THE LAGOMARSINO PETROGLYPH GROUP (SITE 26-St-1)

NEAR VIRGINIA CITY, NEVADA

M. A. Baumhoff, R. F. Heizer and A. B. Elsasser

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Foreword

In December, 1956 Mr. William T. Matthews of the firm of Breed, Abbott and Morgan, of New York City, requested the University of California Archaeological Survey to study, prepare, and publish a report on a petroglyph site near Reno, Nevada, on land which the Curtiss-Wright Corporation was acquiring through the Bureau of Land Management. The suggestion that this study be made came from Dr. Jesse L. Nusbaum, Archaeologist of the National Park Service, who visited the site with Mr. Matthews in October, 1956. Mr. J. W. Calhoun, Director of the Nevada State Museum at Carson City, offered full cooperation in the project.

In February, 1957, following an exchange of correspondence, the University of California entered into an agreement with the Curtiss-Wright Corporation to carry out the project. Thanks are due to Mr. W. H. Kelly, Jr., and Mr. P. G. Guisti, of the Curtiss-Wright Corporation, and the Pyramid Construction Company, respectively, for their whole-hearted assistance in providing transportation and directing the Survey to the site. The present report is the result of field study and analysis of recorded data.

Although no destruction of the petroglyph site is contemplated, the increased activity in this remote area may inadvertently lead to vandalism of the inscriptions. If such should occur, an adequate record available to all interested persons will have been made. Both the Federal government and the Curtiss-Wright Corporation have fulfilled their obligation to science by making possible adequate recording and publication of the data. The Archaeological Survey, long accustomed to learning, after the fact, of irresponsible destruction of archaeological remains by otherwise responsible firms or agencies, is pleased to offer its appreciation in the name of those persons interested in the prehistoric past of the United States to the Curtiss-Wright Corporation.

Introduction

About ten miles northeast of Virginia City, at an altitude of about 5,000 feet in the Virginia Range of Western Nevada, a prominent exposure of fine-grained basalt marks the location of an extensive area of prehistoric petroglyphs (Pl. 1a). The cliff and talus slope of that part of the basaltic exposure where the markings occur face due south. Down slope from about the center of this section is a small spring, evidently permanent, which serves as one of the sources of a creek called locally Lousetown Creek but sometimes referred to as Long Valley Creek (Map 1).

It may be expected that the great number of markings displayed on the rocks would long ago have attracted the attention of travelers or at least the reports of local residents might have encouraged numbers of individuals to visit the site. However, the region is isolated and no well-traveled trails crossed the mountain range at this point, hence it is assumed that relatively few persons have visited the site in recent years. The designation "Lagomarsino" is taken from the name of a local rancher who is known in years past to have utilized the area as grazing land for his livestock. In the files of the Department of Anthropology at the University of California, Berkeley, the earliest reference to this site seems to be in a letter from one John A. Reid to Professor J. C. Merriam, dated January 5, 1904. Later photographs of but a small portion of the individual elements and groups of the petroglyphs were sent to Berkeley by Mr. Reid. All his data were subsequently included in Steward's (1929) volume on petroglyphs where the Lagomarsino site was designated as "208 Pt Virginia City, Nevada."[1] With the inception of the University of California Archaeological Survey in 1948, and the inclusion of Nevada archaeological site records in the files of that organization, the site has been recorded as "26-St-1." The prefix "26" here refers to the state of Nevada, while the remainder of the title signifies the order of the recording of the site in Storey County.

Although the site has been formally designated as an archaeological site, it is true that the petroglyphs there have never been completely recorded. Fortunately, however, they are to this day in an excellent state of preservation, and the almost complete recording in January, 1958 by the present authors was carried out without any difficulty due to the extreme weathering of the rock surfaces or alterations by vandals. Preservation against the latter is attributable mainly to the relative inaccessibility of the site from population centers, and secondarily, in some small measure, to public ownership of the region. The Nevada State Park Commission has for some years had the site posted with warnings against defacement of the rock markings.

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1. Actually Steward has two sites included under this number. Photos showing the Lagomarsino site are Steward's Pl. 66b, c; Pl. 67.

When the Curtiss-Wright Corporation was engaged in preliminary negotiations to acquire the land on which the petroglyphs are located, it seemed advisable that the petroglyphs, being of importance as an outstanding monument of the aboriginal inhabitants of the region, be treated in the same manner as any other spot of national historical or archaeological significance; since the spot could not easily be set aside as an accessible public attraction, complete recording should be made of its significant content, and the permanent record deposited in places available to scholars or other interested persons. Accordingly the Consulting Archaeologist of the U. S. National Park Service, Dr. Jesse Nusbaum, recommended that a qualified archaeologist be assigned to the task of recording the petroglyphs. When the U. S. Bureau of Land Management released the land to the Curtiss-Wright Corporation, representatives of the latter organization were in a position to retain the services of the University of California Department of Anthropology to carry out the necessary field work and publication of results. The Curtiss-Wright Corporation, with the stated purpose of making an educational contribution, generously supported all aspects of the pertinent work by means of a direct grant to the University. The field work of the project was carried out as stated above in January, 1958.

As will be shown below, the petroglyphs are typical of those occurring elsewhere in the Great Basin. There is not one indication in the entire array of markings that the persons who made them had any contact with European-Americans. Such contact would ordinarily be reflected in the markings identifiable, for example, as horses bearing riders or men carrying guns. It is therefore difficult or impossible directly to associate the execution of even a portion of the markings to any of the ethnographic groups of the region and thus offer explanations of their significance in the context of aboriginal cultures which are relatively well-known. Knowledge that the immediate area seems to have been occupied in historic times by the Northern Paiute[2] (Park and others, 1938, p. 624) does not afford enlightenment as to the purpose of the markings. No informant among the Northern Paiute or the neighboring Washo, for that matter, has ever given any explanation of the origin of these or any other petroglyphs in Sierran California or in Western Nevada.

In spite of the lack of definite knowledge as to the origin and meaning of these petroglyphs, certain clues offered by their physical situation and other circumstances allow us to make some cogent speculations regarding these two aspects. First of all, the very magnitude of the group is suggestive of a fairly long span between the time of cutting or pecking of the first and latest symbols on the rocks. The markings are closely distributed in a 400 yard section of vertical cliff-face from twenty to thirty feet high (Pl. 2). Below the cliff, on a talus slope which extends in a thirty or forty degree angle down about 150 yards to the spring, is a jumble of boulders which obviously have been detached and have rolled down from the original cliff. The larger rocks scattered throughout the jumble have inscrip-

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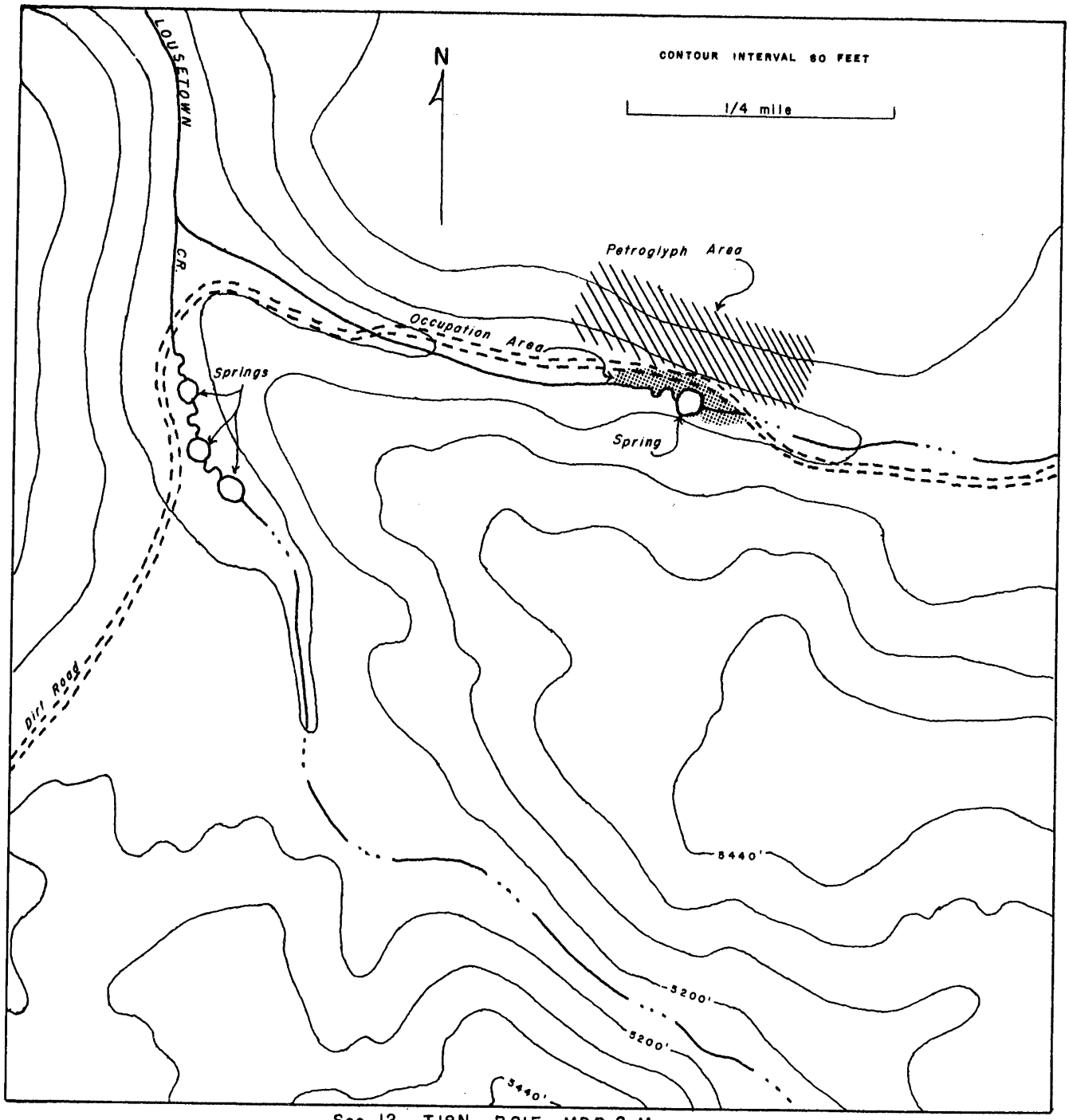
2. The Virginia Range, to the east of Washoe Valley, is taken by Park to represent the boundary between the Northern Paiute and the Washo. The Lagomarsino site is located on the eastern side of this range.



Sec. 12, T18N, R21E, MDB & M

Map 1. Lagomarsino Petroglyph Site

tions on them which appear similar in style and execution to those found on the cliff. Although there was no way of determining whether some of the inscriptions had been lost or obscured by the overturning of the rocks, the general disposition of the markings on many horizontal or easily accessible upright surfaces indicates that any major displacement, presumably from local diastrophic events, must have occurred before the markings were made.

Both the cliff rock and the talus boulders are covered with "desert varnish." This phenomenon is more pronounced on the boulders than on the cliff surfaces, but in all cases it is the cutting or pecking action through the superficial "varnishing" which allows the petroglyphs to appear so boldly on the rocks. The color of the rock below the varnished layer is much lighter than the varnish itself, hence the great majority of the figures are immediately and easily discernible. Even so, many of the latter were chalked in by us so as to allow clearer photography.

In no case did we observe what could be called well-defined revarnishing over already executed figures. This would a priori negate any attribution of great age to the markings, though it should be noted that the knowledge of the formation of desert varnish is not complete, and has only reached a point which allows, and this in a few cases only, extremely rough, relative dating. (See Laudermilk, 1931; Hunt, 1954.)

The techniques employed in producing the petroglyphs were pecking, scratching, and rubbing, in that order of importance. An experiment conducted by us at the site disclosed that pecking with any of the small stones lying about the present surface of the talus slope would easily break the surface of the desert varnish and in effect duplicate the results of the aboriginal technique for the great majority of the figures. Most of the symbols have been positively executed; in some, however (see Fig. 5m, 6h), the "negative" method was followed. There is no doubt that rubbing and scratching were of minor importance, since only a few examples of each were observed. Rubbing marks are illustrated here, as background marks, in Pl. 1d. Scratch marks are shown in the drawing in Fig. 2o. These are known to occur in association with conventional Great Basin type petroglyphs elsewhere: Schroeder (1952, Fig. 14), for example, describes and illustrates a specimen from the Lower Colorado River area which exhibits scratch marks over a previously fashioned petroglyph of the pecked variety so well represented at the Lagomarsino site. The marks in Schroeder's specimen cannot be identified, however, as a distinct element, such as the "cross-hatching" exhibited by some of the scratchings at our site.

Of the approximately 600 separate symbols which occur on the cliff and the talus boulders, 439 have been collected and analyzed in this report. The outstanding result of the analysis is the recognition of two distinct art styles at the site. These have been placed (see below) into an approximate relative chronology which suggests a long period of seasonal occupation of the site.

The close association of the petroglyphs with the favorable environmental features of the surrounding terrain cannot be questioned. If the springs of

Lousetown Creek were running as copiously in aboriginal times as now, and there is no reason to believe that they were not, this in itself would explain the attraction of the spot to mammals such as mountain sheep and deer, hence to human beings as well. The site is well within the range of the mule deer Odocoileus hemionus hemionus and the mountain sheep Ovis canadensis californiana (Hall, 1946, pp. 624, 638). Scattered on the surface of a small occupation or camp site centered about the spring are obsidian chips, and occasional projectile points may also be found there. Evidently the site offered other advantages besides being an excellent place for fashioning petroglyphs.

It is inferred that pine-nuts (P. monophylla) were the most important seeds used by the aboriginal inhabitants of this region. The altitude (ca. 5,000 feet) at the site and the general aspect of the terrain correspond to a typical piñon environment: Upper Sonoran Zone, Pinon-Juniper Belt; see Hall (op. cit., p. 36). The fact that no piñon trees were seen by us in the immediate vicinity of the site may easily be attributed to depredations from nineteenth century Virginia City, ten miles to the south in the Virginia Range. De Quille (William Wright) refers (1876, pp. 215, 216) to the denudation of the piñon in the vicinity of Virginia City as follows: "In the early days these hills were covered with a sparse growth of nut-pine trees--a sort of stunted pine, in size and form of trunk and branches somewhat resembling an ordinary apple tree--but the demand for fuel for the mines, mills, and domestic uses swept all these away in a very few years, and even the stumps have been dug up and made into firewood by the Chinese. . . . And now all the hills and mountains as far as the eye can reach, are brown and treeless."

If our assumptions about the former environment of the area are correct, we are able to state that the Lagomarsino site was ideally situated for a summer or early fall camping spot. Furthermore, the association of the petroglyphs with the permanent spring leads to the proposal that native curing-doctors (shamans) may have been responsible for the rock markings. The motivation for the execution of these petroglyphs may be suggested in terms of the acquisition of supernatural powers by the shamans and in the performance of food-increase rites.

The seeking of power by would-be shamans or curing-doctors, often through dreams, at specific places, such as in mountains, in caves, or near lakes and springs and the like, has been noted in other parts of the Great Basin (Steward, 1941, p. 320; Stewart, 1941, p. 413; Whiting, 1950, p. 29). Although in many cases informants emphasize that the dreams are unsought, Whiting (op. cit., p. 30) states that among the Paiute "there is constant parental pressure to dream and to remember the dream, and this pressure is backed up by the community." In this light, it is reasonable to assume that certain spots would eventually become known as particularly favorable for the reception of visions or the inspiration of the proper kind of dreaming. Park (1938, p. 16), in his monograph on shamanism in western North America, records statements of Paviotso informants which relate that "the spirit that comes in a dream is the shaman's power," and how "some shamans got their power from the water babies. . . . The water babies came

to life by their own power. They formed themselves. Some water babies live in water holes and these holes never dry up. People call these water babies 'the breath of the water holes.' There is a breeze all the time in the mountains where they live."

It may be supposed that the presence of a fine spring in an otherwise relatively dry, mountainous region, near an outcropping of rock particularly amenable to the fashioning of symbolic marks, could offer abundant inducement for certain of the Indians to attempt to depict the objects of their dreams or visions on these rocks.

It is not difficult to relate certain of the petroglyph elements to natural objects, the increase of which would of course be advantageous to the Indians' economy. The more obvious examples are the mountain sheep (Fig. 9f) and possibly what may be interpreted as the cones of the piñon (Figs. 6p, 7c).

While it must be admitted that it is not possible to say with any precision what the purpose of the Indians was in making petroglyphic inscriptions on rocks, one may at the same time make some judgment as to purposes which were not envisaged by the makers of these pecked designs. Although a simple type of map-making was widely known in the Great Basin in the form of "sand maps" (for details see Heizer, 1958), maps showing topographical features such as watercourses, mountains, valleys, and the like, drawn or inscribed on a plane surface are not reported for the Great Basin area. There is a conceptual difference between a scale model showing topography and an abstract geographic plane map. The symbols are rather different, and the two types of representation clearly are of different orders. For these reasons, it seems improbable that any of the Nevada petroglyphic designs known to date can be proved to be maps (cf. Steward, 1929, p. 226). Professor A. L. Kroeber (1958) has recently published an account of the Indian sign language of the Great Plains and surrounding territory, and has discussed the possible relationship of sign language to prehistoric petroglyphs. We quote here his remarks:

" . . . specific resemblances between sign language and pre-Caucasian American pictography are really very few. The similarities are generic and only two: both methods appeal to sight, and only to sight. The positive conventions which are so strong in sign language are lacking in pictography. I know of no picture writing in which an erect index finger means man, or the hooked fingers swept down the side of the head mean woman, or other signs of similar conventionalization.

"Another obvious difference is that the sign language is actually communicative in intent, whereas native art was primarily decorative. It might also serve ceremonial purpose, in which case it worked out certain symbols. But the meaning or purpose of these was known beforehand--somewhat like the words of petitioning prayers or compelling formulas, or the motions of a dance--so that it was their enactment that counted as contrasted with communication. It is quite likely that most communication, except where actual words were used in ritual, is read into ancient pictog-

raphy by us rather than having been present by intent. If communicative purpose had been present, we ought to be able to understand a large proportion of preserved pictographs instead of being so largely baffled by them.

"Another point of difference is that a pictography able to communicate a wide range of information presupposes an ability of realistic representation and discrimination that in general was far beyond native capacities. Such ability generally has to be taught or learned and rests on a developed tradition. On the other hand, the manual and digital skill required to make sign language gestures is in no way special. What there is traditional in it is its conventions: associations of particular gestures with particular meanings. Adequate execution of the gestures would never require more than several trials and might succeed at the first attempt.

"Of course, it is also possible for pictography to get along with a moderate degree of skill in lifelike representation, in proportion as it succeeds in developing accepted conventions. This is the path followed by the picture-writing of southern Mexico, which grew up in a society calendrically interested and therefore future-oriented--also elaborately ritualized as well as technologically diversified and expert."

If we accept Kroeber's analysis, and view the Lagomarsino site petroglyphs in this light, we must admit that while there are some repetitive designs, these seem generically rather than specifically similar, i.e., many designs are similar but few are identical. Our labeling of a design element as "curvilinear meander" or "gridiron" or "rake" is for convenience and as a classificatory device and our decision to so lump generally similar designs is not intended to create the impression that they were each believed to represent the same meaning to the individuals who anciently pecked the designs on the rocks. We do not deny that some, though probably not all, similar designs were intended to represent the same meaning, but the wide variability which is displayed is strong presumptive evidence that we are not dealing with evidence construable as a conventionalized system of elements intended to serve as a surrogate for spoken communication. Groups of design elements occurring together on one rock surface and which exhibit as a group the identical degree of weathering and technique of manufacture are believed by us to represent a single suite applied to one rock surface--say in a single day. Now, if these design groups were intended to communicate to another person or social body a message, or to transmit specific information, one would expect that there would be some regularity or repetition of elements on different rock surfaces. But repetition of a precise series of design elements in a sequence arrangement is scarcely to be found, and if we were to argue that these were messages it would have to be further assumed that each message was a quite different one. In view of the known fact of extreme cultural simplicity of the prehistoric peoples of the western Great Basin area and their uncomplex and practical-oriented activity pattern, it is difficult to believe that there ever existed such a precise mode of written communication or that such a

numerous set of situations could have been present that would require communication by this technique. The apparently haphazard and independently assorted occurrence of petroglyphic designs is taken by us to indicate activity by individuals over a period of time. That these individuals had some purpose in mind is undoubtedly true, but we see no evidence that that purpose was to convey a message or information. As Professor Kroeber suggests, it was probably the enactment, the act of picking up a pebble and pecking at the exposed rock surface, which lies behind the custom. In addition, if we are to judge by what very limited information is available from recent Indians, only certain persons (perhaps hunters or curing doctors as suggested above) at certain specific times (perhaps in the pine-nut gathering season, or the deer hunt or rabbit drive, or when the ceremony during which the girls' adolescence ritual was being held) performed the ritual of petroglyph-making. If this was the case, the hundreds of petroglyph designs at the Lagomarsino site may represent generations of accretion by the hands of many persons, each with his own designs but also conceiving of these design elements within some general culturally-patterned frame or style.[3] The Great Basin style in this sense may be evidence of a genetic (or historical) custom and limited series of design elements--a theme upon which variations were played by individuals. That the style probably has some time depth, and that it endured in essential form for a long period of time, is further indicated by the existence of two substyles (called by Steward "rectilinear" and "curvilinear") of which the curvilinear is older and the rectilinear a later variant of the same pattern.

Analysis of Elements

Petroglyphs on the cliff itself and immediately at the base of the cliff are shown in Figures 1a-6e. The figures show all the elements included in that region and they are in approximately natural sequence from west to east, i.e., Figure 1a shows the westernmost petroglyph and Figure 6e shows the easternmost petroglyph. Figures 6f-10m show the glyphs that are to be found on the boulders scattered on the slope below the cliff. The coverage of the petroglyphs on this talus slope is not complete but it includes a majority of the specimens to be found there. No natural ordering or sequence is to be associated with the sequence of figures showing the petroglyphs on the talus slope.

The drawings shown in Figures 1-10 are taken from two series of photographs. One series consists of black and white photos taken by the University of California Archaeological Survey in January, 1958. The drawings from these photographs are shown in Figures 1a-6o. The U.C.A.S. photographs each had a one foot scale included in the picture so the scales shown in Figures 1a-6o are accurate.

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3. Schapiro (1953, p. 287) says: "For the archaeologist, style is exemplified in the motive or pattern, or in some directly grasped quality of the work of art, which helps him to localize and date the work and to establish connections between groups of works or between cultures. Style here is a symptomatic trait, like the nonaesthetic [form] features of an artifact."

The other series of photographs available to us consists of color slides taken in November, 1957, by Mr. Donald E. Martin of Santa Rosa, California, who kindly lent them to us for purposes of this study. The drawings from these color slides appear in Figures 6p-10m. No scales are included in Mr. Martin's photographs so that it is not possible to judge size with complete accuracy. It is a fact, however, that one can judge size better from a photograph than from a drawing and it has therefore been thought wise to indicate approximate scale in the drawings, as nearly as can be estimated from the photographs. The scales shown in Figures 6p-10m, then, should be taken only as rough estimates, not as precise measurements.

For descriptive purposes each petroglyph at the Lagomarsino site has been assigned to one of 29 "elements." It is hoped that each of these elements corresponds to an ideal type in the minds of prehistoric artists. No doubt this hope is vain, in many cases, but there is evidently no other way to analyze such a mass of material.

The 29 elements are listed in Table 1 together with references to the figures thus classified. A verbal description of the elements follows:

1. Plant Form. Some of these, at least, seem to be genuine representations of plants. The element shown in Figure 1b, for example, may represent the joint pine (Ephedra viridis) which occurs abundantly at the site and which was medicinally important in aboriginal times (Train, Henrichs, and Archer, 1941, pp. 68ff.).

2. Human Figure. Examples of these elements are easily identifiable but occur in a variety of forms (for example, stick figures as against full-bodied figures). They may therefore represent different styles.

3. Face. Specimens classified under this element consist of a straight or curved horizontal line, a straight vertical line intersecting the horizontal line, and a pair of dots or circles, one on either side of the vertical line and below the horizontal line. These figures seem, indeed, to represent faces but even if they do not their resemblance to each other is unmistakable.

4. Snake. At least some of the figures so identified surely represent snakes. All such figures consist of a wavy line with an enlarged tip, as if representing a head.

5. Bird. Only one of the three figures thus classified is certainly a representation of a bird.

6. Foot. Only one of the two figures in this classification corresponds clearly to the "Bear or human tracks" of Steward (1929). The other figure may also represent a track but if so it is in an obviously different style.

7. Sheep Horn. Since there is only one of these it may easily be a misidentification.

Table 1

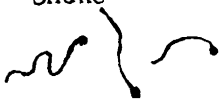
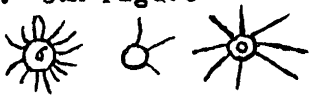
Elements	Figures on Cliff Face	Figures on Talus Boulders	Total Occurrences
1. Plant Form 	1b, 2p, 4a, 5j	8h	5
2. Human Figure 	1c, 1i, 1m, 2j, 3f(2), 5f, 5n	7k, 8r, 9b, 9e(?), 9j, 9k, 9n, 10e, 10m	17
3. Face 	1c, 3i(2)	8a, 9s	5
4. Snake 	1e(2), 1i, 3i(2)	7e(2), 7f, 8e, 8g, 9s, 10d	12
5. Bird 	1f(?), 2p, 3c(?)		3
6. Feet 	2h	7h	2
7. Sheep Horns 	2o		1
8. Sun Figure 	5j, 5n	6p, 7c, 7g, 7t, 8a, 8c, 8d, 8g, 8j(2), 8k, 9c, 9y	15
9. Hand 		8p	1
10. Mountain Sheep 		9f	1

Table 1 (continued)

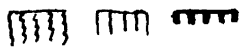
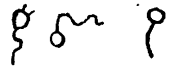
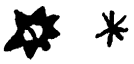
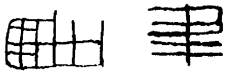
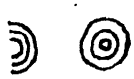
Elements	Figures on Cliff Face	Figures on Talus Boulders	Total Occurrences
11. Horned Toad 		9t	1
12. Bird Track 	1c, 1h(2), 3g, 3i, 4g, 4h, 5b, 5f, 5q(2)	6h, 7k, 7p, 10a, 10i	16
13. Gridiron 	1b, 1d, 1e(2), 1h, 1k, 2a, 2e, 2j, 2k, 3a, 3c, 3g, 3j, 4a, 4c, 4h, 4n, 5n	6k, 6o, 6p, 8m, 9a	24
14. Rake 	1i, 1k, 2a-2f, 3a, 3f, 3g, 3i, 3j(2), 4a, 4c, 4h, 4i, 4k, 4o, 5a, 5c, 5d, 5i-5k, 5n, 5p, 6a, 6b, 6d, 6e.	6g-6j, 6n, 7f, 7m, 7p, 8b, 8s(2), 9m, 10a(2), 10f-10h, 10j	50
15. Polliwog 	2d, 3c(2), 4f(3), 6f	6h, 6n, 7a, 7d, 7r, 8h(2), 9m, 10a(2), 10f, 10g, 10h, 10j	21
16. Asterisk or Star 		6g, 7m, 8e, 8r, 8t, 9e, 9k	7
17. Spiral 	4h	8j, 9p	3
18. Labyrinth 	2i, 3k		2
19. Concentric Circles 	1k, 2f, 2g, 2p, 3g, 4f	6f, 6g, 7e, 7r(2), 7s, 7t, 8a, 8i, 8r, 9g, 9p	18

Table 1 (continued)

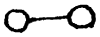
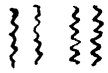
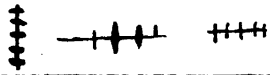
Elements	Figures on Cliff Face	Figures on Talus Boulders	Total Occurrences
20. Dots 	1a, 1b, 1e, 1j, 1m(2), 2b, 2c, 2m-2o, 3a, 3f, 3g, 3i-3k, 4a(3), 4h, 5a, 5b, 5e, 5f, 5h	6j, 6m, 7m, 7n, 9h, 9o, 9v, 10e, 10k(2)	36
21. Circle 	1a, 1b(2), 1j, 3b, 3i(2), 3k, 4j, 5b, 5j, 5m, 5n, 5o	6g, 6h, 6i(2), 6p, 7a, 7b, 7q, 7t, 8f, 8i, 8m, 8q, 9j, 9r(2), 9w, 10a, 10e, 10f, 10m	35
22. Connected Circles 	1e, 1d, 2f, 4j	6n, 7b, 7i, 7n, 9i, 9s, 10a	11
23. Dumbbell 	1b(2), 1e(3), 2d, 3k(3), 3g(2), 4f	6f(2), 7i, 7q, 8f, 9w, 10a(2), 10d	21
24. Curvilinear Meander 	1a, 2i, 3b	6o, 7e, 7m, 7r, 7s, 8n, 8q, 9m, 9u, 10a	13
25. Wavy Lines 	1g, 1j, 2a, 2c, 2e, 2j, 2m, 2n, 3a, 3d-3k, 4g, 4h, 4k, 4m, 4o, 5b, 5g-5i, 5k, 6a, 6e	6g, 6h, 6k, 7a, 7h, 7j, 7n, 7r, 8h, 8m, 8n, 8o, 8p, 8u, 9h, 9m, 9r, 10a, 10e, 10c, 10e, 10f	51
26. Straight Lines 	1j, 2d, 2f, 2m, 2n, 2p, 3b, 3m, 4g, 4o, 5d, 5e, 5f, 5j, 5k, 6c	6i, 6j, 6m, 7a, 7h, 7j, 7n, 7r, 8h, 8m, 8n, 8o, 8p, 9h, 9m, 9r, 10a, 10c, 10e, 10f	36

Table 1 (continued)

Elements	Figures On: Cliff Face	Figures On: Talus Boulders	Total Occurrences
27. Cross Hatching 	1c, 1g, 1j(2), 2a, 2h, 2o, 3a, 3b, 3d, 3h, 4a, 4d, 4e, 4g, 4k, 4p, 5a, 5k, 5o	6g, 8h(2), 9c, 10b	25
28. Diamond Cluster 	4b	9f, 10e	3
29. Ladder 	2a, 5h	6h, 8m	4

8. Sun Figure. Any circle which has rays extending from it has been included in this category. Many of the sun figures on the talus boulders are elaborated with spirals or other circles included within the circle. Many others have lobes as well as rays outside the circle.

9. Hand. The single specimen of this element may be fortuitous.

10. Mountain Sheep. There is only one example of this element but it is a fine specimen of this kind of figure, which occurs so abundantly in southern Nevada.

11. Horned Toad. Only one example of this is present and it may not correspond to Steward's Horned Toad.

12. Bird Track. This group includes all figures having a curved or angular line intersected by a shorter straight line. These seem to be clearly representative of Steward's "Bird Track" element, but of course there is no real reason to believe that they were made to represent actual bird tracks.

13. Gridiron. This category includes all enclosed areas filled with parallel lines. Many of these figures are quite similar to some of the cross-hatched figures (Element 27) and undoubtedly represent variations on the same theme.

14. Rake. This category includes a wide variety of figures which have in common a straight horizontal line from which other lines descend. The pendant lines may be either straight or wavy. In Steward's classification some of these figures would have been classed under "Rain Figure" and some under "Rake."

15. Polliwog. This element includes any circle attached to a wavy line.

16. Asterisk or Star. It is perhaps doubtful that these two kinds of figures should be included together.

17. Spiral. These sometimes have circles included in the center.

18. Labyrinth. This element corresponds to one of Steward's elements but it must be noted that the two specimens at Lagomarsino are doubtful representatives.

19. Concentric Circles. Concentric circles and concentric semi-circles are both included here. The semi-circles often take this form because they are cut off by the edge of a rock.

20. Dots. Dots are to be found in two sizes at Lagomarsino--small ones made by one or two blows of the pecking stone and large ones, sometimes an inch or more in diameter. Dots may be arranged in lines or they may be scattered, simply filling an otherwise blank area.

21. Circle. Circles occur at the site in a variety of circumstances (for example, they may be part of a sun figure) but they have only been counted as such when they stand alone.

22. Connected Circles. These may consist of lines of circles or clusters of circles.

23. Dumbbell. These figures are simply two circles connected by a line.

24. Curvilinear Meander. In this category are included the curving lines seeming to have no real form but covering a considerable area. Figures of this kind, amorphous as they are, are difficult to deal with but they seem to have formed a considerable part of one Great Basin petroglyph style. At some sites in Nevada, for example, the Grimes petroglyph site near Fallon, these meanders are found in large numbers and almost always occur alone.

25. Wavy Lines. Both wavy and zig-zag lines are included in this category. Where several wavy lines occur together they are counted as a single element.

26. Straight Lines. Where several straight lines occur together they are counted as a single element.

27. Cross Hatching. Included here are enclosed areas with square or diagonal cross hatching, and non-enclosed areas, again with either square or diagonal cross hatching. It seems clear that some examples of enclosed cross hatching are related to certain of the gridirons (Element 13) but they have been separated here for purposes of tabulation.

28. Diamond Cluster. These are ill-defined elements, probably not representative of any artistic or cultural reality.

29. Ladder. This category has been included for comparison with Steward but it is doubtful if the present examples are genuine representatives of the element.

The total occurrences of each element on the cliff face and on the talus boulders is given in Table 2.

Table 2

	Element									
	1	2	3	4	5	6	7	8	9	10
Cliff Face	4	8	3	5	3	1	1	2	-	-
Talus Boulders	1	9	2	7	-	1	-	13	1	1
Total	5	17	5	12	3	2	1	15	1	1

Table 2 (continued)

	Element									
	11	12	13	14	15	16	17	18	19	20
Cliff Face	-	11	19	32	7	-	1	2	6	26
Talus Boulders	1	5	5	18	14	7	2	-	12	10
Total	1	16	24	50	21	7	3	2	18	36

	Element									
	21	22	23	24	25	26	27	28	29	Total
Cliff Face	14	4	12	3	29	16	20	1	2	232
Talus Boulders	21	7	9	10	22	20	5	2	2	207
Total	35	11	21	13	51	36	25	3	4	439

It would be of interest to determine whether the distribution of elements between cliff face and talus boulders is merely random or whether certain elements tend to occur oftener one place than another. To test this question statistically, the following procedure has been adopted.

Let X be the number of occurrences of each element on the talus boulders (e.g., X = 1 for Element 1). Then X is a binomial random variable* with $\bar{p} = .47$ (the percentage of total occurrences on the talus boulders). The following elements are excluded from consideration because they are ill-defined and their identification is therefore tenuous--Elements 5, 6, 7, 9, 10, 11, 18, 28, 29. Now observe the number of occurrences on the talus boulders for each of the elements not excluded. Under the hypothesis (that X is binomial with p = .47) we may associate each observation with a probability, the probability that such a binomial random variable will be as large or larger than the observed value. Each of the observations is now assigned to one of three groups, say G_1, G_2, or G_3, according to the following rule. We say that the observation x falls into

G_1 if the probability that the random variable is as large or larger than the observed value is less than or equal to .33,
G_2 if the probability that the random variable is as large or larger than the observed value is between .33 and .67,
G_3 if the probability that the random variable is as large or larger than the observed value is greater than or equal to .67.

* Note that x is an observation on X.

Or symbolically, we say

$$x \in G_1 \text{ if } Pr(X \geq x) \leq .33$$
$$x \in G_2 \text{ if } .33 < Pr(X \geq x) < .67$$
$$x \in G_3 \text{ if } Pr(X \geq x) \geq .67$$

When the observed value of X falls on a boundary value a randomization procedure is adopted assigning the observation to G_1, G_2, or G_3. Consider, for example, Element 3. There are 5 occurrences of this element, of which 2 are found on the talus boulders. Under the null hypothesis we have

probability that X is greater than or equal to 2 = .77
probability that X is greater than or equal to 3 = .44
probability that X is equal to 2 = .33

In order to make G_2 have the proper size we take the .33 probability (probability that $X = 2$) and assign .23 to G_2 and .10 to G_1. Thus $x = 2$ falls into G_1 with probability .10/.33 = .30. Picking a number from a table of random numbers we find that it is .31 and therefore the observation is assigned to G_2. The results obtained for all the observations (excepting the ones excluded) are shown in Table 3.

Table 3

Element	Talus Boulders x	Cliff Face	Total	$Pr(X \geq x)$	G
1	1	4	5	.9211	G_3
2	9	8	17	.4008	G_1
3	2	3	5	.7728	G_3
4	7	5	12	.3089	G_2
8	13	5	15	.0018	G_1
12	5	11	16	.9370	G_3
13	5	19	24	.9980	G_3
14	18	32	50	.9565	G_3
15	14	7	21	.0559	G_1
16	7	-	7	.0051	G_1
17	2	1	3	.4551	G_2
19	12	6	18	.0753	G_1
20	10	26	36	.9943	G_3
21	21	14	35	.0851	G_1
22	7	4	11	.2110	G_1
23	9	12	21	.7239	G_3
24	10	3	13	.0287	G_1
25	22	29	51	.7552	G_3
26	20	16	36	.1944	G_1
27	5	20	25	.9987	G_3

Now consider the random variable

$$Y = \text{no. of times } X \text{ falls into } G_2$$

This is a binomial random variable with $p = .34$. We observe that X falls into G_2 only twice (Elements 4, 17). The probability that the number should be as small or smaller than 2 is .019. We may therefore reject the hypothesis at a significance level of .02.

Rejecting the hypothesis leads us to the conclusion that the distribution of elements between cliff face and talus boulders is not merely random, that in fact certain of the elements tend to occur oftener on the cliff face and certain others tend to occur oftener on the talus boulders. Picking out the most radical examples of each we may attempt a preliminary definition of the two different styles.

Cliff Face Style. Included in this are the following elements--Plant Form (Element 1), Bird Track (Element 12), Gridiron (Element 13), Rake (Element 14), Dots (Element 20), Cross Hatching (Element 27). The most noticeable feature of this style is its tendency to angularity. The cross hatching and gridirons are the most striking elements to the observer, both because of their frequency and because of their size.

Talus Boulder Style. The following elements tend to be most closely associated with this style. Sun Figure (Element 8), Polliwog (Element 15), Asterisk or Star (Element 16), Concentric Circles (Element 19), Circle (Element 21), Curvilinear Meander (Element 24). It will be noted that the characteristic elements of this style tend to be curvilinear. Among the more notable features are the curvilinear meanders which occur almost alone in certain sites in western Nevada (Site Ch-3 at Fallon, for example).

Conclusions

The petroglyphs found at the Lagomarsino site clearly fall into the Great Basin geometric style which characterizes Steward's Area A. Steward (1929, p. 220) was able to distinguish two substyles occurring in the Great Basin. The most widespread of these substyles is generally curvilinear and corresponds neatly to the style found predominantly on the talus boulders at the Lagomarsino site. The circle, in one context or another, is the most common element of this style but perhaps a more characteristic element is the curvilinear meander. These meanders have a vague sort of composition in that they tend to fill an area defined by the outline of a single boulder. But aside from two restrictions--curving lines without abrupt discontinuities and spatial restrictions provided by the area of a single boulder face--there seems to be no aesthetic discipline imposed on the style. The lack of discipline is no doubt attributable to the nature of the materials. Petrography is essentially a decorative art--an attempt to embellish an object without reshaping it. But the objects that are decorated, in this case the boulders, are not themselves made by man and therefore they do not possess any degree

of uniformity to provide a consistent set of restrictions within which the art might develop. The shapes of the boulders are endlessly and randomly varied so that no uniform set of artistic principles can be applied to their decoration.

The other substyle defined by Steward, within the Great Basin geometric style, is characterized by an abundance of rectilinear elements and it thus corresponds to the style found on the cliff face at the Lagomarsino site. The most common elements of this style are gridirons, cross hatching, and rakes. This style has only slightly more artistic merit than the curvilinear style. The elements themselves have a bit more consistency while the composition, or relationship between the elements, has a comparable lack of discipline.

We find two general styles, then, at the Lagomarsino site--Great Basin curvilinear and Great Basin rectilinear. The curvilinear style is found to occur throughout a wide area of Western North America--through the Great Basin proper and extending beyond it at least as far as Utah, Arizona, and Baja California. The distribution of this style is very much the same as that of Jennings' "Desert Culture" (1956, Fig. 1a), suggesting that Great Basin curvilinear petrography formed a part of this culture. The Desert Culture, however, is a sort of developmental level, representing a typical, perhaps inevitable, adaptation by a hunting-gathering people to Great Basin environment. Great Basin curvilinear, on the other hand, is an art style and as such is hardly subject to environmental control except in the negative sense that the rigors of such an environment prevent the development of specialists and thereby restrain artistic virtuosity.

Since Great Basin curvilinear style is not a necessary result of Desert Culture, there is no reason to attribute to it a comparable age (beginning ca. 6000 B.C.). How old is this curvilinear style, then? There is really no conclusive answer, but suggestive evidence on the point comes from the Grimes petroglyph site near Fallon (site Ch-3). At that site is found a pure form of the Great Basin curvilinear style (Steward, 1929, Pl. 65b-d), with elements of the style covering boulders over several acres. At the same site, often on the same boulders, are found elements of another style, consisting mostly of long, deeply cut lines, and small, conical pits 1-2 inches in diameter. There is no question that this second style is much older than the elements of Great Basin curvilinear style; the surfaces of the pits and lines are completely covered with desert varnish and are indistinguishable from the surface of the boulders, while the elements of the Great Basin curvilinear style, although showing some weathering, still make a marked contrast with the rock surfaces.

Thus we find that there is a third and older style which underlies Great Basin curvilinear. Great Basin rectilinear style, on the other hand, is probably more recent than the curvilinear style. For one thing, the rectilinear style has a more restricted distribution than the curvilinear style, being concentrated in the western portions of the Great Basin along the edge of the Sierra Nevadas, especially in Owens Valley, California.

Further evidence that the curvilinear style is older comes from Steward's (op. cit., p. 72) site 37 at Bishop, California. At this site rectilinear elements are found superimposed on curvilinear elements, indicating that here, at least, the curvilinear style is older.

Our sequence of styles is, then, (1) the groove-and-pit style found completely patinated at the Grimes site, followed by (2) Great Basin curvilinear style found throughout the Great Basin, and finally (3) Great Basin rectilinear style found along the western margins of the Basin. The first style is obviously much older than the second style, suggesting that there is a long interruption between the two periods. A likely time for such an interruption would be the Altithermal or dry period of post-glacial times. Since this period is dated at approximately 5,000 to 2,000 B.C., we propose that the pit-and-line style was in vogue some time before 7,000 years ago, that Great Basin curvilinear began since the Altithermal, perhaps 3,000 to 4,000 years ago, and that Great Basin rectilinear began only about 1,000 years ago.

These proposals are only tentative, of course, and will need testing through observation of the association of the styles with datable cultural materials.

Bibliography

De Quille, Dan (William Wright)
1876 History of the Big Bonanza. H. L. Bancroft & Co. San Francisco.

Hall, E. R.
1946 Mammals of Nevada. Univ. of Calif. Press, Berkeley.

Heizer, R. F.
1958 Aboriginal California and Great Basin Cartography. UCAS-R No. 41.

Hunt, C. B.
1954 Desert Varnish. Science, Vol. 120, p. 183.

Jennings, Jesse D. (Ed.)
1956 The American Southwest: A Problem in Cultural Isolation. Soc. Amer. Arch., Mem. No. 11, pp. 59-127.

Kroeber, A. L.
1958 Sign Language Inquiry. International Journal American Linguistics. Vol. XXIV, pp. 1-19.

Laudermilk, J. D.
1931 On the Origin of Desert Varnish. American Journal Science, 5th ser., Vol. 21, No. 121.

Park, W. Z.
1938 Shamanism in Western North America: A Study in Cultural Relationships. Northwestern University Studies in the Social Sciences, No. 2.

Park, W. Z., and others
1938 Tribal Distribution in the Great Basin. Amer. Anthropologist, n.s., Vol. 40, pp. 622-638.

Schapiro, M.
1953 Style. In Anthropology Today, A. L. Kroeber (ed.). Univ. Chicago Press, pp. 287-312.

Schroeder, A. H.
1952 A Brief Survey of the Lower Colorado River from Davis Dam to the International Border. Bureau of Reclamation, Boulder City, Nevada.

Steward, Julian H.
1929 Petroglyphs of California and Adjoining States. Univ. of Calif. Publ. in Amer. Arch. and Ethnol., Vol. 24, No. 2.

1941 Culture Element Distributions: XIII, Nevada Shoshone. Univ. of Calif. Anthrop. Records, Vol. 4, pp. 209-259.

Stewart, O. C.
1941 Culture Element Distributions: XIV, Northern Paiute. Univ. of Calif. Anthrop. Records, Vol. 4, pp. 361-446.

Train, P., J. R. Henrichs and W. A. Archer
1941 Medicinal Uses of Plants by Indian Tribes of Nevada. U. S. Dept. of Agriculture, Bur. Plant Industry, Contributions Toward a Flora of Nevada, No. 33.

Whiting, B. B.
1950 Paiute Sorcery. Viking Fund Publ. in Anthropology, No. 15.

Explanation of Figures and Plates

Figures 1-10. Lagomarsino Site Petroglyphs. The thinnest lines shown are edges of rocks or cracks in rocks. The following exceptional circumstances are to be noted for certain of the figures:

Fig. 1k. The heavy gridiron overlies the rake.

Fig. 2o. The crosshatching here is made by thin line scratching.

Fig. 3g. This figure is a continuation of Fig. 3f. The human figure in the upper left hand corner of Fig. 3g is the same as that shown on the right in Fig. 3f.

Fig. 3j. This is a continuation of Fig. 3i. It will be seen that two of the elements are repeated.

Fig. 5o. The horned circle at the bottom is made with a series of minute scratches.

Fig. 6m. The thin line inside the heavy triangular figure indicates a chip taken out of the rock.

Fig. 8n. The heavy black lines overlie the thick greyish lines. The heavy black lines are accomplished by pecking, the thick greyish lines by scratching.

Plate 1 (a): General view of site, to north.
(b-d): Petroglyph groups on cliff walls.

Plate 2 (a-d): Petroglyph groups on cliff walls.
(e-f): Petroglyph groups on talus boulders.

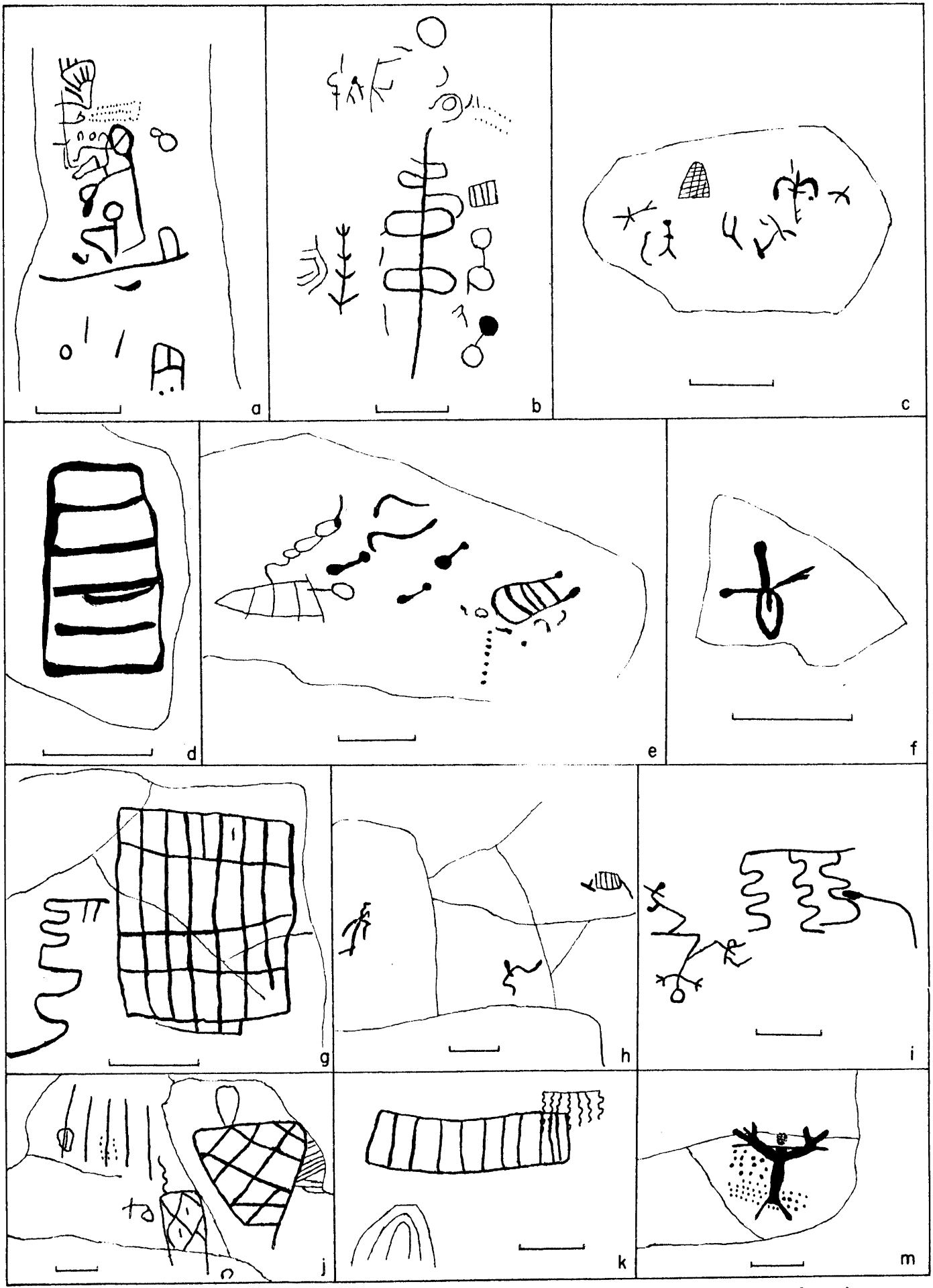


Fig 1. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

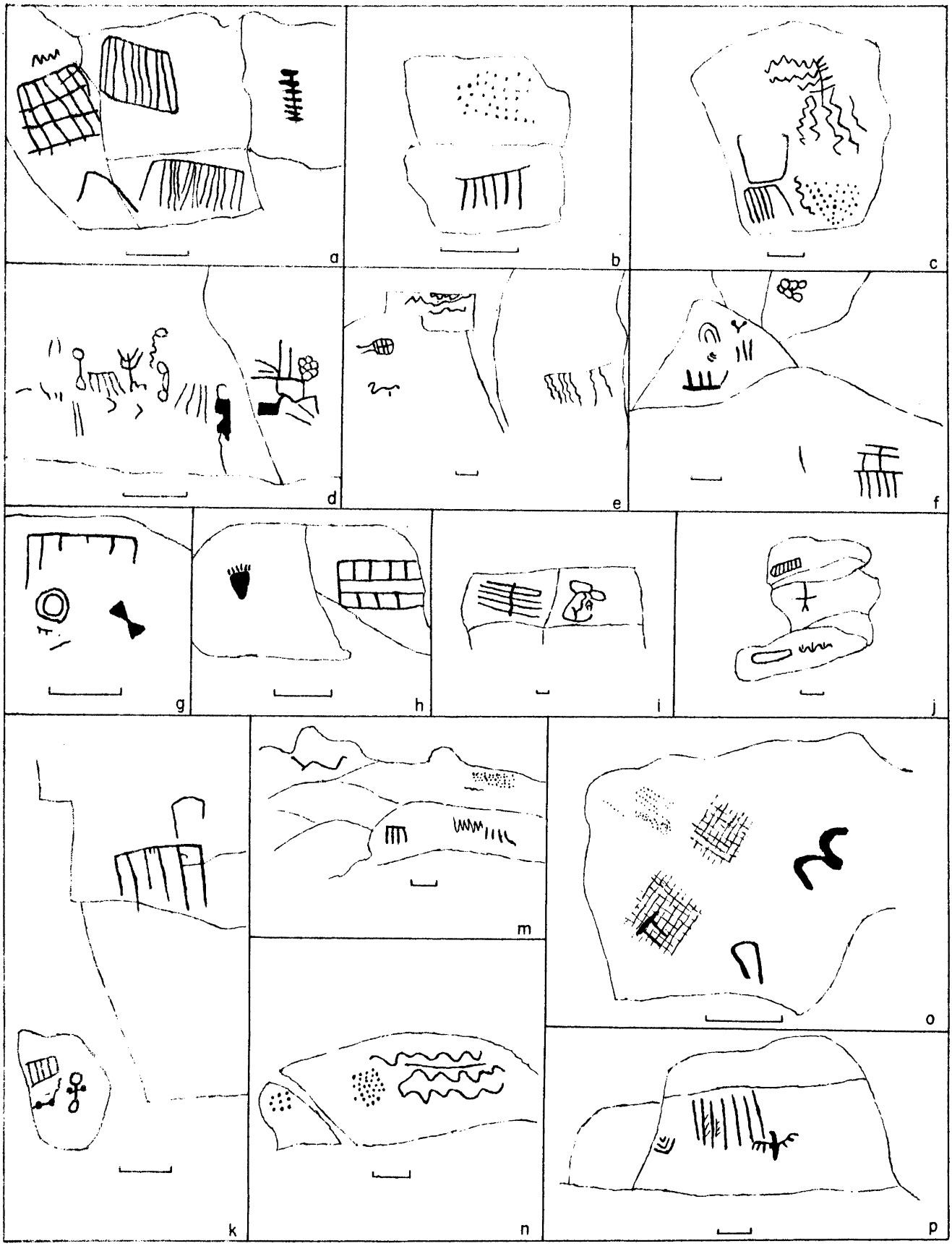


Fig 2. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

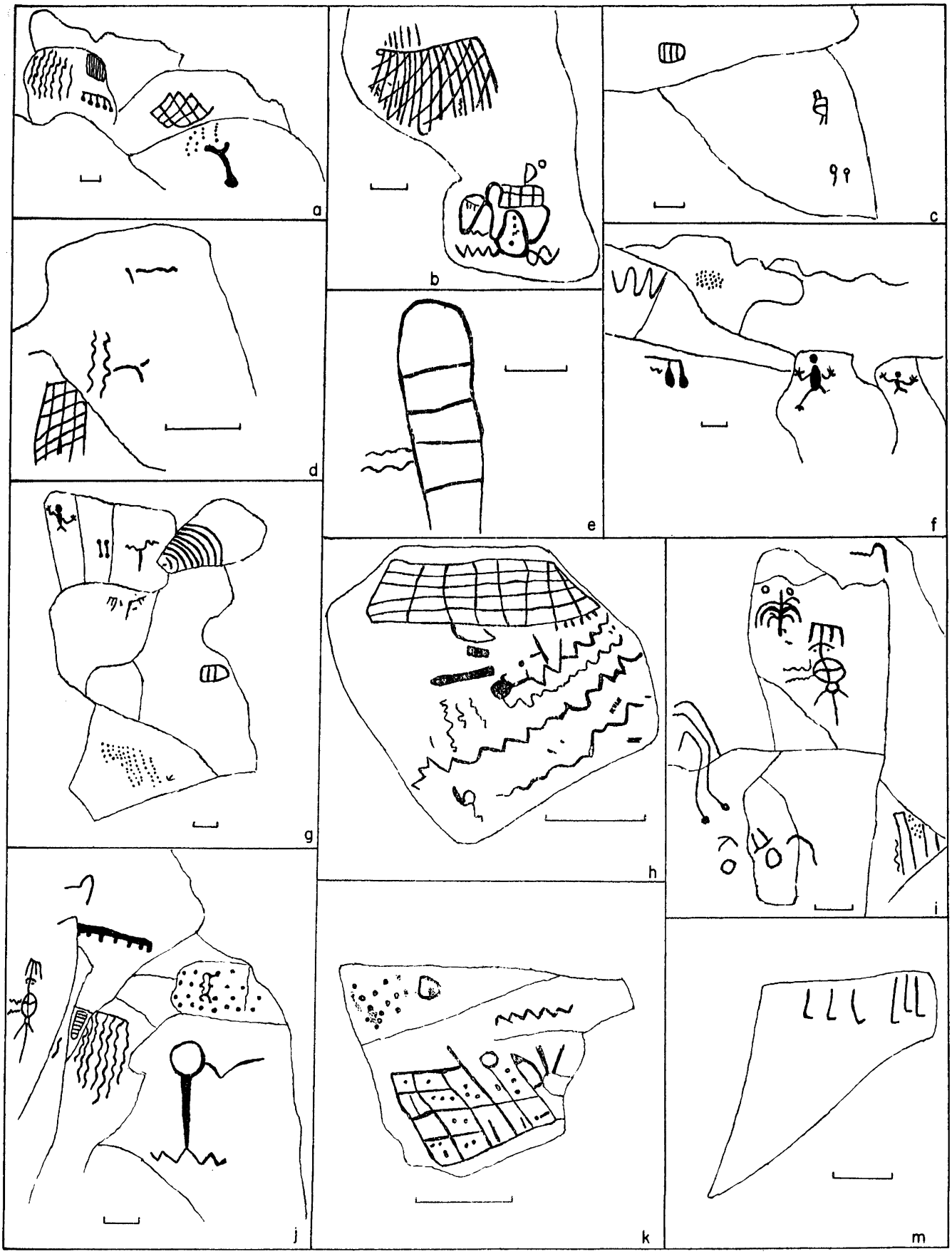


Fig. 3. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

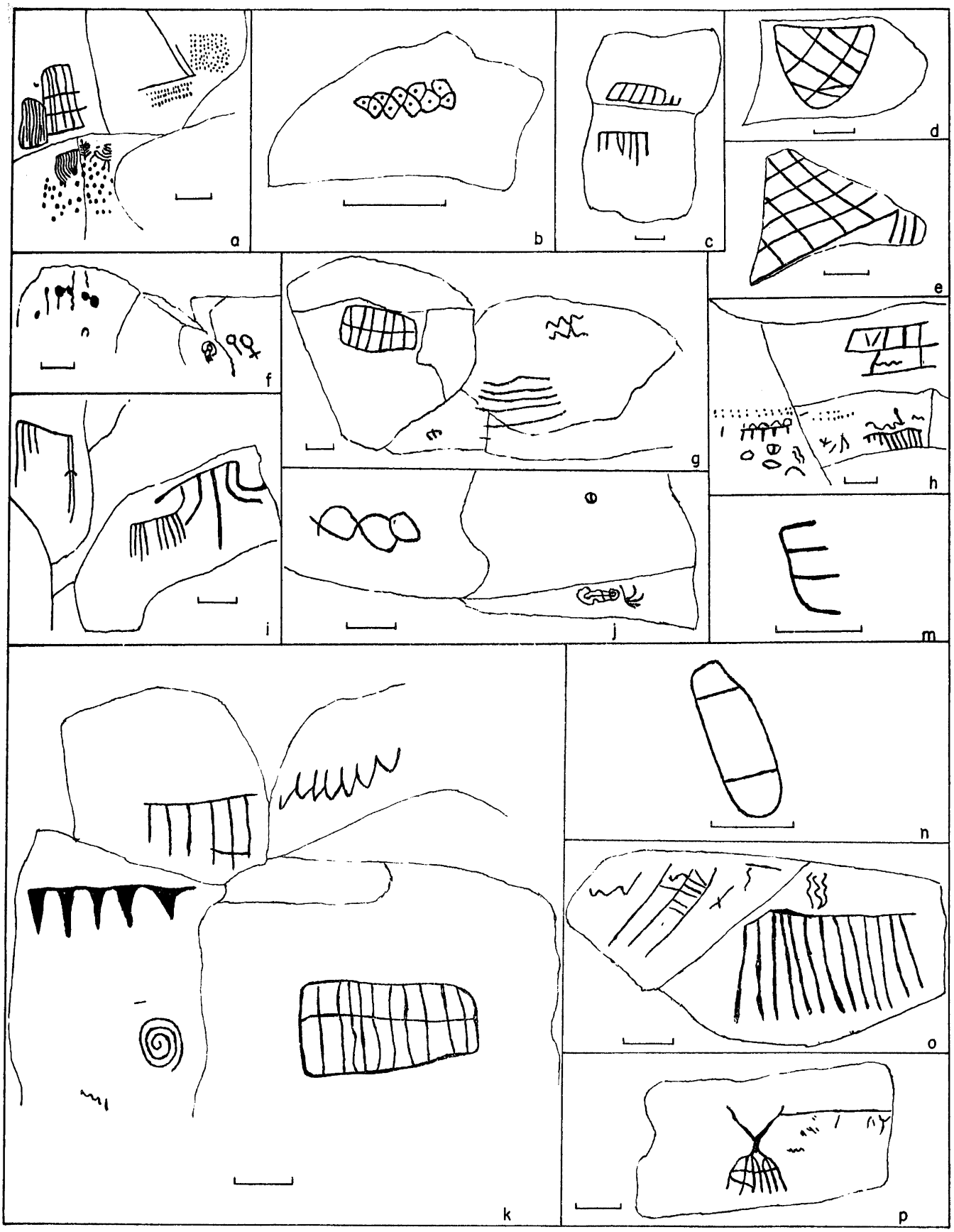


Fig. 4. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

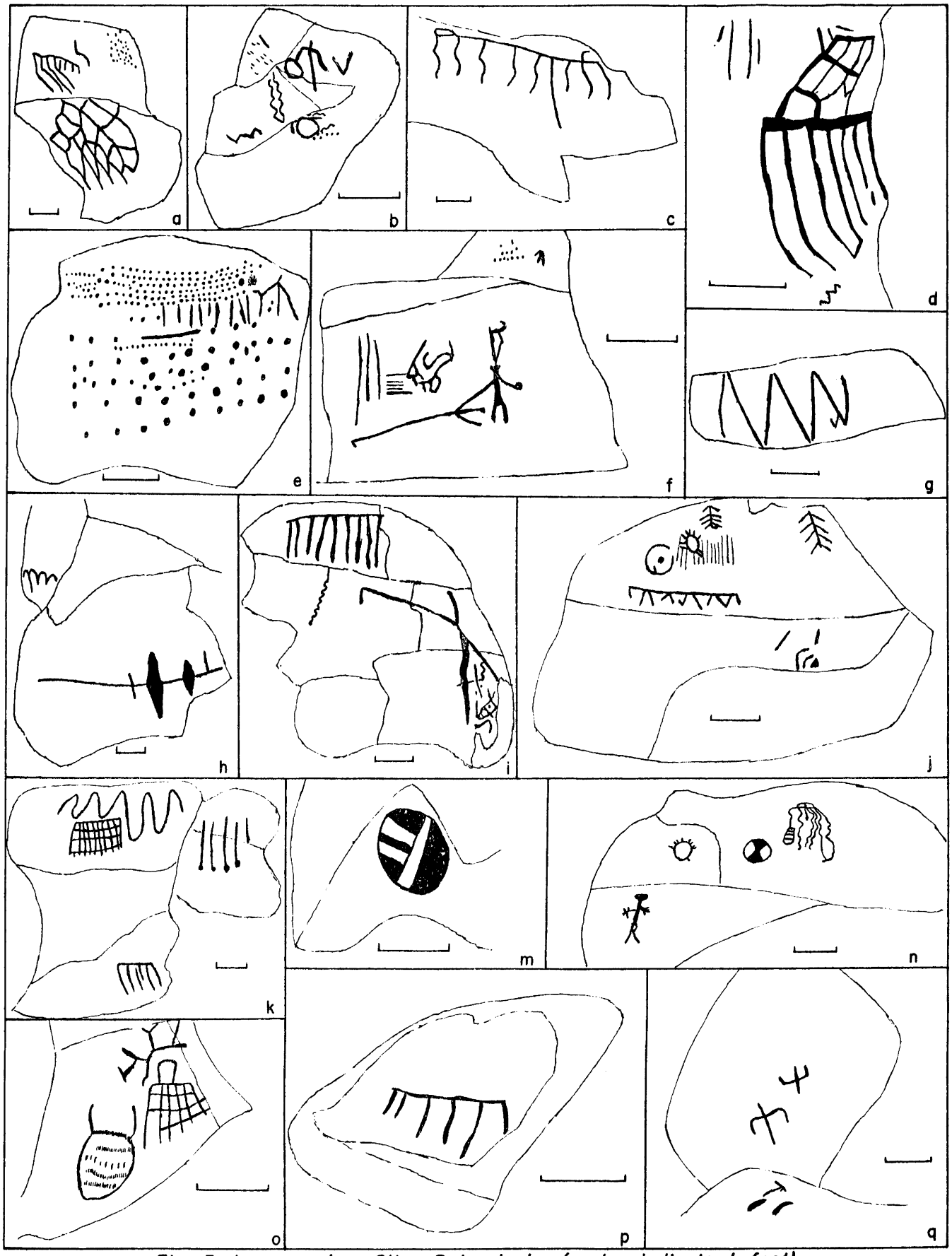


Fig. 5. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

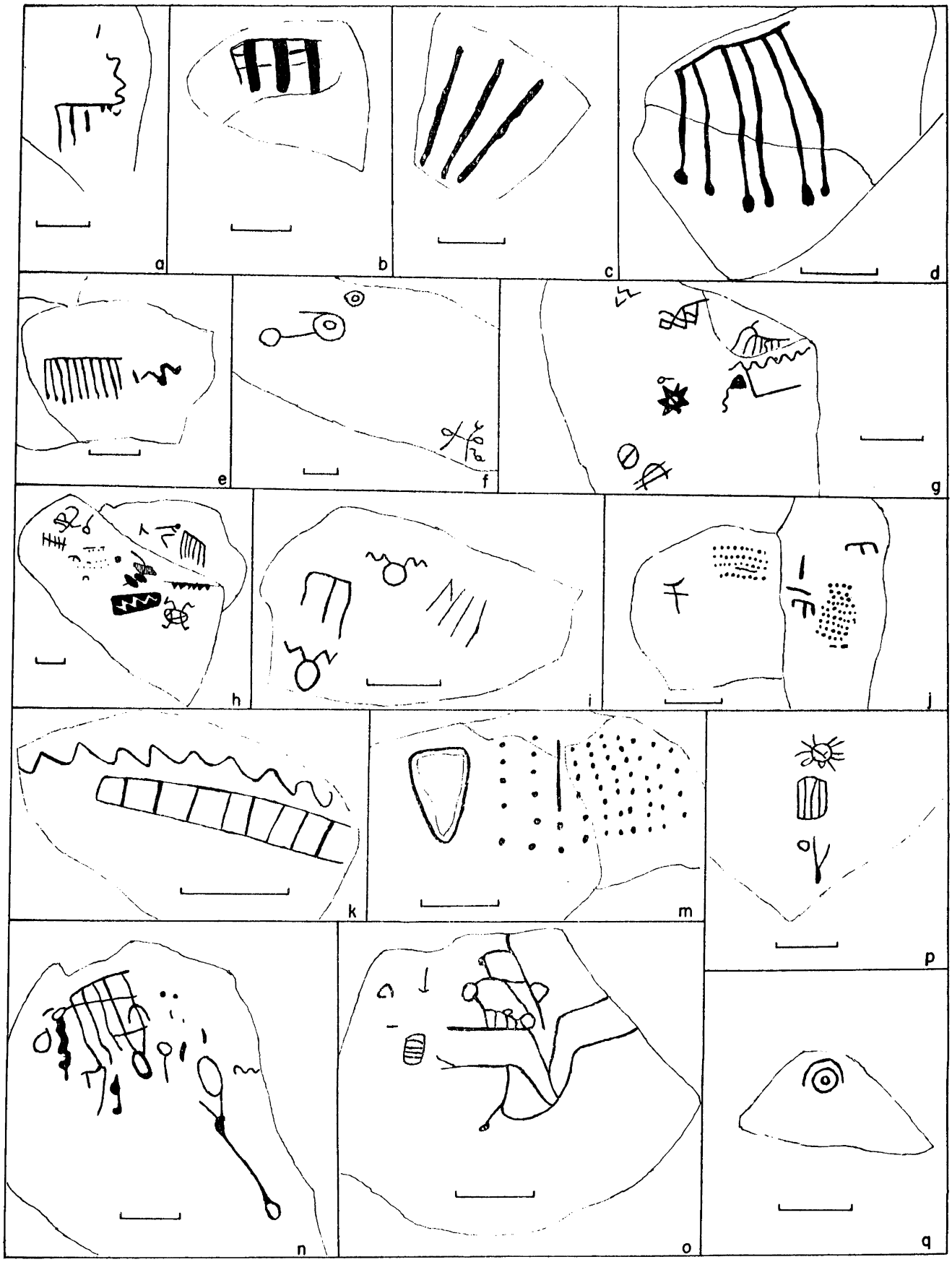


Fig. 6. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

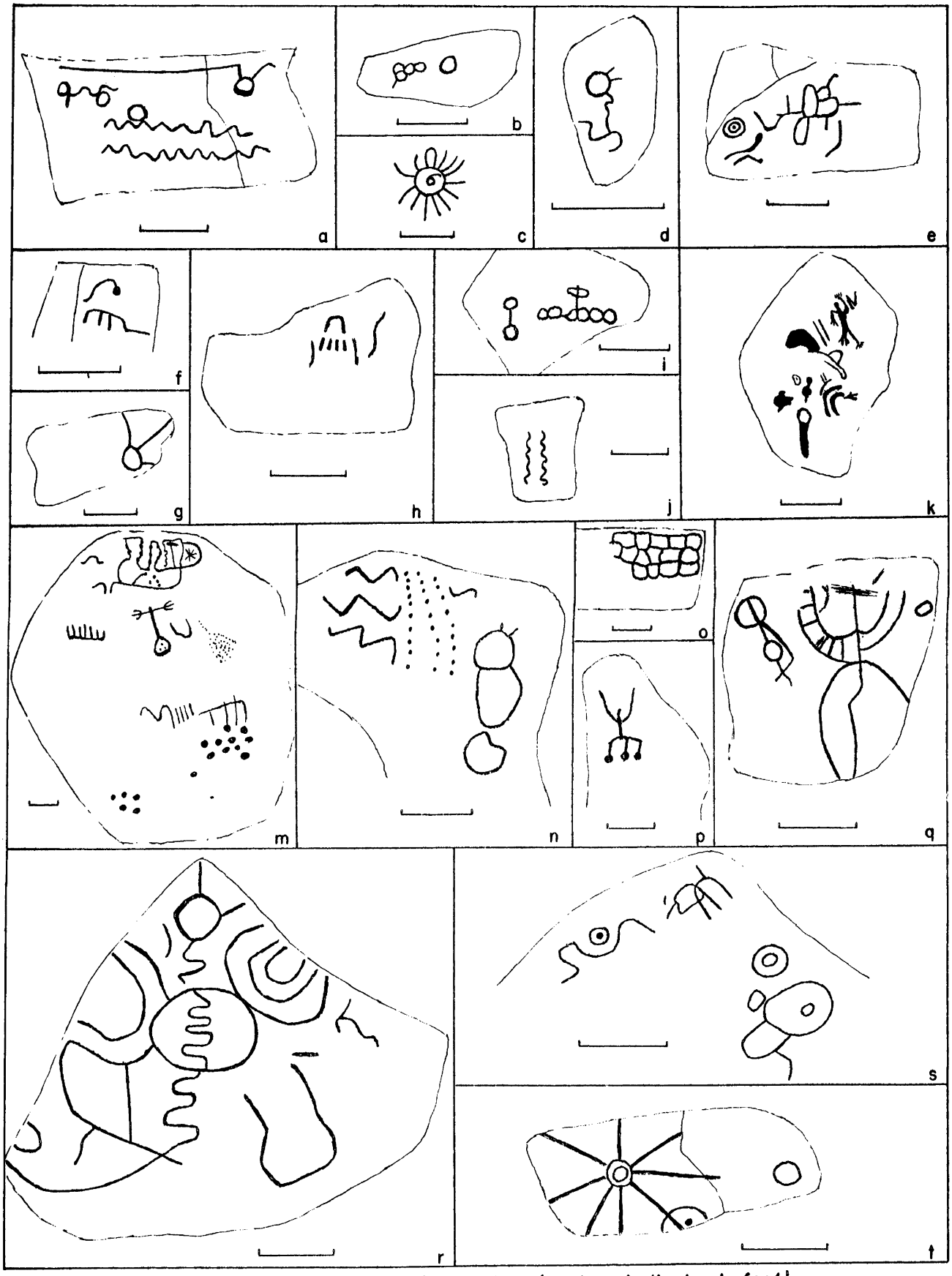


Fig. 7. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

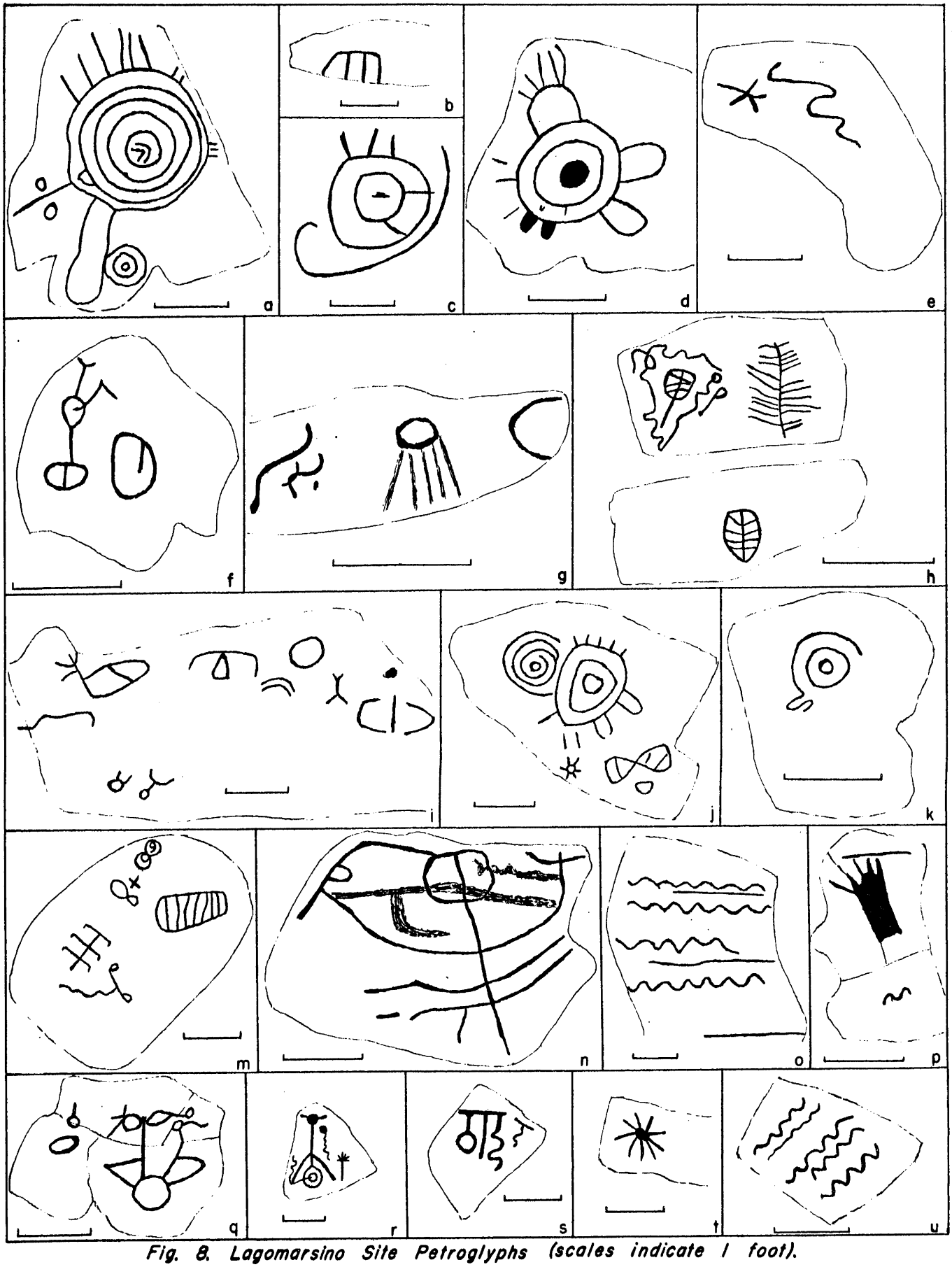


Fig. 8. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

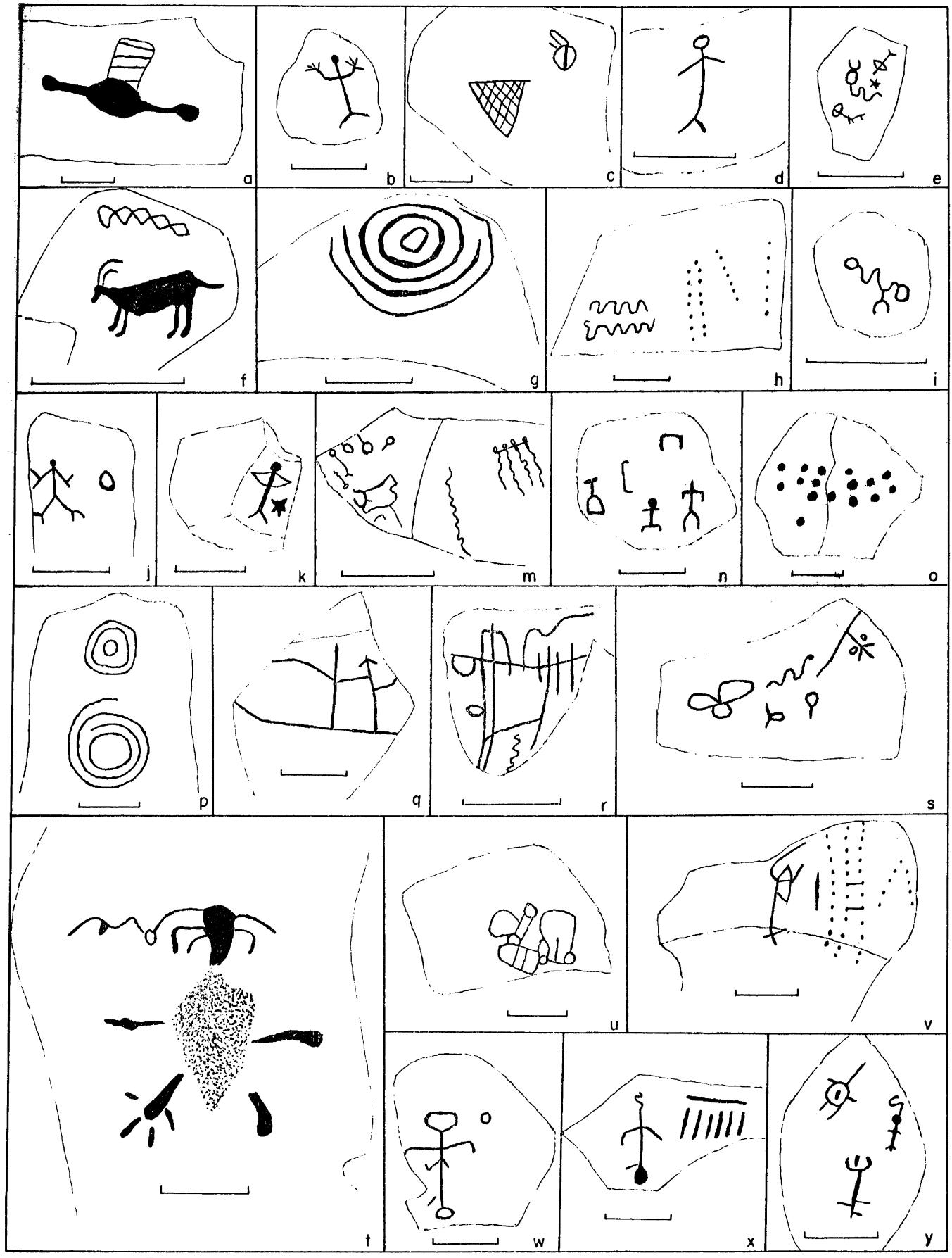


Fig. 9. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

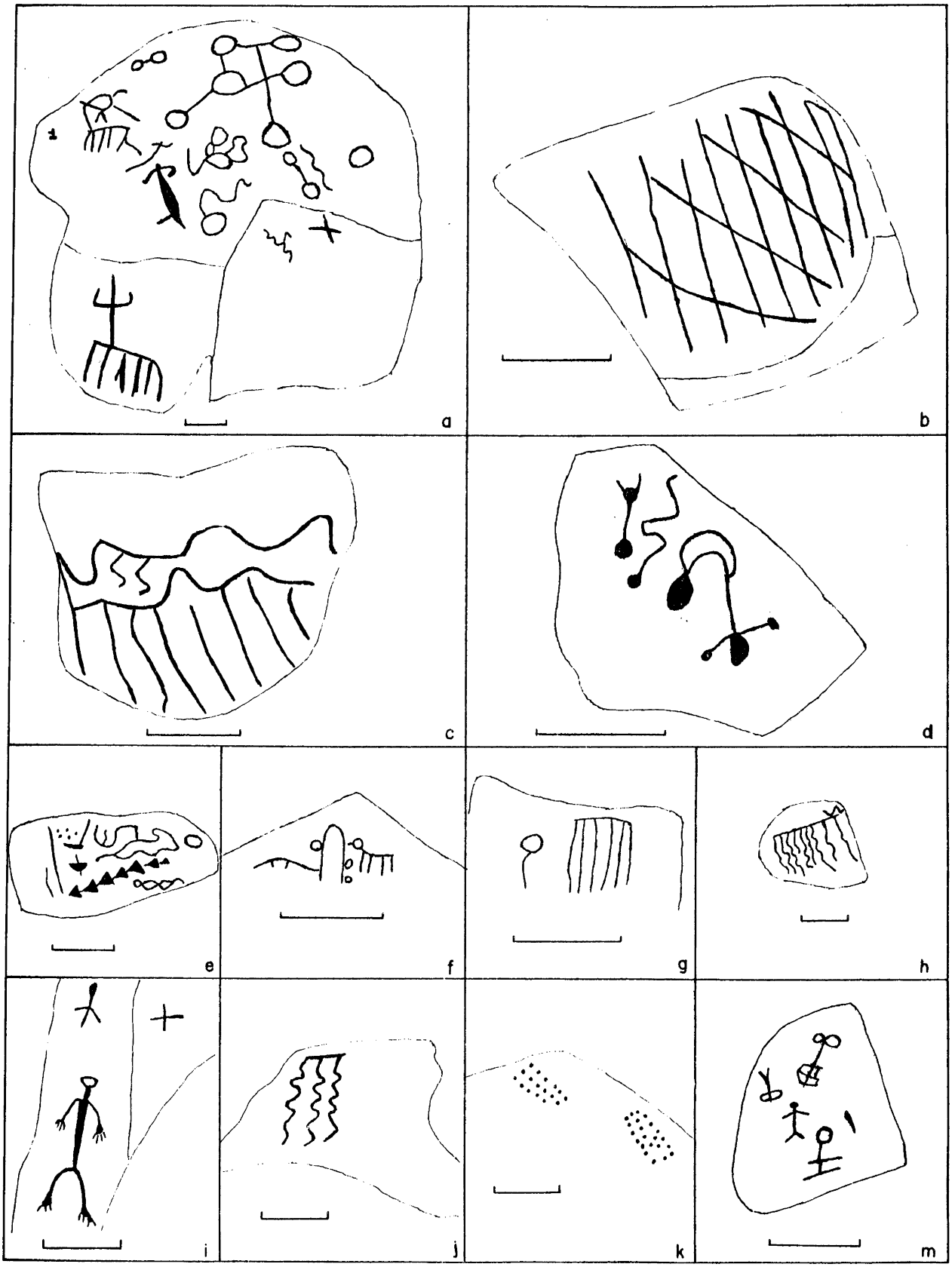


Fig. 10. Lagomarsino Site Petroglyphs (scales indicate 1 foot).

a

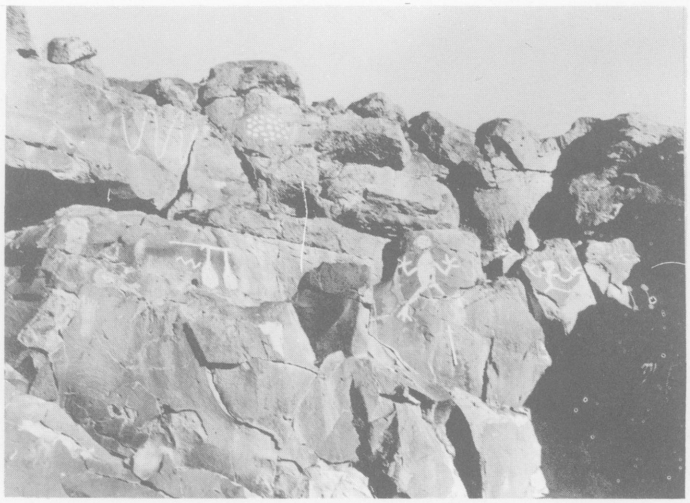
b

c

d

Plate I. Lagomarsino Site and Petroglyphs

a

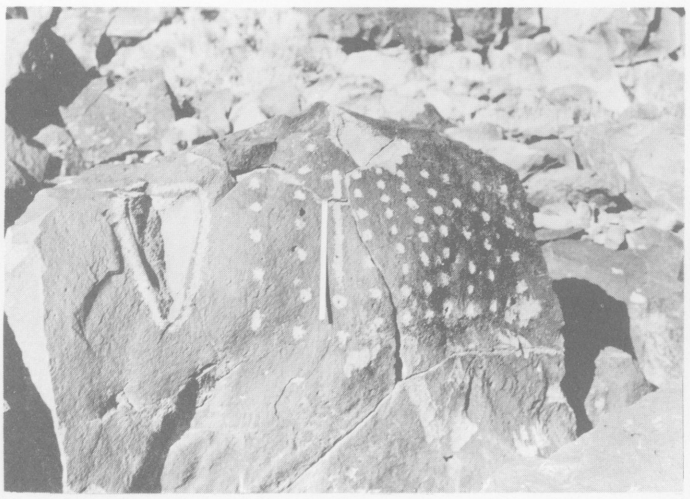


b

c

d

e



f

Plate 2. Lagomarsino Petroglyph Site