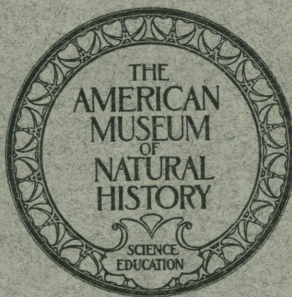


ANTHROPOLOGICAL PAPERS
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY

VOLUME XXX, PART V

TIME-RELATIONS OF PREHISTORIC POTTERY
TYPES IN SOUTHERN ARIZONA

BY ERICH F. SCHMIDT



BY ORDER OF THE TRUSTEES
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY
NEW YORK CITY
1928

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INTRODUCTION

In 1925 the American Museum of Natural History, under the patronage of Mrs. W. B. Thompson, carried on archæological explorations of the Lower Gila region in Arizona.¹ To date only the northern part of this area has been investigated, but the facts presented herein may be applied to the entire district.

Only a few archæologists have studied this highly interesting and important culture area. Cushing excavated Los Muertos, south of Mesa, in 1886, but his final results were never published.² However, Hodge, who was a member of Cushing's party, published a short description of the ancient irrigation systems.³ Later, Fewkes excavated and repaired Casa Grande near Florence and also worked in different sections of the Gila region,⁴ while Hough surveyed ruins in the eastern part of the area.⁵ Recently, Kidder, in his *Southwestern Archæology*, has clearly outlined the most important archæological problems of this region and, in addition, has summarized the reports of previous workers, emphasizing the necessity for stratigraphic research.

Pottery is the principal instrument for this phase of archæological work registering most accurately the extent of certain culture areas and the cultural changes and relations of the ancient populations. For this reason the information derived from pottery while pursuing stratigraphic studies in the course of our explorations has been considered first in importance and forms the foundation and framework of the final report.

¹Schmidt, Erich F., "The Mrs. William Boyce Thompson Expedition" (*Natural History*, vol. 26, no. 6, pp. 635-644, 1927); "A Stratigraphic Study in the Gila-Salt Region, Arizona" (*Proceedings, National Academy of Sciences*, vol. 13, no. 5, pp. 291-298, 1927).

²Cushing, F. M., "Preliminary Notes on the Origin, Working Hypothesis, and Primary Researches of the Hemenway Southwestern Archæological Expedition" (*Compte Rendu du Congrès International des Americanistes*, septième session, pp. 151-194, Berlin, 1890).

³Hodge, F. W., "Prehistoric Irrigation in Arizona" (*American Anthropologist*, vol. 6, pp. 323-330, 1893).

⁴Fewkes, J. W., "Casa Grande, Arizona" (*Twenty-Eighth Annual Report, Bureau of American Ethnology*, Washington, 1912); "Prehistoric Ruins of the Gila Valley" (*Miscellaneous Collections, Smithsonian Institution*, vol. 52, pp. 403-436, Washington, 1910).

⁵Hough, W., "Antiquities of the Upper Gila and Salt River Valleys in Arizona and New Mexico" (*Bulletin 55, Bureau of American Ethnology*, Washington, 1912).

CERAMIC AREAS IN THE LOWER GILA REGION

It will be seen that the Lower Gila region, hitherto considered a rather closely knit cultural unit, has within its boundaries three distinct ceramic areas (Fig. 1). The principal pottery types or groups for these sections are: Lower Salt, Central Gila, and Little Colorado, named according to the locality of their origin or affinity.

The western part of this region is topographically divided into two distinct zones—in the east a mountainous country and in the west the plains of the Saguaro desert. These topographical characteristics are paralleled by a corresponding dissimilarity in the ceramic pattern.

CENTRAL GILA POLYCHROME

Excavations carried on within the limits of the mountainous area between the Gila and Salt rivers revealed a great preponderance of Central Gila polychrome ware in the pueblo ruins scattered over this territory.¹ To be sure, this ware is found as far east as Deming, New Mexico, and principally on both sides of the central Gila River from Solomonsville to Florence, as well as along the San Pedro River. However, no investigator of the Lower Gila region has endeavored to determine whether the makers of this ware were also the builders of the settlements where it occurs, whether there is evidence of a dual occupation, or whether the percentage of polychrome sherds is too small to indicate that they have been made *in situ*. Therefore, without a definition of the proportions of the various pottery types found at given sites, statements as to the range of these types are in many cases liable to be misinterpreted.

LOWER SALT RED-ON-YELLOW.

During a short visit and subsequent close examinations of ruins situated on the Lower Salt River near Phoenix, it was determined that in this part of the Lower Gila region the prevailing decorated pottery is red-on-yellow. This ware is doubtless one of the most interesting of the Southwest. Its home is the desert and the center of the desert culture represented by this pottery was the territory now occupied by the city of Phoenix and the neighboring towns. The makers of this Lower Salt ware certainly built most of the numerous pueblo-like structures and associated small dwellings found on both sides of the Lower Salt and

¹The principal work was done at Togetzoge, a ruin situated on the grounds of the summer camp of the Magma Copper Company, between Superior and Miami, Arizona. Other type sites are: the pueblos three miles south of Cutter, Rice Schoolhouse (Hough, *ibid.*, 39, No. 22), and the Hiley Rickley ruin near Globe, the latter site having been excavated by the owner.

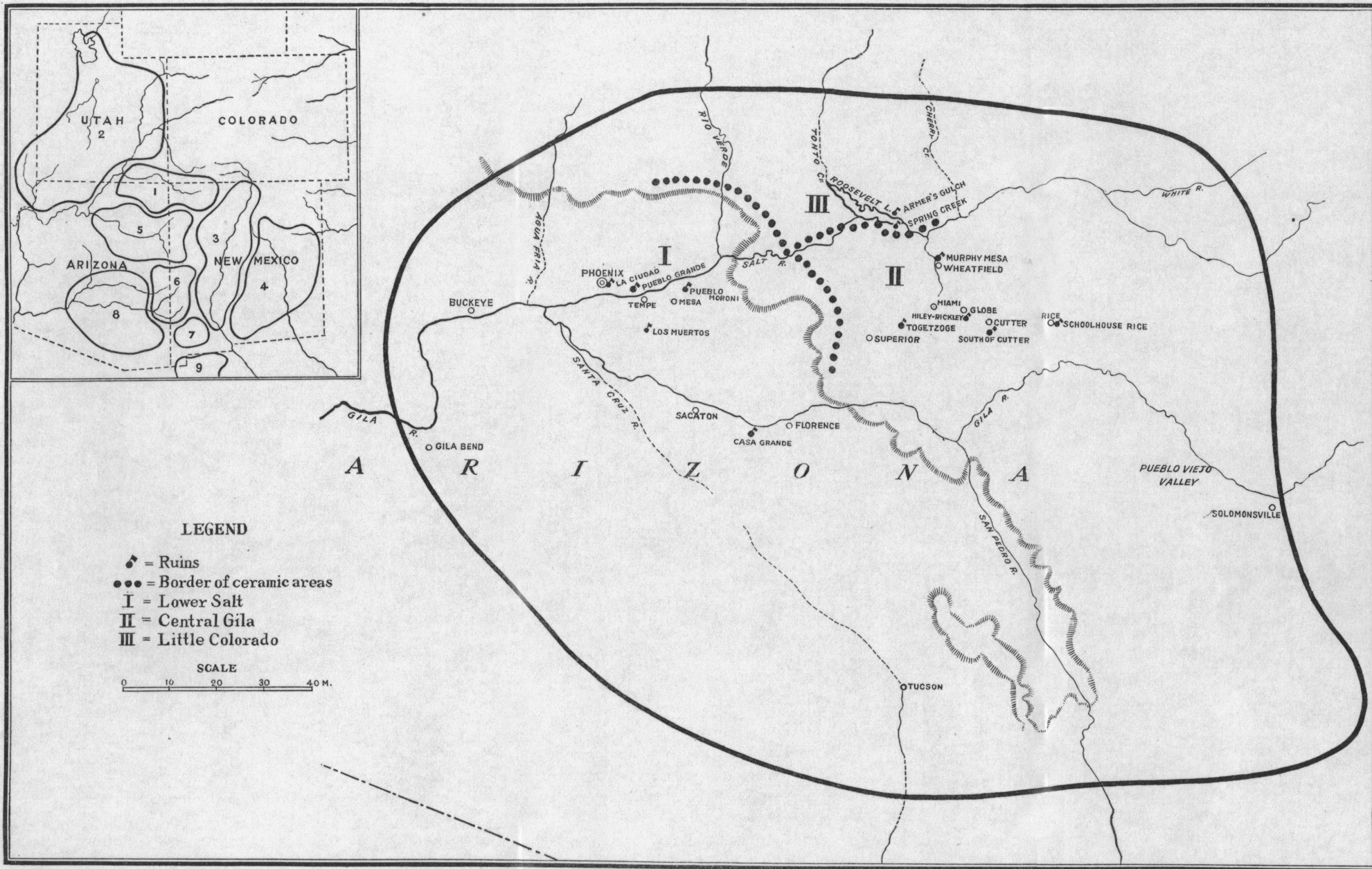


Fig. 1. Lower Gila Area, Arizona

Insert Map: The Culture Areas of the Southwest, after A. V. Kidder, *Southwestern Archaeology*. 1, San Juan; 2, Northern peripheral; 3, Rio Grande; 4, Eastern peripheral; 5, Little Colorado; 6, Upper Gila; 7, Mimbres; 8, Lower Gila; 9, Chihuahua Basin.



Fig. 2

Fig. 2. Refuse Heap of Pueblo Grande, during Excavation, as seen from top of Main Building.



Fig. 3

Fig. 3. Conjunction of Ancient Irrigation Canal with Salt River, near Pueblo Grande

Gila rivers and along the tributaries joining the two streams at their lower course. These same people built the extensive irrigation canals, traces of which can still be seen in the vicinity of Phoenix (Fig. 3).

To date the exact range of Lower Salt ware is not yet known. The northeastern and northern limits of its occurrence are the slopes of the mountains bordering the desert region. Its extent eastward along the Gila River could easily be determined by investigation of the Gila ruins. Of particular interest is the question whether the famous Casa Grande near Florence, and other structures of the same type, were built by the makers of this pottery. Lower Salt ware is found as far south as Tucson and Fresno, southeast of Tucson.¹ The westernmost point at which it is known to occur is the Gila Bend, representing here the peripheral ware of the Southwest.

LITTLE COLORADO WARES.

In addition, it was found that the occurrence of Gila polychrome breaks off south of the central Salt River, giving way to black-on-white ware, which, with some other Little Colorado types, predominates in ruins on both shores of Roosevelt Lake.² For this reason the southern boundary of the Little Colorado Region should be extended southward to the Salt River, though future work will probably result in differentiation between the northern and southern parts of this culture area. In the following pages the problem concerning the time-relations of these pottery groups will be attacked.

STRATIGRAPHIC INVESTIGATIONS AT PUEBLÓ GRANDE AND LA CIUDAD IN THE LOWER SALT AREA

The results of archæological investigations depend largely upon the methods employed by the field-worker. The potsherds upon which this study is based were obtained in the sectioning of rubbish heaps and excavation of rooms. Surface material has not been considered, since in this region at least, surface samples will hardly reveal the accurate proportions of the occurrence of various pottery types. The ideal method of determining the chronological sequence of given types is the stratigraphic investigation of refuse deposits sometimes found associated with the ruins.

At the sites investigated in the Gila polychrome region, rubbish heaps are entirely absent. On the other hand, we find shallow refuse

¹Lumholtz, Carl, *New Trails in Mexico*, (New York, 1912) illustration on p. 170.

²Type ruins: Spring Creek, on the southern shore of Roosevelt Lake and about 4 miles north of Spring Creek store; Armer's Gulch, on the northern shore of the Lake, about 4 miles south of Mr. Armer's ranch.

TABLE 1
RANGE AND DISTRIBUTION OF THE PRINCIPAL POTTERY TYPES IN THE CORE OF THE REFUSE HEAP AT PUEBLO GRANDE

Strata	Decorated										Undecorated		Totals	
	Lower Salt		Central Gila	Little Colorado					Unknown Origin		Black-polished interior	Plain		
	Red on Yellow	Inlaid Red on Yellow	Totals	Poly-chrome	Black on White	White-bordered Black-on Red	Black-on Buff	Slightly Indented	Totals	Red-Brown on Buff-Black Interior	Totals			
I	2	..	2	6	..	..	..	..	..	1	9	195	1541	1745
II	3	..	3	2	..	..	..	..	..	..	5	204	1052	1261
III	..	..	..	4	..	2	1	1	4	1	9	252	998	1259
IV	9	1	10	..	..	..	..	..	..	..	10	258	939	1207
V	5	..	5	..	1	..	..	..	1	..	6	184	617	807
VI	4	1	5	..	..	..	..	..	..	..	5	159	695	859
VII	14	1	15	1	..	..	..	..	..	..	16	149	847	1012
VIII	9	..	9	..	1	..	..	..	1	..	10	207	788	1005
IX	17	1	18	..	..	1	..	..	1	..	19	212	985	1216
X	17	2	19	..	..	..	..	..	..	..	19	233	1124	1376
XI	23	..	23	1	..	..	..	..	..	..	24	243	1109	1376
XII	20	5	25	2	..	..	..	..	..	..	27	200	1254	1481
XIII	28	6	34	..	1	..	..	..	1	..	35	208	1163	1406
XIV	25	11	36	..	..	..	..	..	..	..	36	161	958	1155
XV	13	10	23	..	..	..	..	..	..	..	23	59	497	579
XVI	12	1	13	..	1	..	..	..	1	..	14	25	212	251
XVII	5	1	6	..	..	..	..	..	..	..	6	10	86	102
XVIII	9	1	10	..	..	..	..	..	..	..	10	8	59	77
Totals	215	41	256	16	4	3	1	1	9	2	283	2967	14924	18174

heaps in the northern section near Roosevelt Lake, while deep rubbish deposits occur at the settlements of the Lower Salt River. Therefore, this particular phase of the explorations, namely stratigraphic research, was concentrated on the latter area and especially on one ruin, Pueblo Grande.¹ The building now forms a conspicuous mound and is situated about 7 miles east of Phoenix and 400 meters south of the Arizona Packing Plant. The structure, originally three stories high, is surrounded by a parapet which runs parallel to the outside wall of the main building. It represents the nucleus of an extensive settlement, with a number of smaller structures grouped around it.² In the past Pueblo Grande cer-

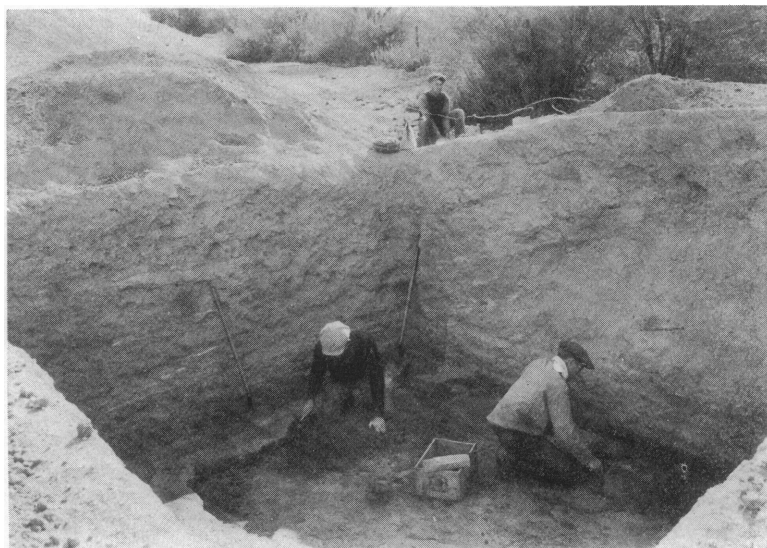


Fig. 4. Sectioning of Refuse Heap at Pueblo Grande.

tainly accommodated a considerable number of people, though probably the various stories were built and inhabited successively. Questions of this kind, as well as many others, can only be answered by careful excavation.

The refuse heap sectioned is 20 meters west of the southwest corner of the parapet,³ and rises about 1.20 meters above the surface. For the stratigraphic work on the apex of this mound a core three meters square

¹Identical with Fewkes' "Great Tempe Mound" (*Prehistoric Ruins of the Gila Valley*, 424).

²The small structures described by previous visitors are now leveled.

³What seem to be shallow rubbish deposits extend between this heap and the defense wall. Another refuse mound, situated east of the main building, has been destroyed by diggings.

was freed on three sides by trenches 1 meter wide (Fig. 4). After the surface was cleared the trenches were carried to a depth of 1.5 meter,¹ to determine whether the deposit was sufficiently deep, to free the core, and to learn whether burials were present. Interments would have disturbed the sequence of the rubbish layers and stratigraphic work would have been rendered useless. The core was cut in layers exactly 15 centimeters deep and the contents of each stratum, principally potsherds, were recorded. Compact refuse layers, as indicated by streaks of ashes, charcoal and similar detritus, were mapped. They show that the center of the stratification core reached the apex of the original rubbish deposit (Figs. 7 and 8). The following tables and graphs are based on the sherds taken from the individual strata of the core. At La Ciudad, a two-story pueblo situated about four miles west of Pueblo Grande, an additional stratigraphic study was made and a core two meters square sectioned in order to check the results obtained at the latter ruin. The principal graphs based on the material from this ruin will be added to the corresponding graphs for Pueblo Grande.

In the tables are given the number of sherds of each ware occurring in the layers of the stratified core. Here, as well as in the graphs, the strata are designated by roman numerals. The figures in parenthesis indicate the number of rim sherds contained in the totals.

The graphs are based on the percentages of the items in the particular tables referred to in each case. These percentages, calculated to correspond with the purpose of the graphs, have been added to them.

¹Since by this process 1½ meters of the core were lost by a cave-in, subsequently the trenches were made shallower and the core was freed on all sides.

POTTERY IN THE REFUSE HEAPS OF PUEBLO GRANDE AND LA CIUDAD

In the ruins of the Lower Gila region we usually find the following pottery classes:—

Undecorated	{ Plain
	{ Black-polished-interior
Decorated	{ Painted
	{ Corrugated-indented ¹

It is obvious that the variations of the proportions of these groups in particular sites are significant. The ratios of the main pottery classes found at Pueblo Grande are as follows:²—

		Sherds	%	Rim Sherds	%
Undecorated	{ Plain	14,924	82.1	.	6.5
	{ Black-polished-interior	2,967	16.2		20.9
Decorated	{ Painted	282	1.6		19.5
	{ Slightly-indented	1			

The peculiarity of this ruin consists in the total absence of corrugated-indented ware, abundant in most areas of the Southwest.³ Equally significant is the exceedingly small ratio of painted ware. The ratios of rim sherds indicate in a very general way that the dimensions of painted and black-polished-interior vessels are approximately the same, whereas pots of considerably larger size (ollas) are represented by the plain ware sherds.

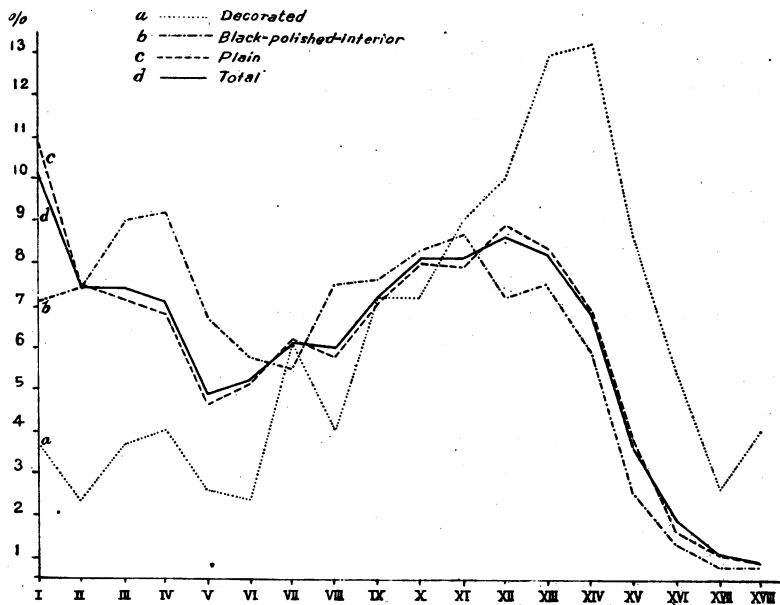
DISTRIBUTION OF SHERDS COMPRISING THE PRINCIPAL POTTERY CLASSES AT PUEBLO GRANDE

An explanation of the peculiar distribution of sherds in the core as shown by the general curve *d* in Fig. 5 may in part be found in diagram Fig. 7 which shows the course of compact rubbish layers, drawn from the cross-section of the northern trench wall (Fig. 8). Starting at the bottom, the rubbish contained in strata XVIII to XV is undoubtedly mixed with the original surface material. From stratum XV the total curve rises rapidly and reaches an apex in stratum XVII, not showing much variation in strata XIV to IX. This part, forming the first maximum of curve *d*, coincides with a dense system of striations as shown in Figs. 7 and 8 (starting above the knee of the man and reaching almost to his

¹Frequent only in the eastern and northern part of this region.

²See corresponding data from La Ciudad, p. 277.

³The single slightly indented sherd (see corrugated-indented in description of types) was at once recognized as a drift piece from the southern part of the Little Colorado region.



Strata	a	b	c	d
I	3.2	6.6	10.3	9.6
II	1.8	6.9	7.0	6.9
III	3.2	8.5	6.7	6.9
IV	3.5	8.7	6.3	6.6
V	2.1	6.2	4.1	4.4
VI	1.8	5.3	4.6	4.7
VII	5.6	5.0	5.7	5.6
VIII	3.5	7.0	5.3	5.5
IX	6.7	7.1	6.6	6.7
X	6.7	7.8	7.5	7.6
XI	8.5	8.2	7.4	7.6
XII	9.5	6.7	8.4	8.1
XIII	12.4	7.0	7.8	7.7
XIV	12.7	5.4	6.4	6.3
XV	8.1	2.0	3.3	3.2
XVI	4.9	0.8	1.2	1.4
XVII	2.1	0.3	0.6	0.6
XVIII	3.5	0.3	0.4	0.4

Fig. 5. Distribution (in percentages) of the Sherds comprising the Principal Pottery Classes, Pueblo Grande.

shoulder). The high percentage of sherds in stratum XIV which, according to the diagram, is underneath the rubbish, may be due to variations in the depth of the refuse, the center of the core being 2.5 meters away from the trench wall. Above the old rubbish deposit in strata IX to V, which are crossed by well-marked veins with wide distances in between, the number of sherds decreases and rises again to a second maximum from strata V to I. In the final summary an attempt will be made to explain this second increase. The extremely high percentage in the uppermost stratum may be due in part to external influences.

The plain ware curve, *c*, nearly coincides with the general curve, since this ware constitutes the majority of sherds. Curve *b* representing black-polished-interior ware follows, in the lower fourteen strata, the course of curves *c* and *d*, but deviates somewhat from these in the upper strata. The distribution of decorated sherds is of particular interest. Curve *a* shows that from the surface to stratum VI their number is small, without much variation in the individual strata. Starting in stratum VII, the sherds increase steadily until the high point is reached in stratum XIV, followed by the typical drop. (See explanations of Figs. 10-12).

DISTRIBUTION OF SHERDS COMPRISING THE PRINCIPAL POTTERY CLASSES AT LA CIUDAD

There is a striking similarity between the phases of the graph shown in Fig. 6, based on the corresponding material from La Ciudad, and Fig. 5, though the rubbish heap of La Ciudad is shallower than that of Pueblo Grande. It would be premature to draw conclusions before the decorated ware is considered, but it must be kept in mind that the courses of curves *d* and *d₁* closely correspond in the upper five strata, while the phase extending in the graph of Pueblo Grande from strata V and XV is considerably shorter in Fig. 6, reaching from strata V and IX.

RATIO OF SHERDS COMPRISING THE PRINCIPAL POTTERY CLASSES AT PUEBLO GRANDE AND LA CIUDAD

In Fig. 9, curve *a*, it is indicated that not only the number but also the ratio of decorated sherds increases markedly toward the base of the refuse heap. Noticeable are also certain correlations between the curves. The ratio of the decorated ware and that of the plain ware decreases from the bottom upward in favor of an increase of the black-polished-interior ware. Starting in stratum V the ratio of black-polished-interior decreases in favor of the plain ware.

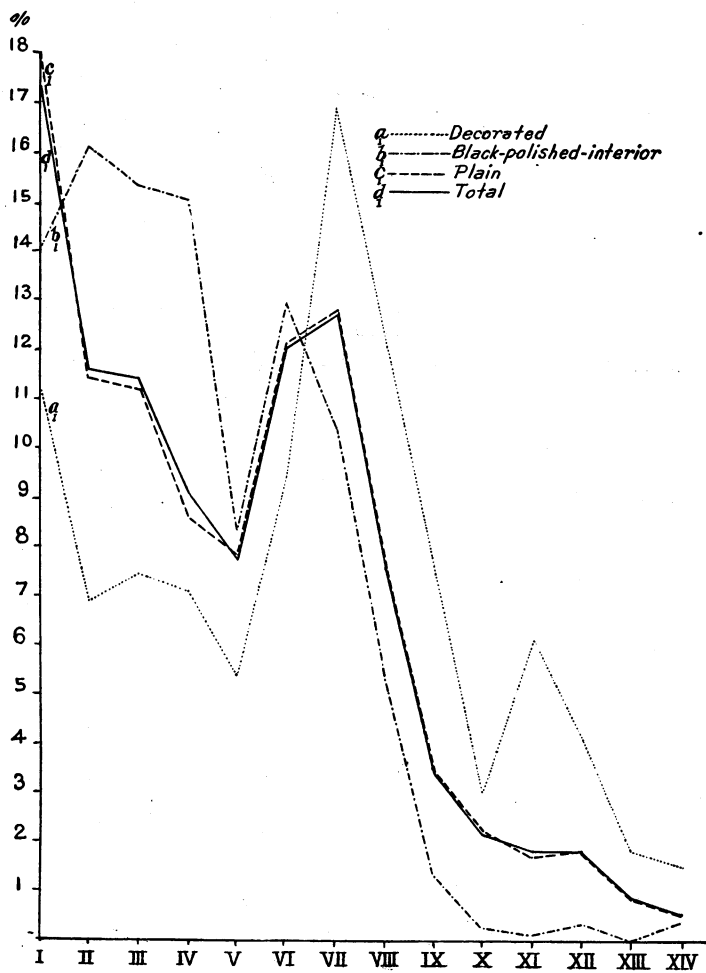


Fig. 6. Distribution of the Sherds comprising the Principal Pottery Classes at La Ciudad.

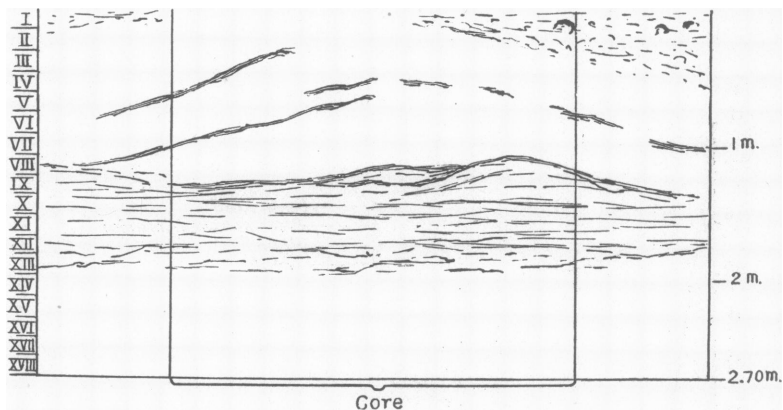
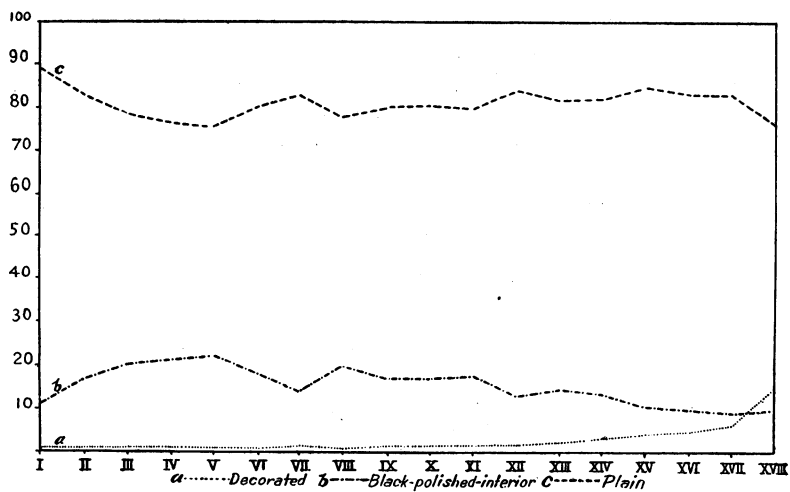


Fig. 7. Cross-Section of Northern Trench Wall, Pueblo Grande.



Fig. 8. North Wall of Trench with Well-Marked Layers, containing Charcoal and Ashes (See Fig. 7), Pueblo Grande.



Strata	a	b	c
I	0.5	11.2	88.3
II	0.4	16.2	83.4
III	0.7	20.0	79.3
IV	0.8	21.5	77.7
V	0.75	22.8	76.45
VI	0.6	18.5	80.9
VII	1.6	14.7	83.7
VIII	1.0	20.6	78.4
IX	1.6	17.4	81.0
X	1.4	16.9	81.7
XI	1.75	17.65	80.6
XII	1.8	13.5	84.7
XIII	2.5	14.8	82.7
XIV	3.1	13.9	82.9
XV	4.0	10.2	85.8
XVI	5.5	20.0	84.5
XVII	5.9	9.8	84.3
XVIII	13.0	10.4	76.7

Fig. 9. Variations in the Ratio of Sherds comprising the Principal Pottery Classes at Pueblo Grande.

The proof that part of these phenomena are not accidental was furnished by the stratigraphic study at La Ciudad. Here too the ratio of decorated ware increases toward the bottom. The same correlation between black-polished-interior and plain ware exists in the upper strata, while in the lower strata black-polished-interior decreases to such an extent that the decorated ware even outnumbers the former, the plain ware in contrast to that of Pueblo Grande remaining stable.

FREQUENCY AND DISTRIBUTION OF DECORATED WARE AT PUEBLO GRANDE

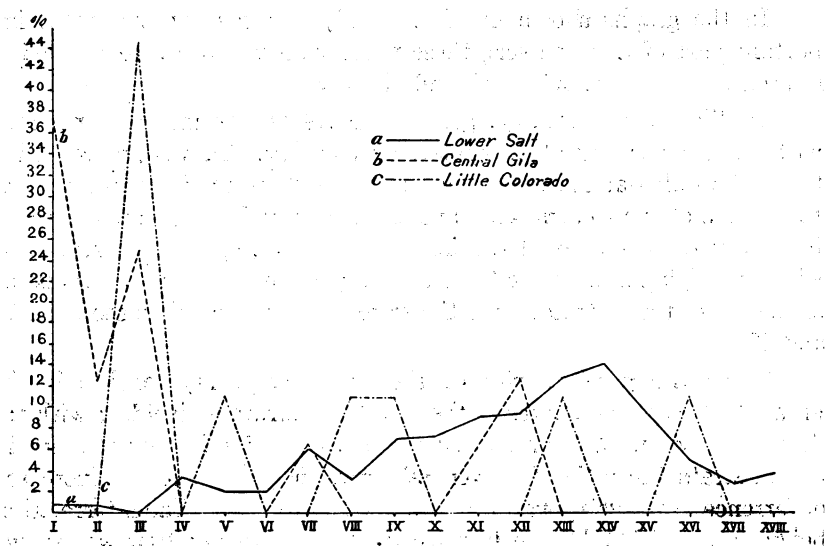
The proportions of the pottery groups shown in Table 2 are as follows.—¹

	Sherds	Percent
Lower Salt	256	90.5
Central Gila	16	5.6
Little Colorado	9	3.2
Unknown origin	2	0.7

TABLE 2
DECORATED WARE, TYPES OF EACH AREA COMBINED

Strata	Lower Salt	Central Gila	Little Colorado	Unknown Origin	Totals
I	2	6	....	1	9
II	3	2	....	....	5
III	....	4	4	1	9
IV	10	....	....	....	10
V	5	....	1	....	6
VI	5	....	....	....	5
VII	15	1	....	....	16
VIII	9	....	1	....	10
IX	18	....	1	....	19
X	19	....	....	....	19
XI	23	1	....	....	24
XII	25	2	....	....	27
XIII	34	....	1	....	35
XIV	36	....	....	....	36
XV	23	....	....	....	23
XVI	13	....	1	....	14
XVII	6	....	....	....	6
XVIII	10	....	....	....	10
Totals	256	16	9	2	283

¹See diagram in summary and corresponding data from La Ciudad, p. 278.



Strata	a	b	c
I	0.8	37.5	
II	1.2	12.5	
III		25.0	44.4
IV	3.9		
V	2.0		11.1
VI	2.0		
VII	6.0	6.25	
VIII	3.5		11.1
IX	7.0		11.1
X	7.4		
XI	9.0	6.25	
XII	9.8	12.5	
XIII	13.4		11.1
XIV	14.1		
XV	9.0		
XVI	5.1		11.1
XVII	2.4		
XVIII	3.9		

Fig. 10. Distribution (in percentages) of Decorated Sherds as classified in Table 2, Pueblo Grande.

It is obvious that the Lower Salt ware far outnumbers the other wares.

In the graphs shown in Figs. 10-12, representing the most important part of this analysis, these pottery groups will be examined as to their interrelations within the rubbish core.

In Fig. 10 the ceramic groups are treated as independent units without consideration of their relative frequency. Curve *a*, representing the Lower Salt ware, is distinguished by a smooth steady course whereas the curves of the Central Gila and Little Colorado wares show marked irregularity. The apex of the Lower Salt curve, *a*, is in stratum XIV, while the high points of the Central Gila and Little Colorado curves fall in the upper three strata. For the ware of unknown origin see Figs. 11 and 12.

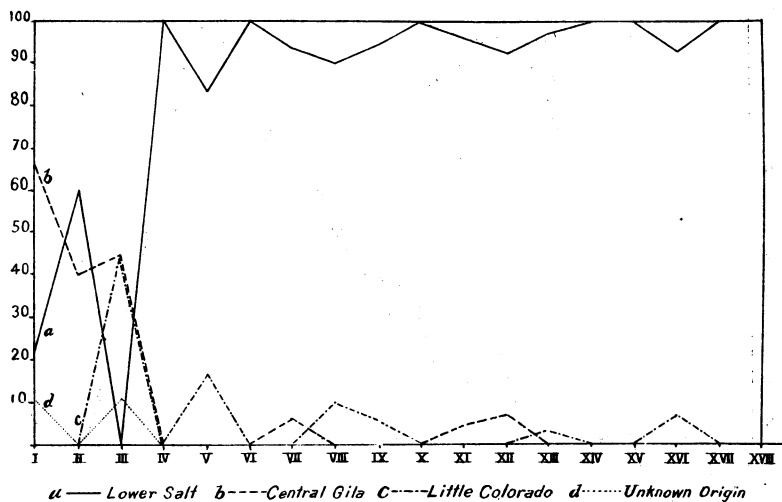
The striking peculiarity of the graph (Fig. 11) consists in the entanglement of the curves in the first three strata, coinciding with the drop of curve *a*. After a steady course as the dominating element in fifteen strata the ratio of Lower Salt ware drops, due to the increased occurrence of intrusive wares in strata III, II, and I. The interrelation between curves *a* and *b* is of particular interest. In Fig. 10 it was shown that seventy-five percent of the Central Gila ware was found in the upper three strata.¹ Fig. 13 indicates that this ware, missing in the lower strata and found only sporadically in the central strata, outnumbers the Lower Salt ware in the upper strata. Though the "ware of unknown origin" is represented only by two sherds found in strata I and III, its very occurrence in the upper strata is significant, since fairly complete vessels of this type were recovered at the Gila polychrome ruin, Toetzogze.

Fig. 12 combines the graphs in Figs. 10 and 11, showing in their actual relations the main points brought out by the two preceding graphs, namely:—

1. The general predominance of the Lower Salt ware below stratum III and its steady increase toward the base of the rubbish.
2. The small number and sporadic occurrence of the other wares below stratum III.
3. The intermingling of all wares and even the predominance of wares other than Lower Salt; in particular, the prevalence of Central Gila ware, in the first three strata.

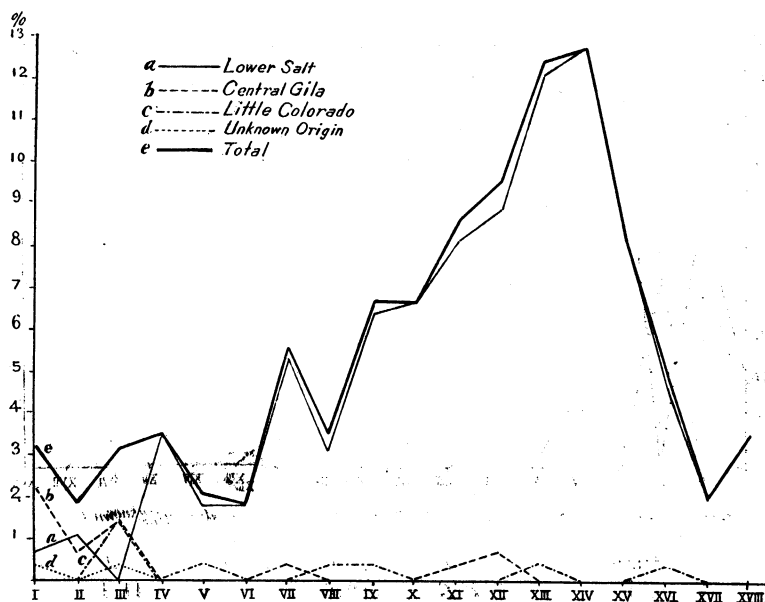
The general preponderance of Lower Salt ware over the other wares and its steady increase toward the rubbish bottom are sufficient proof

¹Two out of the three fragments found in strata XI and XII are only 1 square centimeter large, the third sherd is doubtful, but resembles Central Gila ware most closely.



Strata	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
I	22.2	66.6		11.1
II	60.0	40.0		
III		44.4	44.4	11.1
IV	100.0			
V	83.3		16.6	
VI	100.0			
VII	93.75	6.25		
VIII	90.0		10.0	
IX	94.7		5.3	
X	10.0			
XI	95.8	4.2		
XII	92.6	7.4		
XIII	97.2		2.8	
XIV	100.0			
XV	100.0			
XVI	92.9		7.1	
XVII	100.0			
XVIII	100.0			

Fig. 11. Variations of the Ratio of Decorated Sherds as classified in Table 2, Pueblo Grande.



Strata	a	b	c	d
I	0.7	2.2		0.35
II	1.1	0.7		
III		1.4	1.4	0.35
IV	3.5			
V	1.75		0.35	
VI	1.75			
VII	5.25	0.35		
VIII	3.15		0.35	
IX	6.4		0.35	
X	6.75			
XI	8.1	0.35		
XII	8.8	0.7		
XIII	12.05		0.35	
XIV	12.7			
XV	8.1			
XVI	4.6		0.35	
XVII	2.1			
XVIII	3.5			

Fig. 12. Main Graph, Decorated Ware (See Table 2), Pueblo Grande.

that this ware is *de facto* the pottery made by the original builders of Pueblo Grande.

Comparing curves *a* and *e*¹ (Fig. 12) we see that the decrease of decorated pottery toward the apex of the refuse mound concerns only the Lower Salt ware, this decrease reflecting the decline of the manufacture of this ware at Pueblo Grande. But taking the decorated ware as a whole, its decrease in the upper strata is checked by the increase of other than Lower Salt wares; in particular, by the sudden increase of Central Gila ware. This latter fact and the predominance of Central Gila ware in the upper three strata, in contrast to the preponderance of the Lower Salt ware in the remaining strata, and the disappearance of single stray pieces of the former ware² before the Lower Salt ware reaches its maximum, justify the conclusion that the Lower Salt ware is considerably older than the Central Gila ware. The latter appears toward the end of the decline of the locally indigenous ware, or even after its manufacture at Pueblo Grande had ceased. These conclusions will be amplified in the final summary.

FREQUENCY AND DISTRIBUTION OF DECORATED WARE AT LA CIUDAD

At La Ciudad, as shown by Fig. 13, the situation is somewhat different. Here Lower Salt ware does not continue to decrease after it dropped from the maximum in stratum VII to stratum V. It predominates to the apex of the refuse mound, in spite of the occurrence of Gila polychrome in the upper five strata. However, the principal points referred to with regard to Pueblo Grande are exactly paralleled at La Ciudad:—

1. The unrivaled predominance of Lower Salt ware at the rubbish base indicates that this ruin was also built by the makers of this ware.
2. Central Gila polychrome is a more recent type, since it occurs only in the upper five out of fourteen strata and disappears even before the Lower Salt ware begins to rise to the strata of its maximal occurrence.

Of wares other than Salt and Gila only one sherd of Little Colorado black-on-white was found in stratum VI.

There is a correlation between the phases of the graphs in Figs. 12 and 13 as well as of the graphs in Figs. 5 and 6. The phase extending in the graph of La Ciudad from strata V to X corresponds to the much longer phase, reaching in Fig. 12 from strata VI to XVII. The phase succeeding in the upper strata the drop of the decorated ware, i.e., Lower Salt ware, from its maximum, is in both refuse heaps of about equal length (Fig. 12, strata VI to I; Fig. 13, strata V to I). This phase is

¹See also graph, Fig. 5.

²Probably having migrated within the rubbish heap.

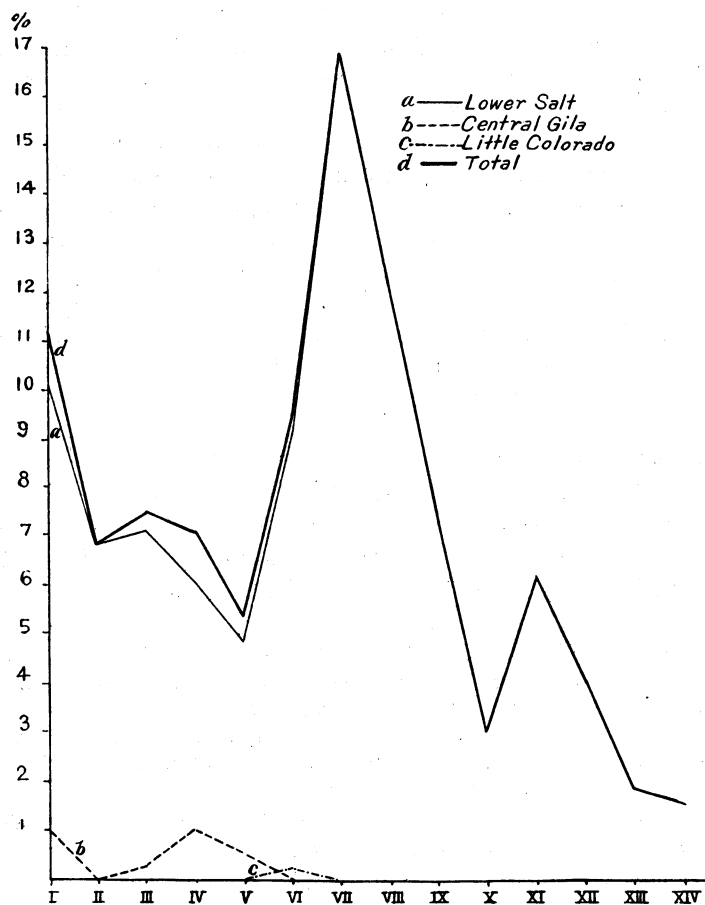


Fig. 13. Main Graph, Decorated Ware of La Ciudad corresponding to Fig. 12.

accompanied, in both cases, by the occurrence of intrusive types, in particular, Gila polychrome, which at Pueblo Grande in part even out-numbers the older ware. As to the correlation between the occurrence of intrusive types and the rise of the total of sherds see p. 281.

TYPES OF LOWER SALT WARE AT PUEBLO GRANDE AND LA CIUDAD

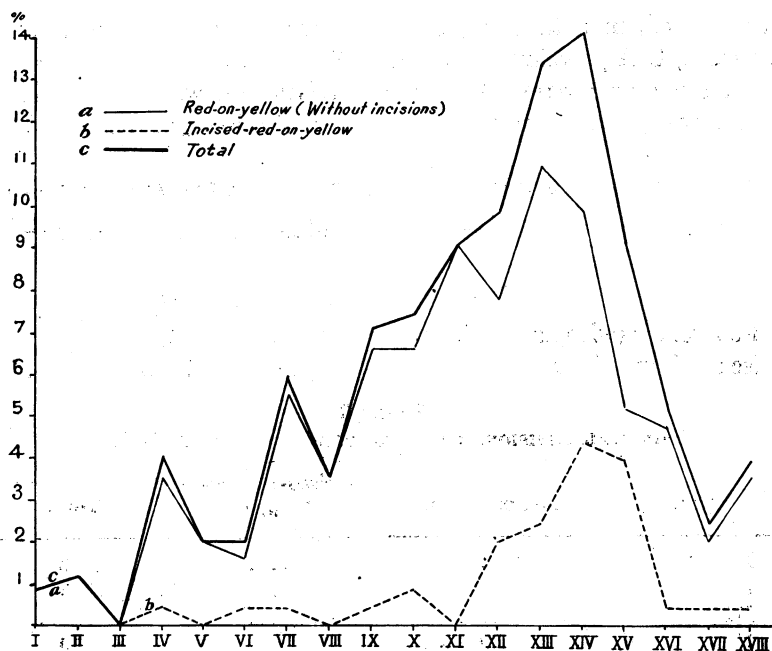
The proportions of the two divisions of Lower Salt ware were:—

	Sherds	%	Rim Sherds %
Red-on-yellow (without incisions)	215	84.0	17.2
Incised-red-on-yellow	41	16.0	24.4

TABLE 3
PRINCIPAL DIVISIONS OF DECORATED LOWER SALT WARE

Strata	Red-on-Yellow	Incised-Red-on-Yellow	Totals
I	2	....	2
II	3	....	3
III	....	....	....
IV	9	1	10
V	5	....	5
VI	4	1	5
VII	14	1	15
VIII	9	....	9
IX	17	1	18
X	17	2	19
XI	23	....	23
XII	20	5	25
XIII	28	6	34
XIV	25	11	36
XV	13	10	23
XVI	12	1	13
XVII	5	1	6
XVIII	9	1	10
Totals	215 (37)	41 (10)	256

The ratio of red-on-yellow exceeds by far that of incised-red-on-yellow. The proportions of rim sherds suggest that only vessels of relatively small size were ornamentally incised. The number of such sherds is too small to allow a definite statement, but their character strengthens this assumption.

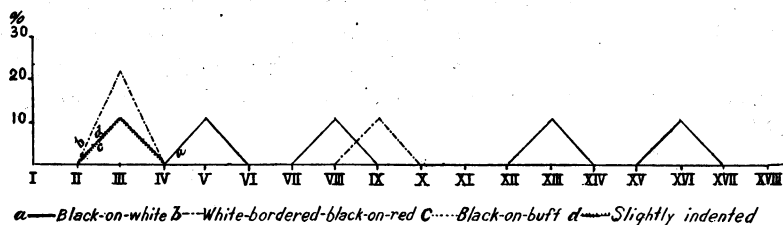


Strata	<i>a</i>	<i>b</i>	<i>c</i>
I	0.8		0.8
II	1.2		1.2
III			
IV	3.5	0.4	3.9
V	2.0		2.0
VI	1.6	0.4	2.0
VII	5.5	0.4	5.9
VIII	3.5		3.5
IX	6.6	0.4	7.0
X	6.6	0.8	7.4
XI	9.0		9.0
XII	7.8	2.0	9.8
XIII	10.9	2.4	13.3
XIV	9.8	4.3	14.1
XV	5.1	3.9	9.0
XVI	4.7	0.4	5.1
XVII	2.0	0.4	2.4
XVIII	3.5	0.4	3.9

Fig. 14. Main Graph, Lower Salt Ware, showing Relations between the Two Types (See Table 3), Pueblo Grande.

The corresponding data from La Ciudad are as follows:—

	Sherds	%	Rim Sherds %
Red-on-yellow (without incisions)	340	89.2	15.3
Incised-red-on-yellow	41	10.8	19.5



Strata	a	b	c	d
I				
II				
III		22.2	11.1	11.1
IV				
V	11.1			
VI				
VII				
VIII	11.1			
IX		11.1		
X				
XI				
XII				
XIII	11.1			
XIV				
XV				
XVI	11.1			
XVII				
XVIII				

Fig. 15. Distribution (in percentages) of Little Colorado Types, Pueblo Grande.

Curves *a* and *b* (Fig. 14) resemble each other in their general trend, but while the increase of red-on-yellow without incisions begins in stratum IV, incised-red-on-yellow is found very sparsely in the upper eleven strata and frequently only in strata XII to XV. From this graph it appears that incised-red-on-yellow is an old variety of Lower Salt ware, disappearing prior to red-on-yellow without incisions. This was

not confirmed at La Ciudad, where the proportions of both types remain rather stable from top to bottom.

DISTRIBUTION OF LITTLE COLORADO TYPES AT PUEBLO GRANDE

Only nine sherds of this group were found representing four distinct types which originated in the Little Colorado region. But these types are distributed within the core in a very interesting way. From the rubbish bottom up to stratum V only black-on-white sherds occur in addition to one sherd of "white bordered-black-on-red" in stratum IX, superposed by the remaining sherds in stratum III. (See summary p. 277.)

SUMMARY

The results of the foregoing analysis will now be combined and the conclusions amplified by additional data. As to the general distribution of sherds within the stratified core, it has been shown that a correlation exists between the number of sherds found in the individual strata and the degree of density in the succession of well-marked rubbish layers.¹ These layers, containing much charcoal and ash, vary in thickness from three to ten centimeters. They may be sediments which formed at the bottom of periodically deposited refuse.

Of the two principal groups, undecorated and decorated, only the decorated ware was found useful as a sensitive instrument for the present stratigraphic study. But in spite of our inability at the present time to determine, by the aid of sherds, the corresponding variations of undecorated and decorated ware in the Lower Gila region, the variations of the proportions of the general pottery classes give valuable information. In order to illustrate this point the proportions of these classes at Pueblo Grande are shown below in graphic form, together with the corresponding diagrams based on sherds from the Spring Creek² ruin, situated on the southern shore of Roosevelt Lake, and the Togetzoge ruin³ situated between Superior and Miami.

A feature common to all three ruins is the predominance of plain ware. Other characteristics are the relatively small ratio of black-polished-interior at Spring Creek and at Togetzoge, possibly correlated with the high ratio of decorated ware, as a whole, at these ruins as compared with Pueblo Grande,⁴ and the high ratio of corrugated-indentated at Spring Creek as compared with the exceedingly small percentage of this ware at Togetzoge and its absolute absence at Pueblo Grande. At the present state of the investigations most of these variations must be regarded as local phenomena until more comparative data are at hand, but it may be considered a fact that the makers of the Lower Salt ware never made corrugated-indentated ware.

As was mentioned above, the most valuable information was obtained at Pueblo Grande by the analysis of the decorated ware, which

¹See Figs. 5 and 7.

²Black-on-white area, sherds recovered by stratigraphic work in a rubbish mound.

³Gila polychrome area, sherds taken from four excavated rooms.

⁴The corresponding data for La Ciudad, Lower Salt region, are as follows:—

	Sherds	%
Plain	6512	85.40
Black-polished-interior	721	9.45
Corrugated-indentated	.....	.....
Painted	393	5.15

Compared with Pueblo Grande the percentage of black-polished-interior is lower and that of decorated ware higher.

indicates that the cultural relations of the former inhabitants of this settlement were, at one time or another, with the peoples to the east, occupying the Central Gila region, and to the north, or the southern part of the Little Colorado region. This fact, as well as the phenomenon of the locally indigenous ware outnumbering by far the intrusive types at any given locality will be shown in the following comparative diagrams¹ (Fig. 17). The wares which constitute only a small percentage of the total of decorated sherds at Pueblo Grande² (Fig. 17a) predominate in the other two ruins, representing the areas to the east and to the north of the Lower Salt region. The prevailing intrusive wares are: Central Gila at Pueblo Grande, Little Colorado at Togetzoge, and Lower Salt at Spring Creek. As to the occurrence of Chihuahua polychrome at Togetzoge, according to Doctor Kidder³ this ware is contemporaneous with Gila polychrome. The home of the ware of unknown origin, occurring in very small quantities at the three localities, has yet to be found.

Returning to Pueblo Grande, the following deductions were made from the examination of the graphs in Figs. 10, 11, and 12. The unrivaled predominance of Lower Salt ware in general (Fig. 17a) and at the base of the refuse, in particular, proves beyond doubt that Pueblo Grande was built by the makers of this ware. The slow and steady decrease of Lower Salt ware from the bottom upward suggests the equally slow and steady decrease of its manufacture at Pueblo Grande, and going tentatively one step farther, the fading of the local culture. This statement cannot yet be generalized, but its correctness, if applied solely to this ruin, is strikingly supported by the course of curve *a* in Fig. 12. There may be objections to our apparent ignoring of the effects of the law of gravity or the migration of sherds by the aid of other agencies as, for example, the work of small rodents. These disturbing factors were seriously considered. But why does the plain ware increase in the upper strata, while the indigenous decorated ware almost disappears (Figs. 5 and 12), and principally, what is the cause of the accumulation of particular intrusive types of decorated ware in the upper strata (Figs. 10 to 12). These phenomena are correlated and determined by definite events, the effects of which have not been obliterated by the migration of single sherds, which beyond

¹Sherds taken at Spring Creek from trenches in six refuse heaps, at Togetzoge from forty-six excavated rooms.

² Proportions of decorated wares at La Ciudad:	Lower Salt	Sherds	%
	Central Gila	380	96.95
	Little Colorado	11	2.8
		1	.25

³Kidder, Alfred Vincent, *An Introduction to the Study of Southwestern Archaeology, with a Preliminary Account of the Excavations at Pecos*, New Haven, 1924 (113).

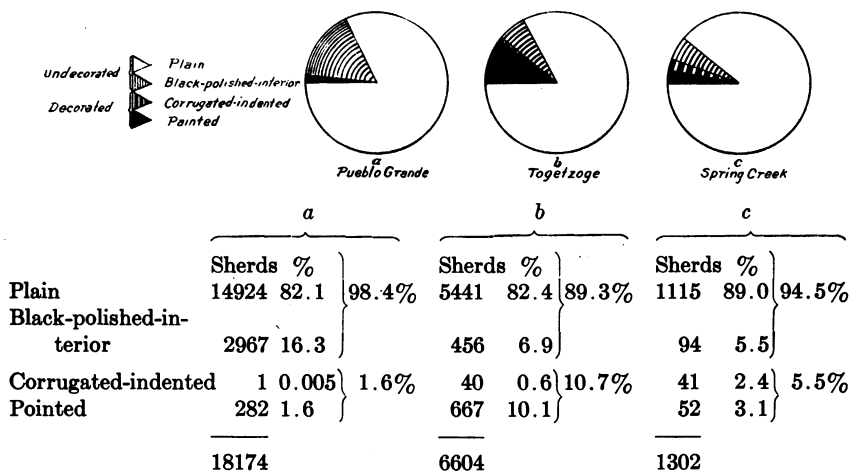


Fig. 16. Proportions of Principal Pottery Classes at Pueblo Grande (a), Togetzoge (b), and Spring Creek (c).

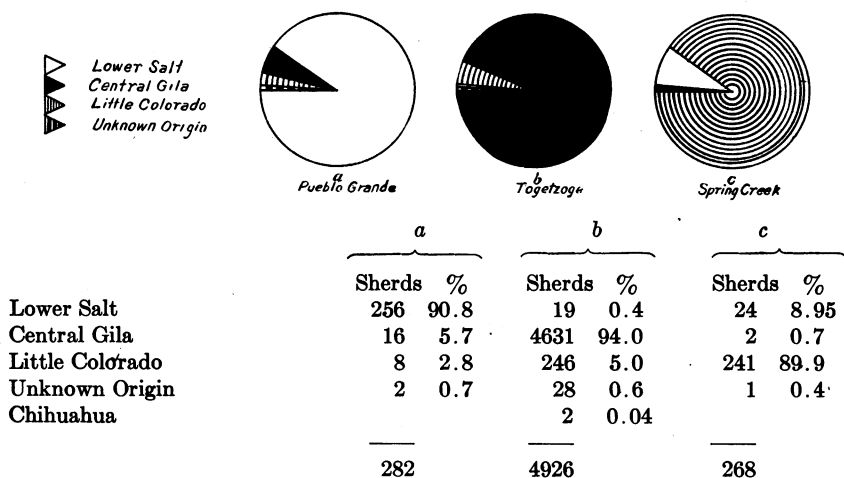


Fig. 17. Proportions of Decorated Wares at Pueblo Grande (a), Togetzoge (b), and Spring Creek (c).

doubt has taken place. Therefore we may state that the contents of the refuse heap under examination are distributed at the present time largely in the same way as when it ceased to be used. Seen from this viewpoint, the cessation of the decrease of sherds in stratum V (Fig. 5), followed by a considerable increase toward the apex, gains importance and suggests the beginning of a new era at Pueblo Grande, seemingly connected in some way or other with Central Gila influence. This assumption is supported by the following observations concerning the decorated ware.

In the Lower Salt ruins Central Gila polychrome has been found to such an extent that as a whole, the pottery found at Phoenix and Tempe, was referred to as "identical with that from the Pueblo Viejo ruins"¹ though the latter are situated more than 200 kilometers east of Phoenix near the eastern margin of the Gila polychrome area. The decorated pottery type prevailing in the Pueblo Viejo section is Central Gila polychrome according to Fewkes² and Kidder,³ Lower Salt ware (Kidder's red-on-gray) being apparently absent.⁴ Prior to stratigraphic research it was justifiable indeed to identify the ceramics of the Pueblo Viejo district with those found near Phoenix and Tempe, since the "Los Muertos" collection⁵ made in the latter region by Cushing in 1886 shows a predominance of complete Gila polychrome over Lower Salt red-on-yellow vessels. Judging from the results of the present study, this identification appears exaggerated, but it illustrates the situation. Further, in the two-story building, La Ciudad, two superposed rooms were excavated by the author. In the upper room built of adobe walls, a broken Central Gila polychrome olla, sherds of the same type, and a corrugated-indent vessel were found, in addition to Lower Salt ware sherds. In the underlying room-filling, separated from the upper one by three superimposed living floors, no polychrome sherds occurred, and in addition to Lower Salt sherds only one black-on-white fragment.⁶ The foregoing points emphasize the significance of the distribution of the intrusive decorated types, in particular Gila polychrome, within the refuse heaps of Pueblo Grande and La Ciudad.

While at Pueblo Grande, as referred to above, the plain ware increased considerably in the upper strata, the decorated Lower Salt ware

¹Fewkes J. W., "Two Summers' Work in Pueblo Ruins (*Twenty-second Annual Report, Bureau of American Ethnology*, part 1, Washington, 1904), 179.

²*Ibid.*, Decorated Gray Ware, 180.

³*Southwestern Archaeology*, 112.

⁴*Ibid.*, 112.

⁵Peabody Museum, Harvard University.

⁶The contours of the lower room could not be determined, because time was wanting. But at a depth of 3.50 to 4 meters from the surface, upright holes were found containing the charred remains of wooden poles. They were part of the lowermost structure and may throw light on the actual composition of some of the "pyramidal substructures" mentioned frequently in regard to the Gila-Salt ruins.

continued to decrease and was replaced by other decorated types, as shown in Figs. 11 and 12. The occurrence of the principal intrusive type, Central Gila polychrome, coincides with the rise of the plain ware, this phenomenon being exactly paralleled at La Ciudad (Figs. 6 and 7). These combined criteria leave no doubt that Central Gila polychrome is a far more recent variety of Southwestern pottery than Lower Salt red-on-yellow (incised and smooth), and it may be assumed that the appearance of the Gila ware in the Lower Salt region was accompanied by a new, though certainly short-lived culture epoch. At the present time it would be premature to suggest whether this new era was due to an actual invasion of the eastern neighbors or to close culture exchange between the Lower Salt and Central Gila populations, and whether there exist evolutionary relations. Systematic excavations would doubtless answer these questions.¹

At this point it is interesting to compare the foregoing conclusions as to the time-relations of Lower Salt and Central Gila wares with statements made by J. W. Fewkes concerning the relative age of Salt and Gila ruins:—

The Salt River ruins are commonly regarded by the Pimas as older than those along the Gila and Santa Cruz. The legends of these Indians declare that the culture of their builders was somewhat more advanced and older than that of the Gila, but that the "compounds" of these two regions were inhabited simultaneously. It is said that there was a constant communication between them and that the relations were not always friendly. An examination of the ruins of the two regions indicates that those of the Salt are more ancient than those of the Gila and the Santa Cruz.²

The last statement by Fewkes is seemingly based on the more or less advanced disintegration of architectural remains, for he remarks before:—

... none of them [referring to Salt River ruins] show walls standing above ground, a fact indicating great age.

In the present case this assumption proved to be right, but in general the preservation of walls cannot be regarded as a reliable criterion. The

¹In addition to the relative frequency of Gila polychrome in the Lower Salt region, there is one particular criterion pointing toward an actual inhabitation by the makers of polychrome of at least part of this area. At Los Muertos, according to Cushing, two methods of disposing of the dead were encountered, cremation and inhumation. While examining the Peabody Museum photographs representing the burial sites of Los Muertos and neighboring ruins, we noticed that the decorated incinerary urns were Lower Salt red-on-yellow, while the decorated mortuary vessels accompanying uncremated skeletons were Central Gila polychrome. On the other hand, it was known that at Togetzoge, in the polychrome area, only inhumation was practised. Future work will have to show to what extent these observations can be generalized, since Fewkes reports that cremation was also practised in villages of the Pueblo Viejo section situated in the polychrome region (*Two Summers' Work in Pueblo Ruins*, 175). However this may be, judging from the above-mentioned photographs, in settlements of the Lower Salt region cremation is associated with the old Lower Salt ware, inhumation with the more recent Gila polychrome, and it must be admitted that these criteria speak decidedly for a dual occupation.

²J. W. Fewkes, *Prehistoric Ruins of the Gila Valley*, 420.

statement concerning the simultaneous inhabitation of the "Salt, Gila, and Santa Cruz compounds"¹ could, without difficulty, be checked up by means of stratigraphic studies. It can only refer to the last phase of the Lower Salt culture, if the Gila and Santa Cruz compounds mentioned by Fewkes were built by the polychrome makers. Nevertheless, the important point is that according to Pima legends the Lower Salt ruins are older than the settlements situated eastward, this tradition having been verified by the present study.² It is possible, of course, that this is an accidental coincidence.

Regarding now the relations between the Lower Salt region and the southern part of the Little Colorado area, it is found that in contrast to the relative frequency of Gila polychrome, Little Colorado ware occurs very infrequently in the Lower Salt region, usually in the form of sherds only. It has been previously mentioned that the distribution of the individual types of this ware found within the core of the refuse mound of Pueblo Grande is significant. To explain this it is necessary to consider first the range of Little Colorado types at Spring Creek and Togetzoge ruins.

The foregoing diagrams are based on the same material which was used for the diagrams in Fig. 17*b* and *c*, but Fig. 18 is confined to painted Little Colorado types, indigenous in the area represented by Spring Creek and intrusive at Togetzoge. The most striking feature is the absolute lack of black-on-white ware at Togetzoge. Not one sherd of this type was found in the latter ruin, though to date fifty-two rooms, in addition to the common burial ground, have been excavated. In contrast, we notice that the majority of painted sherds at Spring Creek are black-on-white. Further, those types which represent the principal intrusive wares at Togetzoge constitute only a small percentage of Spring Creek pottery. These facts give us an exceedingly clear-cut cross-section on which the time-relations of Togetzoge to Spring Creek in particular and of Central Gila polychrome to certain Little Colorado types, in general, are well marked. Though the southern part of the Little Colorado area has not yet been worked out as to the character and range of ceramics, stratigraphic

¹Pueblo Grande is referred to by Fewkes as a compound.

²The origin and movements of the Piman tribes is a highly interesting problem, necessarily linked with archaeological investigations of southern Arizona and northern Mexico. It could be solved by tracing back their remains, left in the deserted villages, rancherias, and camps which are scattered over the old "Papaguera" extending from the Gila to the Arroyo de San Ignacio in Sonora and from the Santa Cruz to the Gulf of California. (Map of Papago Rancherias, present and past, *Lumholtz, New Trails in Mexico*).

Equally important is the question whether the ancestors of the Yuma who live on the Colorado River, practise cremation and make pottery, had their share in the development of the Lower Salt culture.

studies pursued in the northern sector of this region by Spier¹ and Hodge,² and in the Rio Grande region by Nelson³ and Kidder⁴ permit a fairly exact explanation of the present phenomenon. Wherever stratigraphic research was made, black-on-white was found associated with the earliest remains of the Pueblo period, other pottery types following successively

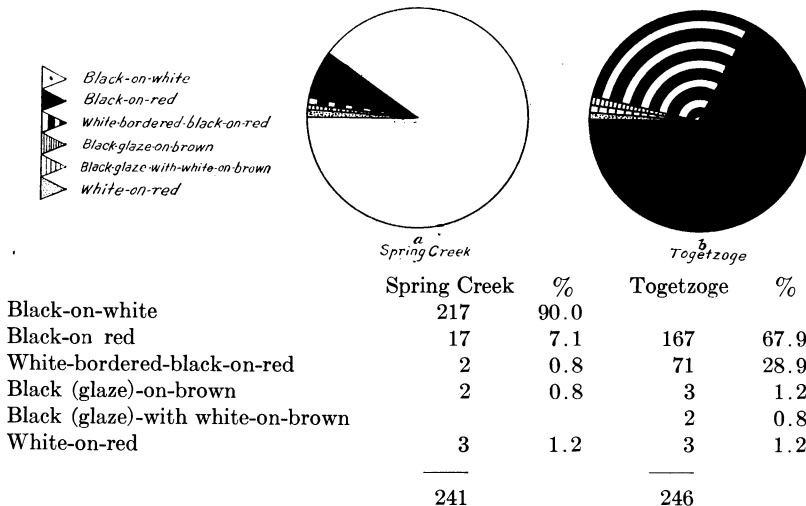


Fig. 18. Proportions of Little Colorado Types at Spring Creek (a) and Togetzoge (b).

and partly overlapping the preceding ones. According to Spier, whose observations agree rather closely with those of Hodge, the sequence of painted types found in the northern Little Colorado region is as follows:—

1. Black-on-white
2. Decline of black-on-white accompanied by the rise of redware:—
 - a. Redware with black paint⁵
 - b. Redware with black-and-white paint⁶
3. Black glaze and white paint on red, etc.⁷

Applying as a clue the main points of this chronology as well as the general fact of the relative antiquity of black-on-white, we may conclude:—

¹Spier, Leslie, "An Outline for a Chronology of Zuñi Ruins" (*This series*, vol. 18, part 3, 1917); "Notes on Some Little Colorado Ruins" (*This series*, vol. 18, part 4, 1918).

²Hodge, F. W., "Circular Kivas near Hawikuh, New Mexico" (*Contributions from the Museum of the American Indian, Heye Foundation*, vol. 7, no. 1, 1923), 27ff.

³Nelson, N. C., "Chronology of the Tano Ruins, New Mexico" (*American Anthropologist*, n.s. vol. 8, pp. 159-180, 1916).

⁴Kidder, *Southwestern Archaeology*, 21ff.

⁵Condensation of Spier's report in Kidder, *Southwestern Archaeology*, 90.

⁶Black-on-red of present report.

⁷White bordered-black-on-red found in the southern part of this region seems to be an intermediate type between 2b and 3.

The intrusive Little Colorado types found in considerable number at Togetzoge, associated with the indigenous Gila polychrome, are of more recent origin than Little Colorado black-on-white. Since the latter type is entirely absent at Togetzoge, in spite of its predominance in a series of ruins represented by Spring Creek and situated, of all Little Colorado ruins nearest to Togetzoge, it follows that Gila polychrome in this region, at least, was not made before the end of the black-on-white era of the Little Colorado region.¹ Contemporaneous with Gila polychrome are those Little Colorado types found associated with the former ware at Togetzoge, i.e., principally black (paint)-on-red and white bordered-black (subglaze)-on-red.

Turning back to the starting point, namely the problem as to the time-relations between Lower Salt ware and Little Colorado types, we find that this question is answered to a large extent by the determination of the relations between Central Gila ware and Little Colorado types succeeding black-on-white. From this viewpoint the occurrence of a few black-on-white sherds distributed over strata V to XVI of the Pueblo Grande refuse heaps gains importance (the maxima of the other intrusive types falling in the upper three strata).² Other criteria are the relative frequency of Lower Salt driftware in the refuse mounds of the black-on-white Spring Creek ruin, noticed also at other ruins of this section, as compared with the trivial percentage of the former ware at Togetzoge,³ and mainly the co-occurrence of Lower Salt red-on-yellow with black-on-white mortuary pottery found by the author in a burial ground on the northern shore of Roosevelt Lake.⁴ These combined criteria show rather convincingly that the Lower Salt ware is contemporaneous with Little Colorado black-on-white, but final information as to the extent of cultural relations between the makers of the two wares must be sought in the ruins situated on the lower Rio Verde. One very important question must at present be left unanswered—the relations

¹A phenomenon somewhat paralleling the situation in the Lower Salt region is encountered in the Roosevelt Lake district. While on the surface of ruins and also in rooms, fragmentary Gila polychrome vessels are found, in the refuse heaps accompanying the ruins hardly any polychrome sherds occur. It may be assumed therefore, that either the polychrome makers inhabited for a short time the settlements deserted by the makers of black-on-white, or the makers of those Little Colorado types which succeeded black-on-white inhabited the black-on-white ruins and stood in close cultural relations to the polychrome makers.

²Graphs Figs. 15 and 12: white bordered-black-on-red—contemporaneous with Gila polychrome—in strata III and IX; sherd of buffware—according to Spier associated in some ruins with white bordered black-on-red—in stratum III (Spier, Leslie, "Ruins in the White Mountains, Arizona", *This series*, vol. 18, part 5, 367); ware of unknown origin—to date found most closely associated with Gila polychrome—in strata I and III.

³Fig. 17.

⁴Armer's Gulch Ruin on map (Fig. 1). Near this ruin eight graves arranged in a uniform manner were uncovered. Two contained fragmentary red-on-yellow pots in addition to black-on-white sherds. The painted ware accompanying the remaining burials was black-on-white. Only one sherd of a crude black-on-red variety was found in these graves.

between the Lower Salt population and the ancient inhabitants of the State of Sonora in northern Mexico. It is our conviction that in this territory the clue will be found for certain foreign—non-Southwestern—features, puzzling the investigator of the Lower Salt and Central Gila regions. There is no doubt that agricultural tribes inhabited Sonora in prehistoric times.¹ Investigations of their remains and subsequent explorations toward the south would finally result in linking up the Pueblo region with the cultures of Central Mexico. This is one of the most important problems for the Southwestern archæologist to solve.

The following schematic diagram (Fig. 19) illustrates the conclusions in condensed form:—

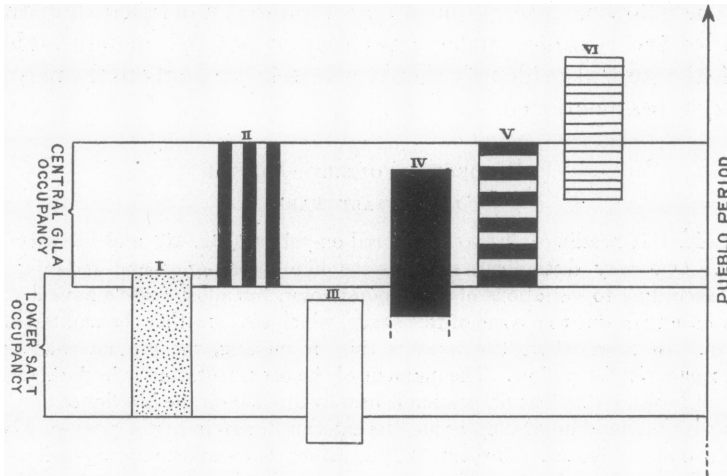


Fig. 19. Time Relations of Principal Decorated Types. I, Lower Salt red-on-yellow and incised-red-on-yellow; II, Central Gila polychrome; III, Little Colorado black-on-white; IV, Little Colorado black-on-red; V, Little Colorado white-bordered-black-on-red; VI, Little Colorado black (glaze) (with white)-on-brown.

We do not yet know the duration or the accurate extent of overlapping of the periods represented by these pottery types. Future research will lengthen or shorten the columns of this diagram as our knowledge concerning these points increases. Certain columns drawn separately may appear inserted and superposed when we know more about the evolutionary relations. Nevertheless, the foregoing diagram, illus-

¹Lumholtz, *ibid.*, 140 ff., 179 ff.; Bandelier, A. F., "Final Report of Investigations among the Indians of the Southwestern United States, part II" (*Papers, Archaeological Institute of America, American Series*, no. 4, Cambridge, 1892), 482 ff.

trating the chronological sequence of the principal types encountered, is essentially true and presents a clue for archæological work in southern Arizona.

Though the present report deals only with the locally important question of the time-relations of ceramic types found in the Gila and Salt regions, the results representing the sequence of culture periods in this particular area will gain general importance by a comparative study of the cultural complexes defined by the various contemporaneous or successive pottery types.

POTTERY TYPES

The following descriptions do not represent a detailed comparative study of the ceramics under consideration but are merely added to enable the student to identify sherds or vessels belonging to the particular pottery types mentioned.

DECORATED POTTERY—PAINTED

LOWER SALT WARE

Under this heading fall two types, red-on-yellow (Fig. 20) and incised-red-on-yellow. One may distinguish subdivisions like red-on-gray and red-on-grayish-black, according to variations of the ground color, but most vessels have a whitish yellow base color due to a wash of this shade, which covers either the painted or both surfaces. In cases where the wash is thin or missing, the ground color is that of the paste, reddish yellow. The pigment of the ornamentation is in dark and light shades of brown red. The decoration is usually applied on the interior of bowls, but sherds with bilateral decoration occur, the exterior design in many cases simply consisting of oblique strokes. The paste is often rather coarse and contains small particles of crystalline rock and mica. The latter occurs also frequently on the surfaces of vessels, perhaps intentionally mixed with the wash for its decorative effect.

Incised-red-on-yellow is in every respect like red-on-yellow without incisions, except for an additional ornamentation in incised lines running, in each case, parallel to the rim of the vessel on the exterior (Fig. 21). In many cases these lines do not join, resulting in a slight overlapping. The incisions were always made before the decoration in paint was applied. The average width of the grooves, which are made by a pointed instrument, is 1 mm., the average depth $\frac{1}{2}$ mm. The distances between the lines vary from $\frac{1}{2}$ to 10 mm.

The scarcity of complete Lower Salt vessels has been previously noted by Doctor Kidder. There are some representative pieces in private collections in Phoenix and the vicinity and in the Peabody Museum of Harvard University, but their number is very limited. Complete incised-red-on-yellow pots are not available at all.

Large vessels of olla form are rare, but judging from the sherds, some of them approached the size of Gila polychrome ollas. One fine example of a large double olla was found near Gila Bend (Fig. 20f). Small ollas are more common (Fig. 20a, c).

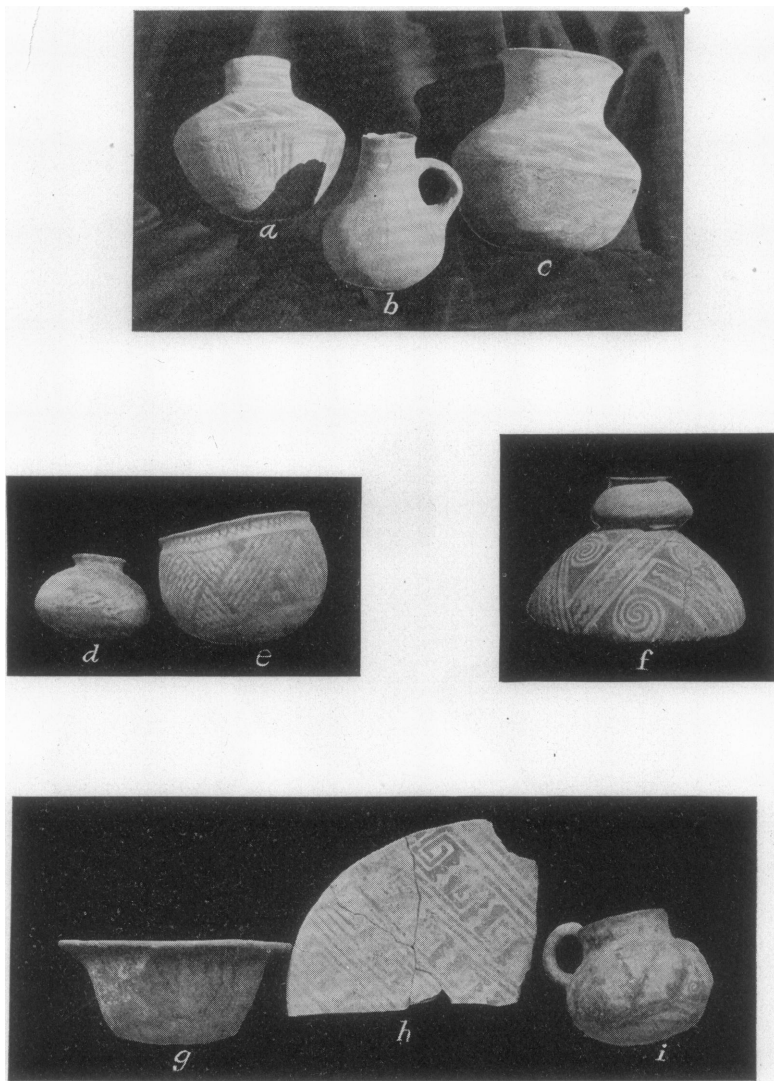


Fig. 20. Red-on-Yellow Vessels, Lower Salt Region. *a-c*, Small ollas and pitcher from Buckeye, Brooster Collection, McDonald Ranch, Buckeye; *d-e*, Small olla and bowl from site one mile east of Phoenix; (*d*, Anderson Collection, Phoenix; *e*, Mrs. W. B. Thompson Collection, Superior); *f*, Double olla from Gila Bend (Photograph by Dr. O. A. Turney); *g-i*, Bowl, plate, and pitcher from ruin six miles north of Sacaton, L. Jaeger Collection, Phoenix.

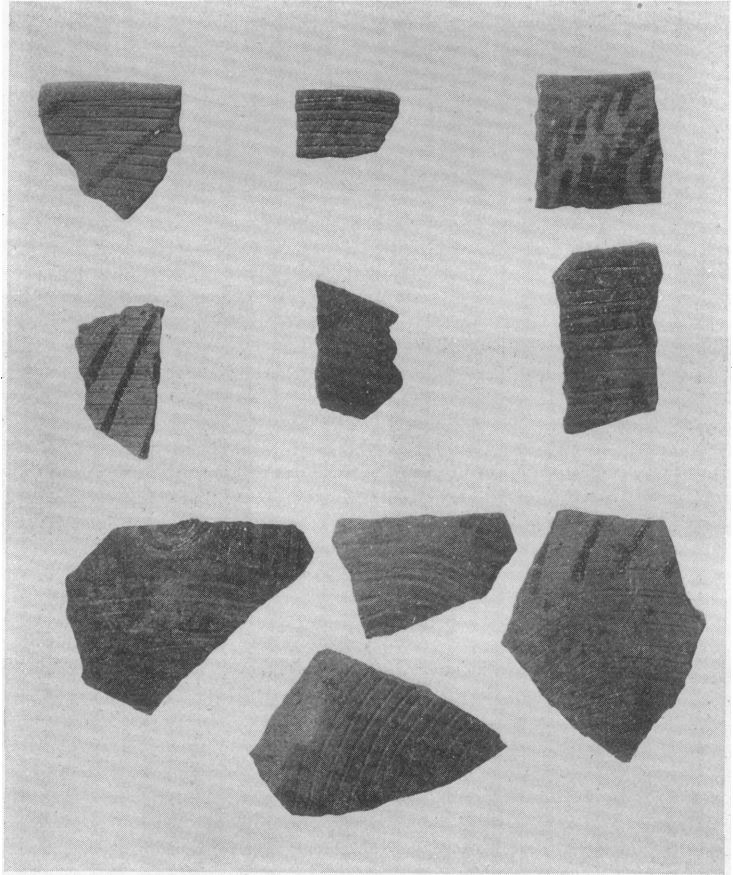


Fig. 21. Incised Red-on-Yellow Sherds. *a*, Bowl, surface, La Ciudad; *b, c, d, e, i*, Bowls, surface, Pueblo Moroni; *f*, Bowl (?), refuse heap, Stratum XV, Pueblo Grande; *g*, Olla (?); *h*, Bowl, surface, Pueblo Grande; *j*, bowl, Stratum XII, Pueblo Grande. American Museum Collection.

Pitcher: Fig. 20 *b*, *i*.

Bowl: Deep, somewhat more than hemispherical, narrow rim (Fig. 20*e*).

Shallow, flat bottom, broad rim (Fig. 20*g*).

Plate: Disk-shaped, slightly concave (Fig. 20*h*).

Dipper: In the collection of Doctor Turney of Phoenix, one dipper was seen, which belongs to the elongated dipper-bowl type.

The incised-red-on-yellow sherds indicate that incisions were applied principally on bowls, on small ollas, urns, and possibly on pitchers.

As far as is known to date, there does not seem to be any distinction between the style of decoration employed on the two Lower Salt types. The most striking feature of Lower Salt designs is the use of more or less conventionalized life forms (Fig. 22) as well as geometric ornamentation, in contrast to all the other wares of the adjacent regions, which have only geometric patterns.¹ (Fig. 23). This fact, as well as the peculiar stylistic treatment of many designs (Fig. 24), which induced Kidder to speak of the "impressionist school of the Southwest"² shows the fundamental difference between the art of the Lower Salt population and that of their contemporaneous and successive close neighbors. This, of course, concerns only the inhabitants of the regions to the east and north of the Lower Salt area, since the territory to the south—the Mexican State of Sonora—is entirely unknown.³

CENTRAL GILA POLYCHROME

The well-known Central Gila polychrome type is identical with Kidder's polychrome redware.⁴ It occurs in the form of large and small ollas, bowls, pitchers, bird and shoe-shaped vessels. Dippers, according to Kidder are rare.

The exposed surfaces of the vessels bear a red or red-brown slip. The designs in black paint are applied on an additional white slip. The bottoms of ollas and the undecorated parts of bowls are left red and red bands are sometimes introduced into the designs.

Bowls are usually decorated on the interior, but exterior and bilateral ornamentation occurs.

The paste is finer than most of the associated plain ware. The cross-sections of sherds show, as a rule, a grayish black core with reddish margins.

The type has been described by Doctor Kidder in a way which makes further definition at this place unnecessary. For the sake of comparison some vessels are illustrated. (Fig. 25*a-b*).

LITTLE COLORADO WARE

Most of the types falling within this category and represented in the present paper originate in the region between the Little Colorado and Salt Rivers. This territory, in particular the section drained by the Rio Verde, Tonto Creek, and Cherry Creek, is nearly terra incognita as to the range and technology of ceramic types. Judging from

¹To be sure, Gila polychrome and Little Colorado black-on-white vessels are sometimes modeled partly or entirely in animal form, but no naturalistic designs occur.

²Kidder, *Southwestern Archaeology*, 111.

³Doctor A. L. Kroeber directed our attention to the interesting fact that in the westernmost part of the archaeological Lower Salt region, on both sides of the Colorado River, the present day Mohave make pottery resembling the prehistoric red-on-yellow ware. Mohave pottery has not yet been studied, but judging from specimens in the Peabody Museum, the pigment of the ornamentation and seemingly the paste closely resemble the pigment and paste of the ancient ware, though the designs show no relation.

⁴Kidder, *Southwestern Archaeology*, 109.

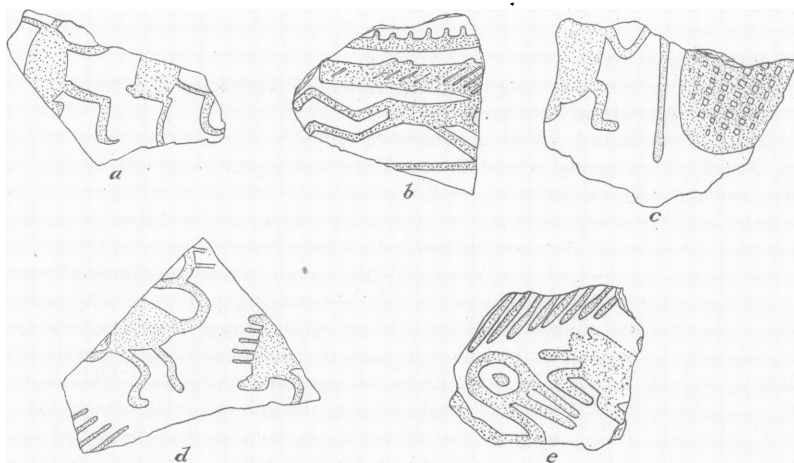


Fig. 22

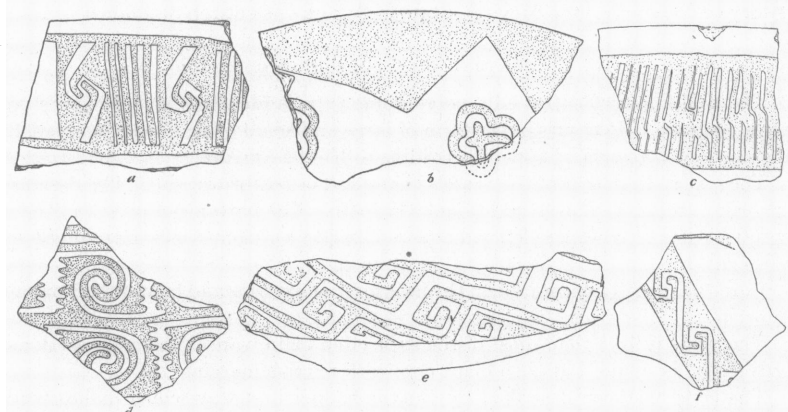


Fig. 23

Fig. 22. Conventionalized Life Form Designs on Red-on-Yellow Ware, Lower Salt Region. *a*, Human being, Los Hornos (Peabody Museum Collection, 4208); *b*, Human being, on olla, Stratum VI, refuse heap, La Ciudad (American Museum collection); *c*, Human being, Los Muertos (Peabody Museum Collection, 505); *d*, Animal on olla, Los Muertos (Peabody Museum Collection, 2278); *e*, Duck on olla, Stratum XIII, refuse heap, La Ciudad (American Museum collection).

Fig. 23. Geometric Designs on Red-on-Yellow Ware, Lower Salt Region. *a*, Neck of olla, surface, Pueblo Grande; *b*, Bowl, surface, Pueblo Moroni; *c*, Neck of olla, surface, Pueblo Moroni; *d*, Olla, surface, Pueblo Grande; *e*, Olla, Los Muertos (Peabody Museum Collection, 2279); *f*, Olla, surface, Pueblo Moroni.

what is known, it seems certain that future work will establish a separation of the northern and southern sections of the Little Colorado area, incorporating part of the southern district into the Upper Gila region.

Black-on-White. Nearly all sherds and vessels of this type, samples of which are illustrated, were recovered in the vicinity of Roosevelt Lake. They show strong Upper Gila influence and in many cases cannot be distinguished at all from the black-on-white of this area. As to technology, the paste is rather fine, grayish white, and coated with a white slip, which as a rule is applied bilaterally. Some narrow-mouthed pieces bear a slip only on the exterior. The pigment of the ornamentation is black paint, in some instances discolored to rust-brown. Bowls are painted interiorly, very seldom on both faces.

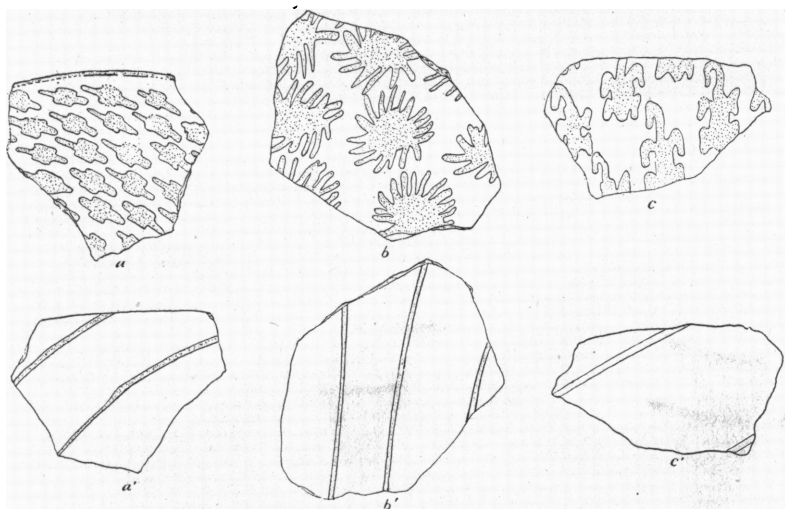


Fig. 24. Unit All-Over Designs on Red-on-Yellow Ware, Lower Salt Region. *a-a'*, Interior and exterior of bowl, surface, La Ciudad; *b-b'*, Interior and exterior of bowl, Stratum XII, La Ciudad; *c-c'*, Interior and exterior of bowl, Los Muertos (Peabody Museum Collection, 2276).

The few pots available at the present time represent the following forms:—

Small olla: Identical with the “standard jar” of the Upper Gila.

Pitcher: An interesting vessel of this type is shown on Fig. 26*d*. It is a “tripod” with twisted handle, reminding one of like shapes of the upper Gila. The pitchers (Fig. 26*b*, *f*) correspond in shape with the small ollas. The handle of Fig. 26*f* consists of three parallel strands.

Seed-jar:

Bowl: Fig. 26, *c*, *e*.

Bowls are decorated with triangular fields or with band designs, leaving an empty three-cornered or circular space in the center. The lips are, in some cases, dotted or blackened. The neck designs of narrow-mouthed vessels sometimes form a repetition of the body designs, but rows of dashes encircling the upper neck occur



Fig. 25. Central Gila Polychrome Vessels. a, Short-necked ollas, convex olla neck, and sherd of bowl from Rooms 14 and 15, Togetzoge (Mrs. W. B. Thompson Collection, Superior); b, Small olla and bowls from burial x¹, Room 25, Togetzoge (Mrs. W. B. Thompson Collection, Superior).



Fig. 26



Fig. 27

Fig. 26. Little Colorado Black-on-White Vessels. *a, c, e*, Bowls; *b-f*, Pitchers; *d*, Tripod pitcher. From burial ground near Armer's Gulch ruin. *b, c, e*, Mrs. W. B. Thompson Collection, Superior.

Fig. 27. White-on-Red Vessels, Little Colorado Region. *a*, Bowl, burial in Room 25a, Togetzoge; *b*, Bowl, burial in Room 51, Togetzoge. Mrs. W. B. Thompson Collection, Superior.

also. Dotted handles are common. The designs present a number of common South-western, in particular Upper Gila, features: interlocking key figures, interlocking frets, terraced devices in contrasted black and hatching, checkerboard design, etc.

Black-on-Red. Of this type only sherds were found. The majority are from bowls, but a few fragments of narrow-mouthed vessels are contained in the collection. The paste is of medium fineness and varies in color from gray to grayish-black, sometimes turning red toward the edges of cross-sections. Bowls are bilaterally coated with a red or brown slip, which is mostly dull, but in some cases very bright and well smoothed. The decoration, applied as a rule only on the interior of bowls, consists of dull black paint which can easily be scratched with a knife point.

On the sherds contained in the collection wavy and terraced lines, scrolls, hatched fields, and checker designs occur.

White-bordered-Black-on-Red. This type is named after the characteristic decoration found on sherds of bowls and what seem to be small jars. No complete vessels were recovered. The upper exterior face of bowls is often encircled by two black bands bordered with white lines in paint, the space between being also filled with designs in white. The interior of the bowls is decorated in a similar way, but the decoration in white is sometimes missing. The type is identical with that mentioned by Spier¹ and the "dentiform" design described by him occurs frequently. The characteristics of this ware are so distinct, that fragments not bearing any decoration are easily classifiable. The paste is grayish-white, uniform and fine. Both surfaces of bowls bear a bright red slip and are in most cases well smoothed. The fractures of the sherds are sharp. The black pigment of the ornamentation may be called a subglaze, since it resists a knife point, and is often somewhat lustrous and crackled, but the lines are usually clear and sharp.²

Black (Glaze)-on-Brown and Black (Glaze)-with-White-on-Brown. These terms were chosen to designate a few sherds of bowls having a brown slip on both faces and decorated on the interior with glossy, often running, lines in black glaze. In some cases the exterior is decorated with designs in white paint. To the latter pieces the second term was applied. Otherwise the two varieties do not show any difference. They are probably related to black-on-red and white-bordered-black-on-red but are distinguished by their lustrous black glaze. The paste being grayish-black, resembles only that of black-on-red.

Black-on-Buff. A single sherd encountered in the refuse heap of Pueblo Grande is the only representative of this type found during the explorations. It is a fragment of a thin-walled bowl, bearing a light buff slip on both sides, with a design in black paint on the interior. It certainly originated in the buffware area of the Little Colorado region.

White-on-Red. At Togetzoge three broken bowls of this type were recovered and restored in addition to some sherds of bowls and ollas found at the same locality and near Roosevelt Lake which together are the only known examples of this type. In the latter region sherds of this type are more frequent. The paste is of rather coarse texture, reddish or grayish. The decoration consists of white lines applied exteriorly on a brick-red slip. Faint indentations occur on some pieces. The interior of bowls

¹Spier, *Ruins in the White Mountains, Arizona*, 367.

²Excellent illustrations of vessels of this type are shown in Fewkes', *Two Summers' Work in Pueblo Ruins*, colored plates XL, XLVII, and LXIII b, c.

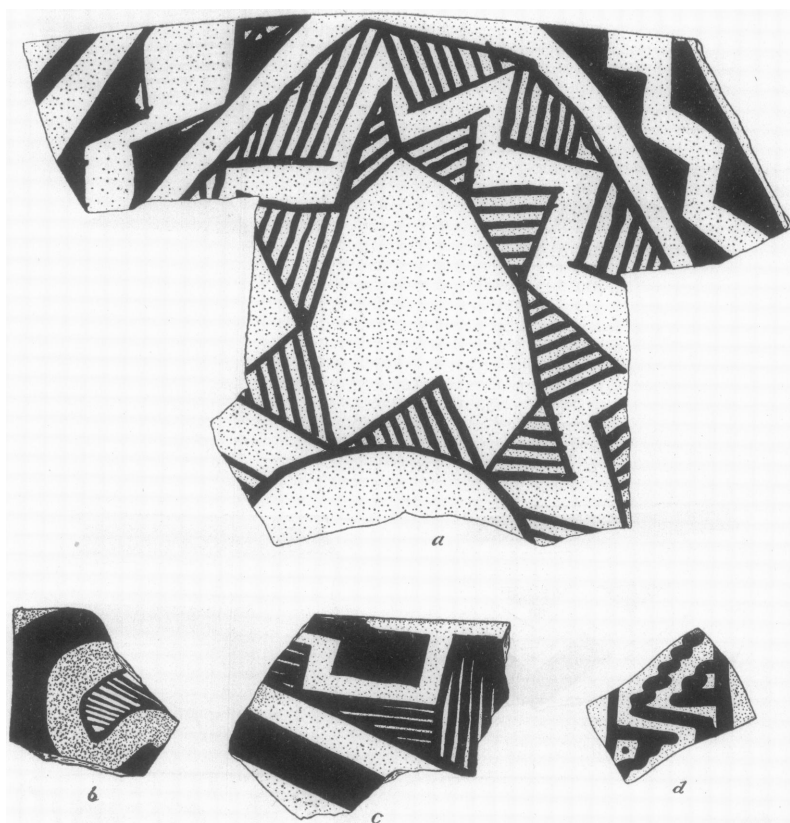


Fig. 28. Designs on Little Colorado Black-on-Red Ware. *a*, Interior of bowl, trench in refuse mound *a*, Spring Creek; *b*, Interior of bowl, Room 25a, Togetzoge; *c*, Interior of bowl, Room 7, Togetzoge; *d*, Interior of bowl, Room 17, Togetzoge.

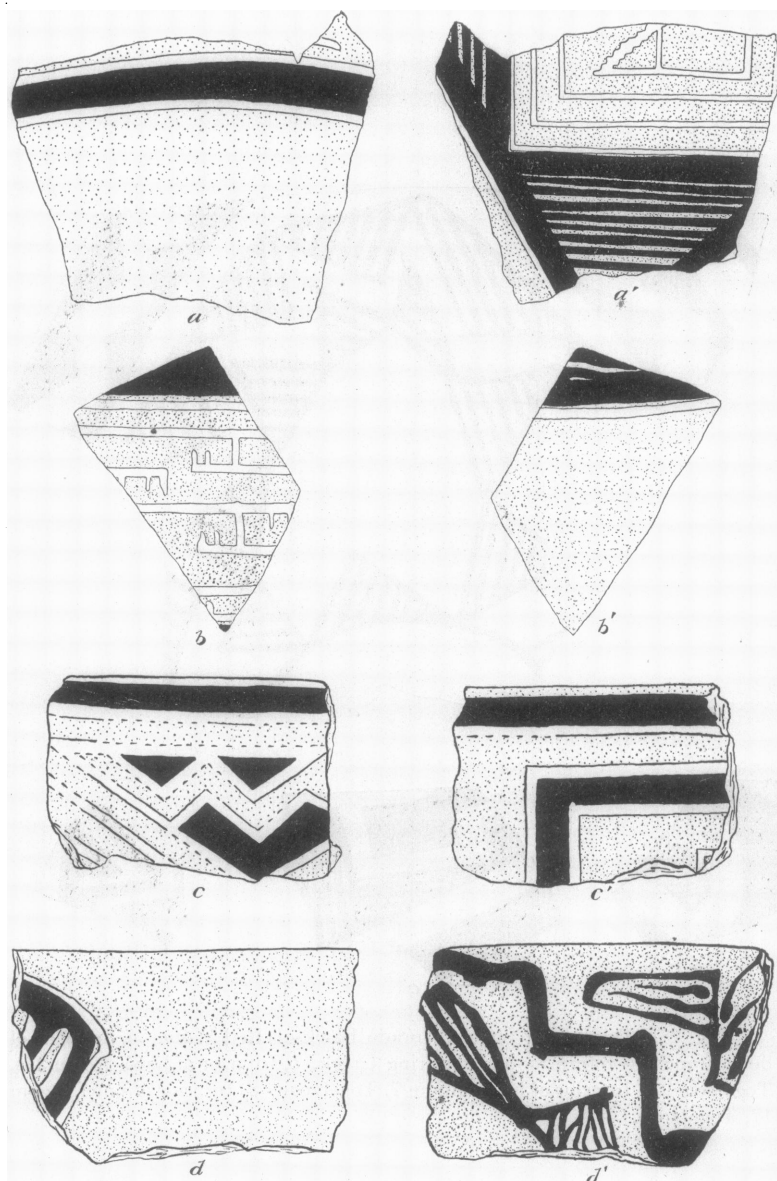


Fig. 29. White-Bordered-Black-on-Red Ware from the Little Colorado Region. *a-a'*, Exterior and interior of bowl, Trench 4, Togetzoge; *b-b'*, Exterior and interior of bowl, Room 11, Togetzoge; *c-c'*, Exterior and interior of bowl, surface, Armer's Gulch; *d-d'*, Exterior and interior of bowl, trench in Refuse Mound b, Spring Creek.

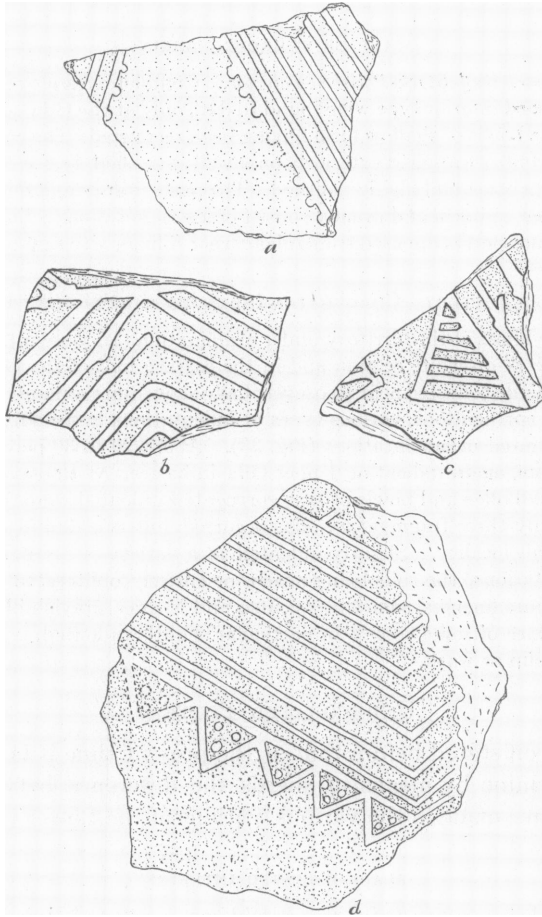


Fig. 30. White-on-Red Designs on Little Colorado Ware. *a*, Olla, Room b, Armer's Gulch; *b*, Olla, surface, Armer's Gulch; *c*, Bowl (?), surface, Armer's Gulch; *d*, Olla, surface, Armer's Gulch.

and, in some cases, the interior of necks of ollas is grayish-black, but hardly ever polished. The designs on all three bowls from Togetzoge are stars built of parallel lines to which hatched triangles or short dashes are attached.

WARE OF UNKNOWN ORIGIN

Red Brown-on-Buff-Black-Polished-Interior. Complete vessels of red brown-on-buff-black-polished interior type were found to date only at the Gila polychrome ruin, Togetzoge, some bowls of shallow form having been recovered. The color of the ornamentation is red brown applied exteriorly on a well smoothed, buff colored slip. The interior is always black and highly polished. The paste is gray and fine. The designs seem to be rather uniform and usually consist of a series of rhombs built up of interlocking lines which end in opposed triangular corner-fillings with saw-toothed edges.

DECORATED POTTERY—CORRUGATED INDENTED AND SLIGHTLY INDENTED

Within the limits of the territory under examination this ware is frequent only in the northern black-on-white section and in the eastern half of the Gila polychrome region. The sherds collected near Roosevelt Lake show quite a number of variations: fine and crude corrugations, various types of indentations and additional indented, incised, and painted ornamentations (Fig. 33). About 20 to 30 percent have black polished interiors, again indicating Upper Gila influence. At Roosevelt Lake sherds of large and small ollas and bowls of true corrugated-indent were recovered, while at Togetzoge only three fragmentary ollas occurred, but it is doubtful whether they were made at this locality. Slightly-indent is a variety of corrugated ware with "wiped" indentations, the coils being nearly or entirely obliterated (Fig. 32). The paste is of medium fineness, sometimes coarse and is gray, grayish-black or reddish. The rugose surface of some vessels, in particular slightly indented, is covered with a reddish-brown slip or wash.

UNDECORATED POTTERY

It has been stated before that at the present time it is not yet possible to determine by means of sherds the difference between the undecorated wares made in the various sections of the Lower Gila region.

BLACK-POLISHED INTERIOR

Sherds of this type are easily recognizable on account of their black, smooth, and often glossy interior. The exterior in almost every case bears a bright red or brown slip with firing clouds.¹

PLAIN WARE

An attempt was made to establish subdivisions of this ware like coarse ware, redware, smooth redware, and smooth brownware. However, it was found hopeless to make sharp distinctions, since grades of fineness and smoothness as well as color shades fade into each other. Only smooth redware is a rather distinct variety. It is scarce at

¹For detailed description see Kidder, *Southwestern Archaeology*, 107, redware with black polished interior.



Fig. 31. Ware of Unknown Origin, Red Brown-on-Buff, Black-Polished-Interior.



Fig. 32. Slightly Indented Vessels. Fragmentary urn and bowls from burial ground near Armer's Gulch ruin (small olla and urn in back row; plain-ware with red slip). Mrs. W. B. Thompson Collection, Superior.

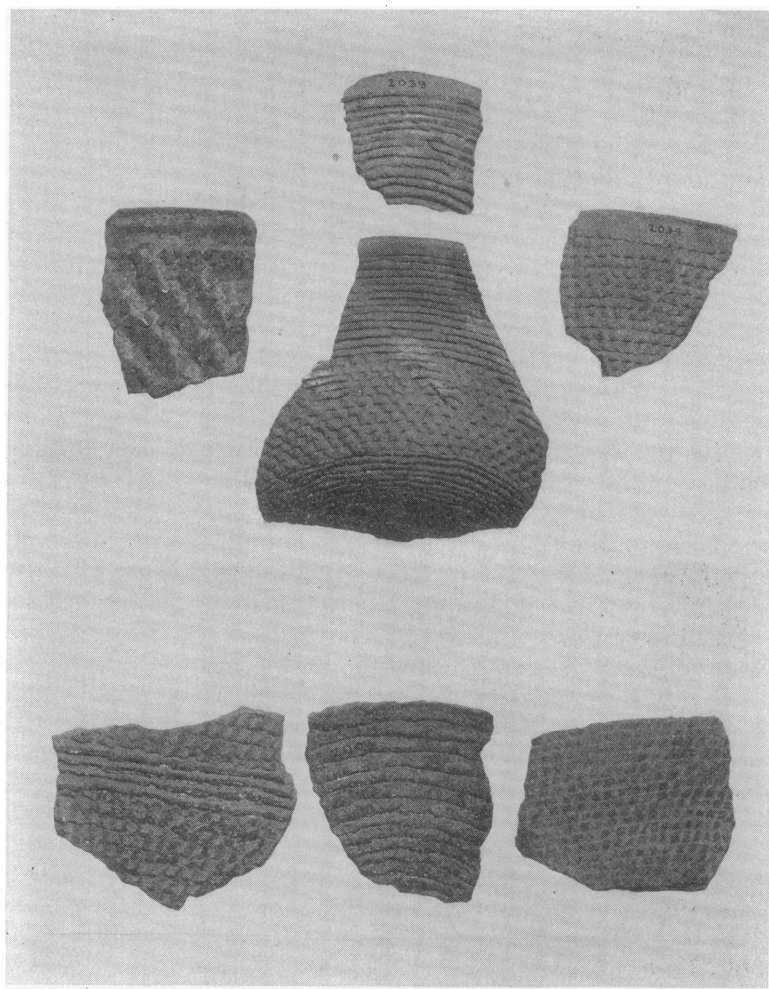


Fig. 33. Corrugated-Indented Sherds from Refuse Mounds a and g, Spring Creek. The upper four sherds are from bowls with black-polished interior, the remaining sherds are from ollas.



Fig. 34

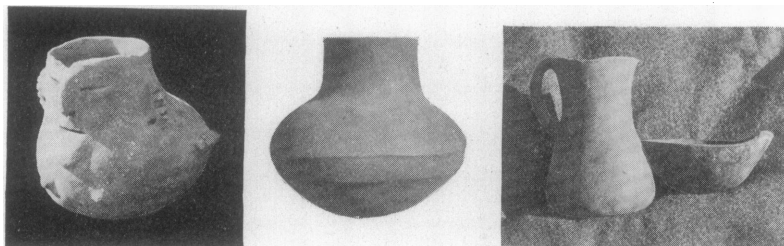


Fig. 35

Fig. 34. Plain Ware Vessels. Small ollas (back row) and urns (front row) from rooms and burials in Togetzoge Ruin. Mrs. W. B. Thompson Collection, Superior. Urn farthest to the left, black-polished-interior, American Museum Collection.

Fig. 35. Plain Ware Vessels. *a*, Duck-shaped vessel with human face, perforated ears and nose, breasts indicated, with Skeleton 39, burial ground, Togetzoge (Mrs. W. B. Thompson Collection, Superior); *b*, Olla from Buckeye, Lower Salt Region, Brooster Collection, McDonald ranch, Buckeye; *c*, Pitcher and ladle from grave in La Ciudad ruin. Ladle, in American Museum Collection.

Togetzoge but relatively frequent in the Roosevelt Lake ruins and on the Lower Salt. The sherds of this sub-type are those of ladles and bowls. They have a red slip only on the exterior, in some cases showing vertical (less frequently horizontal) striations made by a rubbing implement and producing a decorative effect ("onionware") (Fig. 36). This feature, having the same range as smooth redware, is also found on



Fig. 36. Onion Ware Urn, from near Skeleton 4, Refuse Mound g, Spring Creek.

black-polished-interior vessels. The majority of plain ware pots are apparently unslipped, their surfaces showing a great variety of gray, brown, and reddish shades. Firing clouds are common on all plain ware vessels. The paste is usually much coarser than that of the decorated pottery. The following vessel shapes are found: olla, pitcher, urn, bowl, dipper, shoe-shaped and duck-shaped pots. The common forms were described by Kidder.¹ Figs. 34 and 35 present supplementary illustrations. A distinctive feature of Lower Salt plain ware has yet to be mentioned. Several bowls and small narrow-mouthed vessels from a ruin near Buckeye have circular depressions on the bottom to give the vessel greater stability.

¹Kidder, *Southwestern Archaeology*, 108, 109.

