thu'ig	vua'ruk	sitigi-a'lagu	lovak-tia'lik	25
						26
hoa'gesh-be	mo-gesh-be	hal-se-ye	uave	uave-shi-ti	uave-uake	27
niok-hoak	niok-hamuk	nitchi-bab	selghiamat	niekhn	niekhnab - gush-baib.	28
pah-keah'	bay-pok'	ham-hah-mok'	sah-hok'	sah - hok' - miko-thim-tay-kay.	sah - hok' - mike-hah-vick'.	29
tcho-o	hue're	hō-a	ti-te-hem	ti-nim	ti-ui-se	30
tche'	ka-ve	kve-no	te'e'	te'e'-vuy-i	te'e'-vu-ye	31
seh	kah-vèh	quen-nò	tah-èn	tahn-weè	tahn-weè-ch	32
tse'	ka-a-be	gua-uo	tā-ā	tā-ā-vuy-i	tā-re'-vu-ye	33
tcho'h	whèh'lee	que'ah	ta-go'tah-mah	tah-wah-mah	tah-wah-nah	34
so-uh	fol	hol	tā	tā-po	tāvue-sh	35
mait-ja	cue-cumish	mayoca	k-atz	ish-k-atzizo	diò-katzizo	36
may-tyan	ko'go-mish	ma-yu-ka	gats	gats-ishka-sitchi	gats-tiuve-sitchi	37
may-tyan	ko'go-mish	ma-yuka	gats	gats-ishk'	gats-tio-ume	38
lo-lo-khat	se-tla-nit	ke-te-teles	ti-kha-les	ti-kha-les-ket-et	ti-kha-les-bal-el	39
yiti-masgl	mala'-ua	tapa'	gel-shgo'mo	tu-lu-u	mas-khe-sgumu	40

	Tribe and dialect.	181. Twenty.	182. Thirty.	183. Forty.	184. Fifty.
1	Ariwaipa	na-tin	kā-tin	tiz-tin	es-tla-tin
2	Ariwaipa	nā-tin	rha-ge-tin	ti ⁿ -tin	ash-tla-tin
3	Návaejo	nā-tin	ka-tin	te ⁿ -tin	as-tla-tin
4	Jicarilla	nah-tin	kah-tān	tints-tshin	ach-lah-tin
5	Shoshoni	wam-i'-no	pam-i'-no	wat-su'-wee-my	man-i'-gen-ny
6	Shoshoni	wai-matshoui	pahi-matshoui	wachui-matshoui	manek-matshoui
7	Pa-Uta				
8	Pa-Uta				
9	Pa-Uta				
10	Pa-Vant	wamp-su'-ene	pam-su'-ene	wats-u'-ene tom-su'-ene.	man-i'-gin tom-su'-ene.
11	Southern Pa-Uta	voyha'-mashu	pay-mashu'	vatchu'-mashu	maniki-mashu'
12	Pa-Uta of California	voaha-vanoy	pahi'-vanoy	voatsa-vanoy	manigi-vanoy
13	Chemehuevi	voyha'-mashu	pay-mashu'	vatchu'-mashu	maniki-mashu'
14	Uta				
15	Capote Uta	wāh-mas-see	pam-ah-sū-ene	wat-su-to-wom-sū-ene.	man-e-gin-to-wom-sū-ene.
16	Uinta Uta	wam-su-ūne	piem-su-ūne	wats-su-e-su-ūne	man-eh-gin-sū-ūne.
17	Moqui Pueblo	shu-na-tú	pai-pak-te	nale-pak-te	tchibu-shiki-pak-te
18	Takhtam	voa-va'-hamatch	paha-va'-hamatch		mahatch-vo' - hamatch.
19	Kauvúya	vays-nami-tchumi	pays-nami-tchumi		namu-kua'na nami-tchumi.
20	Gaitchim (of San Juan Capistrano)				
21	Tobikhar (of San Gabriel)	hurura-vehe'	hurura-pahi'		
22	Keechi (of San Luis Rey)				
23	Mohave	rāppōwik - takāthouche-hāwik.	rāppōwik - tākāthouche-hāmske.	rāppōwik - tākāthouche-zumpapk.	rāppōwik - tākāthouche-the'rapk.
24	Mohave	ara'bavik - takavutshavi'k.	ara'bavik-takavutshamo'k.		
25	Hualapai	vava-hovak	vava-hamok		
26	Hualapai				
27	Tonto or Gohun	uake-uave	moke-uave	hō-ba-uave	satabe-uave
28	Diegueño	selgh-hoa'k			
29	Yuma or Kutchán	sah-hok'-bah-vick		sah - hok' - thom-papk'.	sah-hok'-sar-rap'h.
30	Iseleta Pueblo	ui-ti	ba-tcho-a-ti	ue-an-ti	pan-to-ti
31	Tehua on Moqui Mesa	vuy-u-te ⁿ -e ⁿ	po'y-te ⁿ -e ⁿ	sho-nen-te ⁿ -e ⁿ	pa-non-te ⁿ -e ⁿ
32	Tehua, Los Luceros Pueblo	wch-tān	poh-wēn-tāh	yoh-nēn-tah	un-ān-tah
33	Tehua, San Juan Pueblo	vuy-tā-ā	po-un-tā-ā	yo-nan-tā-ā	pa-nan-tā-ā
34	Taos Pueblo	wē-tah	po'y-oh-tah	wee-an-tah	un'yoh-tah
35	Jemez or Vallatōa Pueblo	vue'sh-tā	ta-kva-tā	vil-kva-tā	pen-to-kva-tā
36	Acoma Pueblo	dua-k-atz	tsha-mia-katz	dianoa-katz	tama-a-katz
37	Acoma and Laguna Pueblo	tiuve-gats	tche-me-gats	tsian-ana-gats	tama-ana-gats
38	Silla Pueblo	tio-a'-gats	tchi-mia-gats	tian-ana-gats	tam-ana-gats
39	Wintún	bal-el-ti-kha-les	ba-nokhl-ti-kha-les	tla-uit-ti-kha-les	tsan-sem-ti-kha-les
40	Kasúá at Santa Barbara	i-shgomsh-gel-shgomo	masesh-gel-shgo'mo	shumush-gel-shgo'mo.	yi-ti-pa - gesh - gel-shgo'mo.

185. Sixty.	186. Seventy.	187. Eighty.	188. Ninety.	189. One hundred.	190. One thousand.	
go-sta-tin	go-sti-tin	sē-vit-tin	'n-go-sta-tin	ko-nēz-na-tin	ko-nēz - non - ko- nez-nā-tin.	1
us-trhan-tin	us-tsi-ki-tin	tse-pi-tin	ng-gos-tai-tin	gu-tes-non-tin	mil (<i>Span.</i>)	2
us-tā-tin	su's-tsit-tin	se-pi-tin	nas-tai-tin	nes-tua-tin		3
cos-kah-tin	cos-sit-tin	tsah-wit-tin	nos-tsai-tin	co-nēs-not-tin	yah-chet-tin-sas- quō-in-to-gō.	4
nav-ite'-wee-ny	tat-su-e't-wee-ny	ni-wat-su'-it-wee'- ny.	shim-me'r-o-men-ny	shim-me'r'-shin-me'r		5
nāwā-matshoui	moqesi-matshoui	nāāntz-matshoui	youweep-matshoui	matshoui-matshoui	matsou-matshou- matshou.	6
.....	.....	.....	.....	.....	.....	7
.....	.....	.....	.....	.....	.....	8
.....	.....	.....	.....	.....	.....	9
nav-i'-nne tom-su'- ene.	tat-su'ene tom-su'- ene.	ni - wats - su' - ene tom-su'ene.	sar-rum - su' - ene tom-su'ene.	soos-meh'		10
navay-mashu .....	.....	.....	.....	shu-mashu'-mashu'		11
navahi-vanoy	tatsu'-u-vanoy	voshu'-u-vanoy	kvaniki-vanoy	shu'-u-vanu-va'nu		12
navay-mashu .....	.....	.....	.....	shu-mashu'-mashu'		13
.....	.....	.....	.....	.....	.....	14
nah-ve-ū-ne-to- wom-sū-ene.	nah - ve - tah - to - wom-sū-ene.	wat-su-to-wom-sū- ene.	so-or-o-go-mus-tom- sū-ena.	such-sū-muh	to-go-me-sū-muh.	15
nah-ve-su-ūne	nah-ve-kven-su-ūne	wah - ats - sum - su - ūne.	sah-ar-rum-sum-su- ūne.	sooks-mäh	tom-sooks-mäh ..	16
na-vai-shiki-pak-te	tseng-ge-shiki-pak- te.	nan-al-shiki-pak-te	pe-ve-shiki-pak-te	pakte-shiki-pak-te.	sum-mule'	17
.....	.....	voa'otch - tchava'- hamatch.	.....	haukto'-om .....	.....	18
kuan - sople - n a m i - tchumi.	.....	.....	.....	namitchumi - nami- tchumi.	.....	19
.....	.....	.....	.....	.....	.....	20
.....	.....	.....	.....	.....	.....	21
.....	.....	.....	.....	.....	.....	22
rāppōwik - tākā- thōuche - mýsāyn- tik.	rāppōwik - tākā- thōuche - mýkō- wikau.	rāppōwik - tākā- thōuche - mýkō- mokan.	rāppōwik - tākā- thōuche - ellyōu- thouk.	rāppōwik - tākā- thōuche - rappo- wik.	rāppōwik - tākā- thōuche - rappō- wik - óchánjā- rāppōwik.	23
.....	.....	.....	.....	ara'bavik-hā° - hā°- rabavi'k.	.....	24
.....	.....	.....	.....	va'va-va'va	guitvava-guitva- va'ga.	25
.....	.....	.....	.....	.....	.....	26
gesh-be-uave	hoa-gesh-be-uave	mo-gesh-be-uave	hal-seye-uave	gu-tes-non-tin .....	.....	27
.....	.....	.....	.....	.....	.....	28
sah - hok' - h o m - hok.	sah-hok'-pah-keah'	sah-hok'-hay-pok'	sah-hok'-hum-hah- mok'.	sah-hok' sah-hok' ..	sah - hok' s a h - hok sah-hok'.	29
mā-tli-ti	tcho-o-ti	hue're-ti	hō-a-ti	ti-ui-tā-ti	mil (<i>Span.</i>)	30
shi-gin-te°-e°	tche-gin-te°-e°	ka-ve-gin-te°-e°	kve-non-gin-te°-e° ..	te-gin-te°-e°	mil (<i>Span.</i>)	31
se-wén-tah	say-wén-tah	kah-wén-tah	wag-én-tah	tan-én-tah	tan-én-tah-tan-én- tah.	32
si-gin-tā-ā	tse'gin-tā-ā	ka'-vin-tā-ā	gua-vin-tā-ā	tā-gin-tā-ā	mil (<i>Span.</i>)	33
mōh-lee-tah	cho'tah	whē-lee-tah	whē-eh-tah	ta'h-tah	ta'h-tel-lah	34
miesh-tye-kva-tā	so-ula-kva-tā	fol-kva-tā	hol-kva-tā	tā-nao-kva-tā	mil (<i>Span.</i>)	35
shish-ta-a-katz .....	.....	.....	.....	mi-tia-noa-katz .....	.....	36
sh-tsis-ana-gats	may-tyan-ana-gats	ko-go-mish-ana-gats ..	ma-yu-ka-ana-gats ..	gats-ana-gats	ishki mil	37
tchis-ana-gats	may-tyan-ana-gats	ko-go-mish-ana-gats ..	ma-yu-ka-ana-gats ..	gats-ana-gats	ishk' mil	38
se-ba-nokhl-ti-kha- les.	lo-lo-khat-ti-kha-les	se-tla-nit-ti-kha-les	ke-te'-teles-ti-kha- les.	.....	.....	39
yiti-shgomsh-gel- shgo'mo.	yi - ti - maskhesh- gel-shgo'mo.	malanash-gel-shgo'- mo.	tapa'-esh-gel-shgo'- mo.	ciento (<i>Span.</i>) .....	.....	40

	Tribe and dialect.	191. To cat.	192. To drink.	193. To run.	194. To dance.
1	Arivaipa	in-na	in-tla	in ^l -gütr	in-zhlish
2	Arivaipa	i-shā	ish-tla'	el'-khan-tash	i-shish
3	Náwajo	a-te-shi ^a	es-tla'	akh-rhate-ti-tas	a-te-shish
4	Jicarilla	e-sháh	coos-schlá	e-tens-káh	tisch-klò
5	Shoshoni	my-dick'	my-he'he	nook .....	.....
6	Shoshoni	terr-ki	ee-be	noquee	neur-ki
7	Pa-Uta .....	.....	.....	.....	.....
8	Pa-Uta .....	.....	.....	.....	.....
9	Pa-Uta .....	.....	.....	.....	.....
10	Pa-Vant	tick-i'	e-bee'bee	pun-ker'-ro	weep-pi'
11	Southern Pa-Uta	to-kay	hi-bi, hi-vi	nò-kvi	vu'-nimi
12	Pa-Uta of California	tu-ga'te	hi-vi't	poyo-ha't	ne-ga't
13	Chemehuevi	'okara	hi-viga	tra'-vuits	anu'-miga
14	Uta .....	.....	.....	.....	.....
15	Capote Uta	te-ca'h-we	pah-e-ve-vah	to-wo-quo	we-èp-pah-wile
16	Uinta Uta	te-que	e-ve	toque	wee
17	Moqui Pueblo	nish-ni, nish-a	hi-i-kon	va-shiki-ni .....	.....
18	Takhtam	raukts	pa-akain	yakain	tchatchokin
19	Kauváya	nu-vayak-nik	m'-pa'-aka	pini'-vaka	hentchen-enka
20	Gaitchim (of San Juan Capistrano)	na'-atch-khon	pa'-a-an, pa-tchel	huk, ho'-uk	pe'le-e
21	Tobikhar (of San Gabriel)	kva-akh	bakh	yamino	ya-ke'a
22	Kechi (of San Luis Rey)	puh-i-kut	pah-kut	ya'ja	ta'n-i-ka
23	Mohave	tchér-máhm	hah-the'ya	n'ebèsk	n'tcheè-mak
24	Mohave	mam	akha-thim	hi-vesk .....	.....
25	Hualapai	maga	akha-thiga	vuya'muk .....	.....
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun	ma	ha-si	vi-ya-me	ye-ma
28	Diegueño	kisau	kisi	ganau	ima'
29	Yuma or Kutchán	ah-mahm	es-sém'	ah-visk'	ah-muck'
30	Isleta Pueblo	ku-kal	ā-sui	ama'-be	a-fu-ere'
31	Tehua on Moqui Mesa	te-hui-yam-i	tai-shom-i	te-e'-no-vi .....	.....
32	Tehua, Los Luceros Pueblo	yan'-ko	yan-sung-ah	o-èan	e-vee-yàh-reh
33	Tehua, San Juan Pueblo	gang-ko'	ga-su'-a	o-ā	oy-kba'-re
34	Taos Pueblo	coo-cal-buyo	ap-pa'h-zoh	cou'-quee-ah-wee'-ah .....	.....
35	Jemez or Vallatoa Pueblo	te-ku-cl-yo, tse-le-le	se-shò-sho	me-neso	tcho-o-so
36	Acoma Pueblo	nāü-yue-tān (?) .....	.....	.....	pash-co-a-tzan
37	Acoma and Laguna Pueblo	nob-si	ni-esh-ga-si	ko-mi'-tsa	ke-tset
38	Silla Pueblo	nob-si, tchup'e	ni-esh-ga-si	ko-mi'-tsa	ke-tset
39	Wintún	ba	bu-lá	kai-sha	tchu-na
40	Kasná at Santa Barbara	shalshun	sakmil	palpat	pne'-ugh

195. To sing.	196. To sleep.	197. To speak.	198. To see.	199. To love.	200. To kill.	
idn-kr, idn-ā	ins-hūsh	yānl-ski	ns-klī		'ds-kā	1
i-tish-a	ish-kush	yāl-i-le	te-shi-i		sel-khi ^o	2
ko-te-trha-l	i-te-skush	yantl-ti	tī'sh-i ^o		nīs-skhi	3
hab-tish-èh	disch-kèh	has-tseò	desh-è	kasch-tèh	din-scheè	4
e-moo'	ep-wee'				ma-wash, mah-gar-vic.	5
ō-w' y-ti-we	o-pwi	ahmpi	po-nicki	a-ar-son-t-we	par-ki	6
						7
						8
						9
kah	ep-weh'	at-a'm-bar			puck-i'	10
hn-vi'-tuy	o-puy, o-vui	peshe'-toni	pu-nika	aya'-vuay	pa-kay	11
huvi-eru't.	u-vuit	yaro-hat	tu-vuni'ti	avi-zzavi-tini'-emu'-no.	avatsat	12
hovi'tova	opu'tiga	ium-pu'gara	po-niga	aya'vuay	pagarha	13
						14
kuy	puy	ah-pāh-gah	ah-tu-pu-le-chè	pì-ke	pāh-ke	15
ki	h-pwui	um-bār-reh	my	ār-sen-te	pūck-ke	16
tao-lao	pe-hue'	ya-a-ata'	tūsh-ta-a		ni-na	17
	kumunikin	vera'-verenkein	hiekin		meyka'n-akin	18
n'takha-moka	hengup-ka	hengo'taska	penta'huik		penmeknik	19
helkh	ku-uple	ta'-le	tele'vua		mo're	20
tehe-e'a	ya-ta'm-kuan	si-ra'ua	u'toa		muka'nakh	21
ya'o-weh	kup-kut	mu'm-mul-kun.	da'o-ah	e-mak-muk	mu'k-ku-eh	22
ēss-wak	ēss-māhm	sa-quār-ro	ē'-chēe-ook	māark	tā-pōw-ōgee	23
his-vark	hismam	tcha-koark	hi-samk	mu-hank	tapu-yum	24
so-a'rik	smag	kvauk	akha'muk	maha'nik	tokva'naga	25
						26
shva'te	sh-ma'	kua-ue	o-o		ta-ve	27
shgi-yau	akhuma'	ay'	i-yib		amotch	28
ah-sark'	sm-a-o-mah'	es-wh-querk'	ah-see-youk'	ah-may-homkey	ah-tay-pourk	29
a-tcha'ai	a-tchi-abe'	a-tui	ko-mui		a-hoi	30
to-kau-a-mi	o'o-ka-mi	i-hi-li-o	hā-go		o-hcy	31
ich-cha-wan-meh	e-ne-yok-ù-wee	o-hèh-an	nah-mù-ree	nah-yun-dar	nah-hèh	32
ga-kau-na	oyo'ku	o-hi-a	na-mo-re	ui-ta	vo-khe'vue	33
yah-tāh-huh	oon-co'-ah	et-tū-hah	co-mū-ah		ho'h-yar	34
						35
mos-tsa-ay	va-to-ko	po-ve-he-ots	va-mo-i.		ba-ō	36
	kai-patū					37
koyot	si-pat'o	ga-tsa	go-ksh	f'en-ese	ka-ut	38
koyot	si-pat'o	ga-tsa	go-g-tch	t-en-ese	ka-a-ut	39
tchau-ava	khe-na	te-e-ne	ue-ne		kla'-ma	40
pekh-pe'tch	pue'	pti-pta'-ulgh	p'gu'ti	psu-guan	psi-ni-ue	41

	Tribe and dialect.	201. To sit.	202. To stand.	203. To go.	204. To come.
1	Arivaipa	'n-ta	'n-ta	tī	yu-stē'
2	Arivaipa	n-sh'ta'	zzi-zzi	ta-ti-sha'	pe-ni-yil
3	Návaro	ni-ta'	tan-neh-hish-shà	in-al, ni-lo	hish-shàh
4	Jicarilla	dish-tèh	tan-neh-hish-shà	nah-tes-àh	hish-shàh
5	Shoshoni	cah-ree	way-nee	me-a'-ro	kim
6	Shoshoni	cah-ree	way-nee	ooraw-quoi	pepeeche
7	Pa-Uta .....	.....	.....	pike-way	pike-ee
8	Pa-Uta .....	.....	.....	pi-gua	pi-cai
9	Pa-Uta .....	.....	.....	pi-qua	pi-kā
10	Pa-Vant .....	.....	one-e' (to stand up)	pike-gway'	pie-ha'
11	Southern Pa-Uta	uti-ki	vuenit	pey-kve	pay-ki
12	Pa-Uta of California	gatut	vuenit	me-a'nt	ki-mat
13	Chemehuevi .....	.....	.....	uru'a	pi-pitch
14	Uta .....	.....	.....	.....	.....
15	Capote Uta	càr-ree	wè-nee	pike-way	pi-kè
16	Uinta Uta	kar-reh	win-nee	pi-en-nuck-que	kw'hy
17	Moqui Pueblo	gate-e	na-ba	te-mui	bi-te
18	Takhtam	no'-upkain .....	.....	nekhnuma'-kain	kemakain
19	Kauvúya	henyaskon .....	.....	nitchika	ni-ikan
20	Gaitchim (of San Juan Capistrano)	peve'-ekh .....	.....	mo'num	heti-ikhnum
21	Tobikhar (of San Gabriel)	to'ba	to-bakh-aro'	ma', mèa	mahikima'
22	Kechi (of San Luis Rey) .....	.....	hi'-o-wah	hasp-a	nuk-ku
23	Mohave	hín-nák	kí-wówh	kec-èmp ^k	kec-theèk
24	Mohave	hi-mank .....	.....	.....	.....
25	Hualapai	nu-u'a	vis-voiga	mi'am	yu-uk
26	Hualapai .....	.....	.....	.....	.....
27	Tonto or Gohun	o-a'	ish-kvi	hā-mi ^a	miush-ya-me
28	Diegueño	tchiki-yan .....	.....	gi-yamkam	ki'yu
29	Yuma or Kutchán	kay-muckey	ah-vay-oughn	yah-moum'	kay-dee'k
30	Isleta Pueblo	ha-tley	a-kuin	ha-mi ^a	ha-i ^a
31	Tehua on Moqui Mesa	o-sha-age'	o-ny-no	te-ā-to'-oye	o-bo-ā
32	Tehua, Los Luceros Pueblo	oh-sò-ghee	oh-wèen-oh	wèh-pe-um-ah	oh-chee-àh-wèh
33	Tehua, San Juan Pueblo	o-so-ge	am-bu-e'-so-ve	ya-ho	o-ke-e
34	Taos Pueblo	ehl-te' .....	.....	ebn-mah-ah'	mare-hu'-er
35	Jemez or Vallatoa Pueblo	bata-ā .....	.....	po-ve	pa-ā
36	Acoma Pueblo .....	.....	.....	.....	.....
37	Acoma and Laguna Pueblo	tchi-go-ya	ti-a'-kay-tat	kau-ma-na	hau-es-tsos
38	Silla Pueblo	tchi-go-ya	kay-tat-yi	ka-u-ma	hau-es-tsos
39	Wintún	ken-khla-a'	a-le-gaya	hara	uc-ra
40	Kasúá at Santa Barbara	le'-ge-ene	pno'-no	knan	pi-u'ti

205. To walk.	206. To work.	207. To steal.	208. To tell lies.	209. To give.	210. To laugh.	211. To cry.	
n-da-two	na-i-zit	'dn-u	klen-stō	ē-wam-ban-i	i-tlo	nez-gūsh	1
	nay-sit			shne'			2
		ani-si ⁹		nā	tchotlo'		3
nah-sh th	nah-is-ceè	in-dish-sheè	dah-tschäh	pah-un-èh	in-nat-tchlò	con-dèh	4
			ish-ump'	mote	ye-àn-net		5
croi	mah-nik	eur-yungi	quee-tan	mah-rang	kee-abne	yārai	6
							7
							8
							9
pah-wi				mug-gi'	kee-en'	yah-gi	10
pane-parhay	hara' nini	ui-ingi	kui-ta'n	mau-in	ki-ene	yarhai	11
nu ² -uit	voa'git	noka-gat	isheab'	age'af	nishua-it		12
	tuve'aoy				ki-a'noya	ya-gat	13
							14
pah-güb-neh	o-ree-e	ink-ah	tu-wish-er-er	mah-gah-e	ko-äl-leh	kah-bah-bah	15
pi-way	un-nik	kee-we-ne	tu-wish-er-ch	nu-ru-pch	key-en-ne	yèh-reh	16
kui-nang-go	te-maya-ita	ü-üyi	atcha-ta'	tab-ki	na'ni	tchele-u-va	17
	teya-teyakin	eya'km			meakain	vuinkain	18
	hinta-akha'aka				semka	m-vaika	19
	ovo'okhtch	eyo'otitch		telemeket		to-oike	20
yungino	me-hue'khvua	pu-kitcha'	ya-ga're		mea	pau-e'nakh	21
walk-sil-ö	tö-wa'h-hö	i-tu'il	i-is-töt	ök'-kom	sas-sö'-um	nun-ni-kut	22
hèe-bák	izzumkyook	cö-cheèt-wuk	mät-wöh-toy	àyim	chì-ko-warum	e-meëm	23
				hamgue'rgik	tchego-varum	himin	24
				guve'guk	tigu-va'tuga	mi-ya	25
		ti-ituk					26
	kie'nu-veto				te-ku-e'te		27
	matakhuäl	shokho'				au-a'n	28
ah-vay-agh	ach-yem-a-voom	quot-chich	sin-yeef		es-que-va'r-ack	ah-meem'	29
	a-tor-a-tai		koko-atä-ma	yai-yu-dä	ha'su-day	a-tchi-ru	30
		i-sheng-ä	i-holi-ä	na-telu'	na-bay-i	kay-na-bay	31
tah-hö-muy	an-to-äh-me	en-sem-äh-me	en-hay-äh-me	hah-we-ni-me-gèh	nah-pah-è	nah-kee-èh	32
ya-ho	ya-khan-to-ame'	en-sa-mo-me	m'boyo	na-teyi	o-ba'ka	na-kyi	33
en-yeef-ee-ah	en-chee-te'	en-flat-è-yah	en-klat-wat-è-yah	mil-e-chek'-wee-ah	net-tu-moy-ah	co-hee-hoh-ah	34
	vasa-a-ä				va-get-no		35
	sto-ha-etzin	toa				cä-tchique	36
	no-tan-si	ko-tchau-a	ko-yu-petch	tchap'k	tsu-pa-yats	gush-gaits	37
	no-tan-tchi		ko-yu-petch			gush-ga-itsi	38
	eor-na	ka-ya	ba-la	tōy-ut	nuy-ya	watch-a	39
pual-na'laiigh	pko-nu-momo'-netch	pkho'-non	pkho'-ugh	ga-khi-egs	pko-on	psa-guotsan	40

APPENDIX.

ADDITIONS TO THE VOCABULARIES, CONSISTING OF TERMS NOT INCLUDED IN G. GIBBS' LIST OF WORDS, AND OF A VARIETY OF PHRASES AND SENTENCES.

GENERAL REMARKS.

The long list of 211 English words, which has served as a guide for obtaining Indian vocabularies during the last twenty years, is in its main features much older than G. Gibbs' time, for printed lists embodying most of its terms were issued in the form of circulars by the War Department as early as 1804, and most of the vocabularies published by Albert Gallatin were obtained from this source. If abstract terms had been entirely rejected this old list would have been even more useful than it has really proved to be.

The old list of words, as well as the more recent one of G. Gibbs, shows deficiencies which it is quite important to notice in order to judge correctly of the merits of the present collection of forty vocabularies. Of the true character of the Indian languages, and of the great differences observed among the various Indian languages, the originators of the lists had a very imperfect idea. They did not specify with accuracy the terms to be submitted to the Indian informants, and, therefore, some Indian dialects closely related to each other strangely differ in the present collection in some terms in which we expect them to coincide. Facts like these cannot be charged to the word-collectors of the volume before us nor to their Indian informants. A few examples will suffice to put this in evidence:

When asking for the terms *bear*, *deer*, *rabbit*, *wolf*, the investigator will get words the real meanings of which he does not know; what he obtains he will know only when he inquires for black bear, cinnamon bear, grizzly bear; for white-tailed deer, blue-tailed deer, mule-deer; for white, gray, jackass and cony-rabbit; for gray wolf, coyote or prairie-wolf. The same may be said of the majority of classes of animals; in inquiring for *snake*, the word-collector usually gets the name of the snake species most frequently found in the country visited.

The word *feather* will convey no distinct meaning to some Indians unless asked for tail-feather, wing-feather, or down. In *maize* the terms for the various portions of the maize-stalk must be obtained separately. Most Indian languages have different terms for clear *sky* and clouded sky, for the *moon* as a divider of time and the moon as appearing in four different phases, for *cold*, *lukewarm*, *warm*, and *hot*, when referring to the weather, and when said of animal temperature or the temperature of the water.

Our term *friend* has no meaning to most Indians, unless you inquire for "companion," or "one who goes with you, or him." The idea of *warrior* is obsolete now among most tribes of the Pacific States. *Valley* as well as *autumn* are unknown in

that sense which we desire to convey, for valley is to them either a grassy plain, or a cañon, deep vale, dell, and their terms for autumn mostly refer to the temperature of the weather at that season of the year. In most languages *stone* and *rock*, *hillock*, *hill*, *mountain*, and *ridge* are considered separate ideas, and are therefore expressed by terms differing widely from each other.

In inquiring for *verbs*, the sense of the query must be still more specific and unmistakable than in inquiring for nouns. Indians possess an infinity of verbs of going, coming, walking, standing, falling, lying, speaking, seeing, according to the various modes in which these acts are performed; nevertheless, it is true that some of their dialects possess generic terms to express them, like the European languages. The clearest and most definite information for comparative vocabularies can be obtained here when we inquire for terms unmistakable, and therefore expressed by one Indian equivalent only, like *to bite*, *to pinch*, *to scratch*, *to cough*, *to breathe*, *to bend*, *to twist*, *to swell up*, *to snap in two*, *to break in two*, *to break at one end*, etc., with their passive, medial, causative, reciprocal, reflective, impersonal forms wherever such are found to exist.

ARIVAÍPA—VOCABULARY No. 1.

Like all the other Tinné dialects, those of the southern branch of this family present uncommon difficulties in rendering them phonetically. A long acquaintance with one or several dialects is required to express any of them with accuracy by means of one of the modern scientific alphabets. This remark applies as well to the present vocabulary, taken by Mr. G. K. Gilbert, a geologist of the Expedition, as to Nos. 2, 3, and 4.

List No. 1 was obtained, by means of the Spanish language, from Concepcion, a Mexican, who had been taken captive by the Arivaípa Indians in his childhood. He spoke this dialect with fluency, but his Spanish was rather defective.

Mr. Gilbert's *sch* is the German *sch* in *Eschen*; his *tsch* is a compound of *ts* and English *ch*; 'n is a strongly nasalized *n* standing without a vowel; *ü* is the German *ü*, and *kh* the guttural aspirate. Macrons (*ā*, *ū*) often serve to mark emphasis, not quantity of syllables.

Sin-snō-sa, *star* (67); *tzitl*, *hill*, *mountain* (90); *iñl-gütr*, *to run* (193). These three words are but very poor approximations to their true sound. *mbā* is *prairie-wolf*, *coyote-wolf*; *klish-nē-zhō-zhē* (118), lit., "snake without rattles;" *ka-dí!* enough! that's the end!

ARIVAÍPA—VOCABULARY No. 2.

Dr. O. Loew obtained this series of Apache words at San Carlos, Camp Apache Reservation, collating it afterwards with the interpreter, Marcial Gallejos, a Mexican, who had lived fourteen years among the Apaches. Here, as well as in the other vocabularies obtained by Dr. Oscar Loew, the diacritical marks adopted by him for the *ũ* and the nasalized vowels, as described in "Classification" above, had to be, in many instances, replaced by *û* and by *n* superior: *eⁿ*, *iⁿ*, etc. Softened vowels were written either *a^o*, *o^o*, *u^o*, or *ä*, *ö*, *ü*.

Additional words and sentences: *

Tin pot, vase pes-tus.
Hole oyan.
Squirrel tseskosi.
Crow, raven..... tchishuki.

Bean-plant. miⁿ.
Soapweed (*Yucca baccata*).... koye-tsose.
Mullein (*Verbascum*) tseshi.
Sunflower (*Helianthus*)..... na-tlitso.

* Sentences partially extracted from "Zwölf Sprachen aus dem Südwesten Nordamerikas, von Albert S. Gatschet; Weimar, 1876. 8^o." Page 93.

ARIVAÍPA—VOCABULARY No. 2—Continued.

Many, much.....tlaó, tlā-o.
 Just now, presently.....titchi^a.
 Whisky.....tu-ntchi.
 Beer made from Indian corn.....tukhl-pai.
 Paper.....nal-tsos.
 Leather.....kat-il-tchi^a.
 Saddle.....tkhli-vi-gil.
 Stirrups.....tkhli-tares-es.
 Road.....te-ya.
 Trail.....i-tkhin.
 Ass, mule.....tul-kay-a.
 Oak.....shi^a-tsal-pay-e'.
 To cook.....i-pesh.
 To beat.....kli-mil-tsa-se'.
 To throw.....te-nush.

To drink.....estla'.
 I drink.....shi estla'.
 Thou drinkest.....ni estla'.
 He drinks.....a-guan estla'.
 I do not drink.....shi to'-estla-ta'.
 I have drunk.....shi estla'-go.
 I shall drink.....shi il-estli-khn.
 The water is very far.....n-sa^{nt} to'.
 The water is good.....to' n-sho^a.
 Where is the water?.....kha-e-la to' ?
 I have wood.....shi tchish hō-tli.
 I have no wood.....shi tchish e'-ti.
 I see a man.....shi tish-i^a i-nte.
 The man is not old.....nte to-hasti^a-ta.
 He has a horse.....an itkli hōtli.
 I have three horses.....shi itkbl rhage hōtli.
 He has meat.....an pi-i-tsi hōtli.
 I have tobacco.....shi nato hōtli.
 I have many rocks.....shi tsē tkhlotash nil hōtli.
 I give you tobacco.....shi nato shne'.
 I am a good man.....ni shi 'nte ken ni-shō.

To think.....nzze.
 To possess, own.....hōtli.
 To want, require.....ashti^a, zza-zzi.
 To masticate.....fish-al.
 To give.....shne'.
 Not to give.....to-shne'-ta.
 Cloud.....ya-guss.
 Tobacco-bag.....nato-zzis.
 Not good.....to-sho-ta.
 Bad (said of weather).....hai-go.
 Red.....tli-tchi, tli-tcho'.
 Day after to-morrow.....naki-skā-go; cf. naki, *two*.
 What?.....kha-te ?
 Where?.....kha-e ?
 I, my, mine.....shi.

He is good.....an n' shō.
 The grass is good.....tlō shō.
 He knows nothing.....i tu titsa takh.
 I do not know.....to tista ta'.
 I want nothing.....to ashti^a ta.
 I am hungry.....shi 'nta-a sitsā.
 It rains hard.....tlā-o natli^a.
 It is bad weather.....'nta haigo; na to-shō-ta.
 The wind blows hard.....nakate n'yul (or nal) itchi^a.
 This mountain is very high.....tsikhil n'tchā hi.
 I believe it is very near.....shi akhane nzze.
 I have seen many people.....shi shi^a tau vatye.
Green, tu-tli-shi, occurs in 98, *leaf*.
Here, n-tsā-ge, No. 162, is the demonstrative pronoun *this*.
There, a-koy-ya, No. 163, is the demonstrative pronoun *that*.
Rattlesnake, No 119; compare the tribal name *Lipan*.
Prairie, ku-til-kō, No. 89, is given in other MSS. of Loew for *mountain, hill*.
Hill, tsikhil-nas-ā, No. 90, is given in other MSS. of Loew for *island*.

NÁVAJO—VOCABULARY No. 3.

Obtained by O. Loew at Fort Defiance, New Mexico, in June, 1873 :

Cigar.....khlil.
 Frog.....tchā-tlo.
 Mule.....tchan-es.
 Butterfly.....kha-nil-ai.
 Bag.....azz-izz.
 Saddle.....tkhli-vi-gel.
 Whip.....te-e-tits-khis.
 Lead.....te-el-tokbo-ka.
 Cedar.....kb-khat.
 Soapweed.....na-tyes-kai.
 Sage-brush.....tsi-nil-tsil.
 Resin, pitch.....tche'.
 Root.....pe-ke-tlal.

Willow.....tkhai.
 Greasewood.....toku-shi.
 Pottery.....ki-tsil.
 Cloud.....k'-os.
 To eat.....es-tla', a-te-tliikhil.
 To sing.....as-trbal, ko-te-trha-l.
 To scalp.....tsetsetsokhiskhan.
 I do not understand.....to-tisa-ta'.
 M; mine, kha; kha-tsi-tsin, my head. Possessive pronouns are constantly prefixed to the parts of the animal body.
 All, ital-tso', No. 157; in other MSS. of Loew, sit-al-tso, cf. al-tso', *we*, No. 152.

JICARILLA—VOCABULARY No. 4.

“The Jicarilla tribe consists of about seventy families, averaging from five to six persons to a family.

“This vocabulary was obtained from a very intelligent Indian, son-in-law of the

chief. After giving it he insisted upon its being read over to him for any corrections that might be needed."—*Dr. H. C. Yarrow.*

Additional terms:

Jicarilla Apache (tribal name)	Tan-nah-shis-en "men of the woodland."	Whisky	kush-che-heh.
Goatec (sort of beard)	shit-ta-gah.	Tobacco-pouch	pe-nāh-sis-en-dèh.
Knuckles	shil-las-gos-c-tèh.	Hare	cats-tzò.

SHOSHONI—VOCABULARY No. 5.

This vocabulary contains: 1, words obtained from natives of Western Utah; 2, terms copied from "D. B. Huntington's (printed) vocabulary of the Ute and Shoshone dialects," subsequently verified with the help of the Shoshoni Indians visited in Western Utah. Additional terms:

Bear	oo-rèts-ey; the generic term for <i>beast</i> .	Hat	tits-o'-mo.
Bridle	tun-bùp.	Money	lay-pe'e-ase (Chinook jargon: <i>la pièce</i> .)
Brown	soop-she'-bit.	Milk	pit-see.
Enough	so-bi'-gush.	Noon	tab-by'-pant.
Fat	yo-pe.	Paper	tu-wu'p.
To run fast	kit-tànk-nook.	Road	po'.
"Fish-hunt"	pan-gwitch-mo-wick.	Saddle	nar-ri'-no.
Kill thou!	my-beck! imperat. of ma-wash.	Sunrise	tab-by ti'-wick.
Go away!	me-a'-ro!	Sunset	tab-by ti-oi.

SHOSHONI—VOCABULARY No. 6.

Obtained from Shoshoni Indians at Hyko, Nevada.

Good water	a-op-ne pah, i-van pah.	Mountain sheep	nā-āh.
Gunpowder	coo-chop.	Mule	moo-retz.
Dust	ō-coomb.	Lizard	sigopitz.
Cottonwood tree (<i>Populus wip, sa-wipo monilifera</i>).		Frog	wa-ra-tatz.
Willow	mā-āp'h.	Black beetle	oh-oo-cooby-chatch.
Wagon	ō-embunk.	Grapes	ya-āp'h, ya-if.
Shirt	nā-roo.	Species of prickly greasewood	moo-lou-nup.
Pantaloons	coos.	Doctor	po-war-rant.
Boots	pah-rap.	White man	byko.
Hat	ky-chotz.	Sick white man	byko na-ram-me.
Handkerchief	pŷ-yōn.	Lost	week-a-too.
Belt	nā-pop.	Near	char-rip.
Cloth	mou-kof'p.	Tired	toon-toombi.
Calico	son-quarup.	A long way off	me'onè.
Needle and thread	sape-chanum.	A short distance	chā-ip.
Rifle	coquip.	Something	ou-mak.
Gun, bow	arche.	Anything	man-o-wan-gash.
Carbine	foom-pien.	All right	o-quee.
Sunrise	tar-rā-pitz.	To do	oh-nee, oh-nee-wan.
Midday	towai ta-wi.	To know	poo-tootchaway uhkum.
Box	oh-wee'-coo-nup.	To strike a light	man-ik cōne.
Paint	ō'-omp.	To smoke tobacco	quot-ki.
Prairie-wolf, coyote	shee-nap.	To break	co-pō quānak, manik copoqna-nak.
Food	ker-ki.		
Give it to him!	neen marang!	I know it, over there	oo-woo-quaroi, poo-qwant-quaroi.
Give it to me!	neur-'ne marang!	Is he going?	ooro-uns-kāūng?
I give it to him	neene marai.	I am going	roo-ong-bau.
What time is it?	ah-noko-quit-yoni?	Be quick now	be-tengass-ong, pe-tēng-ōn-ing.
Where is it?	ah-ra-wa-co-do-jin?	Go home! go back!	pi-equáy-i-wan!
Where?	ah-ra-wa?		
Where is he?	ah-ra-wa-qua-eeing?		

SHOSHONI—VOCABULARY No. 6—Continued.

Stand up! win-e-wan!	Do not tell him! catch tenay!
Sit down! ker-kari-van!	Come to me! her-beur wa-king-o!
To ask to sing hoo-wee-tong-oo.	Too much ah-wan.
To ask to speak em-parang.	Plenty of tee-weetz.
I will sing weeto-wano.	To give away withoutequiva- lent. nawash marai.
I am going to sleep opwi-i-wan, opwi-i-ban.	By and by rain comes on peki pah-gur-nap pee-pee-che.
To travel oo-raw-quoi.	
I will not do it catcho wan.	

PA-UTA—VOCABULARY No. 7.

Vocabulary No. 7, with these additions, gives the Nuáguntits dialect of the Pa-Uta Branch, spoken in Las Vegas Valley, Nevada.

Bread zamitamop.	Blanket ossowām.
Hat kai-zot.	Spur tiupe-wine-up.
Onion hungitz.	Saddle carrau-oop'.
Lips tepera-bō-ye.	Carbine atch.
Matches mahā-gone.	Pistol towittee-patch.
Tent paritchive.	Sugar piāvee.
Old man nap-po.	Scabbard zit-n̄-ook.

REMARK.—The Pa-Uta will not tell a "Hyko," or white person, their name for baby or anything else they hold dear, believing it would bring ill luck to the object of their regard.

PA-UTA—VOCABULARY No. 8.

Same dialect of Pa-Uta as vocabulary No. 7.

Stop! muck!	Hat cai-zat, cai-tchot.
Spring of water pah-punip.	Coffee he-ba-nub.
Shirt na-raud.	Bread za-me-ti-moeb.
Lip te-pe-ra-boi.	Willow kanap.
Blanket mur-ro.	Root hang-gize.
Book, printed matter poe-o-quat.	Knife scabbard zin-u-ak.

PA-UTA—VOCABULARY No. 9.

This vocabulary, with the additions subjoined here, gives a Pa-Uta dialect as spoken at Cottonwood, a short distance northwest of Las Vegas.

White man hy-ko.	Horse-fly pi-pit.
Man tau-wats.	Blanket mo-row.
Old woman maman-mitz.	Belt na'-pup.
Noon ta-toi.	Scabbard wa-cu-nu'c.
Bread se-me-ta-mup.	Matches mah-koon.
Coffee he-ben-up.	Penis wah-um.
Spring (of water) pa-poon-up.	Canteen oats.
Hat ki-chaw.	Pine (<i>Pinus edulis</i>) te-wa.
Shirt na-row.	Mountain mahogany tree (<i>Cer-</i> <i>cocarpus ledifolius</i>) he-bo-na.
Pantaloons koos.	Cedar-tree saw'-we (nasal).
Boots pack-up.	

PA-VANT—VOCABULARY No. 10.

"Many of the words given here are taken from D. B. Huntington's (printed) vocabulary of the Ute and Shoshone dialects, but were verified by myself from Indians used as guides and others."—*Dr. H. C. Yarrow.*

By inadvertence this vocabulary was placed among the Pa-Uta dialects, while its proper place would be with the Uta vocabularies, Nos. 14, 15, and 16.

PA-VANT—VOCABULARY No. 10—Continued.

Additional words and phrases:

Lodge-pole	wahn-din'.	Antelope	wan-zi'ts
Arrow-point	pan-no'w-nump.	Boat	o-bi's-hock.
Knife	wei'tel (pronounced with forcible expiration).	Bed	sham-n'p.
Clock; lit., "sun-trap"	tab-by-nu'mp.	Beads	tso.
Beaver-trap	pow-inch'yeari-nump.	Comb	nan-zu'r-i-nump.
"Fish-hunting"	pan-gwitch' pushager.	Chair	car-ry'-nump.
Red shirt	an-ka'r tah.	Cloud	pah-ge'r-nump.
Yellow, or brass-colored	wah-ke'r (also name of a celebrated Uta chief).	Cedar-tree	waap.
Old man	nan-i-peds.	Cat	moo-chich.
To be drowned; lit., "to water-die."	pah-e-i-ŷ.	Doctor	poy-gan'd.
All gone	to-pic'-quay.	Devil	shin-no'b.
Go with me!	tam-my'-nah-wah!	Flour	tu-shu'-kent.
Liar	tu-wish'-er-er.	Gun	tum-by'oo.
I do not know	um-pio'; katz poo'-soots-a-way.	Gone away; lit., "not stay-ing."	katz ka'-ra.
		Interpreter	tin-ne'-ah.
		What do you call this?	an-na'-neah?

SOUTHERN PA-UTA—VOCABULARY No. 11. (Additions inserted after Voc. No. 22.)

PA-UTA OF CALIFORNIA—VOCABULARY No. 12. (Additions inserted after Voc. No. 22.)

CHEMEHUEVI—VOCABULARY No. 13.

The few additions to this vocabulary, obtained on Cottonwood Island, are as follows:

Forefinger	naku'-uyon.	Little finger	make'nun.
Middle finger	ma-o'ran.	Cottonwood tree	savib.
Ring finger	mako'avun.	Mesquite tree	kaya'ramb.

UTA—VOCABULARY No. 14.

The author makes the following additions:

All right	mono-na-ai'-maik.	Sit down!	ka'-di!
Agreed!	toi!	Sage-brush (<i>Artemisia</i>)	sho-wa'hp.
Balsam fir	a-wu'mpf.	Sweet elder	ku-nu'-wup.
Belt	na'nung-tsup.	Shirt	tah.
Branch-lodge (hastily constructed)	con-wick-y-up.	Sunrise	ta'-bi.
Gooseberry bush	po-su'-ge-wu'mpe.	Trowsers	ko-su'n.
Hat	ka'h-tsop.	Very	tu'idz.
Honeysuckle	poh-ut-sum-ab.	Vest	a'-war-rah.
Moustache	mu-chu'mp.	Whip	was-nu'mp.
Quaking asp.	tsi'ng-up.	Willow	ka-nu'p.
		Yarrow (<i>Achillea</i>)	a-ku-si'b-o-ab.

CAPOTE UTA—VOCABULARY No. 15.

Obtained from Chi-u-ma, the councillor or third chief of the Capotes, who understands Spanish himself and was aided by an interpreter. The Capotes live near the Jicarilla Apaches and intermarry with them.

Midnight	to-wo-to-wah-e.	Don't understand!	kats a-pu-suts-away!
How do you call it?	ah-gal-e ne-ah?	What is your name?	ah-gah-ah ne-ah?

UINTA UTA—VOCABULARY No. 16.

Obtained from a young Ute Indian, Richard Komas, who was educated at Lincoln University, Chester County, Pennsylvania, and died at Philadelphia in 1876. He was thoroughly familiar with the English language. In comparing the Uta vocabulary

inserted in "Zwölf Sprachen," taken from the same informant by Dr. O. Loew, some differences in pronunciation will be observed.

We insert the following additions :

Cloth, dress, garment	ta.	Leather shoes or boots	pig-ah-wats.
Scalp	tohts-sibe-woov.	Jackass-rabbit	to-sah-cam.
Tongue	ah-och ; <i>also</i> , cup made of the horn of mountain sheep.	Little hare	tah-woots.
Hand	mu'-n ; <i>also</i> , stone-pestle.	Goose, No. 124, Loew :	ava'nursk.
Canvas tent	pance-se-khan.	Yes indeed!	üv-eh car-rim!
Female breasts	pe-e, tato ; <i>also</i> , milk.	To go	quo-e.
AX ; lit., "large hatchet"	a-va-timp pan-nump.	To tell lies	mo-va-pu-re.
Whisky	gkoon-ah-pah (translation of <i>Span.</i> aguardiente).	My	ne-nah.
		Our	tah-me.
What is your name?	an-neh-um neh-ere?	I am a soldier	ne-ere sojor sut-que-uv.
Who are you?	an-ah-rum ? in-a-rum ?	I am a friend to the Indian	ne-ere nun-zu tig-av vo-vent.

MOQUI—VOCABULARY No. 17.

Vocabulary taken in Tsitsúmōvi Pueblo, on the northeastern mesa. Additional terms and specimen of verbal inflection :

Trail	pl-hl.	Thy father	un-a-a.
Cloud	o-mau-e.	His father	it-na-a.
Lizard	na-nau-e.	Chicken, hen	kvoa'-ko.
Sheep	ka-nel-hu.	<i>Name</i> , i-i No. 131, is doubtful ; another list has nu'h-äh.	
No more, enough	eyi.		
I eat	ne nishni.	They eat	ni'wa nishni.
Thou eatest	um nishni.	I do not eat	ne ka nishni.
He eats	bam nishni.	Thou dost not eat	um ka nishni.
We eat	itam nishni.	I have eaten	na ne nishni.
Ye eat	uma nishni.	I have not eaten	na ne ka nishni.

TAKHTAM—VOCABULARY No. 18.

Additional nouns, verbs, and sentences :

My eyelid	novutchavam.	Moist	kopinmishk.
My eyebrows	nuvuyuhuyum.	Quick	navi-ik.
My knee	nitei'ke.	Sweet	pikhet.
Pot, vase (<i>Span.</i> olla)	pa-at.	The same one	hau'ktch.
Horse	neastamu', neatchu-u'ne, pa- akhkvat.	To possess, own	yanumukain.
Devil	tu-it.	To smoke	bivt.
House	kitch.	To scratch	itakhn.
Sick	muvoika.	To cough	koimuktch.
Hard	hakoputchu.	To spit	ne'ahatch.
Tired	kopinhavak.	To sneeze	ahatchiskin.
		To vomit	bishin.
I possess a horse	ne-ne'atchu-une.	I stay in the house	ipin katchakanikivin ; nikivin ka'tchaka.

KAUVÚYA—VOCABULARY No. 19.

The formation of a plural in the substantive is shown by the following instances, to which others are added in the "Comparative Table," inserted after Vocabulary No. 22.

Man	nakhantch, <i>pl.</i> nakha'nitchum, nankha'nitchim.	Horse	pashogot, <i>pl.</i> pashogtum.
Woman	ni'etchlil, <i>pl.</i> ningitchum.	Coyote-wolf (<i>Canis latrans</i>)	isil, <i>pl.</i> istum.
Boy	tiat, <i>pl.</i> tigitum.	Cat	tukut, <i>pl.</i> tuktam.
Girl	nau-ishmol, <i>pl.</i> nau-ishmoilum.	Fish	ki-yul, ki-ul, <i>pl.</i> kiul-m.
Eye (my)	ne-abush, <i>pl.</i> hembush.	Fly	a-avat, <i>pl.</i> ava-atum.
Dog	auai, <i>pl.</i> aualum, auahme.	Snake	pokanet, <i>pl.</i> pokanetum.
Rabbit	ta'vut, <i>pl.</i> ta'vutim.	Bird	vigitmol, <i>pl.</i> vigitmoilum.
Tortoise	ayil, <i>pl.</i> ayilum.	Egg	panyit, <i>pl.</i> panyitum.

KAUVÚYA—VOCABULARY No. 19—Continued.

The following nouns, all inanimate, do not inflect for number: house (No. 53), bow (No. 56), arrow (No. 57), hill; stone, rock (Nos. 90, 92).

Where do you come from?mivakha tuckat?	I have seen youjunte-okval.
Where are you going to?mivikin ihitsakal?	I have one dogpinyaukal aurval
What do you want?mi-ikhuan?	I know youene'-eninkal.
I am scaredni yugekal.	I tell youi'-i kue'-ekhal.
We go togetherumuntchu nitchi-im.	I don't knowhemakilbene'-nauk.
Why do you go?mi-ikhon ihitsakal?	I like it muchpenyakon atsa-e.
I want workentu vakha'-aka.	Heeletaka.
How are you?mi-ikhon e-okal?	My heelsne-etaka.
Sit down!ni-a'-atch!	

GAITCHIM (OF SAN JUAN CAPISTRANO)—VOCABULARY No. 20.

The Indians speaking this dialect inhabit a number of farms and towns situated on the coast of Southern California, near the San Juan Capistrano Mission buildings, and in the Santa Ana Mountains. Cf. below: "Comparative Table" (after Vocabulary No. 22.)

Additional words, phrases, and sentences :

Milky way, galaxyohu'-nte.	Tired, exhaustedmo'-ik.
Silversesinbur (<i>English?</i>).	Heavyvuymkhanť.
Goldgono'knitch.	Lightheme'khmitch.
Try gulchpa-al peya'-alinge.	Roundtchoro'khont.
Grapevinemokvui't.	Costlypolo'-ov.
Butterpuvu'y.	Prettygava'yovitch.
Ropeva'-anot.	To cover upyumu'le.
Flowersposho'o.	To breakgera'pe.
Smell, odora-akhgap.	To findtolo'-ne.
Coyote-wolfano'.	To losetau-vashk.
Wild, madvultu.	
I eatnon na' - atchkhun; non na'atchkonk.	Water is better than winepal ivi huikhnot pal geletch poto.
Thou eatestom na'atchkhun.	I want to speak to you (lit., non oik te'levťchok. "to see you").
He eats, that man eatsvuna'l na'atchkhun.	I have rheumatismnon lamlunk.
We eattcha'am tchem na'atch-khun- von.	Did you not see my father?kaiso-om nanai tele'vuak?
Ye eatomo'm na'atchkhunvon.	The fish is in the ocean tusukha momnga. (mōmt, <i>ocean</i>).
They, those men eatvuna'alum na'atchkhunvon.	I am going to cook beansnon kalelet tolo'vt.
I have eatennon omu na'atchkhungat.	The wind blows hardhu'ngal khořak po'manok.
I have not eatennon kai na'atchkhungat.	Wait a moment!ni gua'te hi-ikmonga!
I am going to eatati-i na na'atchkhunlet.	How do you do?mitcha' so-om i-ik?
Housegi, ki.	Thank you, I am wellnon lo'-ovokon kai mitcha-i-ik.
Houses (collectively)gish.	How many horses have you?hiktchum na-a'-atchum kalvon?
My houseni ki.	The moon is smaller than the temet magat, moil poto hu'ikh- sun; lit., "sun is large, moon nunga. small is more."
Thy housee ki om.	I tell younon oya'-ak.
His housepi ki vunal.	I know younon oyo'nank.
Our housestcha'am tchum ki.	I do not knowkai no aya'luek.
Your housesoma ki.	I like it muchnon oyma'mak po'manok.
Their housesvunal tcha'-am tchum ki.	I am afraidnon shuvo'-ok.
How many houses?hiktchum ki?	I thinknon mushuvuivoik, non pushu'- unpuvoik.
My house is largeni ki magat.	I own, have, possess; lit., "It nobnimi-ikh. is mine."
Thy house is smalle ki olusekela.	Perhapste'-espoko-oho'.
Our houses are largetoha-am tchum ki mamtakara.	Behindpoma'-atchukh.
My house is in the mountainsni ki pu kanvinga.	Beforeyemaik.
To gomo'num.	Together; lit., "One all"supul tcho'-o-onum.
When will you go?miknesho-om mongot?	To the righto'plek.
Where do you come from?metche so-om mana'?	To the lefte'ťchvuk.
I go up the mountainno'n-e kauvi'-ik mana'.	
We go togetherhani ma-agotum tcho'-o-onum.	
Where do you go to?me'tchi iksa?	
Why do you go?hi't so-om hikhlot?	
I see one mannon tele'vuak supul yi-i'-itch.	

GAITCHIM (OF SAN JUAN CAPISTRANO)—VOCABULARY No. 20—Continued.

A few instances will show the formation of the plural in substantives:

Woman	shumal, <i>pl.</i> shushngalum.	Horse	na-a'-atch, <i>pl.</i> na'-atchum.
Stone, rock	tot, <i>pl.</i> to'-otum.	Indian	atakh, <i>pl.</i> ata'khum.

TOBIKHAR (OF SAN GABRIEL)—VOCABULARY No. 21.

When Dr. O. Loew visited the country around San Gabriel Mission in June, 1875, he was told that only two old men able to speak their paternal language were living, the rest of the Indians having exchanged their vernacular for Spanish. He visited them both, and from one of them, Fernando Quinto, a nonagenarian chief, who seemed to be near his dissolution, he obtained the vocabulary with additions. This old man remembered having seen one of Colonel J. C. Frémont's expeditions.

I eat	nonim kva-a'/kh.	Our hands	íyo'm ama'n ue'.
Thou eatest	oa kva-a'/kh.	Your hands	ue' nuperko iyom aman.
He eats	pe-es kva-a'/kh.	Their hands	ue' nuperko iyom aman.
I do not eat	khai ni kva-a'/kh.	My first son	mu piar varake.
I shall eat	nonim kva-a'/ron.	My second son	ayan ni ikok.
I shall not eat	khai ni kva-a'/ron.	My third son	apayan ni ikok.
I have eaten	yamo ni kva-a'/kh.	The water is good	tiribit par.
I have not eaten	khaipo ni kva-a'/kh.	I have two burros (mules)	nona vanhe eni-in buroa'.
My hand	onam aman.	I have bought a burro	no nahuat buroa'.
Thy hand	aman para.	I shall buy a burro	ne hua'ron naik buroa'.
His hand	aman hurura.	My burros are white	raua'nat nihin buro.

KECHI (OF SAN LUIS REY)—VOCABULARY No. 22.

This vocabulary, taken at San Luis Rey April 24, 1876, differs considerably from the one obtained at the same town twenty-five years ago by the Hon. John Russell Bartlett (Pacific Railroad Reports, vol. iii, part 2, page 77), and seems to represent another subdialect. Cf. Buschmann, Spuren der aztek. Sprache, page 550.

Additions:

Hill	meah-mo'as.	Elbow	chem-me-ka'-wah.
Go away!	wak-ke-li-ni-yu!	Wrist	ok-sa'k.
Clouds	ah-wa-wun-nik.	Mule	chuk-ku-chuk-was.
Knee	nü-ta'm-il.	To sneeze	nök-sa-eh.

COMPARATIVE TABLE OF TERMS OBTAINED IN FOUR NUMA DIALECTS AND IN MOHAVE.

Substantives.

English.	Southern Pa-Uta. Vocabulary No. 11.	Pa-Uta of California Vocabulary No. 12.	Kauvuya. Vocabulary No. 19.	Gaitchim. Vocabulary No. 20.	Mohave. Vocabulary No. 24.
Hog			tulnik, <i>pl.</i> tulnik-tchim.	tehi-mutch-mutch	magua'-kui niu-hata
Sheep	nara'vungg		ba'at.	okhe'-u-ut	amo-nio-hata
Mountain sheep	nagh	voniga'-a (<i>Sp.</i> bar-riga).			amo', avil-amo'
Rat	hun	kā-yua	kauvil, <i>pl.</i> kauvilum.		amailga
Cat	toku'baynts		tukut, <i>pl.</i> tuktam.		no'me
Mouse	pu-ny-tehats	pu'itch	kauvil		ave'
Owl					tako'pi-it.
Scorpion	va'pagvits		suy-il		mani-is
Tick, louse, dipteron	pa-atsiv				itsi-payu'
Ant (small black)	pase'-ab		antem		horo'-o

English.	Southern Pa-Uta. Vocabulary No. 11.	Pa-Uta of Cal. Vocabulary No. 12.	Kauvuya. Vocabulary No. 19.	Gaitchim. Vocabulary No. 20.	Mohave. Vocabulary No. 24.
Ant (large, red)	shu'gubit				hano-po'oka
Ant (small)			kovisniliam		tchamathu'lye
Cricket	makatsirobits				hay-u'nyya
Beetle	hogu'vitsits				
Bug (dipteron)	kanga'vitsits				
Lizard	sau-ivab, mugvu'e	mugit, kavuida	pokauet	pa'mamkal	idauk
Grasshopper	atrha'bits	a'gish, hua'tata	vuy-it	vo-e'-etum	itchibsk
Frog, toad	voa'atats	ya-rhua's	vokhatchil, <i>pl.</i> , vo- a'khaslum	vokhau't, vokhau'- kela	hanigo'
Chicken	kvaroyau		khanamu'	ga-khaut	kvalo-yau'va
Crow	ata'bits	ga'a-ga-a	alvat	kauvi'-elut	aga'-aga
Butterfly			totchil	titch-mol	homonab
Spider					alto't
Horned frog			tchalaka	vokhau'k-ule	
Fool	mobuat	atsavitat			alaikvatc
Demented, lunatic	mobuat		velnit		matathau'k
Medicine man	po'-arhant				k-vahi-di
Devil, spectre			te-u'lavil (<i>Span.</i>)	to'-outch	nya'badi
Sagebrush	a'rthump	shava've, hu'bi			itchibilya
Cottonwood-tree	sovib				akh-a'
Willow	kanab		laval-vanat	ava'-akht	ihora
Bunch-grass	mu-nub				agh-tsi
Mesquite (screw bean)	kuya'ramb		menikish		a-i'-isa
Mesquite (flat pod)	o'-ob				aya', ana'lya
Skin	purhu-an	apu'a			matmagulya
Fore-arm	maheigon		emakaua		salgo-nepa'-napa
Calf of leg	vuytsan	a-guitc, vu'itsa	tchin-a	ne-e'-enenkh	memovai'lya
Buttocks	kvuitump				hi-ue'ya
Nostril	movitob	niuvi'na-atagin			hi-bo'go-gopa
Eyebrows	potungavum	ivutika'	yul-sevim	negi'-ma'se	yoko'-ora'
Eyeballs	ashubotu'rugutsin				hido-koyo-oya
Eyelids			eputcha'-vay-im	novaya-vasek	
Shoulder			seklalmolm	nosho'-okum	hivi-gutcha-a'mni- him
Knee			ta'm-i	nete'melekum	
Elbow			puviam	mitiho'-ongum	
Urine	tsi-iga				hiv-thu-uk
Fæces	kuitsab	kuita'	voyatchil		hitchi-e'ragik
Grape	i-yab		esua'notum	mokvuit	kamtc hul-gvili- vinya
Milk			pi'-ghl	u-bi'	ama'a
Cheese					ama'mudil (milk- bread)
Beans		utu'hu			mariga
Bread	same'-tamab, pigiv	gu-masha'a	sauvis		mudilia
Grease					saya, hisaik
Potatoes	tuvi'-no-ob				papa
Cup, olla	hivinump	a'-p	tapa-amol	kava'-amal	hapuruy
Small cup					kvatbki
Large cup, pot	pa'mpun, himbuts				
Basket	tako'o		kupotmol		kupo
Sunrise	tava'va-aug	tavasi-vui			anya'-bilq'
Noon	toroy-tavay	toki-tave'nu			anya'-too'ruk
Afternoon	vui-shu'ba-bue	tave'nu			anya'-tonaim
Sundown	ogangunauk	tave-zzopa'b			anya-hauvk
Midnight	torhoi-tovan	toshumi'b			tinya'mbin-ve-uk

English.	Southern Pa-Uta. Vocabulary No. 11.	Pa-Uta of Cal. Vocabulary No. 12.	Kauvuya. Vocabulary No. 19.	Gaitchim. Vocabulary No. 20.	Mobave. Vocabulary No. 24.
Daybreak	tashe'abuè				aha'abk
Clouds	auva-puy-getu ⁿ	to'umb'	vue'-vunish	tuvi'itch	nuha'yuk
River	parha				havi'lya
Root	tibi-nag		puku-u	po-to'u-ul	sama'
Road, trail	po-o	po-yo	pit		avu'nya
Sand	tovuib	tuvib	temal	e'khvel	
Bad smell	punu'ay				huilyu-uik
Pain (in the bowels)	saroya-aya'	kohe-gamat	mukal		hito'ravk
Pain (in the head)	totsiva-gang-aya'		emuk-nikal	ni-yu'-u-huguk	tchuksa'ravk
Blanket	muu'	pi'-tcho			etnilia-mosaba
Handkerchief	pay-u-um				hamushu-guailpa
Suspenders	nanab				hani'-iba
Shirt	naro'otsi	naro'-o			emata-kohava
Pantaloons	kush				mentoko-hava
Hat	kaitchotch	tso-to-a'			mokupura
Leather strap	anga'siurub				ayu'-ula
Leather bag	kunab				aghma'lia
Saddle	kare'nump	nateno'-o	hi-inivil		hata-ghlal
Bridle-bit	tumpa'nurhump	topa'sa-niga'am	tamanyakalet		hati-a'nik
Spur	tayo'po-vonu'mp	tirama'n	tukuvaa		ahat-kagham
Stirrup	tani'ginump	nara-gara'a			me-ahdam
Rope	nant-h	tu-uhap	ovuish-kha'got	va'-amot	tchu-kve'va
Ring	pana-marhib	mani-ga'a			shalda'-ab

Adjectives.

Sick	narha'mavitch		mukol		itchagnok
Hard, strong			ivok	bara'brhitch	hithperum
Soft				yi-makant	mavi'-ithum
Poor (not good)	o-vo'yune				ala'-ebetitch
Poor (not fat)					okha'-ark
Poor (not rich)	gatch-uru'auvat				avi'-hiu'omotum
Cheap	yu-urnkant		kilia-pekhniniank	benesh-ga'-atch	anu'-uk
Hungry	tu-guy-ay				matchamo'-bnik
Deaf			nanoksh	na'ngvitch	mailgahauk
Blind			tatual	tomovit	thoma'-amk, tho-lak
Dumb				potum-ga'-atch	tchagvoa'ro-motum
Wet	naubitch		palnik	ayu'-o	aha'yum
Dry	tavashi-kvaib		roakhish	auva'khov	hero'-obk
Weak	ka-mutchuatum	garo-oho'va	kilia-ivok	laka'va-khant	hithpermutum
Quick, fast	pitangash	ya-vi-ish	havun	galektel	kumu-vuil
Slow		ovitami'a	pelen	ma'-a-anik	kitcha'-kuithk
Ripe			kvo-a'sis	emengev	aku'-utchum
Clear	hum		kayuvin	vayakhant	
Mad			veluit	vottu	matatla'uk
Sweet				so-o'ut	madu-ulk
Bitter			enini	tchi-ivk	ala'guak
Sour					amathu'lium
Hot	taruy-auv, kutu'tsi				hibi-ilk
Healthy	gatch-narhami-uay				itchagno-motum

Verbs.

English.	Southern Pa-Uta. Vocabulary No. 11.	Pa-Uta of Cal. Vocabulary No. 12.	Kauvuya. Vocabulary No. 19.	Gaitchim. Vocabulary No. 20.	Mohave. Vocabulary No. 24.
To own	uruai .....	.....	penyaukal	ayk	avki'ogo
To wash	māi .....	.....	henpas-khamka	kaya-vu-š	hathu-u'ilk
To think	muta'kav .....	.....	pinsa'tchumink	mushuvu-voik, pu- shu-un-puvoik.	numu-bu'lya, ali- e'ta.
To blow (a fire, etc.)	pokvoy .....	.....	pepu'aukal	bu'ughe	tchabo-thoik
To cough	o'koyb .....	.....	o'-okh-kal	ukh-e	o'-otchk
To hunt	pusha'rbaye	koynu'itim .....	.....	.....	hail-gua'g
To burn (fingers, etc.)	kvashotsan	kutait, goss	na'e	tchu'ye	hibombya
To paint oneself	nan-a'-buv	ina'vishan .....	.....	.....	s'-ata-ork
To spit	gutsu'narha	nava'gi-at, tukhit'	pake-tcho'inkal	tchukh-e	hi-hatche'yok-muk
To jump	vu-u'kuib	nata-gyuene-et	paputsakal	vill-e	hitchibsk
To fall	vu-ey-guts	kva-toha't	na-aminkal .....	.....	hin-ailk
To beat	to-tu'namang	agu'apunat, to-na' .....	.....	.....	tchutch-gamk
To scalp	totsav-mano'verha .....	.....	.....	.....	he'-etauk
To whistle	oshu'guya'	goshu-huvie'rutim	m'kvuy-vuyka	hu-ike	tchoho-ik
To scratch .....	.....	.....	pingi'liayka	sho'-oke	shague'ilk
To vomit .....	.....	oyi'-u	empiviska	muy-i-e	hiok
To bite	to-o'vant	tu-gu-kokvat	pin-ge'-aka	ko'-o-e	tchiki'-auk
To smoke (tobacco)	ko-o'tokay	pa-lmu'-it	mbivo-ok	hu'-ushe	athipa, a-o'vathib
To make	tsarhay, uni'ga	uābait	pengulkal	lovi'-e-e	kitcha-ok
To take	hi-oyuk .....	.....	pengusik	pa'-a-e	kita-ok
To sneeze .....	.....	.....	muvika	hatsi'-i-e	atchu'-isk
To shut (the door) .....	.....	.....	te'mivuin	nake	kisape'-etum
To open (the door) .....	.....	tastigva	ake-vuin	ha'd-e-e	ko-ta'-akum
To grind	tushuy, pa-a'ro-oy .....	.....	tchutchukal	no-okhe	tauva'-am
To swim	nava'gurha	nava'-giat	hena'mika	vay-e	hamo'-o-otuk
To ask .....	.....	.....	pena'na-alkal	tuvi-u'nga	kutchumule

Particles.

Outside .....	.....	huvina'gue	kimuy-kan	pesa'-onga	matara
Inside	u'ba, upa-a'n-i-i	ive	petuk	pushu'n-nga	aval
Above	tu-umbay-au	bamare	tuksa'mika	e'-etch	amai
Below	urug	tarohe'	temai-kan	to'-okh	kavil
Before, in front .....	.....	.....	amutchi	yemaik .....	.....
Behind .....	.....	.....	hungay-kan	poma'-atchukh .....	.....
With, together	hu-u'vay .....	.....	makamkainuk	supul-tcho'-onum	payahana
On other side yonder	kvaya'ntovat .....	.....	.....	gitchamgu-muk	akh-ke'-el
To the right .....	.....	.....	.....	oplek	shal-yahana
To the left .....	.....	.....	.....	e'tchvuk	shal-gvathara
Also, too .....	.....	.....	.....	i-ik .....	.....
Perhaps .....	.....	.....	.....	te-es-poko-oho'	alye'-etum
By and by	to-voyok .....	.....	.....	.....	home're
Now .....	.....	.....	.....	.....	pi-ithe
Always	tu-shump .....	.....	.....	.....	tcha-a'hama-hana
All right! .....	.....	.....	.....	.....	akhotk (good!)
Directly	mugunt .....	.....	tavisnukon .....	.....	tchivil

WORDS OBTAINED ONLY IN SOUTHERN PA-UTA (No. 11) AND IN MOHAVE (No. 24).

English.	Southern Pa-Uta. Vocabulary No. 11.	Mohave. Vocabulary No. 24.	English.	Southern Pa-Uta. Vocabulary No. 11.	Mohave. Vocabulary No. 24.
Charcoal.....	ukvi'v'h.....	.....	Mud.....	pa-nyab.....	mathe'.....
Ashes.....	koshau-uy.....	ham-o'lye.....	When?.....	.....	kanya-to'-oma?.....
Box.....	havingunab.....	kul-ho'.....	Where?.....	hararu?.....	maki?.....
Needle.....	tsabi'ganump.....	auga (<i>Span.</i> aguja).....	Where to?.....	harava'n?.....	.....
Thorn.....	sara'nump.....	ho'-oshak.....	What?.....	ha', himpu ^a ?.....	kutch, ku'-utche?.....
Wagon.....	hovi.....	carcta (<i>Span.</i>).....	Which?.....	.....	maka'-ap?.....
Button.....	tapats-anump.....	matoko-havaki-vatch.....	Which one?.....	.....	mak'anye?.....
Bottle.....	hayko-o'tsav.....	hapuruy.....	How much?.....	hanok?.....	kalya-vi'?.....
Boat.....	parhab.....	nihamaroyekulye.....	How many are?.....	hano'payo'k?.....	kalya-vi'?.....
Pistol.....	tauvi-pi-atch.....	oti-isha-litau.....	Mine.....	nuni.....	inye; inye'-pa.....
Pole.....	tsonakanak.....	avoilpo.....	Thine.....	u ^a mi.....	.....

SOUTHERN PA-UTA—VOCABULARY No. 11.

The following instructive forms of nominal inflection are added to the vocabulary and terms above; also specimens of verbal inflection and of conversational sentences. The dialect is spoken in the southern parts of the State of Nevada.

Horse.....	kva-arov, <i>pl.</i> kva-arovim.	Many.....	avan, <i>pl.</i> ava'-atum.
Louse.....	pa-a'tsiv, <i>pl.</i> pa-a'tsivim.	Rat.....	hun, <i>pl.</i> luna'm, luna'-arha.
Sheep.....	nara'vungg, <i>pl.</i> nara'vunguts.	Willow.....	kanab, <i>pl.</i> kanabarha.
Hand.....	mo-un, <i>pl.</i> mo-ov.	Cottonwood-tree.....	sovib, <i>pl.</i> sovibarha.
Friend.....	tukibun, <i>pl.</i> tukibuvum.	House.....	gan, <i>pl.</i> ganigarha.
Two.....	vuay, <i>pl.</i> vuayum.	Leaf.....	nanga-aik, <i>pl.</i> nanga-arhay.
Three.....	pa-ay, <i>pl.</i> pa-ayum.	Saddle.....	karenump, <i>pl.</i> karenumparha.
Fool.....	mobuat, <i>pl.</i> mobuatum.	Leg.....	yu-uv, <i>pl.</i> yu-uv.
I eat.....	nuni tokay.	We eat.....	mam tokay.
Thou eatest.....	u-um tokay.	We eat together.....	mam tokay kavaro.
He eats.....	i-ing tokay.	You eat.....	mu-um tokay.
I have eaten.....	nuni tokayan.	They eat.....	mamu ^a tokay.
I have not eaten.....	katchun tokayan.	I will eat.....	tekavan.
What is this for?.....	hane-aik?	I will not eat.....	katchun tekavauva.
What time?.....	hano'k?	To write.....	po-onum.
How long ago?.....	pi-gay?	The friend is in the house.....	gan-upa ne mata'vikyi.
Get up!.....	hini'nu!	How many horses have you?.....	hanopayok pung-gu-va?
Sit down!.....	kaga'te!	How old are you?.....	hanopayok to o'rha-i?
Let me go!.....	mani-ve'samang!	How do you do?.....	hare'ru?
I thank you.....	ho-uruok.	I have drunk much water.....	pa-ay avan hiviga.
I like you.....	umi nuni ha'-ushtui.	I am well.....	nou-vats ha-u'i.
I like (Pa-Uta) Indians.....	nuni ha'-ustni nou ^a -nou ^a .	The chief knows much.....	kapitan avan potu'tsu arha'.
My friend is sick.....	nuni tukibun narhami.	I don't know.....	kva aiga.
Where are you going to?.....	hara'ru u'rukvay?	What do you have?.....	hanok uruai?
I have no more.....	gatch ava-an urua-vava.	What is this?.....	hi-im pitchu'-ay?
Bring water!.....	pa yaru a'in!	Let us see!.....	maka' vaukvon!
The stone is hard.....	tu-ump mutchunt.	What have you seen?.....	himpu ^a poniga?
How do you make fire?.....	na aytoo kun?	All is gone.....	tobik tehauk.
		I have eaten a horse.....	nu ^a pung-gu tokava.

MOHAVE—VOCABULARY No. 23.

Mr. E. M. Richardson, who obtained his word-lists among the "Mojaves" on Sept. 14 and 15, 1871, gives the following directions for their correct reading:

"The scanning marks ($\bar{\quad}$ macron, $\acute{\quad}$ breve) show length and brevity of the syllable. Letters in parenthesis are pronounced with a half sound only. The circumflexed a (\hat{a}) is pronounced very broadly; e with the acute (e') represents the French \acute{e} ."

Additions to his vocabulary are as follows:

White man	hi-eeko.	Money	aweè-sà-tyk.
White woman	hi-eeko hin-yá-ga	Gunpowder	ē-páp-hóm.
Mohave man	wé'γ-muekába.	Dust	am-pór-ta.
Indian woman	háh-wy-ah.	Cottonwood-tree	a'-háh.
Chin	yetto-quo-thah.	Willow	e-thōw.
Perforation in ear	bò-sak.	Bag	ath-pah-háh-máhl-yé.
Lip	yáqua-oò-la.	Bell	n'yak-qua-rōw.
Mustache	ye-wóm'be.	Handkerchief	páhní.
Palm of hand	sál-sa-pūy-yina.	Shirt	mátt'y-quo-hába.
Wrist	sál-sa-vara-wésser.	Indian mantle	tolu-cope.
Toe nails	múck-ulu-hō.	Breech-clout	wé'γ-cō-ba.
Knee	me-may'i-póka.	All of them	pý-yá-háhn-yá.
Thigh	me-may'i-theè-la.	All gone	pý-kee.
Shin	me-sów-whera.	By and by, presently	ho-mè-rá.
Ankle	rhòw-wa.	To whistle	chan-a-weè-kit.
Leather	e'h-youl.	To eat beans	ma-reè-ka cha-pòk.
Willow lodge	máht-ky-aal.	To eat bread	mo-theè-lyá máhm.
Boat	quil-ho.	To eat beef	kee-quai-wa a-thòw.
Hot weather	n'ík-a-peèlk.	To go back	o-beè.
Cloud	eè-qui.	To go away	co-beè.
Rapid (in rivers)	a'li.	To smoke tobacco	o'-wa theè-pá.
Stick	boo-wáhl-yeh.	Give me a smoke!	atheèp!
Hill	n'vèè-u-mee.	To strike light, to make fire	awáh whà-lik.
Autumn	áh-see-yúk, n'u-chee-heèlk.	Good bye!	cory-yém-máh!
Maize	teè-cha-hi, teè-cha-wa-sōge.	Tired, exhausted	híp-powik.
Maize as horse-fodder	teè-cha-mi.	Lost	chee-náhm.
Grizzly bear	meh-wáta.	Warm, hot	hee-peèlk, he-peèl-quotch*.
Cinnamon bear	mèth-wat muk-kōra.	Pretty	abòwt pah.
Maggot	hee-cèl-ka-nōke.	At a great distance	ameè-gee-hum.
Large feather	thou-may'.	At a short distance	heè-par-nuk.
Crackers, hard bread	mo-theè-ya-roba.	Something	háh-you.
Strap	á-youl.	All right!	hòw-tén-tah!
Matches	owshi-quá-ōka.	Good water	áhá 'hòwt-ká.
Beads	chuk-ò-oò-la.	Clean water	áhá quár-rige.
Cards	oto-wah.	Give it to him	ho-wáhn k'yim.
Pencil	itch-e-nyó-ra.	Give it to me	in k'yaim.
Earrings	iss-mahl-kít.	Be quick!	coòrà coòrà!
I do not know	sūm-ò-theèk.	I will give you something	máhn'yér ha-youú n'yaim que máhm.
What is your name?	koèch pé moò la?		
When are you going away?	kén yadō-ma yá má?		

MOHAVE*—VOCABULARY No. 24.

Various additions to Dr. O. Loew's vocabulary, and to his word-list above:

Kettle	tashge'ene.	North	nata'k.
Stove	itchi-halyu'lave.	South	kave'ák.
Fireplace	a-a'o-tagra'tove.	Animal	hata, aha't.
Flute	tal-tal'.	Rheumatism	himataravk.
Jew's-harp	tro'-ompa.	Tongue	hipaile.
East	anya'-ák.	Throat bone (hyoid)	melage-ge'nya-han-a'lye.
West	anya'-havuk.	Fun, nonsense	itchimag.

* More linguistic material on Mohave and other Yuma dialects, collected by Dr. O. Loew and others, will be found in my article "Der Yuma-Sprachstamm," published in Bastian and Hartmann's *Zeitschrift für Ethnologie*, Berlin, 1877, pages 341-350 and 365-418.

MOHAVE—VOCABULARY No. 24—Continued.

Color.....	ago'-atum (?).	The Great Spirit.....	amay.
Tears.....	bitonotha'.	High.....	hómik.
Hole.....	matago'opa.	Low.....	tauvanik.
File.....	itcha-guera.	Deep.....	ara-a'rum.
Fence.....	vasha'-huera.	Shallow.....	heva'-abk.
Door.....	avuya'.	Why?.....	wa,? ka-a-to'-otm?
Well (of water).....	ahatchopa.	How often?.....	ha-nilk kalyavi'-i'a?
Inkstand.....	itchanyo-ora-ahoia.	How nice!.....	ká-atum akhotk!
Lead pencil.....	itchanyo-oro.	Something.....	itcha.
Good.....	akhotk.	Better.....	akhotk tahana.
		Best.....	akhotk-taha'n-taha'n-taha'na.
I go.....	i-ye'ma.	We go.....	inyetch-i'yema.
Thou goest.....	match mi-ye'ma.	You go.....	match miyema ma'-ama.
He goes.....	hovatch-i-ye'ma.	They go.....	tcha-am ti-ye'ma.
I do not go.....	iye-moto.	I will go.....	iyema.
I have not gone.....	iye-motum tetchuma.	I have gone.....	iyema tetchuma.
What time is it?.....	anya'-atch kalyavi'?	What do you have to eat?.....	gutch mama' ama'?
You look out!.....	keno ma'-agum!	What is the matter?.....	gutch midam?
Where do you come from?.....	maki-i-mi ti-ika?	Let us see!.....	i-u'do!
Take a seat!.....	inak!	I don't understand.....	ya'nya a'romotum.
These are my children.....	inyepa inye ho-mara.	My friend, how do you do?.....	enova'-agh, kama-uy?
My eyes hurt me.....	inyep i-ido theravk.	I am well.....	inyep evatch a'khotk.
I want to talk to you.....	ekotchun a'vaim.	I have three horses.....	inyepa ahát-o-o'love hamok.
My friend is in the house.....	enova'-atch ava' liu-va'-aga.	Get up!.....	kumuviik!
The fish lives in the water.....	atchi intch aba liuva'-aga.	I will not tell you.....	noko namota.
I will come to see you after a home're eva'-ak ini-yova. little while.		I know you.....	nisto opa'-um.
I did not cough.....	o-otch mo-ot e-ep te'tchuma.	Bring water!.....	aha gi yak!
I am frightened.....	e'-erk.	The captain knows much.....	hama kavapuitan átaim shu- ba-um.
When do you return?.....	kanyato'-oma takave'-ikva'?	The scorpion kills flies.....	mani'-is entch thiliagmo' ta- poyo.
I was there.....	epa-a'mpitchum.	What are you talking about?.....	kutch him tchigvark me i'lyo?
What do you say?.....	gatug-mi?	You talk too much.....	methagvara me a'taik.
My teeth are white.....	inyep ido namasa'vum.		

HUALAPAI—VOCABULARY No. 25.

The following elements of verbal inflection are repeated here from the "Analytic Report," page 562:

I eat.....	kvimago.	I will not eat.....	kvimago ta o'paka.
I shall eat; lit., "I go eat".....	miama kvimago.	I will eat nothing.....	kvimago tuyá o'paka.
I ate just now.....	kvimago vam.	What do you want?.....	kutchu kanaba?
I have eaten some time ago.....	kvimago kure'.		

HUALAPAI—VOCABULARY No. 26.

Four additional terms are as follows:

Cheek.....	yu-hu'l.	Hat.....	put.
Coat.....	ni-kwa'ya.	Mule.....	mu'la.

YUMA OR KUTCHÁN—VOCABULARY No. 29.

Substantive nouns obtained in addition to the preceding vocabulary:

Eyebrows.....	ey-day-nu's.	White crane.....	hah-mus-ra'hm.
House, lodge.....	va-no-kos.	Dove.....	hoos ki bah.
Sunset.....	énya'-hab-buk.	Pelican.....	ah-cah.
Very far.....	kor-row-poon'.	Clock.....	nea-choh.
To love.....	pah-may-kip.	Book.....	ah-wi-n'y'o'ra.
Cough.....	uh-okh'.	Cord.....	oh-tok-ka.
Desert.....	am-áh por-ta'h.	Gum.....	oh-teh-shna-ha.
Male organ.....	mah-dahr.	Skin.....	en-sah-guill.
Quail.....	hah-ma'h.	Dry.....	hah-cheok.
Blue crane.....	núh-qua'h.	Hot.....	mak-a-too-rah.

ISLETA PUEBLO—VOCABULARY No. 30.

The following additional material was obtained at Zandía:

I eat.....	ku-kal.	I have not eaten.....	ha-ro-ta'-a'-gar-me.
I shall eat.....	ko-o-gara.	I shall not eat.....	ha-ro-ko-o-gar-me.
I have eaten.....	ta-tai-gar.	Chief.....	nit-la-ve-da', ta-voi-da'.

TEHUA, LOS LUCEROS PUEBLO—VOCABULARY No. 32.

Obtained from the former alcalde of the tribe, an old and intelligent Indian, who spoke Spanish with fluency.

Governor.....	tù-yoh.	Many, much.....	leh-yàn-yo, nyan-gè-pe.
General, commander.....	a-con tù-yoh.	Foliage.....	tèh-kah.
Farm, rancharia.....	the-àh.	Plumage.....	su-beè kung.
Sunset.....	tah-àn seh-lò.	Very far off.....	ka-e-nah-nah.
Sea; lit., "much water".....	po-shò wch.	We, who have found it.....	to-a-guan-nèh-hah.

TEHUA, SAN JUAN PUEBLO—VOCABULARY No. 33.

Words, phrases, and sentences obtained at Tesuque, a pueblo distant about fifteen miles south of San Juan and speaking the same dialect.

Coyote-wolf.....	te'.	Cloud.....	o-kua.
Ant.....	ane, tsiu-e'no.	Bitter.....	na-sà ⁿ .
Spider.....	k'etup-aye.	Sweet.....	ā-bo.
Rat.....	p'e'.	Apple.....	b'e.
Cat.....	mu-sa.	Peach.....	b'e-poi.
Sheep.....	ku-a.	Wheat.....	tā-tā.
Hog, swine.....	pe-tsure.	Cedar tree.....	hu ⁿ .
Grasshopper.....	kū-ne'.	Red pepper, <i>chile</i>	tsin-di.
Saddle.....	bu-te.	Potato.....	sa-gom-be.
Stirrups.....	an-tye'.	Bean.....	tehua-tu.
Ladder.....	hi-e.	Butter.....	gā.
Blanket.....	be-san-da.	Honey.....	pun-ya ā'bo.
Room.....	vuy-i-ve.	Milk.....	ua'bo.
Box.....	pen-be.	Silver.....	kva-ko-tsā ⁿ .
Dust.....	na-yi.	Beads.....	kva-a.
Knee.....	ko-man-ye.	Something.....	vuy-hā ⁿ -vuy.

The following terms are borrowed from Spanish: *Wine*, binto; *gold*, oro; *field*, nava; *pot, vase*, oya; *mule, ass*, bunto.

To finish.....	ta'kiho-imbe-vay.	To dislike.....	volihi-a'mbi-i.
To receive.....	ay-ho-ni-ha'-i-i.	To travel.....	kanyi-nama ⁿ -a ⁿ .
To accompany.....	na-vinyo-tse-e.	To hear, listen.....	o-to-na.
To ask.....	a'-ma-bay.	To buy.....	toku-ma ⁿ -a ⁿ ; toku-me-kito.
To begin.....	ba're-bi-ire.	To sell.....	toku-be'-keto.
To cook.....	sa ⁿ -na-kokh-ki.	To seek, search.....	o-tungva.
To die.....	natin.	To have searched.....	to-nungva.
I have a horse.....	navim kava'yo ginya ā ⁿ .*	The fish lives in the water.....	p'a p'o we'na ta'.
I have two horses.....	vuye kavayo ginya ā ⁿ .	Where is the water?.....	vehenya na p'o-i?
I have no horse.....	vuy gin kava'yo am be.	I want to drink water.....	navi (or vi) p'e ri mā ⁿ .
I have many horses.....	vayaku ing kavā'yo ko.	I am thirsty.....	vi p'o ti ma osa-a.
I have three horses.....	poye kavayo navi ing mo.	It rains.....	ikuando-o.
I have one horse only.....	kavayo gingkvo.	The sun is very hot.....	pi'wa tan tsa'wa; na tan tsa'wa.
We have two horses.....	na-inta vuyie kava'yo ginya ā ⁿ .	The sun has risen.....	na tam pi.
I have nothing.....	há moa wingkvo be'.	I have seen you.....	vuy mu na're.
I have many friends.....	hehenya k'ema gingkvo.	I am sick.....	māhe.
I have much meat.....	hehenya pivi gingkvo.	What is this?.....	hā ⁿ -ay hā ⁿ na mo?
I have bread.....	navim pan sa.	Much timber is in the mount- ains.....	ua'-a nakana.
I have water.....	navi p'o ti mā ⁿ .	I do not know.....	vo gihan gina.
The water is good.....	p'o hiwo'te; or, p'o hewo'ntyé na mo.	These victuals are good.....	hiwo'te na mo nako'ye.

* Nasalized vowels are marked with n superior, or a tilde, ã.

TEHUA, SAN JUAN PUEBLO—VOCABULARY No. 33—Continued.

Let us go fast	yaho anyogi yamoy.	I have looked out for my don- key.	nā bunto hehenyo ta tonungva.
I think there is hope	nāre an kha' ma-intsi karinko.	Where is the donkey gone? ...	veheni to-o bunto nayi-i?
I shall sell	tokub'e ne.	How old are you?	henyo pā-ayo unkvo a-ā? or, henyo pāya ngvo' ayi?
I shall buy	nā roku mā ^a ā ^a .	How do you do?	hay ho-o mā ^a ? or, hayun kawa'?
I am going to sell a donkey nā rokube kito hā ^a bunto. (ass, mule).		I am doing well	niera' o-omā ^a ? or, hiwo'te o-omā ^a .
I am going to buy a donkey	nā vuy bunto lokume kito.	I have slept well	hiwo-u vi huyo'ko.
I will sell this donkey	nā okube ta-a hā ^a bunto hā ^a i-i.	Good day!	oseng-ge ta' mo!
I will sell two donkeys	nā okube ta-a vuyie bunto.	My horses are white	navi kava'yo tsa'-ige mo.
I have lost a donkey	nā vuy bunto ti beri.	The horses are black	kava'yo fente.
I am searching for my donkey nā vuy bunto-o tungva mā ^a .			

TAOS PUEBLO—VOCABULARY No. 34.

Taos is located in closer proximity to the homes of the Uta, Apache, and Návaejo Indians than any other pueblo of New Mexico; hence the tribe became extensively intermarried with the above Indians. But this circumstance does not seem to have influenced their language to any extent, if we can judge from the vocabulary submitted. It was obtained from a Mexican adopted into the Taos tribe from his childhood, and married to an Indian woman. A few additions are as follows:

Man	sch-ah-nān-na, shòy-en-em.	Moon; lit., "the mother of the sky."	kāh-nah.
People	l-e-re, sow-ah-vè-hu.	Thunder	tah-wèh-uf, tay-āh-mah-a-wah.
Large town, city	pah-ho mè-neh.	Hawk, or eagle	chu-e-unah.
Sun; lit., "the father of the sky."	tah-tah.		

Morning call of the Sirviente of Taos.

The following metric lines, sung every morning by the town-crier of Taos Pueblo for gathering the Indians to their daily labor, was communicated by the alcalde of the village to Mr. Alfred R. Conkling, of New York City, one of the geologists of the Expedition. The town-crier goes out every morning at seven o'clock to chant this strain of words, repeating it frequently, and another song is sung by him in the evening to close the day's work. For this service he receives the liberal allowance of three dollars a month.

I wrote down the Indian text to the best of my ability and added the Spanish translation given by the alcalde, presuming that it will render the original more faithfully than any English translation of a text not yet fully understood.

Nokei mēwa ohā weimo okue neiga, heyo eba dayo hiya tawe yoho pa nomtcha wi yaho yoho mēho yupc-o ī-a towe yaho pato meho tawat. Huya!	Vaya a trabajar a priesa, Vaya a trabajar, porque no esta tarde. A donde te mando que andas haciendo, Que negocio traes. De donde vienes que aquí andas, amigo? Si traes algun negocio por aquí, te pagamos, Y si no tienes negocio, ahora puedes decir. A Dios!
--	--

JEMEZ PUEBLO—VOCABULARY No. 35.

About twenty years ago the Indian population of Jemez was increased by that of Pecos, who rejoined their congeners after leaving their old homes on Pecos River, now in ruins. The language of both tribes belongs to the same family, and some of the existing differences have been recorded by the collector.

JEMEZ PUEBLO—VOCABULARY No. 35—Continued.

Additional terms and sentences:

Frog	wawe', na-ne'.	Donkey, mule.....	bo-ula (<i>Span.</i> burro).
Horned frog.....	hanavela.	Bridle	giushtebo.
Fish	p'o.	Maize, grains of.....	kiunho.
Lizard.....	tisala.	Mosquito.....	tso-ku-ye, tso-hu-ye.
Spider	giú-i ^o .	They	o-vesh, o-mesh.
Centipede	tiamon.	To sing.....	mos-tsa-ay, mos-ta-ay.
Beetle.....	hua'oda'.		
To eat.....	tekuelyo, tselele.	Yesterday it was very cold.....	ho-úm̄ba ho-au no-o.
I have eaten.....	tse tekue'yo, ne-in tokve'yo.	I have many horses.....	ne gela kava'yo giyo.
I am through (eating).....	vó-tse.	I have three horses.....	ta antcho kava'yo giyo.
I shall eat.....	tekue'yo sã.	I will see about it.....	ta mō ho-o.
Jemez is a nice pueblo.....	Vallatoa ho-au ú-ú.	I am going to see a friend.....	nete tchapo nome-e.
The hair is very long.....	yavay iya-oho fola tã.	The trees are green.....	bũilo ba tishie'.
To-day it rains much.....	kvalashur sdyu.	How do you do?.....	a'kiu e-e'?
To-day it is very hot.....	kvalashur ho-au nosh tila.		

À'COMA PUEBLO—VOCABULARY No. 37.

Additional terms and sentences:

To burn, <i>v. intr.</i>	tsoiak.	Sick	tsin-a-sa.
Somebody	ishk.	Small	tsu-is-tish, tsu-ish-ish.
Lips	tchiga.	Cold	ga-ish-tai, yom-atse.
Coyote-wolf	tchoshk.		
I do not eat.....	sa tsi-nobs'-kono.	I do not understand.....	sa ts'-ish kan.
I have not eaten.....	sa tsi-nobs'-ko be.	I own three horses.....	tchome-e kava'yo titsia hinome
Let us eat.....	sho tsau'-eta.	To-day it is very warm.....	tek ato'm-atse.

SILLA PUEBLO—VOCABULARY No. 38.

Additional words and sentences:

Sick	tsiu-a-sa.	Black.....	mu-e-na'-ga-an, mish-ts.
Lips	sh-kuika.	Small.....	ro-osh-kish, me'-kotch.
Coyote-wolf	shotsoma'.	Very good.....	ke-rau'a.
Male parts	hoshtian.	Wicked.....	tcha-ti-rau'a.
Female parts	hapa-ani.		
To eat.....	tchup'e, nobsi.	A man is there.....	hatiku tcha nio.
I have eaten.....	tchu miso be.	I own three horses.....	hino tchami kava'yo; lit., "to me three horse."
I did not eat.....	tsote nobs' ko pa.	Many people are there.....	no hano.
I am going to eat.....	she nobsi.	It rains hard.....	nau'a tsits.
I am not going to eat.....	tsote nobsh kin.	I will see a house.....	tau a'tchin nu k'stse.
The water is not good.....	tsate rau'a tsits.		

WINTÚN—VOCABULARY No. 39.

Additional substantives:

Cheeks.....	khaba.	First finger.....	kurn-tse-sem.
Elbow.....	tsu-bik.	Second finger.....	vene-bol-sem.
Shoulder	khol-tsok.	Third finger.....	van-sem.
Back of head.....	te-ba-bok.	Hat	taki.
Knees.....	su-mik.	Store	p'alunas.
Hand.....	sem, <i>pl.</i> sem-ut.	House.....	k'-el, kau-el.
Thumb.....	kom-sem.		

KASUÁ—VOCABULARY No. 40.

Obtained from Vicente Garcia, an old Indian farmer at Kasuá, who spoke Spanish well. A few Indians only are left who speak this dialect. We add the following terms, sentences, and inflectional elements of the Kasuá noun and verb :

Heart	san'tugh; compare "alive".	Old man	pag-o'-vuash.
Eye	ptu-gh, ptu-gu.	Old woman	enekhe'-vuash.
Pot, jar	ki-nghs.	To cry	psa-guotsan, ksa-kala'lan.
Cat	anakpuk.	To deceive	pietiets.
My first son	ulush tu ke'nuk ta'nukh.	I eat	ga shu-un.
My second son	sa ta kumusk tanukh.	Thou eatest	a shu-un.
My third son	kamaskh pik t'nukh.	He eats	gugsh gala' shu-un.
My hand	ukpu.	We eat	gigh guga giala' shu-un.
Thy hand, his hand	upu.	I shall eat	gsha'-a shu-un.
Our hands	yi lau ki-pu.	I have eaten	moe ga shu-un uash.
Your (their ?) hands	gasikh-pu.	Thou hast eaten	moe pa shu-un uash (vash).
My hand is strong	shush-alk pu.	He has eaten	moe sha shu-un uash.
The water is good	tchol o'.	I buy a burro (mule)	ga shian il bulo; il: the Span- ish definite article <i>el</i> .
The horse is larger than the dog	kauay-ga kha'shi go tehu-un (kha-ak, <i>large</i>).	I have bought a burro (mule)	ga shian auvash il bulo.
I see a nice tree	po'-nis anak pna's (po'-n, <i>tree</i>).	I shall buy a burro (mule)	gsha'-a shia'n il bulo.
I go on the mountain	ite akti ne-alap (<i>i-ite, here</i>).	I buy a dog	ga shian tsu-a ² .
Silver is harder than gold	kal-ut ishitch oloi plata.	I have bought a house	ga shian auvash il a'-ap.
I have black hair	sakhimai k'o-kuc'-n (<i>ok, hair</i> ; akhima, <i>black</i>).	I have not bought a burro (mule)	ke-a' sbian auvash il bulo.
The woman makes bread	nle'neneke sekuel il kapit (kapit, <i>bread</i>).	I shall not buy a burro (mule)	ke gsha-a shian il bulo.
How many horses have you ?	apsht u kavay?	I do not know	ke tcha'mon.
		The fire is large	kha-khi nũ'.



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