

OF MEN AND VOLCANOES

THE SINAGUA OF NORTHERN ARIZONA



BY

ALBERT H. SCHROEDER

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CONTENTS

	Page
Title Page.....	I
Copyright.....	II
Contents.....	III
Illustrations.....	IV,V
Vicinity Maps.....	VI
Introduction	1-2
The Land on Which They Lived.....	3
Cultural Heritage	14
Early Stage of the Sinagua	19
The Black Curtain.....	27
The Changed Environment	33
The Late Stage of the Sinagua.....	45
The Final Curtain - A.D. 1215-1400.....	58
Epilogue - A.D. 1450 to Present.....	64
Suggested Reading.....	69

ILLUSTRATIONS

Figure	Page
1 Vicinity map.....	VI
2 The southern part of the Colorado Plateau.....	3
3 The Little Colorado Monocline.....	4
4 The San Francisco Mountains as seen from Sunset Crater.....	5
5 Walnut Canyon.....	6
6 Looking East over Wupatki Basin from Doney Crater.....	6
7 View over Sunset Crater into field of cinder cones.....	7
8 Grand Falls.....	7
9 Sunset Crater.....	8
10 Wupatki Basin showing Wupatki Ruin and ball court.....	9
11 Grasslands of Wupatki.....	10
12 Broad-leaved trees in Walnut Canyon.....	10
13 Pinyon-Juniper forest.....	11
14 Pine Forest at Sunset Crater.....	11
15 The territory of the Sinagua as of A.D. 1200.....	13
16 Map of Patayan, Mogollon, and Anasazi Influences.....	16
17 Local variations among the culture patterns.....	17
18 Plan of Sinagua house of A.D. 500-700.....	19
19 Culture distributions in the Flagstaff area, A.D. 700-900.....	20
20 Culture distributions in the Flagstaff area, A.D. 900-1060.....	22
21 A timber pit house.....	23
22 Reconstruction drawing of Sinagua timber pit house.....	24
23 Reconstruction drawing of an alcove house.....	25
24 Lava flow at Sunset Crater.....	28
25 Spatter cone at Sunset Crater.....	29
26 Squeeze-up at Sunset Crater.....	30
27 Layers of cinders overlying an early house.....	32
28 Culture distributions in the Flagstaff area, A.D. 1070-1125.....	34
29 An Anasazi kiva at Heiser Spring near Wupatki Ruin.....	36
30 Reconstruction drawing of a Cohonina "fort".....	36
31 Reconstruction drawing of a Hohokam type of house on Wupatki National Monument.....	37
32 Trade items from the South.....	38
33 Pottery types with smudged interior introduced from Eastern Arizona.....	39
34 A masonry-lined pit house.....	40
35 Customs of the five groups, A.D. 1070-1125.....	41
36 Objects of personal adornment.....	42
37 Ledge ruins in Walnut Canyon.....	46
38 Pit house near the rim of Walnut Canyon.....	47
39 Small pueblo near the rim of Walnut Canyon.....	48
40 Locale of island "fort"-like structure, Walnut Canyon.....	48

41	Culture distributions in the Flagstaff area, A.D. 1125-1215.....	50
42	The Great Kiva ("dance plaza") at Wupatki Ruin.....	51
43	The masonry ball court at Wupatki Ruin.....	51
44	Wupatki Pueblo, Wupatki.....	52
45	Wukoki Pueblo, Wupatki.....	53
46	Nalakihu Pueblo with Citadel Pueblo in background, Wupatki.....	53
47	Lomaki Pueblo with earth crack in foreground, Wupatki.....	54
48	Terraced arroyo at Walnut Canyon.....	55
49	Crack-in-Rock Pueblo, Wupatki.....	56
50	Citadel Pueblo, Wupatki.....	57
51	Culture distributions in the Flagstaff area, A.D. 1215-1275.....	59
52	Tusayan Black-on-White jar.....	61
53	Tusayan Black-on-White olla.....	61
54	Jeddito Black-on-Yellow bowl.....	62
55	Yavapai Indian houses.....	64
56	Hopi Indian and pueblo.....	65
57	Apache Indians and wickiup.....	67
58	Navajo hogan.....	67

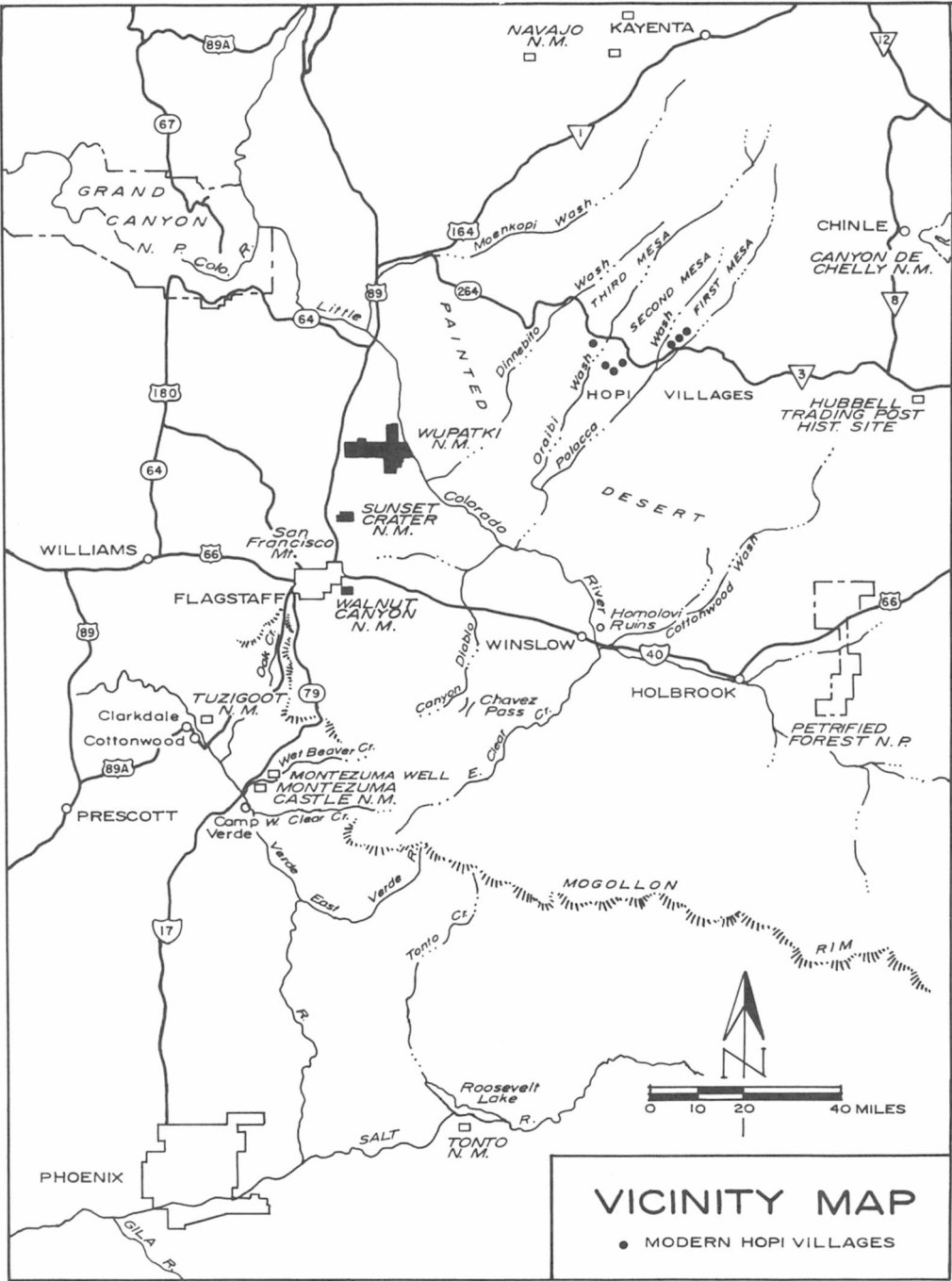


Fig. 1.

INTRODUCTION

The story of the prehistoric Indians who lived in the region of Wupatki, Sunset Crater, and Walnut Canyon National Monuments near Flagstaff, Arizona (fig. 1) not only exhibits much of human interest, but also provides an excellent example of man's adaption to environmental change.

Beginning with settlement among cinder cones in an extensive volcanic field, these people, referred to as the Sinagua, learned to farm land thinly covered with volcanic cinders which helped to conserve moisture from rainfall in this arid country. Later these farmers experienced a catastrophic event, the eruption of Sunset Crater. They soon realized that this upheaval had created new farmlands to the north and east of their homes, an area which previously had been sparsely inhabited. News of this change also reached surrounding people with different ways of life. The "real estate boom" that followed brought about population shifts which resulted in concentrating several unrelated groups within a relatively small area. In a brief span of time, these groups adopted ideas from one another, which modified the original Sinagua customs. The final result was a blend of people and/or ideas that formed a new way of life in the Flagstaff region.

Not all of the events or material remains referred to occurred in, or are now present on, these National Monuments. For this reason, the general story that follows includes reference to other places and people to complete the outline of the development of the culture and the life of the Sinagua.

Sunset Crater National Monument, preserved as an area representing the most recent volcanic activity in the San Francisco Mountain volcanic field, was part of the region occupied by the early Sinagua Indian farmers prior to the eruption of the crater in A.D. 1065. Wupatki National Monument contains the remains of a large number of ruins formerly occupied by the people who moved into the area after the eruption to take advantage of the conditions that created new farmland. Walnut Canyon National Monument represents a unique locale in which other Sinagua Indians built their homes in the ledges of a canyon. These three monuments portray different aspects of the life-way and environment of the Sinagua and their contacts with others who played an important role in influencing the development of the Sinagua culture.

THE LAND ON WHICH THEY LIVED

The weather-beaten face of the Colorado Plateau reflects the marks of time. Its wrinkles are deep; the base of the Grand Canyon, 2,400 feet above sea level, lies a mile below its lowest rim. Only 50 miles away stand the majestic 12,670-foot San Francisco Peaks, the Mount Olympus of the Southwest and the home of Hopi Kachinas (supernatural beings). The time-worn face of the plateau is also splotted with wounds exposing eroded layers of red sandstone and white limestones, burns of black basalt lava flows, bashes from erosion, and cinder-cone knobs.

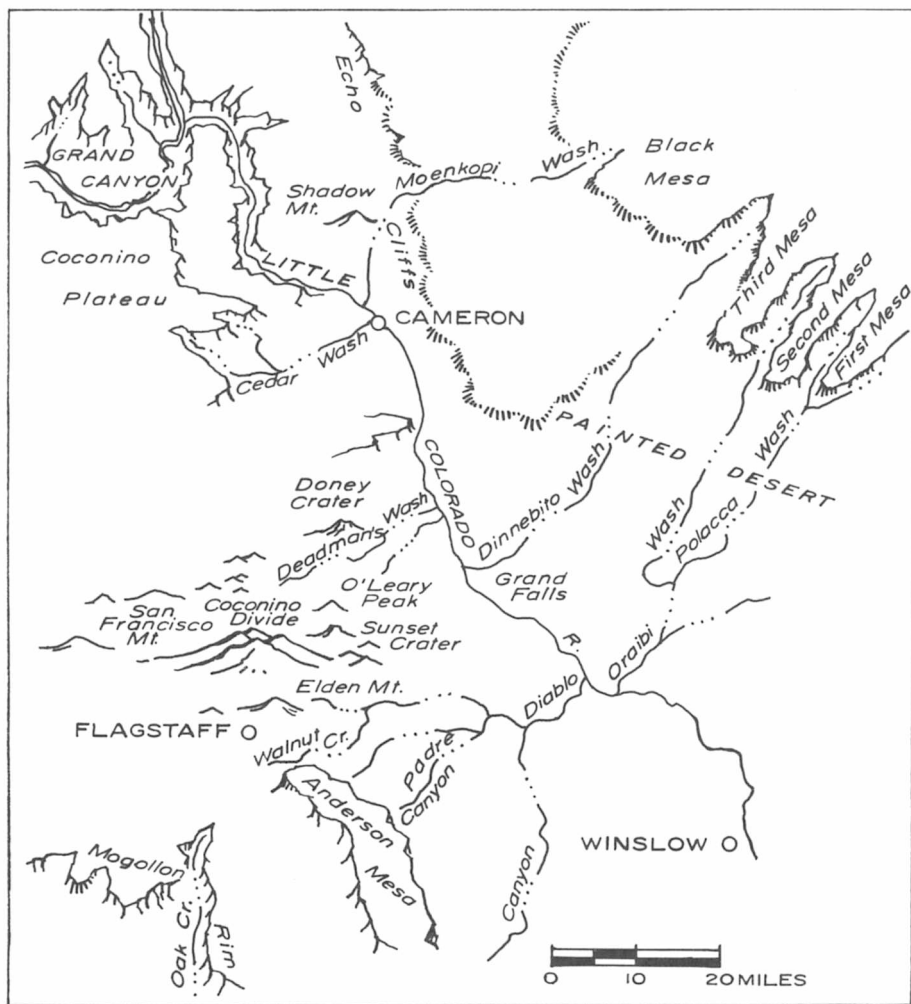


Fig. 2.

The high Colorado Plateau, a varied and scenic country north of the Mogollon Rim (fig. 2), was born eons ago in Cenozoic times. Beginning as a shallow sea, it slowly drained off as it was heaved upward. Pressures of the uplift began to reshape the exposed low plain, molten material pouring out to form extensive lava flows in the area of the present Hopi country. The land west of the Little Colorado River rose to form a low plateau. Its eastern edge, known as the East Kaibab monocline (fig. 3), is still visible in Wupatki National Monument.

Forces of erosion began stripping the upper strata of sand-



Fig. 3. The Little Colorado Monocline as seen in the western part of Wupatki National Monument.

stone on the new plateau, slowly redepositing the red sands on the still level plain to the east where the drainage of the Little Colorado River later was to develop. Volcanic activity again erupted on the west side of the Little Colorado River, vents releasing tremendous black lava flows up to 300 feet in thickness.

The low plateau then began a second slow rise. Heaved by pressures, fractures developed in the land mass and another period of volcanism began. Lava spewed out through breaks,



Fig. 4. The San Francisco Mountains as seen from Sunset Crater.

not stopping until the outlets were sealed, in the process forming the San Francisco Mountains (fig. 4) and others to the west. Erosion began its ceaseless work on the still relatively flat plain, rounding off sharp edges, cutting deeper into cracks, and shifting sands. As river gradients increased with the rise of the land, rushing waters gouged out larger quantities of sand and gravel and began the long process of scouring out the now famous Grand Canyon, colorful Oak Creek Canyon, scenic Walnut Canyon (fig. 5), and Canyon Diablo. Water, heat, cold, and winds began carving the higher land masses, exposing colors and shaping land features to form the scenic landscape of the Painted Desert that stretches east from Wupatki (fig. 6) to Petrified Forest National Park. To the north, erosion cut around Black Mesa, leaving three finger-like mesas protruding to the south on which the Hopi Indians many eras later built their villages. By Pleistocene times (the last ice age) the Colorado Plateau had been sculptured into its modern form.

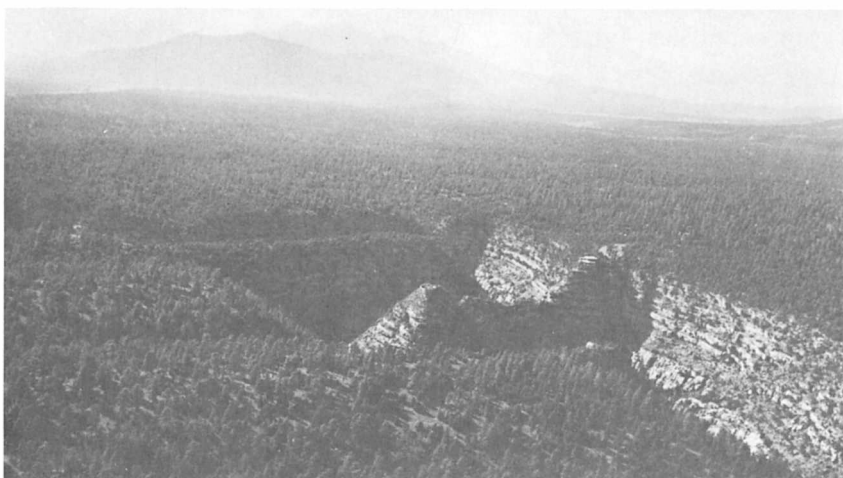


Fig. 5. Walnut Canyon.

Fig. 6. Looking East Over Wupatki Basin from Doney Crater.



While ice-age glaciers lay in the interior valley of the San Francisco Peaks, a final round of volcanic activity pro-



Fig. 7. View over Sunset Crater into field of Cinder cones.

duced about 400 cinder cones (fig. 7) on the north and east sides of the San Francisco Mountain volcanic field. A lava flow from one of these cones temporarily blocked the now developed Little Colorado River. Its waters rose, overflowed its banks, found a way around the tongue of lava, and dropped back into its old channel at the place now known as Grand Falls (fig. 8). The most recent of the cinder cones, Sunset Crater (fig. 9), erupted under the eyes of prehistoric man in A.D. 1065, a date determined by a study of timbers recovered from Indian dwellings buried under the volcanic ash and from

Fig. 8. Grand Falls.

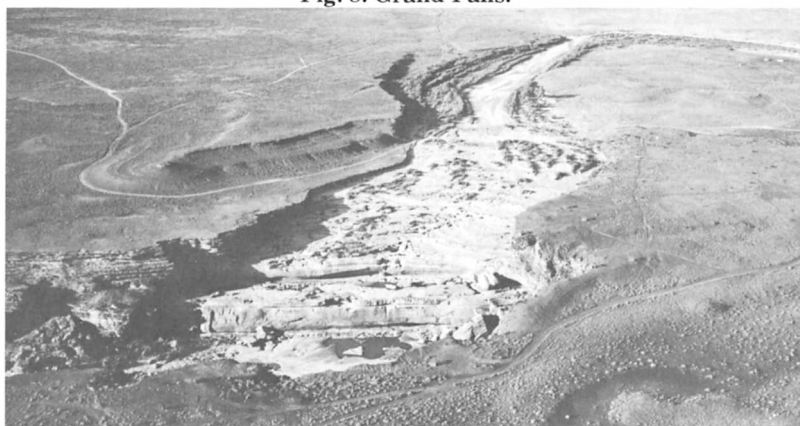




Fig. 9. Sunset Crater.

trees affected by the event.

Over the eons, active forces shaping the land in this region exposed a variety of materials useful to man — limestone and sandstone slabs for construction, chert nodules and basaltic rock for tools and weapons, argillitic rock for ornaments, colored sands for sand painting, clay for pottery, other sands and cinders for tempering pottery, hematite and other materials for pigments, salt for dietary needs, and concretions and fossils as well as quartz and other crystals for ceremonial or ritual use. Land features formed in the process present a wide variety and range in types, but the volcanic field itself played the greatest part in affecting the lives of men in this region.

The climate of the region is as varied as its topography. The Little Colorado River Valley, over 4,000 feet in elevation, receives 6 to 7 inches of rainfall a year, but suffers long periods of drought and experiences temperatures ranging from -4° to 105° . Sunset Crater, only 15 miles away and between 6,700 and 8,000 feet, receives 20 inches of rain a year; and though

its winters are more severe, the summers are pleasant. Walnut Canyon, 25 miles farther south and between 6,300 and 6,700 feet in elevation, has the same amount of rainfall as Sunset Crater; temperatures range from -30° to the 90's. On nearby San Francisco Peaks, precipitation reaches 40 inches a year and temperatures are in the low range.

Precipitation and temperature not only helped shape the features of this land but also played an important role, along with other factors, in the present distribution and type of plant cover in the region. The range in frost-free days, from 169 in the Little Colorado valley to 119 near the foot of the San Francisco Peaks, affects plant distribution and farming potentials, as do different geological formations which have broken down to form the soils of the area — thin clay loams on mesas or sandy loams in the basin at Wupatki (fig. 10), clay loams at Walnut Canyon, and volcanic soils around Sunset Crater.

These differences in soils and climate cause individual plants as well as plant communities of the region to exhibit

Fig. 10. Wupatki Basin Showing Wupatki Ruin and ball court.



considerable diversity. Vegetation representatives of regions from the Arctic to northern Mexico can be found from the top of San Francisco Peaks to the lower reaches of Grand Canyon. Wupatki with its grasslands (fig. 11), Walnut Canyon



Fig. 11. Grasslands at Wupatki.

with its broad-leafed trees in the canyon (fig. 12) and pine-covered rims, pinyon-juniper forests between Wupatki and Sunset Crater (fig. 13), and Sunset Crater with its pine forest and sparse undergrowth (fig. 14) are only four examples of the varied floral communities in this part of the plateau.



**Fig. 12. Broad-leafed trees
in Walnut Canyon.**



Fig. 13. Pinyon-Juniper Forest.

The general lack of standing water and springs in the Flagstaff region, due to the volcanic debris, has restricted the density but not the variety of wild game. Mountain lion,

Fig. 14. Pine Forest at Sunset Crater.



black bear, and timber wolves were more common before stockmen began to exterminate them in the late 1800s. Other predators, such as the coyote and bobcat, as well as badger and skunk, still roam the land. Mule deer frequent the forests and pronghorns the juniper-grass country. The most abundant forms are jackrabbits, cottontails, porcupines, gophers, kangaroo and pack rats, and a variety of squirrels. These animals are similar to those associated with the cultural remains in the ruins at Wupatki, thus indicating little change in fauna in the past 900 years.

Though birds, including wild turkeys, are more mobile than mammals, they are restricted to specific environments because of their feeding habits. In the Flagstaff region they are found in greatest numbers among the pines. Various snakes and lizards, many of them colorful, are present but seldom seen.

While water is not plentiful, melting snows and summer storms fill small depressions in the rocks of exposed limestone and sandstone formations, seep through volcanic deposits to spurt out as springs on the sides or lower edges of sandstone mesas or edges of lava flows, and filter through cinder deposits to feed the roots of trees. Because moisture penetration in cinder deposits is great, pine and juniper forests here survive as much as 1,000 feet lower than usual, and dry farming in open meadows with a light cinder cover is possible even though precipitation is low. General lack of surface water in this region undoubtedly had its effect on the subsistence and settlement patterns of the prehistoric Indians of the area, who aptly have been named Sinagua (Spanish, for "without water").

The wide, dense pine forests on the western and southern boundaries of the Sinagua formed a natural barrier against expansion of settlement, and the arid open land of the Painted Desert, east of the Little Colorado River, created a similar obstacle (fig. 15). In spite of these ecologically derived deter-

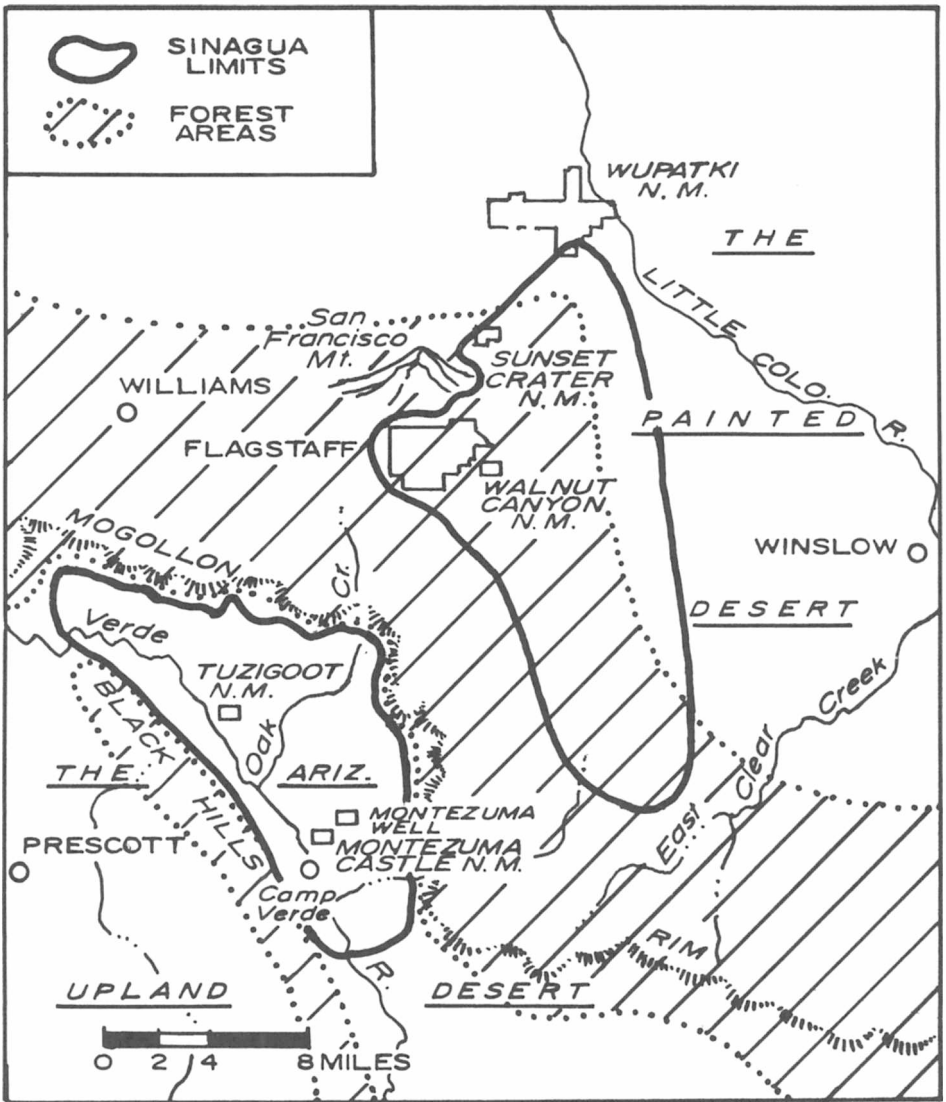


Fig. 15. The Territory of the Sinagua about A.D. 1200 (after Colton, 1968).

ents, the Sinagua penetrated these areas, as well as the San Francisco Mountains, to maintain trade with other groups. The open frontier on the north, however, allowed the Sinagua to mix with their neighbors. This, in brief, was the environment, heavily affected by volcanism, that helped shape the material, religious, social, trade, and territorial aspects of the Sinagua people.

CULTURAL HERITAGE

Just as natural environment affects culture in a specific locale, so does cultural environment of neighboring groups. The development of the Sinagua in the Flagstaff region, which came about relatively late in Southwestern prehistory, had roots to the south reaching back into ancient times.

About 10,000 years ago, in what is now Arizona, men hunted big game and gathered wild plants. Three thousand years later, the Southwest began to suffer a prolonged drought. This, along with other possible factors, ended the big game hunting of late Pleistocene times and forced the people to rely more heavily on wild plants and small game. They also had to become more familiar with available water sources in their search for food.

When corn was introduced from Mexico about 5,000 years ago, some Southwestern nomads, such as those on the relatively high and moist Plains of San Agustin, New Mexico, adopted this food plant as a supplement to their diet of wild plants and small game. In the many centuries that followed, people in the Southwest continued their nomadic habits, some raising corn, where the environment was favorable to its growth, with a minimum of care.

Sometime after 500 B.C., a variety of corn that was resistant to drought or drier conditions was introduced from Mexico. Since this corn would grow in more varied environments and in more arid areas, Indians in regions where corn previously was not raised began to take up farming. As they depended more and more on their plantings, food gathering and hunting expeditions became less frequent and covered smaller areas. Planting grounds became a focal point to which the Indians periodically returned, either to plant, harvest, or replenish dwindling supplies from storage pits or caches.

Becoming more dependent on crops, they could no longer

select choice materials from distant places formerly visited for making needed items. They naturally turned to nearby local resources for materials needed in the manufacture of new weapons, tools, containers, and other objects. Foreign materials or artifacts became luxuries, available through trade with neighboring groups or by means of special trips. Each of the locally made items gradually became more and more stylized in construction, form, and decoration, either because of local limitations of available materials or preferences of the group. These styles often evolved into a local tradition differing from those of neighboring groups.

Among ideas introduced to people of the Southwest who took up sedentary life were a number that came north from the earlier and more highly developed cultures of Mexico. These included houses of upright pole and mud walls built for year-round occupation, a ceremonial lodge in which a group could carry on rituals and other activities, and pottery containers for storage and other daily use. These new ideas appeared after 300 B.C., probably coming in with the new drought-resistant type of corn, and were first adopted by people in the desert of southern Arizona who also fashioned simple shell ornaments, mostly by grinding away unwanted portions to make beads and bracelets. Here later developed a cultural pattern called Hohokam ("those who have gone" in the modern Pima language). These ideas slowly spread north and east from the Hohokam. By about A.D. 200 to 300, the idea of constructing fairly substantial houses for year-round living had diffused as far north as southwestern Colorado, followed shortly thereafter by production of pottery and later by development of specialized structures for ceremonies.

Three other basic culture patterns slowly emerged in Arizona (fig. 16). The Mogollon culture pattern, named after the Mogollon Rim, a prominent geographic feature of eastern Arizona, developed in the mountains along the Arizona-New

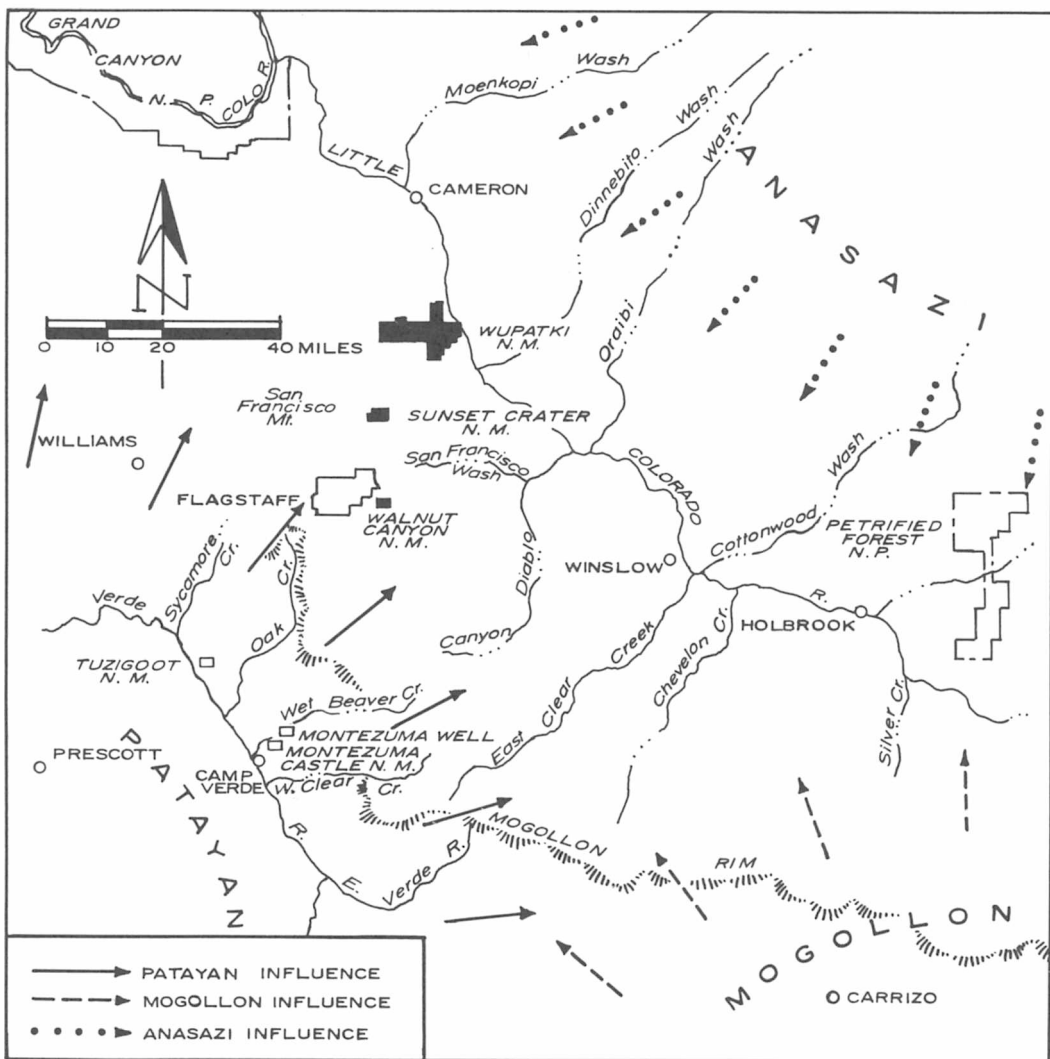


Fig. 16. Map of Patayan, Mogollon, and Anasazi Influences.

Mexico line. In its early stages, it exhibited round pit houses with earthen wall and roof entry, brown pottery (some with an all over red slip) thinned by scraping the vessel walls, grinding stones with a basin-shaped depression, and other items. This pattern differed from that developed by the people living on the plateau of northeastern Arizona. This latter pattern, Anasazi (the Navajo term for "the ancient ones"), in its early period exhibited shallow, slab-sided, round pit houses with a lateral entry, gray pottery (some decorated in black)

thinned by scraping, grinding stone with a trough-shaped depression closed at one end, and other traits. Another pattern, the Patayan ("the old people" in the Pai language of northwestern Arizona), in the upland areas of central and northwestern Arizona differed during its early development in having a square to roundish house on the surface or in a shallow pit with walls of vertical poles and a lateral entry, brown pottery thinned by paddling, grinding stones with a troughed depression open at both ends, and other items. All of these cultures exhibit the same general roster of material culture, but consistent differences between objects of similar categories identify one pattern from another.

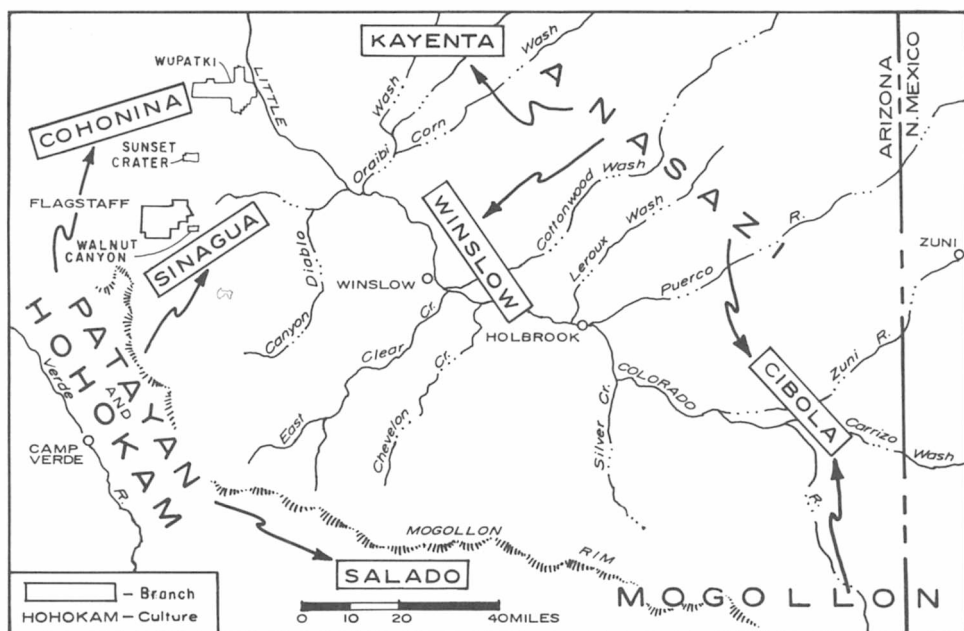


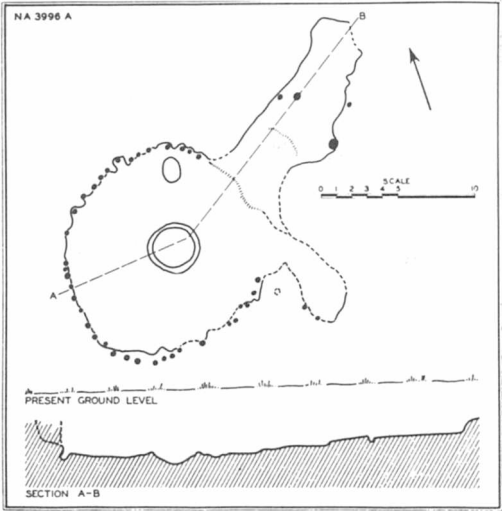
Fig. 17. Local Variations Among the Culture Patterns.

Trade and contacts between people of different cultures exposed each to new ideas or material things, some of which one or the other adopted. As a result, several local variations or "branches" also developed within each of the culture patterns described above (fig. 17).

People living in the Petrified Forest region of the upper Little Colorado drainage prior to A.D. 600, surrounded on three sides by three culture patterns (fig. 16), developed a way of life having much in common with Kayenta Branch Anasazi of the plateau country of northeastern Arizona, particularly in using a circular pit house with a side entry, outlined with upright slabs of stone. Though the people of this valley at this time also accepted some ideas from the Mogollon culture to the south, a most distinctive addition adopted was the technique of thinning pottery vessel walls like the Patayan by paddling the exterior while holding a hand or slightly curved stone anvil on the interior. Thus, the way of life in and around Petrified Forest was a mixture of traits and ideas borrowed from their neighbors.

Between A.D. 500 and 700, some ideas developed by the farming people living near Petrified Forest diffused down the Little Colorado River Valley toward the area of Walnut Canyon, Sunset Crater, and Wupatki National Monuments. In the region 25 to over 40 miles east of Flagstaff, hunters and gatherers, about whom little presently is known, adopted the house plan (fig. 18), some types of stone work, and the

Fig. 18. Plan of Sinagua house of A.D. 500-700 showing central fire pit, post holes of outer wall that slanted inward, and ramp entry. (Museum of Northern Arizona).



technique of paddling pottery that already was present in the Petrified Forest area 60 miles farther east. These new items along with other local tools and implements mark the beginning of the Sinagua way of life in the San Francisco Mountains region. Ideas from neighbors thus provided impetus toward a sedentary existence for the Sinagua.

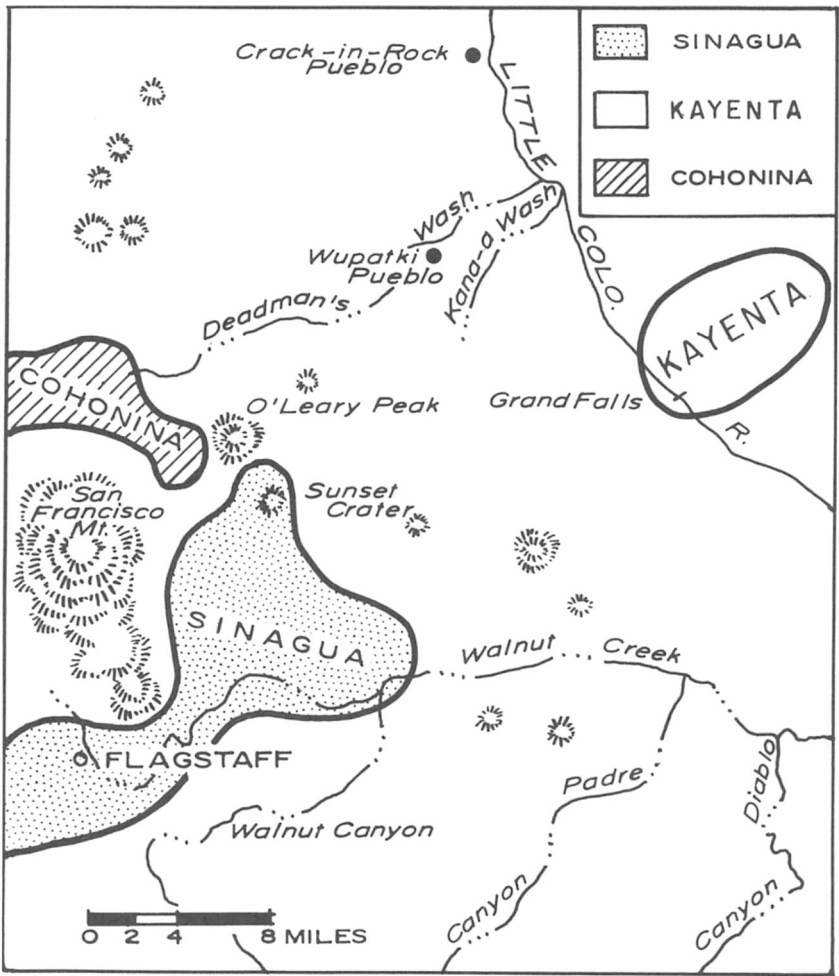
Few sites of this period are recorded. However, they do indicate beginning of a sedentary existence in this region — permanent house, ceramics, grinding stones, a few stone and bone tools, and corn kernels, the latter indicating that these Sinagua grew corn. The presence of a few sherds of foreign grayware pottery associated with the locally made undecorated brownware, as well as fragments of shell bracelets, also testify to trade with the Kayenta Anasazi and the Hohokam, respectively. Small size of the known settlements suggests that each represents one or perhaps several household groups living together.

EARLY STAGE OF THE SINAGUA

At about the time the Sinagua in the Flagstaff area adopted sedentary ways, several additional ideas were being adopted from Mexico by the Hohokam in the desert of southern Arizona — rectangular house with gabled roof and upright pole and mud walls; buff pottery decorated with red designs; ball court; and other traits. In addition, the Hohokam now produced cut, carved, and polished shell ornaments. Of more significance to the Sinagua and other groups to the north was the appearance in northern Mexico about this time of another variety of corn. It was especially suited to higher latitudes and was easier to mill. The new variety gave high yields and probably played an important part in establishment of new sedentary villages in the Southwest between A.D. 700 and 900.

In northern Arizona other influences were developing (fig. 19). About A.D. 700, the Kayenta Branch of the Anasazi began to exert influence on the Cohonina Branch of the Patayan, neighbors of the Sinagua who lived immediately north and west of the San Francisco Mountains. The Kayenta introduced the ideas of gray pottery with black decoration, and metate with one end closed, and other customs. However, the Cohonina preferred to use a paddle, rather than a scraper, in thinning their gray pottery vessels, a technique borrowed

Fig. 19. Culture distributions in the Flagstaff area A.D. 700-900 (after Colton, 1942).



from the south, possible from contact with the Hohokam, an intermediate group, or the Sinagua. Adoption of these new ideas about A.D. 700 marked the beginning of the Cohonina tradition. Later these people adopted other items from the Kayenta which farther set their way of living apart from that of their Sinagua neighbors.

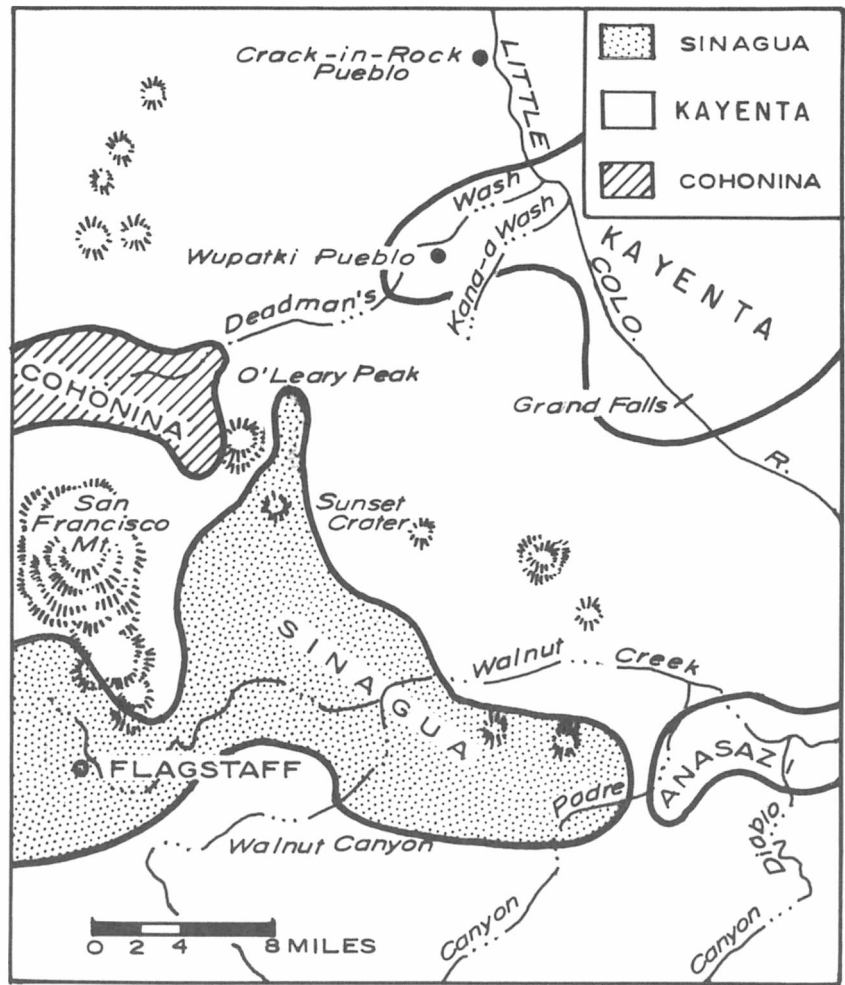
While the Cohonina tradition was emerging, the Sinagua picked up new ideas from the south. The square to rectangular house, probably along with other southern ideas, appeared in the Verde Valley and Flagstaff areas by A.D. 750. Because of more severe winters and availability of pine timbers in the San Francisco Mountains area, these houses in the north were constructed more sturdily, and occasionally even exhibited use of planks instead of timbers. Examples of this house type are found at Sunset Crater National Monument. Contact with other people, through trade or intermarriage between groups, was the process which stimulated the Sinagua to experiment and change their way of life.

During the period from about A.D. 700 to 900, the Sinagua concentrated closer to Flagstaff. They selected areas of light, cinder-covered soils in and around the many old volcanic cinder cones east of the San Francisco Peaks, much like the Cinder Park locale in which they lived prior to A.D. 700. The cinders, which conserved moisture from rain and snow, made farming without irrigation possible in this arid region. Other Sinagua took advantage of a different type environment, concentrating in a small, but choice, farming area on the south side of the San Francisco Peaks (fig. 19) where the land was quite moist. At the same time they continued to be influenced by their Cohonina and Kayenta neighbors, from whom pottery and other items were traded and new ideas introduced. The population of the Sinagua at A.D. 900 is estimated to have been 380 individuals.

Growth and expansion continued between A.D. 900 and

the middle of the next century, as indicated by appearance of a number of house sites in the lower Walnut Creek and Canyon Padre areas (fig. 20). By A.D. 1050, the Sinagua population had more than doubled, reaching an estimated figure of 800. A number of their Kayenta neighbors at the same time moved west, crossing the Little Colorado River below Grand Falls. Only a few settled in the Wupatki area, taking advantage of the few springs in this arid region. Most of the Kayenta expanded farther west to the eastern part of the

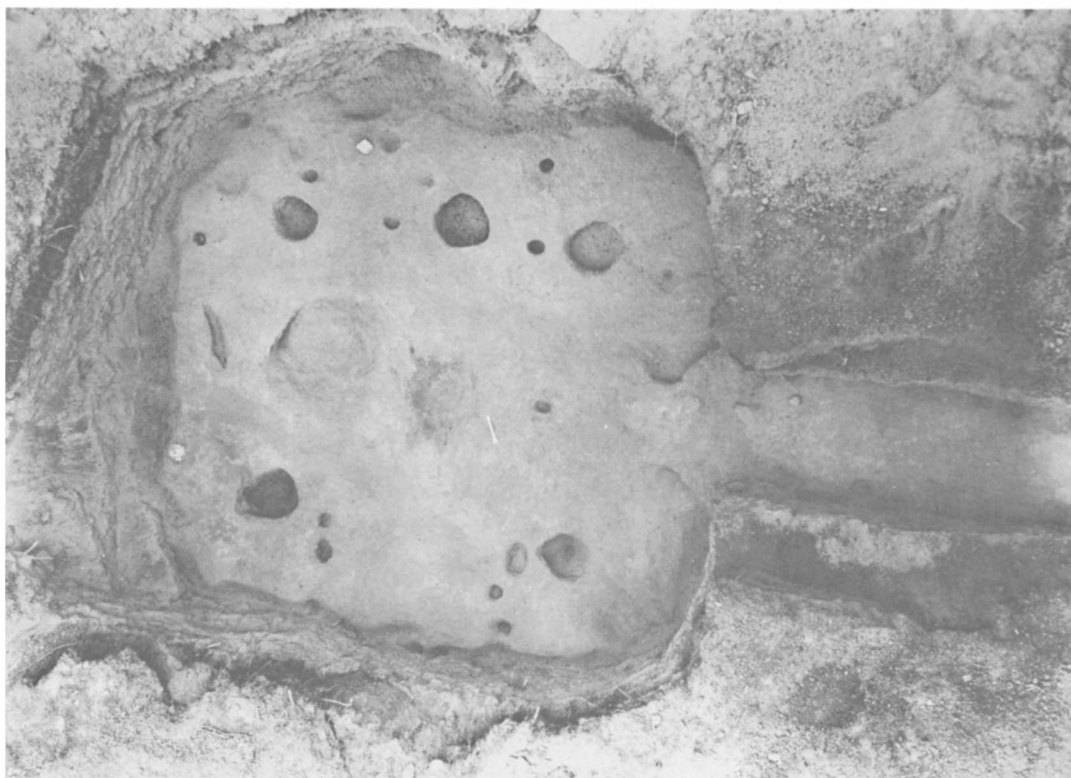
Fig. 20. Culture distributions in the Flagstaff area A.D. 900-1060 (after Colton, 1942).



south rim of what is now Grand Canyon National Park and at this time probably introduced masonry architecture to the neighboring Cohonina living to the south. The latter seem not to have expanded their territory nor to have increased in numbers to any extent on the north side of the mountains.

The timber pit house, consistently used as the favorite Sinagua dwelling from A.D. 750 to 1050, also was adopted to some extent by a few of the Cohonina living close to the Sinagua. However, in the late 800s the sloping ramp entry (fig. 21), which was the means of access into the partly underground Sinagua house, was replaced by a narrow ventilator shaft paralleling the outside wall and making a right-angle turn into the house at floor level (fig. 22). This device drew in fresh air as heat from the fire escaped through a smoke hole in the roof. This roof opening was large enough to permit

Fig. 21. A timber pit house with a ramp excavated at Sunset Crater National Monument, showing major roof support post holes, auxiliary post support holes, and central fire pit. (Museum of Northern Arizona).



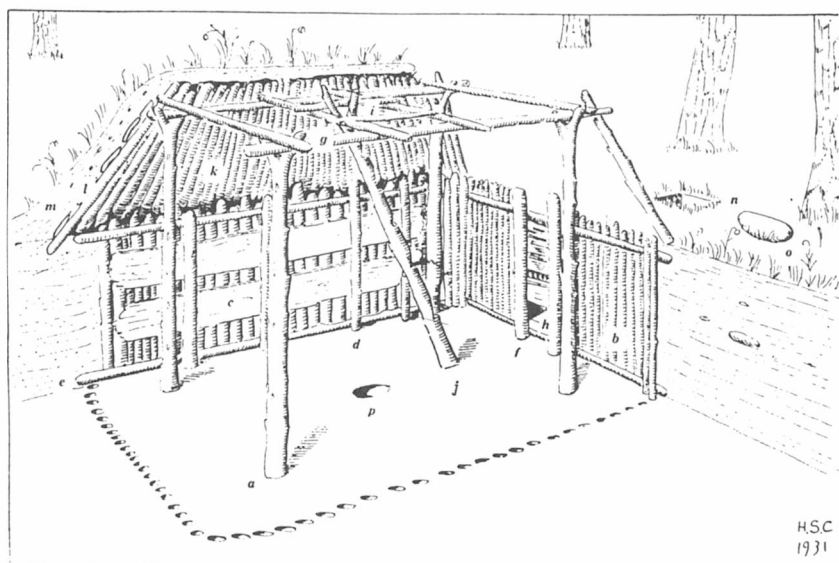


Fig. 22. Reconstruction drawing of Sinagua timber pit house of about A.D. 900. (Museum of Northern Arizona).

- | | | |
|-------------------|-------------------|------------------------|
| a-roof support | g-roof beam | l-pine bark covering |
| b-wall posts | h-air vent | m-earth covering |
| c-plank braces | i-roof entrance | n-ventilator opening |
| d-auxiliary post | j-ladder | o-cover for ventilator |
| e-bracing pole | k-upper wall post | p-fire pit |
| f-ventilator post | | |

entry of the occupants by means of a ladder.

During the A.D. 1000s, possibly due to boggy conditions on the south side of the San Francisco Peaks during spring thaws, the Sinagua devised another type of house, a surface structure on an earthen platform, obviously to eliminate as much ground moisture as possible from the dwelling. The shape was similar to the timber pit house, but an alcove was added on one side. Similar houses were built elsewhere in the Sinagua region but were set partly underground (fig. 23), as was the usual custom during this period. Addition of the alcove as well as the use of stone-outlined, surface granaries, the latter an idea borrowed from the Kayenta, suggest that surplus crops were stored in these structures in case of drought, a practice commonly followed by Southwestern Indians in historic times.

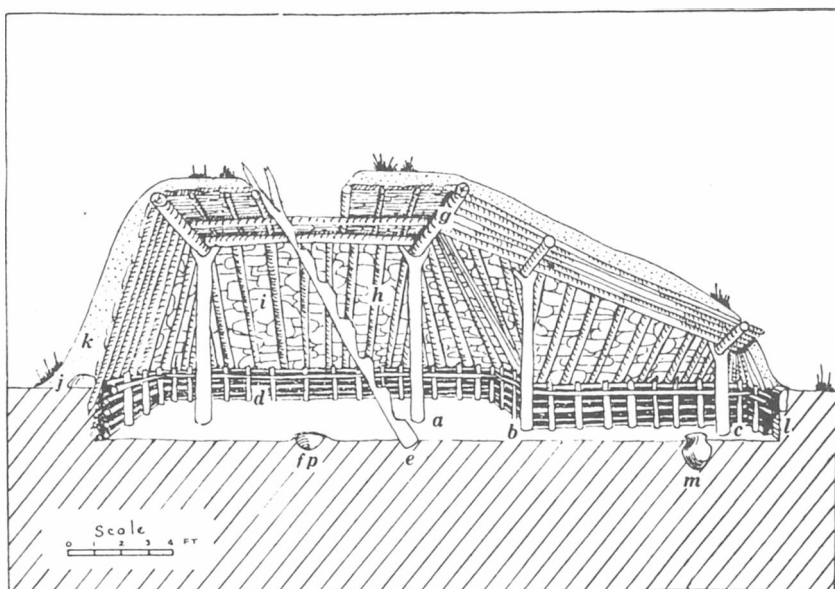


Fig. 23. Reconstruction drawing of an alcove house excavated at Sunset Crater. (Museum of Northern Arizona).

- | | | |
|------------------------------|----------------------|------------------|
| a-roof support posts | fp-firepit | j-rock brace |
| b-c-roof supports for alcove | g-major roof beam | k-earth covering |
| d-lower wall posts | h-upper wall post | l-air vent |
| e-ladder | i-pine bark covering | m-jar in alcove |

Trade with neighboring groups during this later period continued much the same as prior to A.D. 900, and the borders or frontiers between each of the groups remained fairly stable. However the Hohokam of southern Arizona, who had moved north into the Tonto Basin by A.D. 700, also expanded northwest into the Camp Verde area of the middle Verde Valley. This placed them very close to the southern border of the Sinagua (fig. 17).

The Sinagua thus had adjusted to their natural environment and neighboring cultural influences to form a pattern of living different from other groups. They lived along the lower edges of open pine forests, among the junipers, and planted in soil along the fringes of the old cinder cones. Relations with neighboring groups were peaceful. A few luxury items, such as Hohokam shell ornaments and Cohonina and

Kayenta decorated pottery, were imported from their neighbors, but the major part of Sinagua activity concentrated on pursuits necessary for survival of a marginal farming economy.

Wild plants were gathered to supplement their vegetal diet, for medicinal needs, and to obtain fibers for basketry and cordage. The hunt provided skins for clothing, bags, and thongs, and bones to fashion into awls, needles, hair ornaments, rings, beads, dice, and other tools or objects. Periodic treks were made to obtain salt, probably from deposits near the mouth of the Little Colorado River or from the Kayenta themselves, in whose domain the deposits were located. The Sinagua may well have been the middlemen in obtaining shell ornaments from their Hohokam neighbors to the south and siltstone for the carving of pendants from their Patayan neighbors (Prescott Branch) to the southwest, both of which items they traded north to the Kayenta.

During this period the Sinagua continued living in scattered locations in small settlements, either as single families or with a few other possibly related families. Each had separate houses near their farmlands. These small units probably were controlled by the family head. The group possibly had wild plant areas they considered as their own, but most likely shared hunting areas with others, as was the custom among many tribes in historic times.

There appear to have been no special craftsmen in their midst. Everyone did a variety of jobs, though some tasks, as among historic tribes, were no doubt primarily confined to women, such as pottery-making, gathering, basket weaving, and household duties, and others to men, such as hunting, dressing skins, making weapons, farming, and medicinal arts. Clothing probably was made by men and women using hide, fur, or plant material, and footwear probably was a hard-soled

moccasin. Ornaments were few — a necklace of seeds, bone, or stone, a ring of bone, or possibly an imported shell ring or bracelet.

THE BLACK CURTAIN

In the late fall or winter of A.D. 1064-65, the stillness of the eastern slopes of the San Francisco Mountains volcanic field was suddenly shattered by a frightful rumbling and ominous crackling that accompanied the opening of a long fissure, or crack, in the ground. Molten lava spurted out of the deep gash, ejected by heat and the pulsing forces below the earth's mantle. One particularly weak spot gradually widened and tons of material rocketed upward, only to fall back as volcanic cinders and ash around the area of the large vent. Nature's pyrotechnics brightened the scene with small fiery globs of molten lava which spurted into the air and rolled down the ash slopes, hardening into the shape of giant rain drops (volcanic bombs) as they cooled on their descent back to earth. Fine bits of lava, expelled as a spray under terrific pressure, quickly cooled to form cinders and ash and drifted with the winds, covering nearby farmlands and houses of the Sinagua. Black ash and escaping gas belched out in great clouds, the acrid, sulfurous odor gagging fleeing Sinagua. This black curtain, fringed at the base with twinkling fires set off among the trees by molten lava and sequin-like particles flickering downward from the sky, grew larger until it spread over several hundred square miles of the plateau.

Barely visible at the base of this inferno, a black mound broke open, freeing a river of molten fire which slowly grew, consuming everything in its path. As it moved farther out, the flow cooled and developed a crust on its upper surface. Molten material underneath, rebelling against this containment, continued to move and shattered its enveloping jacket, forming large clinkers. Slowed by concentrations of cooled

masses, the lava river gradually solidified more quickly, and its motion was trapped in the sculpture of the black rock (fig. 24).



Fig. 24. Lava flow at Sunset Crater.

The cinder cone continued to grow with each ejection and burst of energy. Prevailing winds from the southwest blew the black cloud to the northeast, toward Kayenta Anasazi (Hopi) country, and caused more of the heavier material to fall on the northeast rim of the cone. Four to six months later the eruption slackened, smoke still billowing skyward and steaming spatter cones and bubbling lava lagoons at the base of the cone undergoing the death throes of a volcano. Hot springs and vapors from fumaroles in the vent threw out mineral-laden sprays, staining the rim with a touch of sunset.

For many months inquisitive Sinagua came to examine the dying volcano. All around there were strange sights — blisters or bubbles, their motion frozen in the flows; fumaroles or spatter cones, like miniature volcanoes whose growth had

been stunted (fig. 25), tunnel-like caves, formed where a molten lava river had drained out from beneath a crusted surface in an attempt to survive; squeeze-ups, (fig. 26), where partly cooled lava with the consistency of modeling clay had been forced up through a crack and quickly cooled into thin sheets, which broke off under their own weight as they arched back toward the ground; and drag marks where cooled or semiplastic lava had been scraped by clinkers or the sides of fissures through which the lava had been extruded. The sharp and ragged rocks, twisted shapes, and open pits in the fractured land formed a barren picture of black on black.



Fig. 25. Spatter Cone at Sunset Crater.

Awed by the calamity but puzzled as to its cause and the still-steaming vents, medicine men probably concocted stories that satisfied the local populace. They collected sulphur crystals, gypsum, and limonite from the crater area for ceremo-



Fig. 26. Squeeze-up at Sunset Crater

nial and curing purposes. Their place in society must have been shaken, however, when the crater erupted a second time, about A.D. 1066-67, and another lava flow poured out for a brief spell. By the time the volcano had finally expended all of its energy, it had sent out two lava flows, built up a cone 1,000 feet high with a crater 400 feet deep and a quarter mile across, and spread ash and cinders over an 800 to 1,000 square-mile area. The northeastern part of the crater rim, because of the predominant southwesterly winds, had been built up 150 feet higher than any other section, a characteristic common to the many cinder cones in this region.

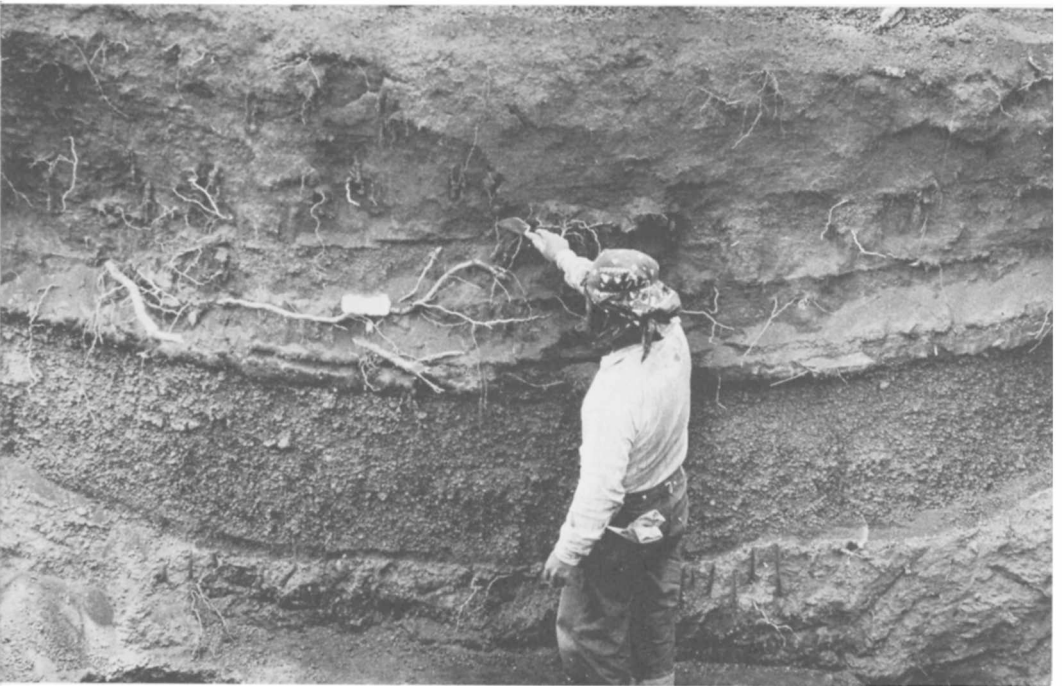
Though most of the Sinagua at the time of the eruption were living to the west and south of Sunset Crater, those bordering on the area of eruption were forced to flee from their homes. Where the cinder fall was light, these people were able to return to their homes in a short period, particularly in the region to the southwest, the direction of the prevailing winds. In those areas closer to the eruption field cinders filtered into the houses through ramp entries, smoke holes, or roof entries. Other houses may have burst into flames when molten material ignited thatch on the roofs. In areas of heavy cinder fall, roofs collapsed into the pit of the house, and the site was completely covered by the black sands. Today the only indication for the existence of these houses is a slight depression on the surface or an occasional piece of broken pottery that has worked up to the surface either by water action, toppling tree roots, or rodent burrowing. Some houses with cinders on or above the floors have been excavated (fig. 27), indicating that they either were occupied at, or had been abandoned before, the time of eruption. Timbers from a few of these houses have yielded tree-ring data that have helped to date the eruption of Sunset Crater.

The modern Hopis have traditions of this catastrophe. They refer to Sunset Crater as Polotamo, the Red Hill, the

home of their Kana-a Kachinas (supernatural beings). Yaponcha, the Wind Kachina of the Hopis, is said to have his home in a crater-like formation named after him on Bonito lava flow to the northwest of Sunset Crater. The Hopis as late as June 1963 left offerings to their Kachinas in the ice cave and other places nearby.

Though the eruption had scorched the region and the blackened land remained barren for years, plants began to grow where favorable conditions existed. Some became root bound in the lava flow area, others were deformed by the winds blowing across the blackened land, and still others grew in normal fashion. Thus the area of the major cinder fall, like a darkened stage, slowly changed color as spots of green gradually appeared in one place or another. The areas of deep cinders, however, were never invaded by plants, and today large

Fig. 27. Layers of cinders overlying deposits above a house floor (at base of illustration) occupied prior to the eruption. (Museum of Northern Arizona).



dunes of black sand still dominate the landscape around and to the northeast of Sunset Crater.

THE CHANGED ENVIRONMENT, A.D. 1070-1125

In the rainy season following the eruption the moisture-holding cinders also acted as an evaporation shield for the water which accumulated on the ground surface immediately below. This surface water, shaded from the sun, moved slowly through the cinders to the ground surface and percolated into the soil. In the course of a few years, as ground water built up, it began to seep out into drainages such as Walnut Creek, Deadmans Wash, Kana-a Wash, and Rio de Flag, probably converting previously intermittent arroyos into flowing streams. Additional water sources appeared in the open country. Small sections of drainages that had been blocked, either as a result of earthquakes tilting the lands or of lava flows, trapped the water, forming ponds and lakes.

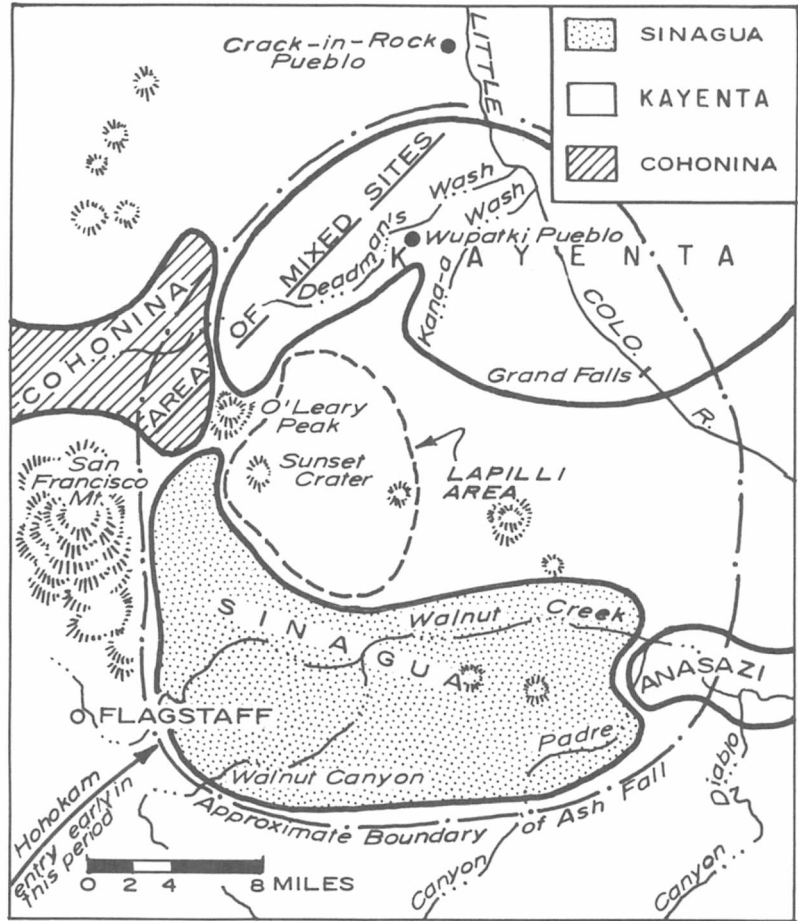
The increase in surface water was a boon to both man and beast. Shallow ponds and lakes drew game into areas previously avoided. Bones of water birds recovered from houses occupied after the eruption, such as geese, ducks, and cranes, suggest that surface water was more readily available than prior to the eruption, and that birds frequented these water pockets and shallow streams, becoming more readily accessible to the Sinagua medicine men who used their feathers for ceremonial purposes.

The Sinagua, already familiar with the benefits of farming on land lightly covered with cinders, extended their farming activities and settlements to take advantage of the new farmland created by nature's volcanic activities. They made no attempt at this time to move north into the area of the main cinder fall. The larger fragments from the eruption had dropped around the general area of Sunset Crater, forming a lapilli area (fig. 28) in which farming was impossible. Instead, the

Sinagua abandoned most of the region south of San Francisco Peaks and expanded east 6 to 12 miles along Walnut Canyon drainage on the southern edge of the cinder fall, where a light deposit made conditions for farming most attractive (fig. 28). These benefits soon led to an increase in the number of Sinagua house sites, with the population probably reaching about 3,000 in the late 1000s.

The effect of the eruption was also noted by the Kayenta. The southwesterly winds had carried the lighter ash and cinders farther north beyond the lapilli area and covered a large part of the Wupatki Basin. The effect, again, was to create

Fig. 28. Culture distributions in the Flagstaff area A.D. 1070-1125 (after Colton, 1942) (Note unoccupied area northeast of Sunset Crater where larger fragments fell during the eruption.)



arable land by increasing moisture retention in the soil beneath the insulating effect of the thin cinder and ash cover.

Shortly after the eruption a few Anasazi settlements developed in the Wupatki Basin. These were mostly small masonry pueblos housing one or two families, which suggests there was sufficient water available for domestic use. The almost complete absence of specialized society or ceremonial structures, called kivas (fig. 29), among the Kayenta sites in the basin at this time further suggests that most of the activity here took place during the farming season, and that only a few permanent villages with kivas were used during the winter. The Kayenta by now had expanded close to the Cohonina, near O'Leary Peak (fig. 28). A few also took up residence near or among the Sinagua on the southeast. Generally, however, about 6 to 12 miles of unoccupied land separated the Kayenta from the Sinagua.

At this time, the Cohonina expanded to the north a short distance, mainly along the western edge of the ash fall. Among sites in this area are a few masonry structures that have been referred to as "forts" (fig. 30) which are found elsewhere in Cohonina territory. Whether these few somewhat unique buildings represent a defense mechanism or a specialized building for some other use is not known. Several are thought to have been built prior to the eruption.

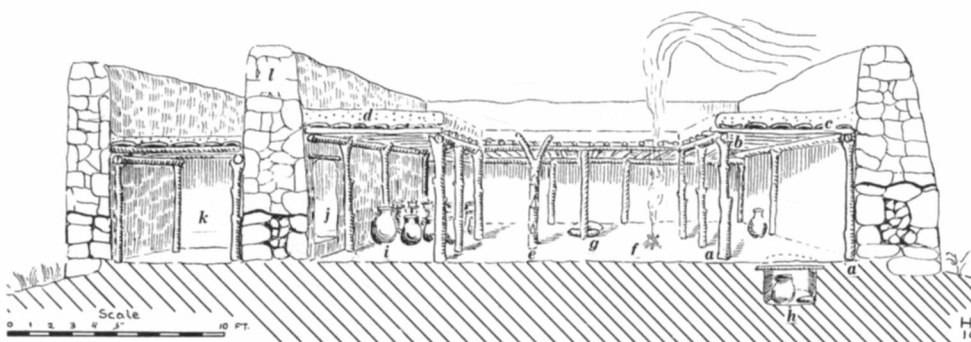
Attracted to the area of the ash fall, a number of Hohokam in the Verde Valley came north and settled among the Sinagua near the Rio de Flag drainage, about ten miles southeast of the Coconina Divide near O'Leary Peak. A few Hohokam and others from south of the divide did move in among some Cohonina after A.D. 1100, marking their first penetration north of the divide. The Hohokam way of life and traits introduced are otherwise virtually absent from Cohonina sites in the western margin of the cinder-fall area during this period.



Fig. 29. A Kayenta masonry - linked kiva at Heiser Spring near Wupatki, showing a central slab - lined fire pit, ash pit, deflector, and ventilator opening in a line, and two of roof support post holes below the encircling bench. (Museum of Northern Arizona).

Fig. 30. Reconstruction of a Cohonina "fort" near Coconina Divide. (Museum of New Mexico).

- | | | |
|-------------------|---------------|----------------|
| a-roof support | e-ladder | i-storage jars |
| b-roof poles | f-fireplace | j-door |
| c-pine bark cover | g-metate | k-granary room |
| d-earth covering | h-floor cache | l-parapet |



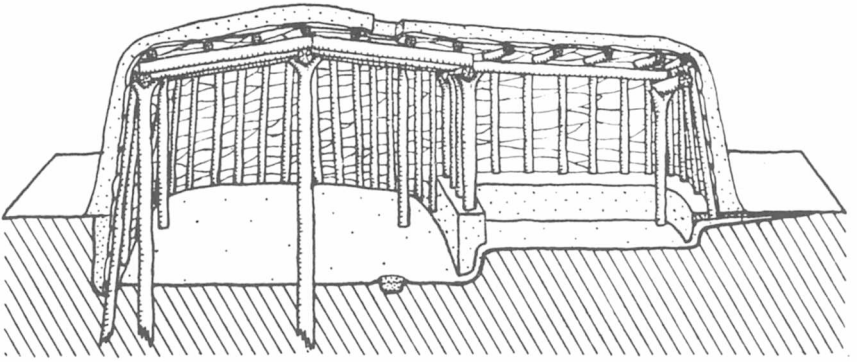


Fig. 31. Reconstruction drawing of a Hohokam - type house at a site on Wupatki National Monument.

One site north of the divide containing a Hohokam-type house (fig. 31), as well as a type introduced by another group (discussed below), is located a few miles south of Citadel Ruin at Wupatki in an area of culturally mixed sites (fig. 28). This particular site is completely enclosed by a low wall that might have supported a stockade, either for protection, a windbreak, or for some other purpose.

The Hohokam of southern Arizona undoubtedly were envied for the ornate shell work they produced and for the parrots, copper bells, and other items (fig. 32) they traded from Mexico. Those Hohokam who moved into the ash fall area and vicinity maintained contact with their kinsmen and traded for these items for use in this newly settled area. Their relatively large villages with a specialized structure, the ball court, stand in contrast to settlements of a family or two among the other groups in the region. Perhaps Hohokam social and political controls of village life were more complex than those of their neighbors where the head of the household group probably established the routine.

The ash fall area also attracted another group (Cibola) who came in from eastern Arizona after the eruption. These immigrants, related to the Mogollon people, had some customs

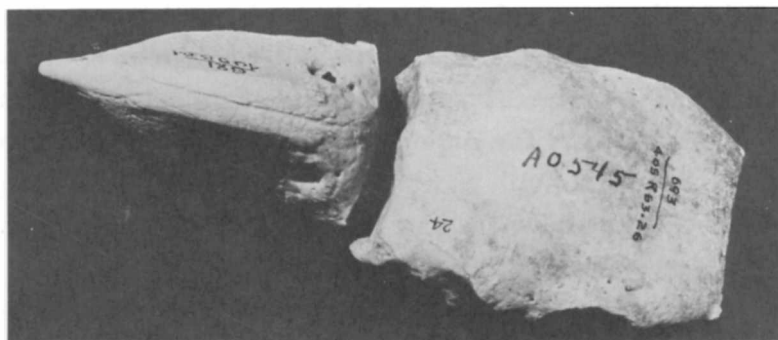
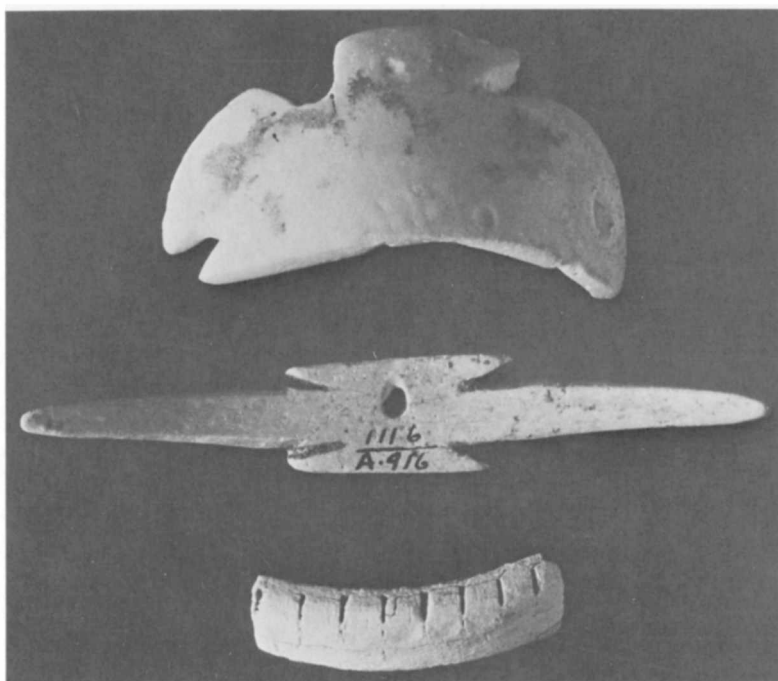


Fig. 32. Trade material from the south - worked shell, copper bell, parrot skull.



Fig. 33. Pottery type with a smudged interior introduced from eastern Arizona after the eruption. (Museum of Northern Arizona).

similar to the Kayenta, especially burying their dead in a flexed position and thinning their pottery walls by scraping (fig. 33). However, their red pottery with blackened interiors was something never before seen in this region. Their pit houses, rectangular and masonry-lined (fig. 34), differed from the less deep, clay-lined Sinagua pit houses, and from the houses in shallow pits with wood and mud walls (jacals) built by the Hohokam during this period. Between A.D. 1070 and 1125, contemporary small, surface masonry pueblos of the Kayenta and somewhat similar, but more crude, Cohonina sites north of the cinder cone area, are markedly different from pit dwellings of the Sinagua people from the east, and the jacals of the nearby Hohokam.

For a short period after the eruption, each of the five groups maintained the particular customs which served to identify one from another, although they pursued a similar way of life. Some of the differences are listed in figure 35. All were farmers, raising maize, pumpkins, kidney and tepary beans, and some, possibly cotton. They gathered seeds, nuts,



Fig. 34. A masonry - lined pit house (an idea introduced from the east) at a site on Wupatki National Monument, showing entrance ramp, fire pit, two post holes, and a storage pit. (Museum of Northern Arizona).

and berries to supplement their diet, obtained beargrass and yucca leaves for weaving and tying of sandals, baskets, containers, and matting, and collected lac, an insect excretion, for an adhesive. From the hunt they saved hides for making containers, clothing, and thongs, and used bone to fashion whistles, awls, necklaces, gaming pieces, and other items which they decorated by carving, drilling, or painting. Clothing and hair were ornamented with bone, stone, and wood items occasionally with imported turquoise or shell products. Nose and lip plugs, necklaces, pendants, and rings, along with pigment also, were used to ornament their persons (fig. 36).

Among ideas introduced by the different newcomers to the San Francisco Mountains region were arrow smoothers,

	SINAGUA	COHONINA	KAYENTA	CIBOLA	HOHOKAM
House	Deep pit house with earthen or stone wall.	Shallow pit house or rock-walled rooms.	Surface masonry rooms.	Masonry-lined pit house.	Pole and mud jacal.
Special use structures		Surface granaries, "fort."	Kiva.		Ball court.
Pottery	Plain brown ware, no designs.	Plain gray ware, black designs.	Plain white ware, black designs.	Plain and smudged red ware, undecorated.	Red - on - buff ware.
Burial	Cremation, ashes not gathered (?) and extended burial.	Cremation (?) and occasional inhumation.	Flexed inhumation.	Flexed inhumation.	Cremation, ashes placed in pit or in pottery vessel.
Settlement	A few pit houses. (Kin-related families?).	A few pit houses and/or a few stone walled rooms and/or granaries. (Kin-related families?).	Small masonry pueblo with a kiva. (Kin-related families?).	Several pit houses. (Kin - related families?).	Concentration of jacals with a ball court (village).

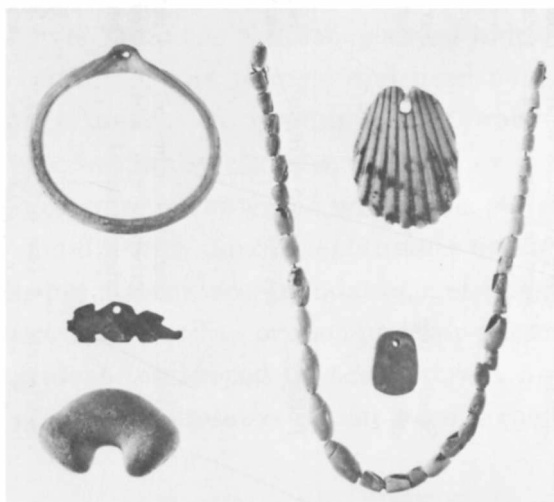
Fig. 35. Customs of the five groups in the San Francisco Mountains volcanic field A.D. 1070-1125.

axes with a three-quarter groove for hafting, nose and lip plugs, paint palettes, basalt cylinders, stone balls, side-notched projectile points, miniature pottery vessels, scoops, redware with black interior, and ball courts.

Trade contacts developed by the newcomers, prior to their move into the newly created farmlands, provided imports, such as pottery from other areas, parrots, new shell items, copper bells, turquoise, and other material. Perhaps during this period the Kayenta and Cohonina sent their salt gathering parties to the deposits near the junction of the Little Colorado and Colorado Rivers, and the Sinagua, the Hohokam, and those who came from the east obtained theirs from salt deposits known to the Hohokam near Camp Verde in the middle Verde Valley.

In the late 1000s and early 1100s, the culture of the Sinagua and the groups living near or among them gradually changed by adopting customs from one another through exchange of ideas and intermarriage, the latter possibly having played a great part. If a woman of one group married into another, she brought along her methods of making pottery, clothing, grinding food, cooking, and so on. If a man moved to his wife's village, he may have introduced a new ceremonial custom, type of burial, weapon, and other items

Fig. 36. Objects of personal adornment. (Museum of Northern Arizona).



or practices usually attended to by men. It was this division of labor among men and women plus variations in residence practices after marriage that probably helped to fuse the different patterns of culture attracted to the ash fall area.

For example, if the Sinagua had the custom of having the bride move to the husband's village, as was the practice among modern Yuman-speaking Indians south and west of Flagstaff, and if a similar custom was followed by the Cohonina, intermarriage between these two groups under such circumstances would tend to bring about a rapid blend in some of the women's material culture or practices, such as in the manufacture of pottery.

Hohokam customs, because of their larger villages, perhaps required more civil and religious leadership than the small settlements of the Sinagua and Cohonina. Women marrying into these larger villages might have brought about some changes in material culture, but probably had little effect on social and political organization. A Kayenta man, probably like his Pueblo descendant of today, moved to his wife's village. In such case, the Kayenta man marrying into a Sinagua or Cohonina settlement could introduce new ideas such as more formalized religious societies, a new type of architecture or ceremonial structure, etc.

This process of borrowing ideas from one another in this relatively small area through intermarriage or by preference gradually wrought a new pattern of material culture traits in the next period, almost completely erasing their differences in customs.

The A.D. 1065 eruption of Sunset Crater no doubt was a major factor in attracting other groups to this area. However, it does not adequately explain why other people living from 50 to 150 miles away would necessarily leave their homes. The period from about A.D. 1050 to 1150 on the west side

of the Continental Divide reflects many interesting events that may furnish part of the answer.

In the middle 1000s, came the relatively sudden development of a number of water control devices west of the divide, obviously to conserve available water and increase efficiency of its use. These suggest that some type of ecological change, perhaps in the rainfall pattern, had reached a critical point for farming over a fairly extensive area, and that farmers instituted new techniques to combat the new set of conditions.

Some planted their fields where rainwater draining from higher levels could be directed toward the farm plot on a gentle slope. Others used level areas subject to occasional, but gentle, sheet flooding. Where live water was available, ditches were used to lead it from a spring or stream to irrigate the fields. In many places, stone alignments were built across the upper ends of shallow arroyos or drainages to form terraces so as to hold the sandy soil in place and on a level. When it rained, water stood in each of these planted terraces. If precipitation was heavy enough, water filled up and poured over the stone wall at the lower end of the terrace and onto the terrace below without eroding the soil.

Apparently the situation was widespread. Between A.D. 1050 and 1150, there was considerable movement among the Indians not only in distant areas, such as ancestral Paiutes replacing the Pueblo-type settlements in southern Nevada, southern Utah, and the Arizona strip and ancestral Mohaves on the Mohave Desert joining their kin along the lower Colorado River. Closer to the Sinagua, some of the inhabitants of the Prescott, Arizona region joined the Cohonina who also were withdrawing from the plateau country and concentrating in the Cataract Canyon country, at the west end of Grand Canyon National Park. Some of these people from Prescott also took up residence among the Sinagua in the Wupatki

area, particularly at Nalakihi Pueblo. Here their cremated remains with associated Prescott Branch pottery occur in the same area with Sinagua burials accompanied by Sinagua pottery.

A gradual, widespread ecological change that either forced Indian farmers to move or develop water conservation devices may well have been the reason several groups relatively near the ash fall abandoned their homes in favor of another locale where a better yield of crops might be assured.

LATE STAGE OF THE SINAGUA, A.D. 1125-1215

By the beginning of this period, the improved environment of the cinder-fall area, with its moisture retention qualities, probably displayed a more luxuriant growth of shrubs and grasslands than before, and the old pine and juniper-pinyon forests had begun to expand downslope toward the north and east in the cinder-fall area. Nearby streams flowed more often and ground moisture evaporation was held at a minimum by the cinder cover. This changing environment proved beneficial to these farming people and others who continued to join them. This was to be their "golden age."

The customs of the Sinagua prevailed in the ash fall area throughout the 1100s — extended burial, paddle and anvil thinned pottery, and various arts and crafts previously pursued. However, by this time they had adopted the Hohokam practice of concentrating into a village, often including a ball court, manufacturing plain and smudged redware of the Cibola type, and building Kayenta style single and multistoried pueblos. The Cohonina seem to have contributed little culturally to this new way of life. It appears that not only the culture, but the lineage of the Sinagua had become considerably mixed through intermarriage. In comparison to the smaller contemporary Cohonina and Kayenta sites immediately to the north,

the Sinagua culture blend had advanced considerably ahead of its neighbors.

Some of the Sinagua moved farther up Walnut Canyon at this time, probably because of the available water supply, open parks some distance back from the rim that could be farmed, presence of stone for masonry construction, and the unique homesites along Canyon ledges. Previously this region had been sparsely settled, but the many ledges on the sides of the canyon, some with deep overhangs, provided worksaving places for masonry homesites (fig. 37), the overhang and back



Fig. 37. Ledge Ruins in Walnut Canyon.

of the ledges serving as roofs and rear walls of the homes. The advantages as a homesite for a large group looking for

a new location outweighed the disadvantages of good farmlands some distance away.

These people constructed most of their homes on the north wall of the canyon so as to receive direct rays of the sun during the cold winter months. Clay floors were built up on the rocky ledge when necessary to make a more level surface for living quarters. Fires in small pits within the dwellings provided adequate heat during the colder months when the doorway was partly covered with an animal skin or tightly woven mat to keep out the cold air. Small one- and two-room farm shelters were constructed back from the canyon rim as well as several fairly large surface pueblos more distant from the canyon (figs. 38-39). By the time Walnut Canyon was occupied, after 1125, the idea of constructing a ball court seems to have been abandoned. None is known to exist near the canyon. So-called fort-like structures on island mesas in the canyon (fig. 40), like the dwellings in the ledges, also differ from the usual Sinagua pueblos.

Fig. 38. Pit house, Walnut Canyon.





Fig. 39. Small pueblo near rim of Walnut Canyon.

Walnut Canyon, with its broad-leafed trees in the canyon bottom and the open pine forests on the rims, furnished a variety of wood for implements and weapons as well as fuel for heating and cooking. Berries, greens, herbs, and tubers that were eaten raw, boiled, mixed with other foods, or other-

Fig. 40. Locale of island "fort"-like structure, Walnut Canyon.



wise treated, occurred in some quantity in the immediate area, along with a variety of game.

Other Sinagua who could not find favorable land in the ash fall area, or for some other reason, moved farther south into the middle Verde Valley in the early to middle 1100s (fig. 15), introducing their new pattern of living to the people who had originally settled there. Here air currents along the edge of the high Mogollon Rim escarpment apparently produced sufficient precipitation for farming. Small pueblos sprang up along the rivers of the Verde Valley where irrigation, introduced perhaps as early as A.D. 750 by Hohokam immigrants from southern Arizona, was still practiced. Some or all of these Hohokam moved north into the cinder-fall area after the eruption. Other Sinagua took up land away from the river valley where farming dependent on rainfall was still possible. This move into the Middle Verde marks the beginning of several pueblos that in the early 1200s developed large communities — Tuzigoot, Montezuma Castle, and Montezuma Well, all three of which are now a part of the National Park System. Prior to the beginning of the 1200s, various aspects of Sinagua material culture spread from the Verde Valley south into the Gila-Salt River Valleys near Phoenix, where manufacture of smudged redware and extended burial became common practices.

The Sinagua who expanded northward toward Wupatki after A.D. 1125 crossed the frontier zone that formerly separated them from the Kayenta and Cohonina and built small pueblos near choice farm plots. The move forced some of the Cohonina to the north, out of the cinder fall area. Though the Kayenta continued to farm in the region immediately west of the Little Colorado River between Grand Falls and Crack-in-Rock Ruin (fig. 41), the Sinagua intrusion did cause the Kayenta to withdraw northward from the upper waters of Deadmans and Kana-a Washes where they had lived in

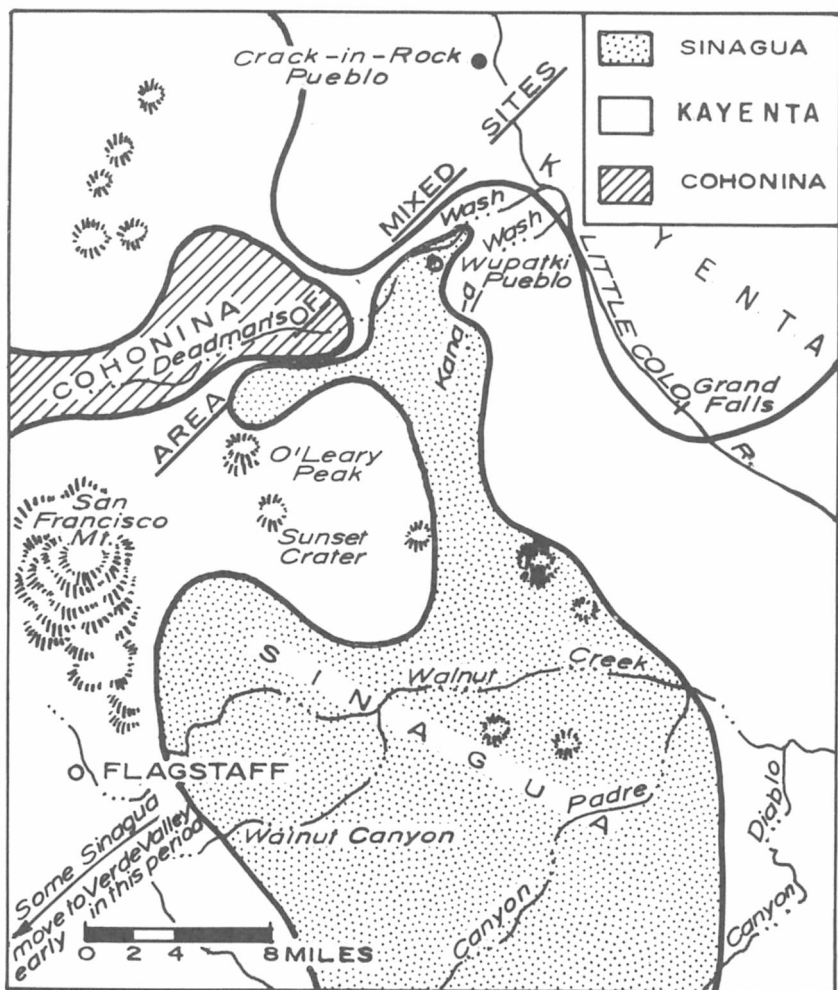


Fig. 41. Culture Distributions in the Flagstaff area A.D. 1125-1215 (after Colton, 1942: 1968) (Note expansion of Sinagua to north and south.)

small pueblos, some with their circular kivas. On arriving in the Wupatki Basin, where the Kayenta before them had built a circular "dance plaza" or great kiva (fig. 42), the Sinagua constructed what might have been their last ball court, the only known masonry structure of its kind in the Southwest (fig. 43).

Between the late 1000s and the late 1100s, primarily from influx of other groups, the population in the area of the San

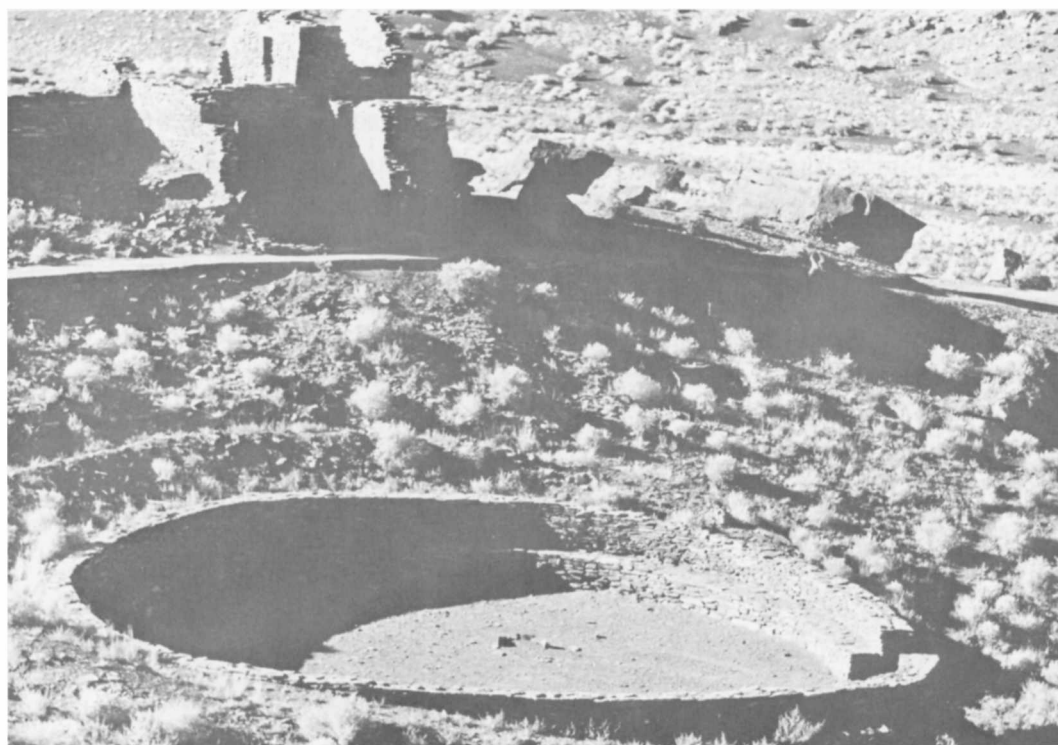


Fig. 42. The Great Kiva ("dance plaza") at Wupatki.

Fig. 43. The masonry ball court at Wupatki.



Francisco Mountain volcanic field increased to about 8,500. Pueblos like Wupatki, Wukoki, Nalakihi, Lomaki, and the communities concentrated in Walnut Canyon flourished, having grown to their maximum size by the late 1100s (figs. 44-47). This was the period of greatest architectural and material development and territorial extent for the Sinagua. The society of the Sinagua at this time probably was composed essentially



Fig. 44. Wupatki Pueblo and adjoining "dance court" and ball court.

of a group of related household units that had gathered together in each pueblo. One or more male heads of each household could have acted in council of elders to direct or advise on affairs of the pueblo. Farmland probably was more or less controlled by the village group and allotted to member families for their own use. Each village probably had a medicine man or shaman and assistants who officiated at curing ceremonies and read omens (a practice common to most tribes in historic times), possibly performing their functions in their own or



Fig. 45. Wukoki Pueblo, Wupatki.

Fig. 46. Nalakihi Pueblo with Citadel Pueblo in background, Wupatki.





Fig. 47. Lomaki Pueblo with earth crack in foreground, Wupatki.

their customers' homes. The general lack of recognized ceremonial structures in or at Sinagua pueblos during this period, except for a few ball courts, suggests that any large gatherings, if they had them at all, for ceremonial purposes either took place at the ball courts or in open areas near a pueblo.

In the 1100s the Sinagua became quite active in trade activities in the region. Through them pottery from the Kayenta and Winslow Branches of the Anasazi was traded south to the Verde Valley. Finished shell objects made by the Hohokam of southern Arizona came north, as did siltstone from north of Prescott and abalone shell, by way of intermediate groups, from the Pacific, which the Sinagua in turn traded to the Kayenta. Development of specific trading enterprises, either by loosely organized Sinagua groups from several pueblos or brought in by traders, introduced "luxury" items not available locally, much as modern importers bring in foreign products today.

Water control devices seem not to have been employed to any great extent in the area of the major cinder fall in

the Sinagua country in the late 1000s, probably because the cinders continued to provide built-in moisture conservation. Some are known and perhaps were constructed in the 1100s as crop yield became a problem through a combination of increased population in the cinder-fall area, overuse of farmland, loss of some of the cinder cover on the farmlands due to wind or water action, or too intensive farming practices. Such circumstances may well have led to development of larger settlements in areas with more choice farmland, such as Wupatki Pueblo, which eventually grew to a 100-room pueblo, three stories high in places.



Fig. 48. Terraced arroyo at Walnut Canyon with line of rocks across the arroyo in the foreground and background.

The Sinagua farmers who remained in the area northeast of Sunset Crater or near Walnut Canyon in the late 1100s did install water and soil conservation devices, such as the terraced arroyos still evident behind the north rim of Walnut Canyon (fig. 48) and in various places near Wupatki Pueblo. In an effort to store water, the Sinagua living around Wupatki



Fig. 49. Crack - in - Rock Pueblo, Wupatki.

developed small wet-weather ponds in the flats by building dams at the lower ends of shallow depressions. Some in the same area became so desperate for water that they half-buried large jars at the bases of ledge overhangs to collect rainwater which poured off favorable drainage spots.

Though water of the Little Colorado River was close by, it was not clear and sweet for domestic use. Neither was it available for irrigation, other than along a portion of the boundary of Wupatki National Monument on small terraces along the river. These were periodically washed out by floods. Most of the river along the east edge of the monument was too deeply entrenched to bring water through ditches to land that might be farmed. The few Kayenta remaining in the area adjacent to the Sinagua on the north concentrated into small pueblos such as Crack-in-Rock Pueblo (fig. 49), near available water and farmlands, in this case the Little Colorado River and adjoining terraces.

How much friction developed among the Sinagua at this



Fig. 50. Citadel Pueblo, Wupatki.

time of stress is difficult to say. Though most of the pueblos constructed during the prosperous period of the early to middle 1100s were built on rock erosional remnants standing above the surrounding country or on the rims of mesas, these types of sites cannot be considered defensive. Such locales most probably were selected to avoid drainage problems or to avoid building on sand or cinder which could not support the weight of heavy masonry walls without danger of settling. However, the need for defensive locations cannot be ruled out.

There are a few sites that could have been built for defense, such as those referred to in the literature as "forts" on the high islands in the canyon of Walnut Creek, the completely walled-in pueblo on the butte at Citadel (fig. 50), or Crack-in-Rock Pueblo where loopholes exist and access to the pueblo was gained via a narrow crack. These sites, as well as the areas in which they are located, were abandoned in the early 1200s. These possibly defensive pueblos might represent occupation by the last remnants of the population in these locales, and the defense aspect, if such it was, might have been due

more to a psychological reaction to their isolated situation than because of actual conflicts. The depopulation of the Sinagua area north of Sunset Crater was not a wholesale exodus, but a gradual affair and probably began in the late 1100s.

FINAL CURTAIN, A.D. 1215-1400

Sinagua abandonment of the Wupatki and Walnut Canyon areas more or less coincided in time with the beginning of a series of droughts which plagued the Southwestern Indian farmers west of the Continental Divide throughout the 1200s. Unlike the periodic droughts of several years in previous centuries, during which the Indians could adapt themselves to temporary shortages because of storage techniques and methods of obtaining water, the repeated droughts of the 1200s led to prolonged or permanent water shortages and repeated crop failures. They lasted long enough so that inhabitants in certain locales could not always adapt emergency measures to tide them over. Those people, forced to migrate, sought regions where surface water or rainfall was available at the right time of the year for their crops and domestic water.

Ground water during the droughts did not accumulate as rapidly as in past periods of better precipitation, and springs in the San Francisco Mountain region undoubtedly became less dependable. Sediments filling small lakes and ponds formed the base for new vegetation around the edges of the pools and plants began to invade the water. Undoubtedly, occasional heavy storms caused water to build up in the ponds to the point where they flowed over and gradually or abruptly broke natural or manmade dams, allowing the precious supply of water to spill out.

The shift in rainfall pattern or density apparently had

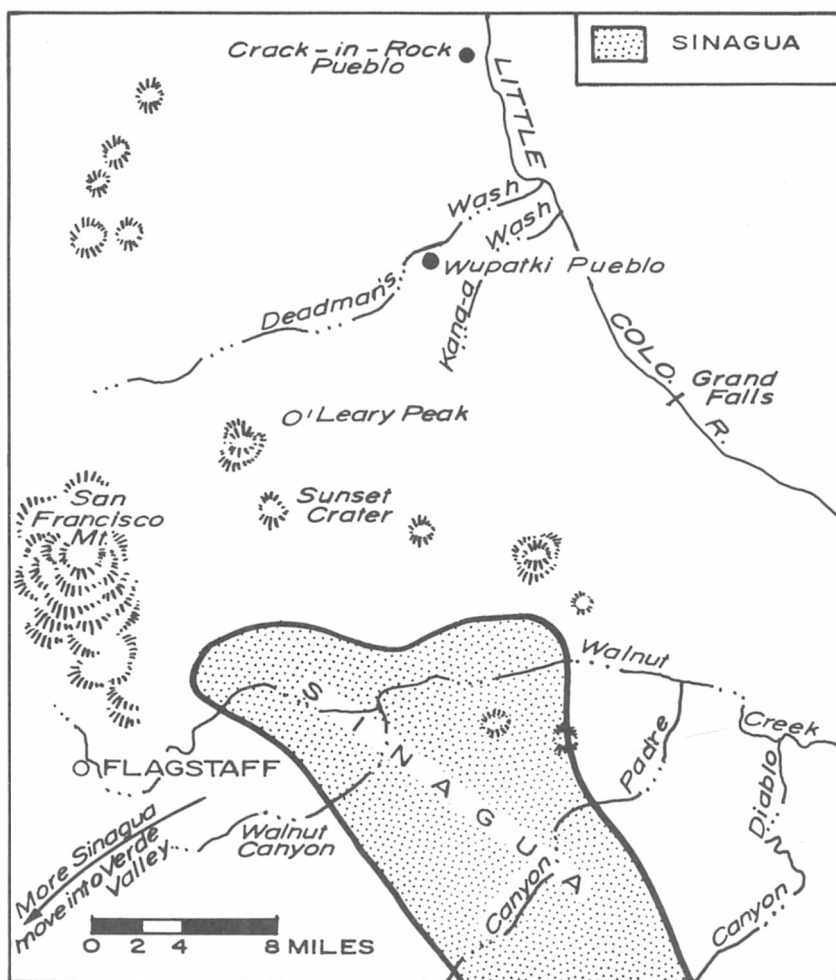


Fig. 51. Culture distributions in the Flagstaff area A.D. 1215-1275 (after Colton, 1942; 1968). (Note the complete absence of Anasazi and Cohonina sites.).

little effect on live springs in deep cinder-covered areas. Probably for this reason some of the Sinagua, when they left the Wupatki and Walnut Creek settlements, concentrated near the old cinder cones south of Sunset Crater and farmed the thinly clad, cinder-covered, open meadows in the vicinity (fig. 51). This country, higher than the Wupatki-Citadel region, received considerable snowfall, an uncommon occurrence north of the Coconino Divide. This meant more water could

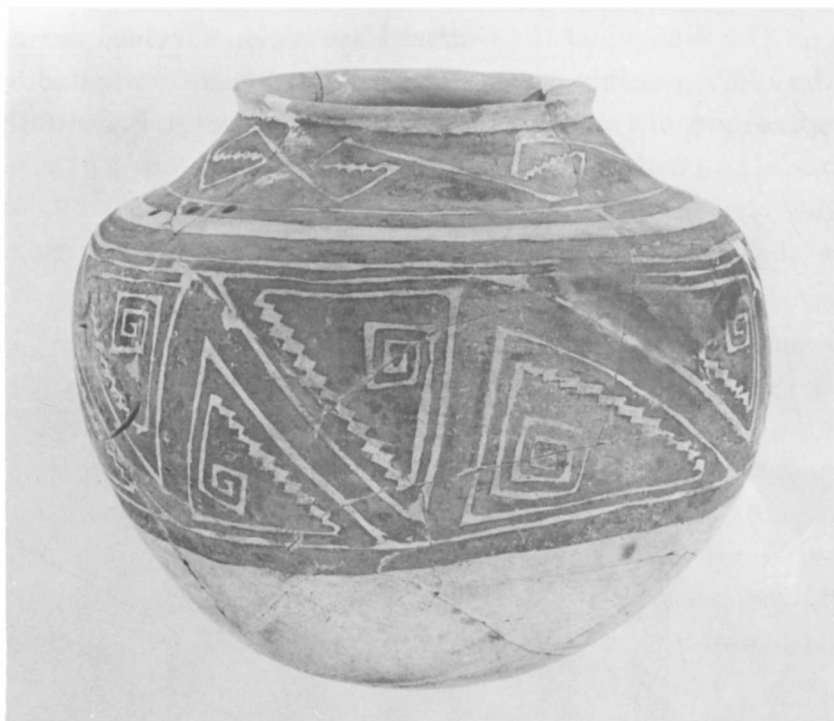
be stored in natural lakes or tanks and more seepage would filter into nearby streams. There is no doubt that this particular area could support a small number of the Sinagua. The population east of the San Francisco Peaks in the middle 1200s is estimated at 600.

Only a few large multistoried pueblos were built or survived in the Flagstaff vicinity during the 1200s. Turkey Hill Pueblo, with 22 ground-floor rooms, and Old Caves Pueblo, with 70 to 80 rooms, are the larger ones known to have been occupied in this time. These sites, like those of the 1100s, were compact dwellings of contiguous rooms, two-storied in places, with trash mounds and burials on one side and a cleared, plaza-like area also to one side used for outdoor cooking, ceremonies, and other activities. The Turkey Tank area, with a permanent water supply today and where the Sinagua in the 1100s dug out a number of caves in the soft volcanic material for use as homes and storage rooms, appears to have been occasionally used for shelter during the 1200s. A few pieces of broken pottery made in the Hopi country in the 1300s also are found on ruins in and around Wupatki, indicating that these places also were sometimes used as overnight or temporary camp areas after they were abandoned. Old Caves Pueblo survived into the very early 1300s, probably the last pueblo occupied in the Flagstaff area.

Other Sinagua, living in the Anderson Mesa region southeast of Walnut Canyon, who obtained black-on-white pottery from the Winslow-Holbrook region and traded it south to the Verde Valley in the 1100s and 1200s, concentrated in the Chavez Pass area farther to the east in the late 1200s. Here they constructed Kinnickinnick and Chavez Pass pueblos, with about 60 to 100 ground-floor rooms respectively. Each pueblo was located near a dependable water supply, a spring, for domestic needs. Kinnickinnick, however, was abandoned about A.D. 1325. Grapevine Pueblo, with about 60 ground-floor



Fig. 52 & 53. Tusayan Black-on-white jar and olla (Museum of Northern Arizona).



rooms constructed early in the 1300s and occupied throughout that century, may have absorbed many of the people from Kinnickinnick. Chavez Pass Pueblo also survived to about A.D. 1400 or slightly later.

During the 1200s, when the remaining Sinagua of the Flagstaff area were concentrated in a few large pueblos, trade still was active. They maintained contact with the Kayenta to the north, obtaining small quantities of their black-on-white pottery (figs. 52 and 53) and trading it south into the Verde Valley. This outside contact collapsed in the late 1200s when nearby Kayenta people left their homes during the great drought of 1276-99 and moved toward the Hopi country. This economic setback along with the unstable environmental factors caused the few remaining Sinagua around Flagstaff to abandon their pueblo way of life in this region. About A.D. 1300 they either returned to the old way of life, hunting and gathering in small bands and farming small plots of corn near springs or wet areas, or joined their relatives in the Verde or Chavez Pass country.

The Sinagua of the Chavez Pass region survived during the 1300s, possibly because of revitalized trade generated by appearance of a pottery type new to the Southwest. Beautifully

Fig. 54. Jeddito Black-on-yellow bowl.



decorated black-on-yellow pottery (fig. 54) was obtained from the Hopi country, where the Indians had begun to fire pottery with coal from local deposits. Hopi polychrome pottery also was developed by adding red decoration. These wares, as well as other polychrome types from the Winslow-Holbrook area on the Little Colorado River, were traded through the Chavez Pass country into the Verde Valley from where small quantities in turn were traded south into the Phoenix region. However, the trade line through Chavez Pass and the middle Verde broke down by the 1400s when suppliers in the Winslow-Holbrook area abandoned their homes to move north into the Hopi country. The Sinagua of the Chavez Pass area either returned to a more nomadic way of life, or joined other groups, possibly the Hopis. The same disruption in trade seems to have occurred in the Verde Valley by the early 1400s.

The rise and fall of the Sinagua illustrates one important point — a culture can exist in almost any given area under a variety of conditions. However, to develop above the basic subsistence level, where almost all time is spent in obtaining necessities, culture must feed on new ideas adaptable to local conditions or the local culture. Usually such changes occur through contacts with other people of another culture. To progress to a point where intercommunity cooperation and leisure activities develop, a culture must maintain contacts with neighboring groups to obtain items not available locally as well as to produce products for trade in return.

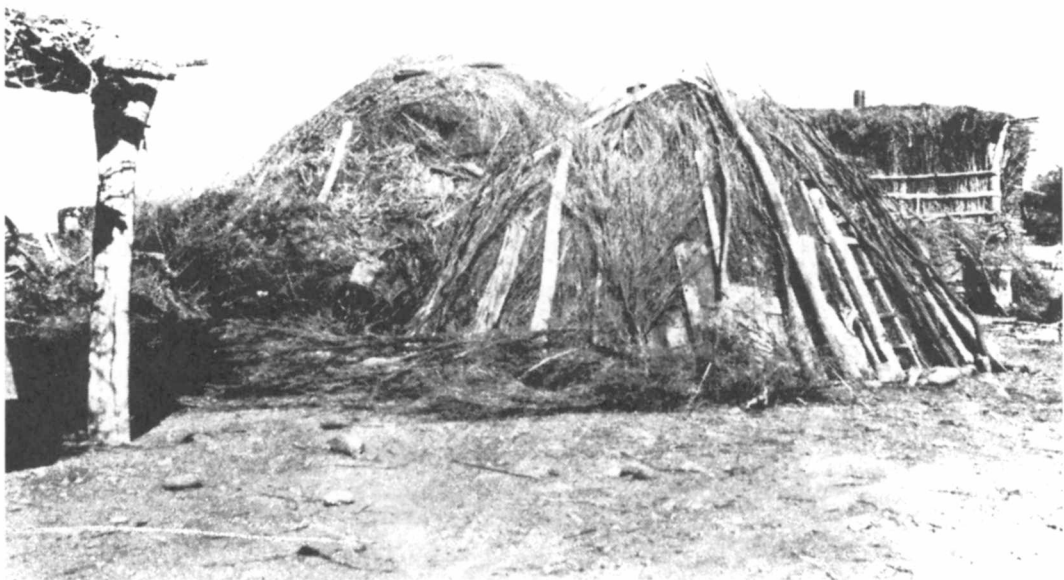
The Sinagua began with a basic subsistence economy. Contacts with their neighbors on their upper Little Colorado drainage brought in new ideas that introduced new items as well as crafts which led to further exchanges with other neighboring groups. The intrusion of several groups after the eruption of Sunset Crater brought in many new items and ideas and led to the development of larger villages and perhaps even to intervillage activities and to somewhat formalized

economic enterprises such as trading merchants. Unfortunately for the Sinagua, the circumstance leading to the influx of new people, the eruption of Sunset Crater, was only a temporary attraction. After 100 years, and other factors affecting their crop yield, the Sinagua began to leave the area. Trade slackened as neighboring groups abandoned their homes. The remnant Sinagua population, as these trade ties were severed, was forced either to leave the area or return to a subsistence level of living. The population on the scene as the final curtain fell was sparse.

EPILOGUE, A.D. 1450 TO PRESENT

About 150 years after the Sinagua culture pattern no longer existed, Spaniards exploring to the southwest of the Hopi country in the 1590s met Yavapai Indians (fig. 55) near Flagstaff and in the Verde Valley. The Indians in the Middle Verde told the Spaniards that in centuries past a people came from the north, used irrigation ditches, built pueblos in the valley, and then later left and moved south. Traditions of the Pimas living in the middle Gila River drainage also tell

Fig. 55. Yavapai Indian Houses (Museum of Northern Arizona).



of pueblo-building people who came down the Verde River from the north and joined them. Thus, surviving Indian traditions refer to a migration south by a prehistoric group into central and southern Arizona. The expansion south by the Sinagua in prehistoric times is the only known situation that conforms to these Yavapai and Pima traditions.

The Hopis (fig. 56) tell stories of a people who came north to join them, but the locale from which they came is not clear. These people, who were one of the last to arrive in Hopi country, were said to have no priests or ceremonies and were composed of clans related to a "water" group believed to have originated somewhere in the south. Perhaps these people from

Fig. 56. Hopi Indian and Pueblo. (Museum of Northern Arizona).



the south might have included some Sinagua.

The Hopis have identified materials associated with one of the richest burials uncovered in the Sinagua country. The personage evidently was one of note, as indicated by the burial offerings. Knowledge of these artifacts, as well as the tradition above, suggests that some of the Sinagua of the Verde, Flagstaff, or Chavez Pass areas might have joined the Hopis. Since very few Sinagua-like traits occur among the Hopis and some Sinagua items still are evident among the Pimas, it appears that if the Sinagua were involved, a larger group moved to the south and contributed to the late pre-Columbian Pima culture that survived into Spanish colonial times.

We do not know that all of the Sinagua abandoned their entire country — near the San Francisco Mountains, Anderson Mesa, and Verde Valley. There was sufficient water and game and wild-food products to support a small population. If some Sinagua remained in their homeland, returning to hunting and gathering and growing some crops in moist bottoms or near springs, their culture could have evolved into something similar to that of the Yavapais of early historic times. The Spaniards met these particular Indians in the Flagstaff, Mormon Lake, and Verde Valley areas between A.D. 1583 and 1605 and described them as hunters and gatherers with small farm plots and living in brush huts.

The Spaniards also mentioned the neighbors of the Yavapais. West of the San Francisco Mountains were the Havasupais, living in the country of the pre-Columbian Cohonina and perhaps descendants of that group or a faction that broke off from the Walapais farther to the west. To the northeast were the Hopis, direct descendants of the Kayenta and other Pueblo people. The region of the upper Little Colorado drainage no longer was occupied, having been completely abandoned by Pueblo Indians by A.D. 1450, except for the

Zuni Pueblos.

In the 1500s, Apaches and Navajos (figs. 57 and 58) came into New Mexico from the high plains. By the late 1600s,



Fig. 57. Apache Indians and Wikiup (Museum of Northern Arizona).

Fig. 58. Navajo Hogan (Museum of Northern Arizona).



both groups had begun to penetrate unoccupied areas of eastern Arizona, the Apaches first being reported in the region below the Gila River in the 1690s and the Navajos in the Canyon de Chelly area by about 1700. Navajos living around Wupatki were latecomers, having fled west from the Canyon de Chelly country in the 1860s when U.S. troops campaigned

against them.

Early American explorers passed through the Flagstaff region in search of a railroad route through the San Francisco Mountains area. Lt. Lorenzo Sitgreaves in 1851 crossed the Little Colorado River at Grand Falls and went by Wupatki Ruin. Lt. A.W. Whipple came up the Rio de Flag in 1853 and passed Turkey Tank Caves, and Lt. J.C. Ives in 1858 saw the Citadel and Wupatki groups of ruins.

Flagstaff was established in 1881 as a lumber and sheep town, and the nearby ruins became more widely known, C.M. Schultz, in the late 1800s, lived in two rooms on the north end of Wupatki Pueblo while herding sheep in the area. This more or less marks the beginning of a period of vandalism in the ruins of the region, those of Walnut Canyon suffering the greatest damage because of proximity to the town of Flagstaff.

The first scientific interest shown in the pueblos was by James Stevenson of the Smithsonian Institution who visited Walnut Canyon in 1882. J.W. Fewkes of the Bureau of American Ethnology explored a number of ruins in the region in 1896. Walnut Canyon National Monument was set aside in 1915. Harold S. Colton, who established the Museum of Northern Arizona, began his surveys and excavations of ruins in the Flagstaff area in 1916. His investigations and interests led to the establishment of Wupatki and Sunset Crater National Monuments in 1924 and 1930, respectively.

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