

REPORT ON FIELD WORK
with the
**RAINBOW BRIDGE-
MONUMENT VALLEY
EXPEDITION
OF 1934**



**Submitted to the California State Department of Education
in partial fulfillment for advanced secondary credentials**

B Y
JAMES A. RUSSELL
A N D
RUSSELL WHITE

**Instructors, Edison Technical High School
Fresno, California**

THIS VOLUME PROPERTY OF
**RAINBOW BRIDGE-
MONUMENT VALLEY
EXPEDITION**

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JAMES A. RUSSELL and RUSSELL WHITE,
members of the RAINBOW BRIDGE MONUMENT VALLEY
EXPEDITION OF 1934, submit the following report
for your consideration.

ACKNOWLEDGEMENTS

We wish to acknowledge our appreciation to the following persons whose assistance made possible this document:

To the members of the California State Board of Education for their commendable action in accepting this type of endeavor and instruction toward credentials in lieu of credits for class room instruction.

To Mr. Ansel F. Hall for his splendid cooperation in the formulation of this report.

To Mrs. Louisa Wade Wetherill and her son, Mr. Ben Wetherill, who furnished much of the ethnological and archaeological information found herein.

To the Staff and members of the Rainbow Bridge-Monument Valley Expedition for their very fine instruction and cooperation.

To members of the Navajo Tribe for their conscientious and friendly endeavor to enlighten us about themselves.

To Mrs. Stanley Pratt for her many helpful suggestions and stenographic assistance.

To Miss Bessie Hagopian for her stenographic help.

To these friends, with most sincere appreciation, we dedicate this report.

James A. Russell

Russell M. White

FOREWORD

This "Report on Fieldwork with the Rainbow Bridge-Monument Valley Expedition of 1934" represents a venture into new fields of knowledge on the part of two energetic young instructors from Edison Technical High School in Fresno, California. Its chapters are based primarily upon active field experience — digging with archaeologists in Basketmaker burial caves, searching with geologists for fossil dinosaur footprints, coming in contact with Navajos and trying to understand them and their language — experience intensified by many a long session around the campfire discussing the meanings of the day's latest discovery—experience that led the authors back to the University after the summer was over to spend several additional weeks "checking up" on things they had seen and questioned in the field.

In addition to participating enthusiastically in the scientific fieldwork of the Expedition, Mr. Russell and Mr. White entered with zest into the many less technical but equally essential activities of camp and trail. Early in the summer Mr. White mastered the vocabulary of the muleteer—which rendered as great a service to the expedition, perhaps, as did his more painfully acquired proficiency in geological terms. Mr. Russell's training in shoveling sand from prehistoric graves was not infrequently turned to good account in the excavation of motor wheels from desert sand traps.

The members of the field staff vouch for the fact that both Mr. Russell and Mr. White have that rare combination of energy, interest, enthusiasm, and good fellowship which are so necessary to an explorer and field scientist. For these qualities we commend them even more strongly than for the merits of their carefully prepared report.

ANSEL FRANKLIN HALL, General Director,
Rainbow Bridge-Monument Valley Expedition

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INTRODUCTION

Our summer's work covered an eleven week period and some three thousand miles of travel. Nine weeks were spent in the field and two weeks were spent at University of California Library to work over the information accumulated during the trip, and to formulate this report.

Our first major point of interest was the Grand Canyon. As I stood gazing at that great chasm an incident occurred which enlivened my whole summer. A small boy stood holding his father's hand and looking off into the canyon. After some moments, he looked up at his father and said, "What happened, daddy?" I was dumfounded. For the life of me I didn't know what had happened, and it took me three or four weeks of constant questioning before I began to realize what had happened. And so I carried this child's question with me all summer and it was my first thought for each new situation I encountered, "What happened here?"

In all my past education I have never experienced a situation where I received so much varied information in so short a time. Each and every conversation, situation, and activity was loaded with new information in such a manner as to make learning essential and desirable. To me, the initial reaction was the realization of the tremendous portals of knowledge opened to me, and of the vast amount of information of which I had been peacefully in ignorance.



MEMBERS OF THE RAINBOW BRIDGE-MONUMENT VALLEY EXPEDITION OF 1934

Here, in Anasazee Camp in the Dogoszhe Biko, field men meet on common ground. There were Ph.D.'s, university students, instructors, laymen -- all working together toward a common end, the accumulation of new knowledge.

Roll call of the 1934 Expedition included instructors and advanced students from the following institutions: Amherst, Brown, Princeton, Dartmouth, Colorado State, Stanford, Chicago U., College of the Pacific, U. of Calif., New York U., U. of Kentucky, U. of North Dakota, Brigham Young U., Fresno State (Calif.), U. of Arizona, Montezuma, Museum of Northern Arizona, Bureau of Plant Industry, U.S.D.A., and Mayo Clinic.

The cleverness with which the archaeologist gleaned and coordinated every little speck of evidence until finally he could hand out a proven, sane, and logical record of people and animals that lived an incomprehensible age ago, telling from where, why, and when they came, their physical characteristics, their modes of living, and where, why, and when they left, especially interested me, and it was with this group that I spent a great deal of time. Days, nights, hours, weeks, rank, and conventions meant nothing. We were all thrown together on equal footing, university men, Boy Scouts and Ph.D's. We all drank from the same bucket (or occasionally from the same mud hole) with the mules. One wore a tenderfoot's outfit, or nothing, at all, as he chose. One could shave every morning or never; there were cases of both. One could swear or pray; again there were cases of both. The one concentrated effort was the desire for information. Everyone, fired by the enthusiasm of competent leaders, found interests somewhere. If one wearied of robbing graves with the archaeologist, he broke rocks with the geologist, or collected plants with the botanist, or caught bugs and mice with the biologist, or prepared bird skins with the ornithologist.

The archaeologist showed me bodies of men who died over two thousand years ago.

The geologist showed me where huge mountains of solid rock had literally been shoved up through the earth's surface by some tremendous force from within.

The botanist showed me the TESTUCA OCTAFLORA, a grass whose life cycle is but one month in duration. Due to the adverse summer here, and winter cold, it sprouts, grows, matures and withers in a single month. Also there were orchids and cactus growing within a stone's throw of one another.

The ornithologist showed me the king bird, a bird about the size of a pet canary that will attack eagles and ravens, and occasionally, by his persistent pursuit, actually kills them.

The paleontologist showed me the three-toed tracks of dinosaurs which lived millions of years ago and were the largest animals that ever dwelt on the earth.

The most important thing I received this summer was not a concrete piece of information, but a reaction. Although I thought I was fairly well informed in my field, I actually found myself ashamed of the extent of my knowledge of my own profession, and of the past efforts I had made for improving it, as compared with the enthusiastic leaders on this expedition. In associating with men who know their chosen fields of endeavor from beginning to end and who seek additional information with a tenacity that is appalling, I have come home with one paramount determination---- and that is to learn more of my own profession, and to keep an alert eye upon the other fellow's job, so that he won't get so far afield as



FIELD STAFF OF THE 1934 RAINBOW BRIDGE-MONUMENT VALLEY EXPEDITION

Lower Row (left to right):

Gerald E. Marsh, Field Director; University of California.
Chas. DeNorte Winning, Associate Field Director; New York University
Lyndon L. Hargrave, Chief Archaeologist; Field Director, Museum of
Northern Arizona.
Ben. W. Wetherill, Associate Archaeologist; National Park Service.
Robert E. Burton, Chief Botanist; Bureau of Plant Industry, U.S.D.A.

Upper Row (left to right):

H. Claiborne Lockett, Archaeologist; formerly Univ. of Arizona.
Russell M. White, Associate in charge of Pack Train Transportation.
C. C. Clark, Chief Biologist; New York University.
S. H. Babbington, M. D., Expedition Physician and Surgeon.
R. H. Thomas, Chief Engineer; U. of California.

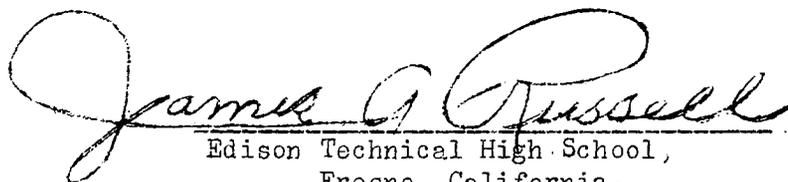
to be lost by me entirely.

To my mind, the material and information covered on this expedition this summer seem to have some sequence, and I will attempt to follow it thru as best I can from what I have seen and heard along the itinerary of this trip. I will endeavor to follow eras of time as indicated by the rock layers in Grand Canyon up through Pleistocene man, branch off here to the area covered by this expedition, and follow the Indians from the purely hypothetical Basket Maker I up through Pueblo I, II, III, IV and V to the population as it exists today.

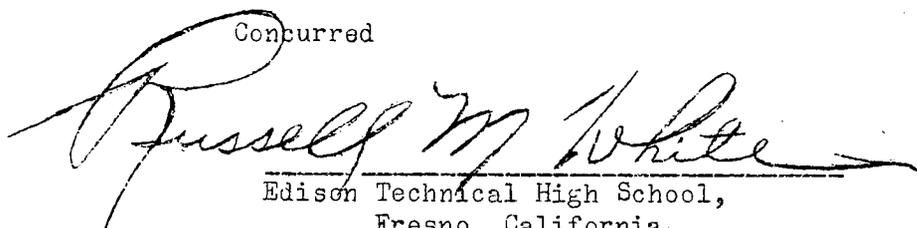
This report is merely my reaction from my observation and study in totally foreign fields, and may not be technically correct in every minor detail.

I was amazed at the vast amount of information one may receive by being placed in a position where practical work is going on. In my estimation every school teacher should be required to spend two weeks of each vacation working in some absolutely unknown field of endeavor. This would widen the teacher's field of knowledge. He would find out what is needed to carry on in the outside world, and, naturally, would be better prepared to teach it. One trouble with our teaching profession is that we teachers become too narrow-minded by being compelled to attend education and theory courses, summer after summer, instead of

receiving an opportunity for reaching out into the practical world and receiving practical knowledge. It is my opinion that teachers and students should be encouraged to substitute endeavors of this kind for book and classroom learning.


Edison Technical High School,
Fresno, California.

Concurred


Edison Technical High School,
Fresno, California.

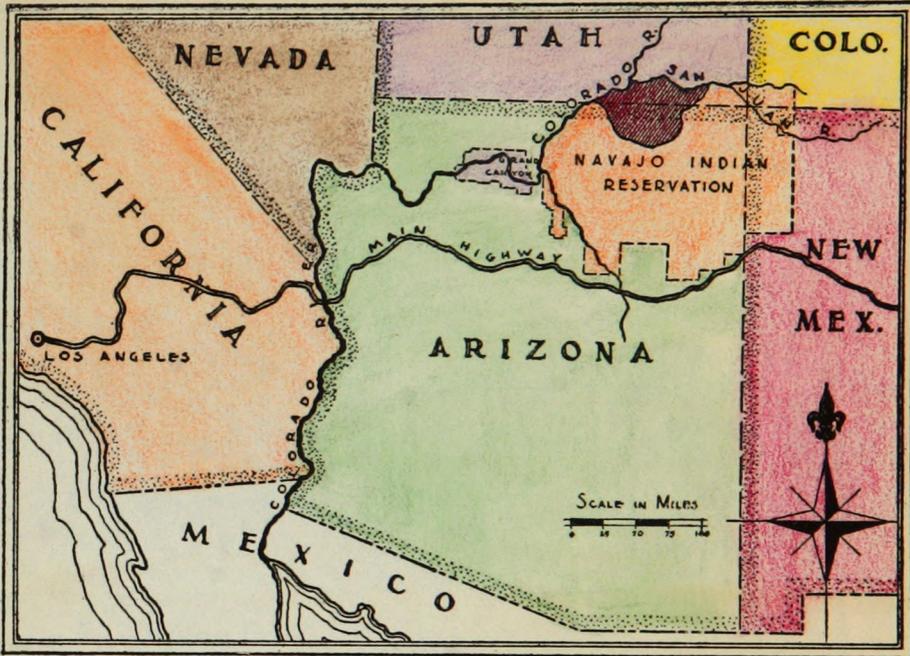
CHAPTER I

THE EXPEDITION

The Rainbow Bridge-Monument Valley Expedition is, so far as we know, unique among scientific projects. Conceived by Ansel Franklin Hall, and directed by many of the foremost scientists and educators throughout the country, the Expedition is, in effect, a cooperative enterprise in which each member of the field party shares the benefits and the burdens.

We must admit with frankness that our main incentive in applying for membership in the Expedition was the possibility of securing "credit" for the field work. We greeted the announcement of approval by the California State Department of Education with enthusiasm, thinking to substitute adventure, travel, and real accomplishment for the previously intended session at summer school -- and at no greater cost. The Expedition not only fulfilled our expectations -- it opened for us entirely new and unexpected horizons of knowledge.

Instead of describing the Expedition and its field work in detail, we present the following photographs which will be allowed to speak for themselves.



LOCATION MAP SHOWING AREA OF APPROXIMATELY 3000 SQUARE MILES BEING EXPLORED AND STUDIED BY THE RAINBOW BRIDGE-MONUMENT VALLEY EXPEDITION.



A BIVOUAC AT WALKER LAKE, NEVADA

Both Eastern and Western field parties traveled by motor caravan. The photograph shows one of the specially built camping busses, not yet "unfolded" for the night, while nearby is the ever present baggage and supply convoy with kitchen trailer. To complete the scene there should have been a number of "station wagons" --- trim speedy cars which were found most adaptable to the Expedition's pioneering in desert regions.



THE GRAND CANYON OF THE COLORADO

The Expedition caravan halted for two days in Grand Canyon National Park --- two days of intensive field study for the geologists under the direction of government scientists.

Those who were to specialize in field work among the Navajo's or on the study of prehistoric man spent the time profitably at the Wayside Museum of Archaeology.

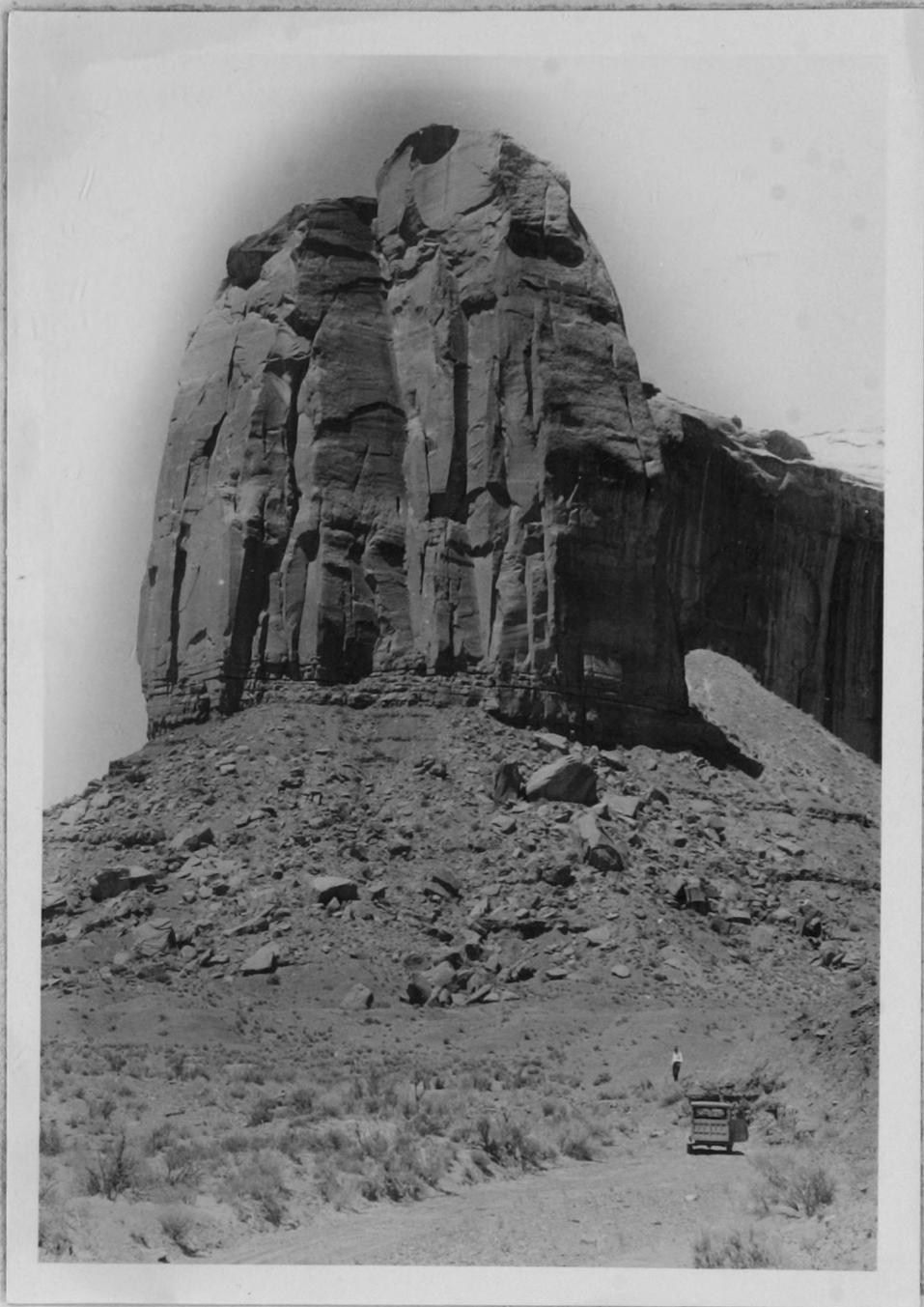


THE EXPEDITION CARAVAN ENTERS THE NAVAJO COUNTRY

After more than two thousand miles of smooth rolling along main highways the caravan leaves luxury behind and enters a region where any "way through" is regarded as "good going". Custom of the country dictates that when too many cars get stuck someone simply selects a new route around the obstruction or pitfall.



PART OF THE EXPEDITION CARAVAN CROSSING A
DESERT WASH



ONE OF THE EXPEDITION'S STATION WAGONS
CROSSING MONUMENT VALLEY.



SAND FREQUENTLY NECESSITATED THE USE OF
"AUXILIARY MOTIVE POWER"



AS DID ALSO AN OCCASIONAL CLOUDBURST

The following map shows the section of country studied by the expedition of 1934.

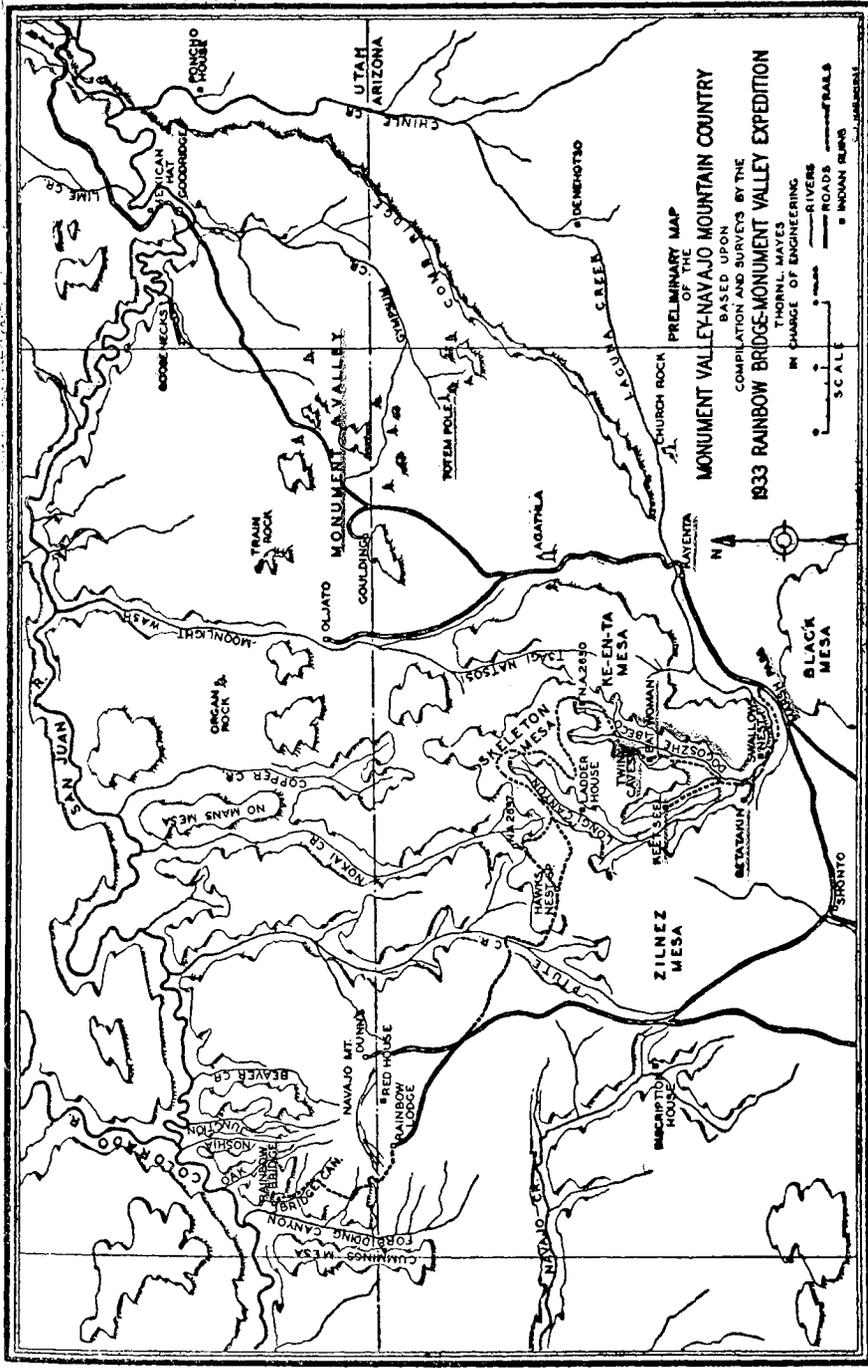
The underscored names are places of special interest.

Kayenta was the location of our supply camp.

Marsh Pass was the junction of the pack train and the automobile.

Twin Caves, located in Water Lily Canyon, twelve miles up the rugged Tsegi Canyon marks the location of our base camp.

Cliff ruins visited and studied were Keet Seel, Betatakin, Bat Woman and Twin Caves. Far to the Northwest were Rainbow Bridge and Navajo Mountain.





PACKING FOR THE TRAILS

Base camp of the Expedition lay several miles beyond the last vestige of "road." Camp supplies, equipment --- everything in fact --- had to be carried in by sturdy burros and mules.



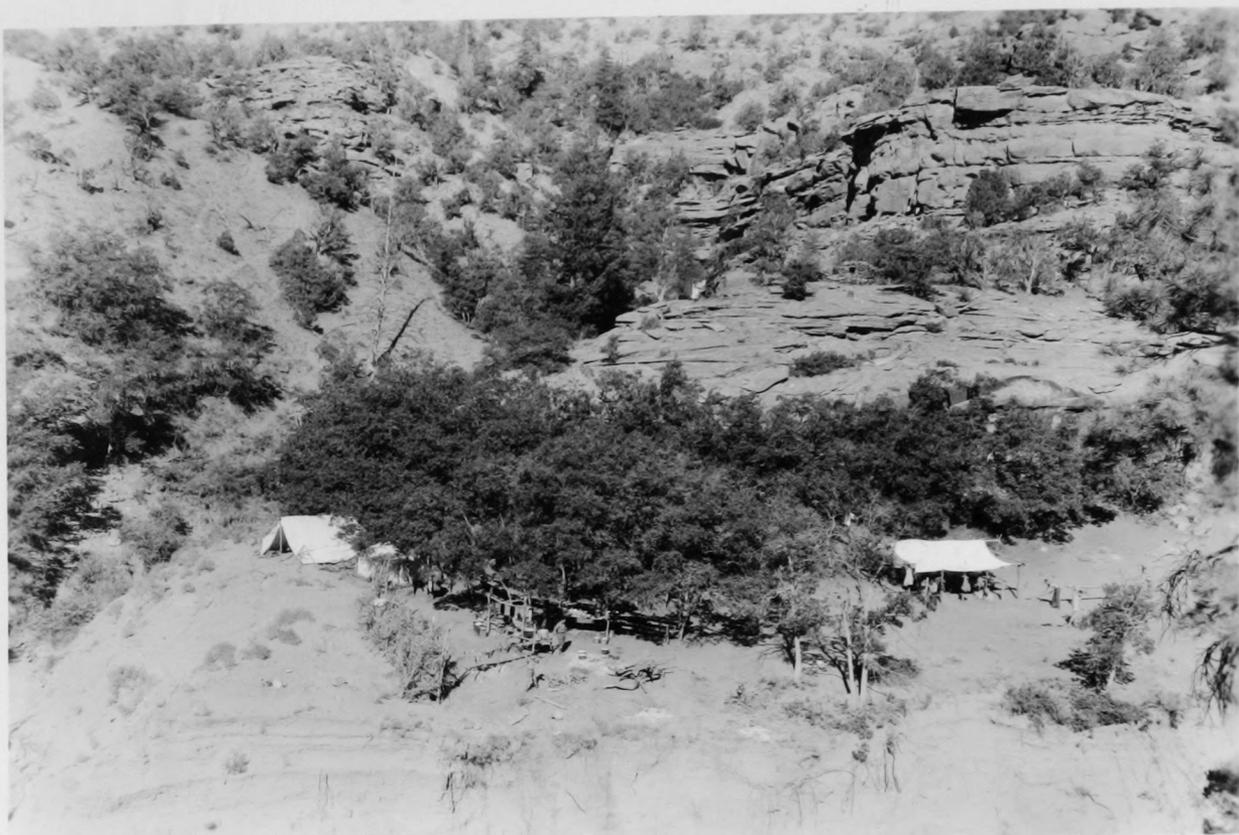
THE PACK TRAIN IN THE DOGOSZHE BIKO

Approaching the "head of navigation" in one of the side canyons of the Tsegi. Anasazee Camp is at the end of the trail ----- from there our scouting parties did some real pioneering.



BASE CAMP WAS IN WATER LILY CANYON

The white spot in the right middle ground is one of the tents of Camp Anasazee. Half a mile below, Water Lily Canyon enters the main Dogoszhe Biko.



CAMP ANASAZI

View taken from a cliff at the opposite side of Water Lily Canyon. The "bedrooms" are convenient nearby caves, one of which contained the most startling find of the 1934 season.



FORMALITY REIGNS AT MEAL TIME IN ANASAZEE



BIOLOGISTS AT WORK

Trappers by night and hunters by day, they lead a busy life. The difficulty first experienced in this outdoor laboratory was that the yellow jackets insisted upon cleaning all skeletons --- but it was soon discovered that their mandiblos did a better job than the zoologists' scalpel.



MOUNTING RODENTS

One small mammal collected during the field season of 1934 appears to be a new species; several new geographical races and numerous extensions of range were reported.



SOME OF THE ENGINEERS AT WORK

Mapping was started as soon as camp was established and continued without interruption all summer. Engineers are an indispensable aid to the archaeologist, the geologist, the biologist, "tying in" their discoveries and recording previously unknown sites so that they can be re-located.



ARCHAEOLOGISTS ENTERING A HITHERTO UNKNOWN CAVE

Most of the larger cliff dwellings can be seen from the canyons below or from the mesa rim above. Occasionally an obscure site such as this one may yield invaluable information on the early people who once sought shelter and security here.



ARCHAEOLOGISTS AT WORK

We laymen were surprised to find that the archaeologist's main tools are not the pick and shovel but finer instruments, like the knife, brush, trowel and awl, which help him to recover the minutiae of data which would be lost to awkward or amateur hands.

CHAPTER II

ERAS OF TIME REPRESENTED BY ROCK LAYERS

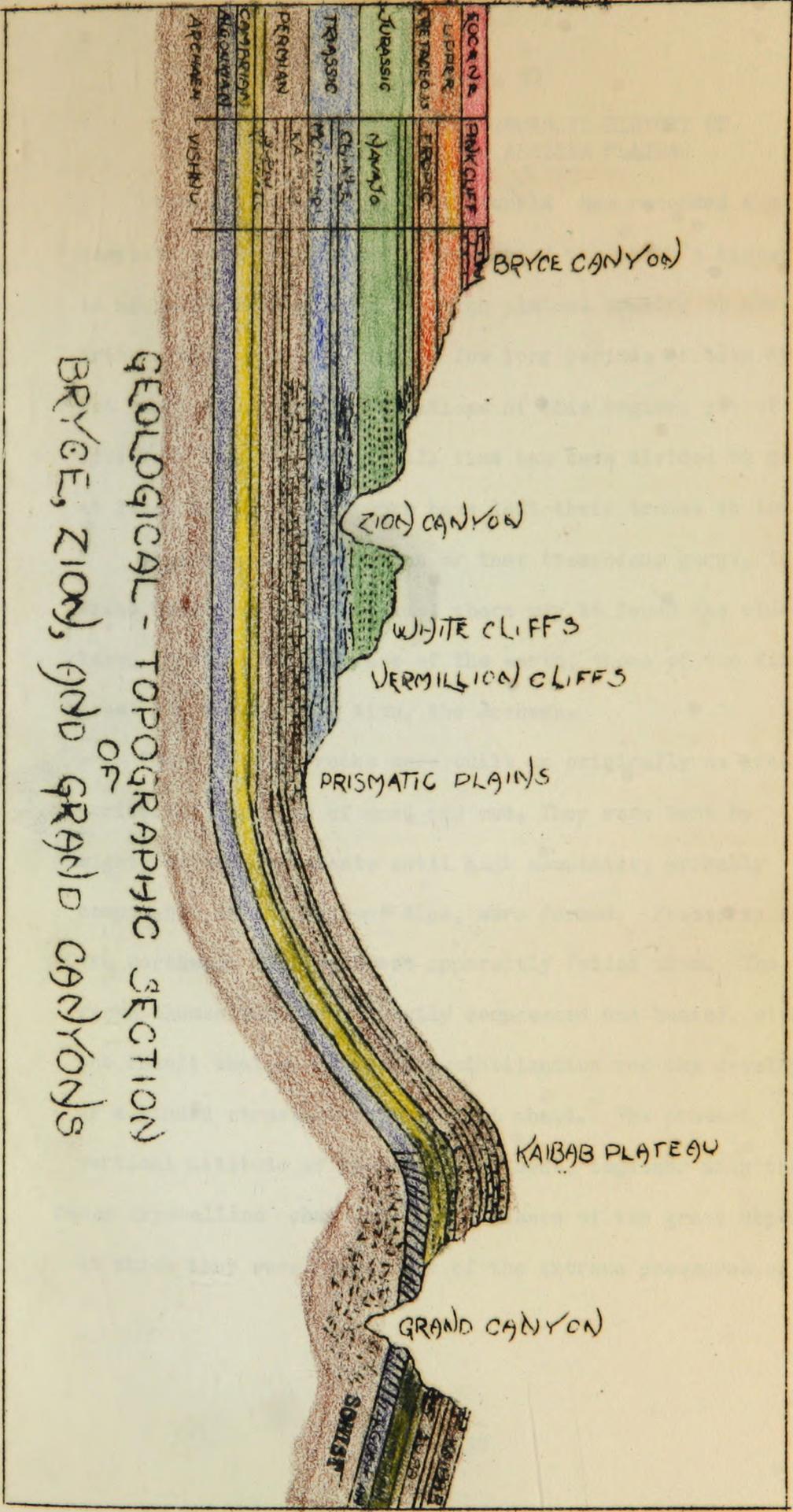
A review of the Geologic History
of the
Northern Arizona Plateau

Chapter II

ERAS OF TIME REPRESENTED BY ROCK LAYERS

A careful study of the following cross sectional diagram should be made before reading the report on the geology of this region.

Note the relations of the various National Parks to the geological eras. We were afforded opportunity to visit all these formations in place in Zion, Bryce, and Grand Canyon National Parks and the geological story was vividly interpreted to us by the government educational staff in each locality.



GEOLOGICAL - TOPOGRAPHIC SECTION
 OF
 BRYCE, ZION, AND GRAND CANYONS

CHAPTER II

A REVIEW OF THE GEOLOGIC HISTORY OF THE NORTHERN ARIZONA PLATEAU

Probably no locality in the world has recorded a more complete or more interesting resume of the earth's history in as small an area than the high plateau country of northern Arizona and southern Utah. A few long periods of time are not represented in the formations of this region, yet of the five long eras into which all time has been divided by geologists, at least some parts of each have left their traces in this area.

Beginning at the bottom of that tremendous gorge, the Grand Canyon of the Colorado, there may be found the oldest known rocks on the surface of the earth, those of the first great era of geologic time, the Archean.

These Archean rocks were built up originally as great horizontal deposits of sand and mud. They were bent by mighty crustal movements until high mountains, probably comparable to the present Alps, were formed. Pressures from the northwest and southeast apparently folded them. The rocks themselves were greatly compressed and heated, with the result that complete recrystallization and the development of a banded structure were brought about. The present vertical attitude of these ancient beds, together with their dense crystalline character, is evidence of the great depth at which they were formed and of the extreme pressures of the



THE GRAND CANYON OF THE COLORADO

This view taken from the edge of the Redwall formation within the Canyon shows the Inner Gorge countersunk into the gneiss and schist of the Archean age --- the oldest rocks known to man.

overlying masses. In brief, the rocks that are seen today in the bottom of the Grand Canyon represent merely the roots of once lofty mountains, and the flat surface cut on these rocks is an old plain that resulted from the wearing down of high country in this region.

As yet no definite traces of life, either plant or animal, have been found in rocks of the Archean era. Though various forms of life may have existed then, and may have been preserved in the original rocks, their record has since been entirely removed by those extreme pressures which altered even the composition and structure of the rocks themselves.

Through the dark crystalline rocks at the bottom of the canyon may be seen shots of granites of a coarse crystalline texture. These granites were forced through in a molten state from the interior of the earth. From a similar source comes lava and volcanic ash. The lava, being exposed to the air, cools too quickly to allow crystals to form, while those molten masses that were forced into older rock cooled very slowly, allowing very large crystals to form.

The unusually large crystals of granite which occur in the cracks and fissures of the inner gorge at the Grand Canyon indicate the tremendous depth at which they were formed, and are further evidence of the great mountains that existed during the first era of geologic history.

Rocks formed during the second era of the earth's history, the Algonkian era, are distinctive from those of the Archean

era in several respects. They are not highly altered nor completely changed in form and structure as are those of the oldest era, nor are they exactly similar to rocks which are seen in the process of formation today. They are known to contain traces of plant life, though no certain forms of animal life have yet been found in them. They represent a period probably as long as all subsequent time.

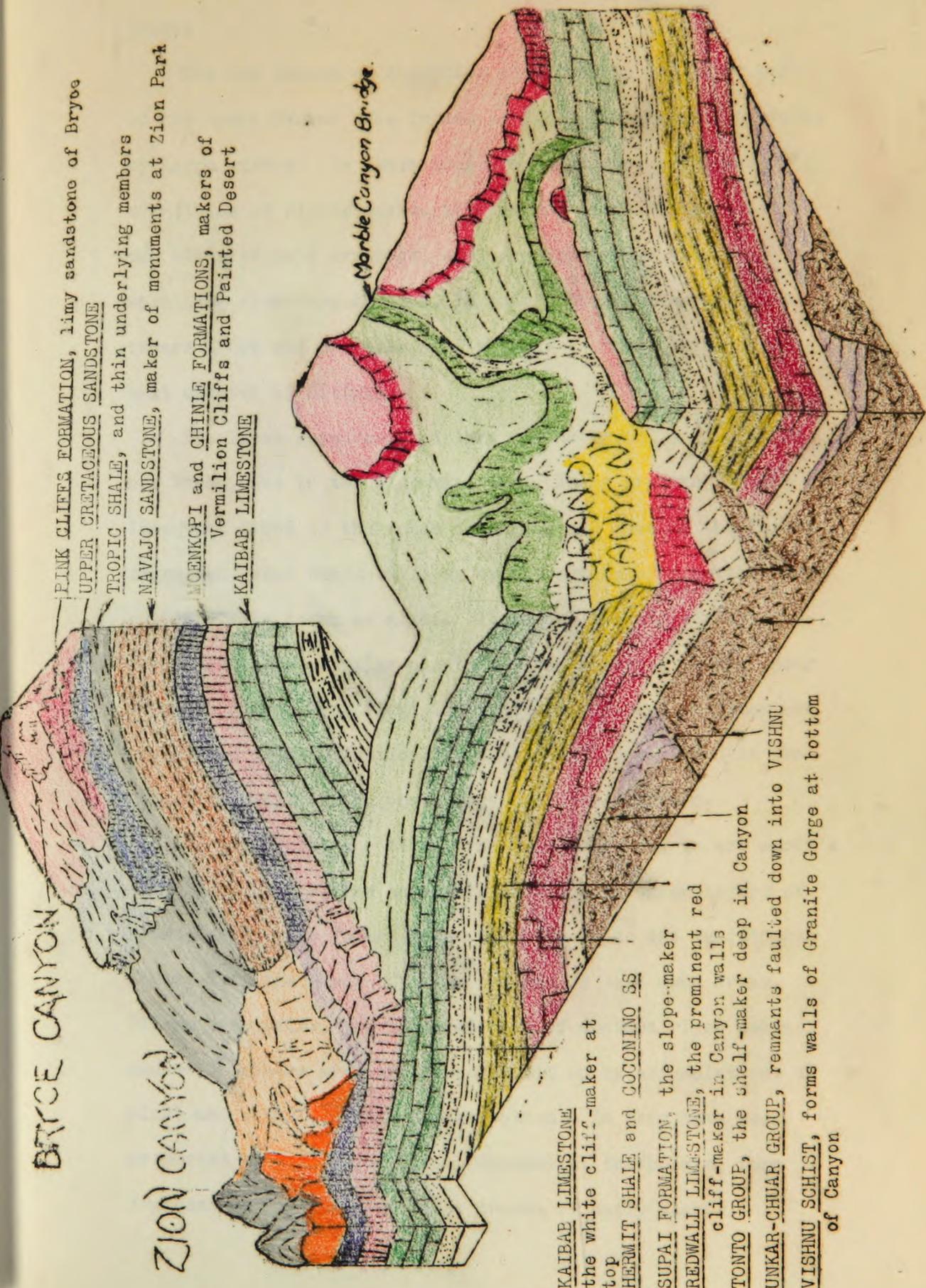
Algonkian rocks of the Grand Canyon represent accumulations of sediments several thousand feet in thickness.

For the most part they are characterized by a brilliant purplish red shale, though they also include a conglomerate or pebble layer, a dark limestone formed principally by plants, and a purple quartzite made by the consolidation of the grains of sandstone.

These rocks were bent and broken into very steep mountains at an early date. In many places it is possible to see sloping layers showing the steep angle at which they were tilted and folded. There are but few remains of those once mighty mountains--small hills on a general level surface remain in the lower part of the Grand Canyon to tell the story.

The age of the rocks of the Algonkian era is estimated at approximately six hundred million years, yet from all indications rocks were formed under conditions of climate not greatly different from those of far later periods of history.

In some parts of the world where rocks of the Algonkian period are exposed, there are evidences of a great deal of glaciation, but at the Grand Canyon ancient flows of lava are



BRUCE CANYON

ZION CANYON

Marble Canyon Bridge

KAIBAB LIMESTONE

the white cliff-maker at top

HERMIT SHALE and COCONINO SS

SUPAI FORMATION, the slope-maker

REDWALL LIMESTONE, the prominent red cliff-maker in Canyon walls

TONTO GROUP, the shelf-maker deep in Canyon

UNKAR-CHUAR GROUP, remnants faulted down into VISHNU

VISHNU SCHIST, forms walls of Granite Gorge at bottom of Canyon

PINK CLIFFS FORMATION, limy sandstone of Bryce

UPPER CRETACEOUS SANDSTONE

TROPIC SHALE, and thin underlying members

NAVAJO SANDSTONE, maker of monuments at Zion Park

MOENKOPI and CHINLE FORMATIONS, makers of

Vermilion Cliffs and Painted Desert

KAIBAB LIMESTONE

GRAND CANYON

found.

The red shales of Algonkian age found in the lower part of the Grand Canyon were formed as muds accumulated probably by large rivers. In these muds are found preserved great quantities of ripple marks, indications of changing currents, the molds of salt crystals, and large shrinkage cracks resulting from very hot sun. In brief, this evidence points toward a hot and probably arid climate in this region during that chapter of history.

The first appearance of life on the earth, so far as is now known, was in the Algonkian era. There are many layers of limestone found in the rocks of this era. Some of the layers represent great reefs built up by the action of primitive one-celled plants known as algae. These are the oldest definite traces of life. Similar plants are found living today. Near Harper's Ferry, West Virginia, they are building up limestone structures almost identical to the fossil ones found in the Algonkian rocks of the Grand Canyon of the Colorado.

It was during the third, the Paleozoic, era in the earth's history that all of the apparently horizontal upper layers of Grand Canyon were formed. Some of these rocks are sandstones formed from the sands of early beaches or sand dune areas, others are shales, the hardened muds of ancient river deltas, and still others are limestones, built up by accumulations of plant and animal remains on sea bottoms. In them have been preserved many forms of life. Seashells, footprints, fern impressions, and various other traces of early plants

and animals remain to tell the story of those ancient times. There are found in the rocks of the earliest part of this period the first definite traces of animal life. In later rocks of this era have been found the earliest evidences of fish, and in the most recent rocks of this group occur traces of reptiles, insects, ferns, and cone bearing plants.

The great highlands which were formed in this region during the Algonkian era were afterwards gradually worn away by erosion until near the beginning of the Paleozoic era, a flat, almost featureless plain existed. Here and there existed a few isolated hills of dark crystalline material of the Archaean era, and a few small mountains of red Algonkian rocks remained. Around and against these, pebbles and sands accumulated, forming a thick layer which today appears as the brown sandstone rim of the Inner Gorge. These are the first deposits of the Paleozoic era. The sea was encroaching upon the land during this time, and gradually the sands of the beach were covered by the muds of shallow water, and these in turn by limes of a deeper sea. Today these series of sands, muds, and limes are found represented in the rocks of the Tonto Platform in the Grand Canyon.

The geologist has found that two long periods of history are lacking in the great succession of ages represented by the strata in the Grand Canyon.

These missing periods belong to the Paleozoic era and are known as the Ordovician, the time when armoured fish were dominant in the seas, and the Silurian, the time when lung



CEDAR MOUNTAIN, NEAR THE RIM OF THE GRAND CANYON
REPRESENTS A REMNANT OF MESOZOIC ROCKS.

Protected by a layer of hard rock, this mesa has preserved layers of rock which have been worn away from the surrounding country. Within these strata are fossils of cone bearing trees and dinosaurs.

fish developed and scorpions became our first air breathers. These ages immediately followed the Cambrian. Their absence is probably due to the fact that this region was above the sea during these two ages, so no sediments were accumulated and consequently no rocks were formed.

During the Devonian period, commonly known as the "Age of Fish", sands and limes were accumulated on the surface of the Grand Canyon region, filling in old river channels and burying the bodies of fish and other animals. The deposits formed at this time later eroded to a large extent until finally only isolated patches of sandstone and limestone of this age remain.

Although fish were rulers of the Devonian age, they were of a primitive type and probably depended on their bony skin armor, rather than on speed for protection.

One of the outstanding features of the Grand Canyon is the great red cliff of limestone about half way up its walls. Actually the rock is rather a pure limestone of gray or bluish color, but in most places it has been stained red by iron oxides from above.

The origin of the Redwall limestone is as interesting as is its structure. The purity of the lime indicates that it was formed in a relatively deep and quiet sea. Its composition represents a vast accumulation of skeletons of ancient plants and animals. Sea shells are found in great numbers. These and other forms of ocean life clearly indicate that a great sea connection then existed between this region

and that of western Canada to the north.

During the Permian period, when many great coal beds of eastern America were being formed, a large area of northern Arizona was receiving sediments from the east, probably carried by rivers from the great highlands of the region. Today these sediments may be seen in the walls of the Grand Canyon as alternating layers of red sandstone and shale immediately above the great Redwall.

The vegetation at this time consisted primarily of ferns and related plants; the animal life included a group of large but primitive four-footed creatures. Numerous tracks of the latter may be observed, having been preserved in the rocks that form the walls of the Grand Canyon. Some of these foot prints are several inches long and the number of toes varies from three to five. They show no close relationship to the tracks of other localities and apparently represent a fauna new to North America.

The Hermit shale, the topmost red stratum of the Grand Canyon, represents accumulations of mud and fine sandy material deposited probably by streams flowing to the northeast. Here and there are found evidences of pools and arroyos with wavy ripple marks on their borders, and a thin film of shiny slime covering the surface. The trails of worms, the footprints of small salamander-like animals, and the fronds of ferns are found delicately preserved in this slime. Rain drop impressions, the molds of salt crystals, and numerous sun cracks also may be seen.

Thirty-five species of plants have been found in the Hermit Shale formation of the Grand Canyon. Many of these are unknown throughout the rest of the world. The types of flora



THE PAINTED DESERT

The colorful shales of the Painted Desert contain abundant deposits of fossil wood, some beautifully agatized.

seem to indicate a semi-arid climate with long dry seasons, for the absence of moist climate and swamp loving types is noticeable.

The light colored formation known as the Coconino Sandstone which appears around the upper part of the Grand Canyon has long presented a puzzle concerning its origin. The white sand of which it is composed apparently was deposited in the form of sand dunes, by the wind, in an area bordering the sea. The only traces of life in this period are represented by the trails of ancient worms and insects, and by the foot prints of early lizards or salamander-like creatures.

The buff and gray limestone which forms the uppermost cliff and rim of the Grand Canyon, and which extends as the plateau surface for a great distance in every direction, is a result of vast accumulations of organic and sandy material in an ancient sea. Many portions of the formation are composed largely of the remains of sea life, shells, corals, and sponges. The teeth of sharks have also been found. In the age when these creatures lived and multiplied in this region, the great body of salt water which covered its surface extended at least several hundred miles in every direction, and today traces are found beyond Flagstaff to the south, in the Painted Desert to the east, and almost to Zion Canyon to the north. It is believed that it was an extension of a great ocean body from the west. The presence of shark's teeth and coral denote a warm saline sea. This is estimated to have been some two hundred million years ago.

The Mesozoic era, the fourth step in the geologic history of the earth, is commonly called "the Age of Dinosaurs". Large

reptiles were the dominant form of life all over the world during this age.

Two isolated hills of unusual interest rise above the plateau surface near Grand Canyon. To the east is Cedar Mountain, a flat top mesa. The other, known as Red Butte, is a rounded hill about fifteen miles south of Grand Canyon Village. These are remnants of continuous layers of sandstone and shale that covered the whole plateau region. The same formations are found in southern Utah, to the north, and in the Painted Desert, to the east. Except at Red Butte and Cedar Mountain they have been completely stripped off and eroded away from the vicinity of Grand Canyon. The time involved in the erosion was tremendous and the consequences were widespread. As a result the present flat surface was formed, then a great plain at an elevation close to sea level. The resistance of Red Butte and Cedar Mountain against time can be explained by the hard cap of lava over Red Butte, and the protecting layer of pebble-rock on the top of Cedar Mountain.

The red sandstones and shales found in Red Butte and Cedar Mountain were laid down during the Triassic Age. Near Flagstaff, at the southernmost limit of the formation, have been found many tracks denoting an old shore line in that section. In the same formation, in Utah and other places to the north are many sea-shells of various types. Gypsum, an indication of arid climate, is also found to a large extent in the rocks of this group.

The Petrified Forests of northern Arizona were formed from trees that grew during the Triassic period.



DINOSAUR FOOTPRINTS

Geologists of the Expedition field party discovered and reported upon dinosaur footprints from many locations in the Monument Valley region. One series, the most extensive yet found, extends almost unbroken for half a mile.

The landscape of the present Painted Desert was probably that of a low flood plain where rivers meandered back and forth, depositing first large pebbles and sand, and later a great layer of finer material consisting of sand and much mud. It was by these streams that a great quantity of logs of evergreen trees were carried down, probably from what is now the Colorado region. In the vicinity of Adamana and Holbrook, Arizona, they were buried in great numbers among the depositing sediments. All four of the Petrified Forests south of Adamana originated in this manner. Nine miles north of Adamana, however, is the North Sigillaria Forest where pine trees are found standing where they grew.

The trees found in the Petrified Forest National Monument represent, so far as known, only one species, but near by to the north several others have been found. All are evergreens belonging to a group now extinct in the Northern Hemisphere.

The process by which these trees were changed to stone took place a very long time after they were buried beneath the sands and silts. Waters bearing in solution the mineral silica passed through the rocks of this region. Particle by particle, as the wood decayed, it was replaced by silica. The colors found in petrified wood are due to small quantities of iron and manganese which were introduced in a similar manner.

The tracks of dinosaurs whose name means "Terrible Lizard", may be found in rocks which apparently were formed from river deposits of sands and muds. In other closely associated rocks have been found the bones of dinosaurs, of other reptiles, and of



AERIAL VIEW OF A PORTION OF THE RAINBOW PLATEAU

Deep canyons intricately carved into red, pink, and brown Navajo Sandstone characterize the country being explored by the Expedition.

animals related to the frog or toad. Some of these creatures apparently were, largely, if not entirely, terrestrial in habit, while others probably lived in either fresh water streams or swamps. Only this summer, near Kayenta in northern Arizona, several dinosaur tracks were uncovered and plaster casts made of them for future study. The skeleton of a marine dinosaur, probably a Plesiosaur, was uncovered in the Mancos shale on Black Mesa.

During that period of history known as the Jurassic, a part of the great Mesozoic Era, the southwestern United States probably had a type of climate somewhat comparable to present day conditions, though probably more desert-like. The land that had been raised in the preceding period to form the great plain remained above sea level. Great mountains were formed to the west and, like the Sierra of today, they robbed the east-traveling winds of their moisture. These mountains also supplied vast amounts of sediment which was carried down into the arid basin to the east, worked and reworked by the wind, and finally deposited as a great stratum of sand. This, on solidification, became the great Navajo sandstone formation, with a thickness in the Zion Canyon region up to two thousand five hundred feet and tapering off to the east to almost a knife edge in the region of Gallup, New Mexico.

The beautiful Vermillion Cliffs and the White Cliffs of southern Utah which together form the walls of Zion Canyon, the red sandstone out of which is carved Rainbow Natural Bridge, and the jagged Echo Cliffs seen to the northeast of Navajo Point at the



RAINBOW BRIDGE AS SEEN FROM THE AIR

A view taken from the Expedition's reconnaissance plane. The rock is red Navajo Sandstone. Rainbow Bridge, seen at the lower right, rises 308 feet above its canyon.

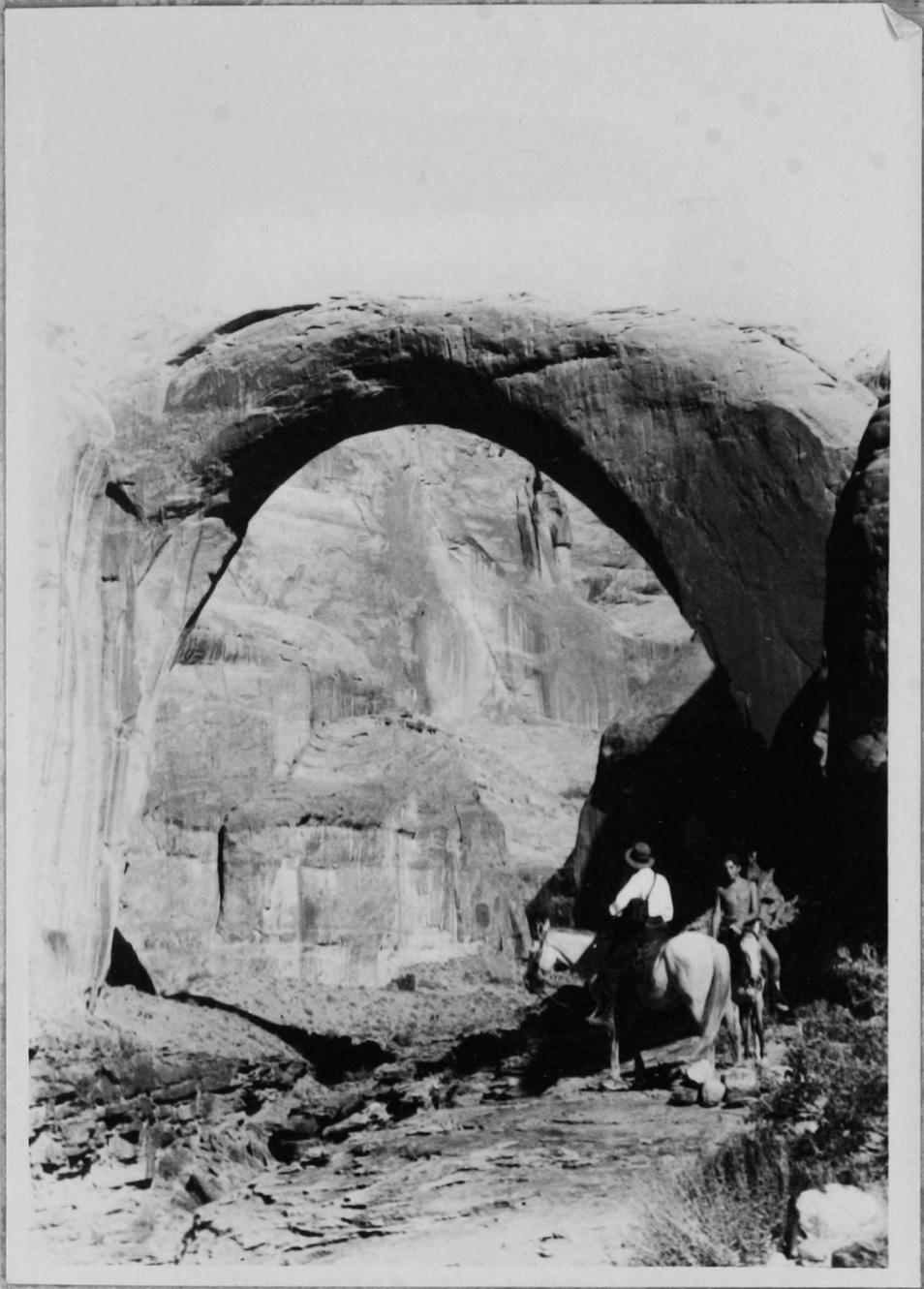
Grand Canyon are all monuments of the Jurassic Age.

In the Cretaceous Period, the last part of the "Age of Dinosaurs", much of Arizona, southern Utah, and northwestern New Mexico was apparently submerged beneath a sea. Mollusks abounded, and various other types of water animals swam or crawled in this region. Their shells were buried and preserved among the muds and limes which were accumulating, and today many of them are found in the rocks of this age.

As time went on the land again rose, leaving low lying coastal plains, two hundred and more miles wide, with rank vegetation. Perhaps swamps replaced the coastal plains and these new conditions were conducive to coal formation. Great amounts of vegetable matter buried beneath sediments brought down by streams, eventually formed the many layers of coal which today are found in various places in Utah, Arizona, and New Mexico. In New Mexico valuable coal beds are found in rocks of this age near Gallup. The impressions of leaves and pieces of fossil wood found in these rocks indicate that there was a warm moist climate during the period in which they grew.

The Cretaceous Period ended with a general change of conditions the world over. Many of the seas were changed to land, new mountains were formed, and in the animal kingdom mammals and other more modern types began to take the place of the reptiles.

The Cenozoic Era, often called "The Age of Mammals", is the most recent chapter in the earth's history. With the exception of the fresh water formations of Bryce Canyon which were formed



RAINBOW BRIDGE

The most symmetrical and beautiful natural bridge yet discovered was unknown until 1911. It can be reached only by a long rough trip by trail and has been seen by relatively few persons.

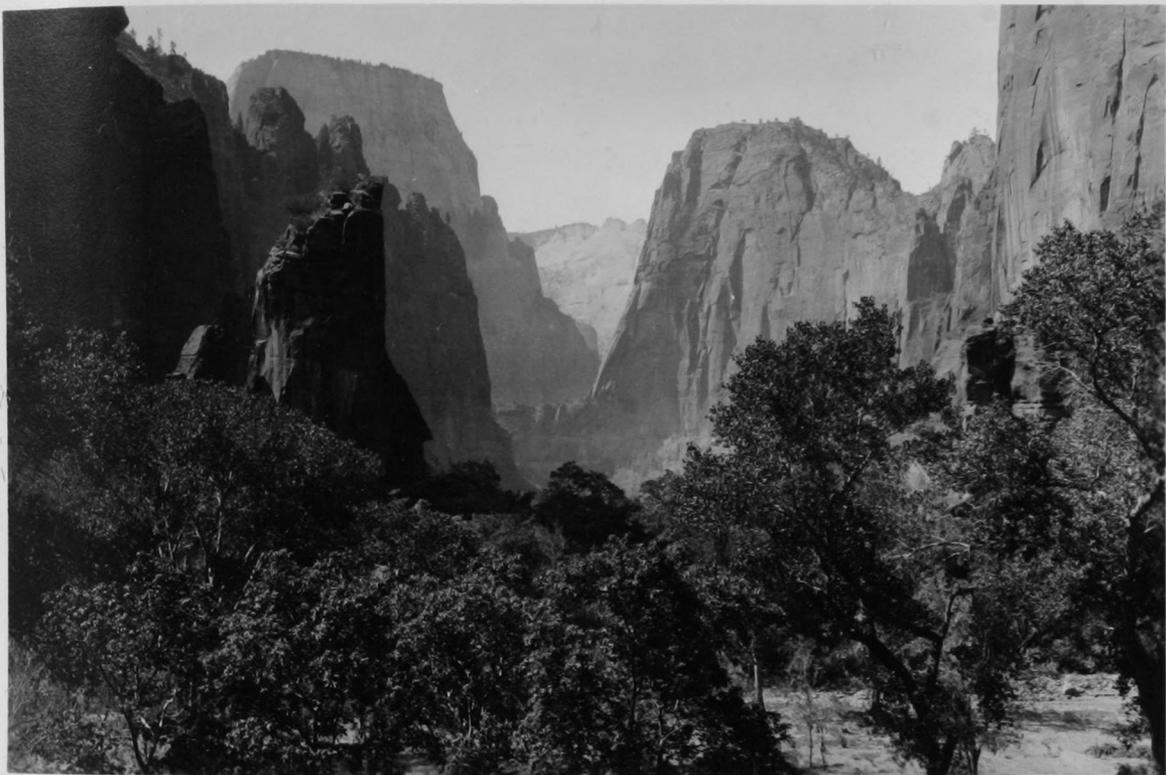
in the very early part of this era, and some volcanic action, no rocks were formed. Thus, very little evidence remains of the animals of the early part of the Cenozoic Era in this region.

With the evidence that is available, it is believed that creatures not unlike the most advanced forms of today roamed this region during those very early times. As the era progressed advancement continued until finally in the very last part, man himself, appeared.

Bryce Canyon and the Cedar Breaks region in southern Utah have the distinction of being composed of the most recently formed sedimentary rocks in this plateau region. During the early part of the Cenozoic Era, limes and some sands collected here in fresh water, probably in great fresh water lakes. In these sediments are found the remains of fresh water mollusks. Rivers and other agents probably had a great deal to do with these formations as is indicated by the great irregularity and variety of sand and other sediments.

The colors of Bryce Canyon are due to the white limestone rock which in many places retains its creamy color, but in others is stained pink by drainage from upland washes. The canyon itself is almost entirely the result of running water. The small streams of the Paunsagunt Plateau were given power to cut into the sands and limestones, and due to the peculiar nature of these rocks the many spires, promontories, and pinnacles were formed.

Zion Canyon in southern Utah, to which the natives like to refer as "A Yosemite Valley in Colors", is not unlike in appearance



ZION CANYON, UTAH

Zion Canyon presented to members of the Expedition the opportunity of continuing geological studies started in the older rocks of the Grand Canyon and the Painted Desert farther south. See charts on pages 37 and 42.

the great glacier carved valley of California, but it has an entirely different history.

The Vermilion Cliffs, which form the bottom two thousand feet of Zion's walls, and the contrasting White Cliffs, which rise an additional thousand feet, are hard, resistant sandstones. Wherever these rocks are found, they form conspicuous perpendicular cliffs because of their hardness. Yet even they show the results of constant weathering and erosion over long periods of time.

It was quite late in the Cenozoic Era that the cutting of Zion Canyon was made possible by gradual, but tremendous, crustal movements in the region. The then broad, low-lying country was raised several thousand feet to about its present altitude. This was a means of giving power to the streams, including the master stream --- the Virgin River. Steadily these active agents of erosion, heavily laden with muds, sands, and pebbles, have been cutting canyons. Zion Creek itself, which is one of the largest tributaries of the Virgin River, has cut downward through all the layers now exposed in the walls of its canyon. Zion Canyon, therefore, has been created as the result of crustal movements bringing into action the effective cutting power of running waters, and these have been assisted by all the forces of disintegration and decay.

Over a large part of the great plateau of northern Arizona are found sheets of black lava and cone-shaped craters. The center of this volcanic activity is located in the San Francisco Peaks, just north of the town of Flagstaff, but lavas and cones are found westward beyond Williams, and to a considerable extent



BRYCE CANYON, UTAH

The fantastically carved monuments of Bryce Canyon are cut into colorful rocks of recent periods, forming the last chapter in the vivid geological story of the Southwest. Refer to charts on pages 37 and 42.

in every other direction.

It was during the Cenozoic Era of geologic history, and after the Colorado River had begun to cut the Grand Canyon, that molten masses began to break through and flow out on the northern Arizona Plateau.

Three great periods of such volcanic activity are represented by the rocks of this region and they range in age from probably at least a million to relatively few years.

The first general period of eruption in the San Francisco volcanic field was characterized by a predominance of lava flows which formed a black rock known as basalt. These flows had an average thickness of fifty feet and covered an area of some three thousand square miles. Accompanying them was the formation of about a hundred small cinder cones.

It was during the second period of volcanism that six isolated cones of large size, and a somewhat greater number of small cones were formed by the eruption of lavas widely ranging in composition. San Francisco Peak, the largest of these cones, and a dominant feature of the region, reaches an elevation of twelve thousand six hundred eleven feet above sea level, or about five thousand feet above the plateau surface. It is composed of five different types of lava, mostly red or light colored, which represent a corresponding number of distinct stages in eruption. Since the termination of its building up, the crest of this cone has been eroded away to the extent of an estimated three thousand feet.

Two hundred small cones and about twenty cubic miles of

lavas were produced in this same general region during the third and relatively recent period of volcanic activity. Much of this material overlies that of the two preceding periods. Probably the most interesting feature of these cones and flows is their age, that of some having been estimated to be only from three hundred to one thousand years.

It was during the Cenozoic Era in the earth's history that mammals developed and in the latter stages that man first made his appearance on earth. In many places in the world the remains of animals that lived during various parts of this age have been preserved. In the famous asphalt pits of California literally hundreds of bones of large mammals, sabre-tooth tigers, mastodons, wolves, and many others----have been brought to light. In the receding ice of northern Siberia, large mammoths, elephant-like animals representative of the last era, but unknown today, have come to the surface, with even their skin and flesh preserved. But in the region of northern Arizona there are few fossils of recent times to tell the story of the life of the area during these ages because this region has been above the level of the sea, and erosion has been working continuously.

Recently, however, near Tuba City about seventy five miles northeast of Flagstaff, Arizona, the remains of several extinct animals of this period were discovered in a spring. Hidden in a sandstone crevice were found the tusks of an ancient type of elephant known as a mammoth, together with some teeth which probably belonged to camels. These creatures were native to this territory



THE PLEISTOCENE CAVE

A small cave near Camp Anasazee yielded more than 100,000 fossil bones of small mammals and birds --- an entirely unknown fauna of Pleistocene age.

not far back in geologic history.

After reviewing the chapters of the world's history and the slow but steady development of life through the ages, it is very natural that one should wonder when man came upon the scene. Compared with the hundreds of millions of years which have elapsed since the time of the first plants, or the millions of years following the first appearance of vertebrate animals, the age of man is as nothing.

In the southwestern United States no definite indications of the presence of very early man as compared with early man in Europe have been discovered. The earliest traces were those found at Folsom, New Mexico, at Gypsum Cave in Nevada, and Clovis, New Mexico and they date back some ten to twenty thousand years ago.

This man was of an advanced type, "Homo sapiens", probably contemporary with Cro-magnon man of Europe, and the forerunner of the American Indian, who came to North America from Asia in the latter part of the Pleistocene Period, during the last glaciation, perhaps twenty thousand years ago. Pleistocene species of animals were then abundant. Migration continued in growing volume during the Solutrean Period and the Solutrean type of flint work became wide spread in America. The time was still late Pleistocene, fifteen thousand to thirteen thousand B.C., and the last period of glaciation was waning, but animals now extinct were still abundant. During this time early man here in American was living in the hunter stage of culture, for implements made by man were found associated with these animals, and a certain type of stone dart point was given the name Folsom .

Man in Magdalenian stage of development, in Europe which is still late Pleistocene, reached America, probably via Asia, but perhaps from Europe via Iceland and Greenland. These bands kept to the north, following the retreating glaciers, and became the ancestors of the Eskimo, probably between thirteen thousand and ten thousand B. C.

In the south the Aurignacian and Solutrean ancestors of the American Indians were spreading rapidly; cultures were changing and local patterns developing. Arid conditions were establishing themselves in the southwest, especially in the Great Basin. Pleistocene animals were becoming extinct. Here groundsloths, ancestors of the horses and especially camels were the last to go. Farther east and north the mastodon still roamed, now invading formerly glaciated country. This was the date of the Gypsum Cave in Nevada.

These last paragraphs are in the main theories built upon finds of man-made objects found associated with these extinct animals, which paleontologists tell us lived during Pleistocene time in America. No trace of man himself, however have come to light as yet with these finds.

Let us now concentrate on the section of country covered by the expedition this summer, "and the Indians who dwell there beyond the outskirts of the white mans civilization."

CHAPTER III

PREHISTORIC PEOPLES OF THE SOUTHWEST

A brief outline of Ancient Cultures:

Early Man

The Basket Makers

The Pueblo People

CHAPTER III.
PREHISTORIC PEOPLES OF THE SOUTHWEST.

The prehistoric peoples of the Southwest have been divided into two cultures and the two cultures broken down into phases for study by the Pecos Archaeological Conference of 1927. For all general purposes this classification holds good; however dates for these phases vary in the different archaeological areas and there are lags in the phases as we go out from the San Jaun Basin area.

The earliest people that we can more or less identify as a culture have been named the Basket Maker People. They were a medium sized, long headed Indian people. For study they have been divided into three stages of advancement, called Basket Maker I, II, III.

Basket Maker I stage is purely a postulated "hunter" stage and there is no definite evidence concerning them. Because of finding corn associated with these people, it is believed that it must be an advanced stage and therefore the definite finds were designated Basket Maker II, and a place left for the earliest hunting stage called Basket Maker I should it be found.

Basket Maker II is also known as the "Farmer" Basket Maker Stage. Agriculture makes its appearance. In the previous stage they were hunters and nomadic in their wanderings. Now, due to agriculture, they take on a semi hunting, semi agricultural phase. It is this Basket Maker II stage upon which the succeeding phases and stage rests.

Basket Maker III is sometimes called the Potter Basket Makers for it is characterized by the appearance of true fired pottery.

The next step in sequence is the appearance of a medium sized, round headed Indian people in the region. They have been given the name Pueblos.



THE "TRAIL" BEYOND ANASAZEE

Getting pack animals up the "Horse Ladder" to the Basket Maker burial cave or Skeleton Mesa was tough work.

Students have divided them into five stages of development, designated as Pueblo I, II, III, IV, V. This brief classification will serve the reader for what is to follow, where each stage will be taken up in order. It must be borne in mind, however that your work was carried on in only one of the major archaeological areas, of Arizona and that there will be differences between it and the others.

The Basket Maker II phase then is accepted as the earliest culture in the Southwest about which we have any concrete information.

Besides the game they killed, they now had small kernel, yellow flint corn and squash. They made blankets from strings of fur, and wore sandals made of yucca, and moccasins made from skins. What textiles they used were made of opocynum fibre and human hair string.

We find them using loose-woven and decorated baskets abundantly. For ornaments they used large stone beads, Olivella shells, seed beads, stone pendants, and feathered hair ornaments and head-dresses. Their weapons were the atlatl or spear thrower and grooved wooden clubs. They smoked short squat pipes.

They buried their dead in stone slab cists or storage bins in caves. The bodies were flexed and bundled up in blankets and skins.

We now come to the period called Basket Maker III.

Owing to easier conditions of life made possible by an assured food supply, permanent habitations were built near their cultivated fields and in the shelter of the caves. As the caves were now occupied by the living, burials were as a rule made in the open. This period marks the first appearance of true fired pottery.



MESA TOP TRAILS ARE BETTER

Once the top of a mesa has been reached the trail scouter has "easy going" ---- until he tries to find a route down again.

A maze of vertical-walled canyons is yet to be penetrated by next year's parties.

This pottery was crude ware but was far superior to the bark and grass tempered, unfired dishes of Basket Maker II. We find plain gray, black or white decorated, and red pottery with coarse sand or crushed rock tempering. Decorations were applied usually to the interior of the bowls, ribbonlike bands enriched with dots being characteristic of this period.

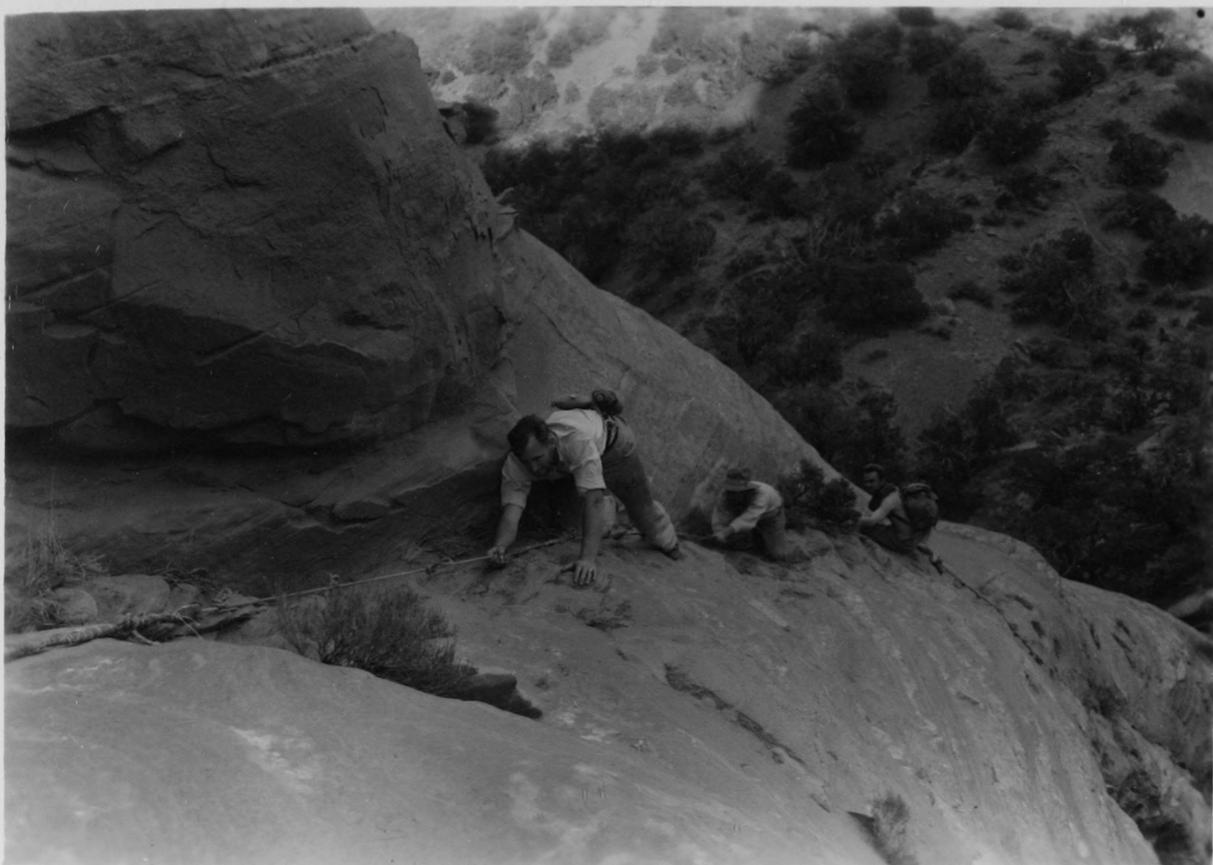
Changes are manifest in the shape of the sandals, which are of most intricate weave with complicated patterns and designs, and in the carrying straps, which are now elaborately decorated. During the latter part of this period the bow and arrow makes its appearance. The whole culture apparently still retains its identity with no manifest tendency to develop into that of the succeeding Pueblo periods.

The physical characteristics of the people of this period are practically the same as those of the previous period.

Their houses had circular foundations of upright stone slabs, over which was a conical roof of poles covered with grass mats, brush and dirt. They were built either in caves or in the open.

Their food, clothing and textiles were practically the same as Basket Maker II. However matting is used now, made of grass and fibre. Evidences of ornaments aside from feather comb-like hair ornaments and Olivella shell beads are meager.

As we enter the period of Pueblo I, we find many changes. It seems a migrant group of Indian people entered the region, having round heads and deformed by cradle boards. They mingled with the original people of the region and took over some of the arts and crafts and added new factors of their own. They lived in semi-subterranean rooms called Pit-houses, with roughly squared corners



CLIMBING TO THE BASKET MAKER BURIAL CAVE

Foot holes pecked into the sandstone a thousand years ago offered insecure footing ---- but, "Its all in the interest of Science" said the archaeologists. After the first week the twice-**daily climb** was regarded with nonchalance by the excavators ---- especially when visitors from the main camp were present.

and slabs set in the sides of the excavation. Occasionally sides show traces of plaster. The roofs were conical. At this time Kivas or ceremonial houses make their appearance. Also are found square cornered rooms loosely grouped, built of adobe or of stone slabs above ground, in caves and also in the open.

In agriculture we now find black beans grown and more than one variety of corn and squash. Cotton is now grown.

Blankets made of fur string, feather string, and cotton are used extensively. Round toed sandals made of woven fine string, and coarse patterns made of fibre and yucca leaves are used.

Cotton cloth of plain loom weaves was introduced. Good pottery was manufactured. The pottery was of much finer temper than any found previously and was well fired. The basic elements of design were solid triangular units with dentals along one edge. There were the plain gray flat neck bands, the decorated black on white, and lustrous black on red decorated.

No sharp break has been found between the Basket Maker culture and that of Pueblo I. Nor can we apply the findings in one area of the Southwest to those of another.

We now come to Pueblo II. Of this period we have very little information and it was the chief aim of the archaeologist in this summer's expedition to unearth as much data as possible on this period within the area explored. Let us postulate how the people of Pueblo II lived.

We can easily imagine that the interior of an earth-lodge was a somewhat gloomy place, the smoke hole in the roof being the only source of light. However, it must have furnished a warm cozy shelter from winter snows and spring winds,



THE BASKET MAKER BURIAL CAVE

The Basket Makers buried their dead in stone slab cists in caves such as this. The lucky discovery of this cave led to the recovery of practically every known type of artifact ever reported from that culture. The technical report on the summer's excavations will soon be issued by the University of California Press.

and a cool refuge from summer sun. In the center of the room, immediately below the entrance or smoke hole, was a fireplace, which was used for cooking and for heating when the weather demanded. A ventilator shaft on the east side brought in a constant supply of fresh air which caused the smoke from the fire to rise and go out the **hole** in the roof. In bad weather, all preparation of food, eating, sleeping, and various other occupations, took place inside the houses, while in good weather everything was done outside, except possibly sleeping. In the room the most important furnishings, if they may be so called, were the milling stones. There were several large portable metates or milling stones of varying grades of coarseness, upon which the corn was ground. Because of lack of space, only one metate was set up for grinding, at a time, the other two, or perhaps three, being leaned against the wall out of the way. On one side of the room, or in the alcove, depending on the type of house, a number of storage jars were set into the floor and others stood on the surface. In these, food and water for immediate use were kept. A few basketry containers--perhaps large burden baskets, small coiled baskets, and yucca ring baskets, also occupied some floor space. All other types of tools and implements for preparing food, for weaving, for pottery and basketry making, preparation of hides, etc., must also have been kept in the house. Perhaps they were neatly tied up in bags or bundles and hung up on the roof beams or on the walls. The bedding for the

usually was probably folded up and used to sit upon in the daytime, and spread out at night. Such covers consisted of fur robes - hides tanned with the fur on, and fur or feather cloth blankets woven on a foundation of yucca cord. Fur cloth blankets were especially heavy and warm.

Very little is known about the clothing of these people. That they had some cotton is certain. They may not have been able to procure cotton to make woven garments for every member of the family. In this event buckskin was probably the most useful material for ordinary clothing, with perhaps the addition of cotton garments for ceremonial purposes. The women wore dresses of buckskin, possibly buckskin mocassins or woven yucca fiber sandals. The men wore breechclouts, perhaps of cotton cloth, buckskin shirts and high leggins and moccasins or sandals. For warmth they wrapped themselves in fur robes, or fur or feather cloth blankets. Children wore the same sort of clothing as adults with perhaps the exception of fur cloth blankets, which are very thick and heavy, while feather cloth blankets are light in weight, but warm.

Ornaments, like pendants and beads, were frequently made from small bits of broken pottery. Various shells obtained by trade from the Gulf of California provided material for bracelets, pendants, and shell bead necklaces. Red shale, volcanic tuff, and bone were commonly employed for ornaments, and turquoise to some extent.



UNCOVERING A MUMMY

The bodies were flexed and wrapped in blankets and skins, as is customary in most burials of that early period. But where were the heads? Seventeen decapitated bodies. Why? That remained the unsolved mystery of the field season of 1934.

Perhaps various perishable things like seeds, seed pods, nuts, cocoons, etc., were also used for decorative purposes.

The Pueblo II people must indeed have been busy folk, and theirs was not an easy life at all, for everything they used they had to make themselves. There were no stores at which implements could be procured. Every tool for making another tool had first to be made by hand. Their occupations may be divided into primary and secondary groups - the primary ones including such things as agriculture, hunting, house building, preparation of foods, etc. Secondary occupations include the preparation of tools, implements, and weapons for the accomplishment of the primary occupations, and frequently entailed journeys to distant places to procure necessary materials.

The primary duties of the men were agriculture, hunting, house building, making of clothing - either of hides or of woven cotton cloth, and the preparation of ceremonial articles. Their numerous secondary occupations included the making of bows and arrows, knives, spears, axes, mauls, digging sticks, digging stones, cordage, nets for snaring birds and small mammals, tumplines or head bands for carrying jars and burdens, looms, weaving implements, beaters for preparing cotton for thread making, ornaments, pipes, pahos or prayer sticks, and other ceremonial paraphernalia.



AN EXCAVATED PIT HOUSE

Before masonry was invented in the Southwest the early peoples lived in pit houses, partly below and partly above ground. The photograph shows a pit house excavated down to the floor, exposing the wall, fireplace, and ventilator. The door is in the right hand corner.

As an instance of the labor preliminary to a hunting expedition: bows and arrows had to be made. First the proper wood for the bow had to be cut and seasoned, then rawhide for a grip and the string prepared, and the bow strung and no doubt painted. Material for arrow-heads had then to be collected, the points flaked and mounted on hard wood foreshafts, and the foreshafts in turn mounted in reed arrows which had to be feathered.

After an animal was killed it was to be flayed with stone knives and the meat cut and prepared for immediate use or for drying. Then the skin had to be tanned, perhaps necessitating the removal of the hair. One can easily imagine what a tedious process would be the skinning, preparing and tanning of a deer skin, with only stone tools to work with. When the hide was finished a shirt or some other article of dress was made from it by sewing up the sides and cutting a slit in the top for the head. The sewing was accomplished by punching holes with a bone awl along the edges of the hide and lacing them together with leather thongs.

The primary duties of the women were the carrying of water for domestic use, the preparation of food, the gathering of all available wild foods such as greens, nuts, berries, etc., assisting probably in the cultivation of the crops, and making pottery and basketry. These duties ~~must~~ have occupied them the greater part of the time, but in addition they had to prepare the clays and paints for making the pottery, gather yucca leaves and splints of some sort for



MEALING BINS

In some of the cliff dwellings there are still mortars of varying grades of coarseness upon which corn, the staff of life, was ground.

baskets, make bone awls for piercing the basket coils, and shape and roughen the corn-grinding stones--manos and metates, etc. They prepared all food for eating, the most tedious process being the grinding of corn. They had first to select and shape, by pecking with a hammer stone, the manos and metates which they used for grinding. Cornmeal was ground every day, for it is an article of food which cannot be kept very long. Moreover, the grinding stones became smooth every few days and had to be roughened by the tedious pecking process.

There is very little to be said about the religious life in Pueblo II for the evidence is very scant as compared with later periods. These people had no rooms wholly devoted to ceremonial purposes like the kivas of Pueblo III sites and later. We know that they had some objects of undoubted ceremonial import such as medicine boxes, pipes, pahos (prayer feathers), fetishes, etc.

Pueblo II people left behind them only a very few petroglyphs (pecked drawings on rocks). They are mostly human figures, unindentifiable animals, and snakes, and have no particular distinguishing characteristics.

Thus we may say in conclusion that the life of the Pueblo II people of this region was comparatively simple, culturally, religiously, and socially. They might be compared perhaps to the Havasupai of recent times, whose mode of living is not very different. Pueblo II marks the last phase of



THE KIVA

The kivas, or ceremonial chambers, became highly specialized during the Pueblo III period ---- the "golden age" of Southwest pre-history.

southwestern prehistory in which each family lived by itself, separated even from related families. With Pueblo III came a great change, from small houses to large community houses. This, in turn, brought about the development of higher type of culture, advanced social organization, and the beginning of complex ceremonies and religious observances. The importance of the change from the one-family house to the community house cannot be overemphasized, for it was after this change (i.e., beginning in Pueblo III) that the Pueblo culture, as we know it today, truly began.

The pottery of this period was plain gray, plain and corrugated neck coils, and other types difficult to distinguish from the work of the preceding period. Decorations of the ware of this period is characterized by broad treatment of the designs.

From the meager information we have on Pueblo II we now come to the more fruitful periods Pueblo III and IV.

The people of this period had light frames and badly deformed round heads. This deformity was due to the custom of binding the babies' heads against the back of cradles.

In Pueblo III the houses were constructed with vertical walls of well laid coarse masonry. The rooms were rectangular or circular. The Kivas became highly specialized. The people lived in communities in large caves or in the open. For this reason these people have frequently been called



KEET SEEL, THE MODERN PUEBLO APARTMENT
HOUSE OF 1200 A. D.

Cliff Dwellers. But the term Cliff Dweller should not be misconstrued to mean a different Indian people - they were Pueblos. They now cultivate several varieties of corn and raise squash and beans. They have developed cotton weaving and use rush, reed, and rod mats a great deal. They have shell ear pendants, turquoise and lignite pendants, and Olivella, stone and turquoise beads. The men have developed a throwing club commonly called "rabbit sticks", in addition to their bows. They smoke long slim pipes.

Pottery making is still progressing; we now have everywhere corrugated gray ware, black-on-white and black on red decorated. Also polychrome decorated ware now makes its appearance. Decorated ware is characterized by the elaborateness of design and fineness of detail.

Burials are found extended and flexed in the talus of caves, in walled up tombs, in cemeteries, and under floors of rooms.

Toward the end of Pueblo III, about 1300 A.D., by adding room to room the small masonry houses of these people grew into large complex buildings and called pueblos after the Spanish name for village. These apartment houses sometimes housed a hundred families. This was the "great period" and referred to as the "Golden Age". It was about this time that Keet Seel, Petatakin, and other large pueblos were constructed. The pueblo culture was at its height.

Then, probably due to intercene warfare combined with a twenty three year draught, a decline set in. Pressure from without by nomadic peoples may also have been a contributing factor. The survivors of this highly culture in Arizona is represented today by the Hopi Indians who live on their reservation in the heart of the Navaho country, numbering some twenty eight hundred souls. During the latter stages of the Pueblo culture a new nation of Indian people began to make their appearance in the region. They called themselves "Dene". We know them as the Navaho. They were first mentioned in history in 1628, when they lived on the Chama River in New Mexico. They were farmers, but as horses and sheep were introduced they gave up their agricultural pursuits, became herders, and wandered afar seeking food for their stock. This is as we find them today-widely scattered, peace loving herders.

We have now come to the Indians of today.

CHAPTER IV
THE MODERN INDIANS OF
NORTHERN ARIZONA

THE MODERN INDIANS OF NORTHERN ARIZONA

On the reservations in northern Arizona today live a number of Indian nations representing the people who once occupied the region in the past. The modes of life of these people have long since been influenced by the environment in which they found themselves. It is from these living people, so slow in changing their ways, that we can catch our archaeology alive.

Arizona is divided into three parts: plateau, mountain, and desert. On the plateau live the Navajo, the Hopi, the Paiute, the Havasupai, and the Walapai; in the mountain region the Apache and the Yavapai; and in the desert, where it extends northward, the Mojave and southward the Pima and Papago.

Three linguistic stocks are represented here: the Shoshonean, including the Hopi and Paiute; the Yuman, comprising the Havasupai, the Walapai, the Yuvapai, and the Mojave; and the Athapascan represented by the Navajo and Apache.

The Shoshonean and Yuman groups have for centuries occupied the respective areas in which they were first found by white man during the last half of the 16th century. The Athospascan peoples, however, are newcomers, having come in from the east during the 17th and 18th centuries.



A NAVAJO FAMILY GROUP

During the summer they live in a cha'o or open brush shelter such as is seen in the photograph. Note the buttons made from silver coins; frequently, at the trading post, we saw Navajos using them for currency when "hard pressed for change."

These nations differ markedly in their respective cultures. The Hopis are primarily sedentary agriculturists with a high plane of culture, and have been so for centuries. The Mojaves, though they are agriculturists, have not attained a high degree of culture. The Havasupai are semi-sedentary people. The Yavapai, who have been influenced by the Apache, the Walapai, and the Paiute, are nomadic and exist mostly on the bounties of nature. The Navajo have become herders, and are occasionally agriculturist, being seasonally nomadic. They have no fixed village groups. They have absorbed many elements from Pueblo culture. The Apache, though they now have cattle and grow some food, have not changed much since the Spanish first knew them, never having had sufficient contact with the Pueblos to be influenced by them.

Considering each tribe separately we find the Hopis of Shoshonean linguistic stock living on the Hopi Indian Reservation which consists of some 2,472,320 acres. There are eleven villages and a total population of over twenty eight hundred. Besides the name of Hopi which means, "The Peaceful People", they are sometimes called Moki, (a Zuni name) which they do not like.

They are perhaps the oldest inhabitants in northern Arizona, for results of archaeological field work show us that their ancestors have occupied the same area since at least 700A.D. and probably long before. When Coronado's expedition



NAVAJO MAN AND WIFE

In the far north of the Navajo Reservation ---- the country being explored studied by the Expedition ---- many Indians still wear the traditional costume ---- or parts of it as the case may be. This "pro- gressive" wears the white man's outer garments but they are merely veneer, hiding underclothes such as were introduced centuries ago by the Spaniards, and beneath that a Geo-string that dates back to the days of the cliff dwellers.

came in 1540, the Spanish found the Hopi occupying a number of villages around the mesas, though none except Araibi were located in the places they occupy today.

Maize is their staple food and they raise beans, squashes, pumpkins, peaches, apricots, sunflower seeds, and melons. They also make very extensive use of native wild plants as well as trader's canned goods, coffee etc. Mutton and rabbit are their principal meats. The tools of the white man have supplanted the stone tools of old. The coffee grinder prepares the maize for the milling stones.

The homes are built of masonry in large towns, where they dwell all the year round, except for short periods in the summer when they camp out on their fields. Their houses now have modern doors and window sashes.

The men are the tillers of the soil. They raise the sheep and cattle, and weave the clothing and blankets. The women remain at home, taking care of their children and houses, preparing the food, and making baskets and pottery.

The women wear blanket dresses, belts, and shawls of wool, and the men shirts, kilts, and woollen blankets, but these are helped out by overalls and stetson hats. Both men and women wear hard-soled buckskin moccasins over the knitted footless stockings. Their ceremonial apparel is made of white cotton.

The women do their hair up in two rolls hanging down on either side of the face. The maiden's hair is done up in two



THE NAVAJO ARE A PASTORAL PEOPLE

Since the introduction of sheep, goats, and horses the Navajo Tribe has prospered. An adequate food supply and their comparatively healthful life in the open are chiefly responsible for their marked increase in numbers during the past half century.

butterflywing whorls above each ear except some of the younger generation who have gone modern. The men bob their hair short below the ears, a bright colored bandeau being tied around the head.

Their crafts consist of weaving a variety of textiles and making baskets and pottery. Each of the three mesas, upon which are located the towns is noted for a particular art viz. 1st mesa pottery 2nd mesa coiled basketry, and 3rd mesa for its twined basketry.

They are organized on a clan system. Descent is recognized only on the mother's side. Marriage is monogamous.

They have a highly complex religious ritual and a great number of ceremonies which are performed at certain definite seasons of the year. The ceremonies are mostly dramatized prayers for prosperity, rain, and the fertility of their crops.

The Havasupai are a group of Indians living on the five hundred and eighteen acre Havasupai Reservation in the bottom of Cataract or Havasu Canyon. They number about two hundred, and speak the Yuman language.

These people are semi-agriculturalists. They raise maize, beans, squash, sunflowers, figs, peaches, etc., and gather pinon nuts, prickly pear fruit, mesquite seeds, yucca fruit, juniper berries, and other seeds. They hunt deer, mountain sheep, rabbits, turkeys, doves, and quail, and today are excellent horsemen.



A NAVAJO HOGAN

The hogan, or winter dwelling, is built of juniper or "cedar" trunks and is covered with packed earth. The entire family. lives **in** primitive "comfort" in this semi-subterranean chamber which is ventilated only by the central smoke hole.

The men hunt animal food, raise crops, and make their clothing. The women gather wild plants for food, help raise the crops, and make basketry containers.

The men formerly wore a poncho-like shirt of deerskin, breech-clout, leggins, today they have adopted the costume of the white man. The women formerly wore a short underapron of buckskin, and an ankle length buckskin dress composed of two apron-like pieces, belted with a Hopi woven belt. Like the men they now wear modern calico dresses, shoes etc. Footgear consisted of decorated moccasins. Rabbitskin blankets were made and used for warmth.

The men bang their hair in front and do it up in a club at the back, using a head band to hold it in place. However, many now have adopted the white man's hair cut.

The women do their hair up with bangs over the eyes and the back hair falling loosely.

Basketry is their main industry. They believe in monogamous marriages, and descent is recognized on both the father's and mother's side.

Religion plays a minor part in their lives. One ceremonial dance is held in late August or early September when the harvest is gathered, to obtain rain and prosperity. This is also a social affair. Occasionally masked dances are held to pray for rain.



MEAL TIME INSIDE THE HOGAN

Corn meal and mutton are the staples, augmented by the white man's coffee and white flour.

The Yuvapai, a Yuman tribe, have a population of about four hundred, divided between two reservations, the Camp Verde Reservation near the mouth of Oak Creek, and Camp McDowell Reservation northeast of Phoenix. Yuvapai is a Mojave name meaning "People of the Sun".

These people live principally on wild foods such as: Mescal, mesquite, beans, acorns, cactus fruits, yucca fruits, wild sunflower seeds, pinon nuts, walnuts, juniper berries, and wild grapes. They kill deer, mountain sheep, antelope, rabbits, wildcats, lion, coyote, woodrat, even a certain hairless caterpillar, horses, and cattle. In some gardens along streams, they raise maize, beans and squashes.

In the winter they live in caves, rock-shelters, or thatched beehive-shaped huts made of a light framework of arched poles. In the summer, trees form their only shelter.

The men hunted wild game and made the clothing. The women gathered plant food, cultivated the gardens, made basketry containers, and pottery.

The men formerly wore buckskin tunics, breech clouts, hip leggins, and moccasins. The women buckskin dresses, and boots reaching to the knees. Both wore willow bark blankets and coyote and mountain lion skin capes. Their principal vocation was making baskets and pottery.

They have one organized ceremonial dance in the spring to insure a bountiful harvest of wild products and one masked, curing, ceremony for the sick, which is held when necessary.



NAVAJO WEAVING RUGS

Farther south the influences of "civilization" are a detriment to Navajo arts and crafts; but in the far north there is a loom before almost every hogan and cha'o.

The Walapai tribe living on the Walapai Reservation northeast of Kingman is very similar to the Yavapai. They live on wild food, mostly, and do not engage in agriculture on account of the nature of the country.

The Pauite people are similar to the Yavapai except they are Shoshonean speaking people instead of Yuman. They have a population of thirty five hundred on scattered reservations in Arizona, Nevada, and Utah.

The Mojaves are a Yuman tribe numbering about one hundred and live on the Fort Mojave Reservation north of Needles, and the Colorado River Reservation south of Needles.

Mojave is a Yuman word meaning, "Three Mountains", referring to the Needles.

They raise corn, pumpkins, squashes, melons, and beans.

Their homes are long four-sided structures with flat roofs covered with brush, sand, and are scattered along the river, and are occupied all year round.

The Navajo are an Athapascan speaking people living on the Navajo Reservation in Arizona and New Mexico. The Reservation contains 15,000,000 acres.

These people call themselves "Dine" which means "The People".

Early in their history a change came about in their lives when they obtained horses and sheep from the Spanish. They gave up their cultivated fields and became herders, wandering over the country in search of forage for their stock.

Mutton is their staple food. They grow maize, beans, squashes, etc., where the land is suitable, and gather wild plants.

They live in hogans built of logs and covered with dirt. The winter hogans are in well-timbered cedar country where there is fire-wood and shelter. Summer homes are in more open grass-land country.

Men formerly engaged in raids and warfare, but now help the women take care of the sheep and grow a few crops. The women take care of the sheep as formerly, and weave the clothing and blankets for the family.

When first seen by Americans, the women wore a blanket dress and woven belt and hard soled moccasins; men wore helmet-like caps of skin, woven or buckskin shirts, short buckskin trousers, tightly woven ponchos, leggings, and moccasins. Both men and women wore blankets for warmth.

The women weave the rugs for which this tribe is famous, and the men are silver-smiths of no mean ability.

The social system is based on the clan plan, and descent is through the female line. Polygamy is common. They have an elaborate system of worship with many complex ceremonies or "chants" which are principally for the purpose of getting rid of evil spirits or for asking benefits from beneficent spirits. Some chants are for curing the sick and some are social.

The Apache people are Athapascan speaking people, and have a total population of about six thousand four hundred. They have

several reservations; the Fort Apache Reservation of 1,742,220 acres, the San Carlos Reservation, Arizona, and the Mescalero and Jicarilla Reservation in New Mexico.

They did not reach Arizona until the 17th century. In 1630 they were said to live in west central New Mexico. They lived originally on wild food. Horses obtained from the Spanish gave them a rapid means of transportation, and by 1783 they had become a rather warlike nation. A great reputation for cruelty and warlike spirit was gained after they were first assigned to a reservation in 1871. It was thirty years before they were subdued.

They have recently been persuaded to take up a little agriculture, raising corn, beans, squashes, etc.; their manner of raising corn is in contrast to that of the Pueblos, for they used the white men's method. They gather and use mescal, cactus fruits, yucca fruit, pinon nuts, walnuts, mesquite beans, etc. From both mescal and corn they prepare very potent intoxicating drinks, "Tiswin" and "Tulapai". In this respect they are unusual, for no other Indians of northern Arizona make any sort of fermented drink.

Their homes are called "ickiups", of which there are two types: a circular, dome-shaped structure made on a framework of light poles arched over; and a gable type made, on a frame of two poles supporting a cross pole. Both are thatched with bear grass, corn stalks, brush, etc. Summer shelters are open with flat brush roofs.

The women raise or collect all plant foods, build the houses, and make baskets. The men look after the stock, hunt, and perhaps help the women farm.

The women wear a full cotton cloth skirt, a loose poncho-like blouse over it, and a cotton cloth shawl. Men wear white men's clothing, but allow the shirt to hang outside the trousers. Both wear buckskin moccasins with turned up beaded toe pieces. Matrons wear their hair hanging loose. Maidens do theirs up in a perpendicular double loop over which is tied a leather ornament decorated with beads and brass buttons.

Chapter V

THE ENTA

A description of ceremonial dances as recorded by James A. Russell and checked by Russell White.

Acknowledgement is due Mrs. Louisa Wade Wetherill and to her son Benjamin W. Wetherill for assistance in the translation of chants, interpretation of customs, and explanation of many intimate details of Navajo life so well known to them.

Far aside from modern civilization, located in the little known territory in Northeastern Arizona, lies a land glorious in its beautiful coloring and rugged cliffs. This land, known as the Navajo Indian Reservation is enriched by the grotesque creations of Monument Valley, the blended hues of the painted desert, the sheer walled canyons cut deep into red and yellow sandstone and blue shale of the Tsegi region. Here are found miles upon miles of deep canyons, rugged escarpments, wooded plateaus, arid valleys, and typical desert of cactus and sand.

Small wonder that the various tribes of Indians from prehistoric times have selected and settled in this paradise.

The last and present settlers who bask in this garden which nature has so lavishly smiled upon are the Navajos. Nestled there with their flocks of sheep and fields of corn they live their quaint simple lives, unheeding the swirl of civilization that lies to the North, South, East, and West.

Although the whole existence of the Navajo seems queer to the whites, his religion particularly arouses curiosity. At the outset the Navajo religion like most forms of belief has one supreme spirit (Utsay Hostin). All other spirits are considered saints or lesser deities. Instead of having one form of worship they have various rituals each dealing with the particular distress the people are in at the time. They believe that both good and evil spirits play a part in their well-being,



AIR VIEW OF TOTEM POLE REGION
OF MONUMENT VALLEY

Scattered Indian communities live in
inhospitable nooks and corners.

and besides receiving help from good spirits, evil spirits may enter in and naturally need to be driven out. Thus we find ceremonies which ask for help and also ceremonies that drive out evil spirits. In some chants both are accomplished at the same time. These services are called Chants, Sings, Ceremonies, and may be grouped into three general divisions.

First come the De gin ki, a chant that calls to beneficent spirits to help the people in their trouble, and also to drive out evil spirits. This chant may be held at any time of the year.

Secondly we find a group of chants used only in praying to beneficent spirits. Three of these chants are: the night Chant, or Yea-be-chi, the Mountain or Fire Dance called Zilth Kid gie, and the Peace Chant called Hoz hon gie. These take place in the late fall and winter.

The last division, and the one with which we are most concerned in this paper consists of the Devil chasing chants. There are two of these chants, and either may be held at any time of the year. The Ho chon gsi is a nine day ceremony with many intricate and interesting rituals, and the Enta is also called the Squaw Dance or War Dance and is a three day ceremony. The Enta is one of the most interesting ceremonies of the Navajos. Originally it was used to call the warriors from the various clans together to protect the tribe from intrusion or to prepare for a raid upon an enemy. As the need for violent combat



KAYENTA, THE METROPOLIS OF THE
NORTHERN NAVAJO COUNTRY

The nearest buildings are the Wetherill "Ranch". At the left in the distance is the Indian Service hospital. The trading post is not in view. In the foreground is the Expedition's temporary supply depot ----- 175 miles from the nearest railroad.

Indians from the country **round** about gathered nearby for a big three day ceremonial dance.

subsided, the ceremony gradually evolved into a chant for protesting against evil spirits which molested the people and for driving out evil spirits and healing the sick. Finally we find entering in the pure element of a social function.

In the dance as it is held today, the importance of the above factors are reversed. The need for raids is nil, and healing and social affairs are of greater importance. It is used to develop and maintain good will and friendliness among these forty two thousand scattered people of the desert. This is one ceremony in which the young people have an opportunity to meet persons of the opposite sex from the other clans. It is the one ceremony in which the young people of opposite sexes are permitted to become so intimate as to dance together, and hence it is the beginning of many courtships.

The preparation for this dance requires a great deal of work and money, as the services of the medicine men come high, and as many sheep and cattle and much flour and coffee are needed to feed the guests. Moreover expensive gifts are dispensed. A single dance will sometimes impoverish a family.

When a man feels he is in a position to finance an Enta, or when his relatives because of sickness are in dire need of the ceremony, he calls together his closest friends, and with their cooperation the ground work for the ceremony is laid. If he is financially able to have the dance and has no sickness in his family, he borrows a patient for the affair, because, healing



A GROUP OF NAVAJOS WATCHING A CEREMONIAL DANCE

Some of these Navajos rode horseback a hundred miles to be present at the three-day Enta which took place while we were in the Monument Valley region.

A TYPICAL NAVAJO WEEB

The weeb, built of juniper and piñon, affords partial protection from the sun. In winter the entire family moves into the weeb during the day.



A TYPICAL NAVAJO HOME

The cha'o, built of juniper and pinyon, offers partial protection from summer sun. In winter the entire family moves into the earth covered hogan.

being a part of the ceremony, a patient is necessary. Word is sent out for miles around by the "grape vine" system, which works by passing the information by word of mouth from person to person, hogan to hogan, and clan to clan. It is said information may be carried among the Indians for two or three hundred miles in this manner in one or two days.

With the date set, accommodations must now be made for entertaining the guests. A Cha'o which is a large shade and shelter, is constructed of juniper and pinon boughs out on the Mesa to the South or West of the host's hogan. This is for cooking and shelter, and must be very large as many hundreds of guests will soon arrive from far and near, on horse back, in wagons, and on foot, and they must be cared for. With preparations completed, and the date at hand, the stage is set for the first day of the three day ceremony. The Mesa is literally overrun with horses, wagons, goats, livestock, dogs, children and austere grownups. Strange as it seems there is no confusion, no boisterous holiday clamor, no loud talking. These slow-living, peace-loving children of the plateaus do not need to shout their thoughts from the house tops. With a mere twinkle of the eyes they express affirmation, happiness, and friendliness. Dissatisfaction or displeasure is expressed by utterly ignoring the issue, turning the attention away and with immovable expression gazing at some distant object. A steady gaze signifies the gazer is still debating whether to be interested or not. Every-



NAVAJOS WATCHING THE RACES

An Enta always provides a good excuse for horse races and a general field-day. Here a typical family group appears interested in the outcome of one of the contests.

thing is quiet and calm. Everyone seems calm in a state of supreme self-satisfaction and content. Here one witnesses two lean, gaunt, sun tanned men who have not seen each other for possibly three years or more. They approach each other slowly, almost unconcernedly, pause and extend their hands. A slightly prolonged hand clasp follows, with a quick steady glance into each other's eyes, and the greeting is over. No word has been spoken and each saunters on to greet other friends. The women are much more elaborate in their greetings. They favor their friends with a friendly, shy, childlike smile, and maybe with a softly spoken monosyllable.

The hair dresses of the men and women are somewhat similar. The hair is combed straight back and held in a loose knot by a string at the nape of the neck.

Ear ornaments are essential for the men. Generally turquoises hang from pierced ear lobes. Of course turquoise studded silver jewelry in many intricate designs and shape is quite the vogue. A large quantity of this jewelry is desirable, and often quantity is preferable to quality. Naturally beads play a most important part in Navajo dress, principally in the form of necklaces. They are made of bone, turquoise, coral, and silver. Often silver coins are used as buttons.

Prior to the last conflict with the whites, the Navajos wore primitive clothes. The men wore loin cloths and the women a short apron. Buckskin was used for clothes when protection was needed.



NAVAJO WOMAN AND BABY

The Navajo baby spends the first year of his life strapped to a cradle board just as did his forerunners in the days of the Cliff Dwellers.



A NAVAJO HORSEMAN

Not an unusual photograph, for they are all horsemen. The Navajo child learns to ride about the time he first walks, and spends a great part of his life in the saddle.

Blankets were made of feathers, cotton and wool. Skins were used for beds.

At present the Navajo women seem partial to long-sleeved, high-necked velveteen waists, each endeavoring to outdo the others in color brilliance. Their skirts are usually made of ten or more yards of vari-colored materials.

In 1863, following the last Navajo uprising, seven thousand prisoners were rounded up by Kit Carson and concentrated at Bosque Rendondo, near Fort Sumner in New Mexico. When it became necessary to renew their clothes, the women copied the costumes of the officers' wives. To this day, in spite of constant contact with the ever-changing fashions of the whites, they have clung to the full skirt and velveteen bodice of seventy years ago.

About the middle of the seventeenth century, with the first contact with the Spaniards, the Navajo men adopted the trouser fashion from them. Generally the pants were made of calico, slit at the ankle on the outside, and usually were lined with a contrasting colored cloth. They were similar to the modern conception of toreador trousers. The blouses worn by the men were similar to those of the women.

However, in the last few years the men have accepted the white man's styles. They vie for honors in the dimensions of their hats, the rule being "the bigger the better". Frequently a man's financial status may be determined by the size of his hat. This is not altogether a whim, as a man's bed consists of



NAVAJO FLAPJACKS ARE "MADE BY HAND"

The Navajo cook shapes the pancake-like cakes by slapping them on both sides and adroitly flipping them from hand to hand.

his hat and one blanket. The blanket is drawn close around his legs and body, and his hat placed over his head and shoulders. Thus to a great degree, the amount of protection he has against the elements is determined by the size of his hat. As to the matter of shirts, the men throw discretion to the four winds and select shirts of the most daring and flaming shades of green, yellow, blue and red. Many are decorated with wild designs of figures, birds, and flowers. However, their trousers are of the most serviceable kind of materials.

Feet are usually shod in white-soled red-topped buckskin mocassins, with a few exceptions of the high heeled cowboy boots which are the vogue in certain regions. Occasionally one sees a pair of out-moded, high-topped laced shoes on a squaw who displays them with much pride.

The preparation and consumption of the evening meal at the Cha'o creates a striking picture. Many of the families gather about their own wagons forming little individual groups whose fires dot the flat Mesa. Others make the big shelter or Cha'o their headquarters. Overhead the canopy of darkness pierced with bright stars, seems to hover closely over these people clustered around their glowing camp fires. The men stand about, arms crossed, silent as statues, on the outer rims of the camp fires' light, patiently waiting. The women are seated cross legged close by the fire, cooking in deep fat or baking on the glowing coals, piece after piece of squaw bread, which forms the major



THE SQUAW DANCE

During a three, five, or nine day sing, these evenings----entire nights, in fact----are given over to the social "squaw dance". The music is furnished by drums, tom-toms, and chanting-men.



THE CHICKEN PULL

This is always the "big event" of a Navajo field day. In earlier days a live chicken was buried to the neck in the sand; now the "chicken" is a small sand-filled sack. Horsemen dashing by, running the gauntlet of shouting spectators and striking lariats, lean down and endeavor to snatch the prize. Of the hundred or more whom we saw in the contest not one was unhorsed although most of them rode bareback and many tugged hard at the "chicken".

part of the Navajo meal. While one piece of bread is baking over the coals, the busy cooker forms another from the dough which she has at her side. She shapes the pancake-like cakes by slapping it on both sides and adroitly flipping it from hand to hand. The baked cakes are placed in a neat pile. This goes on for a long time. The woman attends to her task slowly and efficiently, heedless of the smoke and heat from the open fire, glancing often at the little papoose bound snugly in its cradle close behind her. Garbed in her best array, she is contentment personified. Eventually the eating of the meal of broiled meat, bread, and coffee begins. Slowly and silently the meal progresses with only an occasional meaningful glance or softly spoken word. There are no dishes, and fingers serve as forks.

As stomachs are filled, drowsiness descends, and one by one the group seeks sheep skins or blankets and folding themselves in them close by the failing fire soon fall fast asleep. Finally the flickering flames smolder into ashes, and darkness brings to a close another day for this simple-living family. When at home after the evening meal during the long twilight period, the older men spend hours telling legends and fairy tales.

The first official act of the ceremony was the preparation of the wand which was made of a juniper stick about two and a half feet in length. On to this were fastened turkey and western horned owl feathers, long hanks of multi-colored yarn, spruce boughs, a bag of war paint, which is made of grease and charcoal,



ARRIVAL OF "CHIEF" BY AIRPLANE WAS A BIG
EVENT IN THE NAVAJO COUNTRY

In midsummer our "Chief" accompanied by several friends flew from California to the Navajo country in a big tri-motored plane. The nearest airport lay 175 miles away but the big air liner, after some maneuvering, was successfully set down on the landing field "made by hand" the year before for the Expedition scouting plane. Both Navajos and newcomers are here seen looking each other over very frankly,

stems of a plant called chil dil gessie, which has a yellow blossom and is used for medicine, and a bag of pollen collected from corn and larkspur. After the medicine man had blessed the wand, it was carried by one of the older men of the tribe, accompanied by a cortege of riders, posthaste to the hogan of a friend, one day's ride away. As the wand passed by the camps or hogans on its journey all the men who saw it leaped into their saddles and followed in its wake. When the cortege arrived each member painted his face with war paint. They ate and sang and finally the squaw dance began and lasted all night. The dance began early in the evening when a group of young men gathered and began to chant their dance tunes. There were no instruments of any kind except a single pottery water-filled drum, used for beating time. After two or three hours of this, and after darkness had fallen, a large fire was built near the singers. This was an invitation for the squaws to make their appearance, whenever they were ready to start to dance.

When the squaws arrived the men became alert and ready to dash into the surrounding darkness for safety, because it is the custom that the girl may choose her partner, and when chosen he is obliged to dance until the squaw is willing to release him. His freedom may be gained by paying whatever she thinks her favoritism is worth. If an agreement cannot be reached the squaw's mother is generally handy to help solve the problem, and generally she can quickly convince the young man that the daughter is right. The main dance consists of the squaw's dragging a



EVERY NAVAJO LOVES HORSE RACING



THE NAVAJO OBSTACLE RACE OCCASIONED MUCH EXCITEMENT

Depositing saddles, spurs, and all equipment in a huge pile, the entrants have difficulty in controlling their half wild horses. At the starting signal they mount with a single leap and ride once around the half mile track bareback. Then comes a mad scramble in which each man struggles to retrieve his own equipment while preventing other riders from doing so.

Once found saddles and bridles are slipped on in haste; thus comes the last mad dash, fully equipped, around the desert race course.

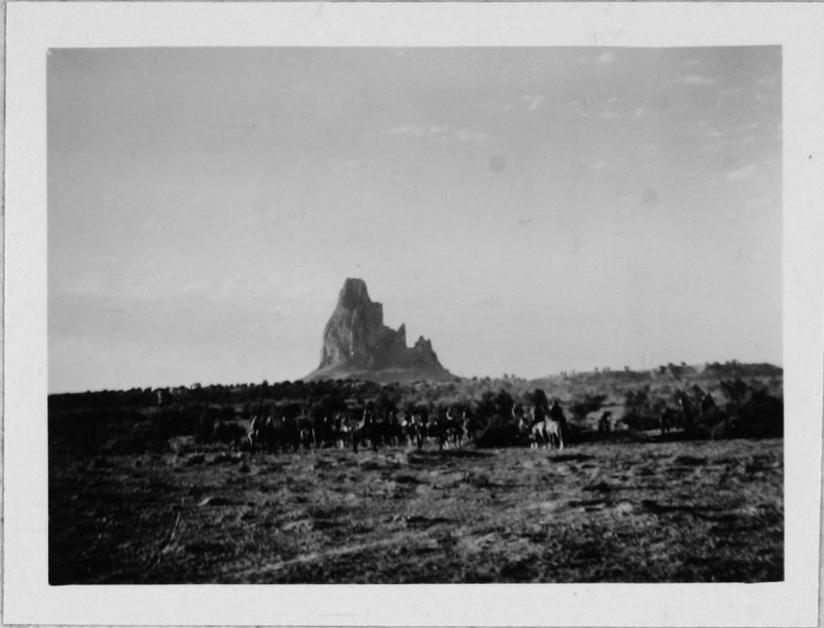
timid victim into the firelight, and by firmly grasping some part of his apparel to prevent an escape, she dances around and around him. The man merely acts as a leaning post, and revolves around and around.

For a variation, the couples form a large circle and trot around and around the dancing space. If the girl likes her dancing partner she may keep him dancing all night, asking no ransom. However, the girls are generally very mercenary and as soon as they are able to collect, they release their partner and race to capture another victim.

The music is continuous. The singers, huddled together, sway with the rhythm of their tunes.

Meanwhile, far back across the plains at the hogan of the host, the entertainment which is provided for the period during which the wand was on its way consists of horse races, foot races, chicken pulls, mixed saddle races, and other events.

In the chicken pull, the mounted riders lined up single file and one at a time rode by a half buried sack of sand, leaned from their saddles and attempted to grasp the top of the sack and pull it from the ground. When some rider was successful in securing the sack he was supposed to carry it around a half mile track and return with it to the judge of the finish. This was a difficult task as the rider who brought the sack to the judge was considered the winner. Naturally after the sack had been



ASSEMBLING FOR THE MUD DANCE

The "invaders" making preparations for the attack at sunrise.

pulled from the ground all contestants gave hot pursuit and the race around the track was a continual battle to gain and hold possession of the trophy. The sack changed hands frequently, and wild dashes and mad scrambles always resulted. This race caused much excitement and seemed to be the favorite of the Navajos.

The mixed saddle race was also very interesting. Each contestant was obliged to throw his saddle and blanket in a pile 100 yards from the finish of a half mile race. The saddles and blankets were thoroughly mixed. The riders started from the starting line bare-back, raced up to the pile of saddles, extricated their own saddles and blankets, saddled their horses and raced across the finish line. The jumble of horses, riders, saddles and blankets was great fun for everyone.

The Squaw Dance at the friend's hogan lasted all night. The next morning the wand was given to the unmarried daughter of the host (or to some young unmarried girl of the tribe in case the host has no daughter) and accompanied by the cortege, she carried it back to within four or five miles of hogan of the host. Here camp was made for the night and preparations made for the closing scene of this spectacular drama being staged by these picturesque characters on a natural stage.

After dancing all night, at dawn of the third day the girl, carrying the wand and supported by the cortege, raced across the desert and swooped down upon the hogan of the host, attacking in Indian fashion. They rode around and around in a wide circle



THE MUD DANCE

The Mud Dance is a ceremony for healing the sick and afflicted and protecting others from ill fortune.



NAVAJO WOMEN WATCHING THE ENTA

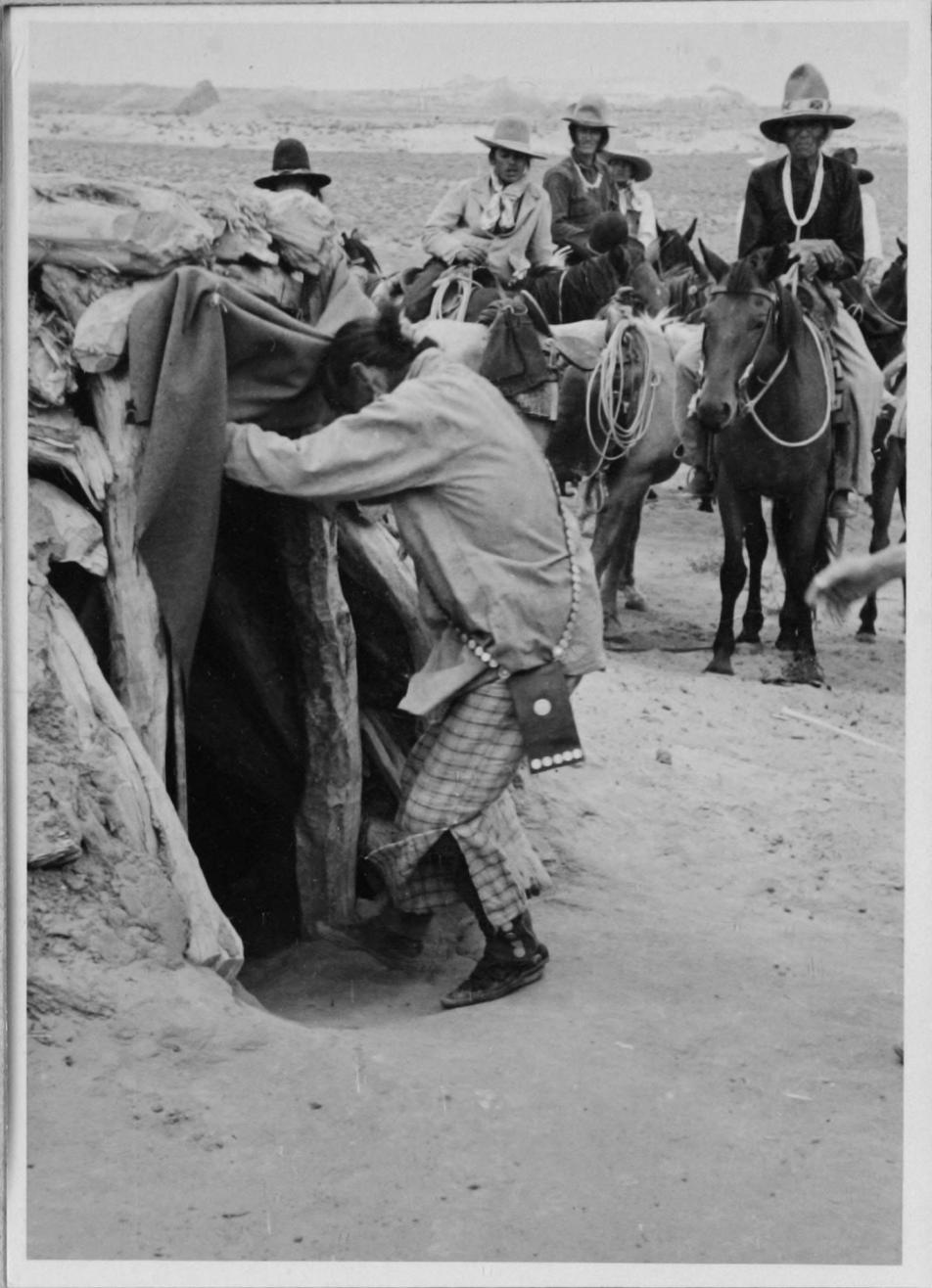
A hogan, or winter dwelling, is seen in the background.

shooting, yelling and gesticulating. The assembled friends at the host's hogan, taken by surprise, scurried hither and yon, gathered at places of protection and returned to the fire prepared for a desperate stand against the invaders. This sham battle can be heard for miles, and from our point of vantage on a near by hill we recalled stories we had heard of times when the results of such a spectacle left the surrounding plain gory with blood.

Soon, however, the sham battle ended with the invaders the victors. They rode around the hogan of the patient three times, shooting and yelling. This procedure was to conquer the evil spirit which inhabited the patient. To make peace, the host was required to throw out gifts and expensive presents to the visitors. At last peace was declared, and the cortege assembled about the hogan of the host and sang for half an hour. The exact procedure at this particular part of the ceremony is sacred and white men are not permitted to see it.

During the morning of the third day the medicine men transferred the evil spirit from the patient to a human scalp. This scalp must come from an enemy. Generally they are taken from the burials of the Hopi Indians or white people.

The scalp containing the evil spirit is carried by the young boys, blackened with war paint, to a spot two hundred yards east of the hogan, and shot by an old warrior preferably with a bow and arrow, but of late years a rifle is used. The war paint makes



THE MUD DANCE

The Medicine Man entering the hogan of the afflicted to perform the sacred ceremony.

the boys immune to the spirit. In this manner the evil spirit is slain and can cause no more trouble.

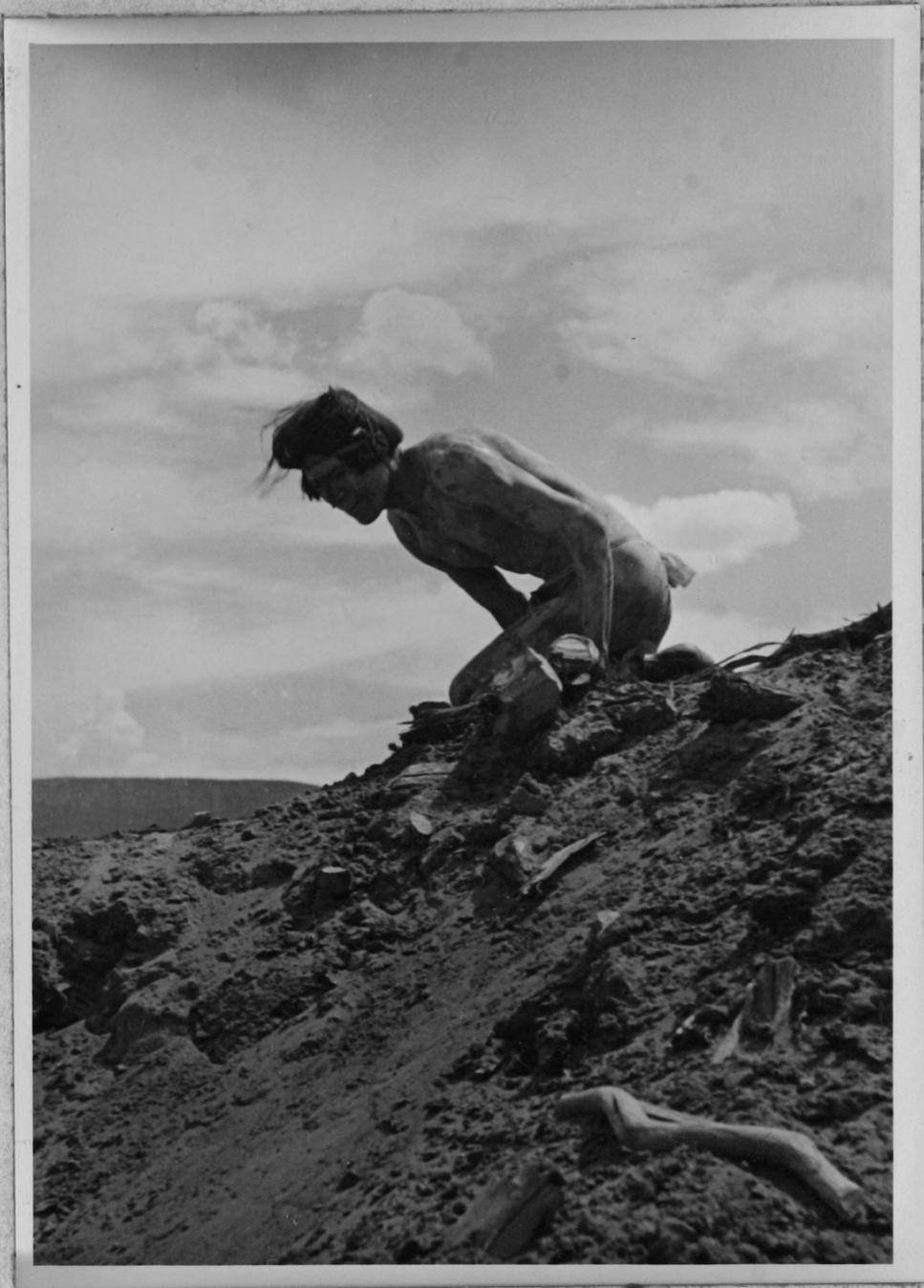
As the slayers of the spirit return, the women go out to meet them with their hair down and bowed heads, in mourning for their men who have been killed in battle.

In the evening, before the guests departed, the last and largest Squaw Dance was held, and at dawn the party broke up and the guests set out on their journeys back to their own hogans.

Sometimes on the afternoon of the third day the Navajos hold their Mud Dance ceremony. This dance was rarely used during the first quarter of the present century, but has been revived during the last ten or fifteen years. This dance is very serious and seldom are whites allowed to be present. However, the dance is very amusing to the white man and full of what seem to be clowning maneuvers. The reason for the antics of the dance is not clearly known. Probably the Navajos are carrying along a custom they themselves do not thoroughly understand.

However the cast of the dance consists of twelve to eighteen young male dancers, one medicine man, who directs the dance, and one head man who assists the dancers. He is an old man with face blacked with war paint and carries a pottery, water-filled drum. He carries the rhythm of the chants by beating on his drum.

The Mud Dance is a ceremony for healing the sick and afflicted, and protecting others from ill fortune. Also, it originally was used to initiate young men into the rank of warriors but now is merely to usher them into positions of honor.



MUD DANCER EMERGING FROM SMOKE
HOLE OF THE PATIENT'S HOGAN



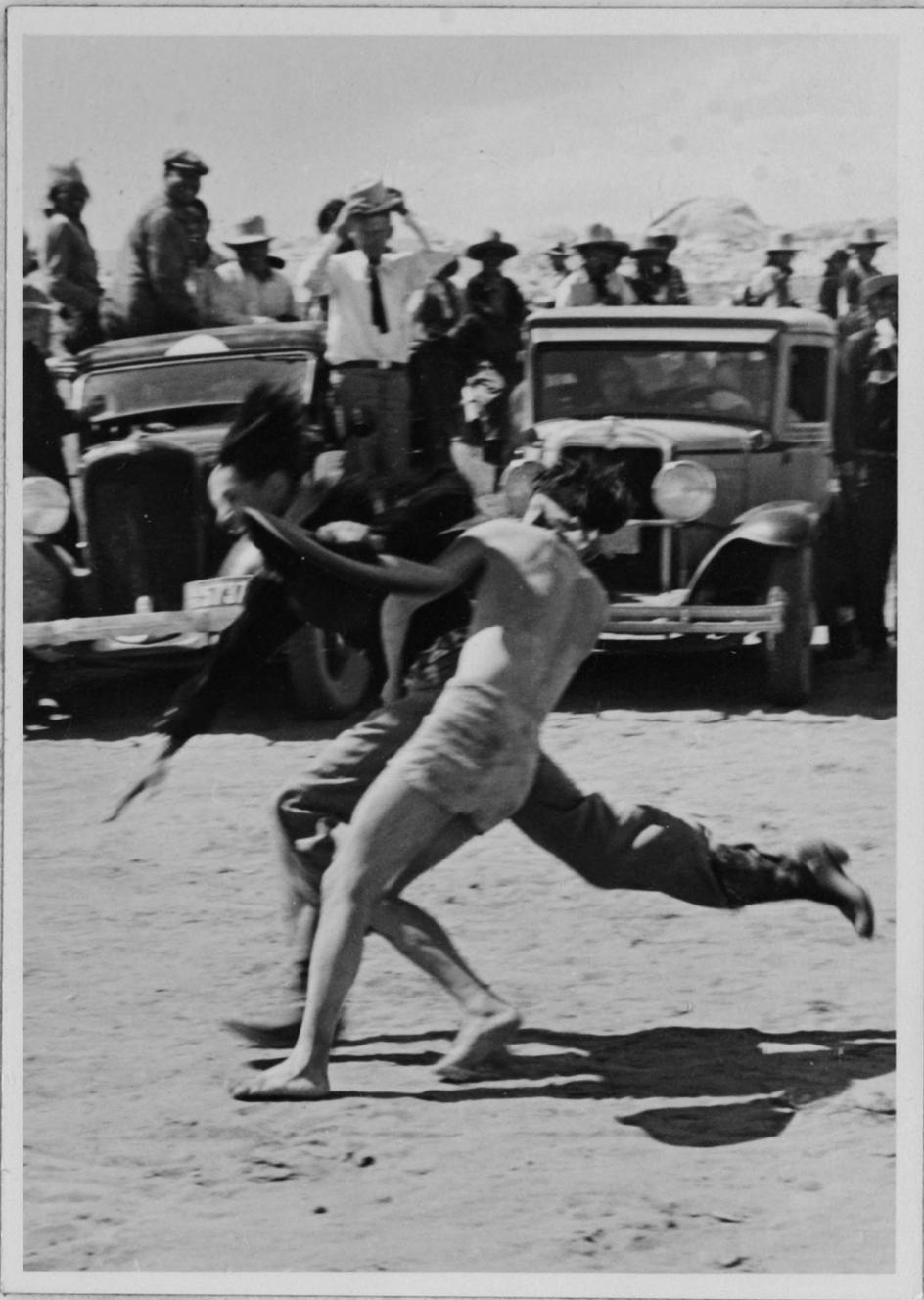
THE MUD DANCE

At this point in the ceremony the patient was hoisted above the heads of the dancers.

A large hole was dug a few feet south of the hogan. Into this this wallow were poured several barrels of water. The medicine man and dancers, accompanied by the old drummer, gather in the hogan. The dancers stripped to breech clouts, moccasins and head-bands, smeared themselves with sacred mud, and for several minutes chanted their preliminary songs as they circled about the medicine man and drummer who were seated in the center of the hogan. Soon the mud-bedaubed dancers one by one crawled out of the smoke hole and somersaulted down the slanting sides of the hogan, all the while joking, clowning, and being funny in general. One by one as they emerged, they formed a group in front of the hogan where they pranced and jeered at their companions. When all had tumbled out of the hogan, the medicine man and the drummer walked out through the regular entrance and were immediately surrounded by the nearly nude crew of mud-plastered youths.

A preliminary chant and dance followed, after which the patient was led to the center of the circle. The medicine man stepped forward applied a yellow medicine (which was pollen from corn and larkspur) to the patient's chin, lips and tongue and spit juice from chewed up juniper needles on his face. The dancers closed in, spitting juice on the patient. All the time sacred songs were chanted and the weird tum-tum of the water-filled pottery drum was going on. At this point the patient was hoisted above the heads of the dancers and held there at arm's length, all the time being rolled over and over. After a minute or so of this manipulation he was lowered and retired.

Others may benefit from this ceremony by paying the medicine man.



ALTHOUGH HE ATTEMPTED AN ESCAPE,
HE WAS CAPTURED BY THE MUD DANCERS

Several squaws brought their babies to be treated, relieved of evil spirits and assured of a happy prosperous journey through life.

Squaws desiring aid were seated in the center of the circle on a blanket and were treated with the same medicine and songs and drum-beats were raised and lowered several times by the assembled dancers who were grasping the edge of the blanket. When these treatments were finished the real fun began.

The drummer took the lead, followed by the naked pack. The Navajo spectators began moving back to safe distances, some went off as far as a quarter of a mile. They knew what was coming.

Suddenly with a yelp, the whole pack launched itself upon a luckless horseman. Although he attempted an escape he had no way out, for it is the custom that whoever is marked must be brought in. If he runs, he is chased until overtaken. If he endeavors to escape on horseback these wild naked dancers leap on horses and ride until they make their capture and drag back the victim. One of the dancers seized the victim's horse by the tail, another grabbed the bridle, a third young demon leaped upon the back of the animal, clasped his arms around the waist of the rider and hurled him from the saddle. Yelling gleefully, the entire crew pounced upon the victim and bore him squirming to the mud bath. Without giving him a chance to remove so much as a boot, they hurled him in the ooze and to make certain he was well covered, they trampled upon him, forcing him under with none-too-gentle feet.

However, when he emerged, gasping and mud covered, he promptly removed his clothes and joined the band to hunt other victims. This was a



SUDDENLY, WITH A YELP, THE WHOLE PACK
LAUNCHED ITSELF UPON A LUCKLESS HORSEMAN

YELLING CLAMOROUSLY, THE HORSES THREW THEMSELVES
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THE AIR WAS



YELLING GLEEFULLY, THE ENTIRE CREW POUNCED
UPON THE VICTIM AND BORE HIM, SQUIRMING, TO
THE MUD BATH

part of the game. In all of the two hours which followed, not one of the captives became angry. Some of the men were garbed in their best clothes, and they were ruined, but no murmur of protest was raised. To be selected as a victim of this ceremony is regarded as a great honor and is a form of initiation into a position of honor and into the realm of leadership. After two or three hours of this horse play the dancers once again assembled near the hogan. Now began the osteopathic treatments. Apparently the rougher the treatment, the sooner the evil spirit causing the ailment would become discouraged and **depart**. Lamé backs were jumped upon with shod feet. Sore and broken fingers, arms and legs were pounded, jerked and pulled. When the last patient **had** come forward the drum tapped. The dancing youths entered the hogan, emerged a moment later and raced away for a bath in a stream about two miles away.

The Mud Dance was over.



NOW BEGAN THE OSTEOPATHIC TREATMENT



FAREWELL NAVAJO COUNTRY!

But already we are planning to go back to that land unspoiled by "civilization". We hope we may be privileged to return with next season's field party ---- or the next ---- and to discover what lies "the other side of the mountain".

APPENDIX

- A - Archaeological Bibliography
- B - Geological Bibliography
- C - A Partial Vocabulary of the
Navajo Language.

APPENDIX A

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APPENDIX C

A PARTIAL VOCABULARY OF THE
NAVAJO LANGUAGE

APPENDIX C

A PARTIAL VOCABULARY OF THE NAVAJO LANGUAGE

white man	bell-a-cana
horse	khling
hello (salutation of surprise)	allah-hay-nay
where are you going	ha-day-go
I do not know	hulla
let's go	huck-a
rice	a-loos (open)
automobile	ch-i-tec (chip)
rabbit spring	ki-bee-toe
joker	huddle-chess-lee
son (boy)	bee-gay
where water runs	chinn-lee
house	kin
red house	kin-klee-chee
yellow house	kin-klee-so
sheep	naʔ-ga-szge
cripple	gan
grandfather	chetty
yes	ow
no	doe-ta

perhaps

girl

girls

who is that

who

please stop

what is that

road

his or hers

mine

yours

water spring

water sinks into ground

rock

rocky canyon

his

canyon

slim

short

tall

jack rabbit

prairie dog

come to eat

cow

doet-say

oat-a (hay)

oat-a-ka (hay)

high-et-te

high

da-a-doon-ton

towel-a-geh

ah-teen

pbi

sshe (yet)

ni (nit)

kay-en-tea

toe-doe-nez-zj

tse

segee (tseqi)

be (yet)

ko

sosee

yazzee

hez

j-i

gloom

cheeny-a-go

beek-ka-shi

brother-boss
little brother
cliff dweller
mexican
beaver
bitter water
water
mountain
sun
people
house
potsherds
broken pottery
house on slope
grease wood
match
chief-captain
mister-sir
I want
I don't want
food
to eat
please
hello
brother-in-law

shy-don-ni
chilly
ana-sazzee
na-ki
cha
chin-chill-bee-to
toe
zilth
zjoohn-nc-hay
day-na
kin
kect-seelay
keet-seel
te-ta-ta-kin
dogoszhi
sin-kiay-hey
na-tan-ee
hos-teen
n-tsn
doc-n-tsn
ching-yung
o-son (on)
da-shown-tay
yah-te-hay
sha-don-hay

no I prefer not	doe-shkla-needa
I don't understand	doe-shkla-pay-hozenda
little boy	hoshkee-azee
people	dee-neh
bread	bah
air plane	ch-i-tee-nah-tah
flying	nah-tah
hello what do you want	hot-ee-shah
baldheaded	tsita hazhazhi
bad	do yashon do
back	bo o na achi
baby	avae
own	bitsigha
aunt	shak a i
ask	naidish kid
tobacco	na t o
pipe	na t o tsi
cup	be idla ni
hat	ch a
shirt	ae
shoes	ke
smoke	naash t o
flower	bila tqahi
bed	tsas ke
girl	at ae d-plataeke
go	nashda

pencil	be ik elchi hi
pen	be ik ilchi hi
book	naltsos
borrow	atsed ish i
wife	ke esdqa or ba ad
arm	agan
eat	asha
leg	ajad
hand	a la or shi la
head	atsits in
coat	ae tso
flower	bila tsahi
foot race	nigh dye
pants	tl a ji ae
night	tl e
day	ji
winter	gai
summer	shi
play	nashne