



Hopi Agriculture and Land Ownership.

C. Daryll Forde

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HOPI AGRICULTURE AND LAND OWNERSHIP.

[WITH PLATES XL-XLV AND MAPS 1-4.]

By C. DARYLL FORDE.

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INTRODUCTION.

THE field-work on which this study is based was undertaken during the summer of 1929, and I am indebted to the Commonwealth Fund of New York and to the Southwest Society for financial assistance. I have to thank Dr. Elsie Clews Parsons and Mrs. Robert Aitken for valuable advice and criticism and for permission to make use of information and unpublished material kindly placed at my disposal.

Work was restricted to the First and Second Mesas, and informants from all the six villages concerned save Shipaulovi (see page 367) were consulted. Interrogation and discussion were conducted with English-speaking informants at Hano, Mishongnovi and Shimopovi; for Walpi, Sichomovi and auxiliary Mishongnovi informants, interpreters were used. As a considerable part of the work consisted in the inspection and identification of field-sites and cultivation methods it is hoped that there was little misunderstanding of native statements. Data from the various villages were compared and corroborated as carefully as possible.

It is obvious that a census method for obtaining data as to land ownership and transfer would be superior to the general survey and the investigation of a few clans and families here undertaken. It was, however, impossible to attempt this during the eight weeks at my disposal, and such an effort would probably have encountered serious opposition in the villages. This account must therefore be regarded to some extent as a reconnaissance, and it is to be hoped that work on similar problems among other Pueblo groups and more detailed investigation among the Hopi may be undertaken before their native economy is more severely modified.

The sketches of village and clan lands (maps 2, 3 and 4) are diagrams and not land surveys. The base maps at my disposal (enlargements of U.S. Geological Survey Topographic Sheets made in the field) were rather inadequate, and there are probably some discrepancies in the

relative sizes of the lands as shown. They may, however, be considered adequate to represent the general topographic and sociological conditions of Hopi agriculture.

PHONETIC NOTE.

The simpler system recommended by the Committee for the transliteration of Indian languages (*Smithsonian Misc. Collections*, 66, 6, 1916) has been employed in this paper. Capital letters are not used for native terms since the capital frequently modifies the value of the symbol. An exception to this rule has been made for personal names and also to phonetic spelling where, as in village names, there is an accepted American usage in the literature and on topographic maps.

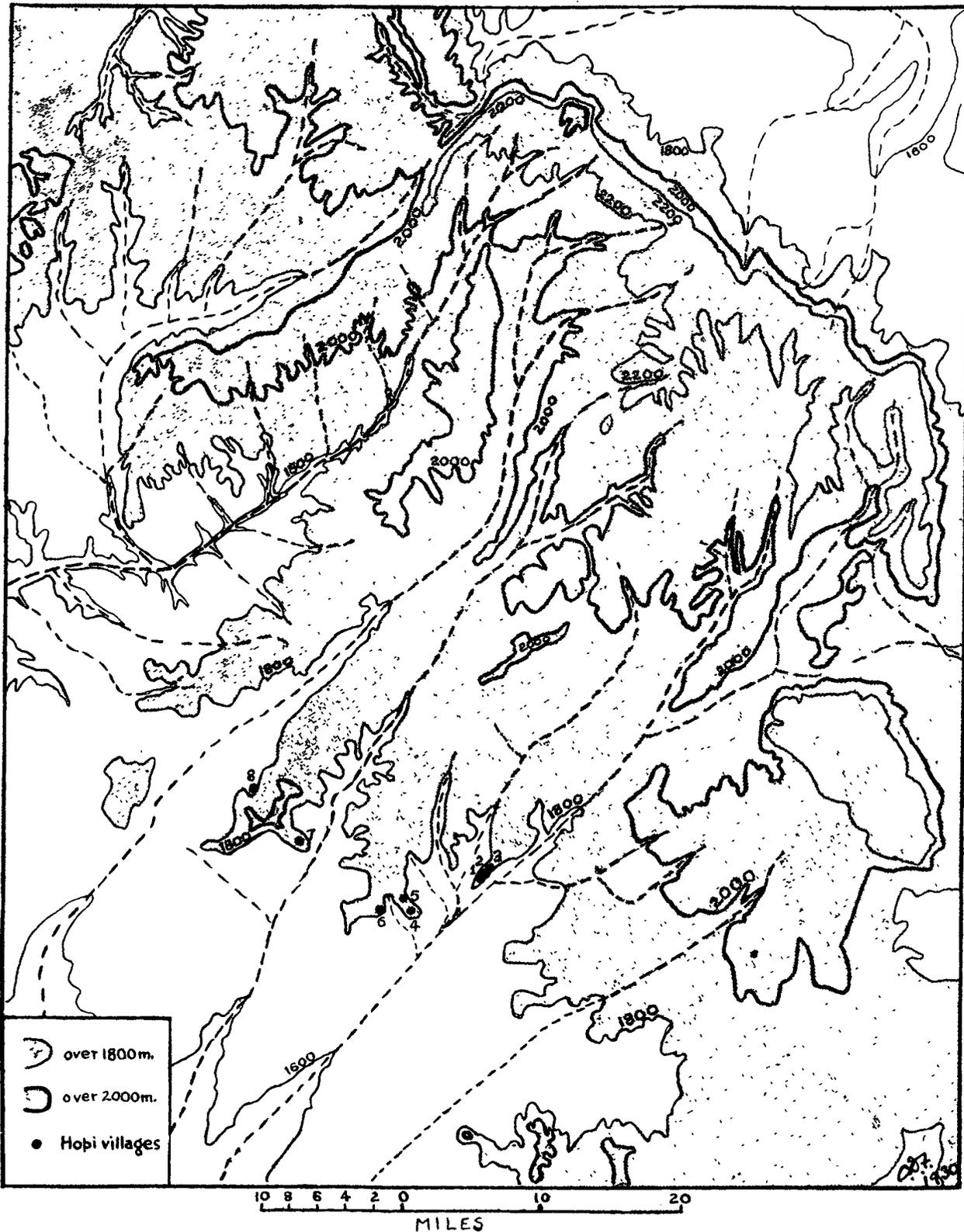
Approximate Values of Symbols Used.

<i>a</i> ; as in father.	<i>x</i> ; as in German ich.
<i>ă</i> ; as in hat.	<i>ñ</i> ; as in sang.
<i>á</i> ; as in but.	<i>tc</i> ; as ch in charred.
<i>e</i> ; as in met.	<i>z</i> ; as in azure.
<i>ē</i> ; as in fate.	<i>q</i> ; velar k.
<i>i</i> ; as in pin.	<i>v</i> ; is bilabial and very close to b.
<i>ĩ</i> ; as in pique.	<i>L</i> ; as ll in Llewellyn.
<i>o</i> ; as in not.	<i>D</i> ; intermediate d-t.
<i>ō</i> ; as in note.	<i>B</i> ; intermediate p-b.
<i>ö</i> ; as in German löss.	' ; glottal stop.
<i>u</i> ; as in put.	' ; weak aspiration.
<i>ū</i> ; as in rule.	Other consonants as in English.
<i>ə</i> ; as a in idea (obscure vowel).	/ ; marks stress on preceding vowel.
<i>y</i> ; as in yet.	·, : ; indicate a long and very long vowel respectively.
<i>c</i> ; as sh in shout.	

PHYSICAL CONDITIONS.

The Hopi, the westernmost group of Pueblo Indians in the American Southwest, occupy a number of villages in the arid plateau lands in the Upper Colorado Basin. These villages are grouped on the southern spurs of a large culminating plateau known as Black Mesa, to the south of which extends a high basin sloping down to the Little Colorado River. This basin has been filled to considerable depth with finely divided rock waste eroded from the plateaux and carried out by floods of the Tusayan washes (see map 1).

Black Mesa extends as an outstanding diamond shaped massif some sixty miles from east to west and about the same distance from north to south. The maximal heights of 8,000 feet are in the north and north-east and the general slope is to the south-west. While steep and lofty cliffs from one to two thousand feet in height border the mesa on the north and north-west, headward dissection along the south-westward drainage lines has left long tongues of relatively lower plateaux at about six thousand, five hundred feet projecting into the sand-filled basin some eight hundred feet below and separated by the flat valleys of the streams



MAP I.—BLACK MESA AND THE TUSAYAN WASHES. HOPI VILLAGES: 1. WALPI; 2. SICHOMOVI; 3. HANO; 4. MISHONGNOVI; 5. SHIPAULOVI; 6. SHIMOPOVI; 7. ORAITI; 8. HOTAVILLA.

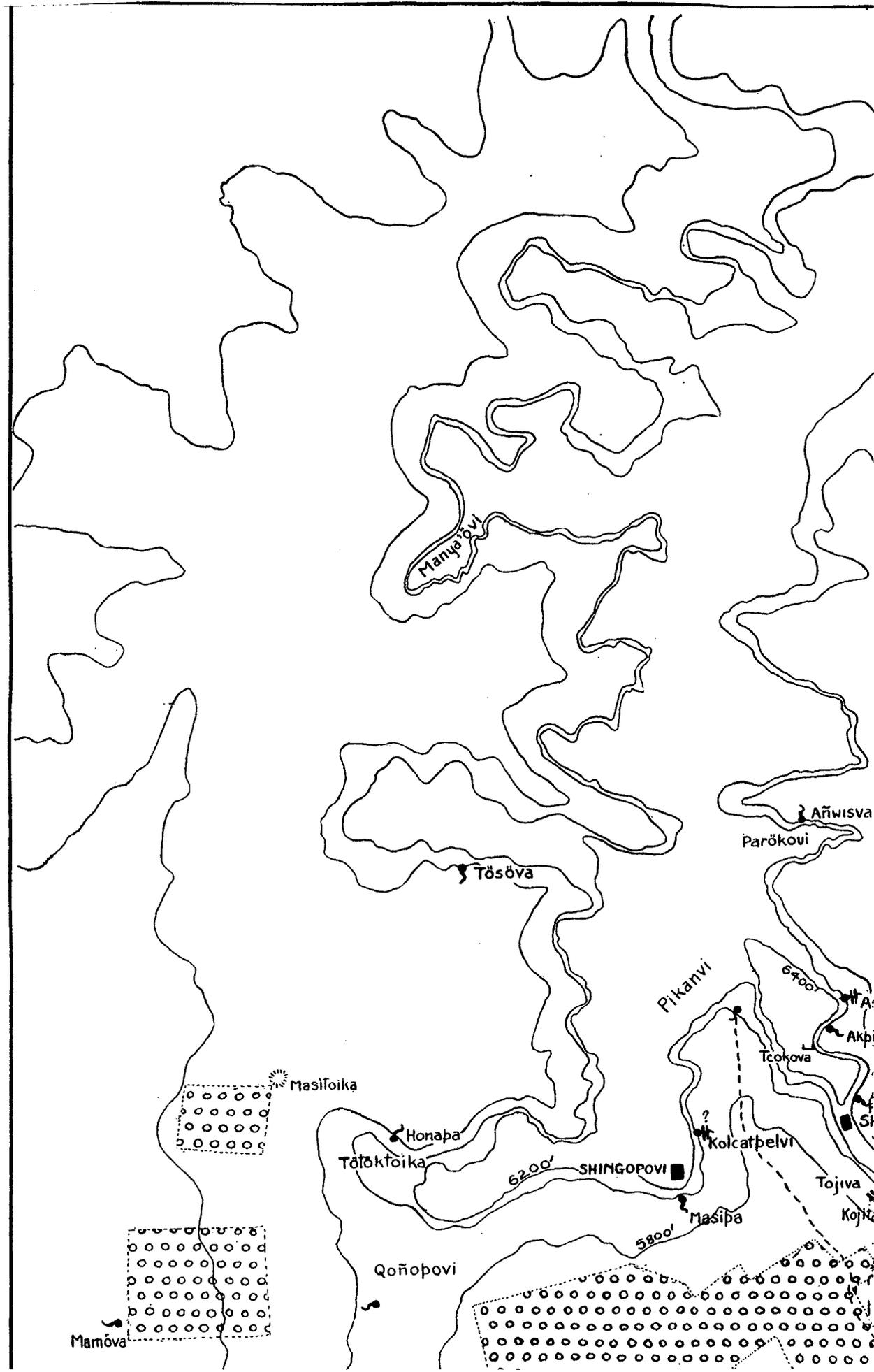
which drain the mesa. On account of the tilt of the general surface the larger streams rise close to the northern edge of the mesa within a few miles of its northern cliff face, so that they capture practically the entire surface drainage of the plateau.

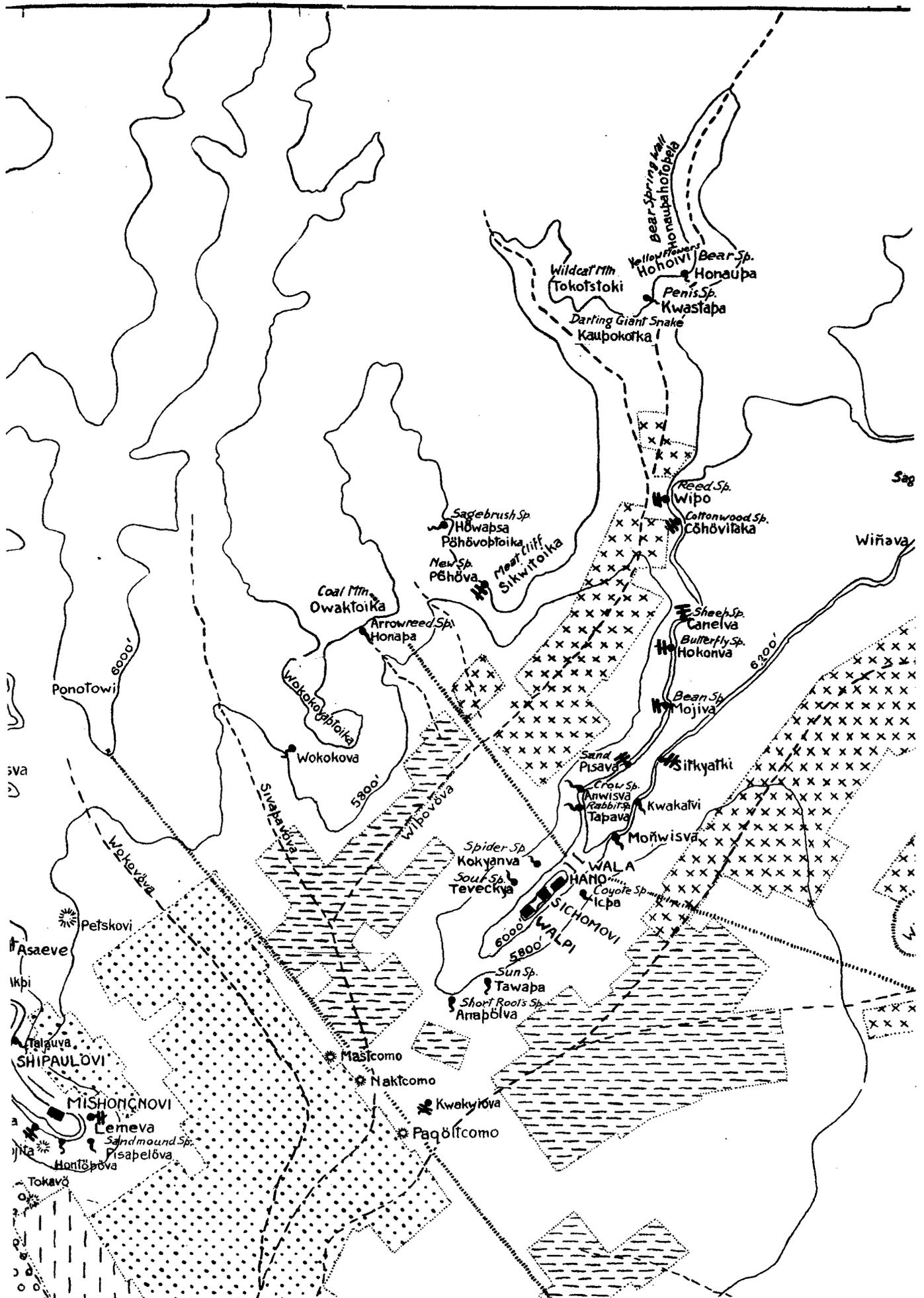
No records of the precipitation over Black Mesa are available, but the relatively dense vegetation of juniper, piñon and even pine, indicates a considerably greater fall than in the lower country to the south. Some idea of the effect of altitude on rainfall and water supply can be obtained from the data for the towns to the south; Holbrook at 5,069 feet has an average annual precipitation of 9.16 inches, while Flagstaff, 2,000 feet higher at 6,907 feet has 23.87 inches.

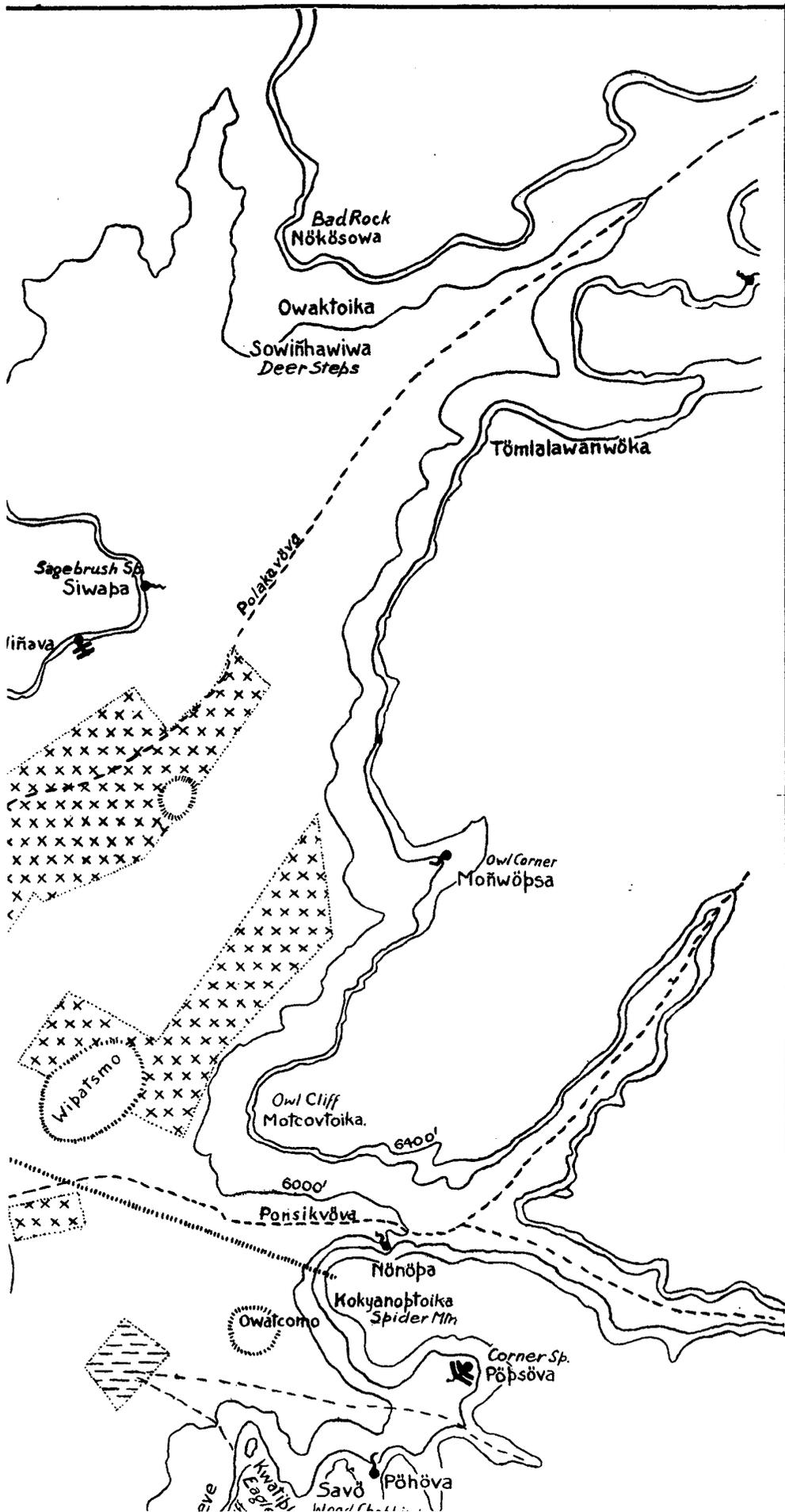
In addition to the surface drainage there is also an important southward seepage of underground water, for the surface rock on the mesa top is moderately permeable Mesa Verde sandstone which dips generally southward. This is underlain by impermeable Mancos shales so that the imprisoned water seeps southward along the plane of contact. There are also thin clay bodies in the sandstone which afford secondary surfaces of subterranean seepage. The junction of the sandstone and the shales in the neighbourhood of First and Second Mesa lies some twenty to fifty feet above the base of the cliffs, and along this line are found a large number of springs and seeps. These are sometimes masked by the accumulation of rock waste at the base of the cliffs so that the water actually emerges at the valley floor.

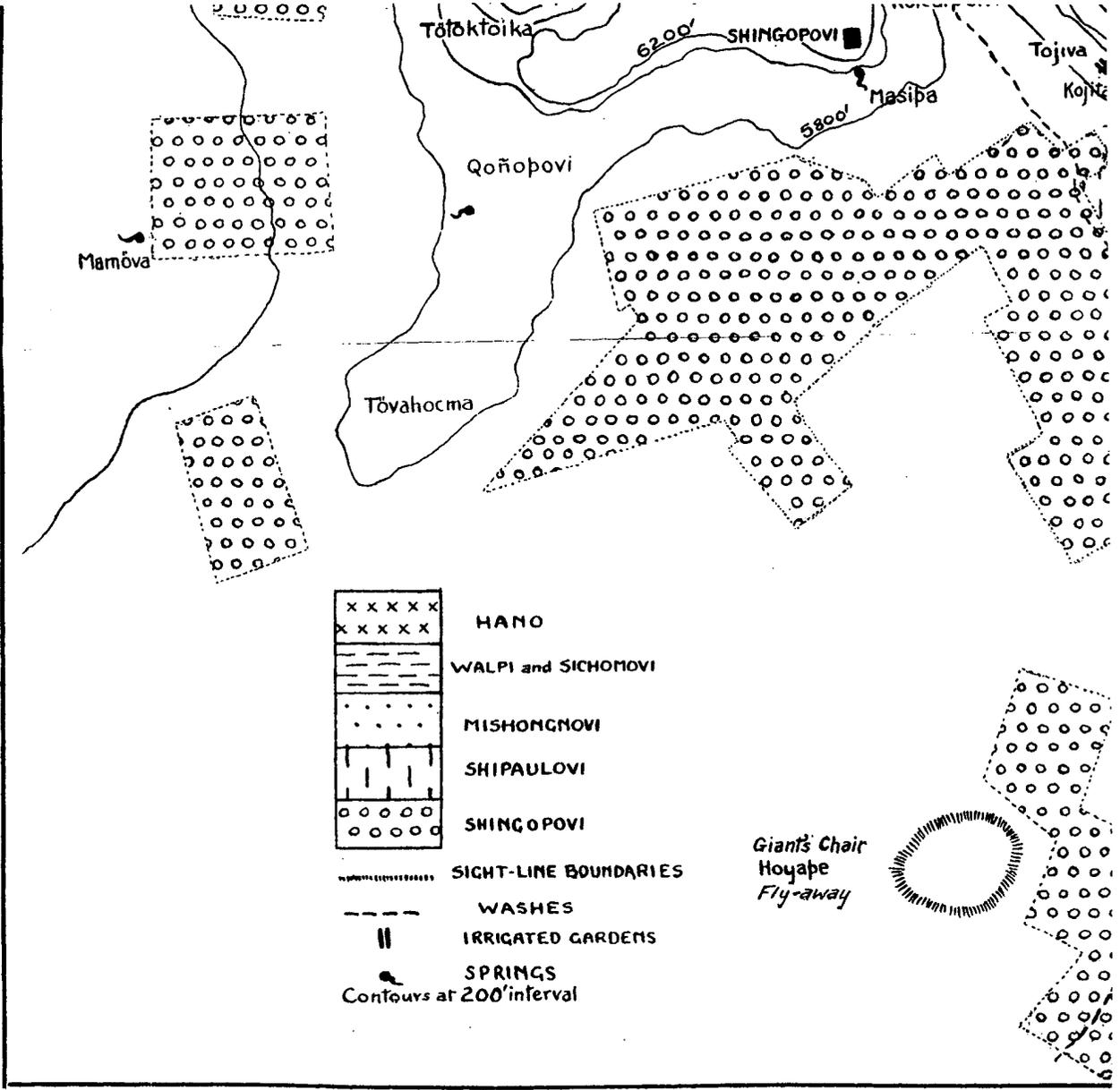
These two circumstances, the southward drainage of the relatively well watered Black Mesa and the development of a spring line along the southern edges and spurs of the mesa, are of the greatest importance in Hopi economy, for the direct precipitation at the southern mesa edge and over the alluvial basin to the south is quite inadequate for agriculture, and away from the washes supports but the scantiest sage brush vegetation with occasional cottonwood and yucca replacing the piñon of the mesa. The average annual fall at the Indian Agency at Keams Canyon is 10.94 inches and showed a range variation from a minimum of 6.98 inches to a maximum of 14.11 inches for the ten years from which this average was obtained. The longer records for Holbrook, eighty miles south of the Hopi villages, give an average of 9.15 with minimum and maximum annual totals of 4.5 inches and 17.6 inches respectively.¹ Precipitation is therefore not only low but very uncertain, varying from half to twice the normal, and this uncertainty is even greater for any single month in successive years. The July fall which is particularly important has varied at Holbrook from $4\frac{1}{2}$ inches to a trace, at Keams Canyon from nearly 4 inches to less than half an inch. Late summer is the period of greatest fall, when local but extremely violent thunderstorms develop. These are accompanied by a sudden and often heavy downpour, which sometimes provides the entire supply for the month, but lighter showers and a more even distribution of rain over the days of July and August may also occur. Winter precipitation falls mostly as snow, for the winter is relatively severe. The mean January temperatures at Holbrook and Keams Canyon are one degree above and one below freezing respectively, while absolute minimum temperatures of 53 and 40 degrees of frost have been recorded at these places (-21° F. and -8° F. respectively) and late killing

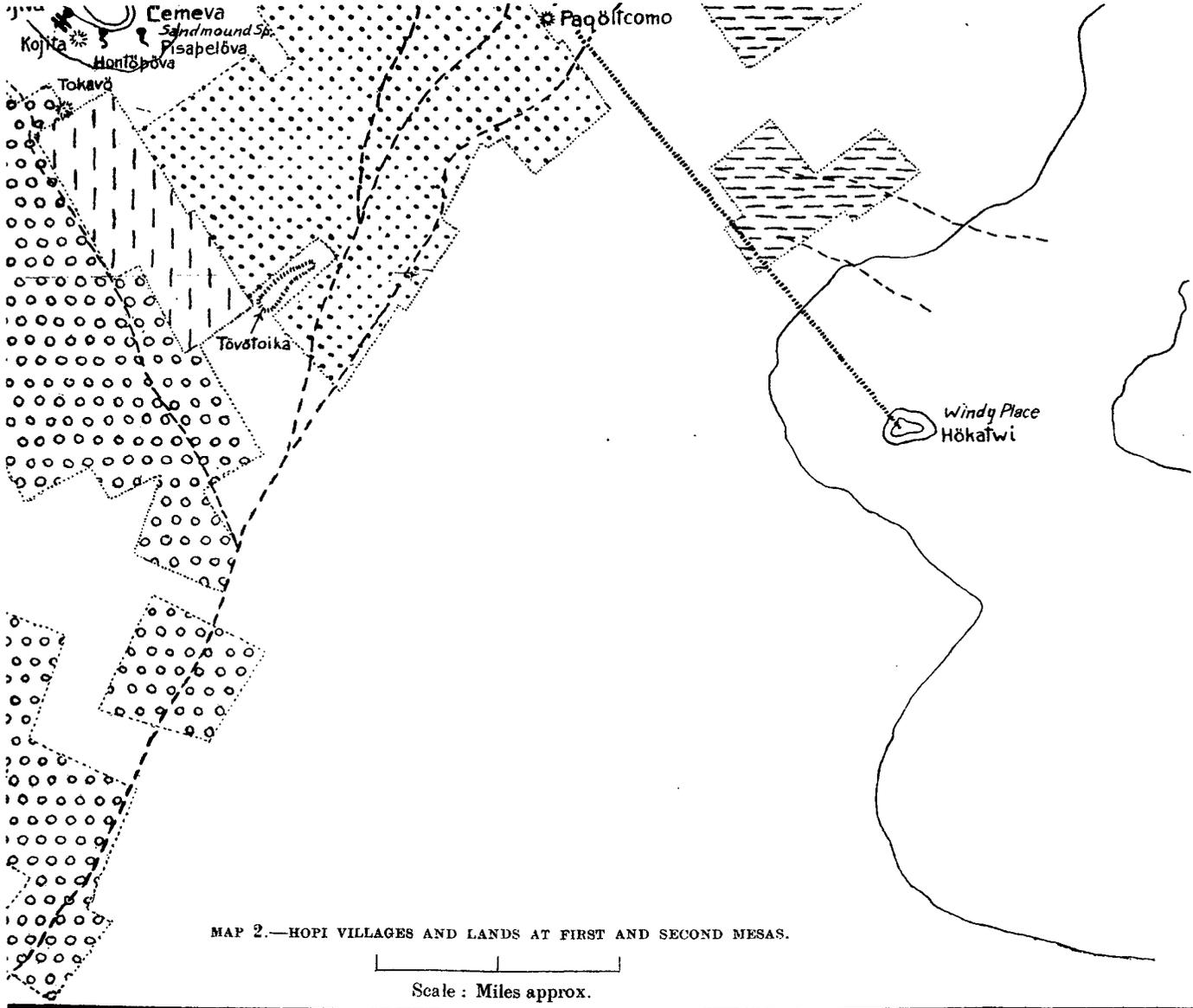
¹ Cf. tables of records in Gregory, H., "The Navaho Country," *U.S. Geol. Survey, Water Supply Paper*, No. 380.





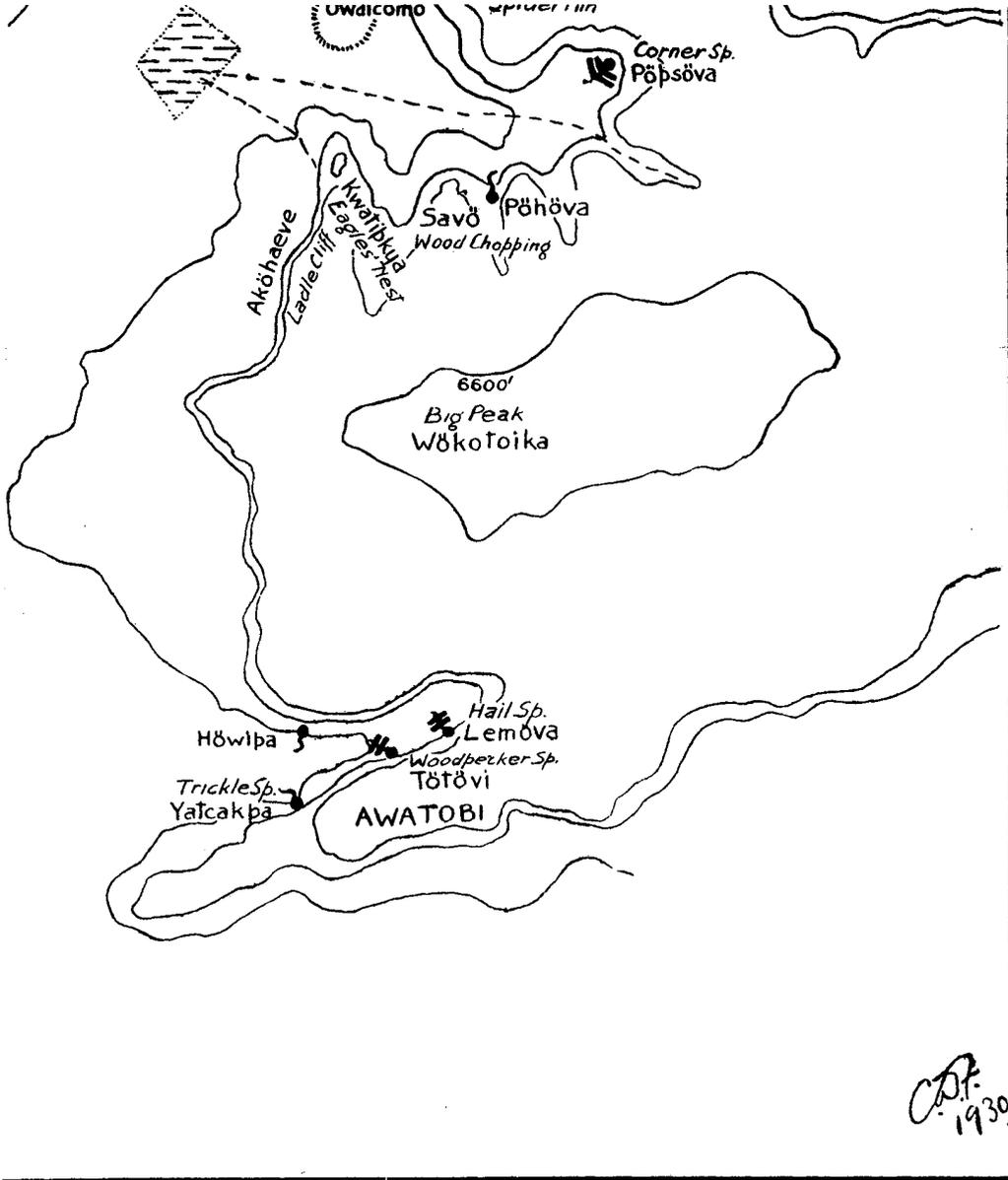






MAP 2.—HOPI VILLAGES AND LANDS AT FIRST AND SECOND MESAS.

Scale : Miles approx.



frosts in May and even June are a real danger to the Hopi in their dependence on so slow growing a staple food as maize, which requires three to five months to mature. Between the winter snowfalls, equal to three to four inches of rain, and the summer storms there is a dry period. The spring rainfall at Keams Canyon averages less than two inches and June is the driest month of the year. This is particularly unfortunate since the crops require water urgently during the early growing period. While the normal expectation of precipitation is under ten inches, the rate of evaporation approaches fifty inches.¹

It is clear therefore that the supplementary water supply provided by the ephemeral streams from Black Mesa and the fringing springs will be of paramount importance in cultivation. But the utilization of this water supply is closely related to the peculiar character of the run off. Since the characteristic rainfall of this area is of the heavy thunderstorm type and of short duration, the ground surface is rapidly saturated and a very high proportion of the fall runs off. But after the rainfall has been thus carried away the valley floor soon dries up almost completely. On the mesa the intermittent streams flow in narrow canyons or arroyos which they have cut in the floor of the valleys, but they emerge from these miniature gorges at the mesa edge and, with reduction of slope, their velocity is considerably reduced so that they cease to flow in well defined channels but fan out over alluvial flats. The accumulation of alluvial material and the imperfect gradation which follows from the rapid alternation of flooding and drying up of the streams, leads to the formation of temporary lakes on level stretches in the washes, the water of which is gradually dispersed by evaporation, by sinking into the subsoil, and by imperfect drainage to lower levels. During the later part of the summer season there may be a permanent supply of water in gullies along the larger washes which drain considerable catchment areas in the mesa.²

As a consequence of these conditions a zone along the *thalweg* of these washes receives a number of inundations during late June, July, and August. The land is temporarily drenched or even flooded to a depth of six inches or more and there is also a considerable underground percolation of water. Similar flooding and underground percolation is produced on a smaller scale along sides of the valleys, the water in this case being derived from direct run off from the scarps and from the seeps and springs whose flow responds rapidly to rainfall on the mesa above.

It is by availing themselves directly of these peculiar conditions that the Hopi are able to maintain an agricultural economy in this desert region. Their cultivation depends essentially on the utilization of naturally flooded areas, a flood water farming and not on an organized system of basin or channel irrigation. The particular hydrographic conditions are not unique; they are found widely on the southern margin of the Colorado plateau, and similar utilization by flood water farming is practised by other pueblo peoples, notably the Zuni, by groups

¹ Measured values for evaporation at Holbrook (1906) 49·8 inches, (1907) 42·07 inches, (1908) 48·62 inches, and (1909) 45·38 inches. Cf. W.S.P. 380, 98.

² Catchment areas of the washes of the Hopi country have been estimated (*U.S. Geol. Survey, Water Supply Paper No. 380, 94*) at:—Jadito, 623 sq. miles; First Mesa or Polacca, 672 sq. miles; Wipo, 179 sq. miles; Second Mesa, 67 sq. miles; Oraibi, 652 sq. miles; Dinnebito, 872 sq. miles; Moenkopi, 969 sq. miles.

of sedentary Navahos and by Spanish Mexican settlements of Southern New Mexico and Arizona.

There are therefore two zones which offer the most favourable conditions for cultivation, first, that in the middle of the valley down which the greater part of the flood waters pass and secondly, a strip along the foot of the mesas which receives a lateral supply. At First Mesa the Wipo and First Mesa or Polacca washes have so recently debouched from the mesa canyons that the valley is relatively narrow and the two zones coalesce to form single belts of cultivable land (see map 3). Good examples of fields receiving a lateral supply are, however, seen in the Pine lands of Hano and the isolated Walpi lands to the north of *hōkatwi*. At Second

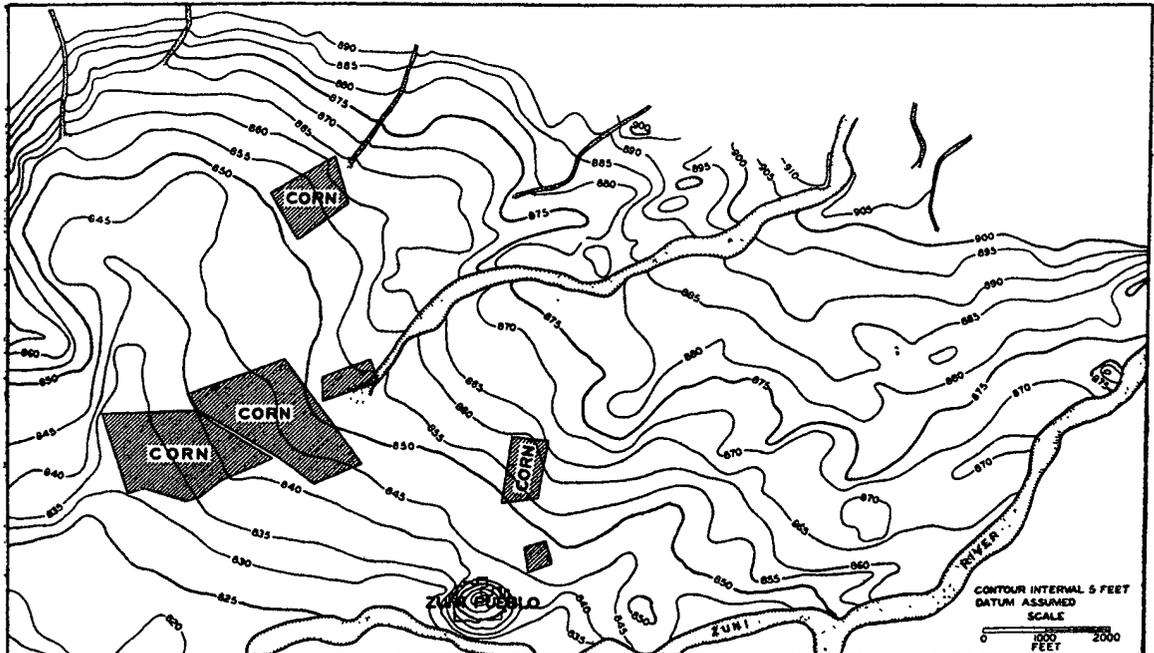
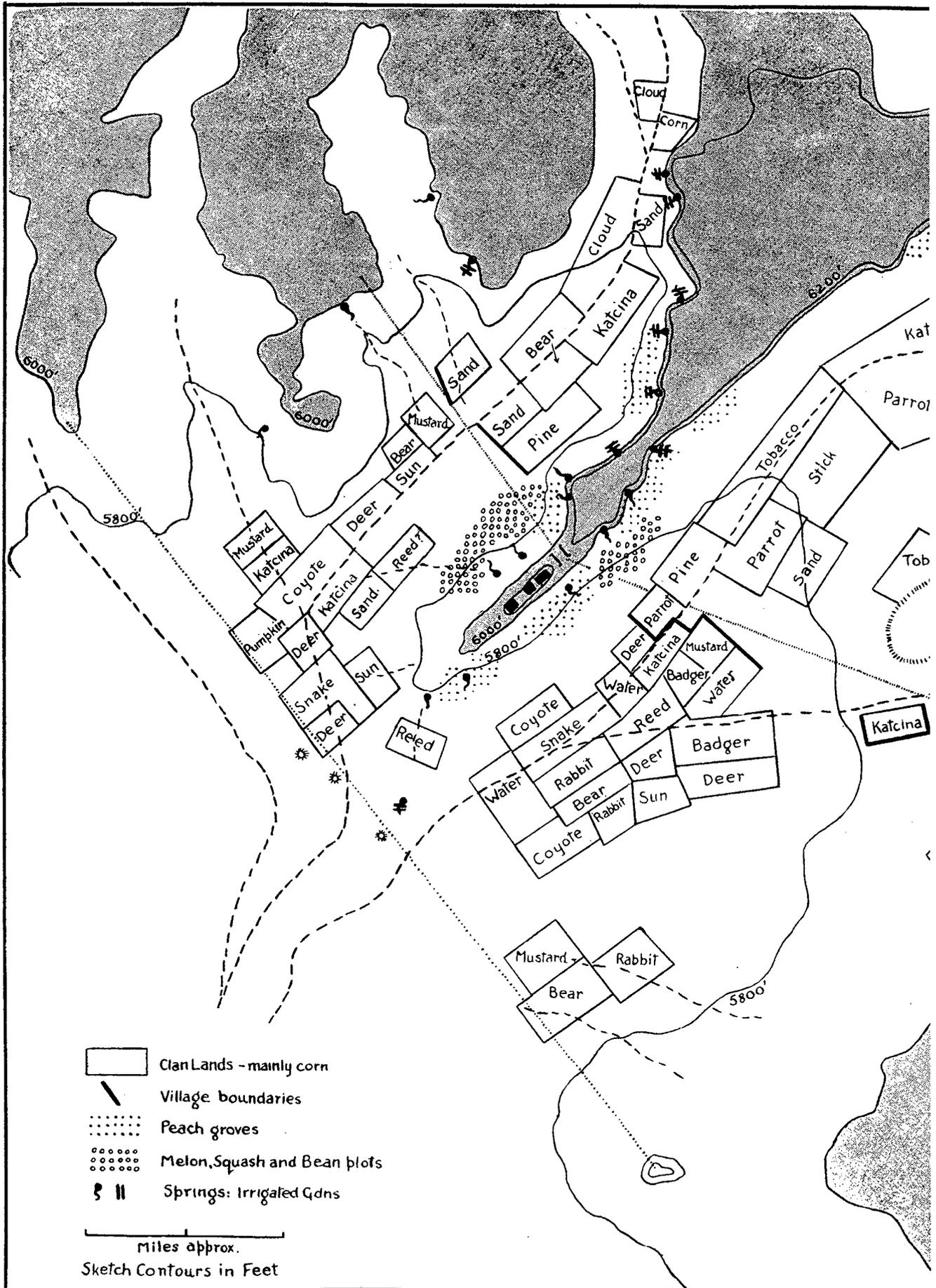


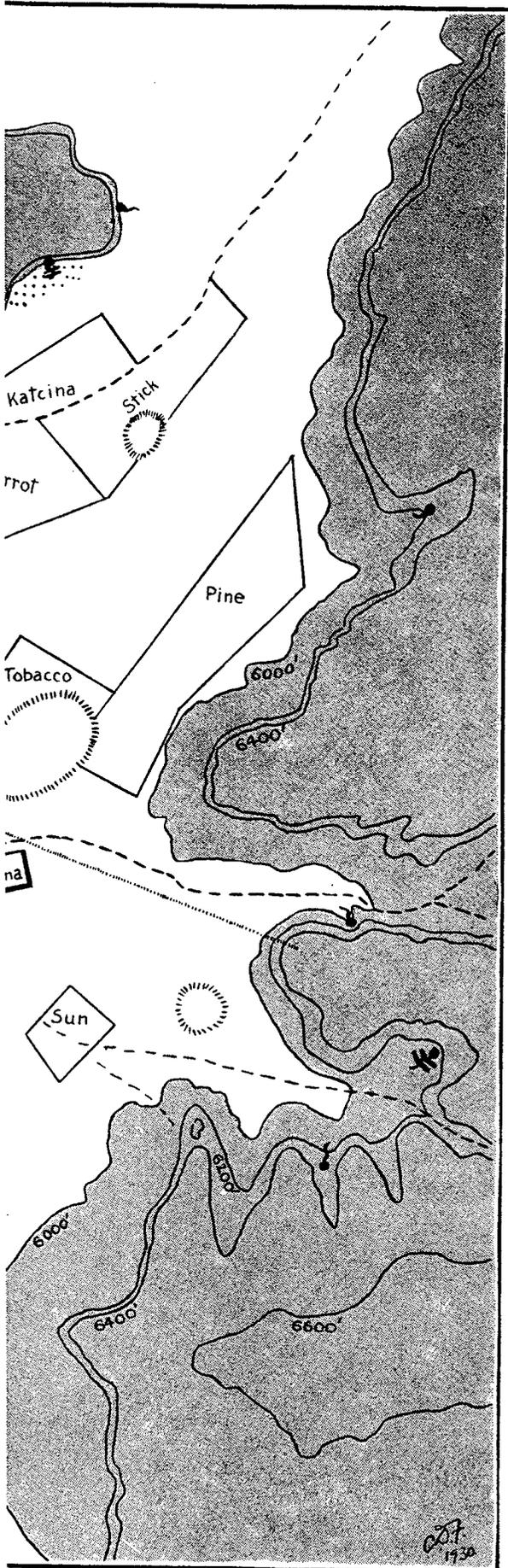
FIG. 1.—MAP OF PART OF ZUÑI VALLEY, MCKINLEY COUNTY, NEW MEXICO, SHOWING AREAS FENCED FOR CULTIVATION OF CORN IN 1908 BEFORE IRRIGATION OF THE VALLEY BY WATER STORED IN ZUÑI RESERVOIR. *Geogr. Rev.*, VOL. XIX, 1929. (BY COURTESY OF DR. KIRK BRYAN AND *The Geographical Review*, AMERICAN GEOGRAPHICAL SOCIETY.)

Mesa (see map 4) the greater part of the Shimopovi lands are irrigated by a lateral water supply from the mesa scarps with the exception of the fields out on the First Mesa wash to the east and south of Giant's Chair. Kirk Bryan has elaborated a similar distinction in his work on Flood Water Farming in Southern New Mexico and has illustrated analogous field-sites among the Zuñi (Text-fig. 1).¹ In both the precise site of the planted area depends on detailed knowledge of the particular conditions since an excess of water at considerable velocity will wash out the crops, while a heavy silt load may bury them. Neither of these dangers can be entirely averted, and destructive floods are the second hazard of Hopi cultivation. Severe storms with heavy rains in the Black Mesa catchment area may, even though it does not rain in the vicinity of the

¹ *Geogr. Rev.*, 19, 445 ff.



MAP 3.—CLAN LANDS: FIRST MESA.



villages, destroy whole fields. The run-off is so rapid that even the canyons cut in recent years are unable to contain the flood which rushes down after these storms. The waters flood over the top of these gullies, temporarily reducing the field to a spongy marsh and uprooting almost every plant in the field.

The rainstorms were particularly heavy during the season of my visit, and a large part of the cultivated land in the lower part of the Wipo wash was flooded out and the crop destroyed. A particularly heavy storm began on the night of Saturday, July 27th. In this instance the greater part of the fall occurred in the immediate neighbourhood of the First Mesa, successive thunderstorms moving up from the south-south-west, flooding the Polacca and Wipo washes. With brief intervals of a few hours on Saturday and Monday morning rain fell almost continuously until the evening of the 29th. So great was the anxiety to repair the damage that the men, hoping the storm had spent itself, went out during the fine spell in the morning of Monday, the 29th, to clear the fields and replant where possible. On the Tuesday, although so late in the season, the less damaged sections of the flooded lands were replanted with corn in the hope of some small yield from the devastated land.

The conditions of run-off have, moreover, been considerably modified in recent years by the trenching of the washes. According to my First Mesa informants the Polacca was still quite flat twenty-five to thirty years ago (*i.e.* when the elder men were youths). To-day there is a miniature canyon or arroyo cut some thirty feet deep in the alluvium on the floor in which the greater part of the flood water is carried (Pl. XLII, fig. 4). Similar channels have been cut in the Wipo and Oraibi washes. During the storm and flood referred to above considerable areas of cultivated land along the banks of the Wipo were destroyed by the disintegration of the steep sandy walls of the stream which collapsed into the miniature gorge cut by the river. It is possible that this erosion of the valleys is in part due to the increased grazing of the catchment areas in the Black Mesa and of the valleys themselves which, by reducing the vegetation cover, increases both the volume and the rapidity of run-off, giving it greater erosive power. But there is evidence of recently accelerated erosion and the deepening of arroyos throughout the Southwest. Bryan¹ summarizes the evidence for its widespread development since about 1880 and suggests that a new cycle of erosion has been established quite apart from human interference.

Although this arroyo cutting has increased the amount and duration of stream flow it has reduced the cultivable value of much land that was formerly subject to abundant natural irrigation. The arroyos have cut across old field-sites and in the erosion of the concave banks they continue to encroach on fields in their vicinity. The concentration of the surface flow in miniature canyons well below the field level has greatly reduced the amount of water received by the fields themselves, and mere scraps of land on the floors of the inner canyons are valued on account of their superior water supply (Pl. XLII, fig. 4). If a man finds that a deep channel is beginning to develop in his field he endeavours to arrest it while it is still small by erecting barriers of logs and brush-wood. Against these, alluvium and windblown sand collect to fill the incipient channel.

¹*Geog. Rev.*, 19, 1929, 453 ff.

Level stretches favourable to water conservation are also constructed artificially on a small scale in narrow gullies cut back into the sides of main washes. These are dammed across at frequent intervals with low walls of stone and brush against which fine, sandy detritus rapidly

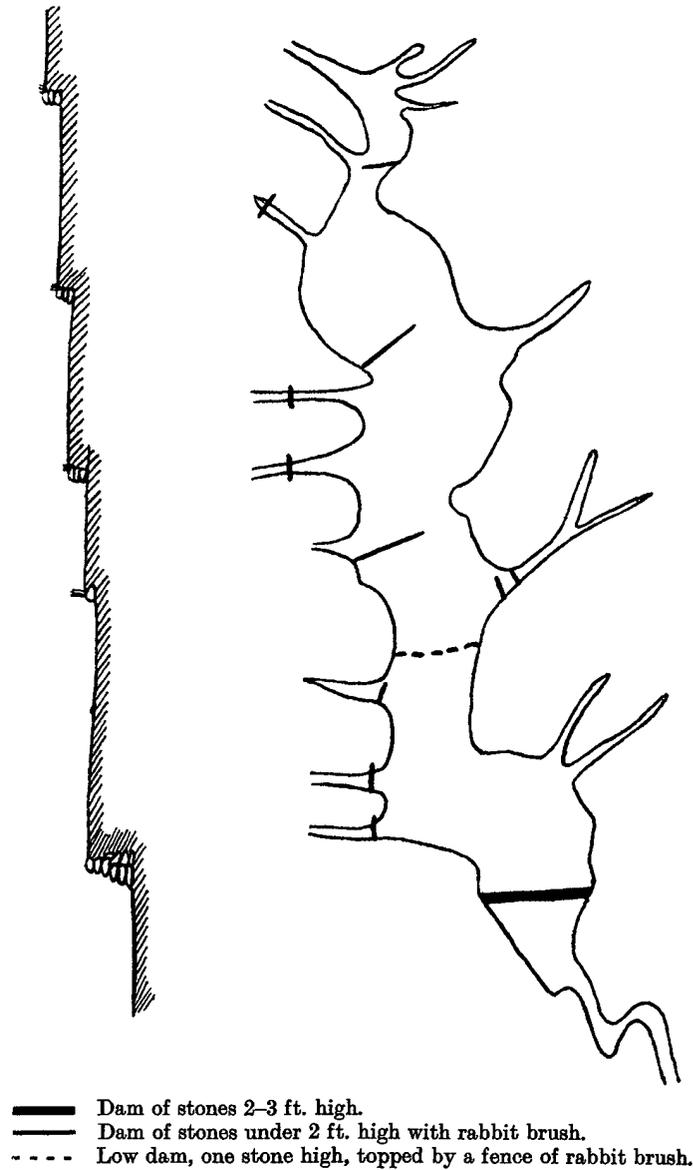
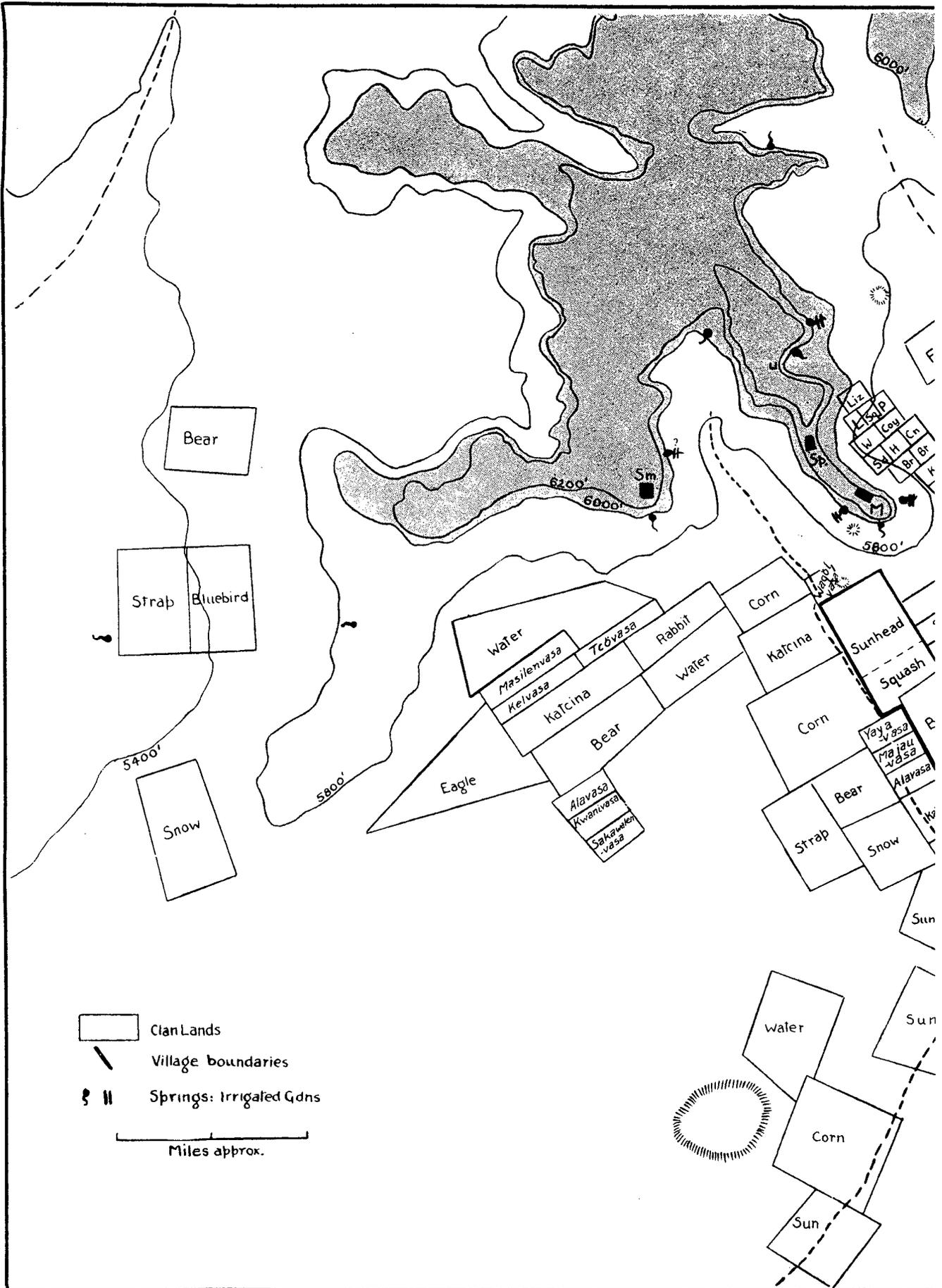
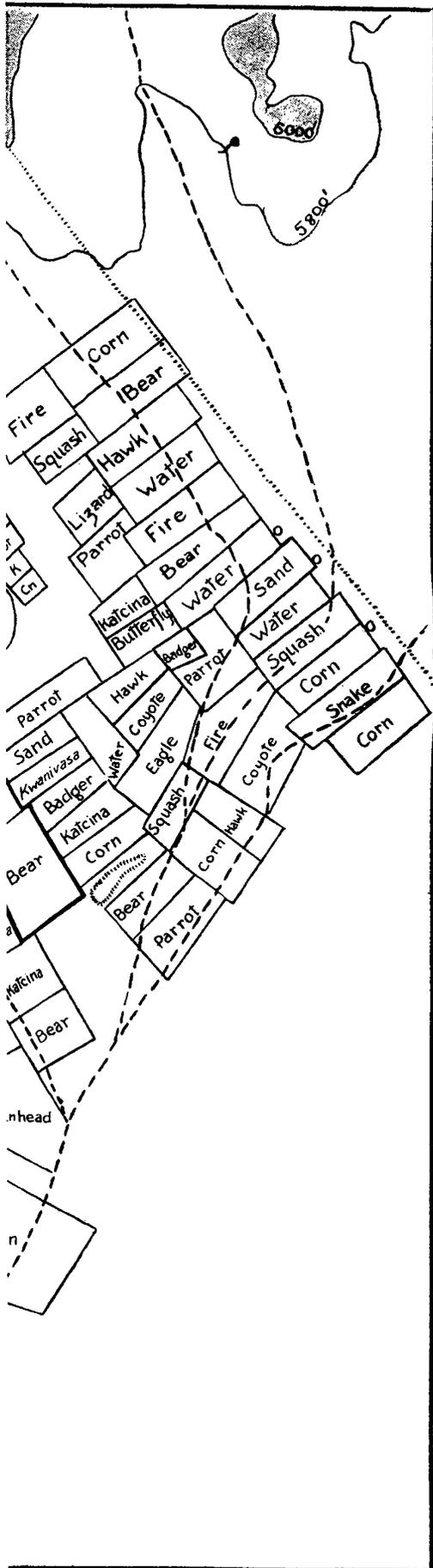


FIG. 2.—SKETCH AND PROFILE OF A DAMMED GULLY IN TEWA LAND.
 (BY KIND PERMISSION OF MRS. R. AITKEN.)

accumulates to form a small flat in which a considerable part of the water supply from freshets which flow down after rains is conserved. These sheltered gully flats with their greater and more assured water supply are particularly suited for growing early corn. Mrs. R. Aitken



MAP 4.—CLAN LANDS: SECOND MESA. (LANDS BELONGING TO SOCIETIES IN ITALICS)



has kindly allowed me to reproduce her sketch-map of such a gully in Tewa land on the Wipo side of First Mesa, inspected by her in April, 1913 (Text-fig. 2). She gives the following note :

“ In one of the gullies in Tewa land on the ‘ north ’ side of the mesa I was shown the ‘ early plant ’ of a man Lelo, Tewa Stick-people. In such places, warm and sheltered, they plant corn very early, for the kateinas to bring, and to eat in summer-time. Sweet corn is also planted there.

“ Lelo’s early plant is in a gully with a floor about thirty feet wide at widest. Across it at intervals he has built little walls of stones, to check the flow of water and sand, and preserve a series of levels. The side-gullies leading to it are also blocked with stones.

“ Above it on one side is a little pile of stones (*k’u koiki*, ‘ rock stand-up ’) which he put there when he first began to make this field, so that no other man should take it.

“ Pobinili remarked that there was some useful space left in the gully below Lelo’s last dam ; some other man, he said, ought to make another dam lower down, and plant on the level thus obtained.”

The introduction of American methods and appliances has also modified Hopi practice and to some extent compensated for the evils of arroyo-cutting. Increase in the number of horses, burros and waggons has enabled them to farm land conveniently at greater distances from the mesas. The adoption of ploughs and cultivators at Oraibi and to some extent at First and Second Mesas has introduced new factors in the choice of field lots, and large fields have been made on level tracts on the far side of the Polacca wash. The Hopi have also brought into cultivation considerable sections of the lands which belonged to the village of Awatobi, which was destroyed in the eighteenth century. All these developments are outside the traditional clan and village lands, and since they have occurred at a time when social regulations have been weakened under the disintegrating effects of American influence, the new fields are less subject to the orthodox conditions of tenure and transfer which have been retained more intact in the old village lands. Since the aboriginal system is the object of this study these new fields have not been considered here.

In addition to providing an assured supply of drinking water for the villages and in modern times for livestock the larger and more accessible springs are used to maintain irrigated gardens. The water is in the first place stored in tanks formed by adapting a rock bottom and building up retaining walls. Crevices are stopped with a mixture of mud and dried vegetation. The gardens themselves are disposed in terraces. Some lie below the spring and its storage tank. The tank is then provided with an outlet, stopped with a bung of cloth or hide and grasses. Removing this bung water is allowed to run from a main discharge channel a foot or so deep and about two feet wide to the various distributing channels, which are stopped by low transverse banks which are breached as required (Text-fig. 9 and Pl. XLIV, figs. 1 and 2): First Mesa gardens are of this type ; at Wipo Spring they are very extensive, and more than a dozen families have gardens of three or four plots each. At Second Mesa, however, the springs lie

lower in hollows which have been deepened artificially. Water is carried up in jars from the storage tank to the plots which either encircle the hollow as at *lemeva* or slope away from its rim as at *tojiva* (Pl. XLIV, fig. 3).

The seepage of several of the springs which are not used for irrigated gardens is of great importance for the peach groves which lie clustered on the slopes below them. The springs associated with the First and Second Mesa villages are listed and classified according to use in table 6 and are indicated on map 2.

VILLAGE LANDS AND BOUNDARIES.

The present villages of the Hopi are perched on the summits of the mesa tongues, but this retreat to the mesa tops is relatively recent and followed the disturbances of the late seventeenth century when Spanish interferences and the raids of other Indian groups, particularly the Ute, induced them to resort to these defensive positions. The lowland predecessors of the mesa villages are well known to the Hopi, and they are aware of the recency of their desertion, but they resist all attempts to induce them to return to the valleys (Pls. XL and XLI). On First Mesa are the three villages of Walpi, Sichomovi and Hano. Walpi is the oldest settled. Sichomovi is an extension of Walpi rather than a separate village. They are separated only by a hundred yards where the mesa narrows to a neck a few yards wide, and the clan and society organizations of the two villages form one system. The joint ownership of land confirms the evidence of clan lists and the statements of informants as to the recency of the movement. Dr. Parsons has also pointed out that Sichomovi "should be described as a suburb of Walpi. Not having its own winter solstice ceremony it is not an independent town."¹

The third village, Hano, is occupied by an alien group, the descendants of Tewa immigrants from the Rio Grande. Traditionally these people came to First Mesa at the beginning of the eighteenth century at the request of the Hopi to assist in defence against the Ute. They established their village at the head of the main trail up to the mesa top, near the transverse notch across a narrow neck which is known as the *wala*. The Tewa people are now bilingual but the Hopi cannot, as a rule, use Tewa freely. These First Mesa villages farm land in the valleys or washes on either side of the mesa peninsula; on the Polacca or First Mesa wash to the south and on the Wipo wash to the north. The Hano fields are above, *i.e.* upstream from the *wala*, Hopi, *i.e.* Walpi and Sichomovi, land is below. According to a tradition repeated by several of my informants, bargaining over the allotment of land took place when the Tewa people first immigrated and the boundary was then fixed as sight lines from the *wala* to eminences on the far sides of the washes. According to Hopi informants the boundary across Polacca wash runs to *kōkyañoptoika* (Spider Mountain). This coincides closely with the present *de facto* boundary; but according to the Tewa the latter represents an encroachment, the original boundary was planned to run to *kwatīpkya*, thus giving the Tewa more land. One Tewa informant claimed that the Hopi at a later date agreed to shift this boundary southward so that it ran from a point on the mesa between the houses of Hano and Sichomovi (see

¹ *American Anthropologist*, new series, 33, 1931, 233.

map 2). This claim, if correct, has never been put into effect. On the Wipo wash the sight line boundary runs, according to the Hopi, to the summit of *ōwaktōika* (Coal peak).

The villages of Second Mesa farm land on the low lands adjacent to their villages and out on the Polacca wash to the south. The boundary between First and Second Mesa land is considered to run along a sight line from *ponōtowi* on the north to the isolated eminence of *hōkatwi* in the south-east. A number of minor eminences in the valley and approximately on this line serve to mark out this line on the ground. Mishongnovi land therefore includes that flooded by the ephemeral stream emerging from the mesa immediately west of *ponōtowi*. The boundary is considered as defined near the washes by the series of natural features referred to, *i.e.* two low sandhills *mascōmo* (Dead Men Hill) and *naktōmō* to the north of Wipo wash and by another low eminence *paqōltcomō* between the Wipo and Polacca washes and a large upstanding rock to the south of the Polacca wash. On each of the low hills there is said to have been formerly a large boulder marking the boundary site. The *naktōmō* stone, according to Lomanaksi and other Mishongnovi informants, was standing until a year or so ago; it consisted of an upright natural rock slab facing north and south and supported on the south by stones. The north face was incised with a horizontal T, whose leg pointed towards First Mesa. Mishongnovi land is bounded on the west by a line running south-eastward from *kojita*, a small hillock near the eastern foot of Second Mesa. The village of Shipaulovi was settled from emigrants from Shimopovi, the westernmost of the Second Mesa villages. Its lands are limited to a small area carved out of the Shimopovi lands lying south of the hillock *tokavō*. These lands are now considered inadequate, and the "land question" is such a sore point that the elders of Shipaulovi refused to discuss it. Information could only be obtained from residents in Mishongnovi and a Shipaulovi emigrant to Shimopovi. Shimopovi lands extend southwards across the Polacca wash. On the west they march with those of Oraibi. My Shimopovi informant claimed that the lands of his village had formerly extended to the *thalweg* of the Oraibi wash and even beyond it, but that the accepted boundary to-day ran parallel to the wash on the Shimopovi side from the peak *mañya'ōvi*. Oraibi views on this boundary were not obtained.

CLAN LANDS.

Within the village territories the greater part of the arable area is divided into a number of large sections from a few hundred square yards to a square mile or more, apportioned among the various clans. The number of clan lands identified for the villages of First and Second Mesa are as given in tables 1-4. These clan lands were formerly delimited by numerous boundary stones (*kālālni*) placed at the corners and junction points. Many of the more significant of these *kālālni*, which were small upright slabs or domed boulders, were engraved on their faces with symbols of the appropriate clan. Some of these boundary stones are still in position. A Cloud (Water)—Tobacco (Rabbit) *kālālni* still stands on the Polacca wash below First Mesa. A Coyote stone is to be seen in the Mishongnovi fields at Second Mesa and a Corn Clan stone was recently removed. Copies of sketches by informants of the symbols engraved on these stones are shown in Text-fig. 3.

The lands vary considerably in size so that no clear idea of the variations in aggregate area available for the several clans is given. But the relative areas of the clan lands are indicated approximately on maps 3 and 4. These diagrams cannot pretend to the accuracy of a scale-plan since no means were available for an instrumental survey, but the distribution, relative size and position of the clan lands were checked with several informants and inspected in the field.

The area available does not correspond at all closely with the number of individuals in the clan. In some the population has dwindled to a dozen or so persons, but extensive lands

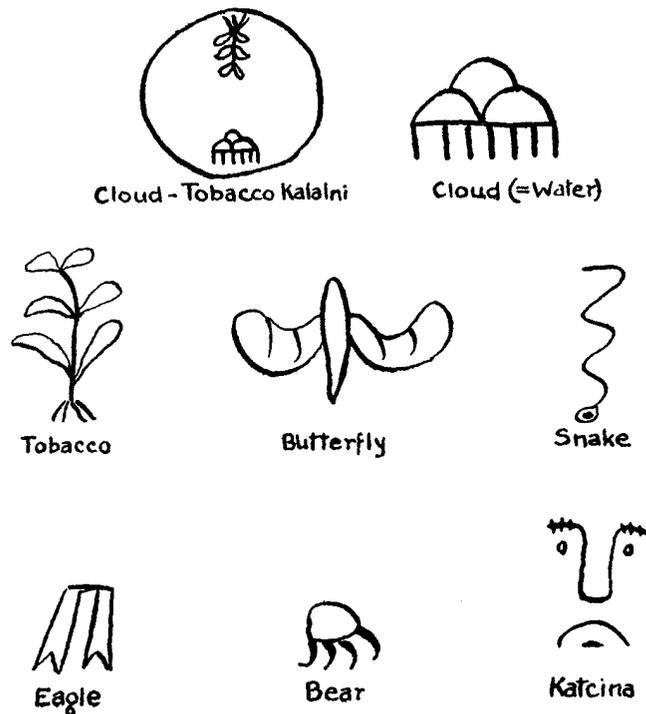


FIG. 3.—CLAN BOUNDARY-STONE SYMBOLS. (FROM A NATIVE DRAWING.)

are available, *e.g.* Coyote and Snake at First Mesa (Hopi), Katsina and Corn at Mishongnovi, while others far larger have no more or even less land, *e.g.* Rabbit at First Mesa (Hopi), Badger-Butterfly at Mishongnovi.¹ With very few exceptions, however, every clan has land in two or more separate parts of the arable area. Most of the clans of both the Tewa and Hopi at First Mesa have lands on both sides of the Mesa, *i.e.* on the Wipo and on the Polacca washes, while only the Bear and Corn Clans of Tewa and the extinct Hopi Squash Clan have but a single land.

¹ *Cf.* census data available in Lowie, R. H., "Notes on Hopi Clans." *Anth. Papers, Am. Mus. Nat. Hist.*, 33, part 6, 309-329.

Mishongnovi fields are watered by the *wōkōvōva* to the east of Second Mesa and to the south-east by the Wipo and Polacca washes in the neighbourhood of their confluence. Only three clans have but a single land and most have lands on both the east and south-east of the mesa.

Shimopovi lands lie in four major groups—to the south of the mesa escarpment, to the west of the mesa, in the flood area of the small wash running down from *pikānvi*, and lastly on the First Mesa wash below the junction of Wipo and Polacca, especially the area immediately above Giant's Chair (*hoyape*—fly away) which apparently tends to hold up seepage on its east side. Four clans have but a single land, but three of these are now merged with others and the lands are only nominally distinct.

The relatively small area of Shipaulovi land is divided among three clans. Squash people have but recently come to the village from Shimopovi and have apparently been given fields within Sunhead land.¹

This dispersal of the lands of each clan over a number of sites is of very great practical importance since it reduces the risk of crop failure; where one group of fields may be washed out there remains the chance that the others may be spared. Disastrous floods do not usually occur in both the Wipo and Polacca washes in the same season. The lands at the foot of the scarps and those out on the washes are still more definitely reciprocal. In an abnormally wet year many fields on the washes are liable to be destroyed by the high floods; in such a season, however, the scarp run-off is likely to be high and the fields at the foot yield well. In a dry season, however, when the latter are liable to be parched out, enough water is usually brought down by the major washes from Black Mesa to afford a harvest for the mid-valley fields.

In addition to the main clan lands which are devoted principally to corn, smaller patches on the sloping grounds closer in to the mesas are planted with beans, squashes and melons. At Mishongnovi these were, according to Robert and Lomanaksi, grouped in clan divisions as for the main fields (see map 4). At the other villages these bean and squash patches on the slopes were apparently not regarded as clan land and were disposed of by individuals as personal property.

The irrigated gardens and all springs were associated with particular clans. The former are given where known in table 5. But the water of springs is available for drinking, irrigating, or stock watering, as the case may be, to individuals of clans other than those "owning" them or mythologically associated with them (see also p. 377). The garden plots were more generally cared for by women, and passed on from mother to daughter. The irrigated gardens at Awatobi are considered at Mishongnovi to belong rightfully to their Badger Clan, since that clan is believed to have migrated thence when Awatobi was destroyed or deserted. Indeed, one Mishongnovi informant claimed that the Second Mesa land boundary ran almost eastwards beyond *hōkatwi*, placing the Awatobi entirely in Second Mesa territory. At present individuals from both mesas have gardens below Awatobi, but First Mesa, with its numerous home springs,

¹ My informant said that they came about ten years ago. No Squash people appear on Lowie's Census for Shipaulovi.

sets less store by them than the Mishongnovi people, among whom Awatobi figures prominently both in legend and in economic life.

The families composing each clan cultivate fields within the clan lands. At the present time there is, except perhaps at Shipaulovi, no shortage of land and the cultivated fields rarely occupy more than one half of the total clan lands. But the whole area of a clan land is rarely available for cultivation, since flood and blown sand are continually spoiling land, severe flood may wash out the soil, sand may accumulate and render it sterile, and the value of a given patch may be completely changed by the events of a few seasons (or even a single one). Freedom to shift the boundaries of plots is essential under a system of cultivation which is dependent on the distribution of natural floodwater and hence on minute changes in surface topography.

About twenty years ago, after some internal dispute as to land ownership and the extension of village lands on the further (south) side of the Polacca wash, a miniature boundary commission is said to have been instituted by the Agency. There was at first an abortive effort to allot land to the male heads of individual families, and many yards of fencing were carried in for the purpose. The investigators were finally convinced that such a system would not only violate the organization of society among the Hopi by disregarding the customs of female ownership and matrilineal inheritance, but would also cripple the agricultural practice, since the success of Hopi farming depends on the facility for shifting the boundary of fields and on the possession of plots in various parts of the arable area. The threatened reorganization of the Hopi land system was therefore abandoned and the rolls of fencing wire were left to rust on the ground.

The family fields themselves are, where possible, not confined to a single stretch of clan land but are scattered over the various sections held by the clan. Cöhöpmana of the Mustard Clan, the wife of an informant at First Mesa, had, for example, fields in three of her clan's lands. During the summer of my visit the field in the westernmost Mustard Clan land on *šwāpvöva* was washed out by flood and the crop ruined.

The family fields within the clan land are not marked by *kälälni*, but their extent is well known to members of the clan concerned. A stone or small post may be put at the corners and the boundaries are considered to run along sight lines between them. Fences are erected only to protect plants from the severe winds, to keep off blown sand or to exclude livestock. Where cultivated land is partly concealed in a depression or gully, the cultivator generally erects small piles of stones on the high ground to either side to warn others against driving their sheep over the field. A line of such stone piles flanks the plots along the modern waggon road as it approaches Second Mesa from the south-east. At the present time the plots actually cultivated rarely occupy the entire fields at the disposal of the family.

The ownership and disposal of fields is closely associated with the matrilineal system. Women alone are considered rightful land owners, just as they are the householders. In any general account of their agriculture the Hopi will explain that the fields belong to the woman and that they receive them from the clan. The mother of each family has several fields at her disposal. When her daughters marry she hands them one or more, or parts of several, and

on her death her female matrilineal relatives assume control of the land, the direct descendants having prior claim. The question of disposal of lands to married daughters has often little practical importance since the daughters continue to live in the house and family of the mother.

Although the land is thus closely associated with the women, they play a minor rôle in actual cultivation except at harvest time. The work in the fields is done by men, that is by the husbands and unmarried sons of the women who control the fields. Fields that were described to me as belonging to Cöhöpmana, for example, were actually cultivated by the husband of her daughter Ruth. Her own husband, Hoñeva, helped his son-in-law, and was personally responsible for only a small plot in the Mustard Clan land on Polacca wash. When Hoñeva married Cöhöpmana she had two fields, one big one on Polacca wash and one small one on the Wipo. She later acquired more land on the *sīvapvöva* Mustard land. Hoñeva's own mother, a Tobacco (Rabbit) woman had two fields on the Rabbit land on Polacca wash; these passed to his two sisters, whose husbands worked them. All their children were men and the fields now belong to Hoñeva's maternal aunt, *i.e.* his mother's youngest and surviving sister.

Since many clan members live in close proximity as an extended family group the precise title to land is often not clearly defined. Apparently the idea of responsibility for work in the fields on the part of a woman's husband was more clearly conceived than that of ownership of field or produce.¹ Several statements suggested that the individual could not in practice refuse demands should occasion arise for a share in the crop from fellow-clanswomen. The clan mother, the senior woman who usually keeps the clan fetish and ceremonial paraphernalia, would intervene in any dispute as to land or houses, and would settle the matter after discussion. These statements tend to reinforce the central idea of ultimate clan ownership of land as indicated by the marking stones (*kälälni*). Ownership is vested in the clan, the individual women have the usufruct and also the right of disposal subject to the veto of the clan expressed by either mass opinion or as a decision of the clan mother.

These customs involve the still obscure problem of the nature and history of the Hopi clans. While practices relating to land holding cannot be expected to solve this problem, the land and the genealogical data may afford some mutual illumination. Here as elsewhere in Hopi organization it is necessary to understand and distinguish between theory and practice. Theoretically, as is indicated by the use of kinship terms of address, all clan members are considered as related. In some cases, as Lowie has recently shown,² all members are actually blood relations, *e.g.* the Strap, Squash and Hawk Clans at Mishongnovi. The term "lineage" has been introduced by Gifford into the American literature to connote a unilateral group of true relatives of this kind whether they function as a clan or not. Dr. E. Clews Parsons, in her notes to "A Pueblo Indian Journal,"³ suggested that the Hopi Clan was a true maternal

¹ In large families, however, where there are several workers, each man stores in a separate pile the corn from the fields for which he is responsible either in his own or his wife's right.

² Lowie, *Notes on Hopi Clans*, pp. 330 and 348 ff.

³ *Mem. American Anthropological Association*, No. 32, 1925 p. 15 and *passim*.

lineage of this type. Lowie at first came to the same general conclusion on the basis of his census at First Mesa¹ but the elucidation of the genealogical material in connection with a similar census at Second Mesa (Mishongnovi and Shipaulovi) revealed the existence of multiple lineages in the majority of the clans. A similar genealogical enquiry at Walpi showed that the Mustard Clan at First Mesa, which appeared as a single lineage in Lowie's Census, contained no less than six lineages between which no true relationship could be traced (table 5). This clan, and others, had appeared as a single lineage when working by census methods because, as Lowie suspected, informants referred to all fellow-clansmen by relationship terms, translating them if necessary into English kin terms.

The problem is still further complicated by the existence of multiple names associated with the clans. *patki* (water) is the usual name of one clan at First Mesa, but other names, *qa'ö* (corn), *pikyēc* (sprouting corn), *ōmauö* (cloud) and *pakwa* (frog) are also used in referring to this clan or to individual members, and similar multiplicity of titles for other clans is clear from the lists in tables 1-4. All names are not given in these lists for some are little used and were mentioned only when lists of all names were asked for.²

Dr. Parsons has implied an association of this plurality of clan names with the existence of two distinct terms, *wuñwa* and *nyamö*, which are used in referring to clans, and applies the term *nyamö* (lit. people, cf. Shoshone *nömö*) to connote the clan as a whole and *wuñwa* to connote a particular named maternal family or lineage within the clan, e.g. the *kököts* (lizard) *wuñwa* (family) of the *tcö* (snake) *nyamö* (clan) or the Eagle family (*kwa'wuñwa*) of the Reed Clan (*pakapnyamö*) so that within a given clan there may be several named families.³ But the distinction between *nyamö* and *wuñwa* as given by my informants did not bear out this principle; the clan was indeed referred to as a *nyamö*, but the term *wuñwa* was interpreted as clansman, i.e. it referred to oneself, to a single or to a few individuals as distinct from the clan as a whole. The Mustard Clan was *a'snyamö*, a member of the Mustard Clan was *a'swuñwa*, and the various lineages within the clan were not particularly associated with the supplementary Mustard Clan names, i.e. rabbit stick, acorn, etc. This appears to agree with Lowie's findings. He also states that "plural names for a single clan is the native conception of the matter as repeatedly impressed on me in the First Mesa."⁴ This point was of some importance since where, as occasionally happened, different lands belonging to a given clan were referred to by informants under distinct names, e.g. Sand and Snake, Dr. Parsons' suggestion might, had it been confirmed, have indicated the association of certain lineages within the clan with definite lands. This, so far as I could determine, was not the case; each family usually held fields in several of the clan lands, a more useful practice of course in view of the agricultural hazards already referred

¹ *Op. cit.*, p. 329.

² See the lists of Fewkes and Stephen summarized in Kroeber, "Zuñi Kin and Clan," *Anthrop. Papers, Amer. Mus. Nat. Hist.*, 18, 1917, p. 135 ff.

³ *Pueblo Indian Journal*, pp. 89, 91 and *passim*. Kroeber, *op. cit.*, p. 147, note 1, has also noted this apparent implication in Mindeff's compilation of Stephen's data (*Bureau of American Ethnology, Report 7*, p. 16) but its inconsistency with formal classifications of the clan by Stephen and Fewkes forces him to conclude that "the hint for all its promise of being an important clue therefore ends in a conflict and doubt."

⁴ *Op. cit.*, p. 309.

to. But the maternal lineage is in many ways basic to the Hopi Clan and, as Lowie¹ and Parsons² have shown, it is a particular lineage within a clan that normally inherits the custodianship of ceremonial paraphernalia or directs activities associated with the clan, similarly in the control and use of land the clan functions through the "Mother" of the presiding lineage, *i.e.* the lineage which controls ceremonial. The fields of lineages and of the component households are distributed over the clan lands.

The fact that individuals do, in general, habitually refer to their fields as belonging to the clan as a whole, and exhibit considerable clan solidarity in the sharing of field labour and of the food thereby produced, and the ready transference of lands to indigent relatives or clansmen suggests that the lineage or maternal family which Parsons and Lowie have claimed as the normal and original content of a Hopi clan continues to exert its influence even where in actual fact the clan contains a number of apparently unrelated families.

At least one process whereby multiple lineages may be produced is quite clear from Hopi statements and from the modifications in clan composition since Lowie's census that are indicated by my material, namely, the merging of two formerly distinct clans. This has happened usually on account of the dwindling numbers of one clan or the incorporation of one or more families from another village and of different clan. The Badger (*hōnani*) Clan of First Mesa had also, according to my informants, the names Butterfly (*Bōvolī*), Porcupine (*moñyau*) and Medicine (*nahō*). At the time of Lowie's visit in 1915 the Butterfly Clan, formerly distinct, had just merged with the Badger. He lists both clans, the same persons appearing in both lists with the exception of his oldest Badger man.³ The interesting point is that according to Lowie's data the Badgers, a certain Yaqwa and his maternal relatives, had joined the Butterflies, while in 1929 the clan was habitually called Badger and not Butterfly,⁴ and no reference was made to the merging of probably little more than fifteen years before. Badger lands were shown to me but none were distinguished as having once been Butterfly, as doubtless some were.

The remnants of the Tobacco Clan had similarly recently merged with the Rabbit people at the time of Lowie's visit. In 1929 the term Tobacco was used as frequently as Rabbit to refer to the merged clan. Hoñeva was of this clan, he knew that the two groups had "joined up" and considered Tobacco the more proper name, this apparently because he was a genuine Tobacco man,⁵ but he was uncertain in distinguishing Tobacco from former Rabbit lands. The Snake (*tcō*) and Sand (*tōwa*) or Lizard (*kōkōts*) appear to indicate a similar process of amalgamation. According to Lowie there were two clans in 1915, but the oldest woman of his Snake Clan (Calakhu) was "said to belong really to Lizard Clan", and he further states that "the

¹ *Op. cit.*

² *American Anthropologist*, new series, 1931.

³ Save that one or two brothers of men listed under both Butterfly and Badger appear only under Badger, that list being perhaps more complete.

⁴ Dr. Parsons has suggested the probable influence of ritual needs on retaining the term Badger since the medicine chief in every ceremony should be a Badger man.

⁵ Similarly here, perhaps, since the pipe chief in every ceremony should be a Tobacco man, that title is maintained despite the numerical superiority of Rabbits.

Lizard [= Sand] Clan joined the Snake Clan for ceremonial purposes. Calakhu knows of no Snake-Lizard marriage; Lizard people call Calakhu mother."¹

In 1929 Sand, Snake and Lizard were given as alternate names for a single clan, with further names as follows: Cactus Fruit (*pöna*), Dove (*höwi*), Blueflower (*toöjōsi*), Yellowflower (*hesi*), and Prairie Dog (*Dōkya*). Takala, the husband of Hoñeva's daughter, whom I knew well, always referred to himself as Snake or Sand and pointed out certain Snake lands, although Lowie lists him as Lizard. Lands belonging to this clan were usually called Snake; none were clearly distinguished as former Sand [= Lizard] land although Takala considered the "Snake land" south of the Kacina land on Wipo as old Sand land (see map 3).

At Mishongnovi my informant, Robert, stated that Tobacco (*pīp*) and Butterfly (*Bōvolī*) people had merged with the Badger Clan. According to Lowie's data there was no separate Tobacco Clan in 1916, but the Butterfly Clan was still distinct and more numerous than the Badgers. It was then considered as linked with the Badgers for ceremonial purpose. Although the two clans are merged one cornfield area was still referred to as Butterfly land, and according to Lomanakī had still a Butterfly *kāllālni* on it, although I failed to find it when on the ground later with another informant. No land was named or definitely recorded as former Tobacco land. Similarly the Parrot (*kyac*) and Kacina Clans are distinguished by Lowie, although only five Kacina people were left.² They were regarded as a single clan by my informants. Robert and Lomanakī both referred to the recency of the merging, which had taken place about ten years before. Parrot and Kacina lands were still distinguished by name, but Parrot people had taken over former Kacina land as required. The Fire and Coyote Clans at Mishongnovi exemplify both a merging of local clans and the absorption of immigrants. At the time of Lowie's census the single Fire Clan family had merged with local Coyote survivors and also with a group of Coyote Clan immigrants from Oraibi, but the majority of the lands are called Fire, and only one is still referred to as Coyote. Fire is also the more usual name for the present clan; all this despite the fact that the vast majority of the people are descendants of Coyote people.

These instances could be multiplied from Shimopovi, where the field data indicate recent merging of several clans (see table 3), but they sufficiently establish two main points. In recent times, at any rate, merging of clans has been a fruitful source of multiplying both lineages and names of a single clan. On merging a clan acquires one or more additional lineages and names. Many of the supplementary names, especially those infrequently used, *e.g.* Acorn for the Mustard Clan, or Dove or Prairie Dog for the Snake Clan may represent mergings in the fairly distant past, whose occurrence is completely forgotten, hence the denial which both Lowie and I received on attempting to apply the theory that each name might refer to a distinct lineage within the clan. It is, however, doubtful whether merging can account for all clan names, since on this assumption, as Kroeber³ has pointed out, the average clan membership on the basis of present population would be reduced to three or four, so that the operation of

¹ Lowie, *op. cit.*, p. 310.

² Lowie, *op. cit.*, pp. 317-8.

³ *Op. cit.*, p. 137.

an independent process of name multiplication, perhaps by analogy, *e.g.* Sprouting Corn from Corn, Sunhead from Sun, must be allowed for.

After merging, the old names may cling to the once separate lands for some time, but eventually, and often apparently (from the First Mesa data) within a generation, the distinction is forgotten and they are all known by the same clan names, the ceremonially more important being carefully retained and more usually employed. In this way with the reduction of strength of one clan its lands are eventually taken over by another.

But this merging and virtual transference of land from one clan to another is not haphazard, nor apparently does a dwindling clan necessarily merge with the one most in need of land. Merging appears to follow pre-existing linkages. Clans are linked somewhat irregularly together to form a higher group of units, sometimes considered as phratries. The unit as a whole is exogamous and there is usually a mythological account of the reason for linkage. The problem is one of some difficulty since it is sometimes impossible in the earlier accounts to distinguish between plural names for a single clan on the one hand and true linked clans on the other. It is also possible that recently merged clans might be referred to by informants in such a way that they appeared as linked but still separate clans. Lowie's table for Mishongnovi includes both linked, merged and plurally named clans, but clear examples of merging following linkages are indicated.

In 1916, according to Lowie, the three clans Bear, Strap and Bluebird were distinct clans of one, one and two lineages respectively. Lowie indicated¹ that they were linked together mythologically. In 1929 these names were given as common for a single clan recently formed by merging. The lands were named Bear. The three clans had merged according to the pattern of former clan linkage. The same appears to have occurred in the cases of Parrot and Kacina; Badger and Butterfly-Lizard; Sand and Snake. At Shimopovi the Bear, Strap and Bluebird Clans, although distinct as landowners, were said to be linked as an exogamous unit. The Bear Clan itself has recently incorporated the Rabbit, Lizard and Eagle Clans who were formerly, it may be presumed, independent members of that linked group. The remaining two linkage groups which go to form the three exogamous units at this village are shown on table 4.

At the Tewa village on First Mesa, according to Dr. Parsons, "with the extinction of a clan their land is disposed of variously. For example, Kosha, the last representative of the Sun Clan of Tewa chose a Cottonwood Clan girl who was unrelated to him to live in his house and inherit his field. The house of the extinct Stick Clan of Tewa came to be lived in by the Pine maternal family of the Bear Clan and they got the field also of the Stick Clan."² There are no data as to the linkage of Sun and Cottonwood, but Stick, Pine and Bear are linked clans and form an exogamous group. The Stick people were already all dead in 1913, according to Mrs. Aitken.

The fraternities, ceremonial and dancing societies are also concerned in the distribution of land. These societies are open under varying conditions to all the people of a village, men and/or women as the case may be, but the leadership of the society is usually retained in one

¹ *Op. cit.*, pp. 332-3.

² Parsons, *Pueblo Indian Journal*, p. 91, note 142.

clan, generally within one family of that clan by descent in the female line. The leaders of such societies have fields set aside and cultivated for their benefit. At First Mesa my informants were vague, but it appeared that these fields lay in the lands of the clan in which the leadership was vested.¹ At Second Mesa, Robert stated the same, e.g. a Drab Flute field lay in Squash land, a Blue Flute field in Parrot land, but later when surveying the fields he pointed out a stretch which belonged to the Agave (*kwani*) society which was distinct from clan land (see map 4). At Shimopovi the fields of society chiefs were distinct from the lands of their clans, and ten large plots were set aside for them (see map 4). These fields are cultivated on behalf of the holders of the offices and pass to the next incumbent; since, however, he or she is generally a close relative on the mother's side the use of the land normally remains within one lineage.²

The village and society chiefs did not themselves cultivate in the past nor apparently engage directly in any economic activity. Their fields were cultivated by working parties (formed from the appropriate societies and clans?) who supplied all the needs of the chief and his household. The chief did not himself demand and organize these services. They were voluntary, and the initiative had apparently to come from individuals of another clan or society. This practice is becoming obsolete at the present time and, as has been already remarked, no distinct chiefs' lands were indicated by my informants at First Mesa. Mrs. Aitken tells me that already in 1913 the First Mesa chiefs

“had not been economically dependent, within living memory at least, on the work done for them by the people,” [but that] “at Oraibi the village chief was maintained by communal work within living memory; the men planted, weeded and harvested for the chief who was not allowed to own sheep; the men killed sheep for him and made clothes for his wife. But the chiefs who held office there in 1913 had refused to accept these services with their accompanying restrictions, preferring to work, own sheep and cattle and become rich like other men.”

Mrs. Aitken was also told that

“in old times, when they were going to plant for one of the Hano chiefs, they went to his house and made him smoke. Then he asked them why they had made him smoke, and they told him they wanted to plant for him. On the day when the people went out to plant for a chief, he took out his dressed-corn [Hopi *tipuni*] and stayed in his house with it. In the afternoon when the people came back they went to his house, and saw the dressed-corn standing, and prayed to it and thanked him for taking it out. They ate in another room in his house and went home. They say, when he took it out, he kept it for four days in his house, and the men had to sleep there four times. Then he wrapped it again and put it back where he kept it. Then he gathered up the sand in which it had been set and the cornmeal that had been thrown to it, and carried all out to the shrine [in the village square].”

¹ Dr. Parsons (*op. cit.*, p. 87) refers to two fields associated with offices—Sunwatcher and Chief of the *wōwōchim*—a religious society.

² Several cases which illustrate the practice governing transference of these offices are referred to in the *Pueblo Indian Journal*.

The formation of field parties for chiefs has not, however, entirely ceased in recent times. Mrs. Aitken herself witnessed an early planting for the chief Satele on April 10th, 1913, and a field party for this chief is also referred to in the *Pueblo Indian Journal*.¹

Mrs. Aitken's informant, Agayo, said that the periodic cleaning of springs was conducted in the same manner as voluntary field-working parties. When an individual noticed that work needed doing at a spring he suggested the formation of a party to the owner (? the owning clan's chief), presumably after ascertaining that a considerable body would join in the work. The owner then arranged for the announcement of the party by a crier, and prepared prayer-feathers to be placed by the spring after the work had been done. At the appointed time the party assembled, did the work and ate food prepared for it, and were then thanked for their work.

So far, however, we have discussed only what may be considered the theory of land distribution. Although all my informants, and other individuals whom I questioned casually, gave substantially the same account of the disposal of land, as set out above, which undoubtedly covers the majority of cases, yet frequently when enquiring as to the possession or inheritance of individual fields remarkable anomalies were found. These consisted in infringements of the rule of matrilineal inheritance by females whereby men acquired fields from their relatives and in some instances passed them on to their daughters or even sons, *i.e.* transferring them to individuals outside the clan. The effect of such infringements, if operating on a considerable scale, would, of course, rapidly disorganize the whole system of clan lands. It was therefore most remarkable that informants appeared to attach so little importance to these anomalies. My informant, Robert Koyanomtiva, at Mishongnovi, had three plots of corn in his deceased mother's clan lands (Parrot), while his two patches of beans and melons were planted in his father's land; he did not cultivate any fields in his wife's clan lands. He claimed that Luke Kowanyosi also had fields in his own clan lands in addition to those of his wife. Robert said that where a family depends on fields from the father's clan the mother would make regular presents of *piki* bread and other food to her husband's family. Such land reverted to the husband's clan on his death, but the sons might continue to cultivate them if the father's clan did not need them and gave permission. Both these men were Christians living below the mesa village near the Mission, but since their fields were within the traditional clan lands there is little reason to believe that their religious secession accounted for their anomalous land holding. Moreover, Patrick Tawawani, an orthodox Hopi of Shimopovi, cultivated fields in both his wife's and his own (Bluebird) clan lands. At Shipaulovi, according to information obtained incidentally by Lowie, male possession of fields was well recognized, for he was told of the following practices in succession to land.² Fields were given or left to children, both boys and girls, in equal amounts, but there is also reference to division by the clan (?) chief. A man's

¹ The sociological functions of the chiefs in relation to agriculture and particularly to the arranging of field parties and the fixing of planting dates are apparently complex and certainly obscure. Dr. Parsons tells me that more data will be forthcoming in a diary by Stephens which she is now editing, but that the matter is still by no means clear.

² MS. notes kindly placed at my disposal.

fields if he had no children were left to his wife, who could not dispose of them. They eventually descended to his nephews and nieces. There is no statement as to whether this referred only to his sister's children, which would retain the land within his clan. A woman's fields, however, do not pass to her husband but are retained within the clan. Should she have no children they go to her nephews and nieces whose parents, *i.e.* her sisters and brothers, may hold them in trust. Shipaulovi as a relatively recent village with limited land is in a peculiar position which may, to some extent, account for the earlier part of these statements.

At First Mesa Cöhöpmana stated that many years ago she gave parts of her land on *sivapvöva* (Wipo side) to her two brothers because there were not men enough in her household to plant all her land. These brothers also plant fields in their wives' clan lands. But Cöhöpmana considered that the fields belonged to her clan still, that she could claim them back at need and that they would return to her family when her brothers died.

Instances of men holding lands at First Mesa are also cited in the *Pueblo Indian Journal*, edited by Dr. Parsons. Land is said to descend within the maternal family, but men as well as women are found in possession. Irregularities also occur, as for instance: "When Sakwistiwa (Water Clan) died he gave this field to his daughter (Horn Clan) for her lifetime, her people being very poorly off in fields. After her death the field will go to Mumsöwö, the nephew who succeeded Sakwistiwa in office as chief of the Agave society, and so back to the Water Clan. Normally land descends in the maternal family, *i.e.* to a man's sister or her children. If he have no close maternal kinsmen he can 'hand it' either to his remote kin, *i.e.* clan, or to his own children."¹ This last statement does not agree with my information, since *normally*, according to my informants, land is held by *women* and descends to their female relatives on the female side, but there is no doubt that the control of land by male clansmen does exist.

That the Hopi system also holds among the Tewa was stated by both Hopi and Tewa informants, but I was not able to investigate this in detail. Dr. Parsons suggests that both men and women inherit in the female line. This is certainly the system, she tells me, in the Eastern Tewa villages, and it may have lingered on among these emigrants to First Mesa. The author of the *Pueblo Journal*, a Tewa, worked, however, in his wife's field which she had received from her "old uncles," and would pass on to her children.

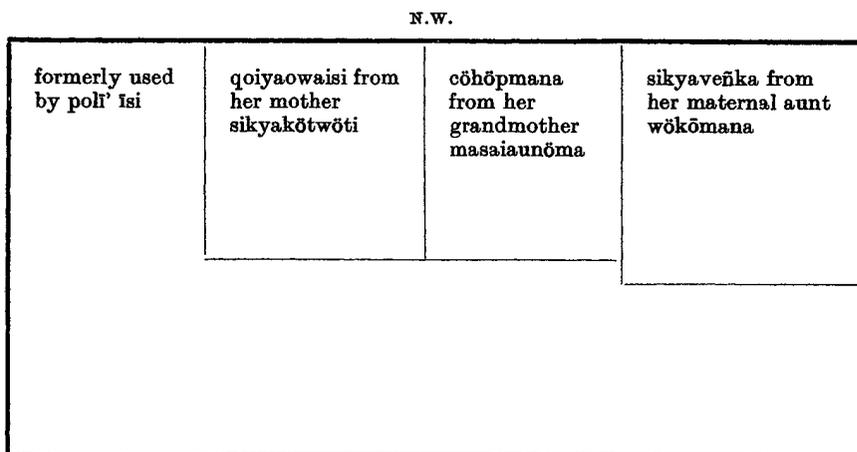
It is necessary to distinguish between the acquisition of fields by men from their maternal relatives and the handing on of fields by men to their own children. The former does not involve alienation of land from the clan and is probably fairly common. The latter procedure, which results in transference of land to members of another clan, is probably unusual except where the man's clan is much reduced in numbers or his wife's clan is very short of good land. In such a case the children must obtain permission of the father's clansfolk and cannot transfer or bequeath the land without fresh permission.

It is clear, therefore, that the Hopi system of land tenure while in theory one of clan ownership with inheritance of usufruct by females in the female line is, in practice, subject to considerable modification. It is possible that some of the present irregularities are due to the

¹ *Op. cit.*, p. 91, note 142.

dwindling of numbers and the emigration of individuals to the Agency workshops and to the American towns to the south. American influence is also tending to encourage male control of the land, and the new fields beyond the Keams Canyon wash are, according to Takala, held by men in their own right.

MUSTARD CLAN—SIVAPVÖVA LAND.



MUSTARD CLAN—POLACCA LAND.

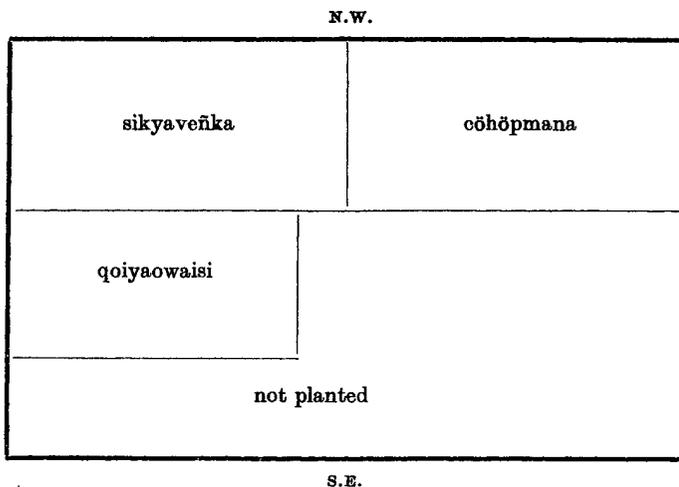


FIG. 4.—DIAGRAMS OF PLOTS IN MUSTARD CLAN LANDS ON SIVAPVÖVA AND POLACCA WASHES, 1929. FIRST MESA.

Present conditions will perhaps be best understood from an account of the disposition of family fields within the lands of particular clans.

In the Mustard Clan lands at First Mesa (see genealogy in table 5, map 2 and fig. 4) :—

(1) Cöhöpmana has fields in three of the lands (on the Polacca, Wipo and Sivapvöva), two plots (apparently parts of the fields) are actually cultivated by her two married brothers and

do not benefit her household. The rest have been virtually handed over to her daughter, Ruth, with whom she lives and are cultivated by Ruth's husband, Takala, with the aid of Cöhöpmana's husband, Hoñeva. The field on the Polacca wash Hoñeva regards as more particularly his own, *i.e.* his wife's.

(2) The husband of Omauö's daughter (of the same lineage), Honewisnōma, works in fields in his own (Snake) clan's territory. This land was given him by *his* mother when she died. The mother had only one daughter who worked in Winslow and no one else wanted the fields.

(3) Qoiyawaisi also has fields in two of the same lands as Cöhöpmana. They are cultivated by her daughter's husband, save that a part of one field is used by Qoiyawaisi's son who married a Bear woman. Qoiyawaisi is "mother" of the Mustard Clan, and brought the clan fetish and other ceremonial articles from Walpi to her Sichomovi house when her predecessor Wokomance died. She was apparently not Wokomance's real daughter, but she will be succeeded by her own daughter Talaiwaisi.

(4) Sikyaveñka has a field next to Qoiyawaisi on the Polacca land, and another on the Sīvapvōva land.

(5) Pala'avatca has fields on Wipo wash and out on the far land (New fields) beyond Polacca, in the line of water-flow from *hökatwi*. She received them from her mother Höwi. Her sister, Norma, shares these, but Norma's husband is a Deer Clan man, and as the Deer people have much land, he also works (? mainly) in fields there.

(6) Növa, who is now dead, did not use any Mustard Clan land because she had a field in Bear Clan land. This field was given by a Bear clansman, Mīle, who was a friend of Növa's uncle, Nahö. Növa's brother, Lomaisva, is still planting in that field.

(7) Polí'isī had fields but has given them up; her daughter (Nīvahoiyana?) lives at Winslow. If she were to come back the Mustard Clan would, according to Cöhöpmana, find good fields for her. Polí'isī supports herself by her pottery. Her present husband has a considerable flock and fields on the far side of Keam's Canyon Wash.¹

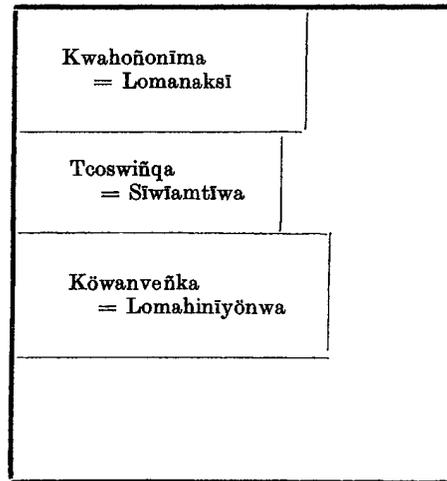
At Mishongnovi, Lomanaksī of Sand-Lizard Clan worked in his wife's fields, *i.e.* in Water land. His most important field was near Naktcomo. Two other men were planting in this place, Sīwīamtīwa, who had married Lomanaksī's wife's sister, and Lomahinīyōnwa (Mike) who was married to another Patki clanswoman. They cultivated only about half the clan land, the disposition of the fields being as in Text-fig. 5A. The rest of the land was apparently unoccupied.

On the northernmost Corn Clan land at Mishongnovi the disposition and approximate proportion of the cultivated areas was in 1929 as shown in Text-fig. 5B.

Mrs. Aitken has kindly given me the following account of the fields cultivated in 1913 by a Tewa (Leslie Agayo) of the Corn Clan. This man lived with his Walpi

¹ Diagrams of the individual plots in the Mustard Clan lands are shown in Text-fig. 4.

WATER CLAN LAND.



WATER CLAN MEMBERS CONCERNED.

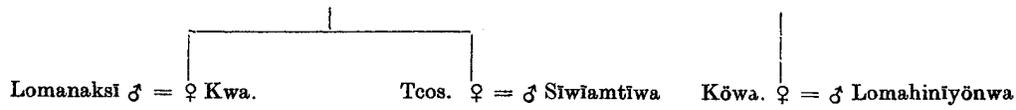
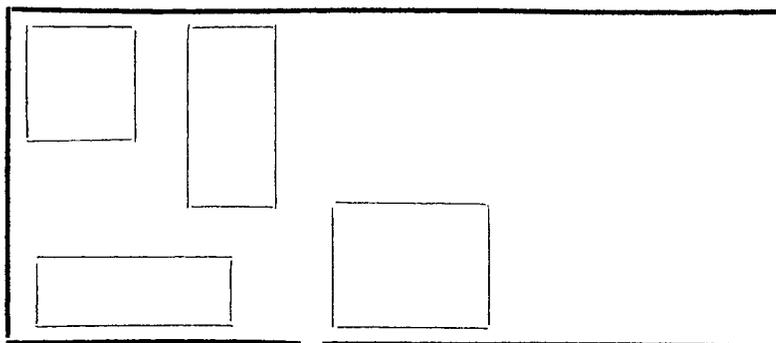


FIG. 5A.—DIAGRAM OF PLANTINGS IN A WATER CLAN LAND AT MISHONGNOVI, 1929.



↓
arroyo

FIG. 5B.—DIAGRAM OF CULTIVATED PLOTS IN THE NORTHERNMOST CORN LAND AT MISHONGNOVI, 1929.

(Hopi) Deer Clan wife and did not contribute substantially to his mother's household :—

“ In 1912–13 he planted in three places for the support of his wife and children :

“ (1) Corn, in his wife's field in Walpi Snake-people's land, south-west of Walpi. She has a field there which belonged to her Snake father. This A. called ' my field. '

“ (2) Corn, on Walpi Cloud people's land, south-east of the mesa. Shupla, his wife's grandfather, plants there. This used to be the best land of all, but by the formation of a new wash its water had been cut off, and Shupla had gone to plant with Snake people, his wife's clan. As he was too old to work much, A. worked for him in summer, apparently in both places.

“ (3) Beans, water-melons and melons in ' his own field ' in Tewa land, north-east of the mesa—presumably in Corn people's field. He takes occasional presents of beans to his mother's house, I think.

“ He has some peach trees on the slope of a valley in Tewa land. He has a number of sheep and goats which he keeps with his brothers. ”

Agayo made the following statements as to the transfer and inheritance of fields :—

“ Suppose that a man plants (for his wife and children) on his own clan field. On his death his brothers or maternal-nephews will plant it. But if his own sons, at his desire, plant the field the very next year after his death, they are free to do so. Then, next year, they will ask their father's people, ' Do you want to plant your field ? ' and very often they allow the children to keep it. For example, Finney (Agayo's son, Deer, Walpi) would ask (Tewa) Corn people, ' Do you want to plant your field ? ' and if they said no, he could plant there all his life, if he pleased, without further question. On Finney's death, Corn people would have a chance of resuming it, his children would ask, ' Do you want to plant your field ? ' and if not, Finney's children would plant it.

“ When a man plants for his wife and children on his wife's field, her people resume planting it on his death.

[“ When the Kacina Clan wife of T'oseñ (Agayo's maternal uncle) divorced him in 1912, she engaged one of her own younger clansmen to live in her house through the winter and plant for her in 1913. He quarrelled with her before the end of the winter and left the house. Her older relations advised her to make it up with T'oseñ if possible. ' One of your own people might be willing to plant for you, but only a husband will give you meat and clothes. ' ”—B.A.]

“ Walpi Snake people have the best Hopi land (since Cloud people's land has been spoiled). Snake people have very large fields and few people, and they let many outsiders have land. Agayo's wife has the field which belonged to her Snake father. ' Snake people invite 'U'ubaseñ (Tewa Corn) to plant there because he is married to a Snake woman. ' [Why 'invite,' ? Because it was not her field.] Wicti (Walpi Rabbit) and Tañ'e (Tewa Pine, married to a Sichomovi Sand or Lizard woman) ' both plant down here, borrowing from Snake people. '

[“ It seems from the foregoing as if 'U'ubaseñ and Shupla are not merely planting the fields of their Snake wives but are invited by Snake people to plant other fields on their own account.

“ Adjoining the field which A. plants in Snake people's land, and separated from it by a sight-line taken from a twig stuck on the southern boundary to two trees on the west, is a field which is referred to, in the Corn household, as 'Pälā's field' [A.'s sister] and 'Donald's field' [Pälā's son] indifferently. A Snake man sold it long ago to one To'utsi (a Hopi, but ? clan), who afterwards went away to live at Zuñi, and sold it to 'Awæ (Tewa Cloud people), Povi'a ayu's first husband. 'Awæ paid for the field with six black woollen dresses, one red-bordered cotton cloak and one belt, all woven by himself, and one Navajo and one Havasupai blanket. A. remembers this well; he was 'Donald's size' at the time, perhaps 1885 or 1890; in any case earlier than 1895. At his death 'Awā left the field to his eldest daughter Pälā 'for' her eldest son Donald (she has no daughters), and Pälā's husband Gunauya (Walpi Corpse-Firewood-Fox) plants it. Young Donald speaks of it as 'my field.' Donald's father (Gunauya) has two fields of his own in different places, inherited from his mother, the late female head of Walpi Corpse-people. There are no female members of her clan living.”]

ZUÑI LAND HOLDING.

Data on the conditions of land holding and inheritance at Zuñi, the pueblo group closest to the Hopi, would be of considerable comparative importance. Unfortunately they did not fall within the purview of Kroeber's *Zuñi Kin and Clan*. Some data were collected during a short visit in 1929. They indicated a type of cultivation closely parallel to the Hopi, some details of which have been published by Cushing in “Zuñi Breadstuffs,”¹ but there was little evidence of the importance of the clan in the distribution and acquisition of fields. Fields were usually owned by women, but this rule was not rigid. A young married man worked in the fields of his wife's parents with whom he lived, but he would also cultivate his own if he had secured any from his relatives. Where a man owned fields they should properly be inherited by his daughter's and his sister's children, and a man often gave a field to his sister's son when he was old enough to use it and to his sister's daughter when she married.

Where a man had no son or daughter his land was usually claimed by his relatives of *his* own clan. Women have the first claim on land because they will stay with the family all their lives. Fields were also loaned for seasons by owners of extensive land to others with large families; no payments were made for these loans. Fields were, however, transferred permanently for payment, for example, a large field (estimated at 3 acres) for three strings of shell and two strings of turquoise beads, or for ten sheep and a horse with saddle, blanket and

¹ Heye Foundation, *Indian Notes and Monographs*, vol. 8, 1920.

bride. The statements here summarized agree very well with those features of Zuñi society emphasized by Kroeber, namely, the paramount importance of the family as distinct from the clan which is "above all a ceremonial institution. . . . Take away the clans and the forms of Zuñi religion will be studded with vacancies, but the life and work of day to day, the contact of person with person will go on unaltered. [The clans] are only an ornamental excrescence upon Zuñi society, whose warp is the family of actual blood relatives and whose woof is the house"¹; and secondly, the essentially bilateral character of the kinship ties and importance of relationship on the father's side. Matrilocal residence doubly cements the relatives in the female line, but "so far as Zuñi reckoning goes, however, the sentiments of kinship and affection are the same toward father and mother, toward the brothers and sisters of each, and toward the partner and children of son and daughter. A cousin on either the father's or the mother's side is identically an older or younger brother, toward whom the same degree of oneness is felt."

AGRICULTURAL SEASONS AND CALENDAR.

The Hopi season opens in February with the clearing of fields and ends with the last days of September when the last corn and beans are gathered in. Although the condition of the season and weather determines the precise time of various agricultural operations, each stage is also anticipated and regulated according to a precise calendar. This calendar, which also serves to determine the dates of the numerous religious ceremonials, is provided naturally by the daily shift in the position of the rising sun on the horizon. The smallest irregularities on the far mesas to the south are well known, and the more significant within the sun's path, probably some twenty or more, are named with reference either to their form, to ceremonial events, or to agricultural operations which fall due when the sun rises immediately behind them. For a well-educated Hopi of Walpi such terms as *neverktcomo* and *lōhalin* have as precise a significance as have for us May 3rd and June 21st with which they correspond.²

The observation of these sunrise horizon positions is nevertheless skilled work, and it is the duty of a religious official, the Sunwatcher, to observe them, to forewarn the people of important dates and to announce them in due course. This duty is inherited at Walpi in the Water Clan, and much depends on the selection of a good man from among those eligible. The author of the *Pueblo Indian Journal* commented in 1921, "We think the Sunwatcher is not a very good man. He missed some places, he was wrong last year. And I think he is going to miss or take on some place (*i.e.* observe inaccurately). All the people think that is why we had so much cold this winter and no snow."³

¹ *Zuñi Kin and Clan*, p. 49.

² Cf. Parsons in *Pueblo Indian Journal*, p. 120, note 184, ". . . the solar observations from year to year are very close, differing only a day or two. From 1921 to 1924 Crow-wing kept memoranda of the planting dates and these, like solstice dates, have varied only by a day or two from year to year."

³ *Pueblo Indian Journal*, p. 75.

A few of the more important points on the Walpi sunrise horizon are indicated in Text-fig. 6A,¹ and part of a Tewa map showing the horizon, kindly lent me by Mrs. Aitken, is reproduced in Text-fig. 7. Unfortunately informants were unwilling to discuss it in detail as it was considered improper that a stranger should understand the timing of ceremonial activities. The Tewa did not have a Sunwatcher but followed the Hopi announcements.² A similar and more detailed horizon calendar was obtained for Shimopovi and is shown in Text-fig. 6B.

The first corn is planted at First Mesa in the third week of April—great importance attaches to this early planting since it provides corn for the *nimankatcīna* ceremony (Departure of the Ancestor Spirits) at the end of July, but the bulk of the corn-planting takes place considerably later. It is probably postponed as late as possible in order to avoid late frosts and to obtain the greatest advantage of the summer rains for the sprouting corn. Sandstorms are also particularly severe in the late spring; these while very destructive to young plants appear to serve one useful purpose in filling cracks on the field surface, thus reducing evaporation.

Water-melons and squashes follow the *nimankatcīna* corn when the sun is announced to have risen behind *neverktcomo* in the first week of May. The main planting of corn and beans with further squashes and water-melons begins when the rising behind *kwitcala* occurs in the third week in May and continues if necessary until the summer solstice, when the sun has reached its home (*tawat kyata*) at *lōhalin*. The whole period of planting, from the end of April until the solstice, is further divided into a number of smaller periods of rather less than a week in duration, named from successive horizon points behind which the sun rises. All these points are announced by the Sunwatcher and many of these are generally known. There are according to Hoñeva about half a dozen points between *kwitcala* and *lōhalin*. Individuals generally follow the same programme each year and wait for the announcement of the day or period in which they intend to plant.³ Since field parties of relatives and friends are formed for planting, relatively few fields are planted at any given time. These field parties are arranged beforehand, and the helpers, if they are not members of the owner's

¹ The positions and bearings of apparent sunrise diverge variously from the positions and bearings of theoretical sunrise, *i.e.* that which would be observed at sea level on a skyline horizon in that latitude, on account of the varying interference, according to altitude and configuration, of the mesas on the skyline above which the sun actually first appears, and along whose profiles the apparent sunrise is marked. The apparent daily march of the position of sunrise is also rendered uneven. Westward facing slopes have the effect of spacing out the apparent positions more widely, while on horizon profiles falling to the east the daily positions lie closer together. This interference may also account for the difference between the theoretical angle subtended by the positions of the summer and winter solstices in the latitude of Walpi, *i.e.* about 38°, and that subtended between the apparent solstice sunrise positions at Walpi as indicated by my informants, *i.e.* about 60°.

² Mrs. Aitken's Tewa informants imply, however, that observations were made at Hano.

³ These periods are referred to by name in the *Pueblo Indian Journal* as follows: "Way down planting time," "Where the wash spreads," Grasshopper, Coyote Bitch, Stone Hill (or Rock pile) and Hole through (or Rock hole through, *i.e.* Perforated Rock) (pp. 87 and 93). Only the last four probably refer to points on the horizon.

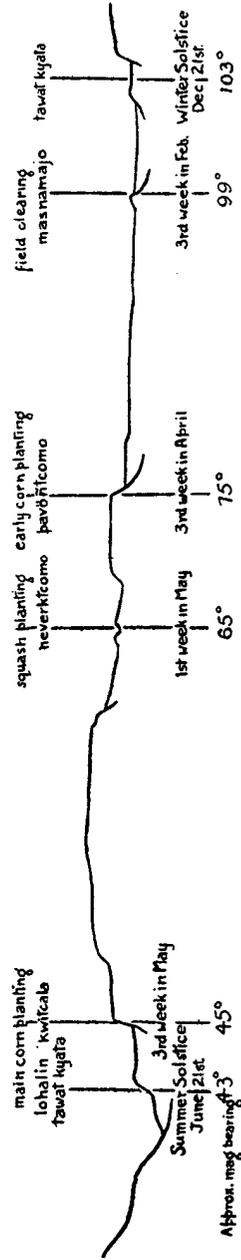


FIG. 6A.—HORIZON CALENDAR, DECEMBER TO JUNE, WALPI.

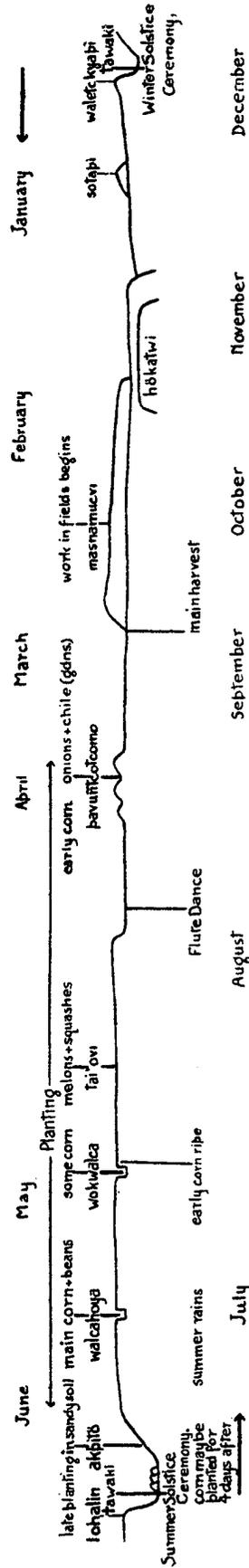


FIG. 6B.—SHIMOPOVI HORIZON CALENDAR. (FROM A NATIVE DRAWING.)

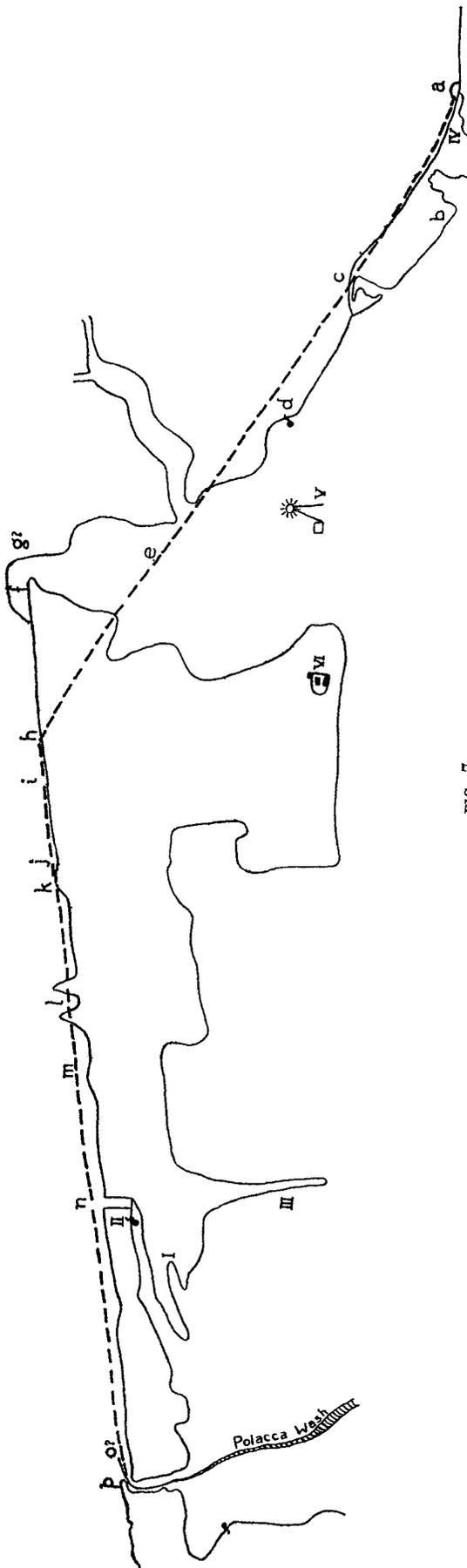


FIG. 7.

From part of a Tewa drawing by Leslie Agayo, Corn Clan, Hano, and kindly placed at my disposal by Mrs. R. Aitken. This part of the drawing represents the mesa edge to the west-south-west of First Mesa from the emergence of Polacca Wash to the modern wagon road to Holbrook. The foot of the cliffs of the far mesa is indicated by a contour line, but the line from *p* to *j* is a horizon profile. The sun's apparent progress is shown by the heavy dashed line; *a-p* are date points on the horizon known to the informant. His statements are given in quotation.

a—Winter Solstice position, "For four days in December the sun rises at this place. First there is the thanta'i ceremony [at Hano]; then one-day dance at Walpi, then the sun stands for four days, then on the fifth day it begins to go northward." There is a shrine of piled stones below the far mesa at the place where the sun as viewed from First Mesa appears to rise at this time. This "winter solstice house" is not visible from the First Mesa villages.

b—K'owile (bird). Water corner.

c—Grey Ridge.

d—Shady Water (Spring). "When the sun gets here on its return journey (i.e. in the autumn) we gather corn." "All the corn is ready and ripe to take."

e—The last water-melons must be gathered before the sun rises here in autumn. "When the sun gets here on its return journey, corn and water-melons get frozen, and such water-melons as remain in the fields are frozen, not worth taking; from here to Shady Water we cook such unripe corn as is not spoilt."

f—Where there is Rock Pine—early water-melon planting.

g—Owl Corner.

h—A position for early planting of corn in spring. "At this date, two days before Satele's 'early plant,' they used to make an 'early plant' for a man now dead" (presumably a chief). Early corn continues to be planted until sun rises at *k*.

i—A position for early planting in spring (April 10th, 1913) and for water-melon harvesting in autumn. An "early plant" for Satele, Tewa Bear people Chief. "When the sun gets here on the return journey we gather water-melons, just the ends of their leaves are frosted."

j—Position for onion planting in spring.

k—Rock becomes a Mound; Hopi name *peluikomo*. An early corn planting point and the water-melon planting in spring. The latter continues until sun rises at *l*—At the Owl Horn Lane.

m—Main corn planting on the level fields.

n—"The Lane"—later corn planting in the washes in spring, and in autumn the first fruits of the water-melons planted at *f*. "When the sun comes out at the lane they begin to plant corn in fields in the washes to the west of the Mesa [i.e. Wipo side] which have water running in them. When the sun gets here on its way back, they bring a small water-melon of those sown at 'Where there is Rock Pine'; and then the Kafcinas are closed up—all gone home" [i.e. *nimamkatecina*—but this is not held until late July, a month after solstice].

o—At sunrise here [after summer solstice] first corn and some water-melons are ripening. "They cook corn [(?) green corn roasting in field ovens] and take some water-melons."

p—Water-cellar—Point of Rocks promontory, summer solstice sunrise position. Corn is planted on sandy land. "It makes the sun stop—blocks the way of the sun; at middle summer the sun comes out here; we say, the sun has arrived at middle summer. The Tewa people only, not the Hopi, make feathered sticks then to turn him. Now they plant corn in the sand fields—sand planting time has arrived."

I.—Ladder Pole—deep well here with a ladder.

II.—The Water that says "Pung."

III.—Water-Bread stone-making promontory (= Hopi Töm).

IV.—Little Eagle Under.—Boundary between Tewa and Hopi land [this is Hopi *kwatshyga*—Eagle Point. This boundary agrees with the Tewa claim referred to on p. 366].

V.—White man's water-dig. American windmill and tank.

VI.—Sun's Shrine—a structure of piled stones.

household, are paid with presents, reciprocal services or the promise of a certain share of the crop.¹

The moon calendar at First and Second Mesas is as follows :—

1.	<i>pa' moyawö</i>	..	play	moon	..	Falling in January.
2.	<i>puwa</i>	,, ..	quiet	,,	..	February.
3.	<i>ösö</i>	,, ..	sprouting	,,	..	March.
4.	<i>kwäya</i>	,, ..	melon-planting	,,	..	April.
5.	<i>pama'ö</i>	,, ..	planting	,,	..	May.
8.	<i>hakiton</i>	,, ..	waiting	,,	..	June.
7.	} <i>tala'va</i>	, ,	nameless	,	
9.						
10.	<i>nasa'n</i>	,, ..	harvest	,,	..	September.
11.	<i>toho'oc</i>	,, ..	burden	,,	..	October.
12.	<i>kel</i>	,, ..	initiation	,,	..	November.
13.	<i>kya</i>	,, ..	'ware	,,	..	December.

But there are also traces of the six moon name cycle. The terms given above for Nos. 1, 2, 3 are also used sometimes for Nos. 9, 10 and 11, while the term for No. 13 is sometimes used for the first of the nameless moons (No. 7).

¹ The entries covering the planting period in the *Pueblo Indian Journal* afford examples of this organization :—

May 22nd.—Planting started yesterday but the people all went to Second Mesa to see the dance. So the man whose turn it was to plant, Tsobe of the *patki* (Water) clan, called out and he went to plant. . . .

May 23rd.—Tsobe is going out to plant [again] to-day. The people who may plant may plant to-day or to-morrow in some places not everywhere. Some people wait until the next *patki* (Water) clan man plants Anga [he plants the Sunwatcher's field one of the two fields associated with an office. . . . Anga is the older brother of Mawa, Sunwatcher], and some wait for the Grasshopper planting. I have to plant at the Grasshopper planting. This is the way it goes. . . .

May 23th.—The Sunwatcher has to go to the man next to plant. He tells him to get ready for to-morrow. If others want to plant that is all right. They are glad to plant with this rain chief or *yui'asita*. Sometimes four men or more will plant when the rain chief plants. They join together so as to bring rain.

May 29th.—The planting starts to-day. The *yui'asita* is to have his working party. It has been changed this year. This man always plants five days before the Grasshopper planting; but this year the Sunwatcher makes a change making the planting day earlier. . . .

June 2nd.—It is the Grasshopper planting so the Eagle family of the Reed Clan is going to have their planting work party.

June 7th.—The Coyote bitch planting time has come. So Chakwen the *kokochwunge* (Lizard maternal family) man is going to have his working party. . . .

Some of these entries suggest that the Sunwatcher or some other authority decides when the various fields are to be planted, that the announcement of the Sunwatcher is an order, as it were, to certain individuals or clans to plant. The statements I obtained indicated that men arranged beforehand for the formation of parties and selected their day, the function of the Sunwatcher being merely to inform them of the day. According to Hoñeva "the Sunwatcher is not so important as in the old days." This may, however, merely reflect Hoñeva's conversion to Christianity.

CULTIVATION AND CROPS.

The clearing of fields is begun when *masnamajō* is announced in the latter part of February. Greasewood branches are cut and gathered to repair the brush fences which are maintained to protect exposed plots against blown sand. Weeds (*tōsaka*) and sage brush are dug up with a short-bladed tool known as *winarioktaka* (wood old man) (Text-fig. 8, 2). This loose brush is then raked off with rough wooden forks made from juniper branches known as *tsavalanpi* (earth scraper) (Text-fig. 8, 3). Weeds must be kept down by continuous hoeing and uprooting during the growing season, otherwise they will consume moisture needed by the crops. The

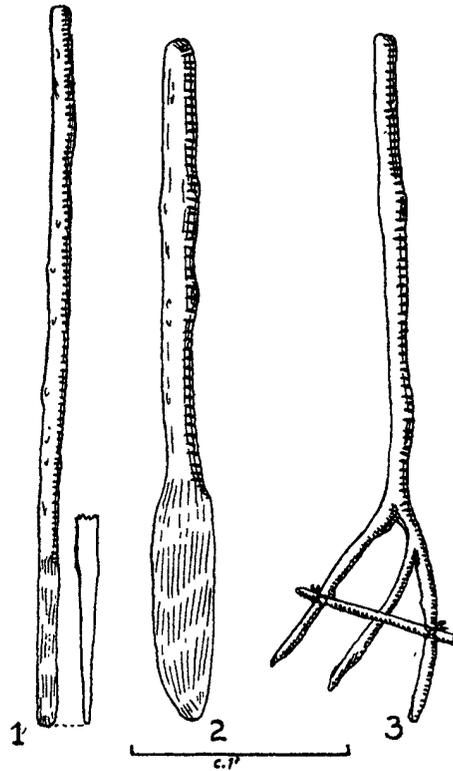


FIG. 8.—AGRICULTURAL TOOLS: 1. PLANTING DIBBLE; 2. WEED-CUTTER "WOOD OLD MAN"; 3. RAKE; "EARTH SCRAPER."

surface of the ground is first loosened over the area to be planted later, that is between the stumps of the corn clumps of the previous years. These clumps are not removed with the weeds but are allowed to remain in the ground and, as will be seen, serve as guides for the next planting. For this operation, which produces a tilth and probably assists in the conservation of water, the bladed tool is used and functions as a hoe. Square-bladed iron hoes of Spanish type and wooden copies of them are also to be found in use.¹ Hoñeva considered that it took one man nearly a fortnight to clear and hoe a normal sized field in this way,

¹ Cf. Hough, *Proc. U.S. Nat. Museum*, 54, p. 236 and fig. 1.

allowing four or five days for weeding and clearing and twice that time for hoeing. Iron forks, hoes and spades bought at the trader's store are rapidly superseding the native tools.

The typical Hopi corn plot is usually about an acre in area. A number of plots which were paced out on the ground varied from 45 to 60 paces wide and 60 to 90 paces long. Before planting, the patch is paced out into three or four strips each about twelve paces wide (fourteen if the individual is small). The length of the strip is not paced and varies according to requirements and the condition of the ground. Each paced strip is planted separately. The planter begins at the top end of the first strip, seeds it in transverse lines about three to four paces apart. Five seed holes, separated by about two paces each, are made in each transverse row. Reaching the bottom he moves across to the second and working transversely up to the top of that strip continues down the third and up the fourth. The transverse rows of adjacent rows are placed so that they alternate with each other. The rows of planting holes of one season are placed between the rows of the previous season (see Pl. XLII, fig. 2). The holes are made with a dibble (*so'ya*), a wedge-ended stick about a yard long and two inches in diameter (Text-fig. 8, 1). The planter crouches on one knee swinging the dibble through a quarter circle from over his head making a deep narrow trough with a vertical face at the far end and scooping the loose earth towards him. He excavates to a depth of nine inches to one foot, loosens the soil at the bottom to a depth of three or four inches. This he powders finely to make a "bed" for the seeds. From ten to twenty seeds are dropped in and covered with loose earth. Women occasionally help the men especially if planting is behindhand. They hold the bags of seed corn and drop seeds in the holes when ready. This deep planting assists in the development of the rooting system and protects the seedlings against washing out by heavy rains or flood. The large numbers of seeds are required not only to insure against the ravages of field mice and cutworms but on account of the destructive powers of the violent sand-laden winds usually blowing from the south-west. The corn sprouts like a young bush with a dozen or more stalks, but the windblown sand cuts away almost half the stems before they are able to develop enough foliage to protect themselves. By harvest time the leaves of the corn clumps on the windward side of an exposed field have been torn into withering shreds (Pl. XLII, fig. 3).

The time required for planting varies, of course, with the number of workers. Hoñeva once planted his family's main field alone, nearly an acre in extent, in three days. Corn of different colours are planted in the various fields or strips of a field. White and blue are most grown, red and yellow are considered to require more water and do not yield so well. Seeds should begin to sprout in eight to ten days after planting. Where seeds fail to sprout the hole is usually re-seeded—this should be done before the summer solstice, but sometimes seeds planted as late as the days before *nimankatcīna*, i.e. early July, will sprout and mature. The ground round the plants is frequently hoed and cleared of weeds; it should be kept loose and powdery. The corn is not hilled as in the Eastern Woodlands, but low banks about a yard in diameter are often scooped up to encircle each corn clump to retain water after rain and flooding.

Beans are occasionally planted between rows of corn but usually in another and smaller plot. Beans are planted in two strips with five plants in a row transversely, half a pace apart

across the row and each row about a pace apart. The seeds are set about six inches deep, eight to a hole, and should sprout in five to six days (Pl. XLIII, fig. 3).

Squashes, water-melons and mush-melons are likewise planted in alternating strips, usually three. But they are spaced more widely, three plants in a row, and each plant five long paces from its neighbour, and each row the same distance from the next with five rows in each strip of a well sized plot. A few gourds are usually planted in the melon plots for the making of gourd dippers, bottles, rattles and other implements.

The land in the middle of the valleys is considered best for corn, "it is sticky like clay, keeps wetter and does not blow away," according to a First Mesa man, "but beans and melons like sandy ground close to the mesa best though they will grow anywhere." Second Mesa men also pointed out how much better the corn was growing close to the washes, whereas the beans planted in the valley cornfields grew too high and with few pods. The plants receive considerable care during their growth. Low banks leaving a hollow from three to six feet in diameter are raised around individual plants to retain water after rains. Parts of the plot which fail to receive flood water are levelled off or roughly trenched to promote a readier flow. Where plants, particularly squashes and melons, are planted in an exposed position, a miniature windbreak is constructed with twigs of greasewood (?) (*Canotai holocantha*) or rabbit brush (*Crysothamnus*) (Pl. XLIII, fig. 2) to protect each young plant from being tattered or smothered by blown sand.

The crop on a particular plot is rarely changed, and that most suited to its quality is continuously grown, fertility being maintained by the wide spacing of plants. Mrs. Aitken was informed by the Tewa that a rotation of beans, pumpkins and sweet corn was practised in some fields. This was probably rare, and her informant also stated "A melon field always keeps the same."

Work in the fields began at sunrise in the old days and, except at harvest time, was abandoned before the heat of the day. Where the fields are at any considerable distance from the village small temporary huts are erected in the fields and used as shelters from heat or storm. These huts were often occupied by the entire family during the period of roasting green corn and during the main corn harvest (Pl. XLIII, fig. 4).

The maintenance of the irrigated gardens is not laborious apart from the occasional repair of walls and the clearing of channels. When the small plots of chile, onions, vegetable dyes, used mainly for colouring piki bread, a kind of cress (*cita*), and sweet corn have been sown they are visited about twice a week in the early morning for watering and weeding. The trees which are encouraged to grow extensively round these irrigated plots (see Text-fig. 9 and Pls. XLIV and XLV) assist materially in reducing the loss of water by evaporation.

Hopi corns are pure strains with twelve rows, the cob is rather short, usually only about 6 inches in length. They are floury but dent corn is not unknown. Blue and white corn is said to ripen more quickly and to yield larger cobs than the other varieties. Red or pink corn is little grown because it yields badly; it is, however, prized for a dish known as pikani, which to-day is apparently made by roasting a mixture of ground corn and sugar in an earth oven.

Lōmanaksī and others at Mishongnovi claimed that there were six kinds of corn in the old days :—

white	=	<i>gotca qa'ō.</i>
blue	=	<i>sakwapo qa'ō.</i>
black	=	<i>kōkōma qa'ō.</i>
yellow	=	<i>takoji qa'ō.</i>
pink	=	<i>wioktō qa'ō.</i>
speckled	=	<i>qōmapavatsa qa'ō.</i>
		(black spotted)

Only the first and the last of these are terms descriptive of the colour ; the informants could not explain the others. They also considered sweet corn to be aboriginal ; this is doubtful,

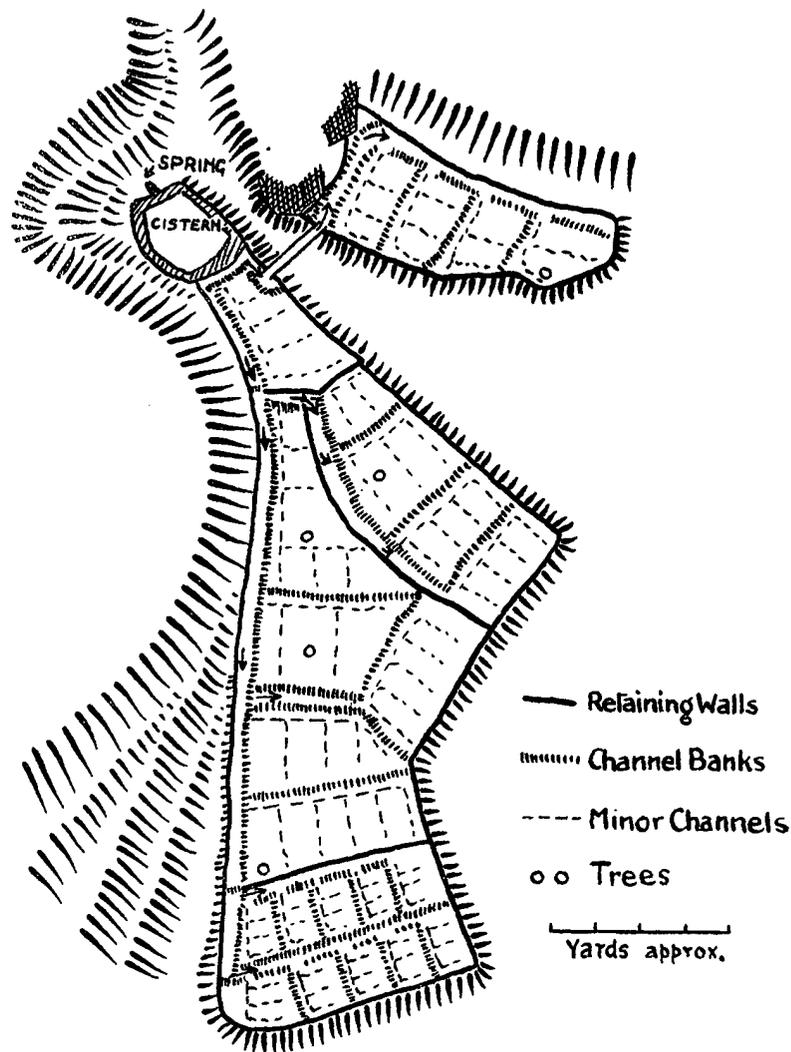


FIG. 9.—SKETCH-PLAN OF AN IRRIGATED GARDEN AT SIKYATKI.

and it is to be noted that it is not called *qa'ö* (corn) but simply *tawaktoi*, a word containing the term *tawa* = sun.

The first corn is cut green at *nimankatcīna* and is roasted in pit ovens in the fields. A good deal of the first green corn is obtained from irrigated plots in the spring gardens. Yellow, Pink, Sweet, and occasionally Speckled corns are favoured for *nimankatcīna*. A party of Tewa were roasting corn at Sikyatki two days after *nimankatcīna* (July 27th) in 1929. During the roasting ear season, which continues until the main harvest, a considerable quantity of corn is cooked in field ovens and some of it is stored for use as a winter delicacy. Sweet corn which ripens very early, especially in the irrigated gardens, is boiled and given to the children at *nimankatcīna*.

The main corn harvest begins late in September and continues during the first weeks of October. Working parties are formed as for the planting and they may stay in the fields from dawn till sunset. The ears are broken off in the field and carried into the villages. Large wicker baskets with a tump line were formerly used, but sacks and donkeys, if not carts, are now available. The rest of the plant was formerly left standing; it was recognized as "good for the field because the juice goes into the ground when the snow comes." But the greater part of the leaves and stalks are now broken off and carried in for animal fodder. On the mesas the corn is stacked according to harvests and colour in the small windowless rooms at the back of the houses. Seed corn was said to have been separated from the rest of the harvest. Every family endeavours to maintain the greater part of a year's crop in reserve until the eve of harvest since drought, flood, wind or pests may destroy an entire crop. This is, however, an ideal not often attained. Cöhöpmana's household, thanks to the richness of Takala's new land and to the supplementary income from Ruth's pottery, which provided money for purchases of store goods (sugar, tea, etc.) and saved them from the necessity of selling corn, had a fairly abundant supply. Ruth still had some corn which was three years old. The harvest of the preceding years (in 1929) had been good and only a few unfortunate families were short of corn in August, *i.e.* just before the harvest of that year. Mrs. Aitken tells me, however, that on the occasion of her visit in the spring of 1913, "ten families in Walpi and Sichomovi were said (on March 23rd) to have come to the end of their corn—the women had traded too much for sugar and other dainties. Some sold their black dresses, some made batches of tourist pottery for the store keepers in exchange for flour."

The varieties of bean (*moji*) grown in recent times are very numerous. Thirty or more types, distinguished by names usually descriptive of its colour and size, are obtainable. Informants were aware that a large number of these were modern commercial varieties or crosses; they agreed that they had only four or five kinds in the old days although there was some discrepancy as to which were indeed old. The following were usually given:—

- tacatak moji* = small white bean.
- wöwoimoji* = large white.
- qömapmoji* = black bean.
- latikomojoi* = flat bean (2 varieties, white and yellow).
- papomoji* = string bean.
- pīntomoji* = speckled bean (2 varieties, black and white and brown and white).

Native squashes (*patña*) are little grown at the present time as they have been superseded by the white man's pumpkin (*tawīya* or *kwana patña* = sweet squash) which will keep green through the winter. The native squashes, one dark green with white stripes (*gōmapatña*), the other large, better tasting and yellow in colour (*sikyapatña*) were cut spirally into long strips about two inches thick which were dried in the sun and folded and wrapped for storing. In the same way the mush melon (*melōni*) has largely superseded the native water-melon (*kawaiio*). Beans and squashes and melons are usually harvested before the corn at the beginning of September.

Sunflowers are grown for their edible seeds which also afford a black dye. They are planted both in irrigated gardens and in the squash patches. They are planted after the squashes but before the corn in *hakitonmoya*.

Peach trees are grown as already stated on the steep slopes of the mesas in sandy ground through which a considerable amount of water percolates. They are propagated either from seeds planted in October, or from cuttings taken in spring. Young plants must be carefully watched and watered when necessary. They must also be protected by a circle of piled stones and wrappings against sheep and donkeys, which will eat the shoots and strip off the bark. The planting and tending of trees is undertaken by men. They are grown on common land, and the trees, not the land, are the objects of ownership. The harvest of a man's trees is gathered by his family. In this the women play the greater part, and the trees are usually inherited by the daughters. The sons of the family should plant trees for themselves. Mrs. Aitken tells me that inheritance by the daughters of the family is also normal among the First Mesa Tewa. It appears that the pattern of land inheritance has influenced the transfer of peach trees. Certainly the great majority of the trees at First Mesa belong to women at the present time. The peach (*sipala*) harvest continues for about a month from the end of September, during which the family may move out to a hut in the peach groves. Each picking is laid out for a week to dry out in the sun on large stone slabs. A small waterproof shelter is provided nearby, often under the slab, into which the drying peaches are carried at the first sign of rain. Both cling stone (*tcokiqa sipala*) and free stone (*kwantaqa*) are grown but the latter are preferred. Apricots are known as *cōhōv sipala*, *i.e.* cottonwood tree peaches, on account of the appearance of the tree. They are less abundant and according to informants were more recently acquired. There was said to have been only one tree at Second Mesa, at the *lemeva* spring, about twenty-five years ago.

Native cotton (*pōsōvi*) is now virtually extinct among the Hopi, first lint and later yarn were purchased at the trader's store and the native plant went out of cultivation. Fortunately sufficient material was collected at the beginning of this century, before its disappearance, for botanical investigation and breeding experiments. The plant, which was grown without artificial irrigation and depended on natural floodings like other Hopi field crops, reflects the severity of its environment. It is small and low, branching very near the ground, and the botanical peculiarities are sufficient, according to Lewton, to justify its recognition as a new species (*Gossypium Hopi Lewton*).¹ It is unique in its precocity, flowering in ten weeks from

¹ Lewton, F. L., "Cotton of the Hopi Indians." *Smithsonian Misc. Collections*, 60, No. 6, 1912.

planting, and yielding ripe bolls in twelve to fourteen weeks, *i.e.* nearly a month earlier than commercial cottons, but the bolls are small and the lint content scanty in comparison with modern commercial cottons.

Tobacco (*pīva*) is not cultivated and the leaves are gathered from wild plants which are particularly abundant in the upper part of the Wipo wash.

MAGIC AND RITUAL IN CULTIVATION.

Magico-religious practices are of great importance at every stage in cultivation, while ceremonial activities throughout the year have nearly always some reference to agricultural prosperity. Pursuing agriculture under semi-arid conditions with extremely unreliable precipi-

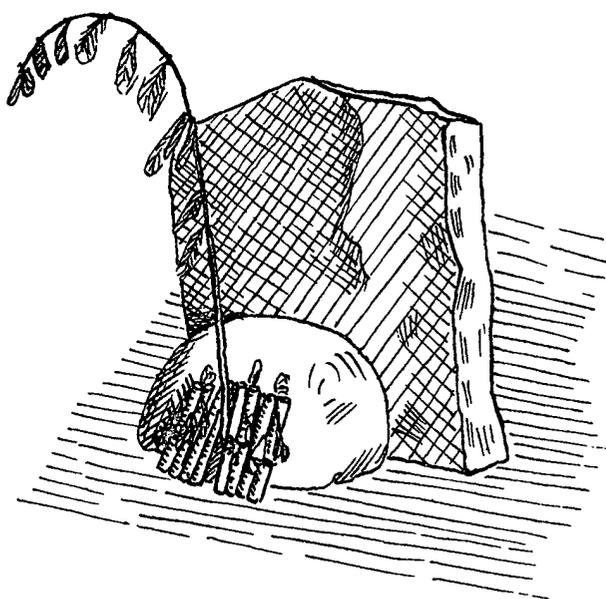


FIG. 10.—FIELD SHRINE.

tation it is to be expected that rain-making, so widespread in the Southwest, should play an important part in agricultural ritual; but rain-making does not exhaust the magical resources and it is convenient to distinguish direct ritual and magic for crop growth from the inducement of rain.

When a plot is first cleared for cultivation a slab of stone about one foot square is set up on edge somewhere near the middle. Every year when the land is being prepared for crops in the spring prayer-feather sticks (*pahō*) are stuck in the ground against a smooth boulder before the eastern face of this slab shrine (*pahōkī*) (Text-fig. 10). These include not only the short *pahō* of two coloured rods and feathers commonly placed in the springs, but also slender twigs about two feet long on which small tufts of eagle and other feathers are tied. These *pahō* are essential to the maintenance of fertility in the plot and are not specifically rain-making.

Mrs. Aitken tells me that the Tewa Agayo made *pahō* feathers to render effective his efforts to arrest the development of a wash in one of his fields :—

“ I made up one feather to tie on the wash-fence ; now you see the sand has hidden it. I made one also for the wash and put it just where the water ran worst, and you see the sand has covered it. When I put the feather I said ‘ You will not go just in the wash—everywhere you will go flowing over ’ [*i.e.* he invokes the water to cease running in a channel and to spread evenly over the field without eroding]. When I put a feather for the field I said ‘ My field, you will be good all the time. ’ ”

During the winter shinny matches are played with a buckskin ball filled with seeds by the young men and boys of the societies occupying the various kivas. The game is played on four successive days or until the ball tears. The spilling of the seeds ensures a good harvest, but should the ball not burst open the crops are likely to fail in the coming season.¹

Ritual elements also deeply interpenetrate the activities of the working parties which are formed during the planting and harvesting seasons. Members customarily run a race during the first day of planting in a particular field ; the speed of the running men promotes the rapid growth of the planted seed. These plantings are also recognized as expressions of clan or village solidarity. To promote such a party, benefits not only the owner of the fields worked and the workers who receive gifts, but also the whole community, and on such occasions people’s thoughts must be kindly, and they must hope well for the future. Mrs. Aitken has been good enough to give me an account of a ritual planting described to her, which took place in 1912. This planting was made by the corpse or skeleton *katchinas* for the Snake Clan of Walpi. The impersonators of these *katchinas*, Tsaka and He’a, had had the proposal announced by the crier at the preceding Winter Solstice, and a time on the horizon calendar was then fixed upon. On the appointed day, according to Agayo :—

“ The crier calls four times. He comes out from the chief kiva at Walpi, and walks east as far as the lane, and calls, going east, until he comes to the last of the houses of Walpi. Then he comes into the plaza of Sichomovi, and calls again from there until he comes to the end of the houses of Sichomovi. Then to Tewa, and calls all along the houses, and down to the lane [*wala*] calling ; then he goes back along the south-east side not calling. He goes back to Walpi chief kiva, and there the men put tobacco in a stone pipe for him and he smokes. Then the men tell him to go out and call again. He goes and calls just as before and returns as before ; goes into the kiva and smokes again. They send him out again ; and this time he says, ‘ You shall get ready and dress up ; I shall come only once more and then we shall all go ; no one will stay here. ’

“ He comes back to the kiva and fetches his blanket and planting-stick, and his bag with a little corn, and his tobacco in another bag. He goes out of the kiva, telling the men [those who have gathered in response to his call], ‘ You will go down now, I

¹ Dr. Parsons (*Pueblo Indian Journal*, 41, Note 69) cites similar shinny games for vegetation magic at Santa Clara, San Juan and Taos.

will come soon after you.' The two skeletons are in the kiva ; they stay there until the planting is nearly done. Someone watches over the edge . . . and sees when the planting is nearly done ; and then they take the two skeletons somewhere and dress them up. We don't ever go near them—we are in awe of them. [That is, when they are skeletons, dressed and in their function.]

"The crier says, 'Now this time when I have called out I shall not come back, I shall go clear to the field.' He goes and calls as before. Then all the men have to start from each house as he comes to it with their blankets and sticks. The crier comes back, goes to the west end of Walpi and down to the fields. The older men are already there ; they sit in a half-circle and smoke, the young men and boys and girls plant. [The boys in their best clothes ; the girls in their black woollen dresses, buckskin boots and fine necklaces, with the hair elaborately dressed.] The girls carry baskets, and each chooses a boy she likes to plant behind. We plant and keep expecting the two skeletons. (People from Oraibi and Second Mesa came to help. There were *lots* of people—all these big fields were finished by noon.) When we finish planting the crier calls out, 'I am happy you finish it so quick ; now all you boys and men come over here and run.' The boys strip ; the man for whom they have planted lays down prizes and starts the foot-races and horse-races. . . .

"The skeletons have not come yet ; but just as the horses are ready to run we saw the skeletons coming out from the west end of Walpi and coming down. The horses came in all of a bunch, we could not decide. Then we saw one skeleton close to us ; he gets to us, and runs after the people, and the people shout and shoot off guns, and the skeleton jumps as if he were scared. He runs round four times in a circle and goes to where the girls are sitting and stretches out his arms. His father's sister's daughter goes behind him to drop corn ; he gives her corn out of his bag ; he makes the holes and she drops corn. The skeleton plants four holes of corn. Then he distributes the rest of his corn to the girls and they take it home.

"His face is tightly covered with a casing of newly killed hare skins, fitted tight over his head and allowed to dry on him and gathered in round the neck with aloe strings. It fits so tight that it doesn't look like a mask at all. The face is painted like a skull, with big eye-holes, big mouth, no nose, and the top of his head all red, and blood all over his body . . . not nice at all !

"We start back home, the boys making fun, running away from the skeleton. The man for whom they plant goes first, and the girls behind him. On the way up the other skeleton is hiding somewhere and jumps out and scares us. At the house of the man they planted for, lots of baked puddings and meat are cooked for the men. They eat just four handfuls and then stop, not five. Because the skeletons always eat four times only and not more, and we are in awe of them, and that's why."

The promotion of plant growth is also more elaborately ensured by the forcing of beans and corn in the kivas in connection with the Katsina initiations. From the end of January

until late in February the Katsina society, which is particularly concerned with growth and fertility, conducts the *Powamu* or initiation ceremony, one of whose objects is to ensure the success of the approaching season and to protect the fields. The Katsina (*Powamu*) chief (also chief of the Katsina Clan) retires to the kiva about a month after the winter solstice. There he plants beans in small boxlike receptacles. A warm temperature is maintained by a constantly tended fire and the sprouting plants are frequently watered.¹

On the success of this planting depends to a large extent the character of the coming season. About a fortnight later the society as a whole assembles at night, and after the kiva ritual the chief and another member of the Katsina society, who wears the ahul katsina mask representing the sun (and during the night represents in ritual the slow awakening of the sun), emerge at dawn to make a circuit of the mesa, visiting kivas and clan houses. At each halt the ahul katsina performs a ritual motion bowing deeply and slowly to each of the cardinal points, symbolically retarding the motion of the sun, thus to prolong the growing period of the coming season. He then plasters corn meal on the door or hatchway of the building, receives prayer-sticks from the occupants and gives them some of the bean sprouts which have been forced in the kiva. These the people put away with their seed corn to induce it, in its turn, to rapid growth when planted.

Beans and corn are now planted by the members of the various societies in all the kivas. Their growth is considered an omen of the coming season. About a fortnight later the sprouts are used in an elaborate bean dance and are finally distributed among the men of the kivas, who take them out to their fields and bury them.²

At the summer solstice another effort is made to prolong the summer. The clansfolk of the Sunwatcher prepare prayer-sticks just before the solstice. These are given to a boy who sets out before dawn to the upper mesa. He arranges the sticks in the ground in a line running north to south and awaits the sunrise. The boy must then dawdle home, picking flowers, thereby inducing the sun to advance slowly.

Later in the season the time of the Snake Dance may even be retarded if the crops are backward. Crow-wing in the *Pueblo Indian Journal* tells us:—

“Aug. 3rd. The people are trying to have the Snake Chief watch the sun very closely and so to call out the right times; if the Snake Chief does not watch the sun right then they dance early, then it freezes early too. That is the reason why they must try and watch the sun very closely. [But] also they have to watch the crops. If the crops are not growing fast, they can wait for four or eight days before calling out.”³

¹ According to Steward and Parsons corn is also grown in the house of the Katsina Clan mother. Cf. *A.A.*, New Series 33, 1931, 60, note 18.

² For a recent account of the *Powamu* ceremony as a whole see Steward, J. H., “Notes on Hopi Ceremonies in their initiatory form in 1927–28,” *A.A.*, New Series 33, 1931, p. 59 ff. The *Pueblo Indian Journal*, p. 53, refers to the planting of both corn and beans in the Tewa monakiva towards the end of the *Powamu* ceremony in preparation for an apparently spontaneous dance which the author “was thinking of having.”

³ *Pueblo Indian Journal*, p. 101.

The implication of this statement is clearly that the season is dependent on the ceremonial time and that the season may be curtailed or prolonged by advancing or delaying the ceremony beyond its proper date.

The increase of the harvests by the indirect method of rain-making also deeply interpenetrate the ceremonial activities of the Hopi. Rain-making elements in ritual are only less numerous than the ceremonial use of corn. Ceremonial smoking for rain occurs during many public ceremonials and kiva activities, and meetings of societies for that particular purpose are called whenever the season threatens to be poor. Rain-making elements are very prominent in the *nimankatc̄ina* ceremonial in late July. Prayer-sticks are deposited in the direction of the four cardinal points, and even the custom that brides of the previous year should wear their white wedding blankets to witness the last dance is said "to show the clouds they want rain."¹

It is also a common practice to douse a man with water before he sets out on his first day's planting to ensure an abundance of water in the fields. This is done by his womenfolk and he may retaliate.

CONCLUSION.

Hopi agriculture thus presents a number of remarkable characters which serve to mitigate the severity of an arid environment. By careful adaptation to local conditions and by the use of ingenious but unelaborate devices all the characteristic plants of the American maize-squash complex are successfully cultivated on a considerable scale. Agriculture is not, as often in marginal regions, auxiliary to hunting and collecting, but basic in the economy.

At the same time agricultural practice is deeply interpenetrated by the elaborate ritual and social organization. The shrine with its *pahō* feathers is carried into the field and skilful husbandry must be supported by individual and collective rites. Agricultural needs and anxieties are, on the other hand, dominant elements in the ceremonial cycle within the pueblos. Agricultural practice, while exhibiting the characteristic western pattern of male cultivation has also been strongly influenced by the matrilineal bias of Hopi society. The transfer of lands reveals a tendency for conflict or at least adjustment between rights deriving from the maternal clan and the desire of the individual, male and female, to provide for children and relatives of whatever clan or sex.

¹ *Pueblo Indian Journal*, p. 99.

TABLE 1.—FIRST MESA CLANS.¹

Lowie, 1915.	Parsons, P.I.J., 1921.	Forde, 1929.	Lands.
1. SNAKE <i>tcō</i> .	1. SNAKE.	1. SNAKE.	2
2. SAND <i>tōwa</i> .	Lizard.	Sand.	1
Lizard <i>qōqōts</i> .	Cactus.	Lizard.	
		Dove <i>hōwi</i> .	
		Prairie Dog <i>dōkya</i> .	
		Cactus Fruit <i>pōna</i> .	
		Blue Flower <i>tcōjōsi</i> .	
		Yellow Flower <i>hesi</i> .	
3. WATER <i>patki</i> .	2. WATER.	2. WATER.	3
Corn <i>qa'ō</i> .	Corn on the Stalk.	Corn.	
	Corn in the Ear.	Sprouting Corn.	
	Frog.	Frog.	
	Cloud.	Cloud.	
	Snow.	Snow.	
	Rain.	Mist.	
	Sage.		
4. HORN <i>ali</i> .	3. HORN.	3. DEER <i>tcōp</i> .	6
Flute <i>lin</i> .		Horn.	
		Flute <i>lena</i> .	
		Ant <i>an</i> .	
5. Coyote <i>īs</i> .	Millet.	4. COYOTE <i>īs</i> .	3
CHARCOAL <i>qoqop</i> .	4. COYOTE.	Fire.	
	Fire.	Redhead	
	Redhead.	"Redhead man" <i>mas</i>	
	Cedarwood.	(Corpse).	
6. RABBIT <i>tap</i> .	5. RABBIT.	5. RABBIT.	3
7. (TOBACCO) <i>pī'ēp</i> .	Tobacco.	Tobacco.	
8. (BUTTERFLY) <i>puli</i> .	6. BUTTERFLY.	Butterfly.	
9. BADGER <i>hōnani</i> .	Badger.	6. BADGER.	2
	Porcupine.	Porcupine <i>manyau</i> .	
		Medicine <i>nahə</i> .	
10. BEAR* <i>huni</i> .	7. BEAR.	7. BEAR.	3
	Spider.	Spider <i>kōkyañ</i> .	
	Bluebird.		
	Bearhide.		
11. SUN <i>tawa</i> .	8. SUN.	8. SUN.	4
12. REED <i>paqap</i> .	Reed.	Reed.	3
		Star <i>cō</i> .	
13. EAGLE <i>qwa</i> .	Eagle.	Eagle.	
	(?) <i>pōōkoñ</i> .		
14. *SAGE ? <i>tep</i> .	9. KATCINA.	9. KATCINA.	3
15. KATCINA.	Parrot.	Parrot <i>kyac</i> .	
		Cottonwood <i>cōhōp</i> .	
16. GRASS [=Mustard] <i>as</i> .	10. MUSTARD.	10. MUSTARD.	4
	chakwena.	<i>icakwena</i> .	
		Acorn <i>kwīnyap</i> .	
		Rabbit-stick <i>pōtskoho</i> .	
17. *SQUASH <i>patañ</i> .	Chaparral Cock.	11. *SQUASH.	1
	Magpie.		

¹ Hopi (*i.e.* Walpi and Sichomovi) only. Names of independent clans in capitals, plural names or names of clans merged with the present independent clans in lower case. Clans merging in 1916 bracketed. Extinct clans asterisked.

TABLE 2.—MISHONGNOVI CLANS.¹

Lowie, 1916.	Forde, 1929.	Lands.	
		Corn.	Squash and Beans.
1. PARROT <i>kyac</i>	1. PARROT. kateina. (?) <i>côhōp.</i>	4	1
2. KATCINA. Raven <i>anwō.</i>		2	1
3. BEAR <i>honō.</i> Bear's Eye <i>wiqōsi.</i>	2. BEAR.	3	1
4. CARRYING STRAP <i>piqōs.</i>	Strap. Bluebird. Spider.		
5. BLUEBIRD <i>icosi.</i> Spider <i>kokyān.</i> Digging <i>moyi.</i> Animal.			
6. FIRE <i>kokop.</i> Coyote <i>ic.</i> Redheaded man <i>māc.</i>		3. FIRE. Coyote. Redheaded man.	3 2
7. BADGER <i>honani.</i> Tobacco <i>pīp.</i> Rabbit <i>tap.</i>	4. BADGER. Tobacco. Rabbit. Butterfly. Porcupine.	2	
8. BUTTERFLY <i>povoli.</i> Porcupine <i>monya.</i>		1	1
9. SQUASH <i>patañ.</i> Pigeon hawk <i>kēl.</i> Crane <i>atok.</i>	5. SQUASH.	3	1
10. CHICKEN HAWK <i>macikwa.</i>	6. CHICKEN HAWK. Eagle.	3 1	1
11. EAGLE <i>icwa.</i> Wild Turkey <i>koyun.</i>	7. SPROUTING CORN.	5	2
12. SPROUTING CORN <i>piqyec.</i> Yellow Plant <i>sivafi.</i> Water Cloud <i>patki.</i>	Corn <i>q'aō.</i> 8. WATER. Cloud <i>omau.</i> Snow <i>nōva.</i> <i>pamōc.</i> Frog <i>pakwa.</i>	4	1
13. LIZARD <i>qōqōts:</i> Sand <i>tōwa.</i> Snake <i>icō.</i>	9. LIZARD.	1	2
		2	1
		1	

¹ Merged or extinct clans or plural names in lower case and stepped in. Linked clans in 1916 bracketed

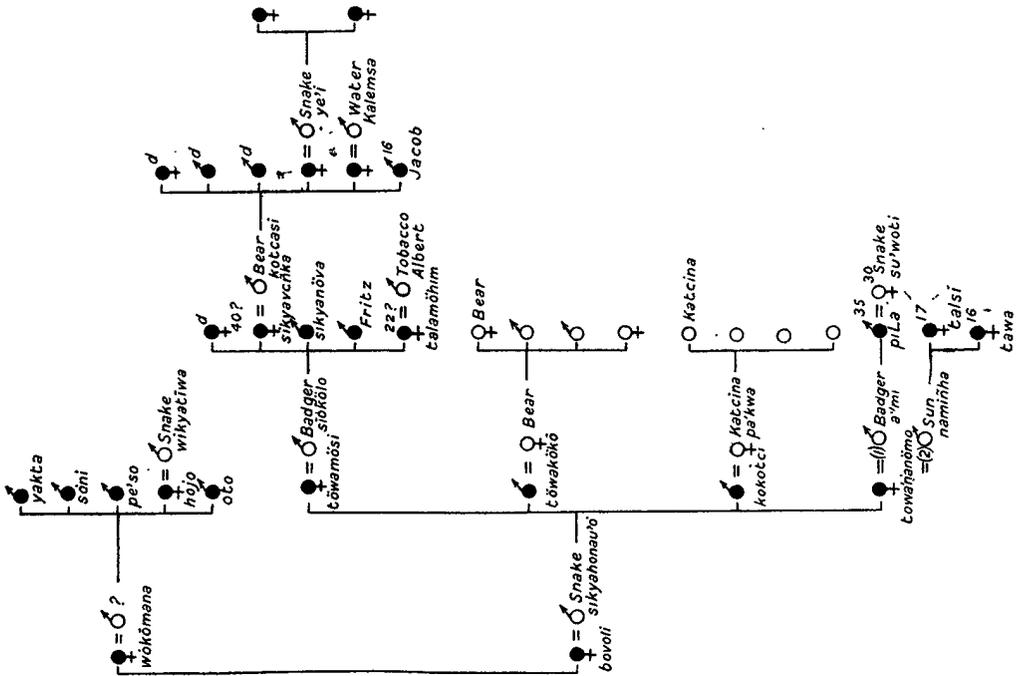
TABLE 3.—SHIPAULOVI CLANS AND LANDS.

Lowie, 1916.	Forde, 1929.	Lands.
BEAR.	BEAR.	1
SUNHEAD.	SUNHEAD.	1
CLOUD (extinct).	SQUASH.	1

TABLE 4.—SHIMOPOVI CLANS AND LANDS.

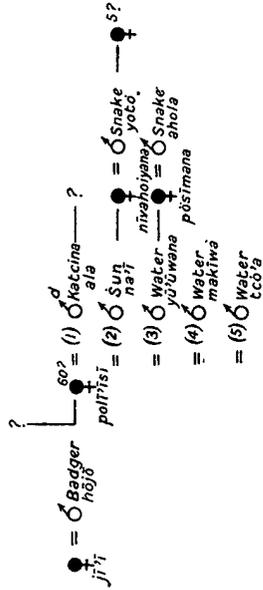
		Lands	
BEAR.	<i>honō.</i>	4	} linked and exogamous unit (9)
Rabbit.	<i>tap.</i>	1	
Lizard.	<i>kōkōts.</i>	0	
Eagle.	<i>kwa.</i>	1	
STRAP.	<i>piqōc.</i>	2	
BLUEBIRD.	<i>icos.</i>	1	
CORN.	<i>piqyec</i> or <i>q'aō.</i>	3	} linked and exogamous unit (11).
WATER.	<i>patki.</i>	3	
SNOW.	<i>nōva.</i>	2	
KATCINA.		3	
SUN.	<i>tawa.</i>	2	
Sunhead.	<i>qalō.</i>	1	} Merged (3). Exogamous unit (3).

4. LINEAGE OF SIKYAVENKA

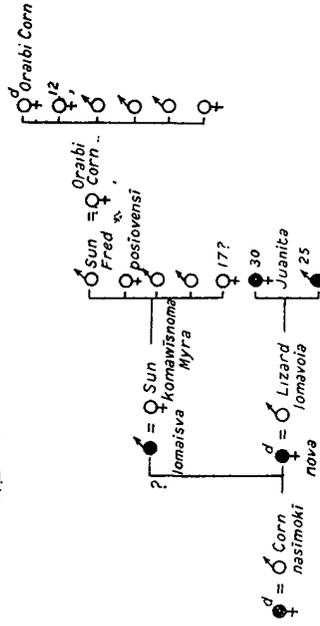


Scheme.
 ♂, ♀ — Mustard clan member.
 ♂, ♀ — Other clans.

5. LINEAGE OF POLTĪSĪ



6. LINEAGE OF NŌVA



Number of husband or wife
 ↓ Age (or dead = d).
 (2) ♂ Clan.
 Personal name.

TABLE 6.—SPRINGS AND IRRIGATED GARDENS.

FIRST MESA.

*Drinking Water Supply.**South Scarp—*

tawapa = Sun Water.
icpa = Coyote Water.
añapölvá = Short Roots Water.

North Scarp—

teveckya = Sour Water.
kokyañva = Spider Water.

tawapa and *teveckya* are the largest; Walpi uses *tawapa* and also the smaller *añapölvá*; Sichomovi and Hano rely mainly on *teveckya* but prefer the water of *kokyanva*; *icpa* until its recent improvement was used mainly for the watering of stock. These are also watered extensively at *tawapa*, the largest and ritually the most important spring of the group.

*Irrigated Gardens.**South Scarp—*

wiñöva
sikyatki = Yellow Rock
añapölvá (see above). Abandoned Gardens.
kwakwöva

Associated Clans—

Tewa Katcina.
 Tewa Bear, Hopi Mustard.
 Hopi Sun.

South, beyond Polacca Wash—

pöpsöva—Corner, many points
lemova—Hail
tötovi—Woodpecker

Hopi Water.
 Hopi Rabbit. Also used by Mishongnovi.
 Hopi Mustard.

North Scarp—

wipo—Reed Water
cöhövitaka—Cottonwood Water
canelva—Sheep Water
hokonva—Black Butterfly Water
mojiva—Bean Water
pisava—Sand Water

Tewa Corn.
 Tewa Katcina.
 Hopi Deer.
 Hopi Deer (gardens now abandoned).
 (?) (?)
 Hopi Snake.

Far Side of Wipo Wash—

pöhöva—New Water Hopi (?)

Other Springs and Seeps used for watering livestock, and for the natural irrigation of peach trees.

South Scarp—

siwapa—Sagebrush Water.
kwakatvi—(?)
moñwisva—Chief's Water.

Far Side of Polacca Wash—

monwopsa—Owl Corner Water.
nönöpa—(?)
pöhöva—New Water.
höwipa—Jackrabbit Water (?)
yatacpa—Trickle Water.

North Scarp—

añwisva—Crow Water.
tapa—Rabbit Water.

TABLE 6.—*contd.*

Other Springs and Seeps used for watering livestock, and for the natural irrigation of peach trees—contd.

Far Side of Wipo Wash—

honapa—Bear Water.

kwastapa—Penis Water.

howapsa—Sagebrush Water.

honapa—Arrow weed Water.

wokököva—

SECOND MESA : MISHONGNOVI AND SHIPAULOVI.

Drinking Water Supply—

tojiva.

lemeva.

icokova (a seepage tank on the mesa north of Shipaulovi).

Irrigated Gardens—

Associated Clans—

tojiva Mishongnovi Water Clan.

lemeva „ Hawk Clan.

asaeve „ (?) Clan.

tötovi } at Awatobi... .. „ Badger Clan.
lemöva }

Other Springs used for watering stock, etc.—

pisa pelova Sand Mound Water.

hontopova.

talavva.

akpi.

añwisva.

SECOND MESA : SHIMOPOVI.

Drinking Water Supply—

masipa—grey water.

Irrigated Gardens—

masipa.

kolcatpelvi (?)

Other Springs used for watering stock etc.—

(pīkanvi).

honapa.

tosova.

mamova.



FIG. 1.—SECOND MESA : VIEW FROM THE EAST.



FIG. 2.—FIRST MESA SEEN FROM SECOND MESA : VIEW ACROSS WIPO WASH.

HOPI AGRICULTURE.



FIG. 1.—SECOND MESA VILLAGES: MISHONGNOVI AND SHIPAULOVI.



FIG. 2.—WALPI: VIEW FROM THE NORTH-EAST.

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FIG. 2.



FIG. 4.



FIG. 1.



FIG. 3.

FIG. 1.—FIRST MESA : VIEW FROM THE SOUTH-EAST ; WALPI AND SICHOMOVI ON THE CREST. FIGS. 2 AND 3.—HOPI CORNFIELDS. FIG. 4.—CORNFIELD PLANTED IN AN ARROYO.

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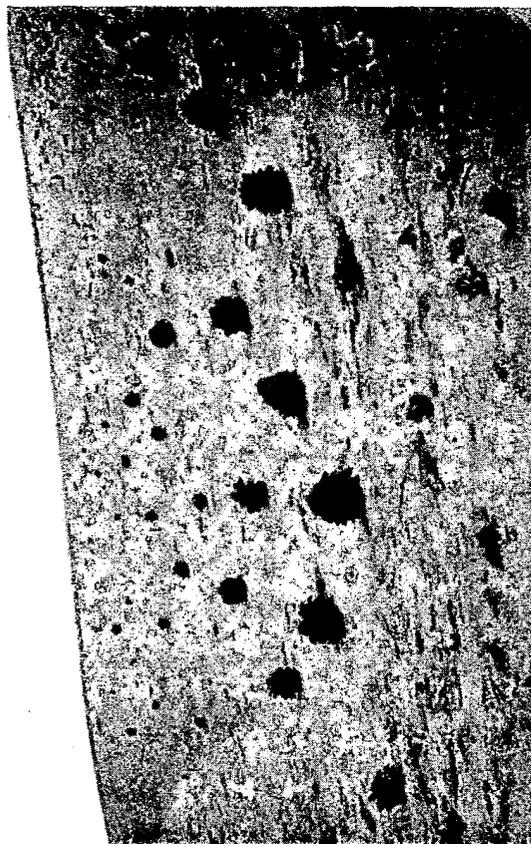


FIG. 2.—BEAN PLOT.



FIG. 4.—SUMMER FIELD HUT.



FIG. 1.—TYPICAL CORN CLUMP.



FIG. 3.—SQUASH WITH INDIVIDUAL WINDBREAK.

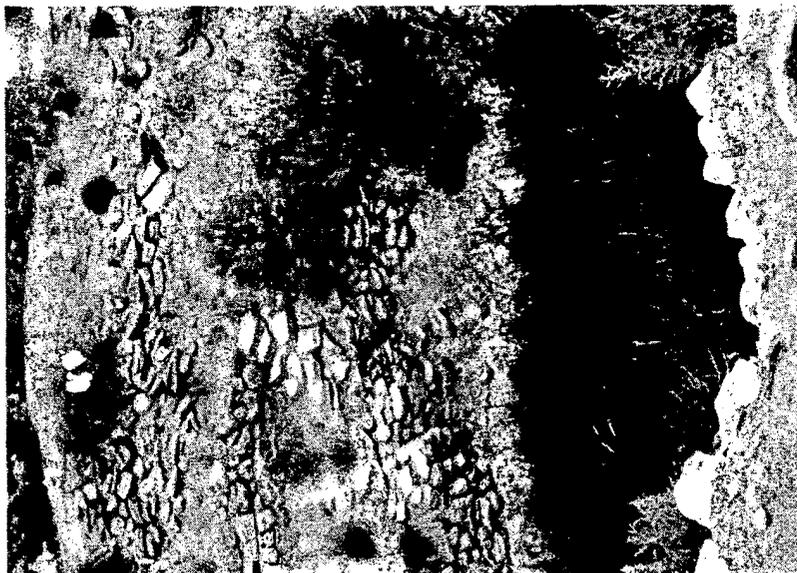


FIG. 3.—WELL AT LEMEVA SPRING.



FIG. 1.—IRRIGATED GARDEN AT SIKYATKI.

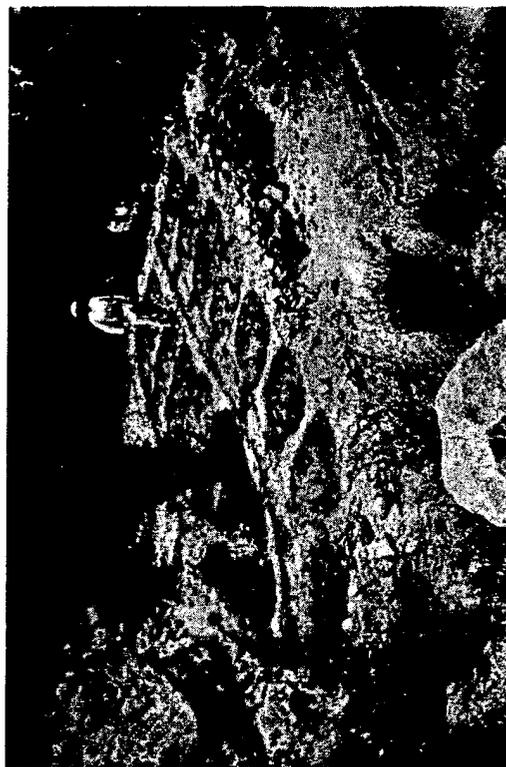


FIG. 2.—CHILI AND ONION BEDS IN AN IRRIGATED GARDEN AT SIKYATKI.

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FIG. 1.—TOKAVO SPRING AND CISTERN : SECOND MESA.



FIG. 2.—IRRIGATED GARDENS AT LEMEVA SPRING : SECOND MESA.

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