

SMITHSONIAN MISCELLANEOUS COLLECTIONS  
VOLUME 63, NUMBER 5

EXPLORATIONS AND FIELD-WORK OF THE  
SMITHSONIAN INSTITUTION  
IN 1913



(PUBLICATION 2275)

CITY OF WASHINGTON  
PUBLISHED BY THE SMITHSONIAN INSTITUTION  
1914

The Lord Baltimore Press  
BALTIMORE, MD., U. S. A.





Looking north from foot of Kinney Lake toward Whitehorn Peak. On the right the cliff at the foot of Robson Peak. Miss Helen B. Walcott on beach in foreground. Robson Park, British Columbia, Canada. Photograph by C. D. Walcott, 1913.

# EXPLORATIONS AND FIELD-WORK OF THE SMITHSONIAN INSTITUTION IN 1913

## INTRODUCTION

There is here presented a general account of the exploration and field-work conducted by the Smithsonian Institution and its several branches, including the United States National Museum, in various parts of the world during the calendar year 1913. These explorations were made by means of allotments from the Smithsonian funds, from Congressional appropriations, and through the coöperation of other institutions and of individuals engaged or interested in geological, biological, or anthropological investigations.

The Institution and its branches were thus represented in a large number of field parties whose researches have tended to increase the general knowledge in various subjects, and have added much valuable material to the collections of the National Museum. Owing to its limited funds, the Institution was unable to participate in several additional enterprises in which opportunities for representation were offered.

In the preparation of the present account the direct statements of those who participated in the field-work have been employed, with one or two exceptions, while nearly all the photographs were made by the explorers themselves.

Some of the work carried on in 1913 was in continuation of operations begun in previous years and reported in part in accounts heretofore published by the Institution.<sup>1</sup>

Three Government branches of the Institution are represented in this report: The National Museum, although having no specific funds for exploration work, avails itself as far as possible of all opportunities presented for making collections in the field; the Bureau of American Ethnology engages largely in field-work, which is covered in detail in the annual report of that bureau; and the

---

<sup>1</sup> Expeditions Organized or Participated in by the Smithsonian Institution in 1910 and 1911. Smithsonian Misc. Coll., Vol. 59, No. 11, 1912.

Explorations and Field-Work of the Smithsonian Institution in 1912. Smithsonian Misc. Coll., Vol. 60, No. 30, 1913.

Astrophysical Observatory at times conducts special expeditions both in the United States and abroad, in connection with its regular work of studying the physical properties of the sun and their effect on the earth.

Both the National Museum and the National Zoological Park received during the year many donations and accessions presented or collected by collaborators in this country and abroad who have no official connection with either branch. The remaining branches under the Smithsonian Institution were not represented by any field parties, and therefore are not mentioned in this account.



FIG. 1.—Looking northeast toward the top of Robson Peak from Rainbow Brook, one-quarter mile south of Lake Kinney, Robson Park, British Columbia, Canada. Photograph taken while clouds and mist were drifting over the upper part of the peak. The summit of the peak is 8,800 feet above the camera. The view shows the southwest face of the peak. Photograph by C. D. Walcott, 1913.

#### GEOLOGICAL EXPLORATIONS IN THE CANADIAN ROCKIES

In continuation of his previous geological researches in the Canadian Rockies, Dr. Charles D. Walcott, Secretary of the Institution, revisited during the field season of 1913, the Robson Peak district in British Columbia and Alberta, and the region about Field, British Columbia. At the latter place he received the members of the International Geological Congress.



FIG. 2.—Robson Peak from a ridge above and north of east end of Berg Lake, showing north side of peak. Robson Park, British Columbia, Canada. Photograph by C. D. Walcott, 1913.



FIG. 3.—Hunga Glacier from south slope of Mumm Peak, with Phillips and other mountains to the south. Robson Park, British Columbia, Canada. Photograph by C. D. Walcott, 1913.

On this trip to Robson Peak, Dr. Walcott approached from the west side, in order to study the local geological section which he considers one of the finest in the world. From the west foot of Robson Peak, Whitehorn Peak rises on the north to a height of 7,850 feet above Lake Kinney (frontispiece), and on the east the cliffs of Robson rise tier above tier from the surface of the lake to the summit of the peak, a vertical distance of 9,800 feet. The base of this geo-



FIG. 4.—Phillips Mountain, from Robson Pass, looking over the front of Hunga Glacier. Robson Park, British Columbia, Canada. Photograph by C. D. Walcott, 1913.

logical section is shown on the right of the frontispiece, and the upper half by figure 1, while figure 2 illustrates a profile of 7,500 feet of the section.

From beneath the base of the mountain at Lake Kinney, the strata slope gently upward so that more than 4,000 feet in thickness of beds, which pass under Robson Peak, are exposed in ledges to the north and south. A considerable portion of this thickness is shown in the dark peak to the left of Whitehorn Peak in the frontispiece.



Owing to exceptionally good climatic conditions, the season of 1913 proved unusually favorable for viewing Robson Peak. Fre-



FIG. 5.—Brook entering Berg Lake, one mile southwest of Robson Pass. View taken about half a mile from the lake. Robson Park, British Columbia, Canada. Photograph by C. D. Walcott, 1913.

quently in the early morning the details of the snow slopes on the summit of the peak were beautifully outlined. Toward evening,

however, the mists driven in from the warm currents of the Pacific, 300 miles away, shrouded the mountain from view (fig. 7).

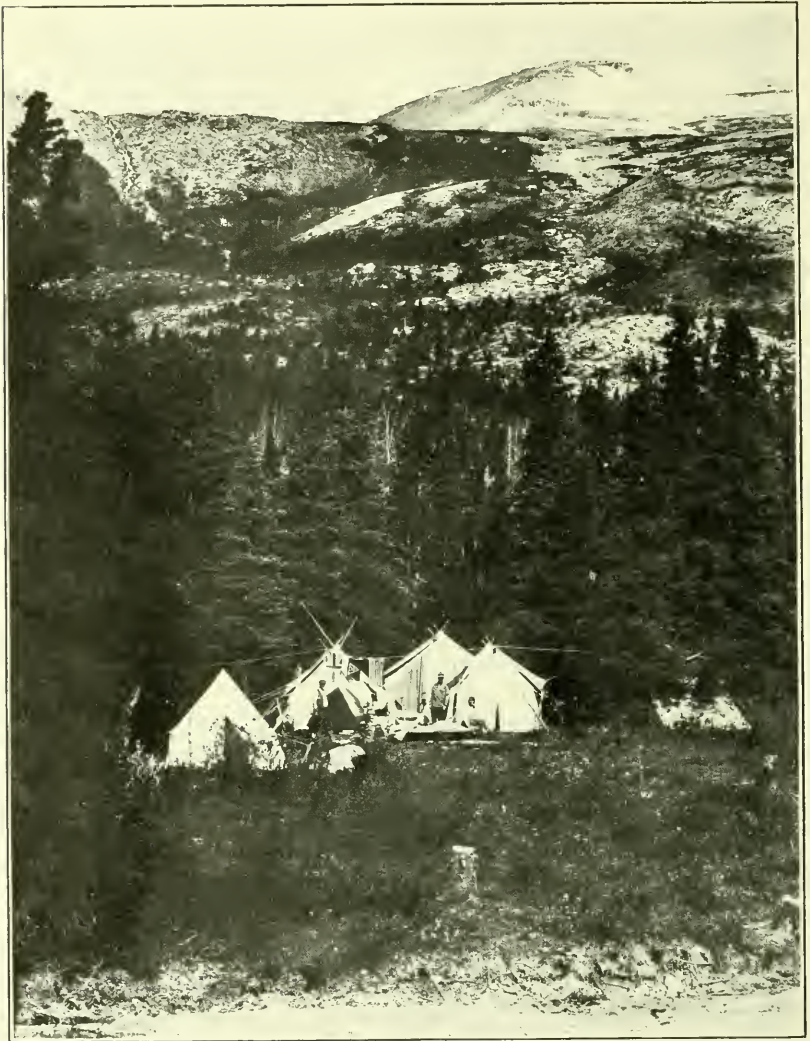


FIG. 6.—Camp on the north side of Robson Pass.  
Photograph by C. D. Walcott, 1913.

From the slopes of Titkana Peak, west of the great Hunga Glacier (figs. 3 and 4), a wonderful view is obtained of the snow fields and falling glaciers east of Robson Peak. The glacial streams come



FIG. 7.—View from Walcott Camp, looking westward over President Range after sunset when the mist is driving eastward over the mountains. Near Field, British Columbia, Canada. Photograph by C. D. Walcott, 1913.

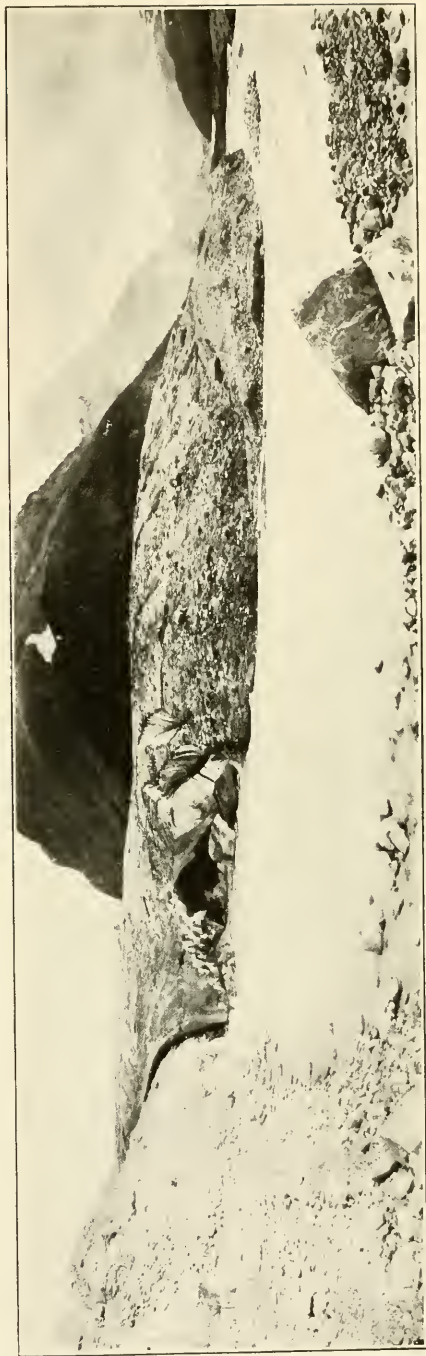


FIG. 8.—Panoramic view of west side of foot of Hunga Glacier where the stream forming the head-waters of Grand Fork comes from beneath the ice and flows westward into Berg Lake, Robson Park, British Columbia, Canada. Photograph by C. D. Walcott, 1913.



FIG. 9.—View looking out from the fossil quarry over Burgess Pass, to the right of the mountain, the Van Horne Range in the distance, the President Range and Emerald Lake. On the left the Kicking Horse Valley, Mount Dennis, and in the distance Mount Vaux. Near Field, British Columbia, Canada. Photograph by C. D. Walcott, 1913.



FIG. 10.—North end of the fossil quarry above Burgess Pass on the slope of the ridge between Mount Wapta and Mount Field, 4,000

tumbling down the slopes (fig. 5) and often disappear beneath the glacier to reappear at its foot with the volume of a river (fig. 8).

At Field, British Columbia, work was continued at the great Cambrian fossil quarry, where a large collection of specimens was secured. The conditions were such that it was necessary to do much heavy blasting to reach the finest fossils which occur in the lower layers of rock. Figure 10 shows the north end of the quarry below the sharp



FIG. 11.—South end of fossil quarry, where many of the most beautiful specimens were secured from the lower three feet of beds. Near Field, British Columbia, Canada. Photograph by C. D. Walcott, 1913.

summit of Mount Wapta, and, in the distance, the President Range with Emerald Lake at its base. The south end of the quarry is illustrated by figure 11; here the solid beds were blasted out to a depth of 22 feet.

Owing to the presence of a fault line, just north of the quarry, and the twist and compression of the rocks south of it, the available area for successful collecting is limited to about 200 feet. In other localities where the shale outcrops on the ridges in the vicinity, com-

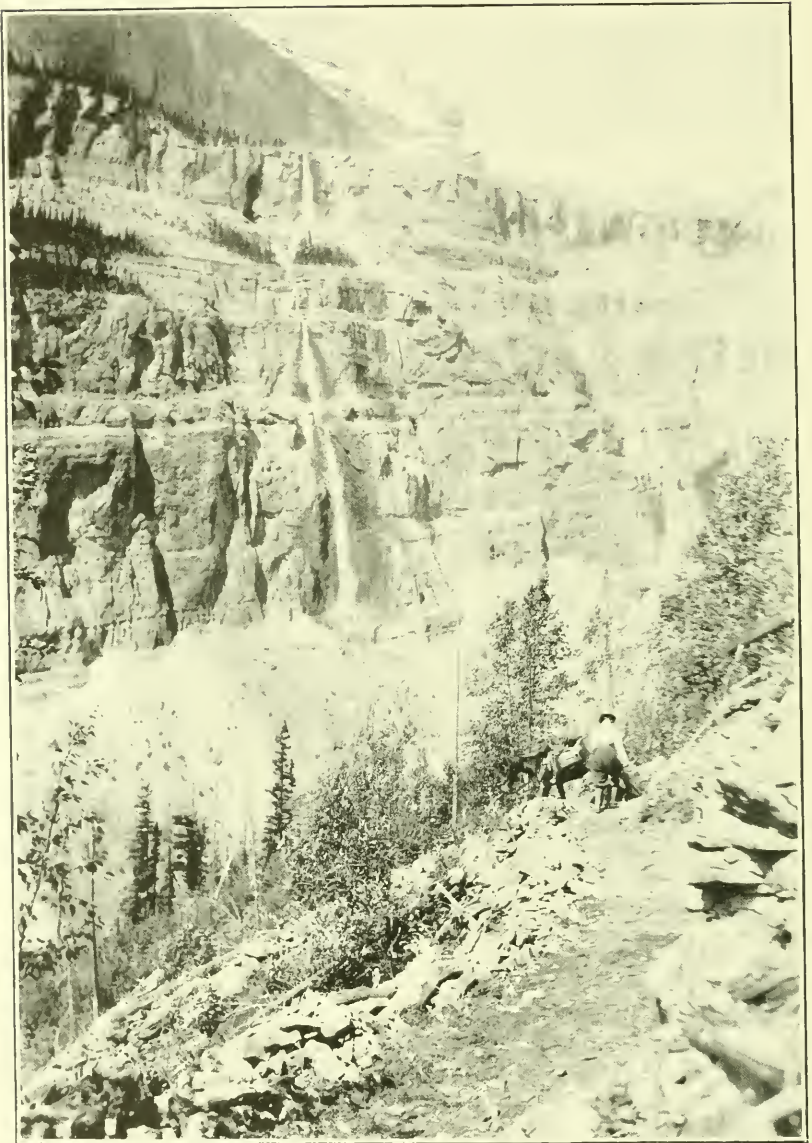


FIG. 12.—View of the west cliff of the valley of the Thousand Falls. On the trail from Lake Kinney to Berg Lake. Photograph by R. C. W. Lett, Grand Trunk Pacific Railway, 1913.



FIG. 13.—Summit of Mount Resplendent, with the mist driving over the three members of the Alpine Club of Canada. Photograph by P. L. Tait, British Columbia, 1913.

pression and shearing have so changed the character of the rock that it is impossible to obtain fossils in a condition to be of service.

The collections of 1913 contain a number of very important additions to this ancient Cambrian fauna, and many fine additional examples of species found in 1912.



FIG 14.—Boulder train on the surface of the west side of Hunga Glacier, overlooking the Robson Pass, British Columbia. The Secretary of the Smithsonian Institution is standing beside the boulder. Photograph by Miss Helen B. Walcott, 1913.

#### GEOLOGIC HISTORY OF THE APPALACHIAN VALLEY IN MARYLAND

Dr. R. S. Bassler, curator of paleontology in the U. S. National Museum, spent a month during the summer of 1913, in the Appalachian Valley of Maryland and the adjoining States, studying the Postpaleozoic geologic history of the region, as indicated by the present surface features. His studies, which were under the joint auspices of the U. S. National Museum and the Maryland Geological Survey, were in continuation of work carried on during the previous summer when the sedimentary rocks of the region were mapped in detail, the final object being the preparation of a report on the Lower



Paleozoic strata of Maryland, to complete a series of memoirs published by that State. Owing to the brevity of this account, only a few points in the physiographic history will be noted here.

Since Carboniferous time western Maryland has been above the sea, and its rocks have accordingly been subjected to a long period of aerial erosion. During Jurassic time, the area remained stationary for so long a period that the surface of the land in the Appalachian province was reduced to a rolling plain. Later uplift raised this



FIG. 15.—Jurassic (Schooley) peneplain, preserved in the Blue Ridge of Maryland. Photograph by Bassler.

plain still higher above sea level, and in Maryland only remnants of the old surface are preserved in the flat skyline of the highest mountains. This ancient plain, or Schooley peneplain, as it is termed, is well preserved on the top of the Blue Ridge, as shown in figure 15.

A second great period of erosion occurred in early Tertiary time, the effects of which were chiefly in the Appalachian Valley proper, where the erosion is indicated by a pronounced plain at an elevation of about 750 feet. This plain was formed only on the softer Paleozoic rocks, and, because of its prominence near Harrisburg, Pennsylvania, is known as the Harrisburg peneplain. Conococheague Creek traverses the Harrisburg peneplain in Maryland, and has dissected it

considerably, as shown in figure 16, but the even skyline of the ancient plain is still clearly evident.

Other factors in the geologic history of Maryland are recorded in the well defined gravel terraces along the major streams of the area and in great alluvial fans of large and small bowlders, spreading out at the foot of the larger mountains and sometimes reaching a depth of 150 feet. All of these phenomena have been plotted and will form a part of the geologic map of the region.

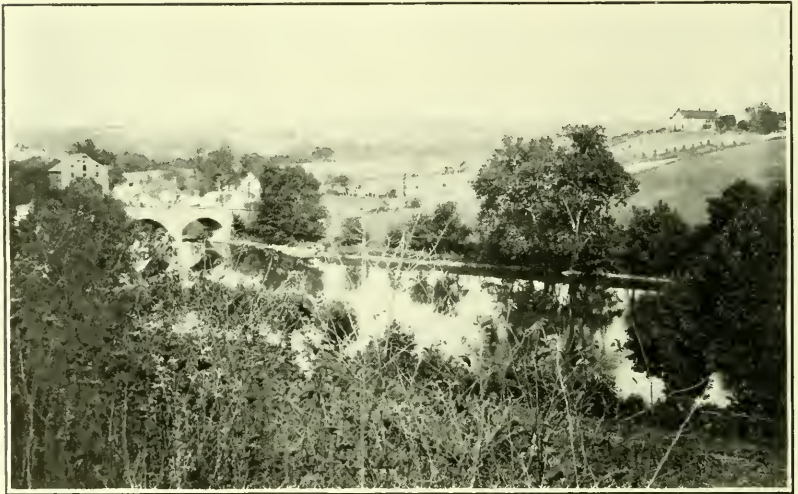


FIG. 16.—Dissected Early Tertiary (Harrisburg) peneplain, west of Hagerstown, Maryland. Photograph by Bassler.

#### COLLECTING FOSSIL ECHINODERMS IN ILLINOIS

The special field explorations maintained by Mr. Frank Springer, associate in paleontology in the U. S. National Museum, were continued during the season of 1913 by his private collector, Frederick Braun. The purpose of these explorations is to obtain additional material for use in Mr. Springer's monographs upon the fossil crinoidea, now in course of preparation, but they also result in important accessions of excellent specimens for the completion of the exhibition series in the hall of Invertebrate Paleontology in the National Museum.

The investigations of the past summer were confined to the Kaskaskia rocks of Monroe and Randolph Counties, Illinois. They were systematically carried on in connection with the geological work for the State of Illinois, in progress at the same time under the direction of Professor Weller, in order to have the benefit of accurate determinations of the horizons from which the collections were made, with reference to the several subordinate formations into which the



FIG. 17.—Portion of a slab of fossil Crinoids from Illinois.  
Photograph by National Museum.

Kaskaskia of that region is divided. In this way it was hoped to rectify some confusion as to the stratigraphic relation of a number of species described in the Geological Reports of Illinois and Iowa. The operations were successful in this respect, and at the same time six large boxes of fine specimens were obtained. Among the specimens there are a number of slabs covered with Crinoids not hitherto found in that formation, in an excellent state of preservation. A portion of one slab, containing 22 specimens of 9 different species, is shown in the accompanying illustration (fig. 17). This specimen and

others of similar character, giving a complete representation of the Kaskaskia crinoidal fauna, are being prepared for installation in the exhibition hall of the National Museum.

#### FURTHER EXPLORATION OF THE CUMBERLAND PLEISTOCENE CAVE DEPOSIT

In May, 1913, Mr. J. W. Gidley, assistant curator of fossil mammals in the U. S. National Museum, made a second visit to the Pleistocene cave deposit near Cumberland, Maryland, which proved even



FIG. 18.—Near view of part of excavation made near Cumberland, Maryland, by U. S. National Museum party. Photograph by Armbruster.

more successful than the one of the previous year, reported in the account of the Smithsonian explorations of 1912.

Many new forms were added to the collection, and much better material was obtained of several species represented only by jaw fragments in the first collection. The collection now contains upward of 300 specimens, representing at least 40 distinct species of mammals, many of which are now extinct. Among the better preserved specimens are several nearly complete skulls and lower jaws. The more important animals represented are two species of bears, two species of a large extinct peccary, a wolverine, a badger, a martin, two porcupines, a woodchuck, and the American eland-like antelope.

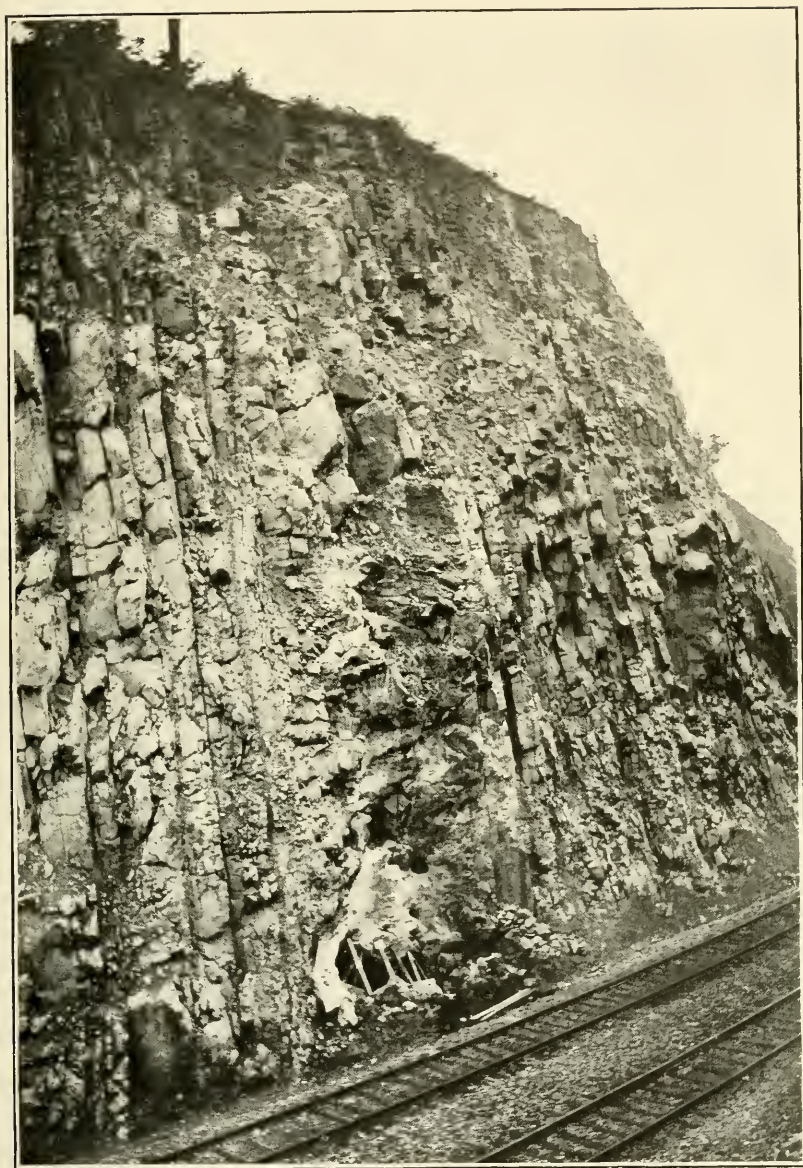


FIG. 19.—View from opposite side of railroad cut showing fossil deposits at bottom, near track, and traces of ancient opening at top of cliff. Photograph by Armbruster.

These species are all new and, with the exception of the American eland, the dog, and one of the bears, which Mr. Gidley has already described,<sup>1</sup> have not yet been named.

Other species represented by more fragmentary material include the mastodon, tapir, horse, and beaver, besides several species of the smaller rodents, shrews, bats, and others.

This strange assemblage of fossil remains occurs hopelessly intermingled and comparatively thickly scattered through a more or less unevenly hardened mass of cave clays and breccias, which completely filled one or more small chambers of a limestone cave, the material together with the bones evidently having come to their final resting place through an ancient opening at the surface a hundred feet or more above their present location. The deposit is at present exposed at the bottom of a deep cut through which the Western Maryland Railroad has built its tracks. The railroad excavation first brought to light the ancient bone deposit and incidentally made access to the fossils comparatively easy. It is proposed to continue work on this important deposit during the next season.

#### A FOSSIL HUNTING EXPEDITION IN MONTANA

While engaged in Geological Survey work in northwestern Montana in 1912, Mr. Eugene Stebinger discovered a promising locality of vertebrate fossil remains. The following summer (1913), under the auspices of the U. S. Geological Survey, Mr. Charles W. Gilmore, assistant curator of fossil reptiles in the National Museum, headed an expedition for the purpose of obtaining, if possible, a representative collection from this area.

In July a camp was established on Milk River, some thirty-five miles north and west of Cut Bank, Montana, on the Blackfeet Indian Reservation. Four weeks were spent here in collecting, the work being confined entirely to the Upper Cretaceous (Belly River beds) as exposed in the bad-lands for ten miles along this stream. Later, in August, camp was moved some fifty miles south on the Two Medicine River, and two weeks were spent working in the same geological formation.

Taking into consideration the short time at the disposal of the party, the results of the expedition were most gratifying. Between

---

<sup>1</sup>Smithsonian Misc. Coll., Vol. 60, No. 27, 1913.

Proceedings U. S. National Museum, Vol. 40, No. 2014, 1913.

500 and 600 separate fossil bones were obtained, many of them of large size. The most notable discovery was a new Ceratopsian<sup>1</sup> or horned dinosaur, the smallest of its kind known. There were portions of five individuals of this animal recovered, representing nearly all parts of the skeleton, so that it will be possible to mount a composite skeleton for exhibition. In this connection, it is perhaps of interest to know that, although Ceratopsian fossils were first dis-



FIG. 20.—Fossil beds as exposed on Milk River, Montana. The small Ceratopsian dinosaur was found in the breaks in the foreground. Photograph by Gilmore.

covered in the Rocky Mountain region in 1855, and portions of a hundred or more skeletons have been collected, this is the first individual to be found having a complete articulated tail and hind foot. It thus contributes greatly to our knowledge of the skeletal anatomy of this interesting group of extinct reptiles.

Another noteworthy find was a partial skeleton of one of the Trachodont or duck-billed dinosaurs. This animal was only recently

<sup>1</sup> Mr. Gilmore's description of this extinct reptile is to be found in the *Smithsonian Misc. Coll.*, Vol. 63, No. 3, 1914.

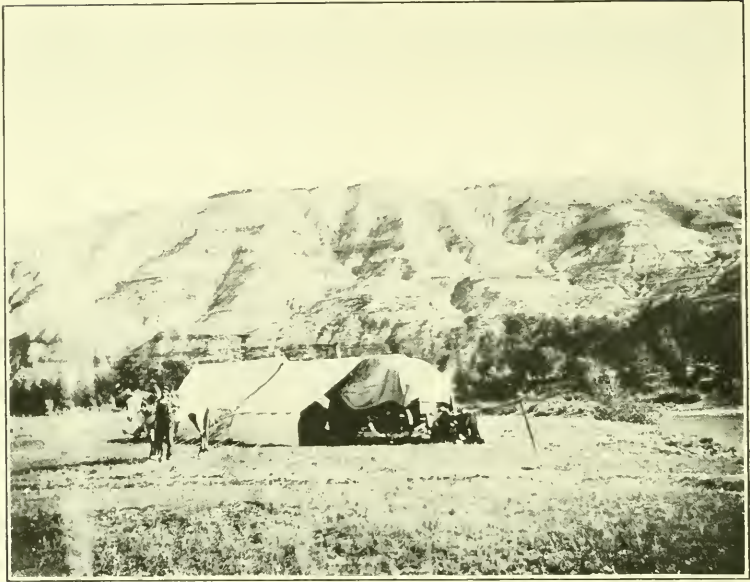


FIG. 21.—Fossil beds as exposed on Two Medicine River, Montana. Camp of fossil hunters in the foreground. Photograph by Gilmore.



FIG. 22.—Fossil leg bone of a dinosaur shown as found in the ground, on Milk River, Montana. Photograph by Stebinger.



described from specimens obtained in Canada, and its discovery in Montana greatly extends its known geographical and geological range. The species was not before represented in the National Museum collections.

Less perfect skeletons of carnivorous and armored dinosaurs, turtles, crocodiles, and ganoid fishes were also obtained. Altogether the material is a most welcome addition to the fossil vertebrate collection in the National Museum, which has been deficient in representatives of this highly interesting but little known fauna.

#### LIFE ZONES IN THE ALPS

During the summer of 1904, Messrs. G. S. Miller, Jr. and Leonhard Stejneger, of the National Museum, visited the Western Alps in an endeavor to ascertain the limits of the life zones which, in that part of Europe, might correspond to those of North America established chiefly through the efforts of the U. S. Biological Survey. That a system of such life zones exists in Europe has long been more or less vaguely stated by authors, but although a definite correlation was established by the gentlemen mentioned, certain points, especially the interrelation of the zones corresponding to the so-called Canadian and Hudsonian life zones in America, were greatly obscured by the long continued interference of man and animals with Nature, such as the grazing of cattle in the high Alps, deforestation, and, more recently, artificial reforestation.

It was thought that the eastern Alps might show more primitive conditions, and in the spring of 1913, Mr. Stejneger took advantage of an opportunity to visit the mountain region between Switzerland and the head of the Adriatic, through a small grant from the Smithsonian Institution. Unseasonable and rainy weather interfered greatly with the carrying out of his investigation. He arrived in the town of Bassano at the foot of the Venetian Alps on April 20, 1913, it being his plan to study the life zones of the Val Sugana and the plateau of the Sette Comuni from that point. This plateau descends abruptly to the Venetian plain on the south, while to the east and north it is separated from the mass of the Eastern Alps by the Val Sugana, or the valley of the river Brenta, and on the west by the lower part of the valley of the Adige, or Etsch. It is intersected by the boundary line between Italy and Austrian Tirol.

From April 21 to May 6, he made a series of excursions from Bassano, Levico, and Trento as successive headquarters, during



FIG. 23.—Mouth of Val Frenzela, at Valstagna, northern Italy.  
Photograph by Stejneger.



FIG. 24.—Plateau of the Sette Comuni, northern Italy, looking east from Gallio. Monte Grappa in the background. The valley is the beginning of Val Frenzela. Photograph by Stejneger.

which time he completely circled the territory, and crossed the plateau once on foot. In spite of the backwardness of the season, he was able to trace the boundaries of the Austral life zones in considerable detail, as well as to gather data which connect with the previous correlation of these zones in the Western Alps and with the corresponding zones in North America. It was found that the bottom of the entire Val Sugana belongs to the Upper Austral zone. Owing to the rainy and inclement weather the results were less satisfactory in the higher regions, though some important data corroborating previous conclusions were obtained.

The time from May 7 to May 20 was spent in a study of the Etsch Valley in Tirol, from Trento to Schlanders, and of its tributary, the Eisak, from Bozen to its source on the Brenner Pass.

The elaboration of the detailed observations will be incorporated with a general report on the biological reconnoissance of the Western Alps.

To this preliminary statement are appended two illustrations showing the character of the country in which the observations were made. Figure 23 is a view of the mouth of Val Frenzela, the narrow valley through which the descent from the Sette Comuni was effected, near Valstagna, a small town a few miles north of Bassano. Figure 24 represents the plateau near the commune of Gallio, about 3,500 feet above the sea, looking east toward Monte Grappa and showing the beginning of Val Frenzela.

#### DR. ABBOTT'S EXPEDITION IN DUTCH EAST BORNEO AND CASHMERE

In continuation of the exploring and collecting carried on through the generosity of Dr. W. L. Abbott, by Mr. H. C. Raven, in Dutch East Borneo, it may be said that the work is going forward with excellent results.

Dr. W. L. Abbott is continuing his personal explorations in Cashmere, which he undertook a year ago, and, although the Museum has received no detailed report, some fine specimens of mammals have been added to the collections and many more are expected.

In a letter received in January, 1913, Dr. Abbott says that in his last shipment the only really good specimen is a queer little silvery grey shrew about 74 millimeters long, quite different from anything he has before seen, of which there are four specimens from Skoro Loomba, east of Shigar. There is also a magnificent snow leopard with its complete skeleton.



FIG. 25.—View from Leh, looking toward the Khardery Pass up the valley to the right. Observe the cultivation in terraces, all irrigated. The elevation is 11,200 feet. The hills in the background are from 20,000 to 21,000 feet elevation. Photograph from Abbott.



FIG. 26.—Shepherds with load-carrying sheep. Each animal carries from 12 to 30 pounds. They bring salt from Tibet to Ladak and carry back grain. Photograph from Abbott.

During the three months' trip which Dr. Abbott spent in Baltistan, in northwestern Cashmere, he secured about 280 skins which have been presented to the National Museum.

After a sojourn in England, he expected to return to Cashmere in May, and march to Ladak. He also intended to visit Nubra, and go east along the frontier to the Dipsang Plains where he hoped to secure specimens of a certain vole from Kara Korum Pass, as well as the little Tibetan fox, known to the Cashmere furriers as the "King Fox." At the time of the letter he anticipated a four months' trip during the summer of 1913.

This expedition, the results of which have been delayed in transit, was very successful. The small fox was obtained, also several wolves, lynxes, and many smaller mammals. The accompanying illustrations have been made from photographs sent by Dr. Abbott.

#### MARINE INVERTEBRATES FROM THE "EASTERN SHORE," VA.

In July, 1913, Mr. John B. Henderson, Jr., a regent of the Smithsonian Institution, and Dr. Paul Bartsch, of the National Museum, made a short trip to Chincoteague, on the Atlantic shore of Accomac County, Va., for the purpose of securing exhibition material of marine invertebrates and ascertaining the local marine fauna, particularly that of the mollusca. Owing to the inaccessibility of this strip of coast, generally known as the "Eastern Shore," collectors seem to have neglected it. At any event, there appear to be but few records and no critical lists published of the shallow water shells from any locality between Cape May, N. J., and Beaufort, N. C.

The chief objects of this trip were to determine of just what elements the molluscan fauna consisted; to see how many, if any, species of southern range lapped over from Hatteras, and what northern species still persisted in this faunal area. The collectors were fortunate in their somewhat haphazard choice of a locality, for they encountered at Chincoteague a greater variety of stations than can probably be found at any other point along this section of the coast.

Here there are interior sounds of very considerable extent which are very shallow (4 to 12 ft.), more or less thickly sown with oyster beds and with patches of eel grass, the bottom ranging from hard sand, through varying degrees of hard clay, to soft mud.

They found also the unusual feature of a bight or protected cove formed by the southward drift at the southern end of Assateague Island, protected from heavy wave action by a long, curved sand spit. This bight has a soft mud bottom, with a temperature possibly

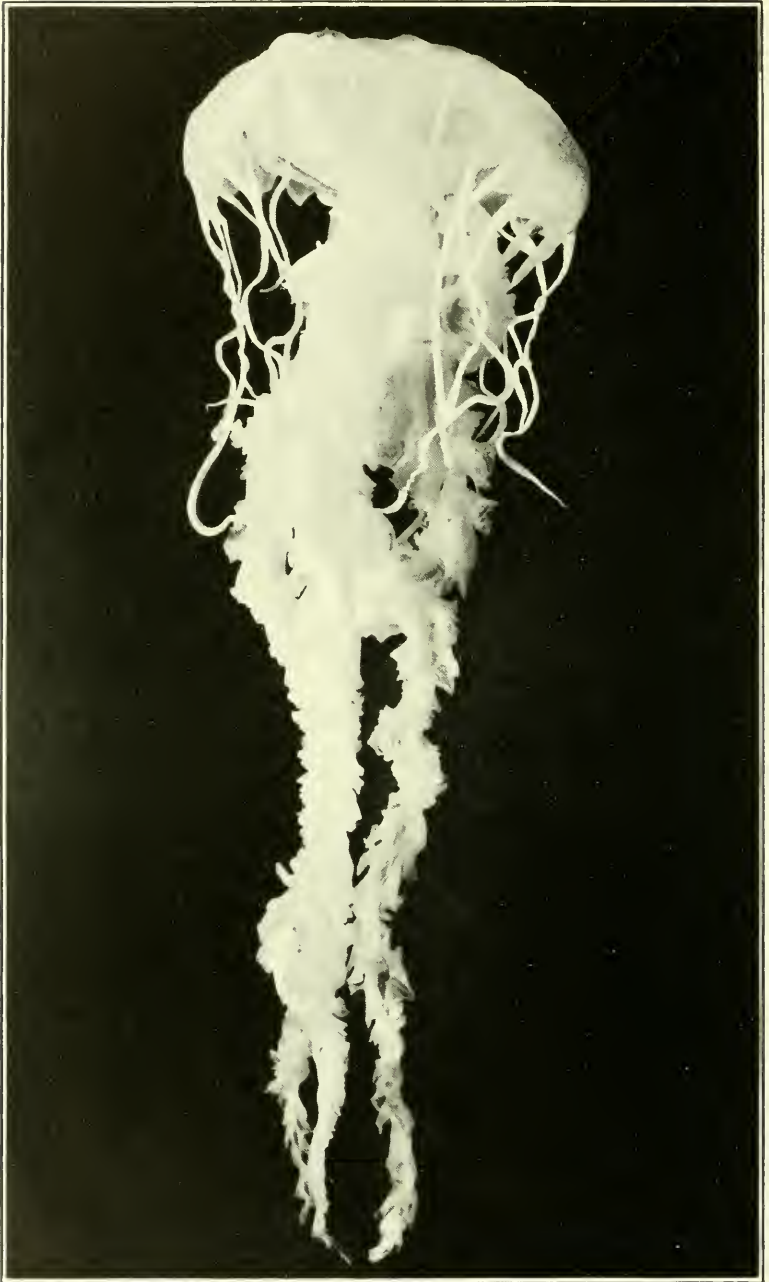


FIG. 27.—Medusa from Chincoteague, Virginia. Collected by Mr. Henderson and Dr. Bartsch. Photographed in alcohol by National Museum.

eight degrees less than that of the open sea. The mud brought up with the dredge seemed almost icy to the touch. This condition is probably produced by cold springs seeping through the floor of the bight. This colder water of the bight yielded to their dredge *Voldia limatula*, large and fine, and *Nucula proxima*, whereas just around the protective spit of sand, on the ocean side, they found dead *Terebras* of two species, some young *Busycon perversa* and a valve of *Cardium robustum*; a somewhat startling association of species.

Then there was the open sea, which here presumably differs in no manner from other open sea stations along the 200 miles or more of this coast. The bottom drops off very gradually to the edge of the continental shelf, some 75 or 100 miles out. The open sea stations which they occupied were, as might be expected, very poor. The smooth, hard sand bottom seemed almost barren of life, and the softer patches that were explored contained only many dead shells, mostly small bivalves. The work in the open sea was scarcely a good test, although the collectors made probably 20 hauls reaching out from the shore some 4 or 5 miles, but the chart soundings indicated more promising areas of pebbly bottom a few miles beyond what they considered the safety zone for a small motor boat.

The inner waters of the sound were found to be unexpectedly rich in molluscan life, the species, for the most part, not having been taken previously outside or in the bight.

Only two full working days were spent here, where the party was fortunate in securing an excellent boat and obliging skipper. The material has been identified with great care, and the results of the expedition will be published in the Proceedings of the U. S. National Museum.

#### EXPERIMENTS WITH CERIONS IN THE FLORIDA KEYS

In the second issue of the Smithsonian exploration pamphlet,<sup>1</sup> attention was called to experiments with Cerions, conducted by Dr. Bartsch, under the auspices of the Carnegie Institution. The plantings of Bahama Cerions made upon the Florida Keys were visited in the latter part of April and early June by Dr. Bartsch, and a de-

---

<sup>1</sup> Smithsonian Misc. Coll., Vol. 60, No. 30, 1913, pp. 58-62.

tailed report of his findings is published in the annual report of the Director of the Department of Marine Biology of the Carnegie Institution of Washington (Carnegie Year Book, 1913, pp. 217-219). The results of these experiments so far obtained may be summed up as follows:



FIG. 28.—“Peanut” shells on living vegetation, Key West, Florida.  
Photograph by Bartsch.

After looking over the entire plantings, Dr. Bartsch is inclined to believe that, with the exception of the Tea Table and Indian Keys, the colonies are doing as well as might be expected. It is also quite possible that when the young in the various colonies attain a larger size, a good many more will be found in the various places, in fact.



a good many may be present in places where they were not discovered previously, for the nepionic shells are quite small and hard to find.

Judging from the young collected, which were born on these Keys, the first generation will be like the parent generation unless decided



FIG. 20.—“ Peanut ” shells on living vegetation, Key West, Florida.  
Photograph by Bartsch.

changes should take place in the later whorls, which have not as yet been developed. The largest specimens found have only seven post-nuclear whorls, leaving two to three whorls still to be developed, and these make up fully half of the length of the shell. If the present



FIG. 30.—“ Peanut ” shells on dead stump, Key West, Florida.  
Photograph by Bartsch.

tendencies prevail in the adult shell, then it can be seen that the somaplasm has not at once responded to the change of environment. The reaction of the germ-plasm to the changed environment will await interpretation until the next generation presents itself.

Dr. Bartsch likewise kept a record of the birds seen on the various Keys visited between Miami, Florida, and the Tortugas, and has published this also in the *Carnegie Year Book* for 1913, pp. 220-222, with the hope that it may prove useful to students of bird migration.

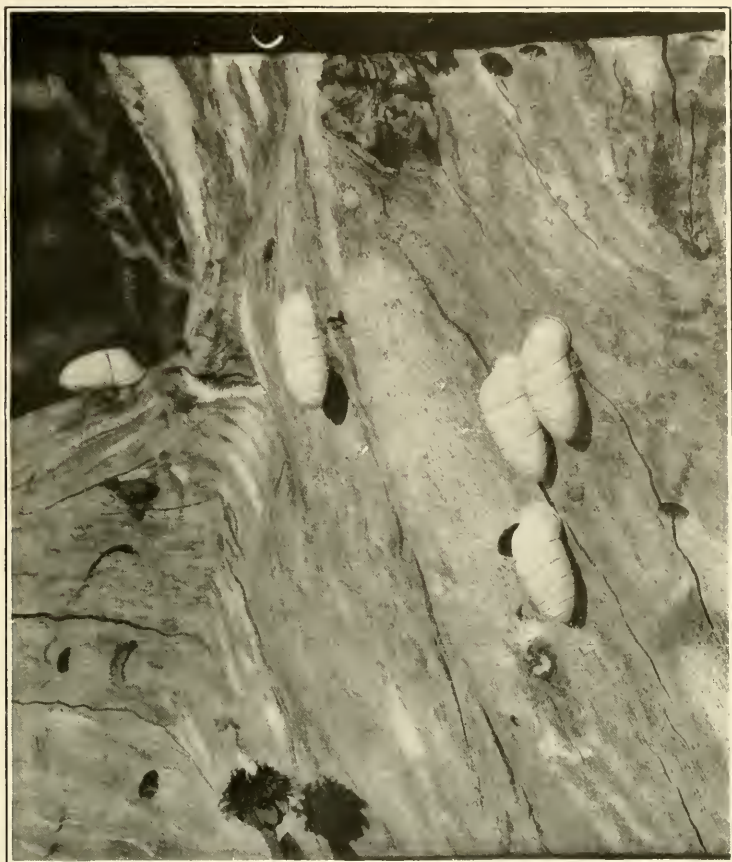


FIG. 31.—Detail view of "Peanut" shells on dead stump, Key West, Florida. Photograph by Bartsch.

#### BIRD STUDIES IN ILLINOIS

Mr. Robert Ridgway, curator of the division of birds, U. S. National Museum, has been working on the completion of National Museum Bulletin No. 50, *Birds of North and Middle America*, and has done some exploration work in the field in connection with this work.

Recently he made a trip to the Little Wabash River, about 16 miles southwest of Olney, Illinois, in order to ascertain what species of birds were wintering in the dense thickets of the bottom lands, and to obtain evidence as to the presence there of a decided element of the Austroriparian or Lower Austral fauna and flora.

Mr. Ridgway's residence in this locality during the winter has been of extreme interest; it is the first time he has had an opportunity to make natural history observations since his first trip to this region forty-seven years ago. He was thus enabled to compare present conditions with those existing on the occasion of his first visit, and has secured some valuable information for incorporation in his exhaustive monograph.

FISHES FROM THE REGION OF QUATERNARY LAKE  
LAHONTAN

The Museum has received through the Bureau of Fisheries a collection of fishes from the various river and lake basins that were



FIG. 32.—A breakfast catch of Tahoe Trout.  
Photograph by Snyder.

at one time connected with the quaternary Lake Lahontan. Twenty-one species are represented, 15 of which are native fishes, including not only all that are now known to inhabit the basin, but also 5 that are as yet undescribed. The collection was made by John O. Snyder, of Stanford University, while engaged in an investigation of the region under the direction of the Bureau of Fisheries.

Lake Lahontan, which in quaternary time was a large body of water, very irregular in shape, extended over a considerable part of



FIG. 33.—Mountain meadow in the high Sierra, one of the sources of the Truckee River. Photograph by Snyder.



FIG. 34.—Truckee River, outlet of Lake Tahoe, California. Photograph by Snyder.

the region now included in northern Nevada and eastern California. It was no doubt a magnificent lake, including as it did a number of large and beautiful islands, with the great snow-capped wall of the Sierra on one side and the endless shimmering desert on the other. Even now, though dwindled and shrunken through desiccation, its glory has not all departed. For although one may travel for days over the wind-driven sands of its parched floor, the great terraces and castellated crags of its ancient shores tower at times hundreds of feet on either side, and there still remain a number of small though



FIG. 35.—Humboldt River near the Palisades, Nevada.  
Photograph by Snyder.

very beautiful lakes and several rivers of considerable size which were once tributaries of the greater lake. The waters of none of these reach the ocean but ultimately disappear through evaporation, or sink into the loose, dry sands of the desert.

Lake Tahoe, near the crest of the Sierras, 6,247 feet above the sea, has 195 square miles of clear water which reaches a depth of 1,645 feet. Its outlet, the Truckee River, plunges down 2,300 feet in a distance of about 100 miles, finally bifurcating and entering Pyramid and Winnemucca Lakes. The former is 30 miles long and 12 wide, the water having a depth of over 350 feet. It embraces some pictur-

esque islands, two of which should be permanently reserved by the Government, for they shelter thousands of birds during the nesting

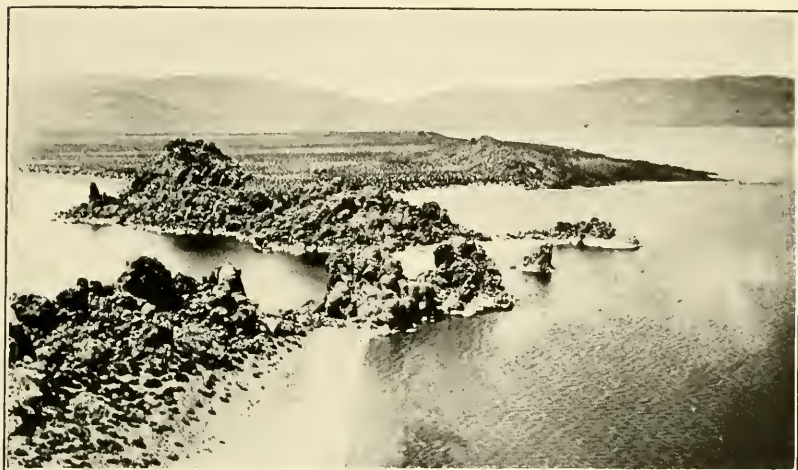


FIG. 36.—The Needles, Pyramid Lake. Photograph by Paine.



FIG. 37.—Tufa domes, Pyramid Lake. Photograph by Paine.

season. Humboldt, Quinn, Walker, and Carson Rivers, and also Honey, Walker, and Carson Lakes are parts of this system.

These rivers and lakes are well supplied with fishes, exceedingly abundant in number, although representing but a few species. Of chief interest and value among these are the trout which appear to have found here the most advantageous conditions for growth and development. At least 2 native species occur, *Salmo henshawi*, the large cut-throat which occasionally reaches a weight of over 20 lbs., and *S. regalis*, the royal silver trout, much smaller than the former, but a most beautiful fish, remarkable for the brilliant silver of its sides and the unparalleled blue of its dorsal surface. Formerly the lakes and rivers of the region fairly swarmed with trout, and during the spawning season they often entered the rivers in such numbers that it was difficult for them to find room in the channels. Several species of suckers and large minnows occur in countless numbers.



FIG. 38.—Bird Island, Pyramid Lake. Photograph by Paine.

Of these *Chasmistes cujus*, the Kouiewee of the Piute Indians, inhabits only Pyramid and Winnemucca Lakes. It lives in their depths, and is never seen until in the spring, when great schools suddenly appear at the mouth of the Truckee River, crowd up the channel and cover the bars, often pushing each other out of the water in their struggles to find room enough to deposit their eggs. Formerly this was an occasion of rejoicing among the Indians, for here were numbers of large, fat fishes which only need be kicked out of the water and hung on the bushes to dry. The Piutes still continue to cure them in large quantities for winter food. A small white fish abounds in favorable places. Some of the minnows reach a foot in length, bite



a fly or small spoon, and occasionally contribute to the camper's breakfast.

A study of the fish fauna of the basin bears out the conclusions of geologists regarding its long isolation. Nearly all of the species are distinct from those of neighboring systems, and some belong to groups of very restricted distribution. An account of the fishes, their habits and distribution will appear in a future bulletin of the Bureau of Fisheries.

#### CACTUSES AND DESERT PLANTS FROM THE WEST INDIES AND SOUTHWESTERN UNITED STATES

Dr. J. N. Rose, associate in botany, U. S. National Museum (at present connected with the Carnegie Institution of Washington



FIG. 30.—St. John's Harbour, British West Indies. The high point on the right is Rat Island, used as the Government Leper Asylum. Part of the town of St. John's is shown, the seat of government of the Leeward Islands under British control. Photograph by Russell.

in the preparation of a monograph of the Cactaceae of America), accompanied by Messrs. William R. Fitch and Paul G. Russell, spent over ten weeks in travel and field-work in the West Indies in the spring of 1913. As this was an unusual opportunity to obtain very valuable material needed for the collections of the National Museum and for use in making exchanges, the Museum detailed Mr. Russell

for the trip. This expedition formed a part of the larger scheme of studying in the field the desert plants of both North and South America, which had been organized by Dr. N. L. Britton, Director of the New York Botanical Garden, and Doctor Rose, in connection



FIG. 40.—A *Cereus* (*C. lepidotus* Salm-Dyck) common on these islands. Near St. John's, Antigua. Photograph by Russell.

with their Cactus Investigation for the Carnegie Institution of Washington. Doctor Britton also took a party to the West Indies.

Both parties started from New York City January 25. Doctor Britton and his assistants explored St. Thomas, St. Jan and others of the Virgin Islands, Porto Rico, and Curacao. His collection consisted of more than 3,000 species, comprising two sets, one of which has been sent to the National Museum as an exchange.



FIG. 41.—A specimen of the Century plant (*Agave obducta* Trelease) showing an immature flowering stalk. Near English Harbour, Antigua. Photograph by Russell.



FIG. 42.—Specimens of the Melon-cactus (*Cactus intortus* Mill.) and Century plant (*Agave obducta* Trelease) on promontory near English Harbour, Antigua. English Harbour was once a fortified British stronghold. Admiral Nelson here fitted up part of his fleet for the Battle of Trafalgar. Photograph by Russell.

At the same time, Doctor Rose's party visited St. Thomas, St. Croix, St. Kitts, Antigua, and Santo Domingo. Knowing that the Museum greatly needed duplicates for exchange purposes, general collecting was done whenever possible. Dr. Rose's collection consisted of more than 1,200 species and about 7,000 specimens. Of these, one set has been mounted for the Museum and has become a part of the study series of the herbarium. A second set was sent to the New York Botanical Garden, while other sets have been sent to the Bureau of Science at Manila, and to the Royal Botanical Garden and Museum at Berlin, for use by Dr. I. Urban in the preparation of his Flora of Santo Domingo.

While especial attention was given to collecting the Cactus flora, a large general botanical collection was made. In this there are some new species, one in particular being a very remarkable *Annona* from the desert plain at Azua, Santo Domingo.

In addition to the herbarium material, 12 boxes and crates of living plants, chiefly Cacti, were sent from the West Indies by Doctor Rose, and two boxes of living plants were sent to Lady Katharine A. Hanbury's garden at La Mortola, Italy, in exchange for specimens and courtesies shown to Doctor Rose when in Europe in 1912.

Many packages of seeds, bulbs, cuttings, etc., were obtained for exchange purposes of the Museum or for study by the various workers in the U. S. Department of Agriculture.

#### PLANTS FROM SOUTHWESTERN UNITED STATES

In September and October, Doctor Rose, accompanied by Wm. R. Fitch, made extensive botanical collections in southeastern Colorado, New Mexico, and western and southern Texas. While the trip was made primarily for the purpose of collecting and studying the Cacti of this region, many other flowering plants were obtained, a full set of which has been mounted and placed in the National Herbarium.

#### THE FLORA OF WESTERN NORTH CAROLINA

During the latter part of August and early September, 1913, Mr. Paul C. Standley, of the Division of Plants, U. S. National Museum, and Mr. H. C. Bollman, of the Smithsonian Institution, spent four weeks camping in the mountains of western North Carolina, near Montreat, Buncombe County. Although undertaken primarily as a vacation trip, advantage was taken of the opportunity for study of the flora of this most interesting region. Over seven hundred speci-

mens of plants were secured, besides small lots of some of the common and easily collected animals. Special attention was devoted to the mosses, hepatics, and lichens, in which the region abounds, and a representative collection of each of these groups was secured. Lists of the species of cryptogams have been prepared for publication.



FIG. 43.—Mountain brook near Montreat, North Carolina. Photograph by Standley.

The mountains of North Carolina are of great interest botanically, since they support a varied flora, many of whose components are not found elsewhere. Western North Carolina was visited by some of the earliest American botanists who collected here the types of many of the typically mountain plants. Although numerous botanists have explored the region, many of its divisions are still unexplored and yield rich returns to the collector.

About Montreat the mountains are covered with an almost virgin chestnut forest, traversed by numerous small, swift streams of clear, cold water, bordered with hemlocks. There is an abundant undergrowth of rhododendron and laurel, two of the handsomest of North American shrubs, which attain their greatest perfection in the southern Appalachians. The herbaceous vegetation consists of many

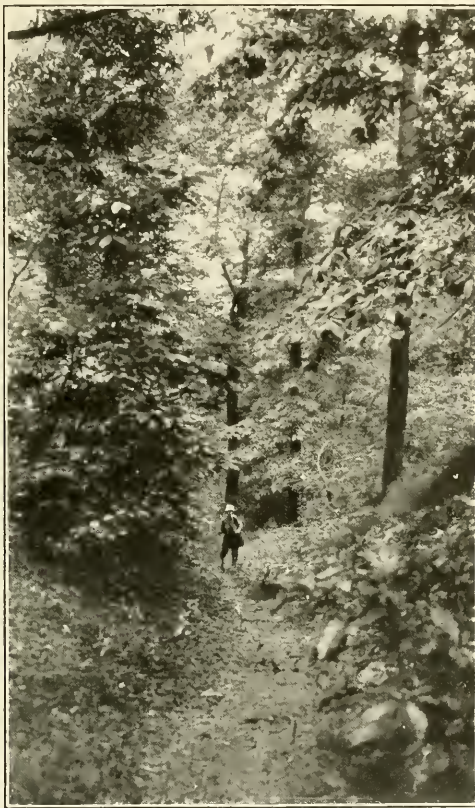


FIG. 44.—Chestnut forest near Montreat, North Carolina. Photograph by Standley.

species, some of them of limited distribution. A small sphagnum bog, in particular, yielded a large number of rare plants.

The most interesting excursion made during the month's camp was to the summit of Mount Mitchell, the highest peak in eastern North America—6,710 feet. By trail, it is distant about sixteen miles from Montreat. The trail at first follows a logging railroad which is being extended into the mountains, then strikes through the heavy

spruce and balsam forest covering the higher slopes. This primeval forest, which resembles in its general appearance those of the Rocky Mountains, unfortunately seems destined to disappear in the near future; indeed, it has already been removed from a large area, and desolation left in its stead. It is deeply to be regretted that as Mount Mitchell is made more accessible by the railroad its chief beauty will be destroyed.

A single night was spent on the summit of the mountain. A cabin was built here and maintained by the State some years ago, but it is now abandoned and has fallen into decay. At the summit of Mount

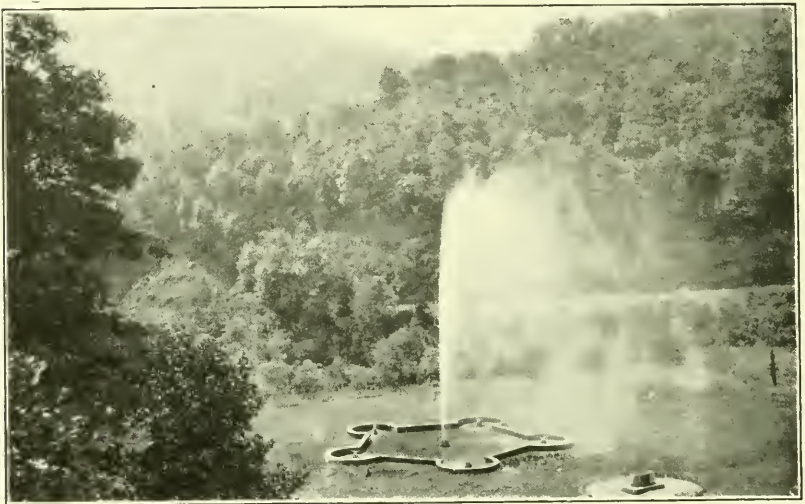


FIG. 45.—Artificial fountain near Black Mountain, North Carolina. It is fed from a reservoir on a neighboring mountain. Photograph by Standley.

Mitchell is a monument which marks the grave of the man whose name it bears, who lost his life while engaged in exploring its slopes. From this point at sunrise a wonderful view is obtained of the vast mass of mountains which cover the adjacent region, their valleys filled with a sea of clouds above which the higher peaks rise like rugged islands.

A small collection of plants was made upon the peak, a locality whose flora is little known. The flora, strangely enough, is not particularly interesting, for it includes but few species. The vegetation is remarkable chiefly for the large number of introduced plants it includes. These have doubtless been transported by the visitors who ascend the mountain each year. In spite of the altitude of Mount



Mitchell, it yields none of the boreal plants which make the floras of the mountains of New England so interesting. The lower mountains of North Carolina, and some of the other high peaks, are much more interesting botanically than this, the loftiest of them all.

#### ANCIENT MICA MINES OF NORTH CAROLINA

In April, 1913, W. H. Holmes, head curator of the department of anthropology, visited the mica mines of western North Carolina, making such observations as seemed necessary for a reasonable comprehension of the nature and extent of the ancient operations.

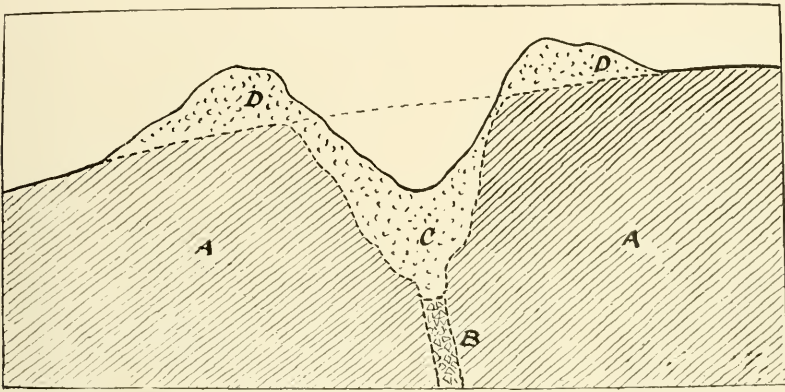


FIG. 46.—Section of an aboriginal mica mine: *A*, General schistose formation; *B*, Mica-bearing vein; *C*, Old digging partly filled up; *D*, Ancient dumps.

Mica was in very general use among the Indian tribes east of the Great Plains and was mined by them at many points in the Appalachian highlands from Georgia to the St. Lawrence River. From these sources it passed by trade or otherwise to remote parts of the country and is found especially in burial mounds, stone graves, and ordinary burials throughout the Mississippi Valley. The crystals of mica are of diversified shapes and sizes, reaching in some cases upwards of two feet in dimensions. They separate readily into sheets of very attractive appearance, which are transparent or translucent, displaying various silvery and amber hues. Mica crystals occur distributed through narrow veins of quartz and feldspar which extend at various angles through the inclosing schistose formations.

Although probably serving few practical purposes the sheets were highly prized by the aborigines for the manufacture of personal or-

naments and for sacrificial and mortuary purposes. It is stated on good authority also that they were used as mirrors.

Mr. Holmes visited a number of mines in the vicinity of Spruce-tree and Bandana, Yancey County, and near Bakersville in Mitchell County. The most important workings in the first mentioned locality are known as the Sink Hole mines, near Bandana. Although these mines have been operated extensively in recent years, sufficient traces of the old work remain to convey a fair notion of the nature and extent of the prehistoric mining. There are two main groups of pittings, each approximately 1,000 feet in length and 20 to 60 feet in

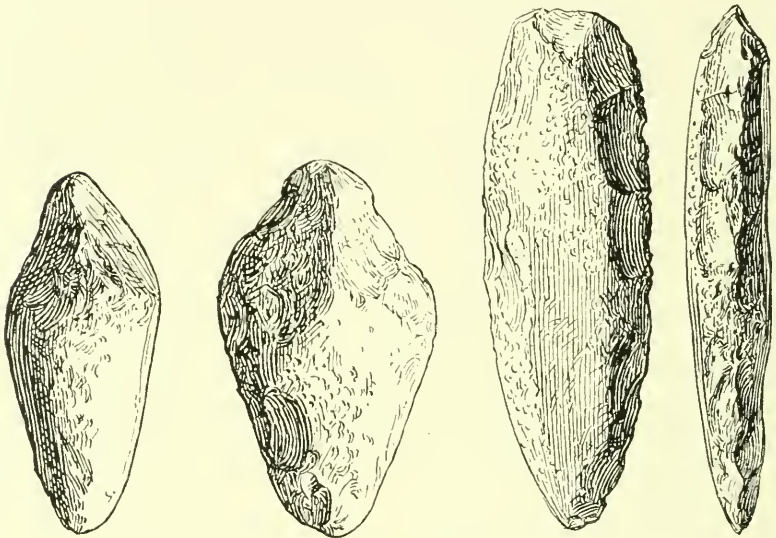


FIG. 47.—Stone picks used in excavating and freeing the crystals of Mica.

width. The original depth in many cases was upwards of 40 feet, but recent operations of white miners have served to change their appearance, and to fill up the deeper excavations. The pittings are surrounded by a somewhat uneven ridge of detritus derived from the excavations, which has been added to in places by the modern miners, and has been dug into of late years to recover the mica rejected and thrown out by the aborigines.

An important site of the ancient operations now known as the Clarissa mine, three miles east of Bakersville, Mitchell County, was also visited. This is probably the best preserved and most striking of the aboriginal workings in this general region, and serves to illustrate the importance of the mica industry in prehistoric times. Entering a

low ridge at an oblique angle, the excavation reaches a depth of nearly 100 feet. The outer margin is buried beneath heavy bodies of ancient dump material which now supports numerous chestnut trees, the trunks of which are four or five feet in diameter. The modern operators of the mine who have worked the vein at the upper end to the depth of 300 feet have filled the old trenches deserted by the aborigines.

So far as could be determined, the implements used in excavating the decomposed schists and breaking up the vein material, thus freeing the mica crystals, were rude picks and hammers of stone, a few examples of which were found. Drawings of these are shown in figure 47.

Mr. Holmes extended his reconnoissance into South Carolina, where an ancient mound of large dimensions, situated twelve miles below Columbia on the Congaree River, was examined. A plan of the mound was made, and an examination of an ancient burial site on the edge of the mound yielded numerous relics of pottery and stone.

Near Waynesboro, Georgia, a number of ancient village sites and certain outcrops of flint, where the aborigines had obtained the material for their implements, were examined. Later, in the spring, Mr. Holmes visited St. Louis, Missouri, with the view of studying the very interesting collections owned in that city, and accompanied by Mr. Gerard Fowke spent a day at Mill Creek, Illinois, making collections on the ancient quarry and shop sites of that locality. He later extended his excursion to Davenport, Madison, Milwaukee, Chicago, and Columbus, for the purpose of making studies in the museums of those cities.

#### ANTHROPOLOGICAL EXPLORATION IN PERU

Dr. Aleš Hrdlička, of the National Museum, has made a second report<sup>1</sup> concerning his field-work in Peru during the past year, in connection with the Panama-California Exposition at San Diego, for which a very important exhibit in physical anthropology is being prepared. The investigations extended over several hundred miles of the Peruvian coast and over hitherto unexplored regions in the western Cordilleras. The objects of this trip, which occupied the first four months of 1913, were to determine the anthropological relations

---

<sup>1</sup> Anthropological Work in Peru in 1913, with Notes on the Pathology of the Ancient Peruvians. Smithsonian Misc. Coll., Vol. 61, No. 18, 1914.

of the ancient Peruvians of the mountains with those of the coast, and to extend the investigations which Dr. Hrdlička has carried on for many years, regarding Indian and especially pre-Columbian pathology.

The expedition was a very strenuous one, but proved remarkably successful. Over 100 ancient cemeteries and many ruins, a large



FIG. 48.—The picturesque town of Huarochiri, in the western Cordillera of central Peru. Photograph by Hrdlička.

percentage of which were previously unknown to science, were examined and over 30 boxes of skulls and other material for future study were collected for the U. S. National Museum and the Museum at San Diego.

Dr. Hrdlička reports that skeletal material, which formerly abounded in Peru and is essential to scientific research, is fast disappearing, and in a few years can not be gathered without the expenditure of much time and money.

The results of the expedition will prove of unusual value to anthropology. While some of the links in the chain of evidence are still missing, it can now be said with certainty that the Peruvian coast from Chiclayo, in the north, to Yauca, in the south—a distance of over 600 miles—was peopled predominantly before the advent of the whites by one and the same physical type of Indian. These Indians were of medium height, with short and broad skulls, and



FIG. 49.—The ruins of the Incaic Temple of the Sun, at Pachacamac, Peru. Photograph by Hrdlička.

moderately to strongly developed muscles according to the locality. The most important fact ascertained in this connection was that both the Chimu and Nasca, two of the foremost cultural groups of ancient Peru, were identical and, as regards physical characteristics, inseparable parts of this coast people.

According to their location, the people of old Peru were either fishermen or farmers. They seem to have been organized into numerous political groups, which developed smaller or greater cultural differences according to environment and other influences.



FIG. 50.—Ancient cemetery in Peru; a typical example of the waste of pottery and bones by the despoiling peons. Photograph by Hrdlička.



FIG. 51.—Cache, by the explorer, of ancient pottery left behind by vandals after despoliation of a cemetery south of Huacho, Peru. Photograph by Hrdlička.

Some of their smaller dwellings were made of reeds, while larger structures were built of small uncut stones, sun-dried brick, or blocks of adobe. Their knowledge of weaving, pottery-making, and decoration was surprising. They wove from native cotton and llama wool, and their designs indicate changes brought about by time and other influences. The native dress consisted principally of a poncho shirt, a loin cloth, and sandals, with occasionally a simple head-gear.

The pre-Columbian Peruvians of the coast knew the uses of gold.



FIG. 52.—Indian hut and inhabitants, with a ruin-covered hill known at Llaxwa, in the rear, located in the Sierras, south-east of Nasca, Peru. Photograph by Hrdlička.

silver, and copper, and worked these metals to some extent, especially copper or "bronze" in the manufacture of weapons. Their common weapons were a metal or stone mace, a wooden club, a copper axe and knife, the sling, and in some regions the bow and arrow. Their implements were the whorl, weaving sticks, looms, cactus-spine or bone needle, bone needle-holders, sharpened sticks, copper knives and axes, hoes and fishing paraphernalia, including nets, sinkers, reed-bundle boats or balsas, and peculiar rafts which were paddled.

Throughout the whole territory along the coast the people deformed the heads of their infants by applying pressure to the fore-

head probably by means of pads and bandages, which process flattened the back of the head as well. They did not practice filing, cutting, or chipping the teeth, or other mutilations which would leave marks on the skeletons.

These natives seem to have been free from general bodily ailments before the advent of the white men; on the other hand they suffered from several peculiar local diseases affecting the hip-bone, the head, and the ear.



FIG. 53.—A party of vandals in an old cemetery on the railroad from Ancón to Huacho, Peru. Photograph by Hrdlička.

The people of the mountains possessed a good average development of the body and of the skull, and were even freer than the coast people from disease. Wounds were, however, common, and in some of the districts serious wounds of the head were frequently followed by the operation known as trepaning, and although this was often crudely done, it was successful in many cases. This practice was probably carried on even after the coming of the Spaniards.

The results of the expedition failed to strengthen the theories of great antiquity of man in Peru, tending rather to prove the con-



trary. Aside from the cemeteries or burial caves of the common coast or mountain people, and their archeological remains, there was no sign of human occupation of these regions. Not a trace suggesting anything older than the well-represented pre-Columbian Indian was found anywhere; and neither the coast nor the mountain population, so far as studied, can be regarded as very ancient in the regions they inhabited. No signs indicated that any group occupied any of the sites for even as long as 20 centuries; nor does it seem that any of these people developed their culture, except in some particulars, in these places.

#### ARCHEOLOGICAL EXPLORATIONS IN WESTERN NEW MEXICO

Mr. F. W. Hodge, ethnologist-in-charge of the Bureau of American Ethnology, in the early autumn of 1913 made a reconnoissance of



FIG. 54.—Character of masonry shown in one of the house-groups of the compound. Note the failure of the builders to “break” the joints and the consequent weakening of an otherwise excellent wall. The face of the stones is pecked to smoothness and all the stones are artificially squared. Photograph by Nusbaum.

a group of ruins on a mesa rising from the southwestern margin of the Cebollita valley, about 20 miles south of Grant, Valencia County, New Mexico, and only a few yards from the great lava flow that has spread over the valley to the westward for many miles. While no very definite information regarding the origin of this ruined pueblo



FIG. 55.—Stone outer wall of a defensive structure near the mesa rim. This wall is about 132 feet long in the clear, and is pierced only by small loop-holes. Photograph by Nusbaum.



FIG. 56.—Skeleton, with burial accompaniments, found in a small cist. Photograph by Nusbaum.

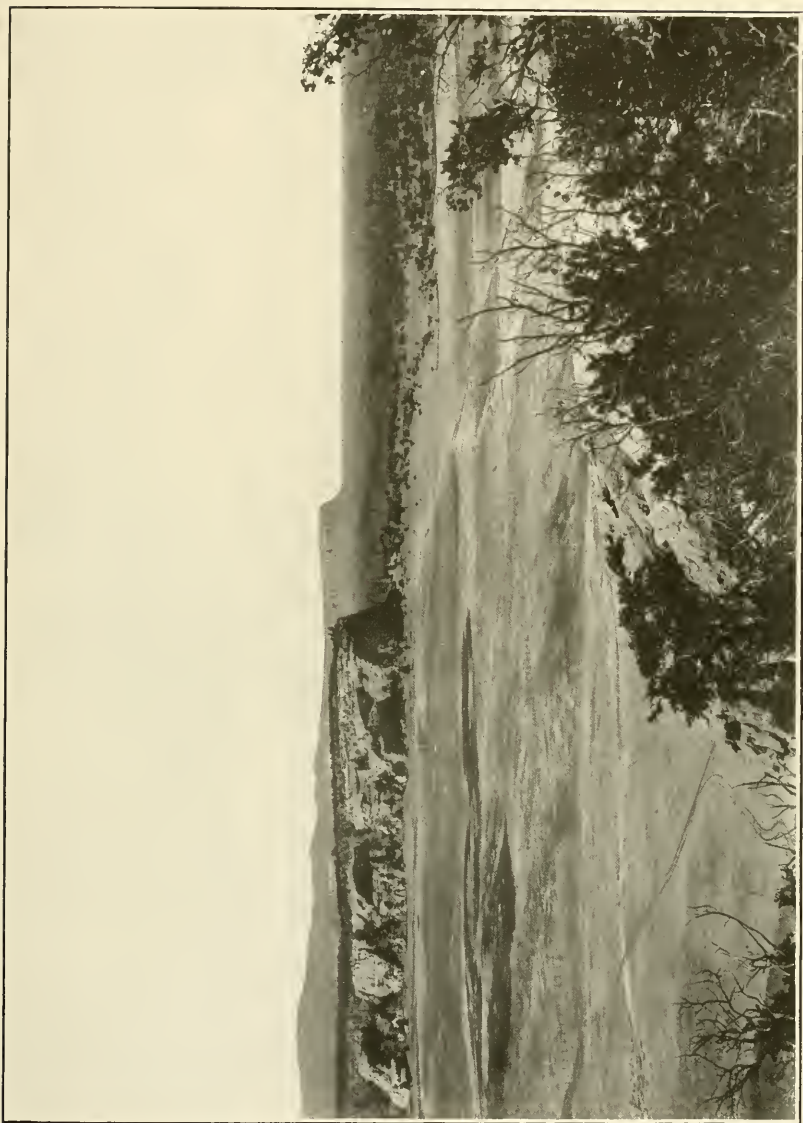


FIG. 57.—View southward across Cebollita valley, New Mexico. The lower mesa across the valley is that on the summit of which are situated the chief ruins described. Photograph by Nusbaum.

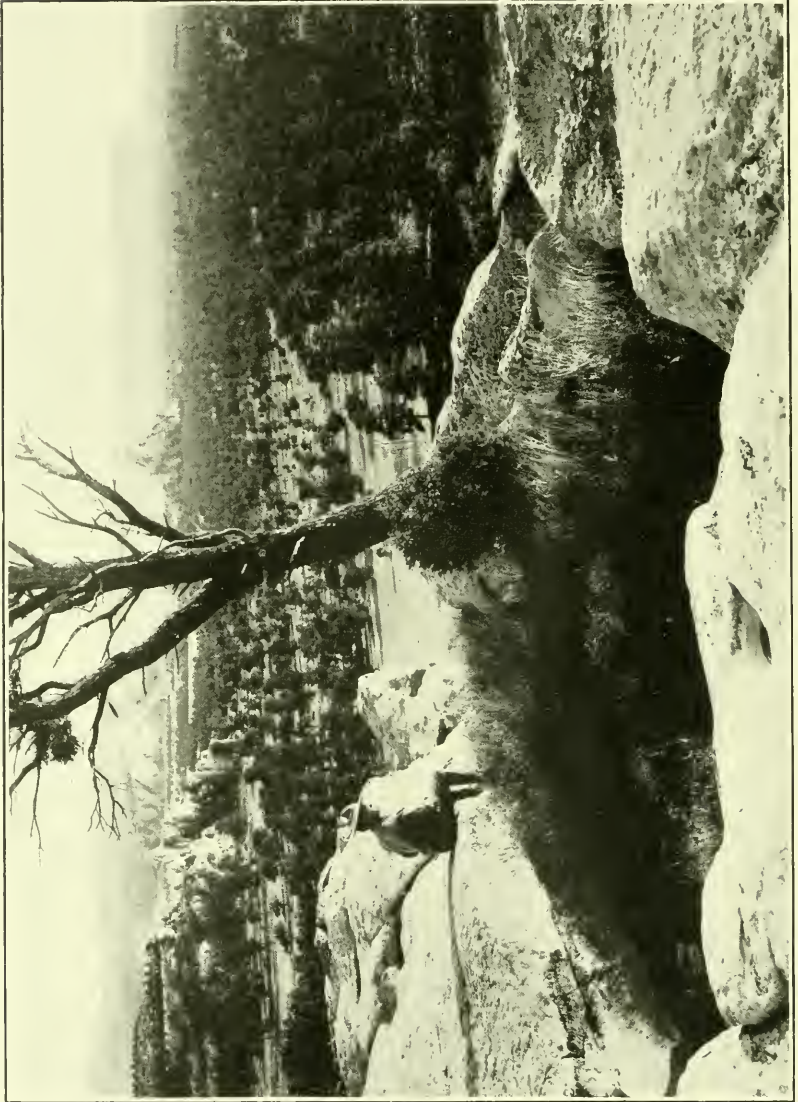


FIG. 58.—Smaller reservoir, probably chiefly a natural depression, in the rocky floor of the mesa-top; looking southward. Photograph by Nusbaum.

has yet been obtained, there is reason to suppose that it was occupied by ancestors of the Tanyi, or Calabash, clan of the Acoma tribe, and is possibly the one known to them as Kowina.

These ruins consist of a number of house-groups forming a compound, built on an almost impregnable height, and designed for de-

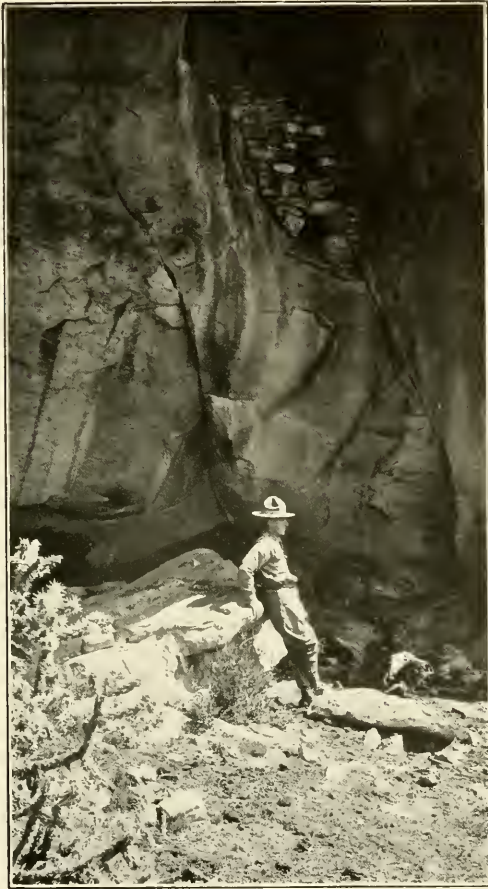


FIG. 59.—Small cliff-house on the northern side of Cebollita valley. Photograph by Nussbaum.

fence; not only the groups but the individual houses have the form of fortifications, while the vulnerable point of the mesa rim is protected by means of a rude breastwork of stones.

The outer wall, which protects the whole mesa, is built of exceptionally fine masonry, probably the finest work to be found in ancient

pueblo ruins of the Southwest. The building stones have been dressed to shape, matched for size, and their faces finished by pecking, with such labor as to confirm the belief that this ancient village was designed for permanent occupancy. Altogether the work proves of great interest, and it is surprising to note the one failing, on the part of these early builders: they seem to have been unaware of the necessity of breaking the vertical joints in the courses of masonry, thus causing many weak points in the otherwise excellent walls.

Among the special features of interest which Mr. Hodge discovered were a burial cist where skeletons, pottery, and the remains of a mat were found; three small cliff lodges situated in the sides of the cliffs; several ceremonial rooms or kivas associated with the ruined houses, and the remains of the early reservoirs of the inhabitants.

A full report on the exploration of this interesting pueblo will be made by Mr. Hodge in a later publication.

#### ANTIQUITIES OF THE WEST INDIES

Dr. J. Walter Fewkes, ethnologist in the Bureau of American Ethnology, spent January, February, March, and part of April, 1913, in the West Indies, studying the prehistoric antiquities of the Lesser Antilles, and gathering material for a proposed monograph on the aborigines of these islands. He examined numerous local collections, and visited many village sites, prehistoric mounds, shellheaps, and boulders bearing incised pictographs.

The most extensive excavations during these months were made at Erin Bay, Trinidad, in a shellheap of considerable size, where he found a valuable collection of animal heads made of terra cotta and stone, and other objects illustrating the early culture of that island. From Trinidad he went to Barbados, where he found evidences of the former existence of cave people living in a shell age or one in which stone was replaced by shell. Excavations were later made at a village site of the Black Caribs at Banana Bay, Balliceaux, a small island near St. Vincent, and a small collection was gathered from it.

He obtained many drawings of specimens in a rich collection from St. Kitts and Nevis, owned by Mr. Connell, and examined the shellheaps at Salt River, Christianstadt, St. Croix, and at Indian River, Barbados. The collection of prehistoric objects obtained from St. Croix, Danish West Indies, was ample to prove that the early culture of the inhabitants of this island was more closely related to the culture

of Porto Rico than to that of St. Vincent. The material obtained in this field-work will be embodied in a report which Dr. Fewkes has in preparation on the magnificent collection of West Indian prehistoric objects owned by George G. Heye, Esq., of New York. The exploration was done in coöperation with the Heye Museum.

Field-work in the West Indian islands was supplemented by a visit to those museums in Europe where extensive Antillean collections exist. August, September, and October were devoted to studying prehistoric West Indian objects in Berlin, Bremen, Copenhagen, Vienna, and Leipzig. While in the first mentioned city he employed Mr. W. von den Steinen to make drawings of the originals of the Guesde Collection and many other objects from Hayti, Porto Rico, and the Lesser Antilles.

In the Bremen Museum a stone collar was found to have its knob modified into a reptilean head, an unique feature that would seem to shed light on the meaning of these objects. The Museum at Copenhagen has a rare ceremonial celt connecting petaloid stone axes with stone heads.

These field-studies and examinations of museum specimens have led Dr. Fewkes to the conclusion that in prehistoric times there existed in the Antilles a race of sedentary people having a form of culture extending from Trinidad to Porto Rico. This culture differed in minor details, in the various islands, as the style of stone implements, pottery, and other objects of material culture in all these islands shows. It was preceded by a life in caves which survived in western Cuba and the western peninsula of Hayti down to the time of the discovery by Columbus. The Caribs, who came comparatively late, brought a different culture that overlaid and, in a measure, absorbed the preceding culture in the Lesser Antilles. In other words, evidences were found of at least three distinct types of culture in the Lesser Antilles: cave, agricultural, and Carib. The second or agricultural type was found to have the subdivisions localized in the following groups of islands: Cuba, Santo Domingo, and Porto Rico; St. Kitts, including Nevis; the volcanic chain of islands from Guadeloupe to Grenada; Barbados; and Trinidad.

As with all other sciences, the highest form of research in culture history is comparative. It is universally conceded that the race inhabiting the New World, when discovered, had not advanced in autochthonous development beyond the neolithic age, whereas in Asia, Europe, and Africa a neolithic age was supplemented by one in which metals had replaced stone for implements. In the Old World

this polished stone epoch had been preceded by a paleolithic stone age not represented, so far as is known, in America. The ethnology and archeology of our Indians therefore form only a chapter, and that a brief one, or a segment of a much more extended racial evolution, as illustrated in Asia, Europe, and Africa.

It is profitable to compare the neolithic stone ages in the New World and the Old in order to appreciate rightly the position of the American Indian in the advance of human history, and his relation to the dawn of human history.

In order to carry on comparative studies of the stone age of aboriginal America and the corresponding age in the Old World, Dr. Fewkes spent six months in field and museum work in Europe and Africa. He visited the prehistoric mounds, dolmens, and megalithic monuments at Stendal and Stöckheim in Altmark, a short distance from Berlin, and examined the finely installed collections from these localities in local museums. He also visited the island of Rügen, in the North Sea, where there are many prehistoric mounds, Huns' graves, workshops, and megalithic and other remains of the neolithic inhabitants. The many antiquities from this island in the museum at Stralsund furnished considerable data for a comparative study of artifacts from this part of Europe with similar objects from North America.

Dr. Fewkes believes that the time is past when the great ruins in our Southwest should be left to destruction by the elements, after smaller objects have been extracted from them. In order to protect these ruins he has inaugurated, under the direction of the Smithsonian Institution, at Casa Grande, Spruce-tree House, and Cliff Palace, a scientific method of excavation and repair. In order to improve his methods by becoming better acquainted with excavation and repair work adopted by the ablest European archeologists, he visited Egypt, Greece, and Italy (Pompeii).

He found in some cases that whereas repair work in the Old World is often neglected and cannot be called very scientific, and some of the excavated ruins have been left in very bad condition for future students, the majority are being carefully protected after excavation, in a manner well worth study by those who aspire to the most advanced standards.

The best archeological repair work in Egypt may be seen on the Temple of Amen Ra at Karnak, and the mortuary temples, the Ramesseum, Medinet-Habu, and the Seteum, from which were obtained valuable suggestions. The admirable repair of the hypo-style



hall of the Temple of Amen Ra, by M. Le Grain, is the most important ever attempted on an ancient building.

Part of his time in Egypt was devoted to comparative problems, and he was also able to give some attention, all too limited, to evidences of convergence and parallelism in the neolithic or predynastic culture of the Nile Valley with that of the Gila. He investigated more especially remarkable lines of similarity in artificial methods of water supply, in both regions, and the influence of coöperation of predynastic villages in building great irrigation canals, on the development of a higher social organization. He had always in mind the collection of material bearing on interrelationship of climatic conditions and early culture in the Nile Valley.

#### AMONG THE EAST CHEROKEE INDIANS OF NORTH CAROLINA

Mr. James Mooney, ethnologist in the Bureau of American Ethnology, spent the summer of 1913, June 18 to October 4, inclusive, with the East Cherokee Indians in the mountains of western North Carolina, among whom he had made his first field studies in 1887. These Indians, numbering some 1,000, live upon a small reservation in Swain and Jackson Counties with several outlying settlements farther to the west. They are a part of the historic Cherokee Nation formerly holding the whole mountain region of the southern Alleghenies until removed by military force in 1838 to the Indian Territory, where they now number about 30,000 of pure or mixed blood. Those in North Carolina are the descendants of some hundreds who made their escape from the troops and were finally, through the good offices of their friend, Col. Wm. H. Thomas, allowed to remain and settle upon lands purchased for them with their share of the fund originally appropriated for their removal to the west. There are still living among them several who remember the removal.

Constituting from the beginning the most conservative and pure-blooded element of the tribe, protected by their mountain barriers from outside influences and never having been subjected to the shock of forced removal to a distant and strange environment, these East Cherokees remain to-day the conservators of the ancient traditions, and exemplars of the aboriginal life once common in varying degree to all the tribes of the Gulf States. Until 1881, when the first school was established, they continued virtually unchanged. Since then, schools, railroads, and lumber industries have made rapid advance, which, with the passing of the older generation, must before many years bring to a close the Indian period.

On this occasion, Mr. Mooney made headquarters in the largest and most conservative settlement, locally known as Raven Town or Big Cove, some 12 miles from the agency, over a very rough mountain road impassable for vehicles during a part of the year. Here, shut in by the highest peaks east of the Mississippi, some 500 Indians dwell in fairly comfortable two-room log cabins perched high up on



FIG. 60.—Cherokee potter; Katâlsta, daughter of Yanagûski, "Drowning Bear," Head chief of the East Cherokee about 1838. Photograph by Mooney.

the slopes of the mountains, always near a convenient spring. They till their fields of corn and beans, which extend sometimes even up to the crest of the ridge. Some have oxen, and a few have horses, but the great majority cultivate their fields by hand, and travel always on foot.

While many are nominally Christians, and most of the younger people can speak English, they still, as a community, adhere to their

ancient rites of the Green Corn dance, the "going to water" at every new moon, the fishing and hunting charms, the medicine man, and the native ball game. Many of the women are expert in basket making, in a variety of patterns, but the pottery art, which flourished a few years ago, is now virtually extinct. The blow-gun, formerly used for shooting small game, is now almost a thing of the past, together with the head turban and the moccasin.

Although the outer life and semblance are thus altered, the possession of a native alphabet or syllabary, invented by a mixed blood of the tribe nearly a century ago, has enabled their priests and doctors to preserve their ancient ritual prayers and formulas without change and apparently almost without diminution from the remote past. By good fortune some twenty-five years ago Mr. Mooney was enabled to obtain some hundreds of these Cherokee manuscript formulas, the secret possession of their leading priests. Many others have been obtained on later visits, in addition to much miscellaneous ethnologic material, until the collection now numbers approximately 600 formulas, perhaps the equivalent of as many printed quarto pages, covering every occasion of Indian life, war, love, hunting, fishing, agriculture, medicine, games and ceremonials. This collection of aboriginal American literature is unique and without parallel. As a revelation of primitive psychology it is invaluable. The antiquity of the formulas is sufficiently indicated by the abundance of archaic forms and references, many of which cannot now be explained even by the priests, who simply say, "This is the way it was given to us." Many of these formulas are highly poetic.

The explanation of those originally obtained, almost one-half the whole collection, was procured from the principal recognized priests of that time, all of whom are now dead. At the same time, all the words of the formulas were glossarized, and all the plants mentioned in the medical prescriptions collected, and labeled with their Indian names, and later identified botanically by experts of the Smithsonian Institution. Other formulas have been translated and explained during subsequent visits. During the last summer the number was considerably enlarged by the best known teachers. All those then untranslated were translated and glossarized, and the additional plants named therein collected. The whole body was then revised from the beginning, so that nearly every formula has now had the interpretation of at least three recognized authorities. There is still a paucity in certain classes as compared with others, notably in the formulas relating to war and to the ball play, as compared with those relating

to medicine and love. This deficiency may be supplied by future gatherings, but for the formulas already translated, it may be confidently affirmed that no important additional light is now procurable.

While the formulas constitute the largest body of aboriginal American literature extant, the plant collection constitutes probably the largest ethno-botanic collection from any one tribe, comprising some 700 species with Cherokee names and uses, nearly all of which have been scientifically identified by expert botanists. This collection represents the combined plant knowledge of the principal doctors in the tribe.

Opportunity was also afforded for special studies and observations, particularly of the ceremonial "going to water," and augury with the beads to forecast the health prospect and life-span of each member of the family, before partaking of the first corn of the new crop.

#### CEREMONIAL DANCES OF THE CREEKS IN OKLAHOMA

In July and August, Dr. John R. Swanton of the Bureau of Ethnology visited the territory of the old Creek Nation in Oklahoma,



FIG. 61.—The "Feather" dance, Fish Pond square ground.  
Photograph by Swanton.

to attend several of the ceremonial dances or busks about which he had collected much information in previous years. He witnessed four of these ceremonials: that of the Eufaula Creeks near Eufaula, McIntosh County, those of the Hilibi and Fish Pond Creeks near Hanna, in Hughes County, and that of the Tukaba'tei near Yeager. Notes were taken on all of them and a number of photographs were obtained of the first three. Considerable supplementary information



FIG. 62.—The women's dance, Fish Pond square ground.  
Photograph by Swanton.



FIG. 63.—"Feather" dance, Hilibi square ground. Photograph by Swanton.

was secured from the older men regarding the busk ceremonial and other ancient usages.

When the ceremonies were over Dr. Swanton visited the Indians in Seminole County, who still speak Hitchiti, a language formerly current throughout southern Georgia, and recorded several texts. He also secured the coöperation of a Hitchiti Indian, able to write in the missionary alphabet, to obtain other texts after his departure.

#### CEREMONIES AND RITUALS OF THE OSAGE

During the year 1913, Mr. Francis LaFlesche of the Bureau of American Ethnology secured the songs and rituals of five different Osage ceremonies. Two of these are practically complete; the others are fragmentary, but enough information was obtained to give a fair idea as to their significance. These rites are: *Wa-dó-ka We-ko*, Scalp Ceremony; *Wa-zhiú-ga-o*, Bird Ceremony for boys; *Wa-wathon*, Peace Ceremony; *Zhin-gá-zhin-ga Zha-zhe Tha-dse*, Naming of a Child; and *We-xthe-xthe*, Tattooing Ceremony.

Owing to the superstitious hold these rites still have upon the people, together with the fact that every initiated person obtained his knowledge at a great expense, it was almost impossible to procure complete texts of any of the ceremonies.

The Tattooing Ceremony is of peculiar interest. It was more difficult to secure information concerning it than of any other ceremony. In earlier times only the warrior who had won war honors was entitled to have the ceremony performed and have the war symbols tattooed upon his body. If his means permitted it, they might also be placed upon any number of his relatives. These war symbols were his marks of distinction as a man of valor, for the strength and life of the tribe depended upon the prowess of the warriors. In those days there were but few who were entitled to have the ceremony performed, because war honors were not easily won and few were wealthy enough to afford the expense of the ceremonies. When, during the last century, wars between the various tribes ceased, the real significance of the rite vanished, but the superstitious belief that the symbolic figures meant long life to the individual so tattooed, remained prominently in the minds of the people.

About the time that the right of the honored warrior to the exclusive use of the Tattooing Ceremonies came to an end, a new condition arose which materially changed the character of the rite. From the sales of lands to the United States the Osage tribe acquired a wealth by which a greater number of its members were enabled to

have performed the tattooing, as well as other ceremonies. It was then that this ancient rite became the means by which any individual could publicly display his affection toward a relative.



FIG 64.—An Osage Indian with tattooing.

Figure 64 shows designs tattooed upon the body of a man. Those on a woman are more elaborate and cover the upper part of her body, breast and back, and the lower part of her legs. Figure 65 shows

three implements used in tattooing. Each of these is made of wood about the length of a pencil. To the lower end are attached needles arranged in a straight row, and to the upper end are fastened four small rattles made of the large wing quills of the pelican. This



FIG. 65.—Three implements used in Osage tattooing. Photograph by DeLancey Gill.

bird is referred to in one of the dream rituals as, *Mon-thin-the-don-ts'a-ge*, He-who-becomes-very-old-while-yet-going. In certain passages of the ritual it is intimated that these implements were originally made of the wing bone of this bird and were used for doctoring as well as for tattooing.



The coloring matter employed in tattooing is made of charcoal mixed with kettle black and water. The charcoal is made from certain trees that serve as symbols of long life in the war ceremonies. Tail feathers of the pileated woodpecker are used for putting on the ink and drawing the lines.

On November 17, 1910, *Wa-çé-ton-zhin-ga*, one of the prominent men of the *Pa-çi-u-gthin* band (Hill-top Dwellers) died. It was learned that he had a *Wa-xó-be-ton-ga*, a Great *Wa-xó-be*. This is a white pelican, the bird which is supposed to have revealed, through a dream, the mysteries of tattooing and to have supplied the implements. On February 16, 1911, *Wa-çé-ton-zhin-ga*'s widow after much persuasion reluctantly consented to part with this sacred object (the Great *Wa-xó-be*), together with its buffalo hair and rush mat cases. It was thus secured by the writer, and now has a place in the United States National Museum.

#### A STUDY OF SIOUX MUSIC

The field-work of Miss Frances Densmore during the season of 1913 was concentrated on the southern portion of the Standing Rock



FIG. 66.—Indians dancing the Grass Dance at Bull Head.  
Photograph by Miss Densmore.

reservation, which lies in the State of South Dakota. Many acquaintances had been made on a previous visit to the locality, and the earlier knowledge gained of the Indians opened the way for intensive work along the lines which had been selected, *i. e.*, songs of war, songs connected with the use of medicinal herbs, and songs of tribal social

organizations. As in previous years, the songs were recorded phonographically, about 130 songs being secured in this manner for the Bureau of American Ethnology.

In connection with this work Miss Densmore collected about 120 specimens, illustrating the old arts and industries as well as the customs of war and the practice of medicine. Twenty herbs said to have medicinal properties were secured from medicine men who use them in treating the sick. These herbs were identified at the Department of Agriculture in Washington, and a number of them were found to be in use among physicians of the white race.



FIG. 67.—Indian equipment for boiling meat without a kettle. Photograph by Miss Densmore.

During the celebration of July Fourth, at Bull Head, many old dances were given. Figure 66 shows the Indians at this celebration of the Grass Dance. A demonstration of the manner of boiling meat without a kettle was also given, Miss Densmore witnessing the process and afterward purchasing the entire equipment, shown in figure 67. This was of interest in connection with the subjects under investigation, as it was a method used in old times by Indians on the war path or buffalo hunt. The paunch of a freshly killed animal was suspended between three stakes, water was placed in it, and brought to the boiling point by means of heated stones. Meat was

thoroughly cooked in this manner. A portion of the meat thus prepared was secured in connection with the apparatus.

Many of the war songs were illustrated by native drawings. Figure 68 shows a man known as Jaw, an old warrior with a wide reputation

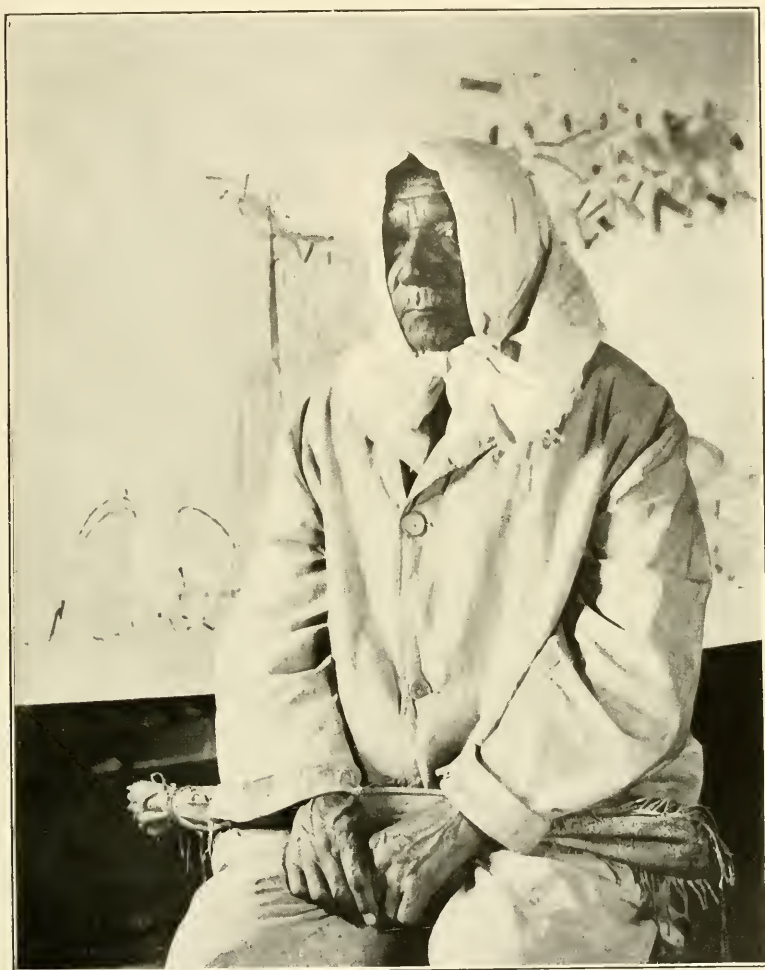


FIG. 68.—Jaw, an old Sioux warrior, whose horse-stealing expeditions are illustrated by his own drawings in the background. Photograph by Miss Densmore.

for stealing horses. Behind him is one of his drawings depicting such an expedition.

A medicine man with his drum is shown in figure 69. This man was named White Paw Bear, and proved a valuable informant to Miss

Densmore. He was a close friend of the famous chieftain Sitting Bull.



FIG. 60.—White Paw Bear, a medicine man with his drum.  
Photograph by Miss Densmore.

Miss Densmore attended a large feast given in her honor by Red Fox, the Sioux chief who adopted her two years previously in place of his daughter. This adoption was ratified later by the tribe.

## STRANGE RITES OF THE TEWA INDIANS

Mrs. M. C. Stevenson continued her comparative study among the Tewa Indians of the Rio Grande valley, in behalf of the Bureau of American Ethnology. A close relationship was found to exist among all the Pueblo Indians, especially in their essential beliefs, resulting in a great brotherhood between them. Living in an arid land the cry of their souls was and is—"rains to water the earth."

Primitive man sought to define the mysteries of Nature, to account for its phenomena: thus primitive philosophy was born, and then re-



FIG. 70.—Plaza and kiva of the Sun people, San Ildefonso. X denotes the entrance to the kiva. Photograph by Mrs. Stevenson.

ligion and ritualism crept in. The Pueblo Indian began at an early period to create a pantheon of gods of his worship, gods to be appealed to for the good things of life, and angry gods to be propitiated, and thus, long ago, a most complicated system of religion and rituals developed among such peoples of the Southwest as had homes constructed of stone, clay, and plaster.

The more clever men of the past ages differentiated their gods into two classes, anthropic, principally ancestral, and zoöic, and these men assumed to dominate the remainder of the people by asserting their direct communication with the gods. Through their power and influence with these gods they were next in importance to the gods them-

selves. Their doctrines taught that: The gods who bring good are exacting, and man must comply with the demands of his gods in order that the godly blessings may be bestowed upon him. He must not only perform the religious duties assigned him, but observe proper intelligence in the performance of these rites. "In the far past Avä'nyu, the great plumed serpent, whose home is in the depths of the lake of the departed, determined to take a journey over the upper plane so that he could look below and observe the people of this world.

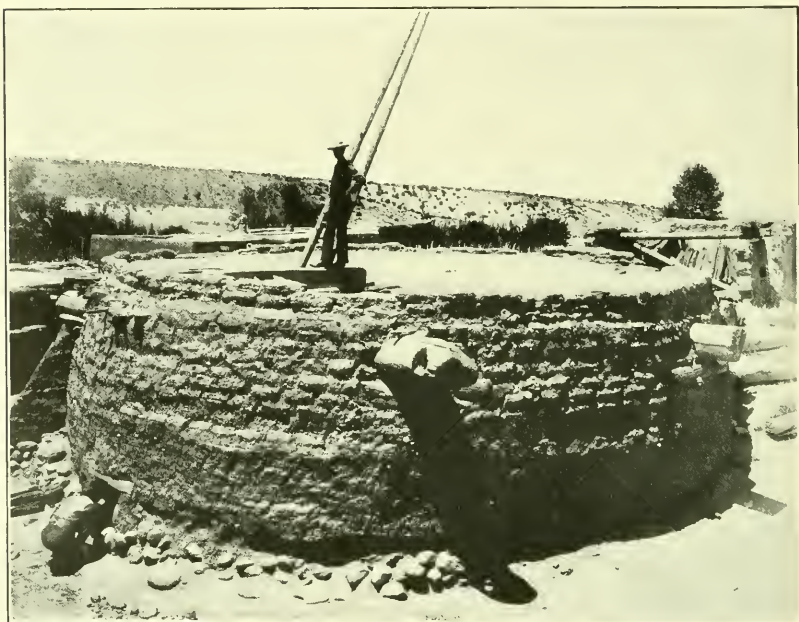


FIG. 71.—Circular kiva at Pueblo of Nambe, New Mexico.  
Photograph by Vroman.

Upon viewing a certain village on the summit of a mesa not many miles from the present pueblo of San Ildefonso on the Rio Grande, he discovered that though the people were devout, their rituals were all wrong and as a punishment for their ignorance he converted them into *si'de* (small bird), Mexican pajarito, and had them fly away. Since that time the deserted village has been called *Si'de ge*, small bird place. These ruins are known to the outside world as the Pajarito ruins.

Religion and ritual kept pace with the development of man. The peoples more remote from the long-continued influence of Roman

Catholic priests, retain more of their elaborate rituals and native paraphernalia than those who have been under the control of the Church.



FIG. 72.—Rain priest of Sun people of Nambe. Photograph by Mrs. Stevenson.

Priesthoods and fraternities were organized, and chambers were built in which to invoke and propitiate the gods. These chambers were circular and built under ground, symbolizing the innermost world

whence the people came. As the people ascended from these chambers, they symbolized their emergence from the innermost world



FIG. 73.—Juan Gonzales, associate rain priest, and present governor of San Ildefonso. Photograph by Mrs. Stevenson.

into this world; and, although most of the kivas, or Hopi ceremonial chambers, at the present time, are above ground or partially so, they



still represent the undermost world, the coming out still symbolizing the emergence from the undermost world, and the kiva the undermost world itself. The kiva is a prominent feature of the archeological remains of the Southwest, there is seldom a mesa, cliff, or cavate ruin where these ceremonial chambers are not to be found. They are the substantial evidence of the worship of the cliff dwellers. The underground structures have undergone changes since the oppression of the invading Spaniard. In the Tewa village of San Ildefonso, for example, the under-ground circular kiva was abandoned after the first departure of the Spanish invaders; in fact, there is not a pre-Spanish building in the village. The ruins of the old village are barely distin-



FIG. 74.—Zuñi personators of the rain gods.  
Photograph by Mrs. Stevenson.

guishable in the fields, while the present village stands a short distance to the north. The first kiva constructed by these people after the coming of the Spaniards was round and built principally above ground, but before another kiva was constructed the people decided to build these chambers in rectangular form and in line with their dwellings, so that they would not be distinguished by the Spanish enemy. Many other pueblos adopted the plan of the rectangular kiva situated among the dwelling houses.

The Tewa are divided into the Sun and Ice peoples, therefore there are two kivas, one for each people. Every male child must be initiated into one of the kivas in order to be eligible to dance with the gods after death in the undermost world. The female child is passed

through impressive ceremonies by a priest of the kiva, just after birth, and is carried into the presence of the rising sun on the twelfth day. As the tiny infant is held up facing the sun the following prayer is offered to the Sun father: "May the child grow to womanhood; may she speak with one tongue, be gentle and kind to all, and may all be gentle and kind to her. May her life be so full of love for all the world, and may her acts be so pure that she may be blessed with the love of the Sun father, so that her span of life may be complete, that she may not die, but live long, and become a child again.



FIG. 75.—Learning to photograph. A fine likeness of the rain priest of the Ice People. The woman at the tub is his mother. Photograph by Mrs. Stevenson.

and so sleep, not die, to awake in the world with the gods. May she ever inhale more of the sacred breath of life."

In order that the rain priest may come into closer communion with the gods he must mortify the flesh. Semi-annually, at the winter and summer solstice, the rain priests of the Sun and Ice people retire, each with his associates, into the kivas for a retreat of four days and nights, to pray for rains, observing strict fasts, taking only meal-bread, and drinking popcorn water. Here it is that the rain gods are specially invoked. The rain priests do not pray with their lips—"hearts speak to hearts." While the priests practice deceptions upon the people and even delude themselves, when they leave their retreat,

it is evident from their expressions that their minds and bodies have been elevated above worldly thoughts.

Whence come the rains so devoutly prayed for? By direction of the Council of the Gods, the shadow people fill their vases and long-necked gourd jugs from the waters of the six regions, and, ascending to the upper plane, provided there are sufficient clouds to protect the rain makers from view of the people of this world, they proceed to water such portions of the earth as have been assigned to them by the Council. The Tewa priests have given such close observation to



FIG. 76.—Kiva of the Ice People, San Ildefonso. X shows upper entrance. Two trees are by the lower entrance. This kiva is headquarters for the buffalo ceremonial. Photograph by Mrs. Stevenson.

the winds and clouds that they are quite weatherwise, and seldom select a time for a rain dance, when rains do not follow.

Zoöic worship has to do with the healing of the sick, the beast gods acting as mediators between man and the anthropic gods. The most shocking ceremony associated with the zoöic worship of the Tewa is the propitiation of the rattlesnake with human sacrifice to prevent further destruction from the venomous bites of the reptile. The greatest secrecy is observed and the ceremonies are performed without the knowledge of the people except those directly associated with the rite which is performed quadrennially. Although many legends of the various Pueblos have pointed indirectly to human sacrifice in

the past, it was a revelation to Mrs. Stevenson when she was informed that this rite was observed by the Tewa at the present time; and, while it is said to exist only in two of the villages, she has reason to believe that they are not exceptions. In one village the subject is said to be the youngest female infant; in the other village an adult woman is reported to be sacrificed, a woman without husband or children being selected whenever possible. The sacrificial ceremonies occur in the kiva. The subjects are drugged with *Datura meteloides* until life is supposed to be extinct. At the proper time the body is placed upon a sand painting on the floor before the table altar and the ceremony proceeds amid incantations and strange performances.



FIG. 77.—Lucindra Jackson, Yonkalla tribe, Kalapuya family. Photograph from Frachtenberg.

The infant is nude, and the woman is but scantily clad. After the flesh has decomposed and nothing but the bones remain the skeleton is deposited, with offerings, beneath the floor of an adjoining room of the kiva. The entire ceremony is performed with the greatest solemnity.

#### NOTES ON THE ALSEA AND KALAPUYAN INDIANS

The opening of the year found Dr. Leo J. Frachtenberg in Siletz, Oregon, completing the linguistic and ethnological studies that were commenced in 1910 among the Alsea Indians. In addition to im-



FIG. 78.—Mary Harris, who died in 1910, the last of the Willapas. Photograph from Frachtenberg.



FIG. 79.—William Smith, an Alsea Indian, about 65 years of age. Photograph from Frachtenberg.

portant new linguistic material, he obtained a number of myths belonging chiefly to the Coyote cycle. This work was brought to a successful close towards the end of March.

In the early part of June he went to Bay Center, Washington, where he was told could be found, still extant, some members of the Willapa tribe, an important branch of the Pacific group of the



FIG. 80.—William Hartless, a Kalapuya Indian about 65 years of age. Photograph from Frachtenberg.

Athapascan family. Unfortunately, upon close investigation, these reported Willapas proved to belong to the Chehalis tribe of the Salish family, a circumstance that substantiated his previously expressed belief that the Willapa Indians are entirely extinct. Upon his return to Siletz, Oregon, Dr. Frachtenberg began work on the Kalapuyan family, collecting linguistic notes and mythological material until the middle of September, when the work had to be discontinued for lack of funds.

FIELD-WORK AMONG THE CATAWBA, FOX, SUTAHO, AND  
SAUK INDIANS

From a study of Siouan and Muskogean languages, it appeared that these stocks resemble each other morphologically as compared



FIG. 81.—The Brown Family, Catawba Indians. Photograph by Michelson.



FIG. 82.—Catawba Children. Photograph by Michelson.

with other American Indian languages. It therefore became a matter of importance that Catawba, a Siouan language of the Southeast, should be investigated to determine how close these resemblances were, and whether it was possible that both stocks were de-

rived from a common ancestor, but had differentiated at an early date. Accordingly, Dr. Truman Michelson of the Bureau of Ethnology left for South Carolina in May, 1913. Unfortunately, though a goodly number of individual words were collected, it was found that barely half a dozen persons were left who could give simple connected phrases, and only one or two who could give connected



FIG. 83.—An old Cheyenne who remembers a little of the Sutaio language. Photograph by Michelson.

texts, but upon examination it was found that even the few texts which Dr. Michelson collected were extremely fragmentary. Under these conditions it is likely that it will not be possible to unravel the structure of the language in detail, and hence the problems presented above remain unsolved.

In July, Dr. Michelson arrived in Tama, Iowa, to renew his researches among the Fox Indians. After making arrangements for



future work in August, he left for Montana to ascertain whether the Sutaio were a missing link connecting the Cheyenne with the normal Algonquian. The number of persons who remembered anything of the language were few, and none who could dictate connected texts were found. However, it seems clear from the individual words collected, that Sutaio will not shed any light on Cheyenne.



FIG. 84.—David A. Harris, Chief of the Catawba Tribe. Photograph by Michelson.

Upon his return to Iowa at the end of the month, he renewed his work with the Fox Indians. He was particularly successful in working out their social organization. A few more important myths were collected, and a number of those collected previously were translated. During his stay among the Foxes he also secured a number of ethnological specimens for the National Museum.

In October, Dr. Michelson left for Kansas to investigate the Sauk and Fox of the Missouri and adjacent tribes. A preliminary survey was all that was attempted owing to the inclemency of the weather. Some myths, obtained among the Foxes of Iowa, were also translated, and the investigator returned to Washington for office work.

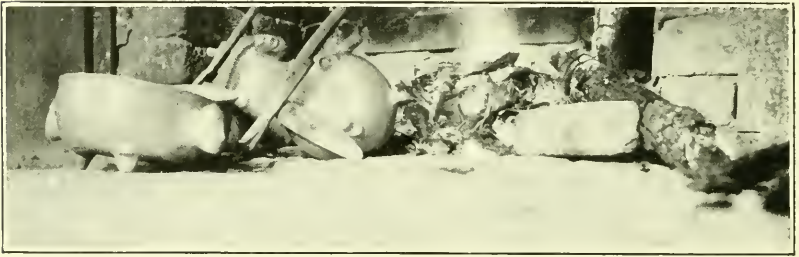


FIG. 85.—A Catawba hearth with pottery. Photograph by Michelson.

#### EXPEDITION OF THE ASTROPHYSICAL OBSERVATORY

Mr. L. B. Aldrich proceeded to Mount Wilson in July, 1913, for the purpose of measuring the solar radiation. He was joined there at the end of August by Director Abbot. Several kinds of work were undertaken; first, the usual spectro-bolometric determination of the solar constant of radiation. This work has now been carried on during every summer at Mount Wilson from 1905 to 1913 inclusive, excepting the year 1907. It has resulted in showing an irregular variability of the sun from day to day, and a dependence of the sun's radiation on the number of sun-spots. It has also yielded a value of the solar constant of radiation believed to be correct within one per cent. Since there have been criticisms of the value, however, on the ground that it is impossible to correctly estimate the losses of radiation in the earth's atmosphere, it was felt desirable to check the result by sending up self-registering apparatus attached to free balloons to the highest possible altitudes.

This work was undertaken by Mr. Aldrich in coöperation with the United States Weather Bureau. Balloons were sent up on five days from Santa Catalina Island, carrying in each instance a self-registering pyrhelimeter devised and tested at the Smithsonian Astrophysical Observatory, and a self-registering apparatus of the Weather Bureau, which records the temperature, pressure, and humidity of the atmosphere.

All the balloons carrying pyrhelimeters were fortunately recovered, and in one instance the flight reached the altitude of about 33,000 meters, or 108,000 feet. The registering pyrhelimeters behaved very well with the exception that their temperature sunk lower than was expected, so that in each case the mercury in the stem of the

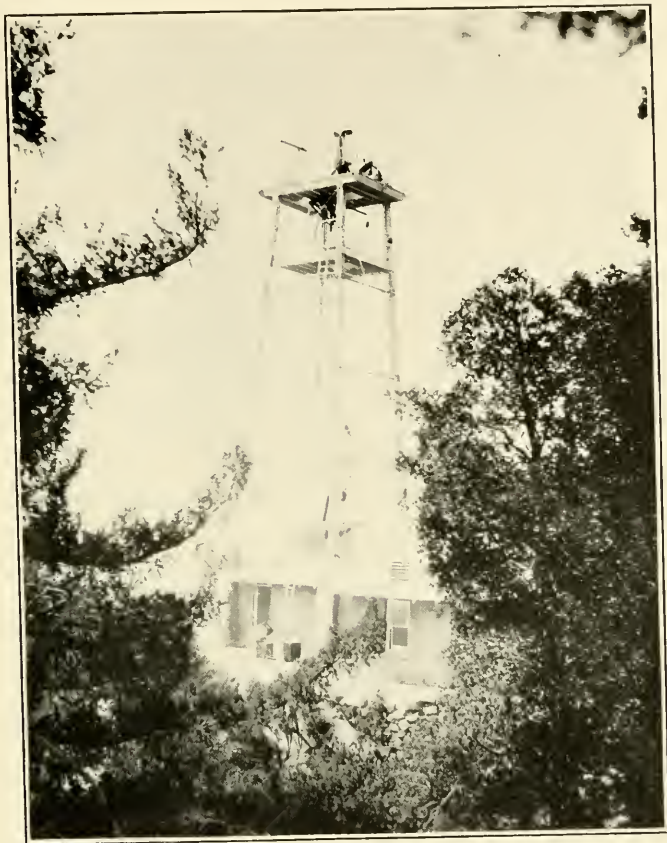


FIG. 86.—Observing station of Astrophysical Observatory on Mount Wilson with new tower telescope. Photograph by Abbott.

thermometers was frozen at an altitude of from 40 to 50 thousand feet, and therefore their records did not extend as high as the flights of the balloons. Nevertheless these measurements are obtained at altitudes above the highest clouds, and where the water-vapor and dust of the atmosphere is almost inappreciable. The results reached do not differ from what would be expected in view of the value of

the intensity of the solar radiation outside the atmosphere, as computed from the ordinary measurements of the Astrophysical Observatory. It is expected that the observations will be repeated with improved apparatus in the year 1914.

After the arrival of Mr. Abbot, the new tower telescope was completed and prepared for observations of the distribution of brightness over the sun's disk. A solar image of about 9 inches in diameter is formed in this telescope by the use of mirrors, without lenses. The distribution of brightness along the diameter of the disk is observed at different colors of light by means of the spectro-bolometer. It is found that the sun is much brighter at the center of the disk than

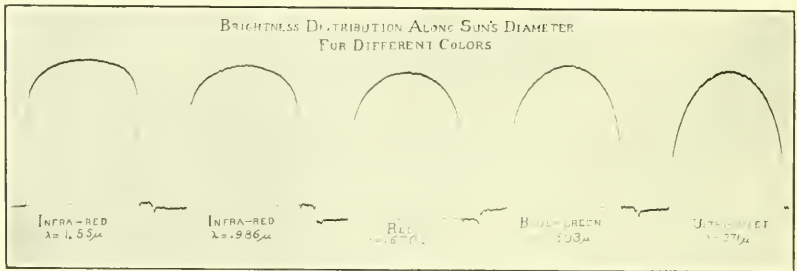


FIG. 87.—Diagram showing Brightness Distribution along Sun's Diameter.

it is near the edge, and that this contrast of brightness is greater for red light than for violet light.

The distribution of brightness along the sun's disk was observed on nearly 50 days, in connection with measurements of the intensity of the solar radiation as it would be outside the atmosphere. The results show in 1913, as in former years, a variability of the solar radiation from day to day. Along with this variability of the amount of the radiation, there is also shown a variability of the distribution of the brightness along the diameter of the sun's disk. This result is very interesting and important, for it enables the variability of the sun to be observed in two independent ways at the same observatory.