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Archaeology and Petroglyphs of Dampier (Western Australia) an Archaeological Investigation of Skew Valley and Gum Tree Valley

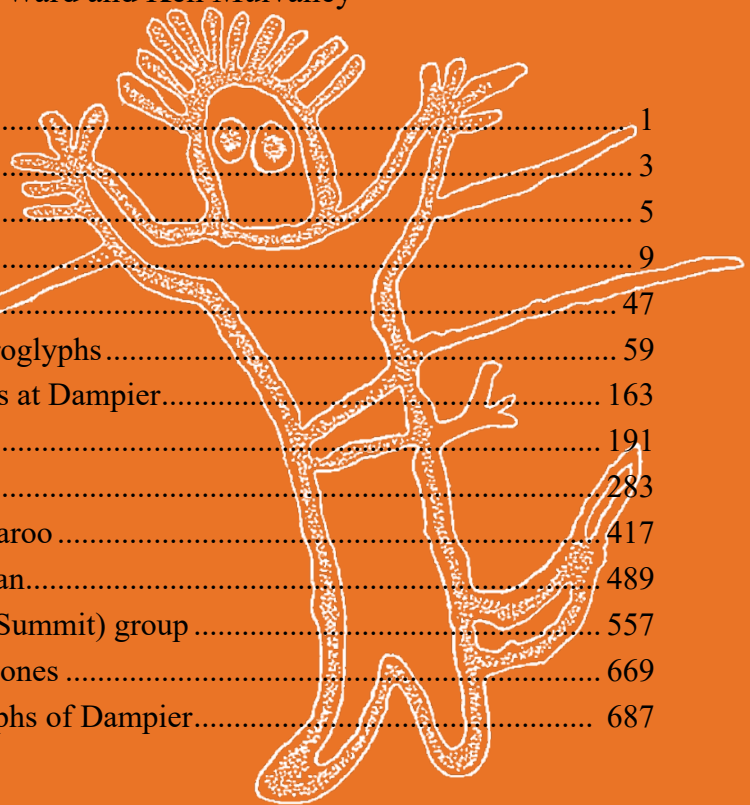
by

Michel Lorblanchet

edited by

Graeme K. Ward and Ken Mulvaney

Foreword (John Mulvaney).....	1
Foreword (Russell C. Taylor).....	3
Preface.....	5
Editors' Introduction	9
Chapter 1. Introduction	47
Chapter 2. Part I. Skew Valley Petroglyphs	59
Chapter 2. Part II. First excavations at Dampier.....	163
Chapter 3. Gum Tree Valley, Spirit.....	191
Chapter 4. Gum Tree Valley, Eagle.....	283
Chapter 5. Gum Tree Valley, Kangaroo	417
Chapter 6. Gum Tree Valley, Woman.....	489
Chapter 7. Gum Tree Valley, Top (Summit) group	557
Chapter 8. Comparisons between zones	669
Chapter 9. Conclusions—Petroglyphs of Dampier.....	687



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- Lorblanchet, Michel, 2018a. General introduction to the research at Dampier. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 1, pp. 47–58. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1688>
- Lorblanchet, Michel, 2018b. The Petroglyphs of Skew Valley. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 2 (part I), pp. 59–161. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1689>
- Lorblanchet, Michel, and Rhys Jones, 2018. The first excavations at Dampier (Western Australia), and their place in Australian archaeology (with addendum on radiocarbon dating of Skew Valley midden). In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 2 (part II), pp. 163–190. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1690>
- Lorblanchet, Michel, 2018c. The Spirit Figure Group at Gum Tree Valley. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 3, pp. 191–282. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1691>
- Lorblanchet, Michel, 2018d. The Eagle Group at Gum Tree Valley. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 4, pp. 283–416. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1692>
- Lorblanchet, Michel, 2018e. The Kangaroo Group at Gum Tree Valley. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 5, pp. 417–488. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1693>
- Lorblanchet, Michel, 2018f. The Woman Group at Gum Tree Valley. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 6, pp. 489–555. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1694>
- Lorblanchet, Michel, 2018g. The Summit of Gum Tree Valley. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 7, pp. 557–668, with addenda by Jacques Evin and George Kendrick. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1695>
- Lorblanchet, Michel, 2018h. Comparisons between the six zones studied in Skew Valley and Gum Tree Valley. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 8, pp. 669–686. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1696>
- Lorblanchet, Michel, 2018i. Petroglyphs of Dampier—general conclusions. In *Archaeology and Petroglyphs of Dampier (Western Australia), an Archaeological Investigation of Skew Valley and Gum Tree Valley*, ed. Graeme K. Ward and Ken Mulvaney, chapter 9, pp. 687–690. *Technical Reports of the Australian Museum, Online 27*: 1–690. <https://doi.org/10.3853/j.1835-4211.27.2018.1697>

Author

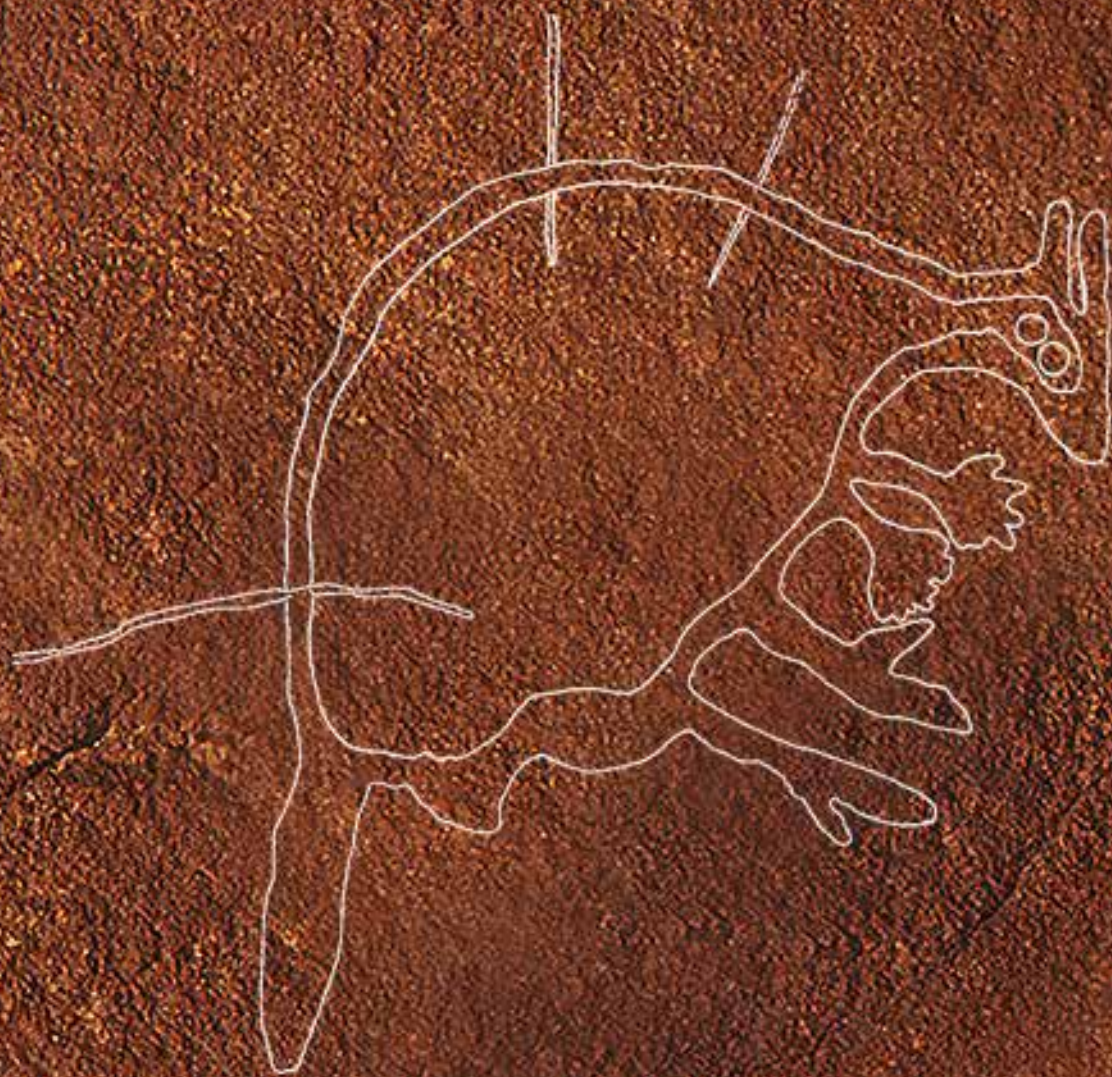
Michel Lorblanchet joined the *Centre national de la recherche scientifique* (CNRS, France) in 1969 to study the Palaeolithic rock art of France. After graduating in 1972 from Université Sorbonne (Paris) with a doctorate in Prehistory, he was employed from 1974 to 1977 at the Australian Institute of Aboriginal Studies to conduct research into indigenous Australian rock art. From his base in Canberra, he participated in projects in Far North Queensland and in western Victoria. Between 1975 and 1976, he conducted the fieldwork at Dampier, Western Australia, on which this monograph is based, and made two further fieldtrips there in 1983 and 1984. He returned to France in 1977 to the *Centre de Préhistoire du Pech Merle* (Cabrerets). Lorblanchet was appointed *Directeur de recherches au CNRS* in 1995; he retired in 1999 and lives near Saint Sozy in the Lot Valley where he continues to research and publish about rock art. He is the author of many papers and several books on European Palaeolithic art (some are listed in the editors' introduction) as well as reports and this monograph on his Australian researches.

Volume Editors

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Chapter 5
The Kangaroo Group



The Kangaroo Group at Gum Tree Valley

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The Kangaroo Group site

The Kangaroo Group (GTVK) is situated, as is The Woman Group (GTVW), on the hilltops covered by the chaos of gabbro blocks dominating Gum Tree Valley in the south. It is 200 m to the west of GTVW. At between 60 and 65 m above sea level, it is about 15 m lower than the Woman Group. The site is composed of a plateau sloping slightly towards the west and facing west along a depression oriented north-northwest to south-southeast (Figs 5.1, 5.2 and 5.3).

The presence of small clusters of trees and bushes form islands in the middle of the block formation and characterize the site. My research has shown that some of these natural islands were being transformed into camp sites by the former inhabitants of the region. Importantly, the site included two living sites (Huts A and B), the second of which, Hut B, dominates the south-facing plateau and affords an extensive view of the marshy stretches of Fenner Creek, which today are the site of the salt works of the company ‘Dampier Salt’.

The petroglyphs located here, while thinly scattered in this area, form five secondary concentrations (Figs 5.1 and 5.4). The map of distribution of the petroglyphs (Fig. 5.4) reveals three major concentrations, numbered Groups I, II, III. Groups II and III are richer, each comprising 12 carved blocks, while Group I has only ten.

These concentrations of often huge carved blocks dominate depressions (*a–f* on the plan, Fig. 5.1). The depressions are characterized by blocks that are markedly smaller and are devoid of any petroglyphs.

The map of the distribution of the petroglyphs themselves (Fig. 5.4 lower) based upon the number of motifs on each stone slab, reveals the same concentrations and confirms that the richest grouping is Group II (the ‘contour level 10’ indicates that it has more than 50 petroglyphs). Group I is at

‘Level 9’ and Group III, ‘Level 7’. The centre of maximum density of the site, therefore, is located midway (about 20 m) between the two living sites, Huts A and B. The much less dense IV and V concentrations can be interpreted as satellites. There appears to be a connection between the living sites and some of the petroglyphs.

In addition, a standing stone, comparable to the two dressed stones at GTVW, is in evidence at the southeastern edge of the Group (indicated by asterisk on Fig. 5.4).

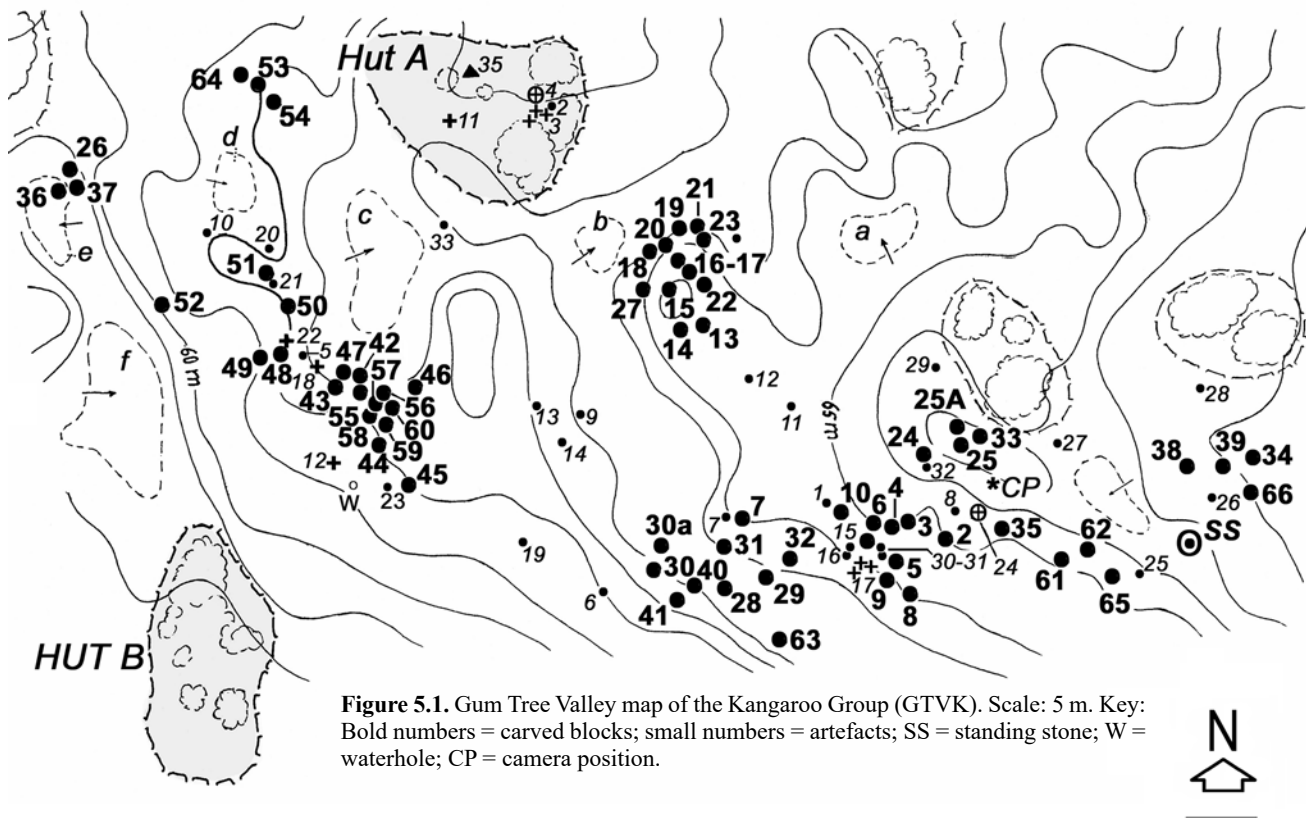
Finally, linked to the GTVK group is an isolated panel, south-facing and standing a few hundred metres from Hut B in an area where petroglyphs are very sparse. This deeply patinated example consists of five ‘human’ stick figures, in profile, deeply weathered, holding with extended ‘arms’ five ‘hooked boomerangs’ (Fig. 5.6). This impressive petroglyph is located on the general map of Skew Valley and Gum Tree Valley (Chapter 1, ‘13’ in Fig. 1.3), that is, among the isolated petroglyphs that are near but outside the main petroglyph clusters.

The Kangaroo Group Petroglyphs

Depictions of humans

The GTVK Group features 30 ‘human’ figures (Fig. 5.5). These represent a little more than one tenth of the total Kangaroo Group petroglyphs (Table 5.1). Depictions of human forms therefore are less abundant here compared with other zones of the Gum Tree Valley complex or the nearby Skew Valley Group. Among the regions studied, GTVK contains the fewest ‘human’ motifs. They are three to four times less numerous at GTVK than, for example, at Skew Valley, and at the entry to Gum Tree Valley (GTVS).

Their average length is 280 mm. The smallest figures



measure 120 and the largest 650 mm. The general characteristics of the ‘human’ figures are described below.

Depictions of stick figures

There are 18 ‘human’ stick figures, which makes this type the largest proportion recorded in all the groups studied. As a rule, these are schematic, spindly motifs (Brandl, 1978). They are presented ‘face on’, except for one that is in profile (Fig. 5.5: 13).¹ Their ‘arms’ are generally raised, and only sometimes horizontal (Fig. 5.5: 7, 21, 46, 50, 53) or lowered to the ground (Fig. 5.5: 13, 15). The shapes of their ‘heads’ are linear or oval (Fig. 5.5: 19, 50).

Almost always, they are depictions of males and, only occasionally, without the depiction of gender. There are no explicitly ‘female’ figures. Some representations have larger, ‘spindle-shaped’ ‘bodies’ (Fig. 5.5: 18, 25A), but their silhouette remains slender. They are always figures with ‘arms’.

Other ‘human’ motifs

Only five other motifs can be classified as a variety of ‘human’; they have large ‘bodies’ (Fig. 5.5: 11, 60). Three are shown in profile (Fig. 5.5: 24, 25). Although situated outside the boundaries of the group (and thus not incorporated into the inventory), further examples can be included in the description of ‘other humans’ at GTVK: These are the five ‘men holding boomerangs’ on the isolated panel on the southern slope (Fig. 5.6: left). They are standing in line as if dancing. The ‘hooked boomerang’ type that they hold was not known ethnographically to be used in the region (Hanns Peter, pers. comm., July 1975).

These stick figures in profile can be seen everywhere on Dampier Island. Typical examples are those on the slab that was uncovered by excavation of the Skew Valley midden (Chapter 2, Part I: Figs 2.11, 2.12), and dated to older than about 3500 years ago (3420–3870 cal BP at two standard deviations: ANU-1837). Moreover, one of the stick figures on this Skew Valley block holds an implement that appears

to depict a hooked boomerang. Such comparison tends to confirm both the possible old chronology of the stick figures in profile and of the ‘hooked boomerangs’.

Despite their schematic depictions, the motifs belonging to these two types are sometimes animated. One little character (Fig. 5.5: 27) raises an ‘arm’, and another (24) is depicted as having been struck by a spear, falling onto his back with his legs in the air. The only ‘weapon’ depicted is the ‘spear’ associated with the last motif. Another individual (Fig. 5.5: 19; Fig. 5.6: 19) seems to hold a large arc above its ‘head’, which may represent a boomerang rather than an arciform headdress. A very schematic figure (Fig. 5.5: 53; Fig. 5.6: 53) is also adorned by two parallel arcs, which might also represent head decorations still used in various ceremonies by the Aborigines in many regions of Australia.

Aboriform ‘human’ motifs

Three ‘human’ figures at GTVK are depicted in a ‘treelike’ form (Fig. 5.5: 28, 30, 63). They look like armed men carrying at waist level arc-like shapes (made using the infill technique) that probably represent boomerangs. Some very similar motifs have been described at other zones, one example at Skew Valley (Fig. 2.52) and four at the Eagle Group (e.g., Fig. 4.9, GTVE-105 and -359).

Depictions of coital scenes

Four individuals are depicted engaged in coitus. Two (Fig. 5.5: 11) present unusual characteristics: the position of both partners is indeed unusual, although it sometimes is found among the images of other parts of the Pilbara. A ‘male’ endowed with a disproportionately large ‘penis’ is in profile while his ‘partner’ with raised ‘legs’ is depicted frontally. A third unexpected personage, a ‘male’, sporting an antenna-like ‘headdress’ (of the ‘Kurangara type’ common to the Pilbara—Wright, 1968) similar to that of the large human petroglyph in the Woman Group (Fig. 6.5: 27S, GTVW-27S) seems to participate in the action through

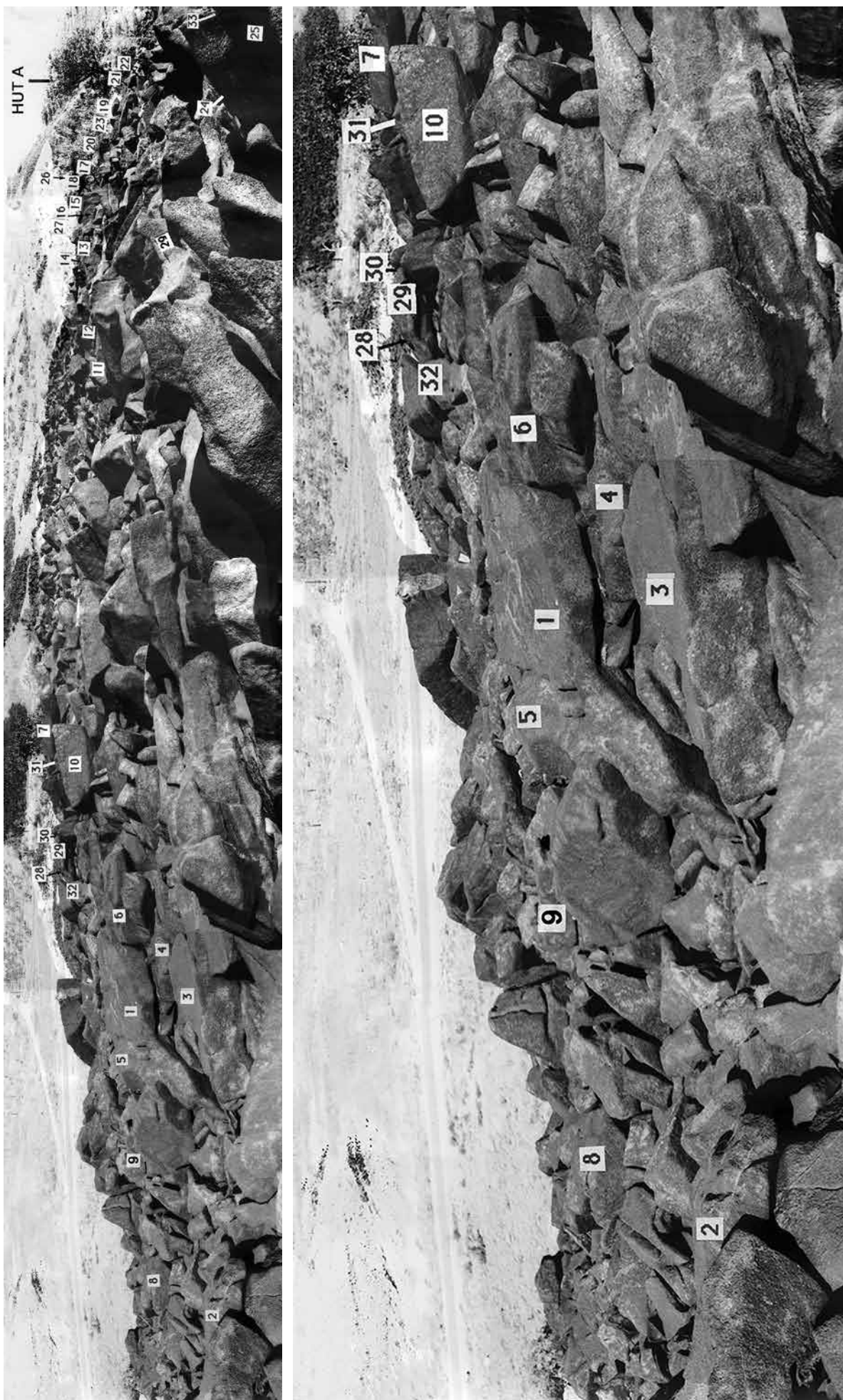


Figure 5.2. GTVK. Photograph of the general area of the Kangaroo Group (above) and enlarged left half of photograph (below) (the right half of this photograph is enlarged on next page).



Figure 5.2. GTVK. Photograph of the general area of the Kangaroo Group (above) and enlarged right half of photograph (below) (the left half of this photograph is enlarged on previous page).



Figure 5.3. GTVK. Part of the site with ‘The Kangaroo’ panel (GTVK-1) in the centre, and the Fenner Creek mud flat in the background.

holding the other individual in his outstretched ‘arms’ (Fig. 5.5: 11). This image is deeply patinated.

Another motif (GTVK-64 {p. 485}),² also deeply patinated, seems to represent the same scene in a more schematic fashion. The ‘male’, a classic stick figure, is connected to his partner by his ‘genitals’, in ‘linear pecking’ carving technique that is depicted devoid of ‘breasts’, probably due to the extreme stylization of the figure. The latter raises its ‘legs’ and, in this position, appears like the Greek letter ‘phi’. The couple is depicted here in a frontal projection on the same plane.

Overall, GTVK ‘human’ representations are characterized by a disproportionately high number of individuals involved in coitus, while single figures with exaggerated ‘genitals’, common at GTVW, are rare.

Depictions of human prints

Two representations of prints of human feet³ have been recorded on two stone blocks (GTVK-4 {p. 456}, -22 {p. 466}). These ‘prints’ are totally pecked. The first is 230 and

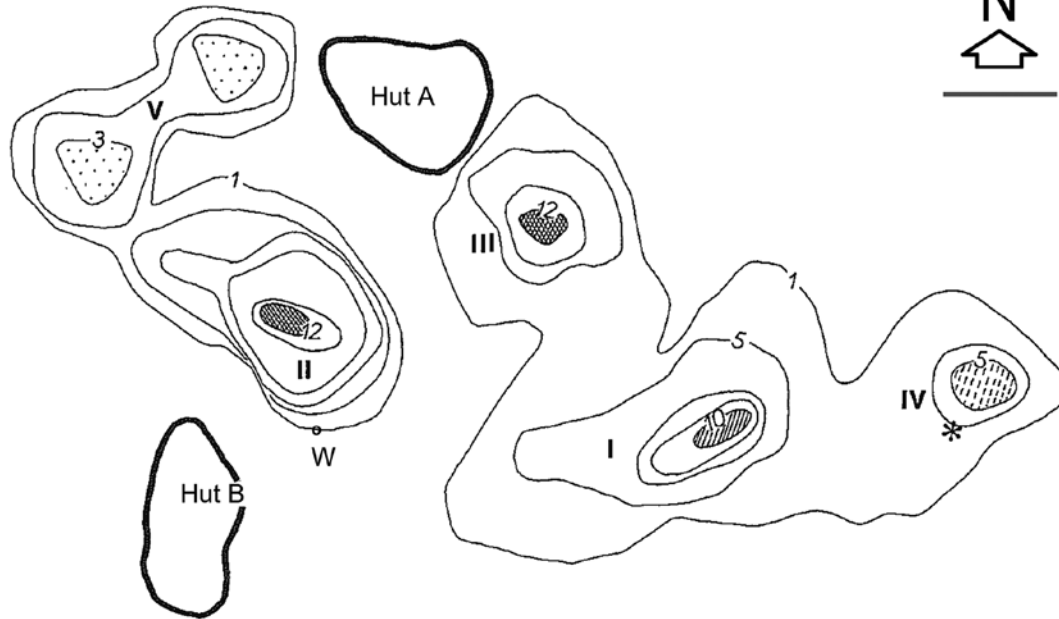
the second is 300 mm in length. These two single ‘prints’ were found on blocks about 20 m apart. It is difficult to envisage that they represent the path of the same individual, a ‘creation hero’, as sometimes seems to be the case in other regions. While the carving technique is identical in each, these two ‘prints’ differ in their patination, and their orientation is not exactly the same. The first (Motif 4 {p. 456}) represents a right foot while the second (22) is less diagnostic, with big ‘toes’ of undifferentiated lengths.

Depictions of animals

Depictions of macropods

Four representations of macropods were recorded and mapped at GTVK. They show much variety in their dimensions, their morphology and their execution technique. The ‘animal’ on the first panel (Fig. 5.7: 1, GTVK-1 {p. 454}), with its considerable height (1250 mm) its massive appearance, its ‘tail’ and its powerful ‘feet’, probably represents a kangaroo. Its ‘genital organs’ show that a male was meant to be depicted, ‘The Kangaroo’ of this group.

Carved blocks



Petroglyphs

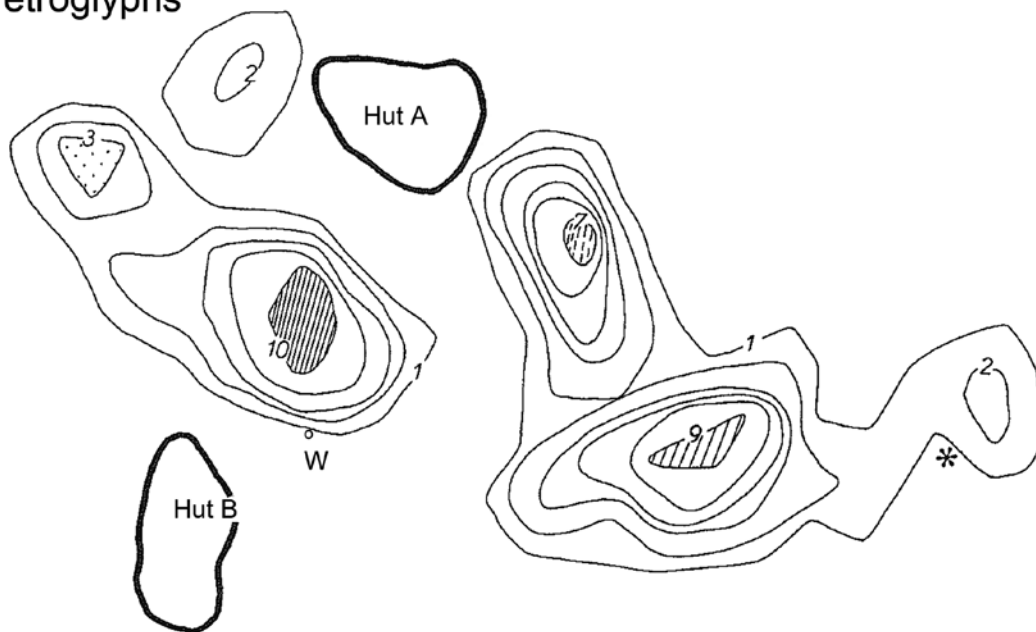


Figure 5.4. GTVK. Map of equi-density contours. Asterisk indicates position of standing stone. Scale: 10 m. *Upper:* density of carved blocks. *Lower:* density of petroglyphs.

By contrast, the more slender outlines and thinner ‘tails’ of the two small specimens from another panel (Fig. 5.7: 34) suggest that they were meant to represent wallaby. It is necessary, however, to consider the processes of simplification that can also account for such characteristics. A very tall ‘macropod’ (Fig. 5.7: 52, GTVK-52 {p. 481}) is too poorly preserved to be identified positively.

It is remarkable that these figures show the three main techniques used in the region: deep infill pecking, deep linear pecking, and outlines made with deep, heavy grooving. They have certainly been made during several different periods. The grooves, regularized and polished through renovation and successive re-remarking of ‘The Kangaroo’ (Fig. 5.7: 1), indicate maintenance over a long time by numerous generations of carvers. I will return to this interesting observation.

It is also remarkable that three of the four ‘macropods’ are depicted as symbolically wounded with ‘spears’ driven into their ‘backs’. These ‘weapons’ are straight lines without barbs—unless such technological simplicity is, in fact, the artistic style of the carver.

Depictions of birds

One ‘bird’ (Fig. 5.8: 25; GTVK-25 {p. 466}), 280 mm long, is difficult to interpret: the huge ‘body’, the ‘neck’ and the elongated ‘feet’ may be intended to represent an Emu. However, the long ‘beak’ with its curved extremity may be that of an Ibis, and this is the best interpretation that fits the image (a beautiful petroglyph of an Ibis was recorded at Skew Valley (Chapter 2, Part I: Fig. 2.29)). The line on the ‘back’ seems to represent a spear—a common feature on ‘animal’ figures in the region.

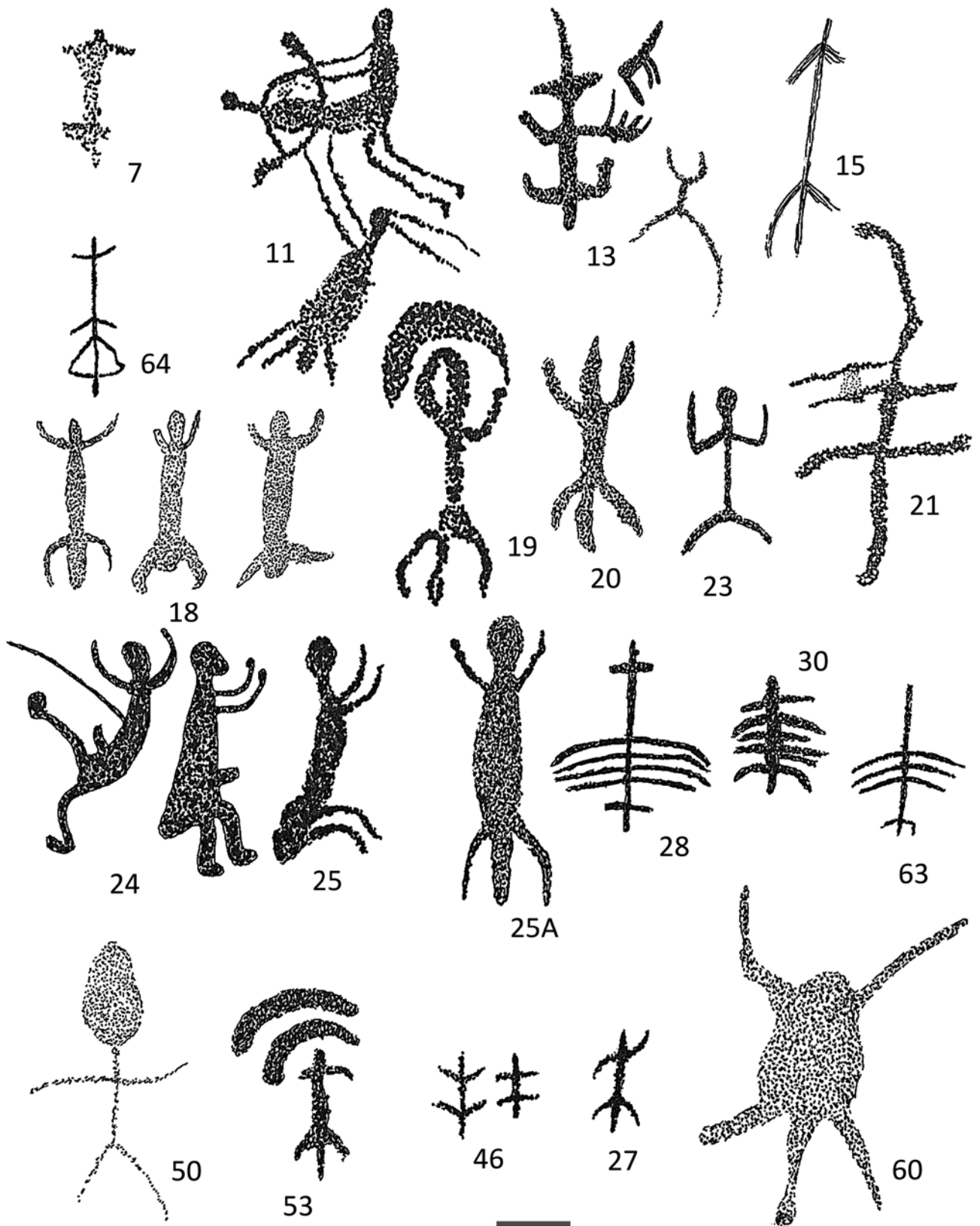


Figure 5.5. GTVK. Depictions of 'human' figures. Scale: 100 mm.

Table 5.1. GTVK Petroglyphs: Inventory of motifs.

type of motif		number		percent	
'Human' figures:					
'human print'	Hp	2		0.70	
undifferentiated 'male'	H	2		0.70	
'male' in profile	He	3		1.06	
'male' stick figure	Hs	17		5.99	
'male' stick figure in profile	Hsc	1		0.35	
'humans' in 'coitus'	Hsex	4		1.41	
tree-like 'human' figures	Har	3		1.06	
Totals			32		11.26
'Animal' motifs:					
'kangaroo'	AK	4		1.41	
'bird'	AO	1		0.35	
'snake'	AS	1		0.35	
'turtle'	AT	16		5.63	
'fish'	AP	4		1.41	
other 'animal'	AA	1		0.35	
Totals			27		9.50
'Eggs' in groups *	AOF	100	100		35.21
'Animal prints':					
of 'kangaroo'	EK	10		3.52	
of 'bird'	EO	4		1.41	
of 'turtle'	ET	4		1.41	
Totals			18		6.34
Geometric motifs					
circular forms	GC	4		1.41	
concentric circles		1		0.35	
arc-like forms	GAR	24		8.45	
bi-lobate forms	GB	6		2.11	
oval forms	GO	6		2.11	
linear forms	GL	15		5.28	
punctations	GP	9		3.17	
other geometric forms	GA	12		4.23	
dumbbell-shape	GH	1		0.35	
Totals			78		27.46
Other motif (indeterminate)	MA		29		10.22
Total motifs			284		100
* What to count is often arbitrary. Generally, a decision was made to count each 'graphic unit' as one entry. In the case of the 'eggs', counting <i>each group of eggs</i> would confuse 'turtle eggs' with 'Emu eggs'. The large number of 'eggs'—as at GTVK—itself indicates mainly turtle eggs.					

Depictions of snakes

At the top right of one slab (GTVK-43 {p. 477}), there is a regular double meander, totally pecked, one end of which is half obliterated. This snake-like motif reminds us of the representations of reptiles from other parts of Gum Tree Valley, notably at the Eagle Group (GTVE).

Depictions of turtles

Sixteen representations of turtles have been recorded at GTVK. Their length varies from 130–480 mm, with an average of 270 mm. They form a relatively homogenous group (Fig. 5.9).⁴

They generally have large oval 'bodies' and front arch-shaped 'flippers' pointing downwards, which may indicate swimming movements. They have remarkably discoid (Fig. 5.9: 49), rectilinear (Fig. 5.9: 42, 65) or triangular 'bodies' (Fig. 5.9: 8). Certain unfinished examples (Fig. 5.9: 62; GTVK-48 {p. 479}) show that the 'bodies' were drawn first and that the 'flippers' and the 'head' were added later.

They are generally entirely pecked. However, three have a linear outline and infill of very sparse pecking or a blank interior (Fig. 5.9: 62, 65).

Almost all of these images appear to be representations of 'marine turtles'. However, one (GTVK-1 {p. 454} upper), which dominates 'The Kangaroo' motif, clearly is a depiction of a freshwater turtle, since it is distinguished from its neighbours by its slender elongated 'neck' (which is undifferentiated from its 'head'), and by its short 'limbs' (Fig. 5.10: right). It is probably a depiction of *Chelodina* sp. (a long-necked turtle), usually hunted by women in the waterholes and swamps across tropical Australia (Isaacs, 1987: 184–185).

Depictions of fishes

The four representations of fish at GTVK are varied. Their length extends from 160–440 mm. The oblong 'body', the slightly indented powerful 'tail' of the first (Fig. 5.8: 2) suggests the barramundi (or giant perch, *Lateolabrax*); however, the absence of dorsal and ventral 'fins' questions this identification.

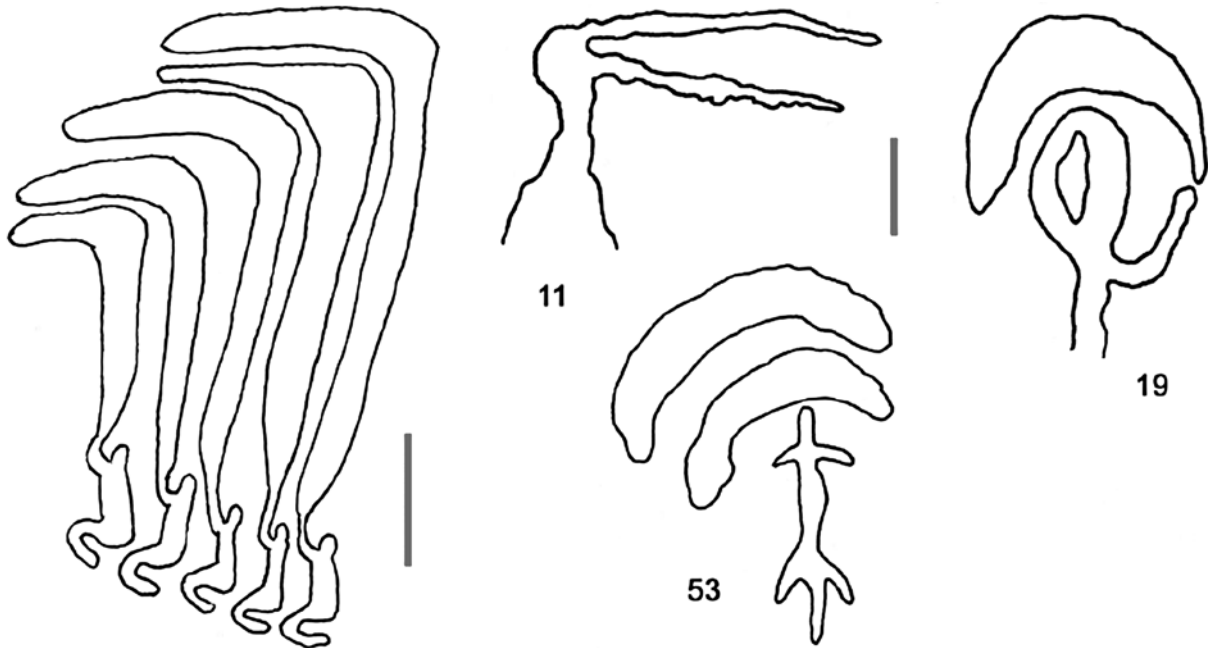


Figure 5.6. GTVK. Depictions of 'human' figures with 'cultural items'. Scales: 100 mm. *Left:* panel 13. Five stick figures with 'hooked boomerangs'. *Right:* depictions of human figure headdresses.

Similarly, the lack of detail or the absence of 'fins' in another petroglyph prevents any conclusive identification (Fig. 5.8: 12). The slender form and indentation of the 'tail' are not sufficient indicators. Other examples (Fig. 5.8: 13 and 61) have very large 'bodies' which distinguish them. They could be *Pleuronectes* or *Sparids*⁵ but the 'fins' are, again, very schematic.

Depiction of 'another animal'

One panel (Fig. 5.8: 3) bears a depiction of a very schematic quadruped. Its 'limbs' are of equal length, the length of the 'neck' and the two protuberances on its 'back' (ears?) rule out identification as a kangaroo, but preclude any other objective identification.

Depictions of eggs

About 100 images of eggs, making up 35% of total petroglyphs, have been found at GTVK. They are large round circles of 20–60 mm in diameter; they are clustered in five groups of 5–25 large dots.

On two panels (GTVK-42 {p. 476}, -42A {p. 475}), the close association of these forms with representations of turtles, their 20 and 30 mm diameters, and their distributions in groups of more than 40 units, tends to confirm these as representations of turtle eggs. By contrast, on other panels (GTVK-43 {p. 477}, -50 {p. 480}, -52 {p. 481}), diameters of 40–60 mm, groupings of five to eight, and, moreover, lack of association with pictures of turtles, suggests that these are representations of birds' eggs.

Based on the diameters of the circles and the numbers in each cluster, I estimate that about 80% of these motifs at GTVK represent turtle eggs and 20% birds' eggs.

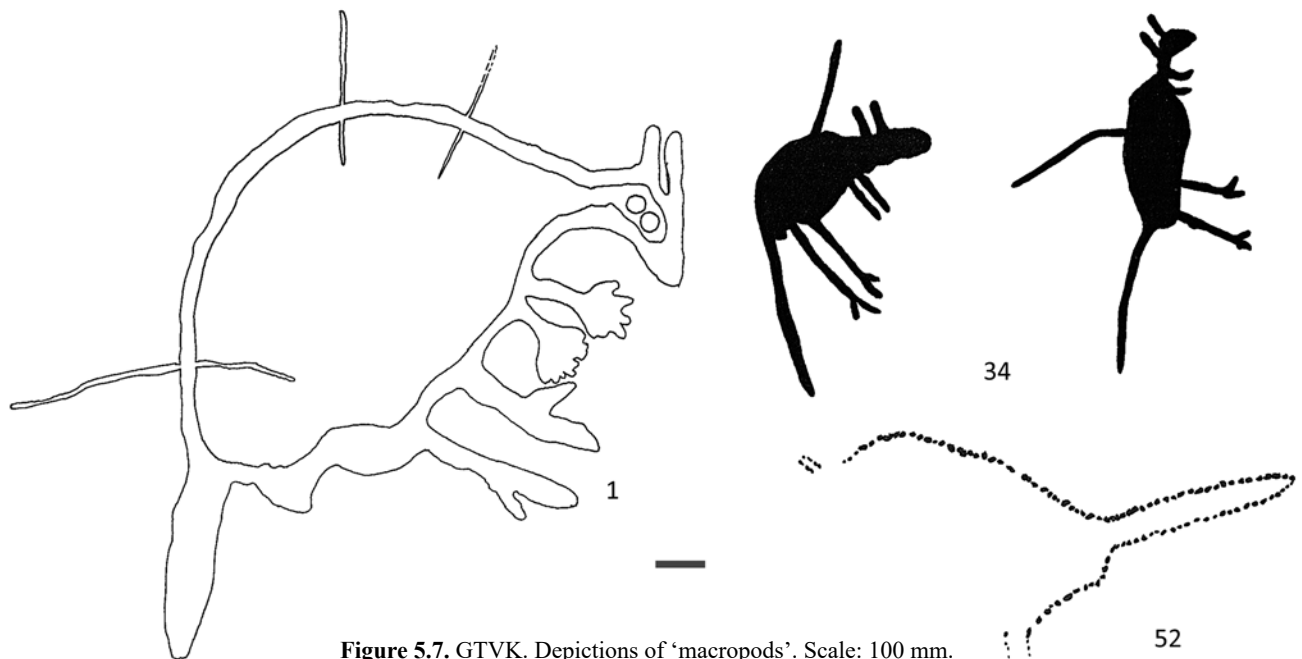


Figure 5.7. GTVK. Depictions of 'macropods'. Scale: 100 mm.

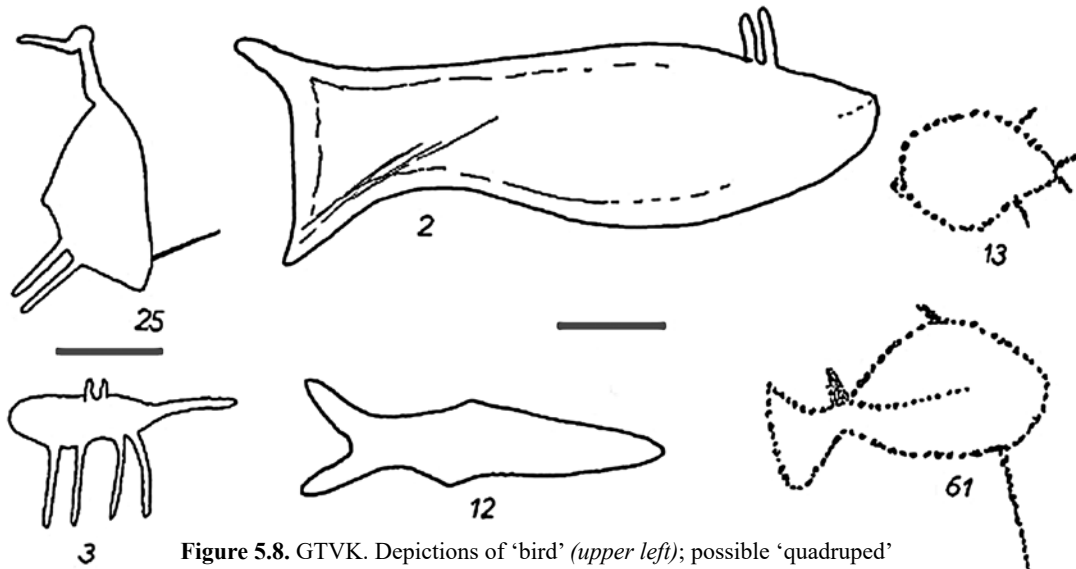


Figure 5.8. GTVK. Depictions of ‘bird’ (upper left); possible ‘quadruped’ (lower left); and ‘fish’. Scale: 100 mm.

Depections of animal prints and tracks

Depictions of macropods prints

The petroglyphs of the Kangaroo Group include ten ‘macropod prints’. Their length varies from 60–160 mm. The average is 117 mm, which corresponds to the average length of actual prints of present-day kangaroo.

The ‘prints’ of GTVK are variable: some (Fig. 5.11: 55) are schematic and rectilinear, while others are naturalistic (1–9). One of the ‘prints’ from Panel 1 (GTVK-1 {p. 454}) is a representation of the front feet of a macropod, almost

identical to a tiny human hand. Its dimensions and overall association with several other ‘macropods’ prints facilitated its identification.

Depictions of bird prints

Only four representations of bird prints have been recorded at GTVK. Some of the usual trident motifs are identical to Emu footprints (Fig. 5.11: 1-4 and 1-16), while another (Fig. 5.11: 15) includes a fourth ‘digit’. It could also be a schematic representation of the heel of a squatting Emu, and, in this case, the print could symbolize brooding, a nest and the breeding bird.

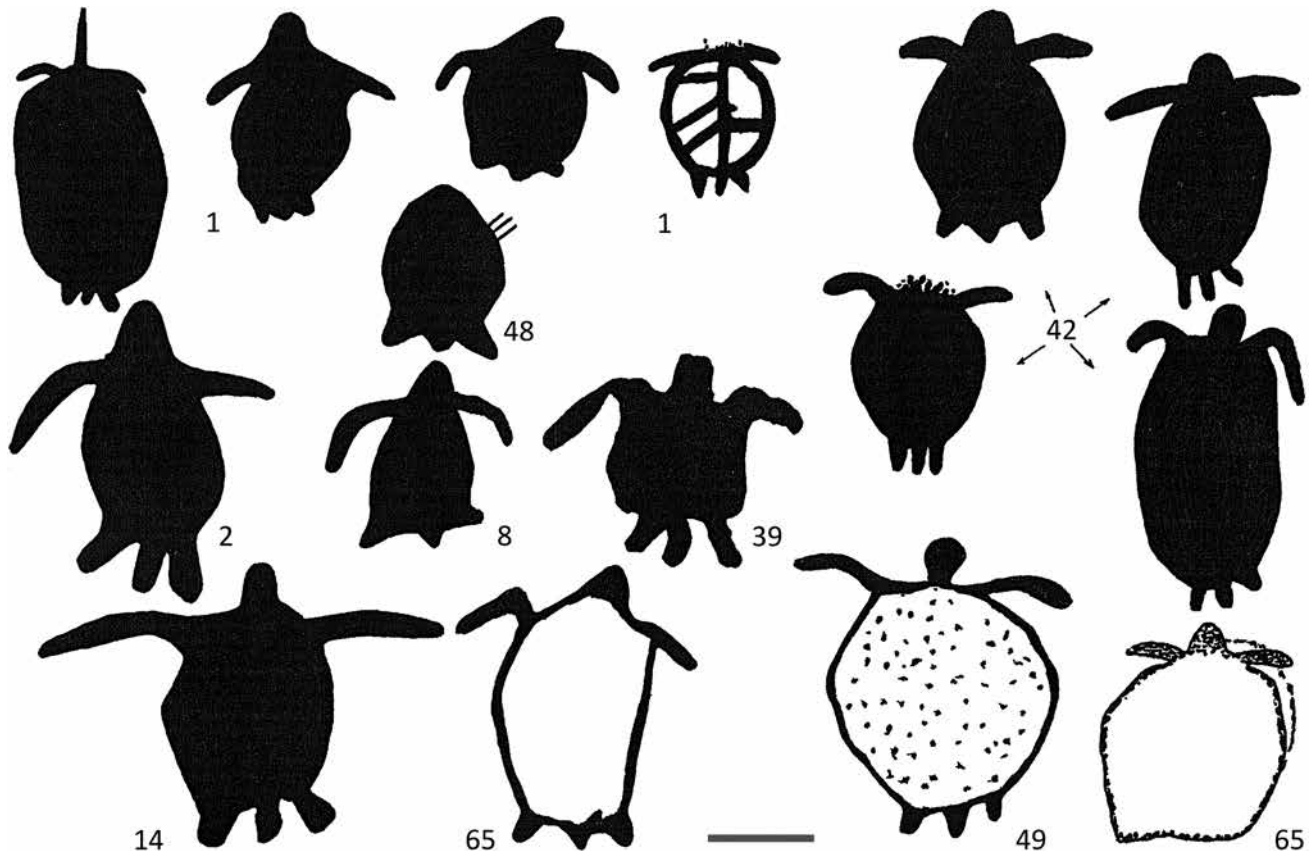


Figure 5.9. GTVK. Depictions of ‘turtles’. Scale: 100 mm.

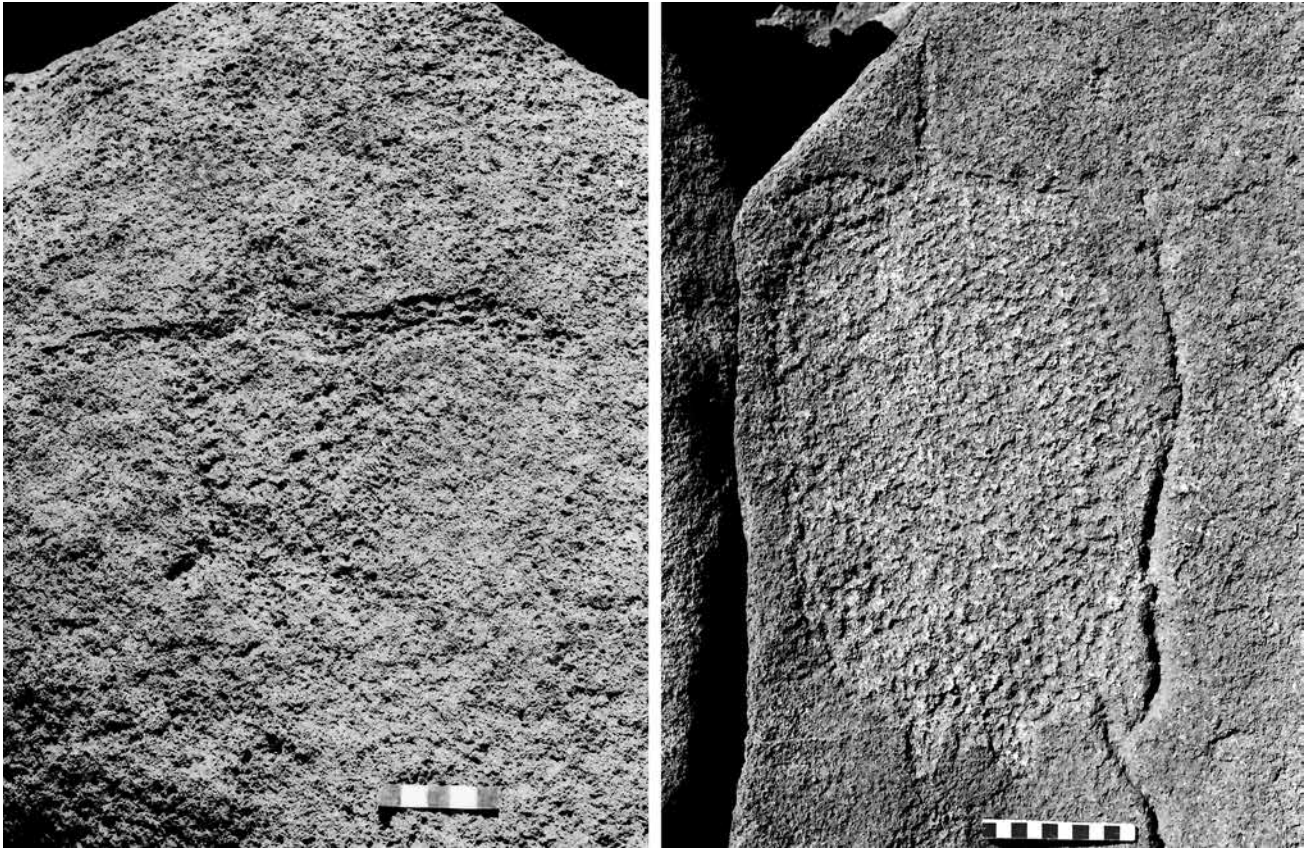


Figure 5.10. GTVK. Depictions of the two types of 'turtles' recorded at the Kangaroo Group. Left. GTVK-14 'marine turtle'. Scale 50 mm; Right. GTVK-1 'fresh-water turtle'. Scale: 100 mm.

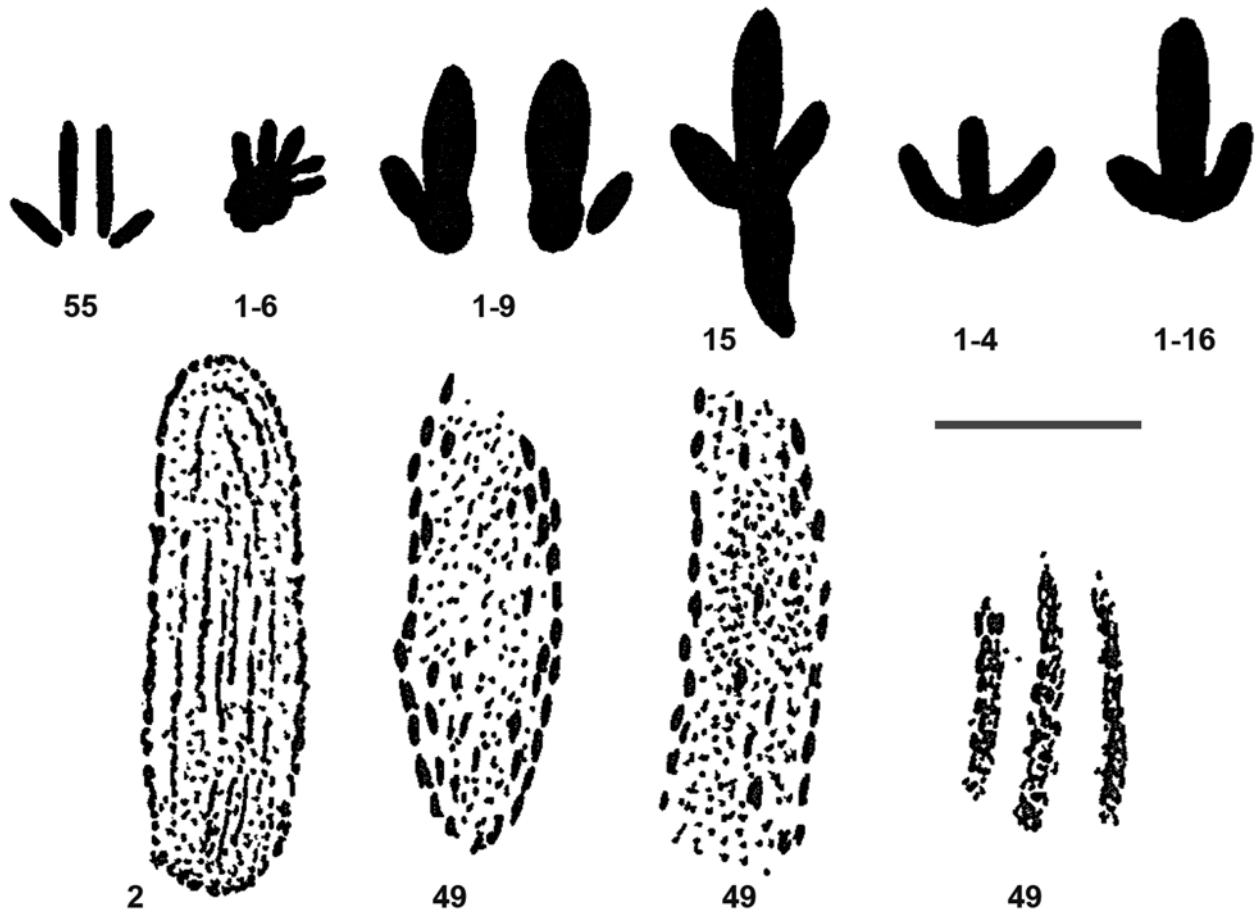


Figure 5.11. GTVK. Depictions of 'animal prints' and 'tracks'. *Upper:* 'macropod prints' (55, 1-6, 1-9); of birds (15, 1-4, 1-16). *Lower:* 'turtle tracks' (2, 49). Scale: 100 mm.

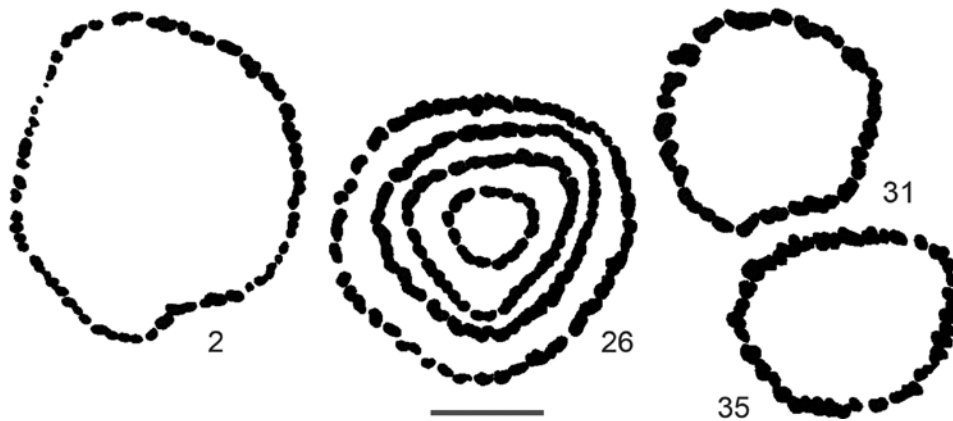


Figure 5.12. GTVK. Geometric forms: circles. Scale: 100 mm.

Depictions of turtle tracks

Four ‘turtle tracks’ have been identified at GTVK (Fig. 5.11: lower). While all were associated with ‘turtle’ petroglyphs, they present three different aspects:

- 1 An elongated oval form showing internal parallel striations representing the grooves made by turtles crawling across the sand (Fig. 5.11: 2, 49 left);
- 2 A ribbon form with wide lateral grooves (Fig. 5.11: 49 centre); and
- 3 A motif of three parallel lines (Fig. 5.11: 49 right). This must be the most common type of the print in the region (cf. Figs 2.34, 2.35).

This variety corresponds to the actual diversity of prints produced by the different species of turtle.

Geometric patterns

Circular forms

Five circular motifs were recorded at GTVK. These are simple linear figures with a circular outline, the diameters of which vary from 130–500 mm. However, one of these (Fig. 5.12: 26) is a motif formed by four concentric circles, examples of which are found elsewhere in Gum Tree Valley, especially at GTVE.

Arc-like forms

Twenty-four arc-like shapes have been catalogued at GTVK. In a general sense, these motifs pose identification problems; this will be discussed further in a study of comparative collections towards the end of this work (Chapter 8). Their length varies from 110–260 mm, and their height from 40–120 mm (Fig. 5.13). They are either linear elements or large motifs whose surface is entirely pecked. Often there are isolated motifs, or just a single example among other petroglyphs. In two cases, however, they are repeated and positioned clustering together in two parallel ranks of two or three (Fig. 5.13: 29, 53). In two instances, they feature a ‘human’ figure and perhaps represent a ‘headdress’ (GTVK-19 {p. 464}, -53 {p. 482}).

Bi-lobate forms

Six bi-lobate motifs exist among the GTVK petroglyphs. Some are large and entirely pecked (Fig. 5.14: 45), and others are spindly (Fig. 5.14: 42). A few have an appendage at the top of their arc (Fig. 5.14: 55 and 42), and others lack these (Fig. 5.14: 42, 45).

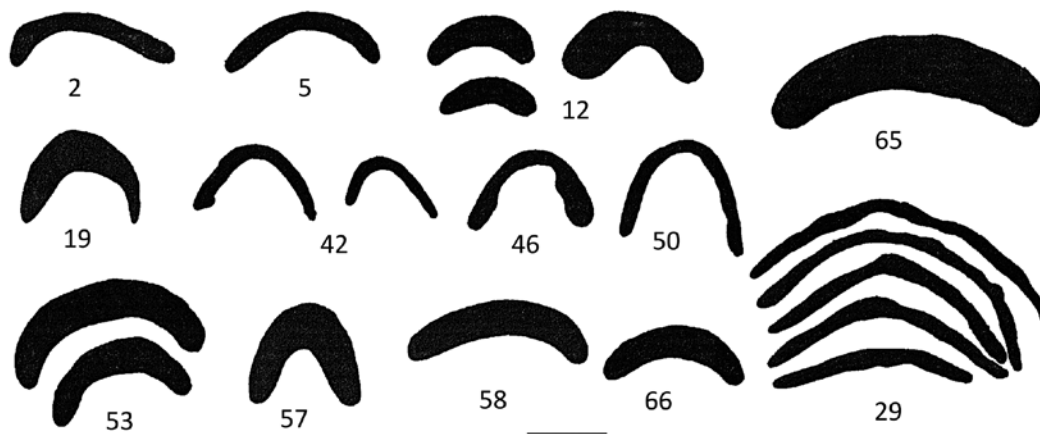


Figure 5.13. GTVK. Geometric forms: arciforms. Scale: 200 mm.

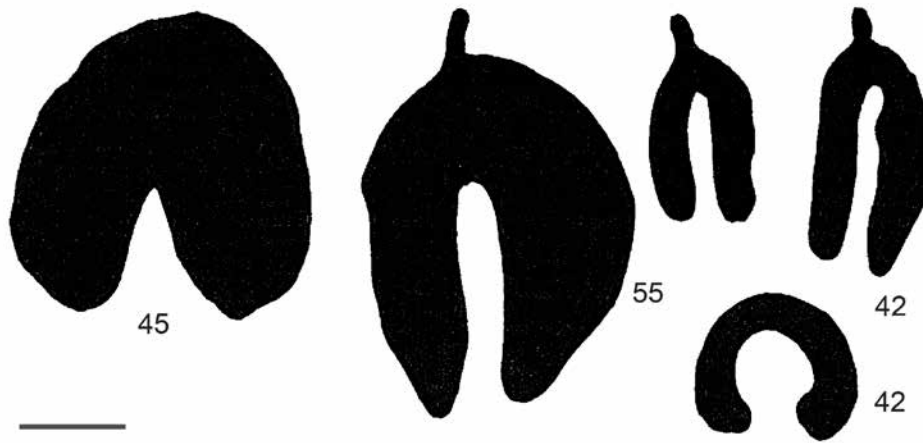


Figure 5.14. GTVK. Geometric forms: bi-lobate motifs. Scale: 200 mm.

Oval forms

Six ovoid figures at GTVK can be placed in this category, which, however, is not homogenous. The various motifs are closed, linear, more elongated than large; their lengths vary from 140–620 mm (Fig. 5.15: upper). Some have a totally pecked surface (Fig. 5.15: 37). These motifs may be isolated, or associated with other figures. In one case (Fig. 5.15: 50), a large oval surrounds a human figure, like a mandala (GTVK-50 {p. 480}).

Linear forms

About 15 linear motifs were recorded in the GTVK assemblage. This category includes several curved or straight lines of 80–550 mm in length (Fig. 5.16). Sometimes they are simple sticks (Fig. 5.16: 7, 19, 46). Others are more complex branching shapes (Fig. 5.16: 1).

Dots or punctations

Nine entirely pecked, disc-shaped motifs can be classed as dots or punctations. Their diameters vary from 30–80 mm. They usually are found as a single example and occasionally in pairs (GTVK-7 {p. 458}, -36 {p. 473}, -44 {p. 478}, -46 {p. 478}).

Other geometric forms

Twelve motifs belong in this category. They include three zigzags of 1300–1900 mm in length, which are clustered on neighbouring panels (Fig. 5.16: 1, 3, 6). This motif category has not been observed in other parts of the region. There is also a small open oval (Fig. 5.16: 1), a large reclining U-shaped motif (Fig. 5.16: 10), a cross (Fig. 5.16: 36), a simple, rayed motif (unless it was intended to represent an octopus; Fig. 5.16: 54) and an indented, notched, disk (Fig. 5.16: 55).

Dumbbell-shaped forms

As at GTVW, there is a dumbbell motif at GTVK. The 350-millimetre-long example is associated with a large punctuation motif on Panel 44 (Fig. 5.16: GTVK-44 {p. 478}).

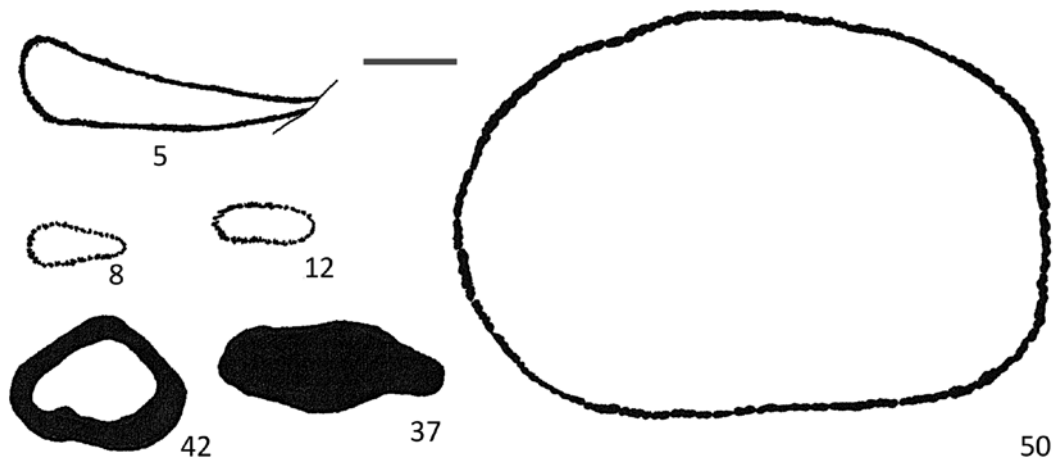


Figure 5.15. GTVK. Geometric forms: ovals. Scale: 100 mm.

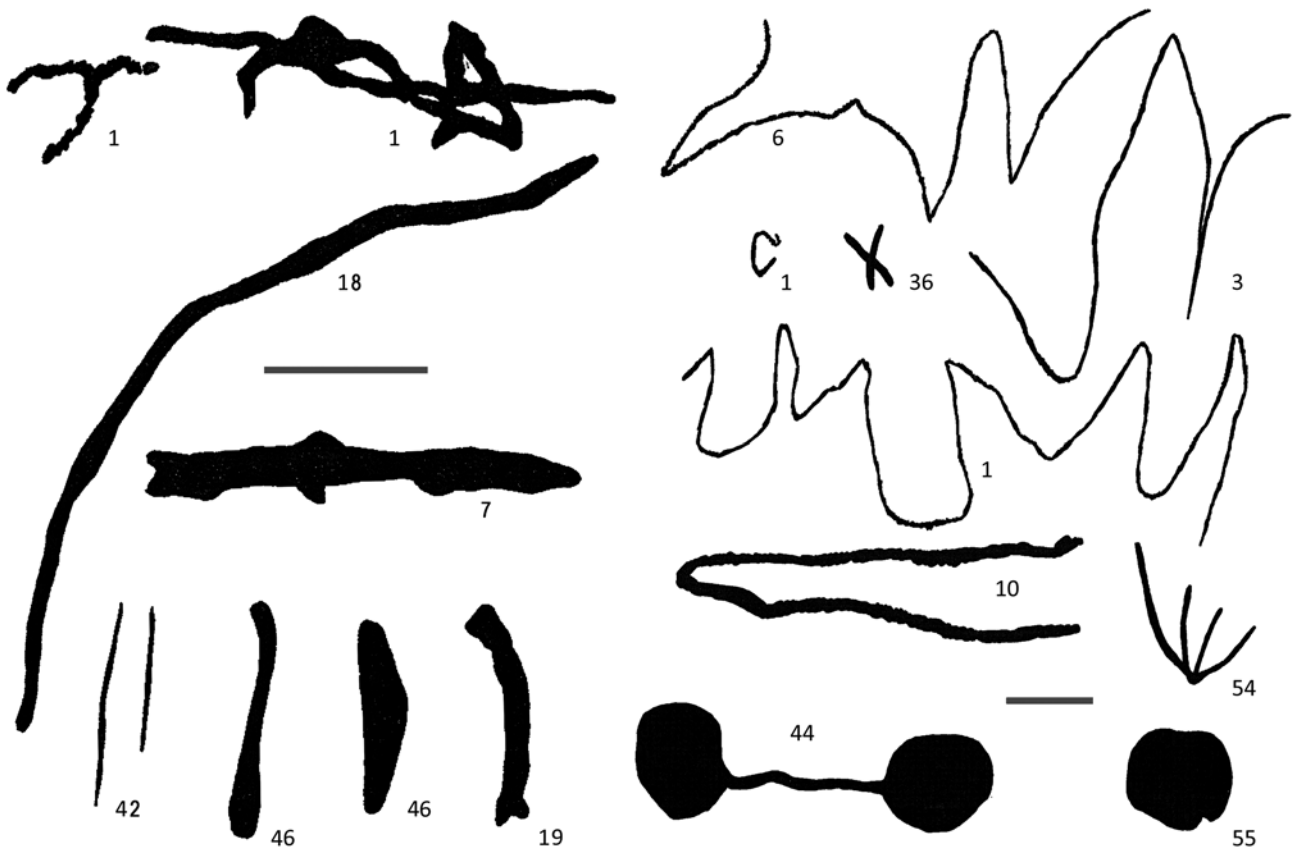


Figure 5.16. GTVK. Geometric forms. Scales: 100 mm. Left: linear forms. Right: other geometric forms including 'dumbbell-shaped' motif (44).

Indeterminate carvings

Twenty-nine motifs representing more than 10% of the total number of figures at GTVK have been categorized as 'indeterminate' (Fig. 5.17; Table 1: 'other motifs'). They are, for the most part, petroglyphs that are well formed, often carefully executed, and clearly visible, but it has not been

possible to identify the subject. Some (e.g., Fig. 5.17: 17, 51, 54), perhaps represent marine creatures. Others might be incomplete (e.g., Motif 32 {p. 472}). Ultimately, it is a matter of remarkably poorly conserved motifs whose decipherment is impossible today (e.g., Motif 34 {p. 472}). These motifs were made using linear- or infill-pecked techniques.

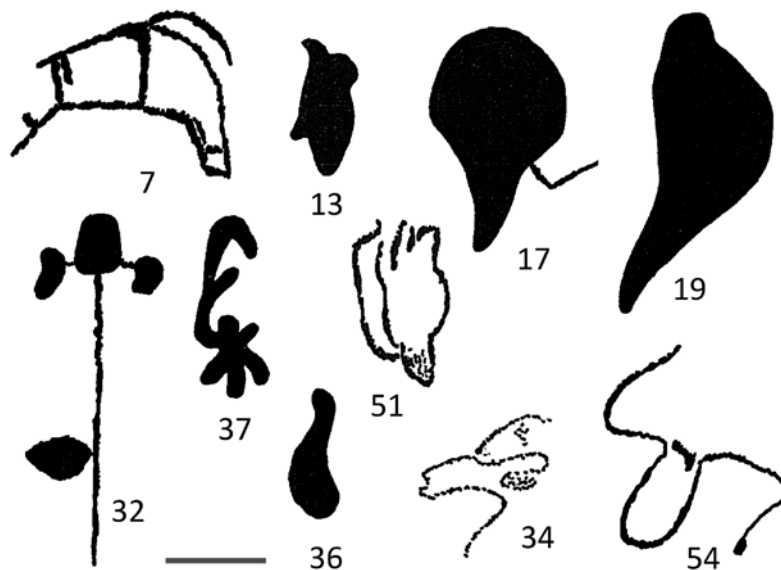


Figure 5.17. GTVK. Indeterminate carvings. Scale: 100 mm.

Distribution and associations of motifs at GTVK

In GTVK the average number of motifs (indeterminate images included) on each panel is 4.17, which is a high incidence. On the 69 panels (carved blocks or slabs) recorded for this site, 31 have only a single motif; three panels are exceptionally rich, featuring 15–77 motifs (Table 5.2).

Internal relationships

Intra-thematic associations

By studying the relationships between figures (Table 5.3), I tried to understand whether certain subjects are grouped together or isolated (as single motifs), whether the groupings were intentional or accidental, whether the associations of motifs possibly represent scenes or events—for example, the migration of turtles.

Among the GTVK petroglyphs, the only subject consistently isolated is the representation of human feet,

Table 5.2. GTVK. Summary of numbers of motifs per panel.

motifs per panel	1	2–4	5–10	11–14	≥15
number of panels	31	19	12	3	3

of which there are two examples (GTVK-4 {p. 456}, -22 {p. 466}). Some themes, frequently associated with other subjects, also might be found as single examples: these are depictions of men, turtles, fishes, circles, arcs, dots and ‘other geometric’ motifs. No themes are found exclusively in repeated sets (that is, are never ‘single’ or ‘isolated’). Some subjects, however, while usually single motifs, are sometimes repeated: these are depictions of humans, eggs, and arcs. It is difficult to know if these repetitions have a figurative meaning. Groupings of ‘eggs’ probably indicate the nests of birds and turtles. Three ‘human’ figures in line could suggest, perhaps, a dance or a ceremony. As for the rare arrays of arcs, their interpretation is uncertain.

Table 5.3. GTVK. Intra- and inter-thematic relationships.

themes	Total subjects		Subjects single isolated		Subjects single repeated			Subjects in association with other motifs			
	n		n	%	n	%	NMIR	n	%	IA	NMIA
Hp	2		2	100	0	0	0	0	0	0	0
H	20		7	35	3	15	2.3	10	50	2.2	3.5
AK	3		0	0	0	0	0	3	100	2.6	10
AO	1		0	0	0	0	0	1	100	1	1
AS	1		0	0	0	0	0	1	100	1	8
AT	10		4	40	0	0	0	6	60	3.3	17
AP	4		1	25	0	0	0	3	75	3.6	5.6
AA	1		0	0	0	0	0	1	100	1	1
AOF	5		0	0	1	20	15	4	80	2.5	4
EK	2		0	0	0	0	0	2	100	4.5	10
EO	2		0	0	0	0	0	2	100	3.5	11
ET	2		0	0	0	0	0	2	100	3	3
GC	4		2	50	0	0	0	2	50	3	3.5
GAR	14		3	22	2	14	3.5	9	64	2.8	12
GB	4		2	50	0	0	0	2	50	4	40
GO	6		0	0	0	0	0	6	100	2.5	16
GL	8		0	0	0	0	0	8	100	3	14
GP	7		0	0	0	0	0	7	100	2.2	3.2
GA	10		2	20	0	0	0	8	80	2.5	5.9
GH	1		0	0	0	0	0	1	100	1	1
MA	19		6	31.5	1	5.5	2	12	63	2.6	5

Key Tables 5.3 and 5.4		EK	‘print/s of kangaroo’
Hp	‘human print’	EO	‘print/s of bird’
H	‘human’ figures	ET	‘track/s of turtle’
AK	‘animal’: ‘kangaroo’	GC	geometric: circular form
AO	‘animal’: ‘bird’	GAR	geometric: arc-like form
AS	‘animal’: ‘snake’	GB	geometric: bi-lobate form
AT	‘animal’: ‘turtle’	GT	geometric: triangular form
AP	‘animal’: ‘fish’	GO	geometric: oval form
AA	‘animal’: other	GL	geometric: linear form
AA(HO)	‘animal’: ‘Man-Bird’	GP	geometric: punctuation or dot (smaller, different to ‘eggs’)
AA(HK)	‘animal’: ‘Man-Kangaroo’	GA	geometric: other forms
AOF	‘animal’: ‘eggs’	GH	dumbbell shape
		MA	other, undetermined motif
IA	Index of Association (that is, the average number of other themes associated with the first theme)		
NMI	Average number of individuals		
NMIR	Average number of repeated individuals		
NMIA	Average number of individuals associated with the theme		

Table 5.4. GTVK. Inter-relationships among the petroglyphs subjects.

	H	Hp	AK	AO	AS	AT	AP	AA	AAHO	AAHK	AOF	EK	EO	ET	GC	GAR	GB	GT	GO	GL	GP	GA	GH	MA
H	6	-	-	1	-	-	1	-	-	-	1	-	1	-	-	4	-	-	1	5	3	1	-	5
Hp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AK	-	-	-	-	-	1	-	-	-	-	1	1	1	-	1	-	-	-	-	1	-	1	-	2
AO	1	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-
AS	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
AT	-	-	1	-	-	2	1	-	-	-	1	1	1	2	1	3	1	-	2	2	-	2	-	2
AP	1	-	-	-	-	1	-	-	-	-	-	-	-	1	1	2	-	-	1	-	1	1	-	2
AA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
AAHO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AAHK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AOF	1	-	1	-	1	1	-	-	-	-	5	-	-	-	-	2	1	-	2	1	-	-	-	-
EK	-	-	1	-	-	1	-	-	-	-	-	2	1	-	-	-	1	-	-	1	-	2	-	2
EO	1	-	1	-	-	1	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	1	-	1
ET	-	-	-	-	-	2	1	-	-	-	-	-	-	1	1	1	-	-	1	-	-	-	-	1
GC	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	1	-	-	-	-	1	-	-	1
GAR	4	-	-	-	-	3	2	-	-	-	2	-	-	1	1	2	1	-	4	3	2	1	-	2
GB	-	-	-	-	-	1	-	-	-	-	1	1	-	-	-	1	2	-	1	1	-	1	-	1
GT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GO	1	-	-	-	-	2	1	-	-	-	2	-	-	-	-	4	1	-	-	1	1	1	-	1
GL	5	-	1	-	-	2	-	-	-	-	1	1	1	-	-	3	1	-	1	2	3	1	-	4
GP	3	-	-	-	-	-	1	-	-	-	-	-	-	-	1	2	-	-	1	3	2	1	1	2
GA	1	-	1	-	-	2	1	1	-	-	-	2	1	-	-	1	1	-	1	1	1	2	-	6
GH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
MA	5	-	2	-	-	2	2	-	-	-	-	2	1	1	1	2	1	-	1	4	2	6	-	6

The majority of motif themes are found in association with other themes.

Inter-thematic associations

Certain subjects are never single and are always associated with other themes (Table 5.4): these are depictions of kangaroo, birds, snakes, other animals, animal prints and some geometric shapes such as ovals, lines, dots and the dumbbell, all of which are numerically small. While sometimes isolated, most themes appear to be inter-related—in, at the least, 75% of cases. Among the most frequently related themes, some have a very high association index, between 3 and 4.5 (Table 5.3: ‘IA’), and this re-emphasises their strong tendency to association: these are depictions of turtles, fishes, prints and some geometric shapes, circles, bi-lobate and linear forms.

Table 5.4 shows that the largest range of associations were found for the ‘indeterminate’ category (‘MA’), for turtles, other geometric forms, lines and arcs. ‘Human’ figures are only in the tenth position. By contrast, circles and prints are associated with a more limited number of themes.

Ultimately, Tables 5.3 and 5.4 complement each other in emphasising the rarity of individual themes, both single and repeated, and, by contrast, the high number of associations of two or more subject elements. Elements that display the greatest tendency of association are representations of turtles, fishes, animal footprints and certain geometric forms, notably lines and arcs. These often combine to form a strong index of association (they generally are associated with many themes) and the largest range of associations (each is related to a wide range of themes). ‘Humans’ and ‘Indeterminate motifs’ associate little throughout; however, the average number of other themes with which they are related is quite low.

External relationships

A comparison of the maps of subject relationships allows one to visualize more clearly the distribution of petroglyphs

and their relationship or potential association (Fig. 5.18). In fact, certain themes appear seldom, so that their relationship is not always significant. These general tendencies can be described as follows:

Some themes have a much-dispersed distribution; they may occupy an area spread from one side of the site to the other:

- 1 ‘Human’ motifs (Fig. 5.18: uppermost) have a strong concentration in Group III, close to Hut A;
- 2 ‘Kangaroo’ (but they are present only three times); and
- 3 Punctations and arcs (Fig. 5.18: lowermost) show a more marked concentration in Group II.

By contrast, other themes have very focused distributions (Fig. 5.18):

- 1 Within the category of ‘human’ figures, the ‘tree-shaped human’ figures (arboriforms) are located to the southeast of Group I (GTVK-28 {p. 469}, -30 {p. 470}, -63 {p. 485}). Always single motifs, these are separated from each other by 5–8 m;
- 2 ‘Fishes’, only four examples (GTVK-2 {p. 455}, -12 {p. 458}, -13 {p. 461}, -61 {p. 484}), are separated by 5–10 m from each other. They are found in Groups II and III (Fig. 5.18: middle);
- 3 ‘Eggs’ are only present in Group II (Fig. 5.18: middle);
- 4 Circles are throughout Group I, while a unique motif of concentric circles is isolated to the northwest;
- 5 Bi-lobate motifs are found exclusively in Group II, where they are only 1–5 m apart (Fig. 5.18: lowermost); and
- 6 Meanders, classed among the ‘other geometric motifs’, are the most concentrated since they are only found on contiguous panels and only in Group I (Fig. 5.18: lowermost).

Comparison of the thematic composition of the sub-groups comprising GTVK (‘Groups I to V’ of the Kangaroo Group)

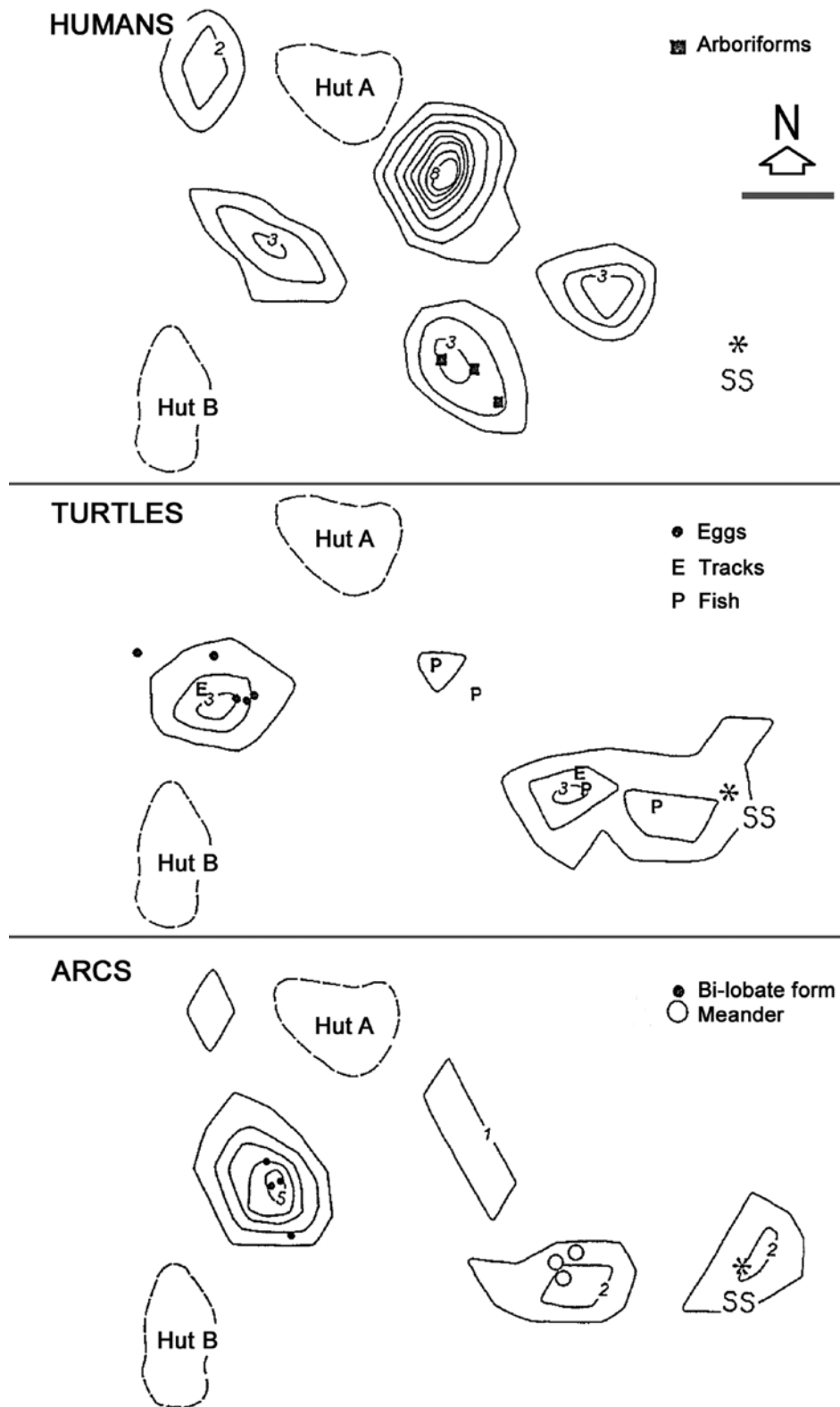


Figure 5.18. GTVK. Map of the densities of some motif subjects. Scale: 10 m.

illustrates these differences, and reveals the relationships that maintain the themes.

As well, Group III has a strong proportion of ‘human’ motifs (36%), which is three to four times higher than that of the same category in Groups I and II. Groups I and II, by contrast, have a ‘turtles’ focus; this is particularly strong in Group II where representations of ‘eggs’ appear beside those of the ‘reptiles’. Thus Group II has a high proportion (86%) of the GTVK ‘egg’ motifs. Depictions of turtle tracks are even more numerous in Group II than in Group I. It is equally remarkable that all the GTVK bi-lobate motifs are

within Group II, accompanying the ‘turtles’ and the ‘eggs’.

Finally, it is also notable that, in a radius of about 10 m around the ‘Standing Stone’ (SS), located at the southeastern corner of the site (Fig. 5.1 above and Fig. 5.19 below), seven carved panels were found on which the ‘turtle’ theme is repeated three times, and the arc theme three times also (depictions of a fish and another geometric motif also are present). Even though this dressed stone may be situated on the border of GTVK, and thus a distance from most of petroglyphs, it is possible that these four themes are somehow focussed upon this standing stone.

Carving techniques and patination observed at the Kangaroo Group

GTVK carving techniques

The Kangaroo Group demonstrates the four main carving techniques observed in Gum Tree Valley. These four techniques cover, in total, almost 80% of petroglyphs.⁶

- 1 **Deep linear pecking** characterises 24% of the GTVK petroglyphs.
- 2 **Overall (infill) deep pecking** (intaglio) was applied to 44% of the motifs; another 1.4% showed a combination of deep linear pecking and total deep pecking.
- 3 **Superficial linear pecking** is less conspicuous since it only occurs in 1.7% of the petroglyphs.
- 4 **Overall superficial pecking**, also less apparent, represents only 7.7% of the motif assemblage.

Finally, the technique of simple linear incision (probably done with the sharp edge of a blade or a flake of chert) has been observed only on a single slab (GTVK-42 {p. 476}); this motif includes two long parallel lines (of 10 and 15 cm respectively).

Re-marking at GTVK

Twenty percent of petroglyphs at GTVK have been re-marked ('renovated'). Instances of re-marking using techniques different to those underlying the uppermost motif are more numerous here than at GTVW, the other site of the hilltop, where only a single example of re-marking was detected.⁷

Representations of prints of macropods, birds and turtles (GTVK-1 {p. 454}, -2 {p. 455}, -49 {p. 479}), of eggs (GTVK-42 {p. 476}, -42A {p. 475}, -52 {p. 481}), together with two human figures and two geometric motifs (GTVK-13 {p. 461}, -42 {p. 476}), all have been re-carved. The original motifs were done in deep pecking (linear or more often infill); they have been re-marked later using superficial pecking.

'The Kangaroo', at the centre of GTVK-1 {p. 454}, which is the largest figurative motif of the whole group, seems to have been particularly important: its original carved outline (deep groove technique), like those of the large 'kangaroo' of GTVE, has been re-carved, pounded, and re-worked by successive generations so much so that, today, these grooves are deep, smooth, shiny concavities (Figs 5.21: 'U'-shaped cross-sections), fashioned by the repeated work of the carvers. By contrast, the sides of the grooves are deeply patinated, with the same colour and damage and wells of pitted corrosion as the surrounding natural rock (Fig. 5.19).

This 'U'-shaped cross-section appears in marked contrast to that of the adjacent 'turtle' motif with its more V-shaped carving contour (Fig. 5.22).

Use of the contour gauge

As in Skew Valley and other parts of Gum Tree Valley, I recorded cross-sections of several GTVK petroglyphs using a contour gauge or 'template former' to show precisely and clearly the differences in carving techniques (Figs 5.20, 5.21). Moreover, it was possible to give prominence to the re-marking of some petroglyphs and to quantify this phenomenon through photo-electric cell measurement (Figs 5.23, 5.24).

Identification of phases of carving

Cases of *superimposition* are few at GTVK. They were recorded on only two slabs (GTVK-1 {p. 454}, -42 {p. 476}). These re-markings and superimpositions, the arrangements of motifs on the slab, and the contrasts of their patination, all assisted me to unravel the tangle of these two motif arrangements (which are the richest examples at GTVK), and to learn how they were formed over time.

Four phases of carving can be distinguished on GTVK-1 and these are shown in Fig. 5.22:

- 1 At a very ancient time, pecked linear marks, barely discernible today, were made on the central and right side of the panel;
- 2 A depiction of a large kangaroo, outlined in grooves (represented on Fig. 5.22 by the dark outline), was superimposed on the earlier motifs (dotted outlines) and placed across the central and western areas of the panel;
- 3 Depictions of spears were pecked into the back of 'The Kangaroo'. Then, four 'turtles', whose surfaces are totally infilled with pecking (intaglio), were placed around 'The Kangaroo' merging with the general silhouette. They are lodged between 'The Kangaroo' and the edge to the panel. The 'flippers' and the 'tail' of one of the 'turtles' is closely linked to the front 'feet' of the 'macropod'. It is the shape of 'The Kangaroo' that determines the placement and orientation of the 'turtles'. The latter, which have been worked in linear pecking, were placed along from the 'tail' of 'The Kangaroo'. And a head of one of the 'turtles' was not able to be depicted because this place was already occupied by the macropod's 'genitals'; and
- 4 Finally, the outline of 'The Kangaroo' was re-carved (diagonal lines) by successive generations; the base of the grooves was smoothed by further re-marking so that a 'fresh' band appeared inscribed there.

The second panel (GTVK-42 {p. 476}) is also packed with motifs: the largest 'turtle' (on the right) has been carved after the 'eggs' on the same area of the panel. In effect, the 'reptile' head is moved to its right as if to avoid an 'egg' carved earlier. And this 'turtle' is much more patinated than most of the 'eggs' that surround it. This phenomenon is due to the fact that most representations of eggs in this section have been re-marked and now appear brighter than the 'turtle'. Some 'eggs' elsewhere have not been completely re-marked over their entire surface. Their edges are sometimes deeply patinated. On the smaller neighbouring slab (GTVK-42A {p. 475}) one half of the 'eggs' has been re-carved, and these stand out clearly from the rock, while the other half, not re-marked, is severely patinated (Fig. 5.23).

These examples show that a study of contrasting patination is essential to understanding the history of change over time of these decorated surfaces.

Patination study at GTVK

Proportions of patination states

Visual assessment of weathering of the carved surfaces of the GTVK petroglyphs in terms of the three usual categories 'deep patination', 'patinated', and 'fresh' showed a strong preponderance of deep patination (56.2%). Moderate patination is relatively frequent (31%) and petroglyphs with a fresh, strongly contrasting appearance represent a substantial

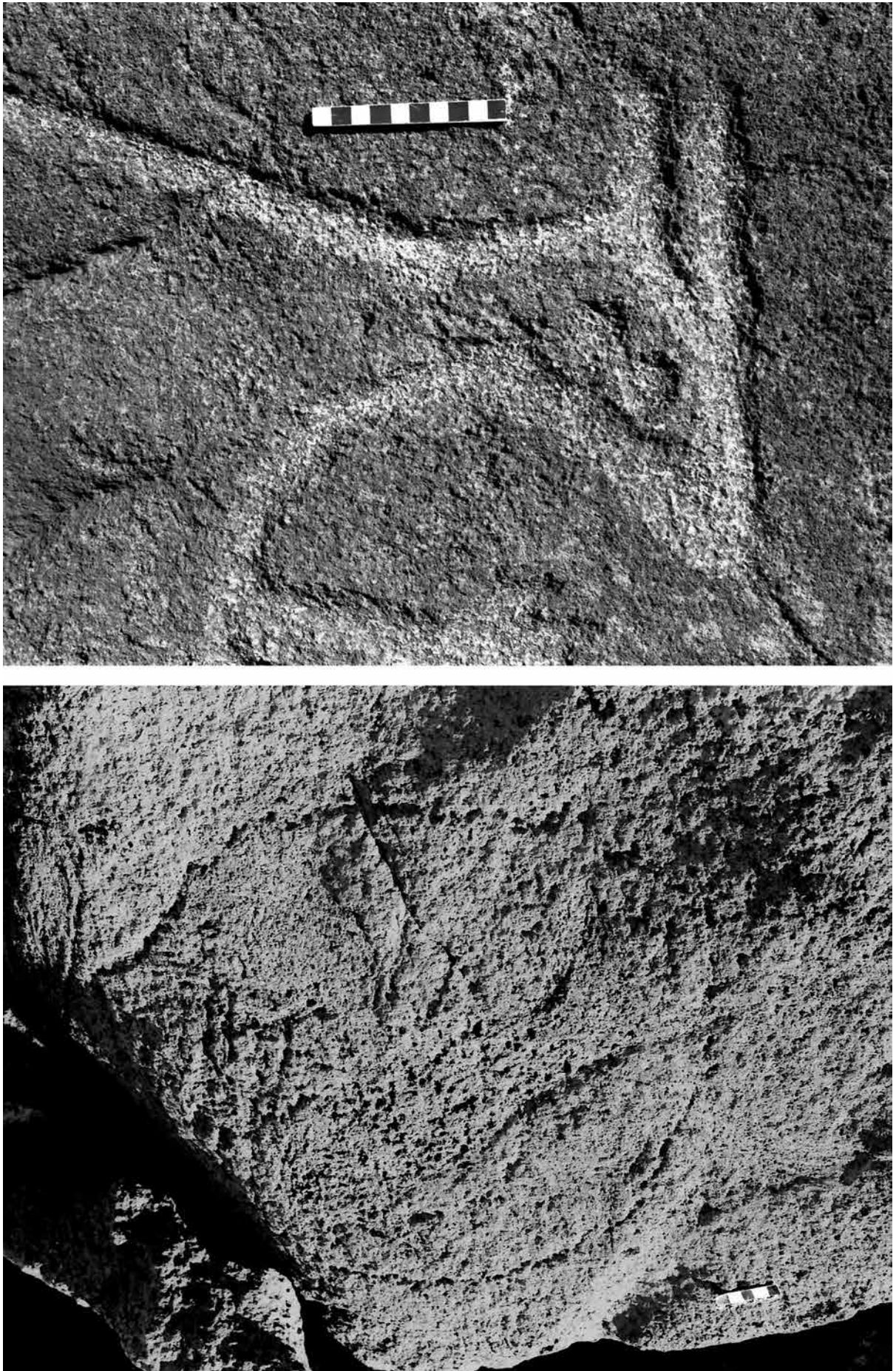


Figure 5.19. GTVK. Two types of carving techniques. *Upper:* head of 'The Kangaroo' (GTVK-1): Grooving technique re-marked as shown by the white ribbon in the bottom of the groove. Scale: 100 mm. *Lower:* Panel GTVK-2: linear pecking, deeply patinated, difficult to see (a tracing was necessary to decipher the motif). Scale: 50 mm

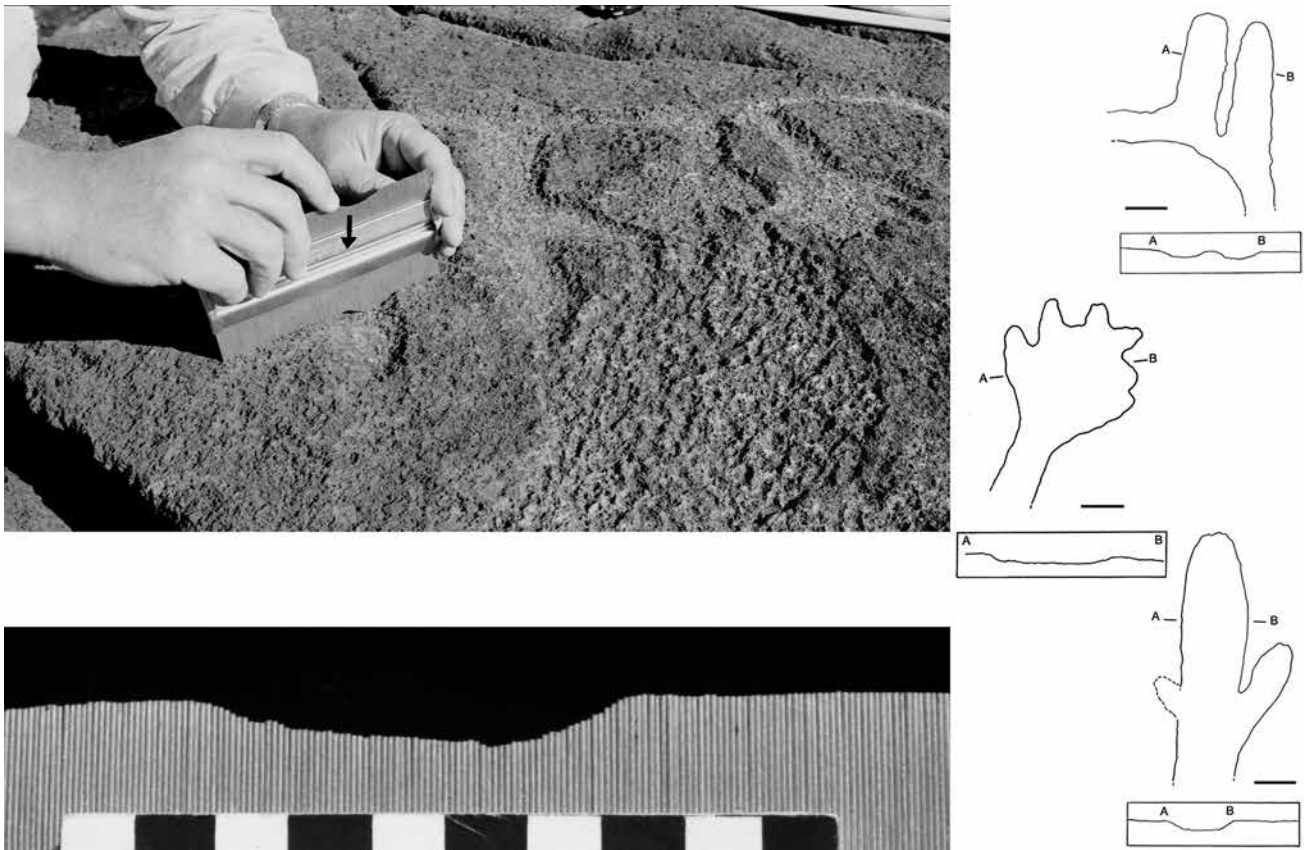


Figure 5.20. GTVK-1. Use of the contour gauge to record cross-sections of motifs. *Upper:* placing the implement. *Lower:* contour-gauge section of a back 'leg' of 'The Kangaroo' (GTVK-1): teeth of the gauge photographed above a black background. Scale 100 mm. *Right:* contour-gauge sections showing U-shaped bottom fashioned by repeated pounding. *Top:* 'ears' of 'The Kangaroo', with section A–B showing double depression; *middle:* 'paw' of 'The Kangaroo'; (*below*) section A–B showing flat bottom of a re-marked carving; *bottom:* 'foot' of 'The Kangaroo', with comparable section A–B. Scale 30 mm.

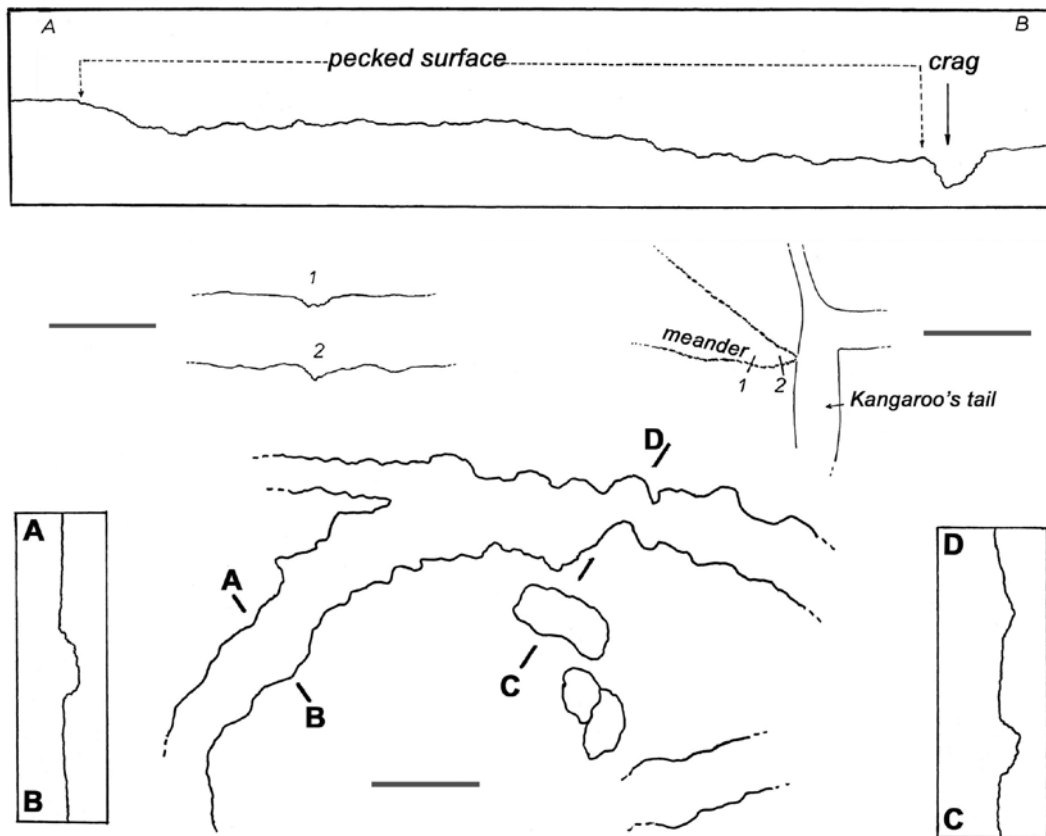


Figure 5.21. GTVK-1. 'Turtle'. Contour-gauge sections of the 'body' of the fully pecked 'turtle' of the upper part of Panel GTVK-1 showing irregular bottom due to pecking. Scale 30 mm. *Upper:* contour-gauge section of the hind part of the 'turtle': an example of intaglio (full pecking) producing rough bottom. *Middle:* contour-gauge section of the meander-line near 'The Kangaroo' tail. *Lower:* contour-gauge section of the outline of the pecked 'turtle' (#4) between the 'tail' and the hind leg of 'The Kangaroo'. The line is deep; it was made by repeated pecking.

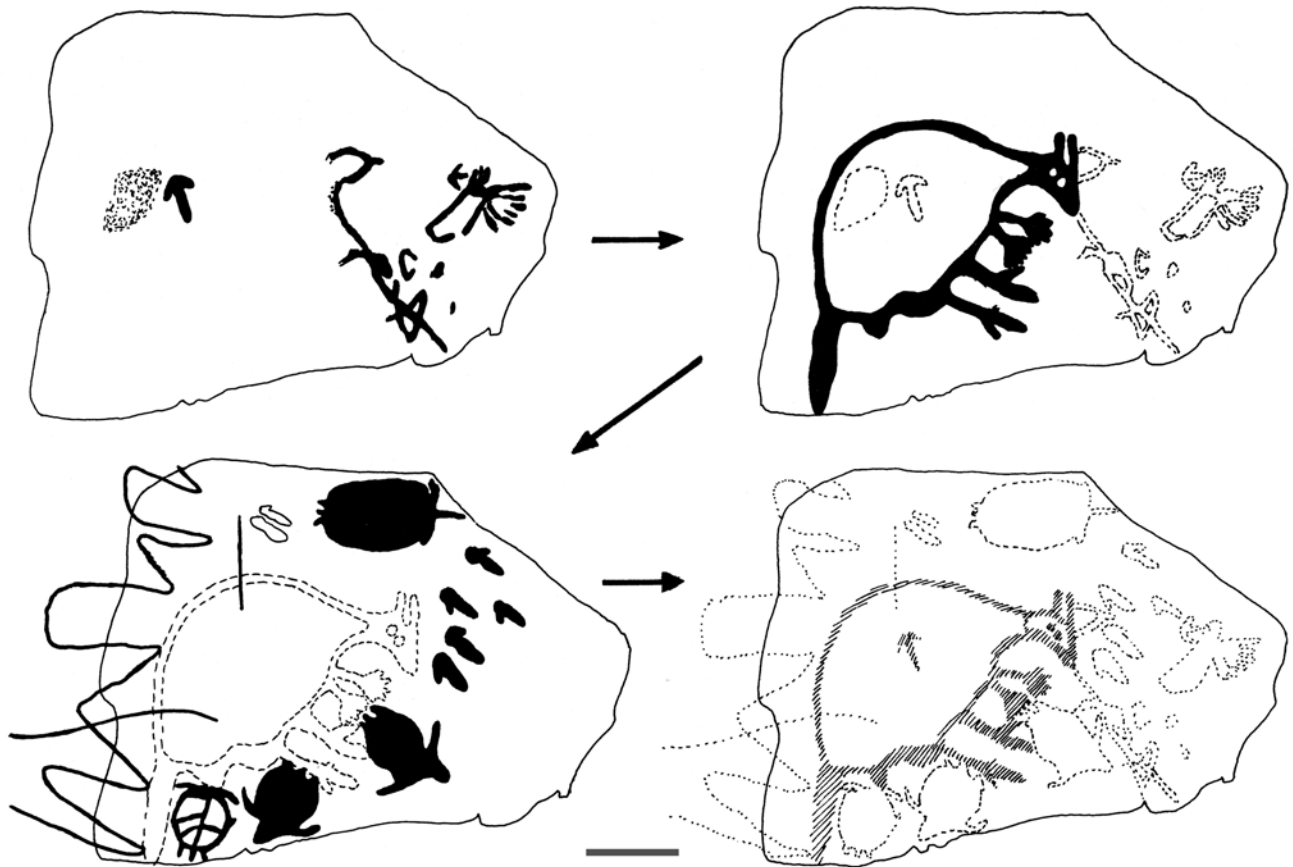


Figure 5.22. GTVK-1. Successive stages in the carving of Panel 1 (length of block: 1.85 m). Scale 300 mm. *Upper left:* old linear carving, deeply patinated. *Upper right:* 'The Kangaroo' (represented by dark outline) superimposed on the earlier carving (dotted outline). *Lower left:* various motifs made around 'The Kangaroo', deeply patinated. *Lower right:* repeated re-marking (diagonal lines) of 'The Kangaroo' and one print (at centre of 'body').

12.8% of the assemblage (Fig. 5.24). These fresh-looking motifs are not always new motifs; they are very often old petroglyphs (deeply or superficially patinated) that recently have been re-remarked. The frequency of retouching has been mentioned in the preceding section.

Use of a precise photo-electric cell to measure patination contrasts allowed me to check this impression (Fig. 5.25). The technique revealed a small population of petroglyphs with very marked contrast (between 0.20 and 0.34) that is isolated from the rest. The distribution of patination at GTVK is therefore bimodal.

This process allowed us to produce densitometric sections for interesting motifs, an example of which is given for GTVK-1 {p. 454} (Fig. 5.25). The tops of the densitometric sections (right curve) are peaks (= low values) because the grooves of the outline of 'The Kangaroo' had been re-carved and thus made brighter. The 'relief' of these petroglyphs literally had been 'revived'.

Refreshing or 'making the old brighter' was a major reason among those identified by Indigenous Australians for renovating rock-paintings and petroglyphs in the discussion of re-marking by Katharine Sale (1995: 133–134).

Photo-electric cell measurements

It is necessary to distinguish between 'density' value and 'contrast' value. 'Contrast' is the difference between density values as measured by the photo-electric cell. At the Dampier sites, I used a Gossen Mastersix meter, a photo-electric cell that allows precise measurement at various points.⁸ The cell measures the density of the surface at each point: The darker the surface, the higher the 'density' (maximum is black), while a lighter surface produces a lower value (minimum is white).

The contrast value is obtained by comparison of density values—thus the difference between the density value of a recently carved line (e.g., '0.5') and that of the adjacent weathered block surrounding the motif (e.g., '1.2') calculated as $1.2 \text{ minus } 0.5 = 0.7$ defines the contrast value.

A 'densitometric section' can be obtained by measuring densities along a line (as shown on Fig. 5.25). In this case, the re-carved part of the petroglyph gives peaks (= lower values) in the section because they are whiter.

Patination and motifs

I counted the GTVK motifs showing different categories of patinae to draw up Table 5.5. But counting the re-marked motifs led to a numerical exaggeration: in effect, each renovated motif had been counted twice, once in the category of its first patination and a second time in the category of re-marked patination. In sum, a re-marked motif (one carrying two patinae) is considered as two petroglyphs superimposed.

Table 5.5 shows that the population of patinae are different in important ways: 189 motifs have a 'deep patina' (Patina 1), 106 have a 'medium patina' (Patina 2) and 44 have a 'fresh' appearance (Patina 3).

The assemblage's path from Patina 1 to Patina 2 does not involve any important iconographic change: the same themes persist with simply fewer geometric motifs, representations of humans and eggs and an increase in representations of animals. This noticeable increase in 'animal' motifs in the Patina 2 category is because three times as many 'turtles' are associated with the second patina category than with Patina 1.

Patina 3 is almost exclusively made by re-marking of old petroglyphs and not the execution of new motifs. These

Table 5.5. GTVK. Relationships between motifs and patination.

motif	Patina 1 'deep patination'		Patina 2 'patination'		Patina 3 'fresh'	
	n	%	n	%	n	%
'human' figures	24	12.7	9	8.5	—	—
'animals'	11	5.8	17	16	1	2.3
'eggs'	71	37.6	34	32	27	61.4
'prints'	4	2.1	17	16	12	27.3
geometrics	54	28.6	25	23.7	4	9
undetermined	25	13.2	4	3.8	—	—
totals	189	100	106	100	44	100

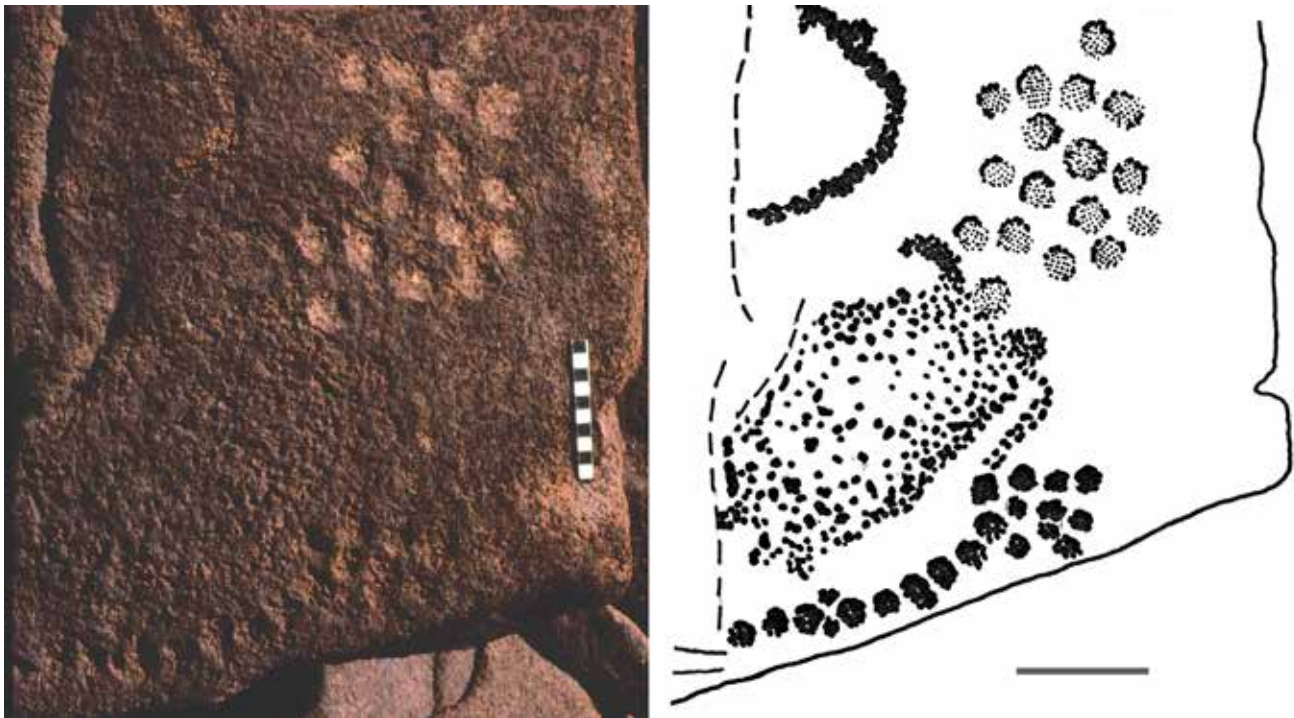


Figure 5.23. GTVK-42. Showing 'turtle' and 'eggs' deeply patinated at bottom and renovated 'eggs' (contrasting colour) at top. Scale 100 mm.

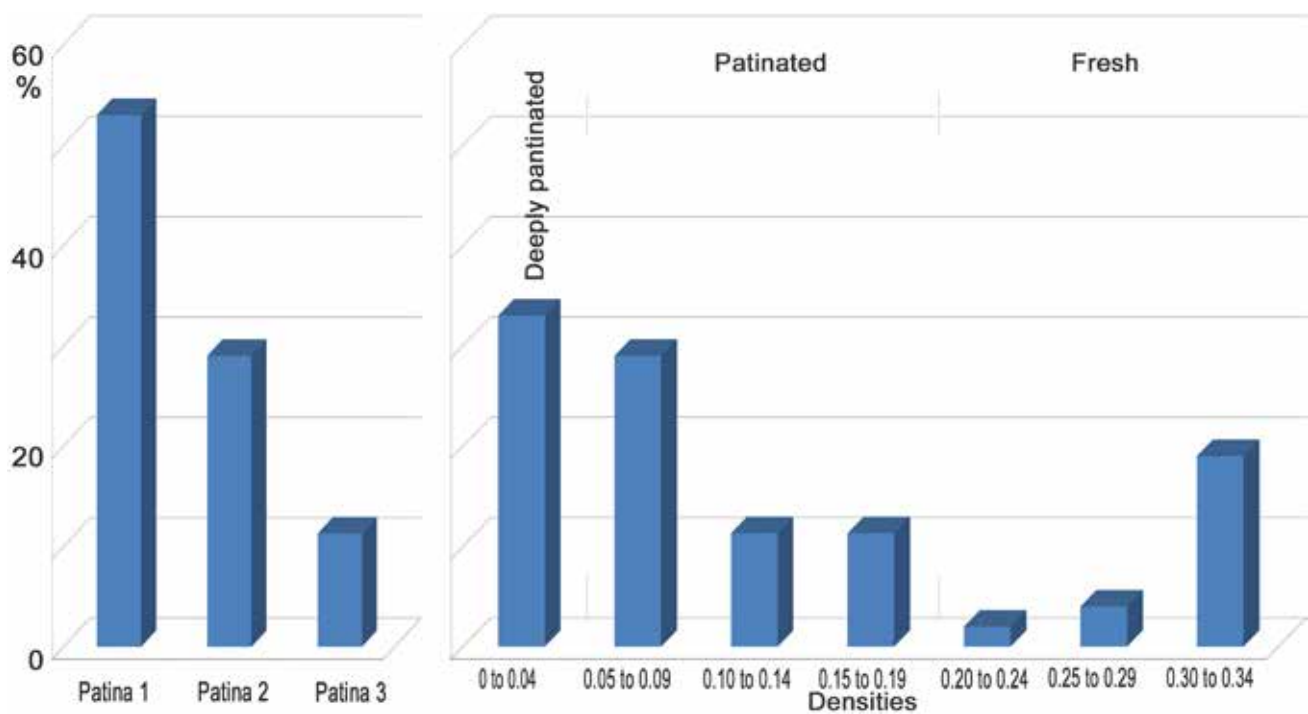


Figure 5.24. GTVK. Categories of patination: visual evaluation (*left*), photo-electric measurement (*right*). First column = deeply patinated. Columns 2–4 = patinated. Columns 5–7 = fresh.

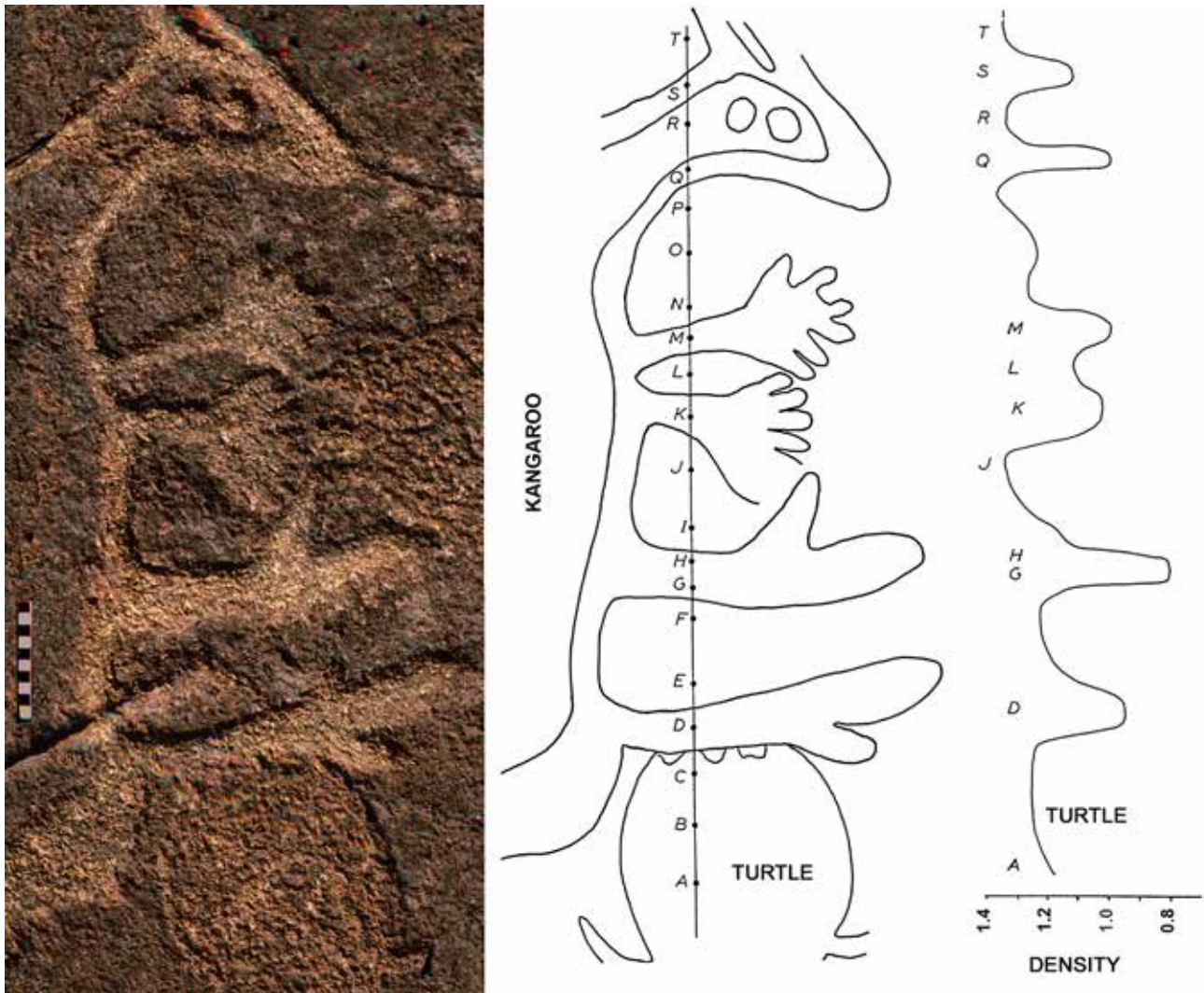


Figure 5.25. GTVK-1. Densitometric sections of 'The Kangaroo' and accompanying 'turtle'. Left: Photograph of measured surface. Scale 100 mm. Middle: Points at which measurements of density values were made. Right: Density contrasts expressed by amplitudes of the curved line. The 'feet' and 'neck' of 'The Kangaroo' that have been re-marked are high peaks (D-S); but the 'turtle' (A-C) completely pecked, deeply patinated, does not show any marked relief

renovations only concern a small number of themes, mainly 'eggs' and 'bird prints' and 'macropods prints'.

Quite definitely, the activity of the GTVK carvers seems to have declined over time, from the period of Patina 1 to that of Patina 3. These trends seem to manifest themselves during the long occupation of the site through a continuing *decrease in the number of geometric and 'human' motifs, an increase in 'kangaroo' and 'bird' prints and, above all, a continuing dominance of 'egg' motifs throughout all these periods.* This is a feature of GTVK to which I shall return later.

Patinae and carving technique

Deep pecking, linear or infill, defines 74% of cases of Patina 1 and in 26% of cases of Patina 2 (Table 5.6). It is never encountered in association with Patina 3. In contrast, superficial

pecking, linear or infill, is found in 55% of cases of Patina 2 and 45% of Patina 3. It is never associated with Patina 1.

Thus, it appears that carving techniques at GTVK may have changed over time from deep pecking to superficial pecking, with an intermediate stage during which the two techniques were used at the same time. Other techniques, incision and fluting, were used here only very exceptionally.

Distributions of patination

A comparison of the distributions of 'deeply patinated' petroglyphs (Patina 1) and of 'patinated' petroglyphs (Patina 2) is instructive (Fig. 5.26). It seems to show a shift in the zones of medium density from the east to the west. In effect, the petroglyphs with Patina 1 (Fig. 5.26 upper) are especially numerous at the eastern part of the site, in Groups I and III

Table 5.6. GTVK. Summary of patination and carving techniques.

	Patina 1 'deep patination'		Patina 2 'patination'		Patina 3 'fresh'		totals	
	n	%	n	%	n	%	n	%
pecking								
deep	184	74	64	26	—	—	248	100
superficial	—	—	53	55	44	45	97	100
total number of motifs studied							345	

where the maximum density rises to Value 9 (nine carved panels in a circle of 5 m diameter), while in the west the density only reaches Value 4. By contrast, Patina 2 petroglyphs are clustered in the west where they register a zone of maximum density—that is, reaching Value 10. It could be said that, during the period of transition from Patina 1 to Patina 2, the centre of gravity of the Kangaroo Group moved to the west.

It is probably significant that the zone of maximum density of Patina 2 is lodged between the Huts A and B, halfway between the two. These living sites seem to have ‘attracted’ the carvings. This interpretation tends to be supported by the fact that the panels bearing re-marked petroglyphs with a ‘fresh’ appearance (Patina 3) are also found mainly to the west. Such distributions thus seem to establish spatial relations—which are also chronological ones—between clusters of petroglyphs of Patina 2 (and some motifs of fresh appearance), and the occupation structures. There is further support for this idea from the dating by radiocarbon analysis of these structures (below).

The rock support at GTVK

Dimensions

The carved blocks of GTVK are smaller than those of GTVW, which occupies a similar position on the plateau (Table 5.7). The dimensions of the stone slabs at GTVK are more homogenous than those at GTVW since the standard deviation is clearly less.

Moreover, as was mentioned earlier, the petroglyphs are placed on prominent blocks, generally voluminous, dominating the depressions where the blocks are smaller (their maximum length most often being less than one metre). No petroglyphs were found at the base of a depression. There seems to have been a preference for large blocks and elevated positions.

The petroglyphs at GTVK are not large, particularly compared with the block size (Table 5.8). The significance of the standard deviation in comparison with the average length is that it emphasises the heterogeneity of the lengths.

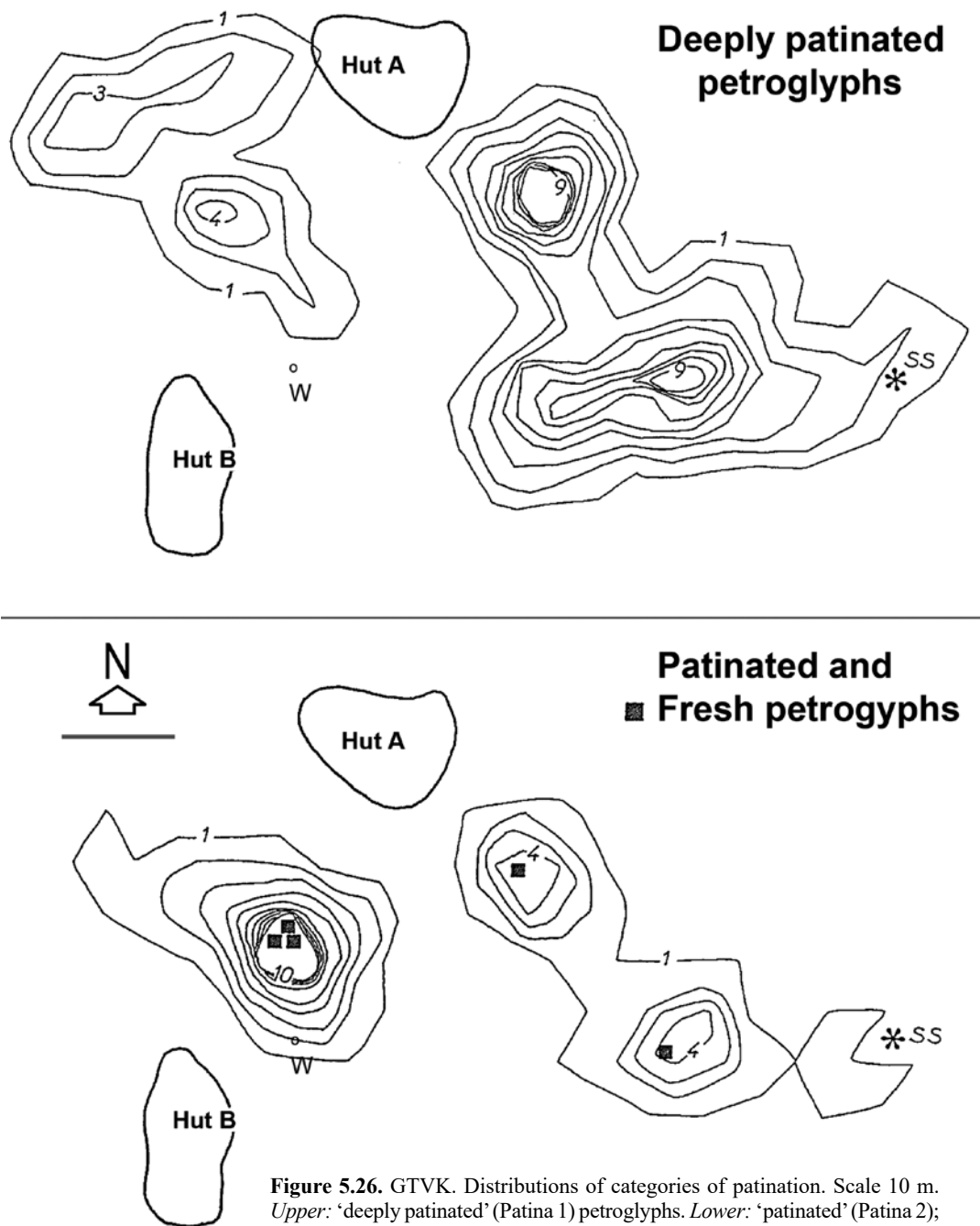


Figure 5.26. GTVK. Distributions of categories of patination. Scale 10 m. *Upper:* ‘deeply patinated’ (Patina 1) petroglyphs. *Lower:* ‘patinated’ (Patina 2); with slabs with re-marked—‘Fresh’—petroglyphs (shown by filled squares).

Table 5.7. GTVK. Comparison of dimensions (mm) of carved blocks at GTVK and GTVW.

	average length	maximum length	minimum length	range of variation	standard deviation
GTVK carved blocks	1180	2100	350	1750	456
GTVW carved blocks	1500	4000	380	3620	800

Table 5.8. GTVK. Summary of dimensions (mm) of GTVK petroglyphs and comparison with block sizes.

	average length	maximum length	minimum length	range of variation	standard deviation
GTVK petroglyphs	270	1900	40	1860	238
GTVK carved blocks	1180	2100	350	1750	456

The largest motifs are meandering geometric forms, and ‘The Kangaroo’ (GTVK-1 {p. 454}), which has been re-marked many times. As at GTVW, the motifs occupy only a small portion of the available block surfaces—on average only 23% of the length of the slab. The richest panels are on rather large slabs—but not the largest ones—with the area available being between one and two square metres.

Moreover, if, for each sub-group of petroglyphs making up GTVK, one calculates the average density of motifs per square metre of block surface, it seems that Group II is by far the richest, not only because it has the largest number of carved slabs but also because it has the greatest density of petroglyphs per square metre. This density rises to 6.5 motifs per square metre, while it is only 3.6 for Group I, and 3.0 for Group III.

Shapes

The motifs are almost all placed within the boundaries of the slab walls. Instances of motifs ‘overflowing’ are the exception. Thus the ‘spears’ embedded in the back of ‘The Kangaroo’ (GTVK-1 {p. 454}, -34 {p. 472}) continue onto another face of the block by bending at a right angle. Similarly, a large meandering linear ‘snake’ crosses from the upper to the lateral surface of the same slab (GTVK-1 {p. 454}).

Orientation of carved surfaces

The map of the orientation of the carved surfaces shows that the latest petroglyphs most often occupy the upper surfaces of the slabs (Fig. 5.27). In fact, more than 85% of all the carved surfaces are in this position. Less than 15% of the surfaces are on vertical or inclined surfaces (Table 5.9).

The dominance of the use of the horizontal surface inclination is more prevalent here than elsewhere and at GTVW in particular, the neighbouring group, where 43% of the petroglyphs are on the top surfaces of the slabs. On the other hand, among the petroglyphs not on upper surfaces, but on the vertical or inclined block faces, there is no evidence for a preferred orientation. A certain tendency towards western orientations is perceptible but this only applies to a few panels.

In sum, as with The Woman Group (GTVW), the petroglyphs of the Kangaroo Group do not generally attract the visitor’s attention. In both, the petroglyph assemblages seem relatively hidden.

Inclination of the block faces

The relationships between the motifs and the inclination of the block faces can amplify and clarify one’s first impression. In effect, Table 5.9 shows that the index of visibility is nil for animals, eggs and prints, which are almost always placed on the upward-facing surfaces.

Evidence is limited for the indeterminate and geometric motifs; however, some are found on vertical faces. But, in the end, it is the category of ‘human’ that has the highest visibility index.⁹ This is even though this value remains at a level well below that which can be observed in other parts of Gum Tree Valley and Skew Valley. Thus, here again, the ‘human’ figures are those motifs that mostly confront the prospective visitor entering the site.

Finally, the best times for visibility of the motifs were noted during the course of a long stay at the site. It seems that 19% of the petroglyphs are most visible and most easily decipherable in the early morning (between 0800 and 1000 hours); 46% at late morning; 5% at midday; 11.5% in the early afternoon, and 17% at late afternoon, shortly before sunset. In addition, 1.5% is constantly in shadow and always difficult to decipher.

Cultural remains discovered among the GTVK petroglyphs

The remains found among the petroglyphs of GTVK are various. They include a few stone tools, shells, two living sites and a dressed stone (Fig. 5.28).

Stone artefacts and shells

In 35 different places, stone tools and flakes, and shells of marine molluscs were found among the carved blocks (Table 5.10). The stone tool assemblage includes a total of 19 flakes (13 of local gabbro, three of fine-grained, green granophyre, and three of quartz), and eight cores (five globular and three with one striking platform). The tools are limited to two scrapers. Such a tool assemblage, which probably is not chronologically homogenous, provides only imprecise information.

The material, dimensions and the technology reveal that it belongs to the ‘Australian Core Tool and Scraper Tradition’ that appeared in the Pleistocene and lasted through the Microlithic phase up to the time of European colonization (Mulvaney, 1969, 1975). Some of the cores, scrapers or flakes could be from the Pleistocene but no further; independent evidence strongly supports this hypothesis. The patina of certain pieces tends to favour a considerable age without being more precise.

Moreover, the relative abundance of cores in relation to flakes is remarkable. It seems that no important manufacturing was carried out on the site. For the most part, pieces probably were introduced after their production. The abundance of cores—particularly round, globular cores—probably is related to the use of these heavy pieces in the pecking of the petroglyphs.

Table 5.9. GTVK. Motifs and inclinations of the support blocks.

motifs		Upper surface of slab (T)		Vertical block face (V)		Inclined block face (S)		Visibility index
		n	%	n	%	n	%	
'humans'		18	62.5	6	18.7	6	18.7	0.33
'human feet'		2						
'animals'								
'macropod'	AK	2	—	—	—	2	—	—
'bird'	AO	—	—	—	—	1	—	—
'snake'		1						
'turtle'	AT	15	—	—	—	1	—	—
'fish'	AP	4	—	—	—	—	—	—
other	AA	1	—	—	—	—	—	—
total 'animals'		23	85.1	—	—	4	14.8	0
'eggs'		100	100	—	—	—	—	0
'animal prints'								
of 'kangaroo'	EK	10	—	—	—	—	—	—
of 'bird'	EO	3	—	—	—	1	—	—
of 'turtle'	ET	4	—	—	—	—	—	—
total 'prints'		17	94.4	—	—	1	5.2	0
geometrics								
circle	GC	4	—	—	—	1	—	—
arc	GAR	18	—	5	—	1	—	—
bi-lobate motif	GB	4	—	1	—	1	—	—
oval	GO	6	—	—	—	—	—	—
line	GL	13	—	1	—	1	—	—
point	GP	7	—	1	—	1	—	—
others	GA	11	—	—	—	1	—	—
'dumbbell'	GH	—	—	1	—	—	—	—
total geometrics		63	80.7	9	11.5	6	7.6	0.14
indeterminates		21	78.4	4	14.2	4	14.2	0.20
totals		244		19		21		284
percentages			85.9		6.7		7.4	100

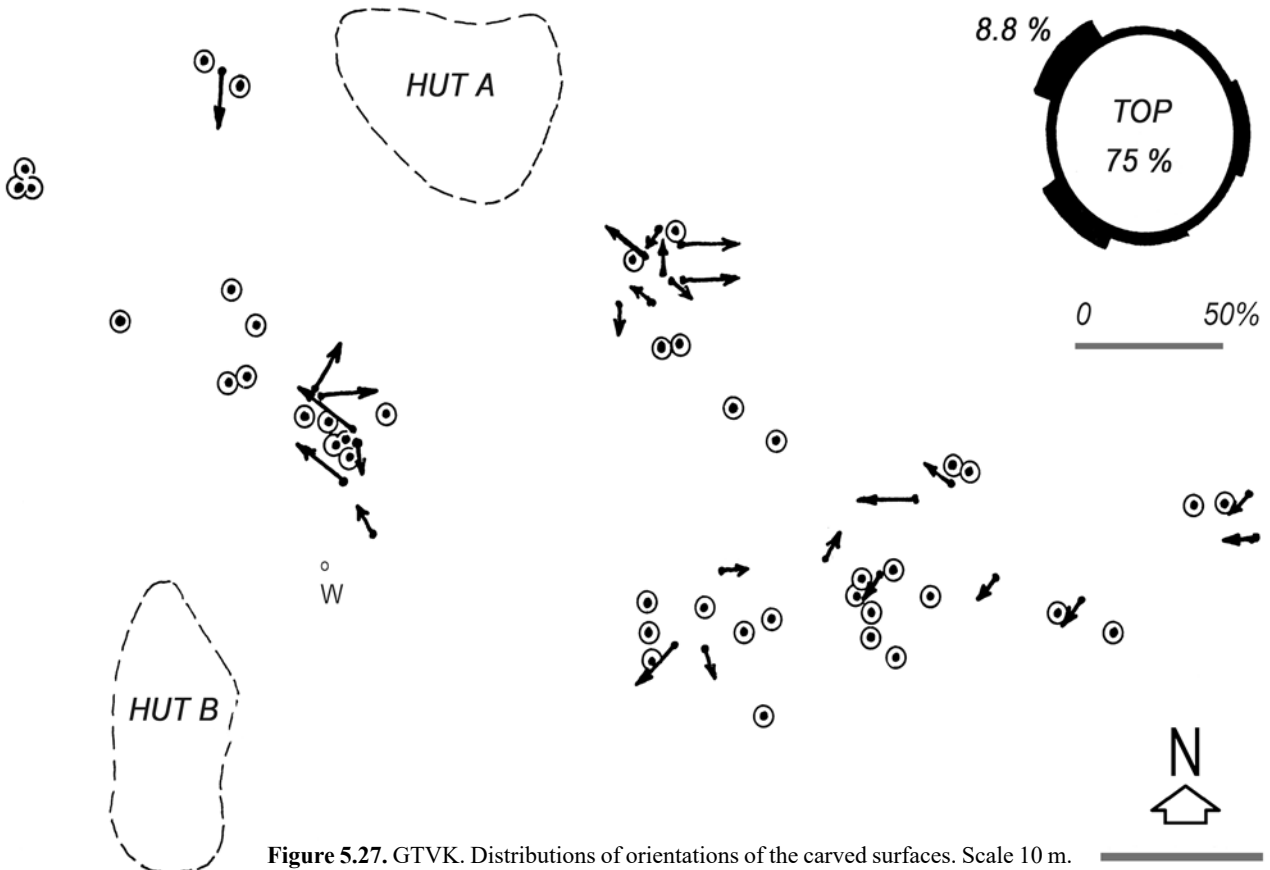


Figure 5.27. GTVK. Distributions of orientations of the carved surfaces. Scale 10 m.

Table 5.10. GTVK. List of remains recovered.

1	large flake	19	globular nucleus
2	3 flakes (2 quartz)	20	nucleus with platform
3	20 <i>Anadara granosa</i>	21	globular nucleus
4	fragment of <i>Syrinx aruanus</i>	22	10 <i>Anadara granosa</i>
5	scraper	23	flake
6	flake	24	fragment of <i>Melo amphora</i>
7	flake of quartz	25	thick scraper with steep edge
8	flake	26	globular nucleus
9	flake	27	flake
10	globular nucleus	28	flake
11	10 <i>Anadara granosa</i>	29	flake
12	20 <i>Anadara granosa</i>	30	flake
13	small flake	31	flake
14	large globular nucleus	32	nucleus with platform
15	green granophyre flake	33	large globular nucleus
16	green granophyre flake	34	flake
17	c. 100 <i>Anadara granosa</i>	35	c. 100 <i>Anadara granosa</i> from southern part of Hut B (LY-3611)
18	6 <i>Anadara granosa</i> in a fissure		

Shells found in the fissures between the blocks and on the floors of living sites (Huts A and B) number about 300 items. Almost all are of *Anadara granosa*, corresponding to the upper level of the Skew Valley shell midden. These shells were found clustered in small piles of six to ten. The largest heaps are those found at the foot of GTVK-1 {p. 454}, and on the ground surface of the southern section of Hut B. This last shell sample has provided a radiocarbon date of about 2400 years ago (below).

Finally, two large shell fragments of giant gastropods were recovered; one, from the floor of Hut A, is of the Australian Trumpet or False Trumpet (*Syrinx aruanus*),

and the second, from a few metres to the east of GTVK-1 {p. 454}, is of a Giant Bailer or Diadem Volute (*Melo amphora*).¹⁰ Throughout time, these shells have been used as receptacles for carrying water.

The ranges of shells and stone pieces overlap without being identical (Fig. 5.28). Shells are concentrated in few places: below Group I around GTVK-1 {p. 454}, below Group II, between the two living sites, and even on the hut floors (Fig. 5.4 shows Groups). By contrast, the stone artefacts (numbered dots) are widely spread over the whole site with a minor concentration beneath Group I. These observations do not allow any strong conclusion to be drawn.

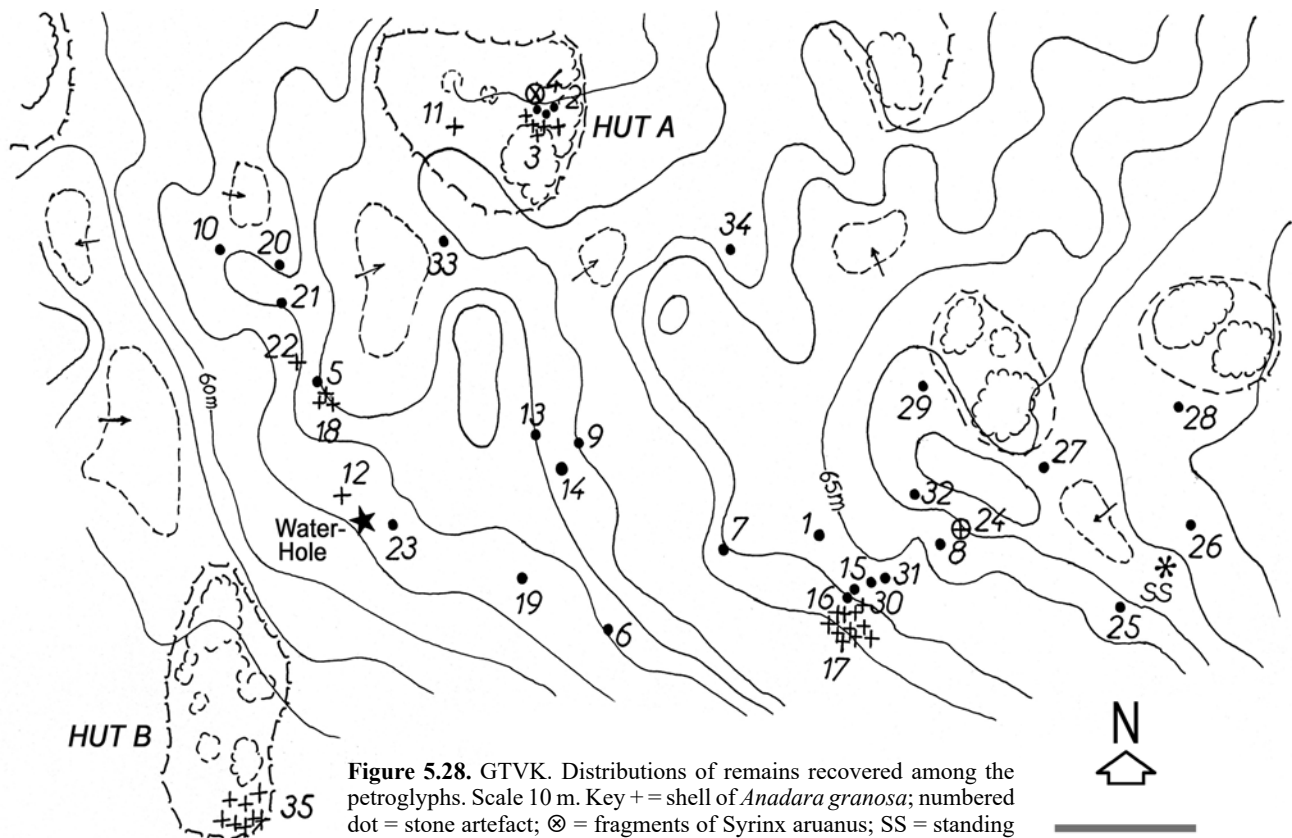


Figure 5.28. GTVK. Distributions of remains recovered among the petroglyphs. Scale 10 m. Key ++ = shell of *Anadara granosa*; numbered dot = stone artefact; ⊗ = fragments of *Syrinx aruanus*; SS = standing stone; ⊕ = fragments of *Melo amphora*; star = water source.

Living site floors

On the plateau that dominates Gum Tree Valley, I found floors of living sites with crude dry-stone walls arranged around circular or oval spaces in the gabbro scree (Figs 5.29, 5.30). These living sites, in effect, made use of a particular geomorphological place.¹¹ The scatters of gabbro that cover large expanses of Gum Tree Valley are divided by a network of dense faults, quite visible on aerial photographs. Incidents tending north-south are crossed by other faults in an east-west direction. This probably explains the east-west, then north-south route of the watercourse.

This habitation structure, surrounded by a ring of blocks, is divided into small lateral apses (*a* to *i*) with flat floors and regular walls surrounding a central place (*f*), which was excavated. ‘Cubby-holes’ (*g*, *h*, *i*) are today still shaded by Kurrajongs.

In the Kangaroo Group, the intersection of these crevices (more numerous than elsewhere) has allowed erosion to drill differentially into the less resistant material, thus causing fractures and small depressions to open up among the large gabbro blocks. The floor of these basins, formed of small gravel, sand and soft soil offers the only surface where one can stop for any time, rest and sleep (Fig. 5.30).

Within the barren, mineral landscape of large sombre boulders, these clearings (of an average diameter of 10–15 m) are the only islands of green. Thanks to the presence of the soil, these are the only vegetated places. Among the bushes and shrubs, taller Kurrajongs (Broadleaf Bottle Tree, *Brachychiton australe*) provide shade and fruits still enjoyed by Aborigines today. These plants were identified for us by biologist and botanist Nathan Sammy, then employed by the Dampier Salt Works Company (Tables 5.11, 5.12). It is probable that they have been growing in these places for millennia, in an unchanging environment.

These islets provide many advantages to human settlement: level ground, shade, foods (discussed below), and branches for roof-building (Figs 5.32, 5.33). Thus, there is permanent housing. For many millennia, shellfish-collectors

Table 5.11. GTVK. Vegetation of Hut A.

family	species
Aizoaceae	<i>Trianthema</i> sp.
Capparidaceae	<i>Cleome viscosa</i>
Chenopodiaceae	<i>Rhagodia priessii</i>
	<i>Enchylaena tomentosa</i>
Convolvulaceae	<i>Evolvulus alsinoides</i>
Curcubitaceae	<i>Mukia maderaspatana</i>
	<i>Trichosanthes cucumerina</i>
Euphorbiaceae	<i>Phyllanthus</i> sp.
Fabaceae	<i>Indigofera</i> sp.
Goodeniaceae	<i>Scaevola spinescens</i>
Malvaceae	<i>Abutilon cryptopetalum</i>
Mimosaceae	<i>Acacia coriacea</i>
Nyctaginaceae	<i>Boerhavia diffusa</i>
	<i>Commicarpus chinensis</i>
Poaceae	<i>Paspalidium clementii</i>
Sterculiaceae	<i>Brachychiton australe</i>
Santalaceae	<i>Santalum lanceolatum</i>
Solanaceae	<i>Solanum</i> sp.
Sapindaceae	<i>Heterodendrum oleaefolium</i>

Source: Nathan Sammy, 11 July 1984.

Table 5.12. GTVK. Vegetation of adjacent huts (Hut B) and other small depressions.

family	species
Capparidaceae	<i>Capparis spinosa</i>
Crassulaceae	<i>Crassula</i> sp.
Portulacaceae	<i>Calandrina</i> sp.
Amarantaceae	<i>Ptilotus</i> sp.
Boraginaceae	<i>Trichodesmum zeylanicum</i>
Combretaceae	<i>Terminalia circumalata</i>
Poaceae	<i>Dactyloctenium radulans</i>
Convolvulaceae	<i>Ipomoea costata</i>
Fabaceae	<i>Tephrosia</i> sp.
	<i>Rhynchosia minima</i>
Myoporaceae	<i>Eremophila longifolia</i>

Note. This list includes species not found at Hut A, although the species in Hut A are found also on the adjacent hut sites. Source: Nathan Sammy, 11 July 1984.

cleared the ground by throwing to the side and beyond the large boulders that cluttered the area. In this way, they built around the perimeter a circle of stones without patina and showing a contrasting light colour to the dark crust of the surrounding boulders (Fig. 5.32).

It is apparent that some blocks had been dug up and brought to the surface; thus, these circles are mainly the work of the first inhabitants of the site. Even if one can envisage that plants had contributed to the development of this phenomenon by loosening the blocks with their roots, it is certain that the circles are man-made constructions.

The confirmation that they are artificial structures is provided by the fact that some of them are composed of coalescing apses, the remains of small individual shelters. Furthermore, these remains encircle a small central internal space where I found traces of daily human activity—concentrations of stone tools and shells.

I have observed this type of structure in several places on the heights overlooking Gum Tree Valley, but only a few contain significant signs of habitation. Two are found in the Kangaroo Group. I have named these living sites or ‘huts’ (using the term in a very loose sense). I have mapped and excavated ‘Hut A’ (Figs 5.29, 5.31).

Further investigation revealed that the lateral apses are archaeologically poor, while the floor of the central place consists of only a thin layer of sediment. This sediment is slightly carbonaceous, of maximum thickness of about 100 mm, and much richer than surrounding areas in the shells of *Anadara granosa*, and more rarely of *Melo amphora* (Figs 5.31, 5.33).

From the excavation of the centre of Hut A, I recovered 47 flakes of gabbro, six quartz flakes, one chalcedony flake, and three tools: one steep-edged scrapper in chalcedony on a micro-bladelet core, a small scraper on a flake of black granophyre, and a notched gabbro flake (Fig. 5.34).

Locally, the occurrence of gabbro is widespread; granophyre is found within a few hundred metres, while quartz and chalcedony would have to have been imported from further afield. The unique archaeological layer, at the centre of Hut A, was laid down by the *Anadara* collectors who were the builders of this living site. Hut A, shaded by two Kurrajongs, is 17 m long and 12 wide. In fact, it consists of the marks left by at least seven, if not eight (*a–h*) small oval ‘rooms’ of 1.5–4 m in length around a central space (Fig. 5.29: *f*). These units (*a–h*) could not have been contemporaneous. It is more likely that they are the remains of shelters built over successive stays in this particularly favourable place.

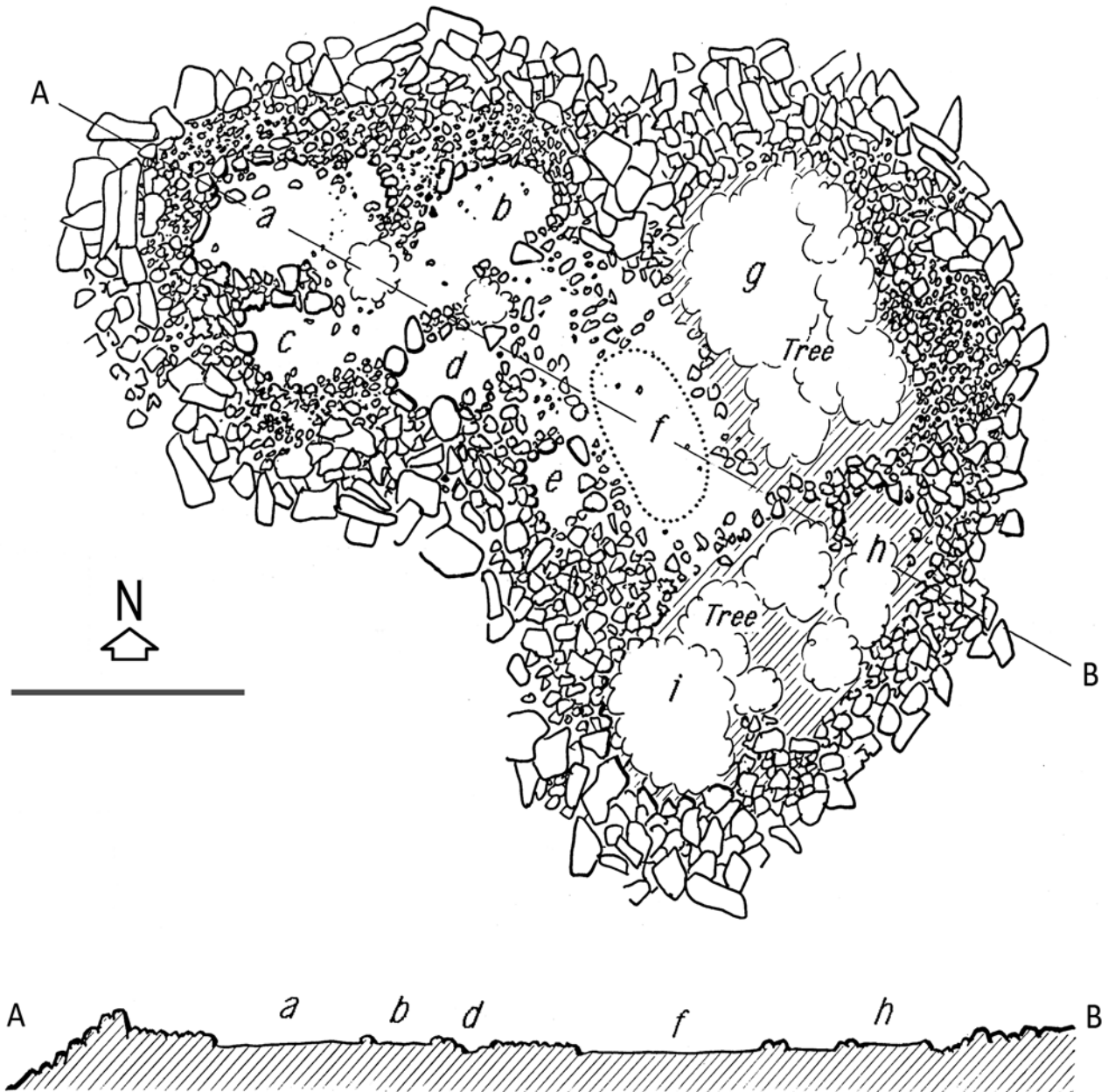


Figure 5.29. GTVK. Hut A. Plan and cross-section (A–B). Scale 4 m. (a–i) small lateral apses with flat floors and regular walls; (f) central place (which was excavated); (g, h, i) ‘cubby-holes’ (today still shaded by Kurrajongs); in plan, diagonal lines represent soil carrying grass.

It is probable the lateral shelters, each set up for one or two persons, were so arranged for night use around a central camp occupied by the group during the working day. The unplanned placement of these constructions over time lead to the architectural layout observable today.

Hut B, 15 × 6 m is situated on the edge of the plateau whence the view extends as far as brackish marshes of Fenner Creek. I did not excavate Hut B, but was able to record its plan carefully (Fig. 5.35). It shows the same lateral arrangement of ‘rooms’ (e–l), and the same presence of a central place. From its surface I collected stone flakes and many shells of *Anadara granosa*. *Anadara* shells from the south of the area were subjected to radiocarbon analysis (below). This structure also has, to its northwestern side, four holes lined with artificially placed stones. These are probably post-holes (Fig. 5.35: a–d).

Finally, I recorded the presence of a large natural hole in a block of gabbro located 8 m to the north east of Hut B, near GTVK-45 {p. 477}. With a depth of about 400 mm, it can contain a store of about 50 L of rainwater during days after the monsoon storms.

Anadara granosa shells collected in central place (f) of Hut A (LY-3610 and those collected from the southern sector of Hut B (LY-3611) were subject to radiocarbon analysis; they returned age estimates dating the hut floors to within the two-standard deviation range of 1950–2710 cal BP (Table 5.15).

Thus, it is established that at the time of the deposition of the upper level of the Skew Valley shell mound, the *Anadara* collectors were visiting the plateau overlooking Gum Tree Valley. They had developed and used the habitation structures of the Kangaroo Group and most likely they made some of the petroglyphs near the living site.

Dating of GTVK hut floors

Two samples of marine shell were collected from the hut floors (above); a third sample was obtained from *Anadara* shells lodged between carved blocks (Fig. 5.28: sample 17). All three were submitted for radiocarbon determination to the University of Lyon radiocarbon dating laboratory. Details of the samples, results of the analyses, and calibration of the radiocarbon age estimates are presented in Tables 5.13–5.15.

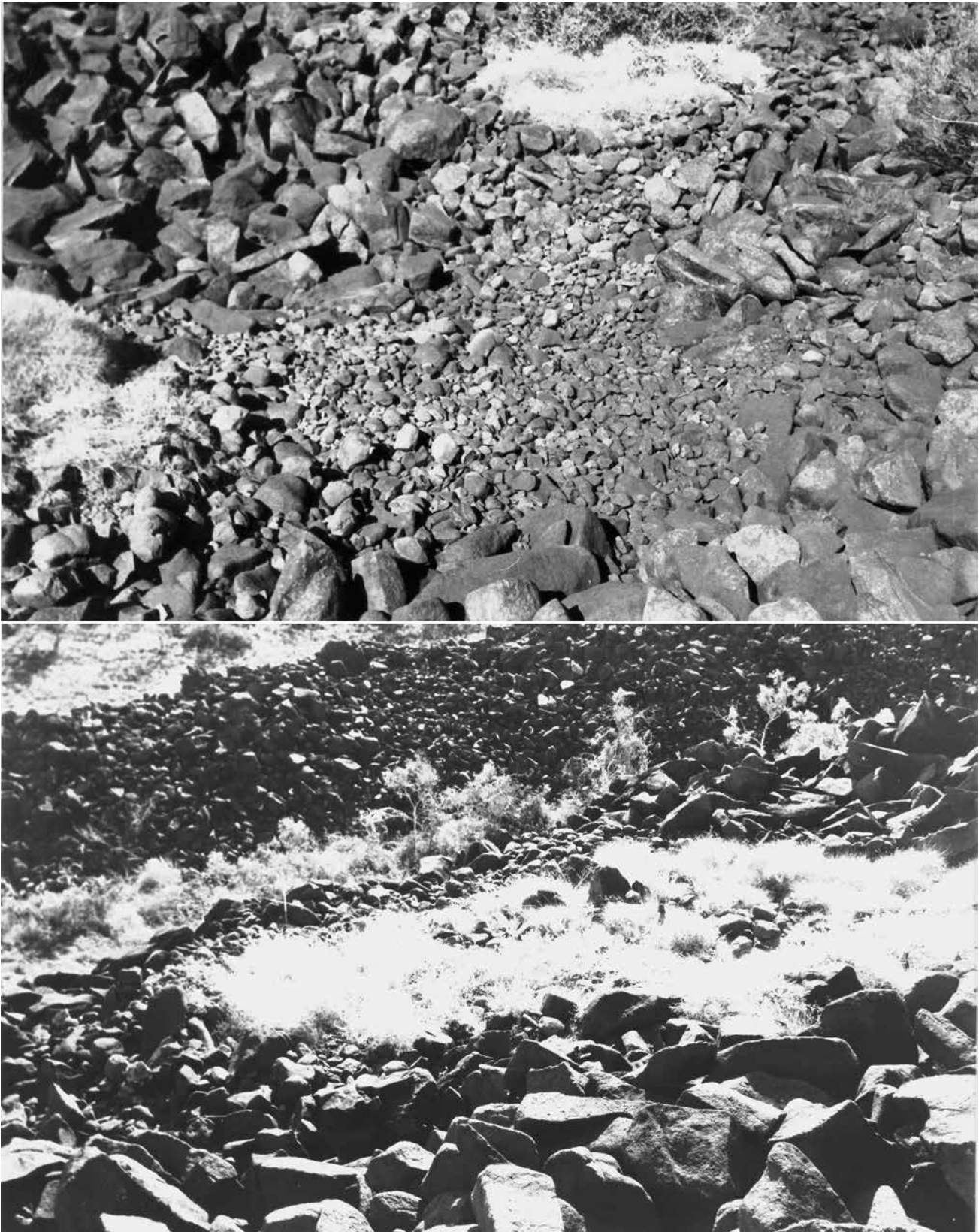


Figure 5.30. GTVK. Evidence of habitation. *Upper:* example of natural formations (near GTVK) some of which have been transformed into huts (5 m in diameter); area of gravel in the middle of a chaos of gabbro. There are tufts of spinifex top and left. It has not been transformed into house site. *Bottom:* a house site (between GTVK and GTVS) with outer ring (10 × 5 m); it has spinifex inside.

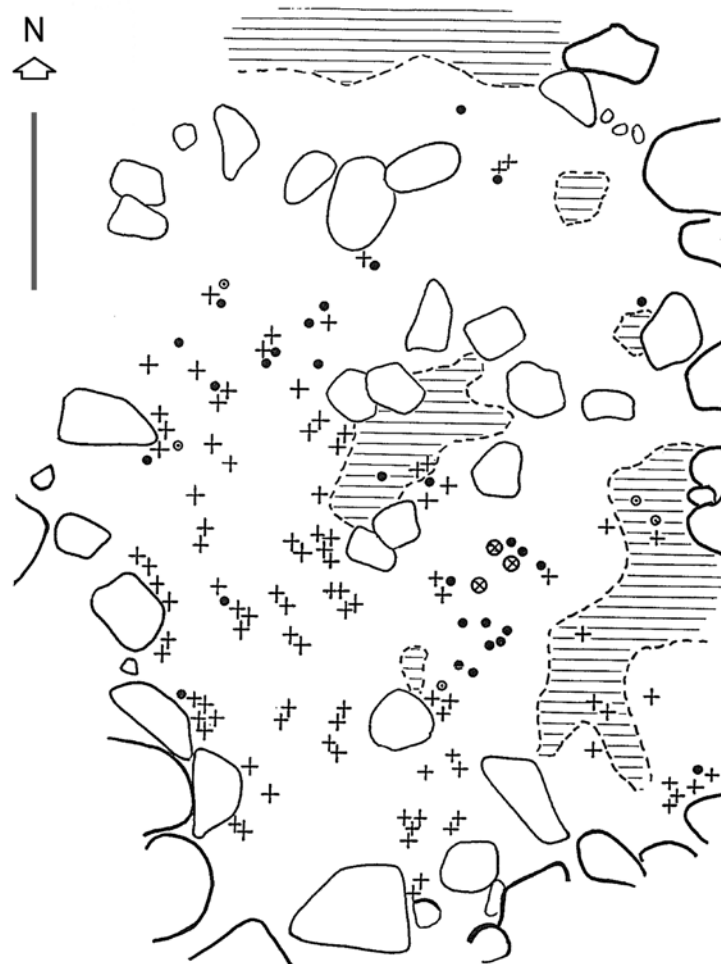


Figure 5.31. GTVK. Hut A. Detail of the excavation of Area f. Scale 500 mm. Distribution of artefacts: ● = flake; dot-in-circle = stone piece; + = shell of *Anadara granosa*; ⊗ = fragments of *Melo amphora* (marine shells were subject to radiocarbon analysis). Diagonal lines represent soil.

Table 5.13. GTVK Huts A and B: Shell samples. Un-calibrated radiocarbon results.

GTVK	sample context			material	laboratory code	uncalibrated 14C ages BP	collector / laboratory comment
GTVK-1	Hut A	centre of hut	surface	<i>Anadara granosa</i>	LY-3610	2730±110	
GTVK-2	Hut B	southern part of hut	surface	<i>Anadara granosa</i>	LY-3611	2680±150	
GTVK-3	S.17	between carved blocks	surface	<i>Anadara granosa</i>	LY-3612	3670±140	previously 'LY-3615'

Table 5.14. GTVK Huts A and B: Shell samples. Calibration input data.

laboratory code	sample code	14C BP (CRA)	14C SD lab error or added years variance f**2	age span years	d13C per mil	d13C SD years	Delta R years	Delta R SD years	marine carbon percentage	cal curve
LY-3610	marine	2730	100	1	0	0	52	35	100	3
LY-3611	marine	2680	150	1	0	0	52	35	100	3
LY-3612	marine	3670	140	1	0	0	52	35	100	3

Table 5.15. GTVK Huts A and B: Shell samples. Calibrated radiocarbon results generated by calib611.

laboratory code	radio-carbon age	Delta R±SD years	calibration data set	one sigma ranges	rel. area	two sigma ranges (rounded)	rel. area
LY-3610	2730±100	52±35	marine 09.14C	cal BP 2260: cal BP 2570	1	cal BP 2130: cal BP 2690	1
LY-3611	2680±150	52±35	marine 09.14C	cal BP 2110: cal BP 2530	1	cal BP 1950: cal BP 2710	1
LY-3612	3670±140	52±35	marine 09.14C	cal BP 3350: cal BP 3695	1	cal BP 3175: cal BP 3895	1



Figure 5.32. GTVK. Habitation evidence. Hut A (upper) and Hut B (lower). Pole scale: 1 m. External views of the rings of stones. Note the light colour of certain blocks that were dug up from the centre of the habitation area and thrown to the exterior where they accumulated to form the ring.

The results are all statistically highly probable as indicated by the factor in the ‘relative area’ column (Table 5.15). The age estimates include rounded cal BP age ranges at one and two standard deviations. These data indicate an age for the deposit of the shells on the surface of the hut floors within the

period of about 2700–1950 cal BP (two standard deviations) or about 2400 years ago. The value (about 3500 years ago) for the third age estimation indicates that the GTVK site was already frequented from the early phase of the *Anadara* period (Layer I of SKV midden).

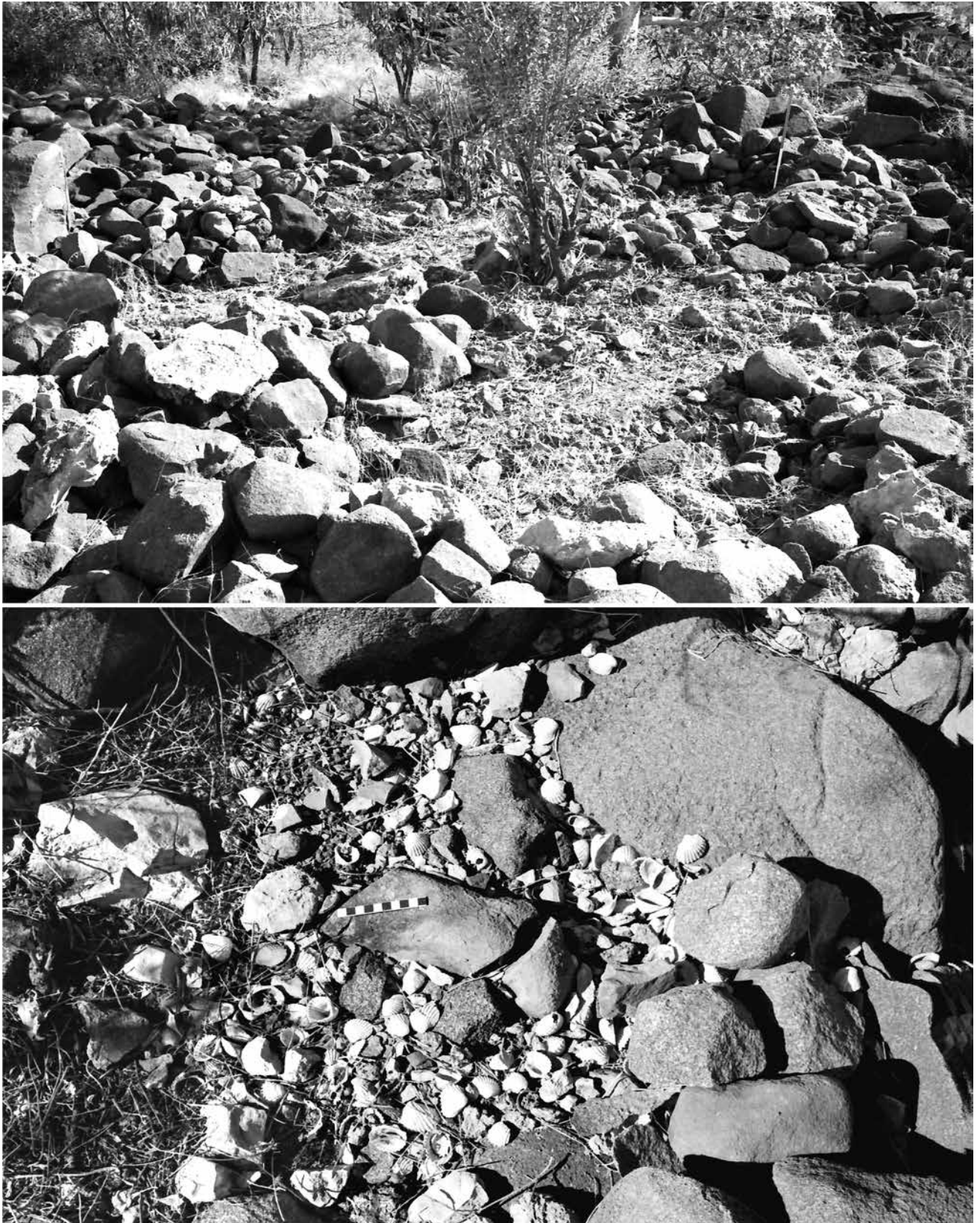


Figure 5.33. GTVK. Evidence of habitation. *Upper:* internal view of Hut A, detail of room (f) where *Anadara* shells were collected for radiocarbon analysis. Pole scale (*upper right*): 1 m. *Lower:* Hut B: shells collected for radiocarbon analysis. Scale 100 mm.

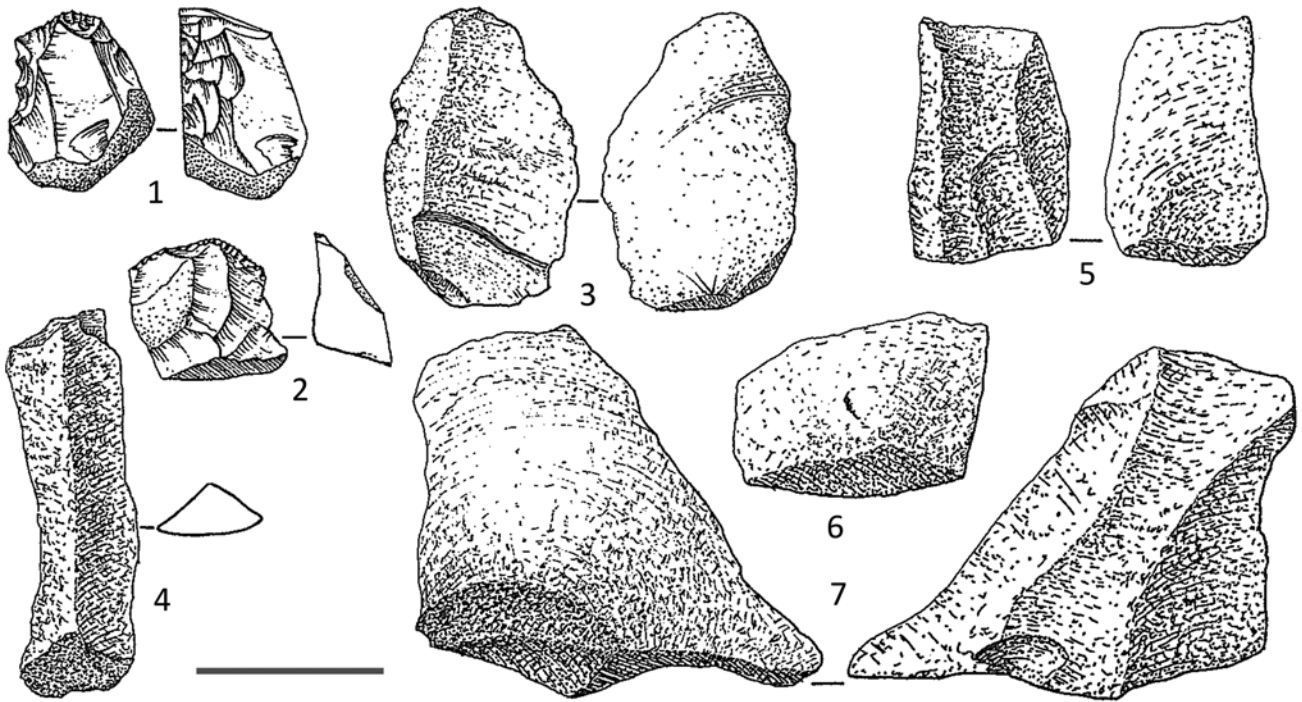


Figure 5.34. GTVK. Hut A. Some artefacts recovered during the excavation; (1) steep-edged scraper in chalcedony; (2) scraper in black granophyre; (3–7) flakes in local gabbro. Scale 30 mm

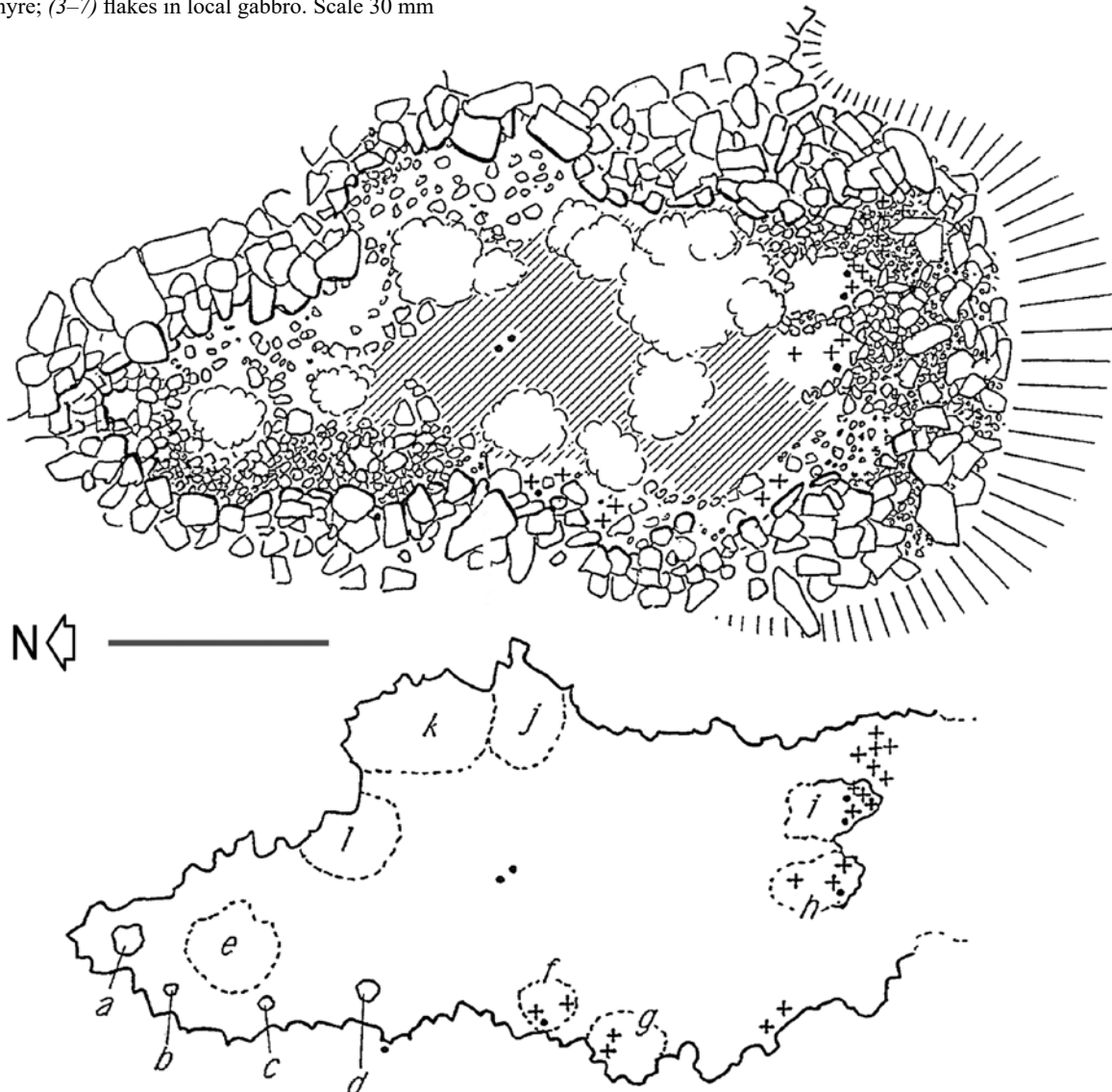


Figure 5.35. GTVK. Hut B (not excavated). Scale 4 m. *Upper:* several small apses (e–l) are visible on the edge near the ring of blocks. Traces of occupation are: + = shell of *Anadara granosa*; • = stone artefacts. The centre occupied by a grassy surface was probably a central common space. *Lower:* simplified map of Hut B. Key: a, b, c, d = probable postholes; e–l = lateral apses with tools.



Figure 5.36. GTVK. Standing stone at the southeastern edge of the site. Scale 100 mm. *Upper:* view toward west showing Fenner Creek mudflats. *Lower:* closer view.

Standing stone

In the southeast of the site, held between two carved blocks (GTVK-65 {p. 486} and -66 {p. 486}), a long stone, 150 mm in average width, and 70 mm in average thickness,

extends 600 mm above the ground. It is fixed in a fissure and wedged in by stones (Figs 5.1 and 5.36). This small standing stone is similar to those recorded in southern GTVW, which is situated 150 m to the east.

Conclusions about the Kangaroo Group

The cluster of petroglyphs named ‘The Kangaroo Group’ (GTVK) is situated on the broken heights dominating southern Gum Tree Valley. Here the petroglyphs are numerous and they form a distinct concentration contained within a rectangular area of 80 × 40 m. Five distinct secondary petroglyph sub-groups (Groups I to V) were defined within the Kangaroo Group.

- A total of 284 motifs were recorded within GTVK. Of this assemblage, as shown in Table 5.1, approximately one-tenth each are representations of ‘human’ figures, various ‘animals’, and indeterminate motifs. Representations of eggs (mainly of the turtle) are the dominant motifs, accounting for more than 35% of the total of the graphic units, with geometric forms (arciforms are the majority) more than a quarter of the total, while ‘animal prints’ are less numerous (about 6%). Thus, the importance of the depictions of marine turtles and their eggs seems established.
- Most elements of the GTVK petroglyph assemblage are depicted in association with other motifs; isolated (single) images are unusual. Elements that show the strongest tendency to associate are the depictions of turtles and prints and certain geometric motifs.
- Most often the petroglyphs are found on horizontal surfaces. Generally, they do not catch the visitors’ attention. The index of visibility for these motifs is zero or extremely low. Only ‘human’ figures—located on vertical and sub-vertical block faces—usually confront a visitor entering this place.¹²
- Seventy percent of petroglyphs were made by linear or infill pecking, while superficial pecking only was used in 10% of cases.
Finally, 20% of motifs have been re-marked, which makes the rate of renewal very high in comparison to other areas of the Gum Tree Valley complex. It is mainly ‘prints’ and ‘eggs’ which have been re-carved and more rarely ‘human’ figures or geometric forms.
- The study of patination revealed a clear preponderance of deep patinae (<56%). As shown by Fig. 5.24, incidence of average patination (Patina 2) is relatively numerous (31%), and fresh-appearing petroglyphs (recently carved and re-marked old motifs) represent nearly 13% of the assemblage, which is considerable in comparison with GTVS (which has 9.3% of Patination 3) and especially with GTVW (also on the hilltop) where only very few (about 1%) are ‘fresh’. This study reveals an old and long utilization of the site during which there was a steady decline in geometric motifs and ‘human’ figures, an increase in ‘animal’ prints, and a continuation of representations of ‘eggs’ seemingly dominant at all periods.

- The picture of the distribution of petroglyphs according to their state of patination shows an interesting phenomenon: during middle and recent phases of use of the site, the living sites (Huts A and B) that were established on the margins of the Group seem to have encouraged more petroglyph making.

The huts are habitation structures with a central focus and lateral, often individual, small rooms. Test-pits that I made here, and materials collected, allowed chronometric dating to around 2400 years before the present. It is the bivalve collectors who built the habitations and who used the site while adding some new petroglyphs.

- The other remains recorded among the petroglyphs include a stone tool assemblage, marine shells and a standing stone at the southeast margin of the Group.
- Ultimately, the characteristics of the site allow comparison of the Kangaroo and Woman Groups. These two important concentrations of petroglyphs are distant from the shore, isolated on the hill tops, away from movement zones and frequent visitation. Both have many depictions of turtles with their eggs, and both have small ‘standing stones’ on their margins. The Kangaroo Group is distinguished from the Woman Group by the presence of living structures that appear to have functioned to bring together small groups of persons who seem to have camped at the site and made new petroglyphs there.

Considering all the features of these two sites, GTVK and GTVW, brought to light by my study, it is reasonable to suggest that they were two of those increase sites, called ‘*dalu* sites’ by the last Aboriginal community (Ngarluma) living in this area (Palmer, 1975: 158).

They were probably increase centres for the main food sources—the kangaroo and especially the turtle—bones of which were recovered from the excavation of the Skew Valley midden, mainly in the upper layer (the *Anadara* layer: Chapter 2, Part I: Animals hunted and depicted). The increase rituals may have assisted in the seasonal renovation of the images of the reptiles and their eggs that are carved on top of this hill. From this area, one can overlook the Fenner Creek mud flat where the turtles used to come regularly to lay their eggs (Nathan Sammy pers. comm., 1984). Palmer (1975: 158) wrote that the presence of petroglyphs depicting:

... possible food sources ... [at ‘*dalu* sites’] leads to a tempting conclusion, for which there is not sufficient evidence, that there is a link between the propagation of natural species and the petroglyphs.

This study of the GTVK and GTVW ‘*dalu* sites’ provides evidence to support Palmer’s observation.

References

- ABRS. 2009. *Australian Faunal Directory*. Canberra: Australian Biological Resources Study. [Accessed 11 April 2011].
<http://www.environment.gov.au/science/abrs>
- Brandl, Eric J. 1978. Human stick figures in rock art. In *Form in Indigenous Art: Schematisation in the art of Aboriginal Australia and prehistoric Europe*, ed. P. J. Ucko, pp. 220–242. Canberra: Australian Institute of Aboriginal Studies.
- Hallam, Sylvia J. 1986. Yams, alluvium and villages on the west coastal plain. *Archaeology at ANZAAS Canberra*, ed. G. K. Ward. Canberra Archaeological Society.
- Isaacs, Jennifer. 1987. *Bush Food: Aboriginal Food and Herbal Medicine*. McMahons Point, NSW: Weldons.
- King, Philip Parker. 1827. Narrative of a survey of the intertropical and western coasts of Australia, performed between the years 1818 and 1822 ... with an appendix containing various subjects relating to hydrography and natural history. London: Murray. [Accessed 30 August 2013].
www.gutenberg.org/ebooks/12046
<https://archive.org/details/narrativeasurve00kinggoog>
- Mulvaney, D. John. 1969. *The Prehistory of Australia*. London: Thames and Hudson.
- Mulvaney, D. John. 1975. *The Prehistory of Australia* (revised edition). Ringwood, Australia: Penguin.
- Palmer, Kingsley. 1975. Petroglyphs and associated Aboriginal sites in the northwest of Western Australia. *Archaeology and Physical Anthropology in Oceania* 10: 152–160.
- Sale, Katharine. 1995. Making the old brighter. Aboriginal re-marking of rock pictures. In *Management of Rock Imagery*, ed. G. K. and L. A. Ward, pp. 137–140. Melbourne: Australian Rock Art Research Association (Occasional AURA Publication 9).
- Stokes, J. Lort. 1846. Discoveries in Australia: with an account of the coasts and rivers explored and surveyed during the voyage of H.M.S. Beagle in the years 1837-38-39-40-41-42-43, by command of the Lords Commissioners of the Admiralty: also, a Narrative of Captain Owen Stanley's visits to the islands in the Arafura Sea. London: T. and W. Boone. [Accessed 30 August 2013].
www.gutenberg.org/files/12146/12146-h/12146-h.htm
- Wright, Bruce J. 1968. *Rock Art of the Pilbara Region, North-west Australia*. Canberra: Australian Institute of Aboriginal Studies.

Endnotes

- As in other chapters, a motif may be illustrated in an accompanying text figure (e.g., Fig. 5.5, item 13), and/or in the appendix following the relevant chapter (e.g., GTVK-13 {p. 461}) arranged more-or-less in serial number order—Editors.
- Examples of various motifs are included in the text figures. Illustrations of many petroglyphs prefixed 'GTVK-' are provided in the Appendix following this report. Some motifs—identified, numbered, studied, traced in detail, photographed, located on maps, and sometimes included in computations reported in Lorblanchet's study—are neither included in text figures nor in the illustrative appendices accompanying each chapter due to the large number of petroglyphs at each site—Editors.
- Qualification of use of the term 'human prints': (a) These are not 'hand prints' comparable to the ubiquitous pictograms found throughout Australia (and widespread throughout the world) that are produced by blowing pigment across a hand (also done with other items such as a boomerang), or made by pressing a hand wet with pigment onto a shelter or cave wall. (b) Rather, in the context of this discussion of Dampier petroglyphs, 'human hand print' and 'human foot print' are shorthand terms for representations of the hand/s or foot/feet of a 'human'. (c) Since they are most often the depiction of part of the integral anatomy of a being, they are qualitatively different from the 'animal prints' discussed subsequently in each chapter, the 'kangaroo track', 'bird print' and 'turtle track', which represent simply the 'footprint' left in the soft ground by a passing animal—Editors.
- Representations of turtles, their tracks and eggs are discussed further in Chapter 6 GTVW—Editors.
- Pleuronectes*: a genus of fish in the Pleuronectidae family, a flounder, a plaice-like fish; habitat sandy-bottom. *Sparids*: fish of the bream family Sparidae; marine and freshwater; habitat is seagrass beds and sandy bottoms (ABRS, 2009)—Editors.
- The range and specific characteristics of carving techniques are discussed in greater detail in Chapter 4 GTVE and Chapter 7 GTVT—Editors.
- Re-marking (renovation) is discussed in detail in Chapter 3 GTVS, and extensively in Chapter 4 GTVE—Editors.
- About Gossen 'Mastersix' and 'Profi-flex' there is a further note in the 'General Introduction'—Editors.
- The character and analytical role of the 'visibility index' or 'index of visibility' is discussed in greater detail in Chapter 7 GTVT—Editors.
- For example, ABRS (2009)—Editors.
- Archaeological identification of habitation areas, living floors, house structures is rare in Australia. King (1827: 43) mentioned seeing bush humpies on, probably, Intercourse Island, and Stokes (1846: 169) commented on the presence of bush huts; Hallam (1986) has discussed archaeological evidence of habitations in the southwest coastal region—Editors.
- The terms 'sub-horizontal' and 'sub-vertical' designate rock surfaces that are approximately horizontal or vertical with respect to their position in the landscape—Editors.

Chapter 5—Appendix

Recordings of the Petroglyphs of the Gum Tree Valley Kangaroo Group (GTVK)

In order to define the orientation of each figure, on each recording are indicated: (a) the north orientation when it is a horizontal panel on top of a slab, and (b) the vertical orientation (an arrow with a 'V') when the surface is close to the vertical. Unless otherwise indicated, all scales represent 10 mm.

GTVK-1



GTVK-1

The Kangaroo panel

Length of block 1850mm

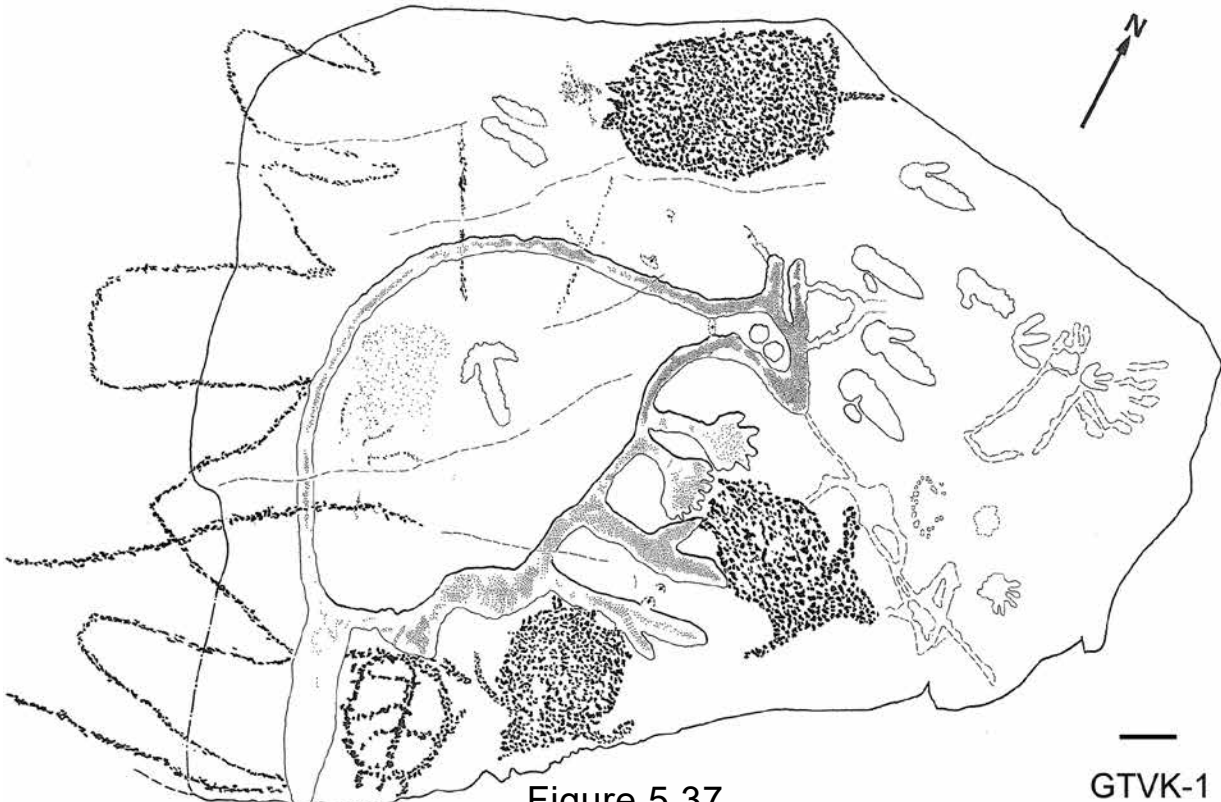


Figure 5.37

GTVK-1

GTVK-2

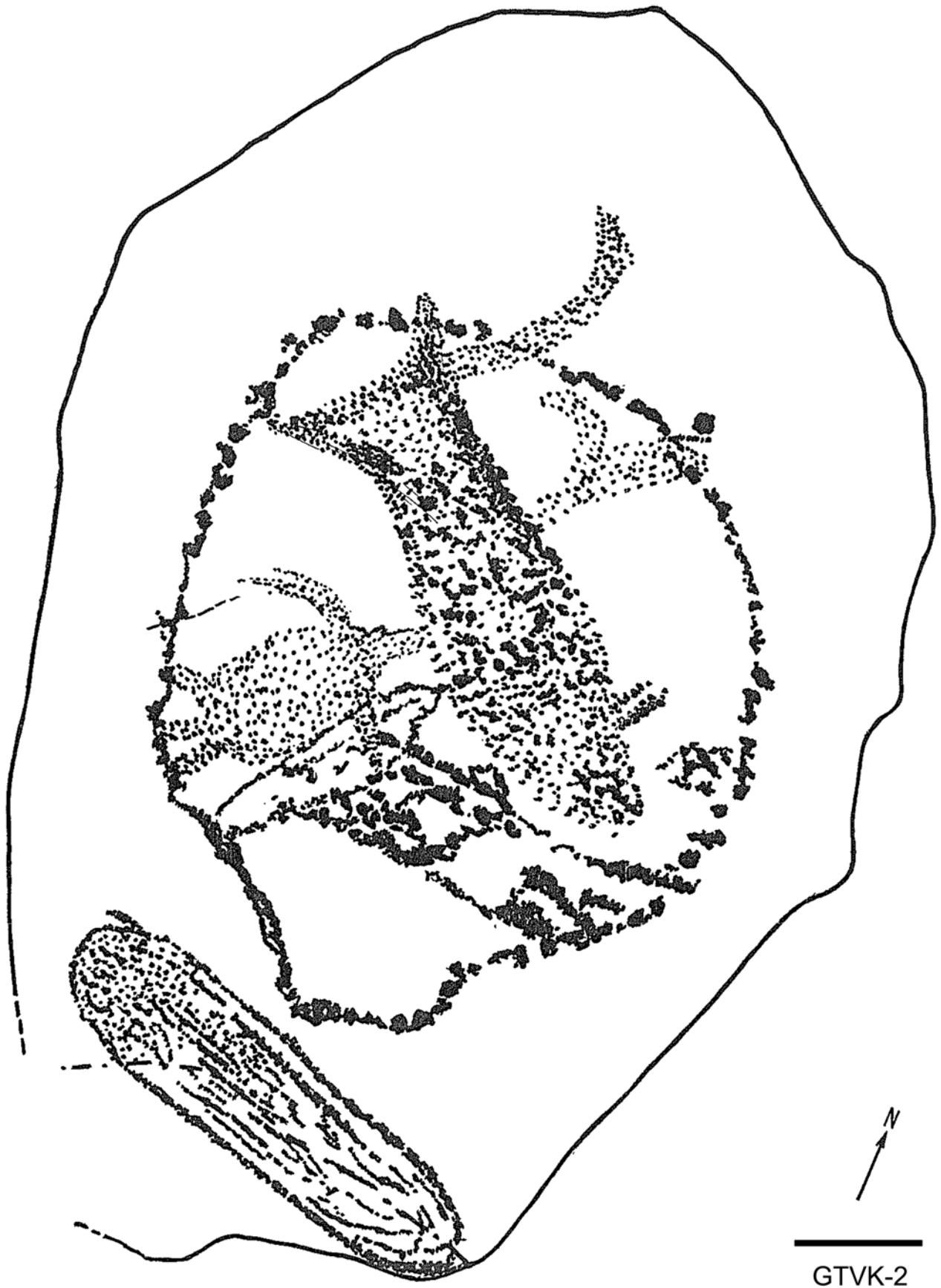


Figure 5.38

GTVK-3+4

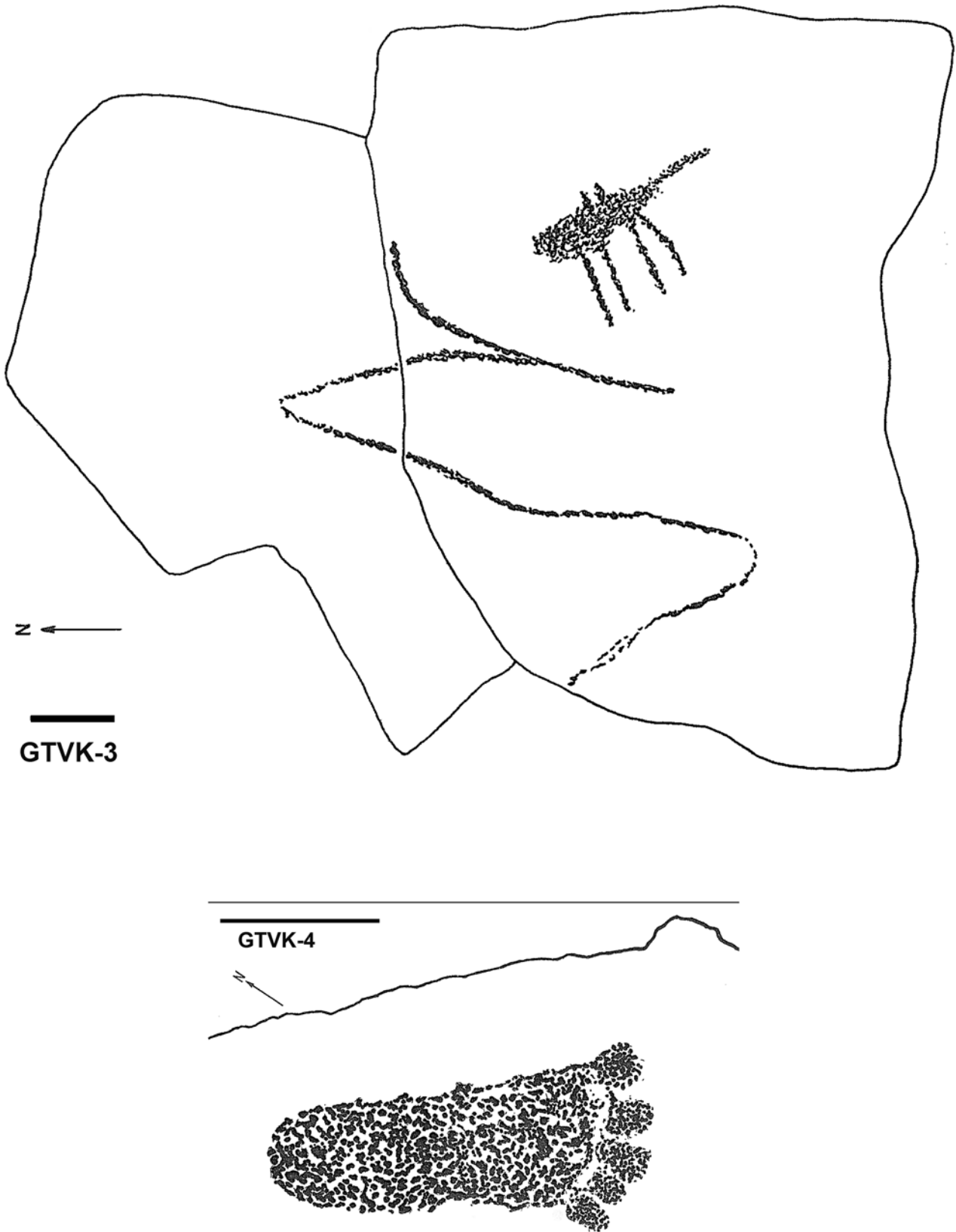


Figure 5.39

GTVK-5+6

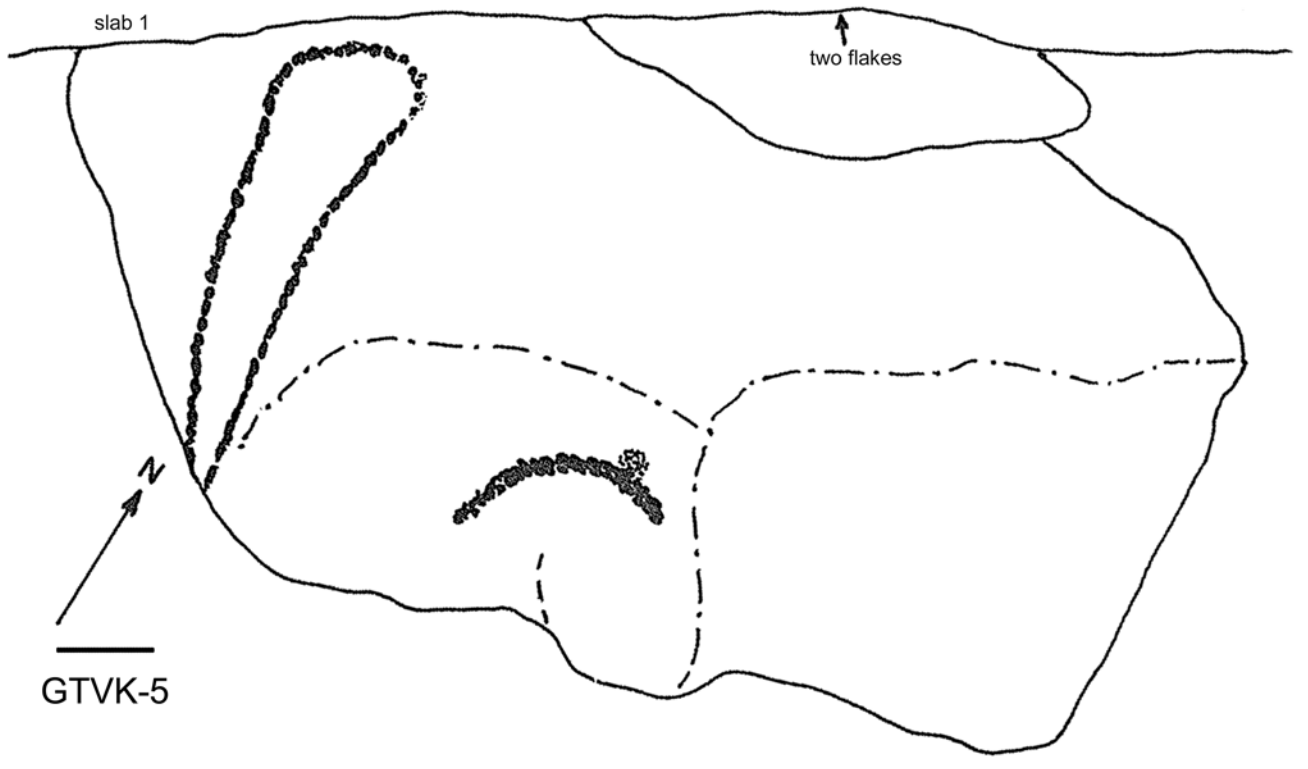


Figure 5.40

GTVK-7+12

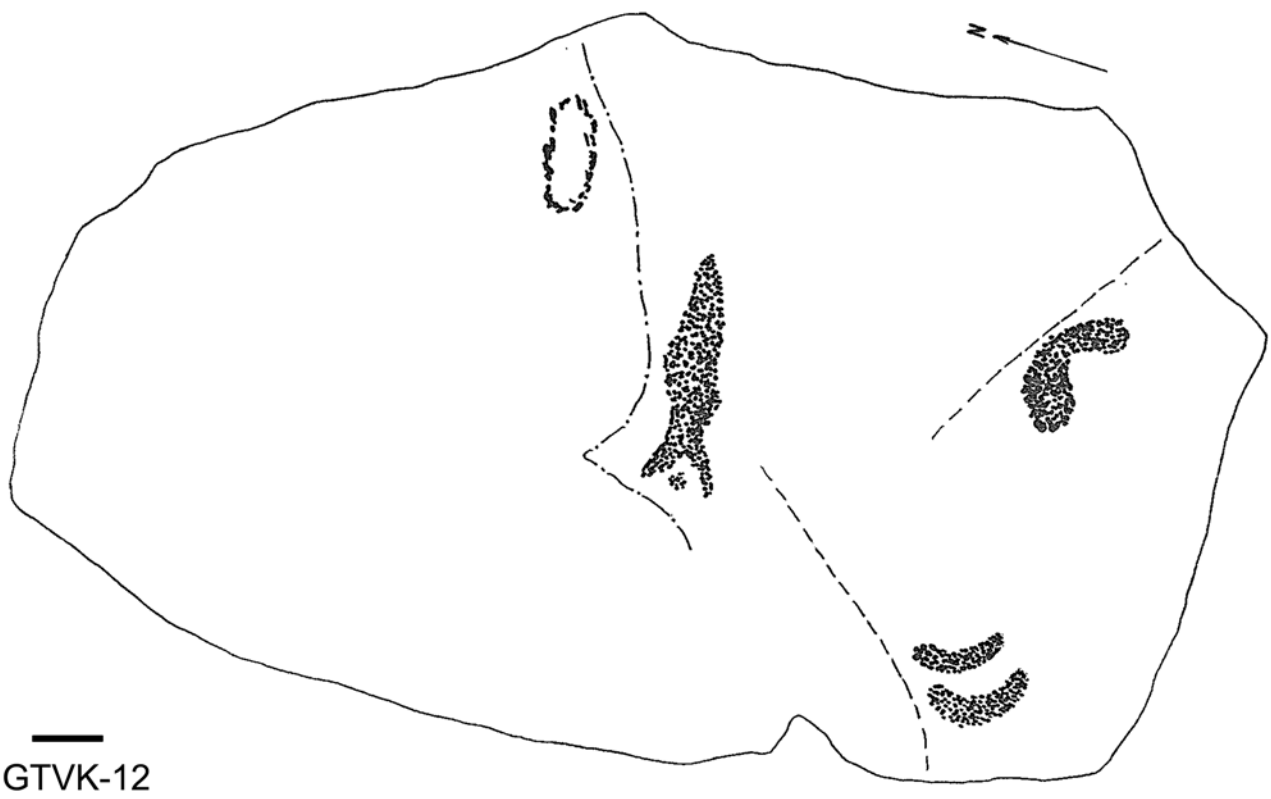
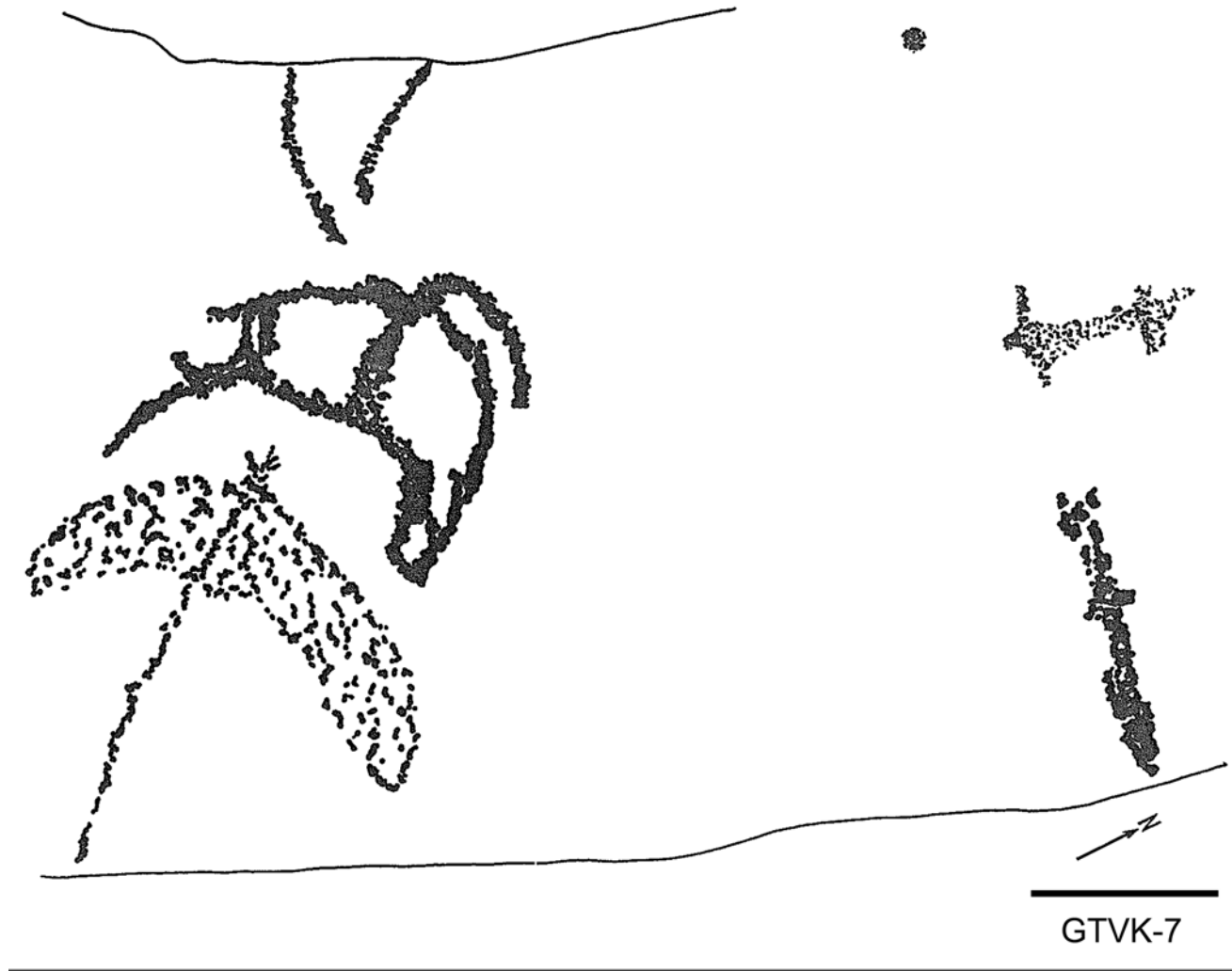


Figure 5.41

GTVK-8+10

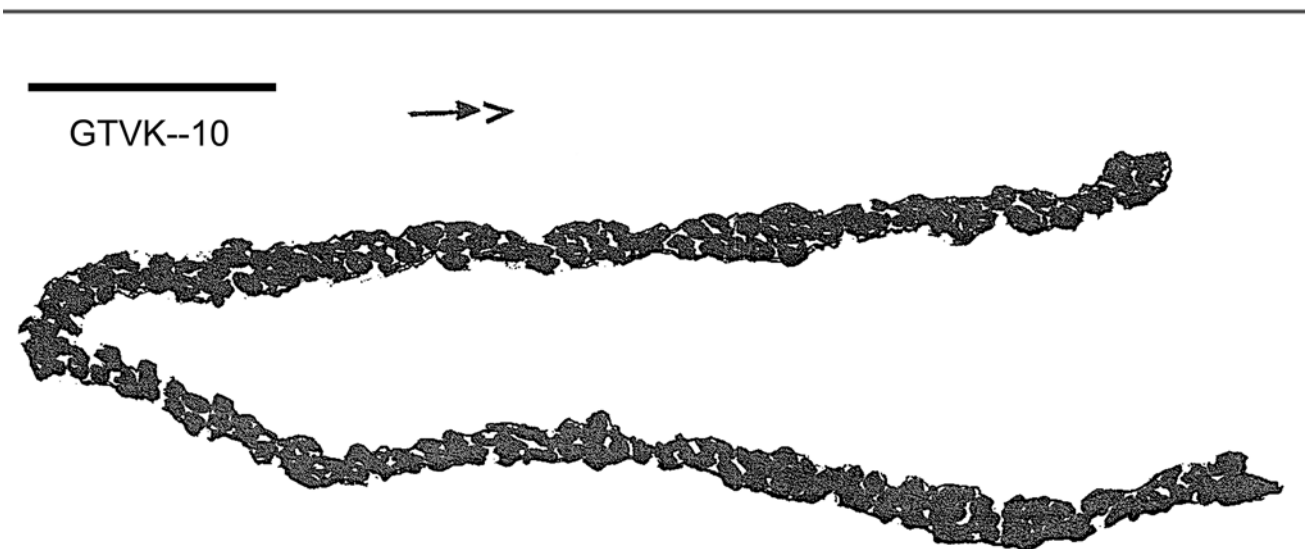
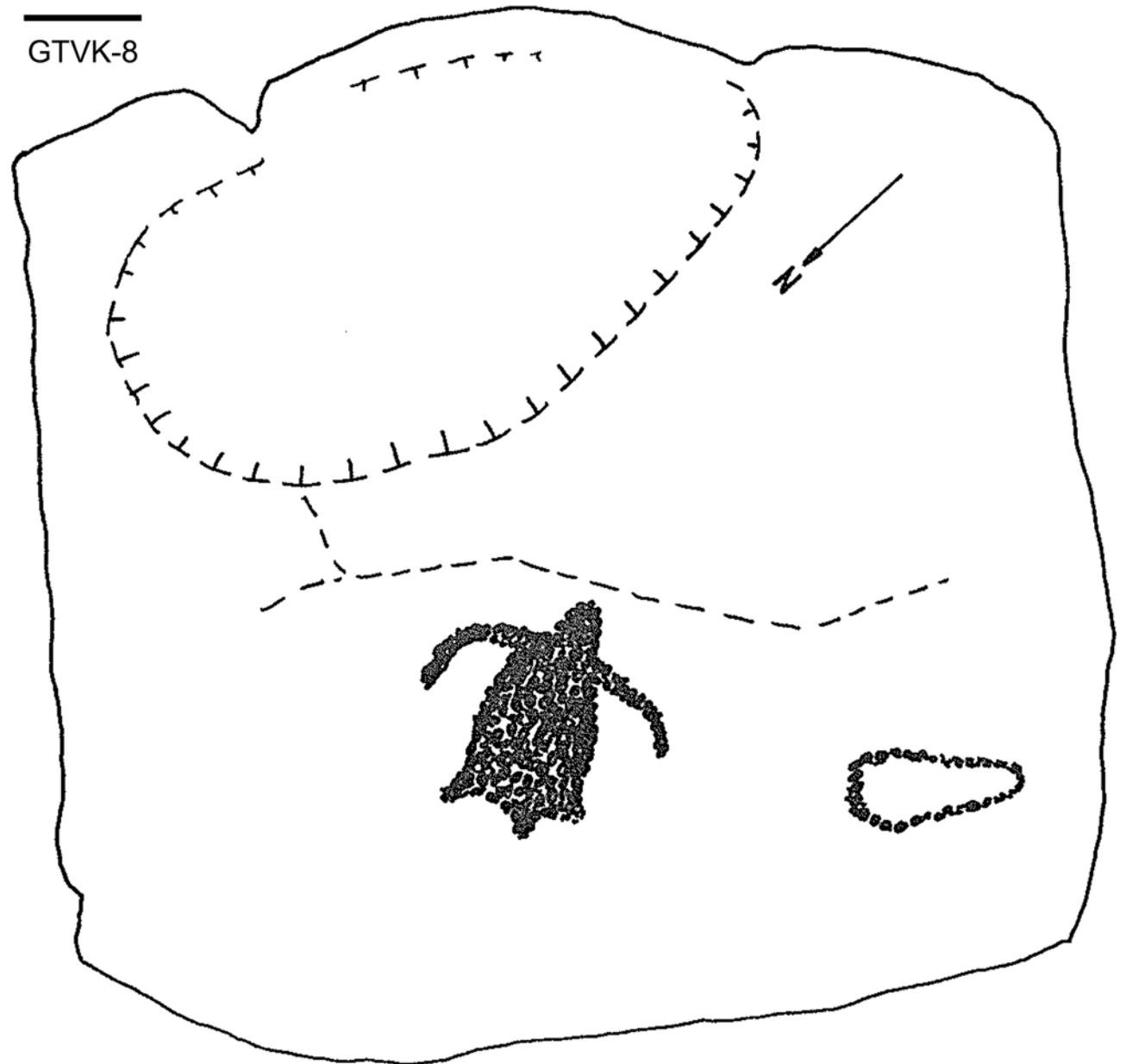


Figure 5.42

GTVK-11

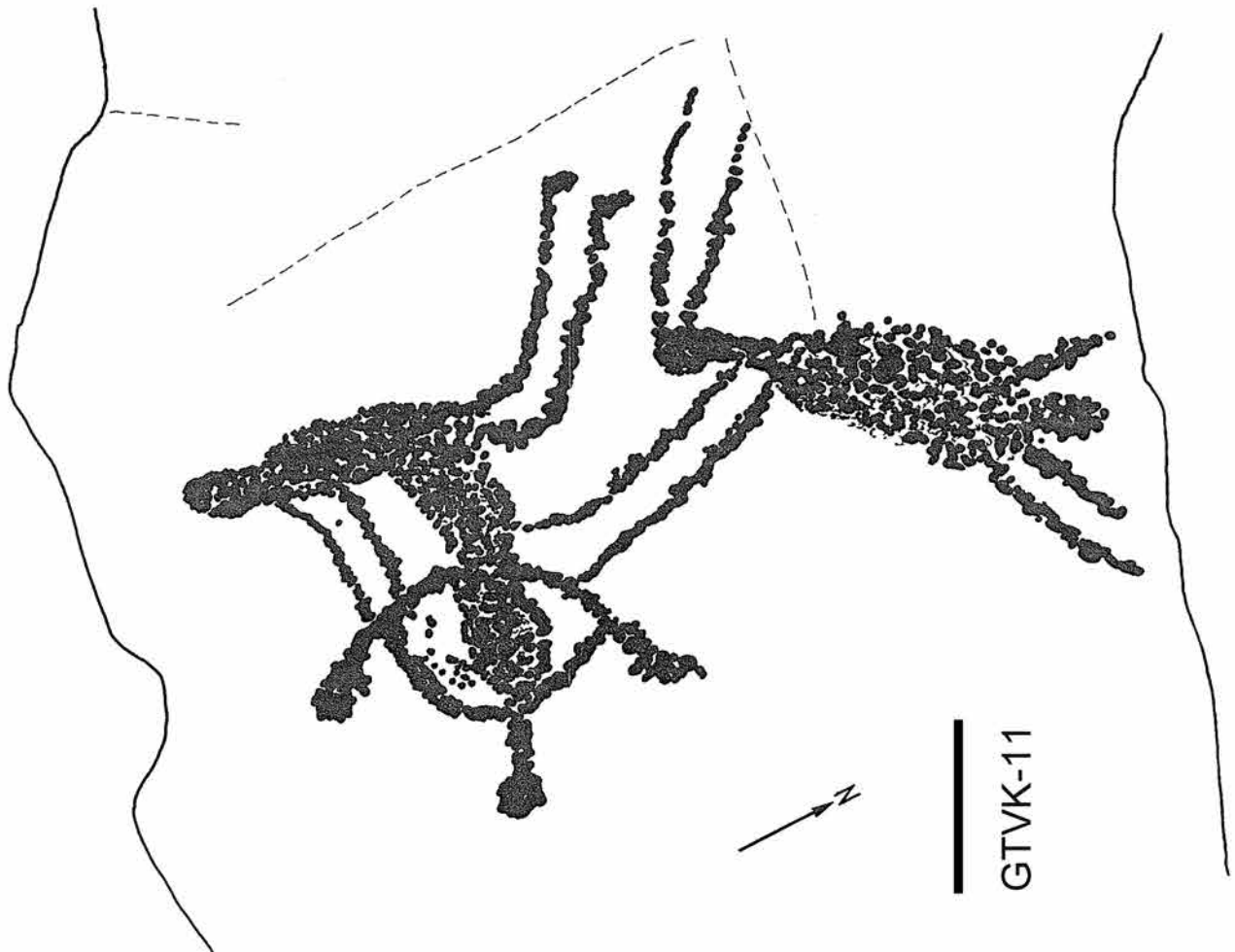


Figure 5.43

GTVK-13+15

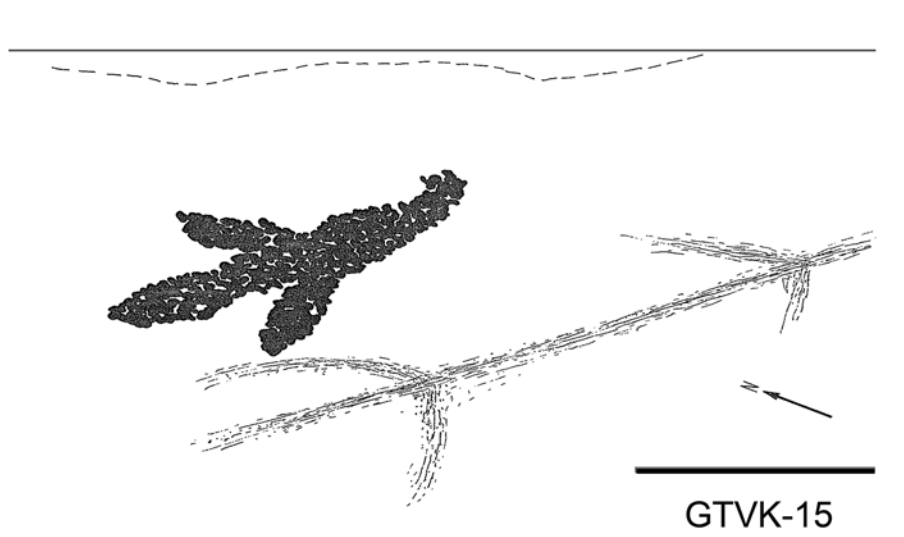
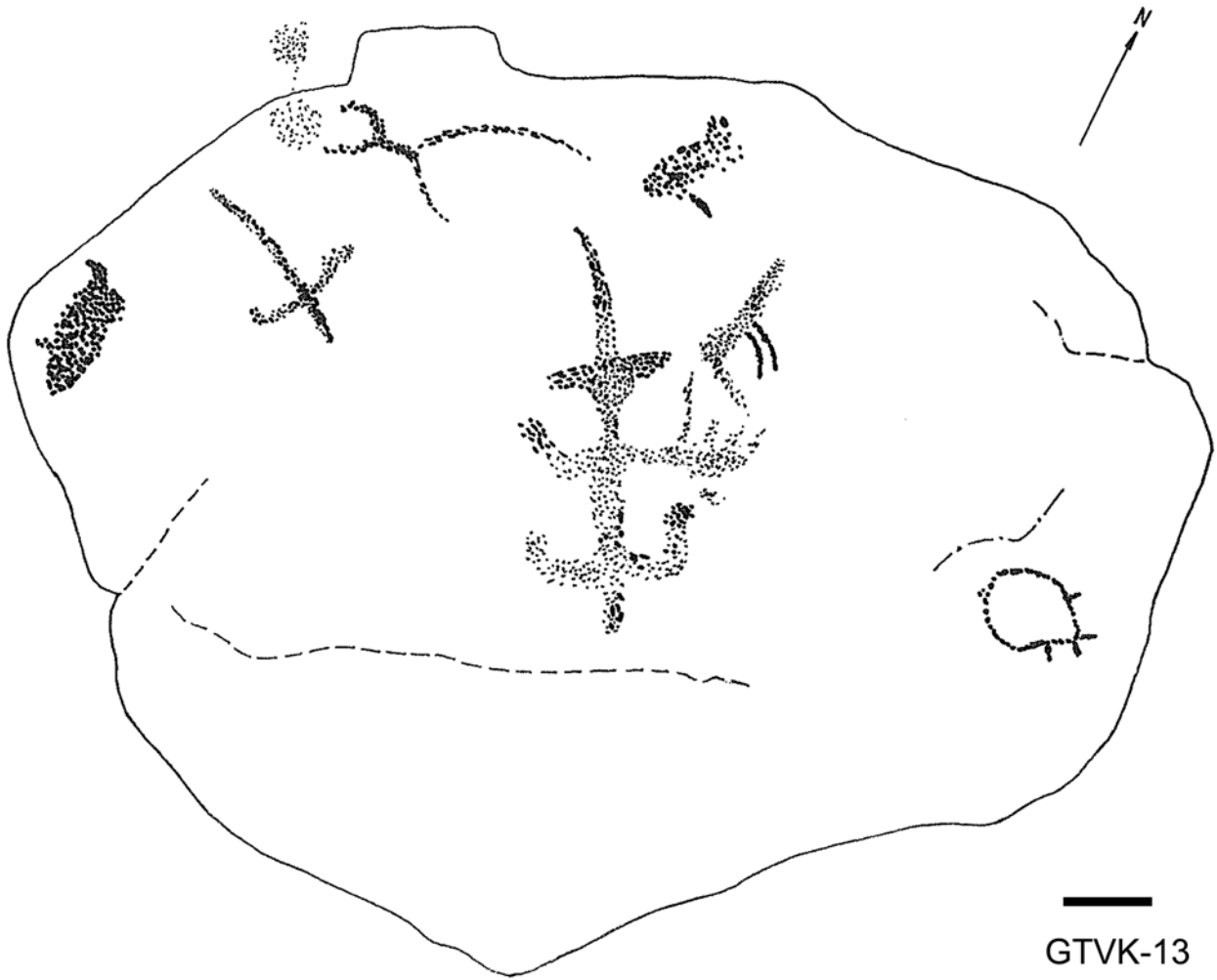


Figure 5.44

GTVK-14+18

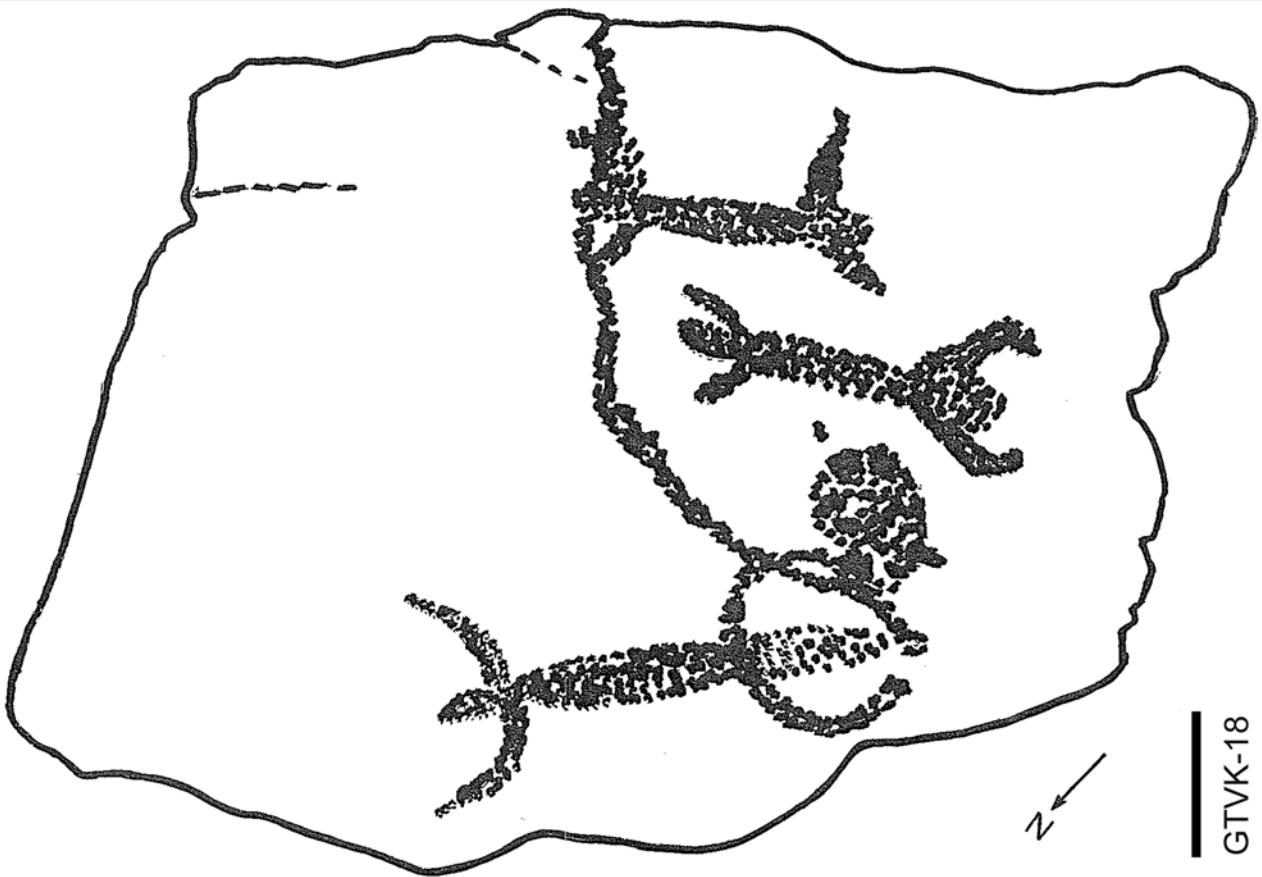
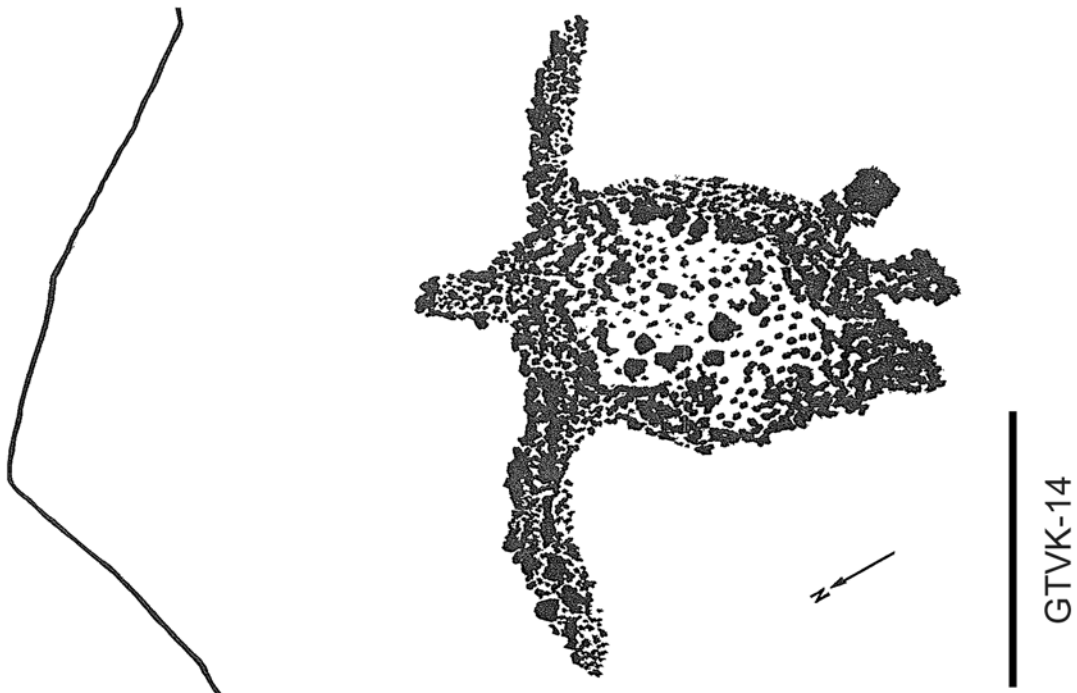


Figure 5.45

GTVK-17

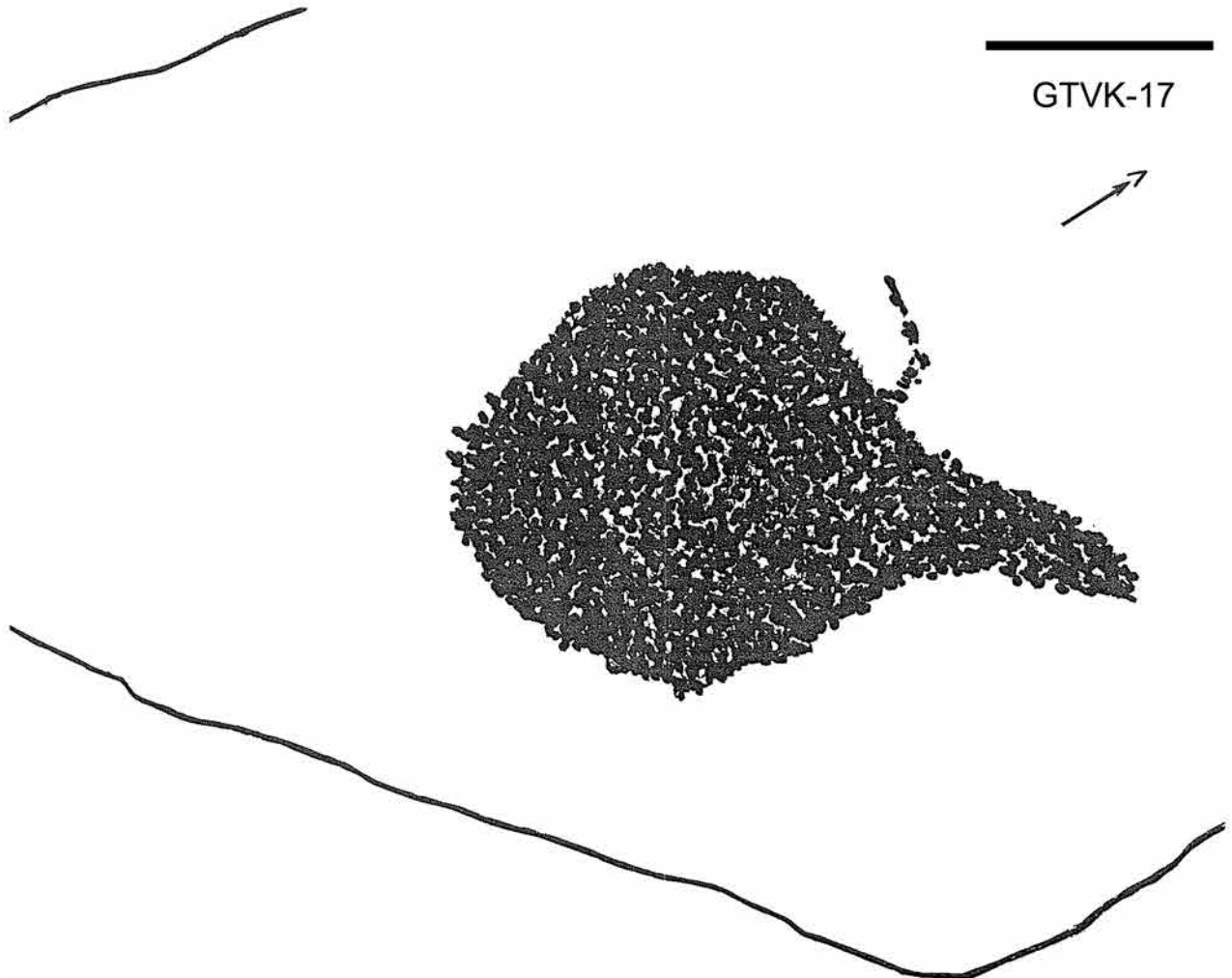
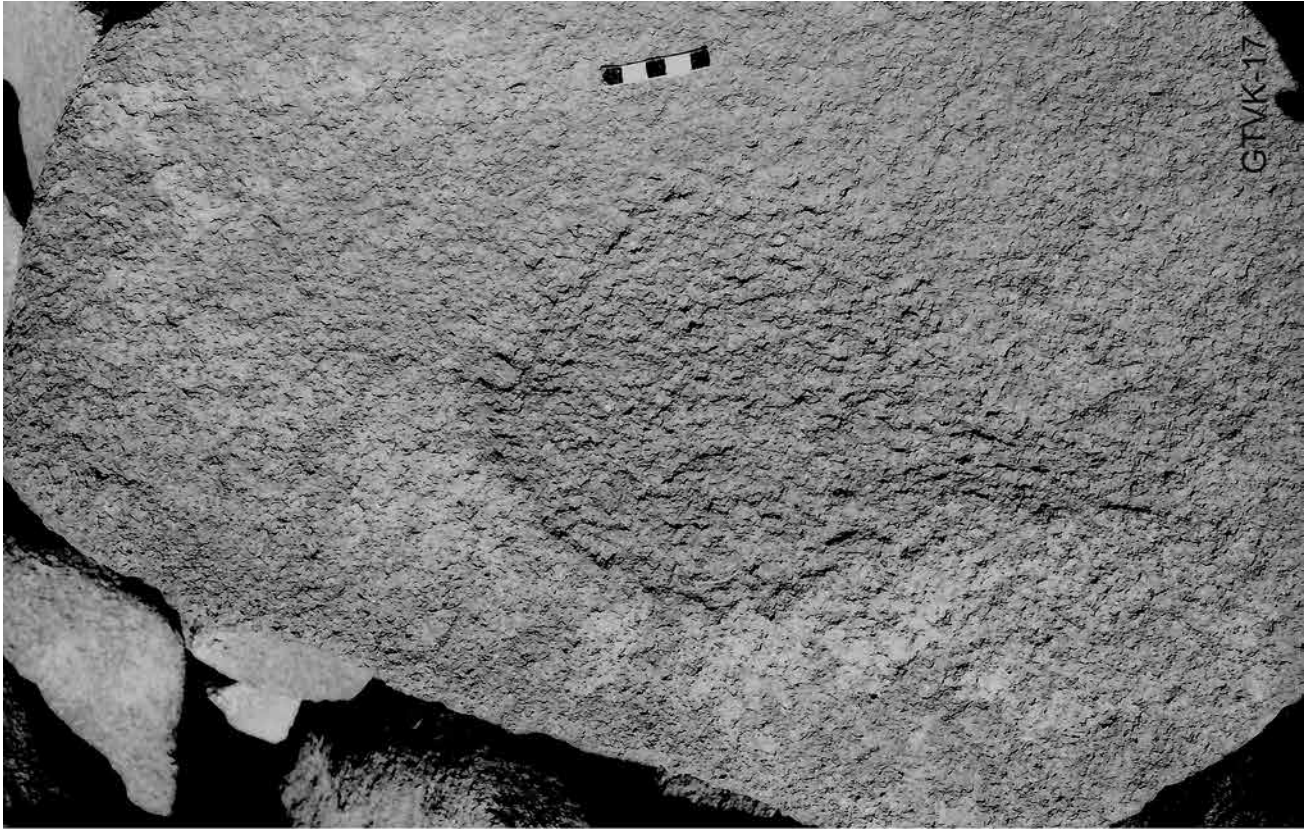


Figure 5.46

GTVK-19

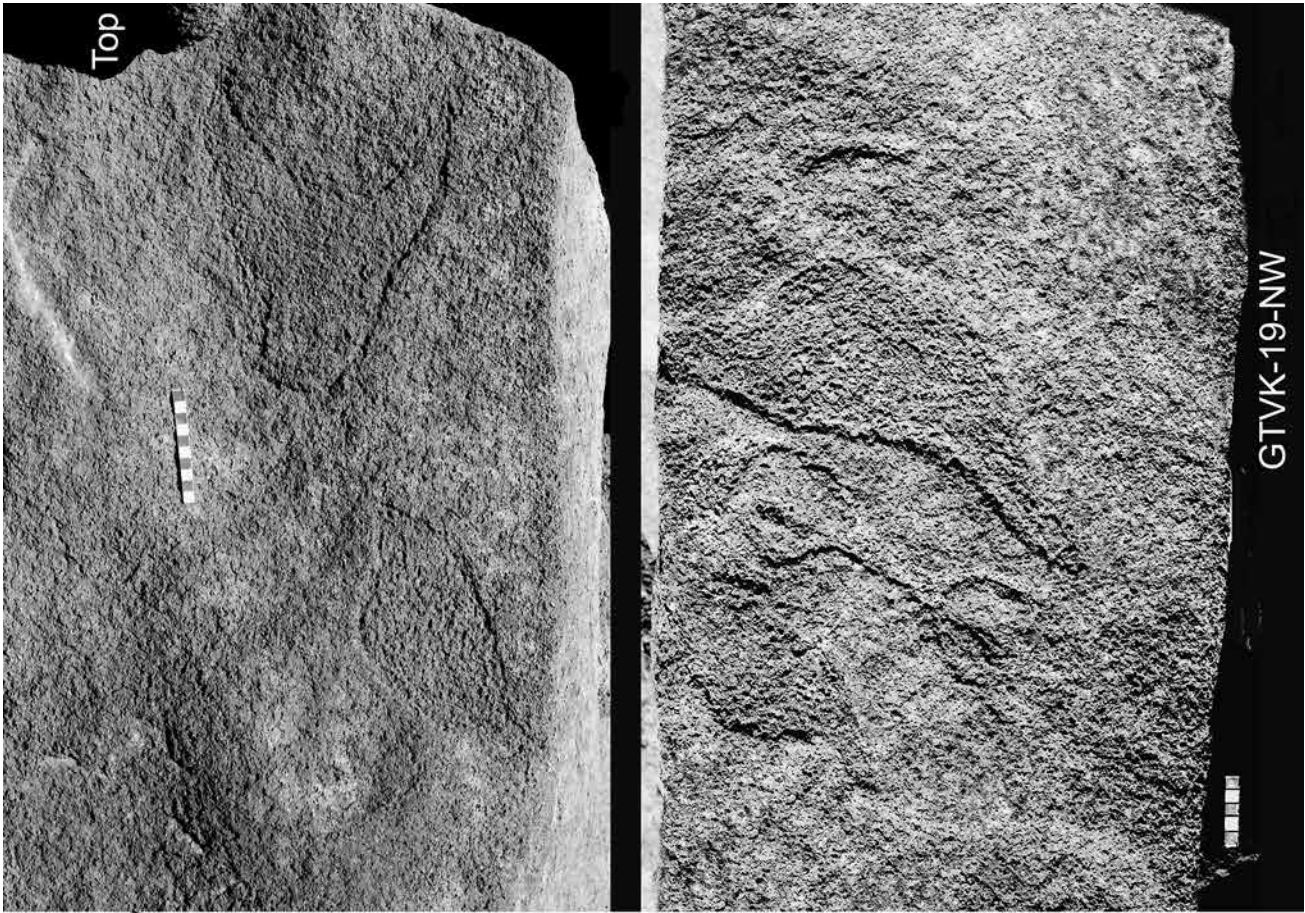


Figure 5.47

GTVK-20+21

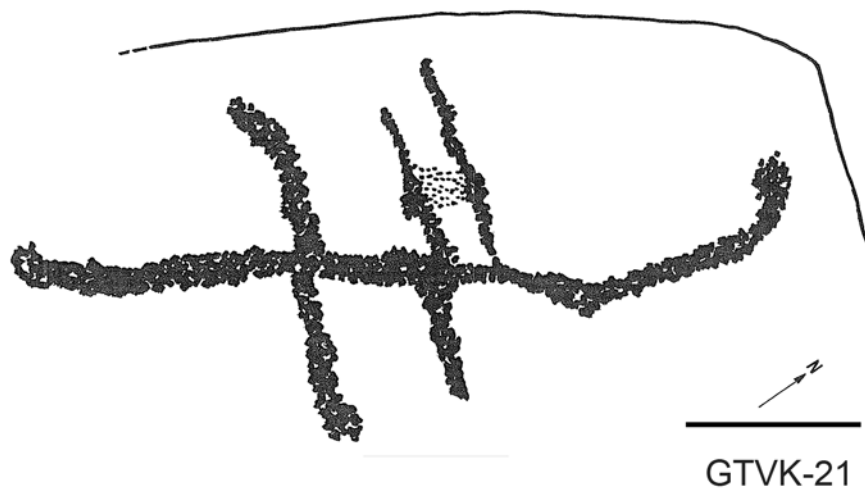
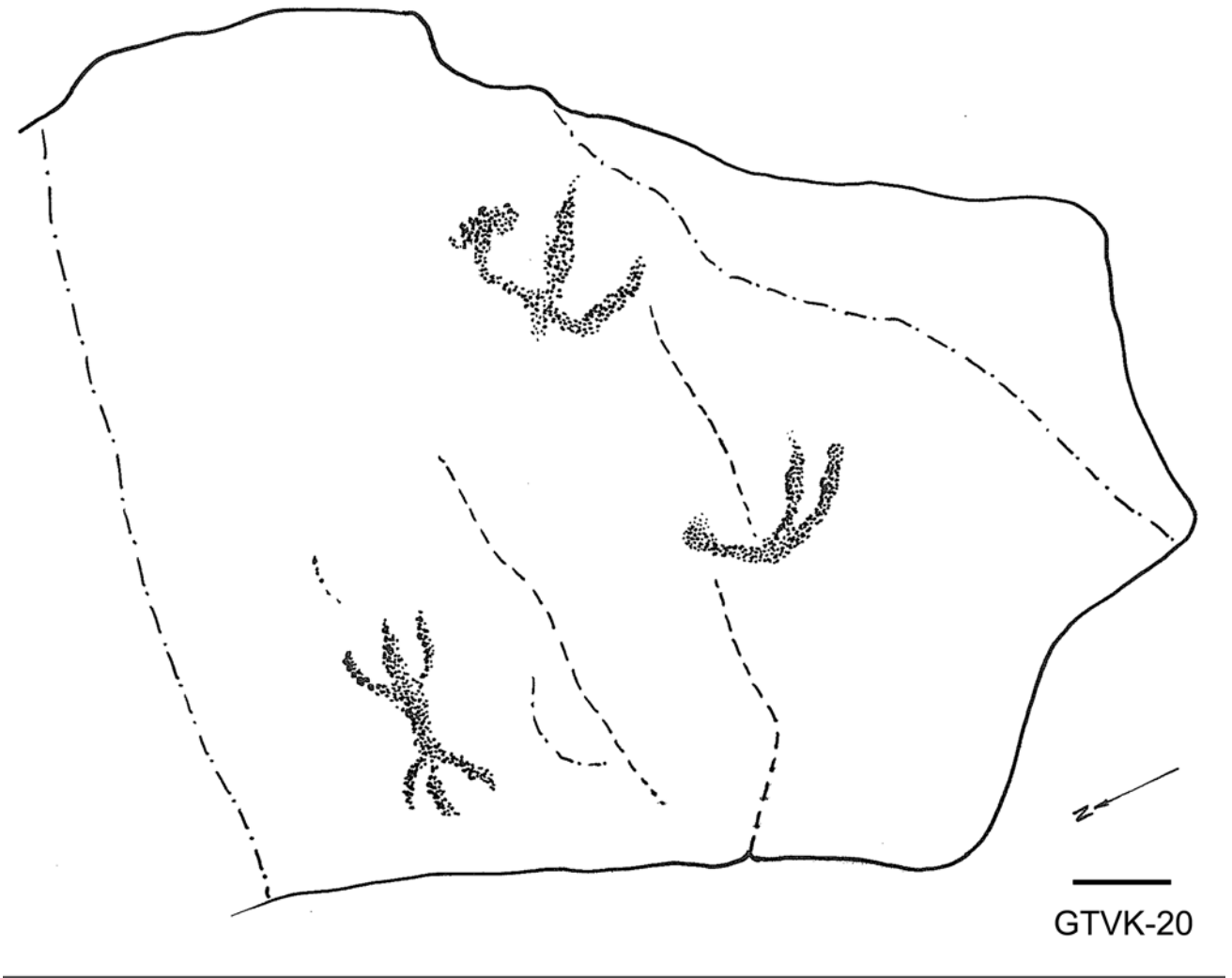


Figure 5.48

GTVK-22+25A

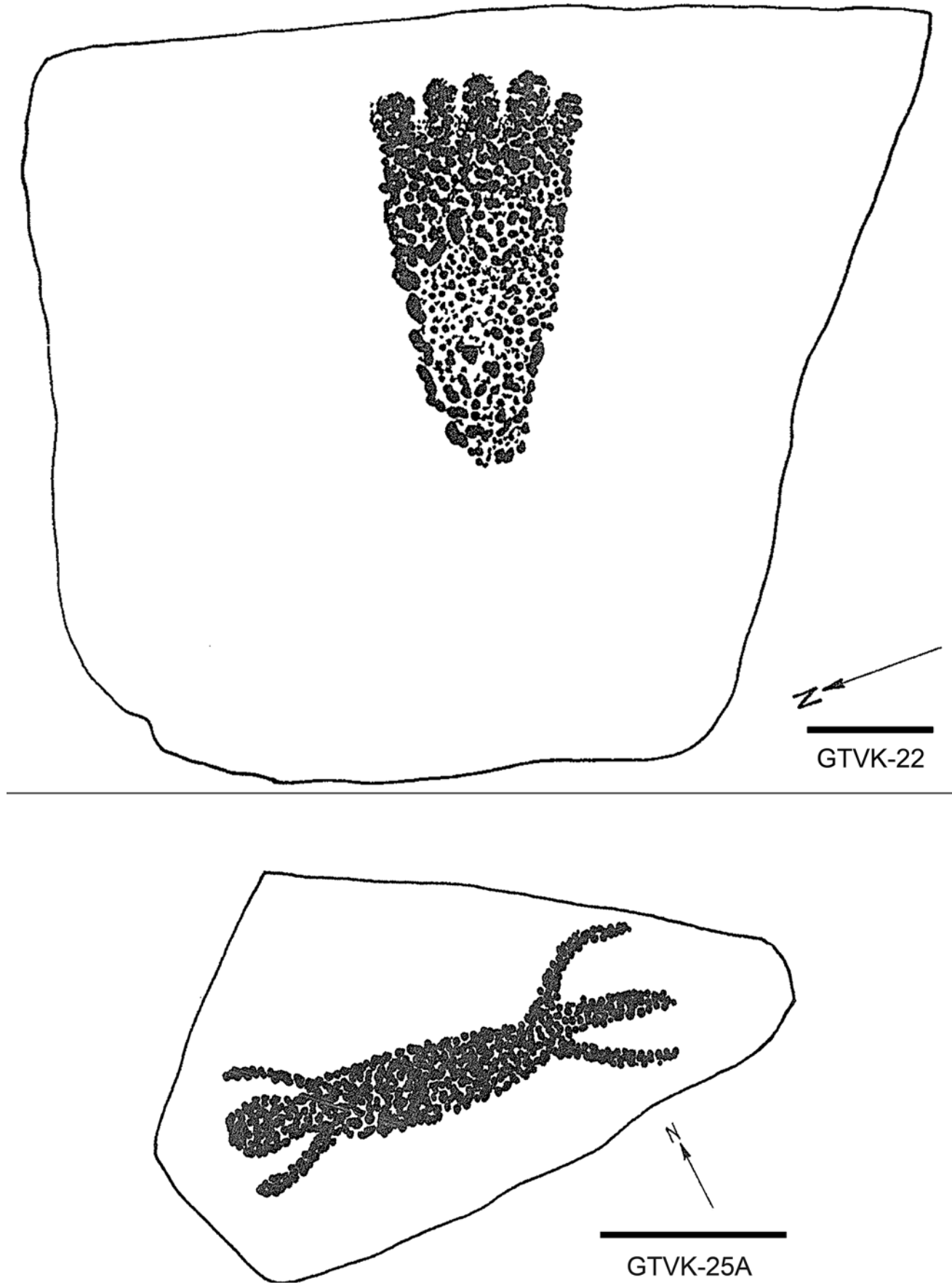


Figure 5.49

GTVK-23+24

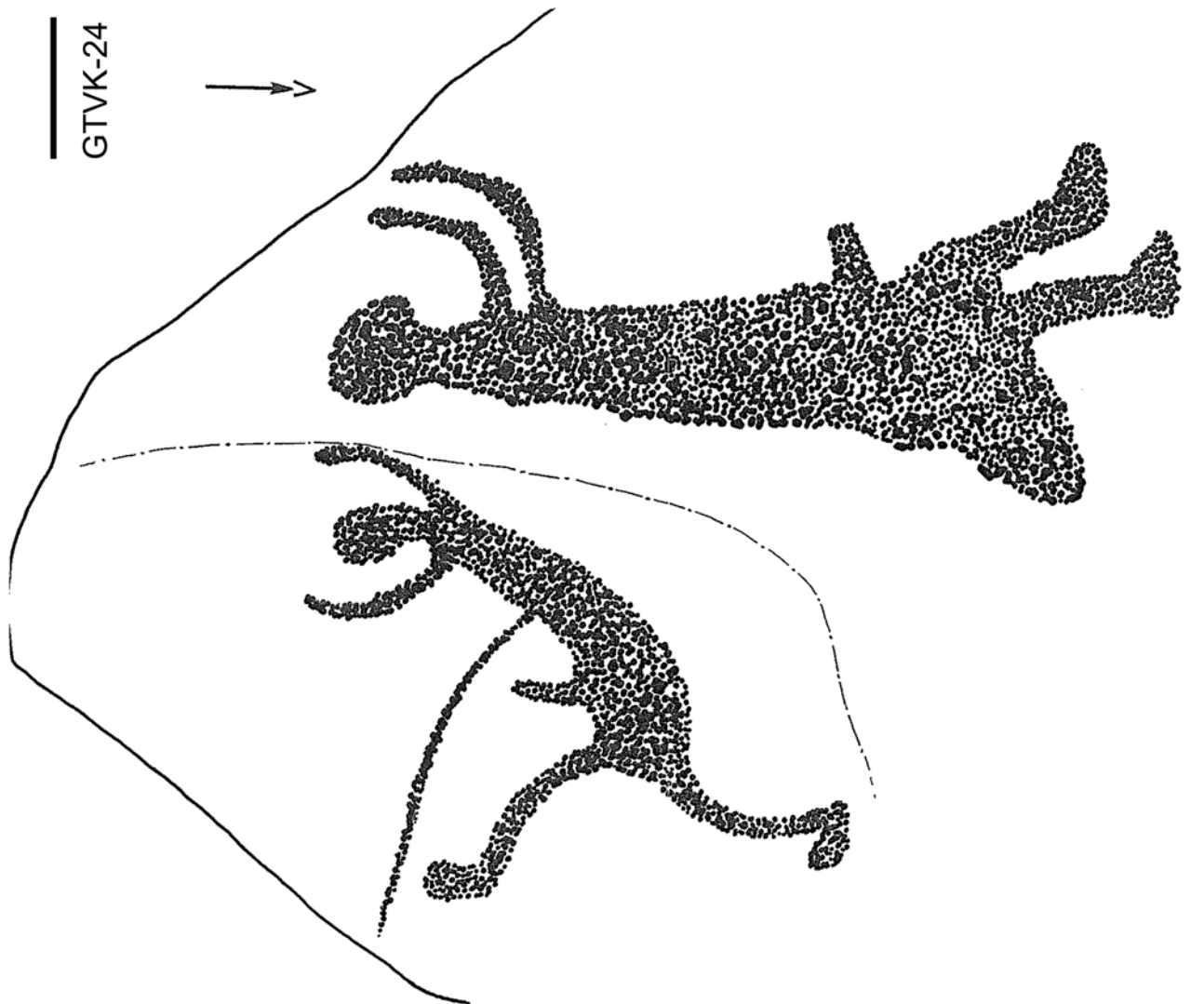
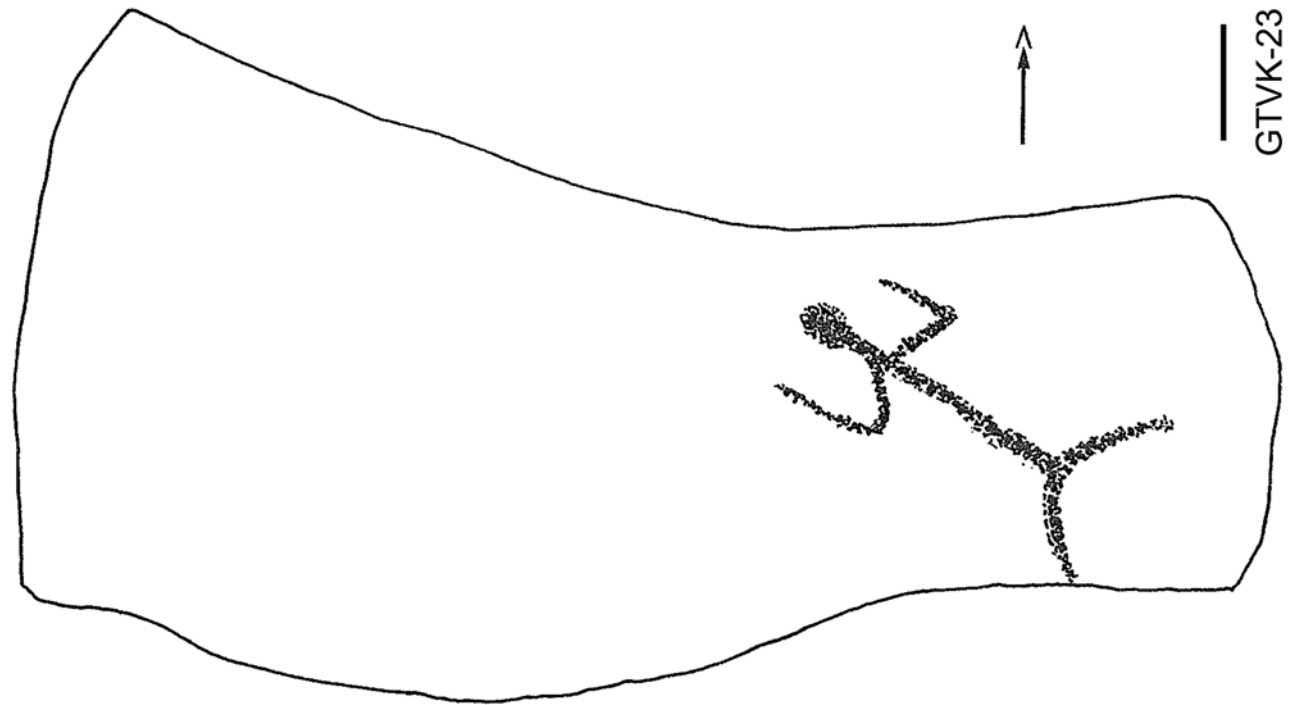


Figure 5.50

GTVK-25

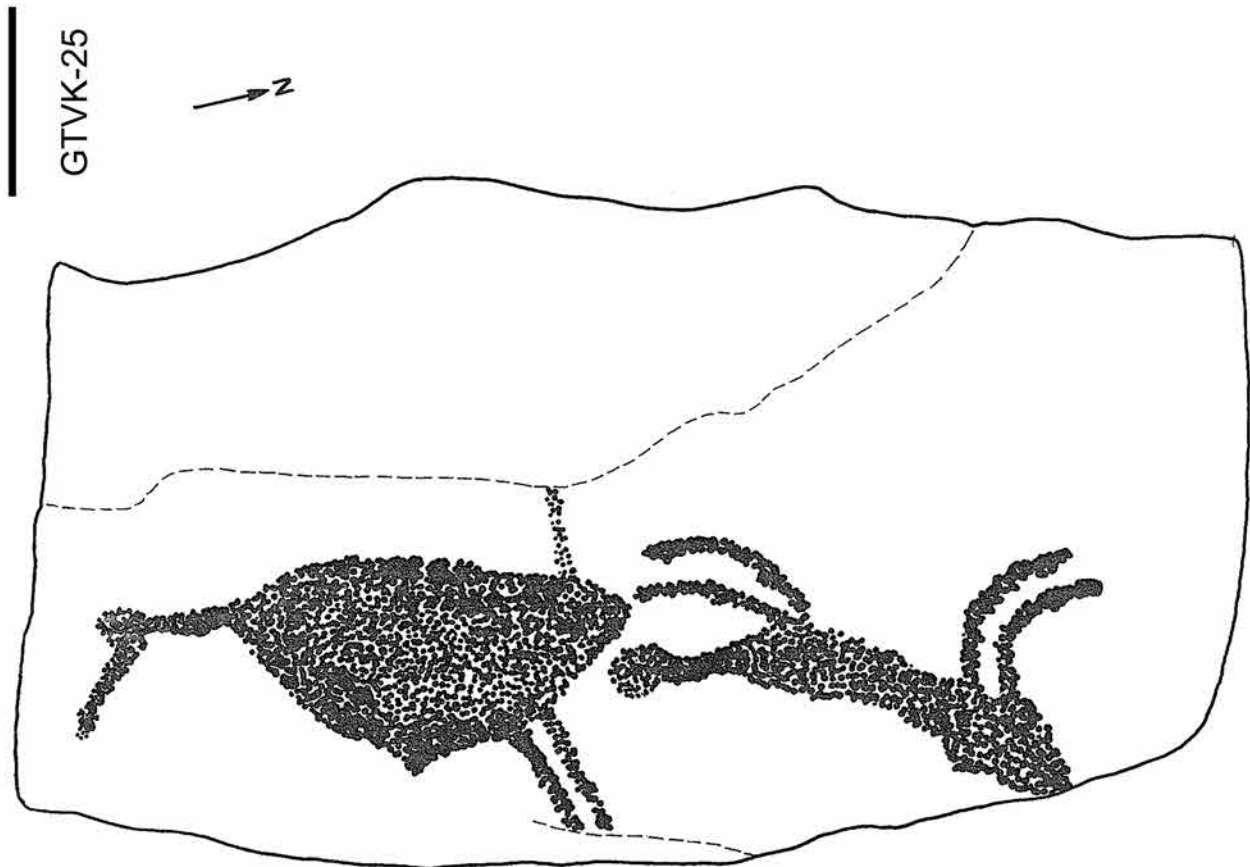


Figure 5.51

GTVK-28+29

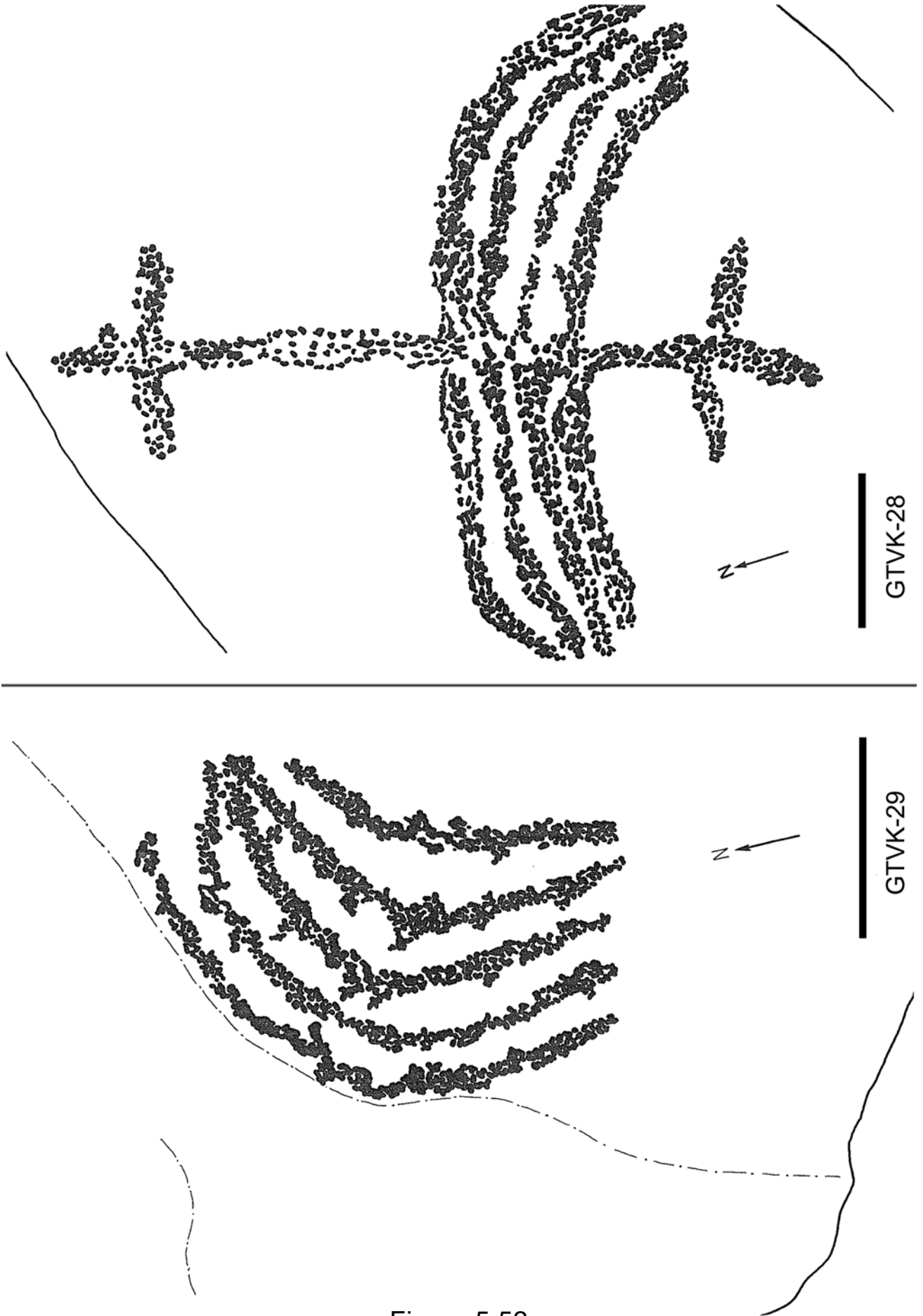


Figure 5.52

GTVK-30

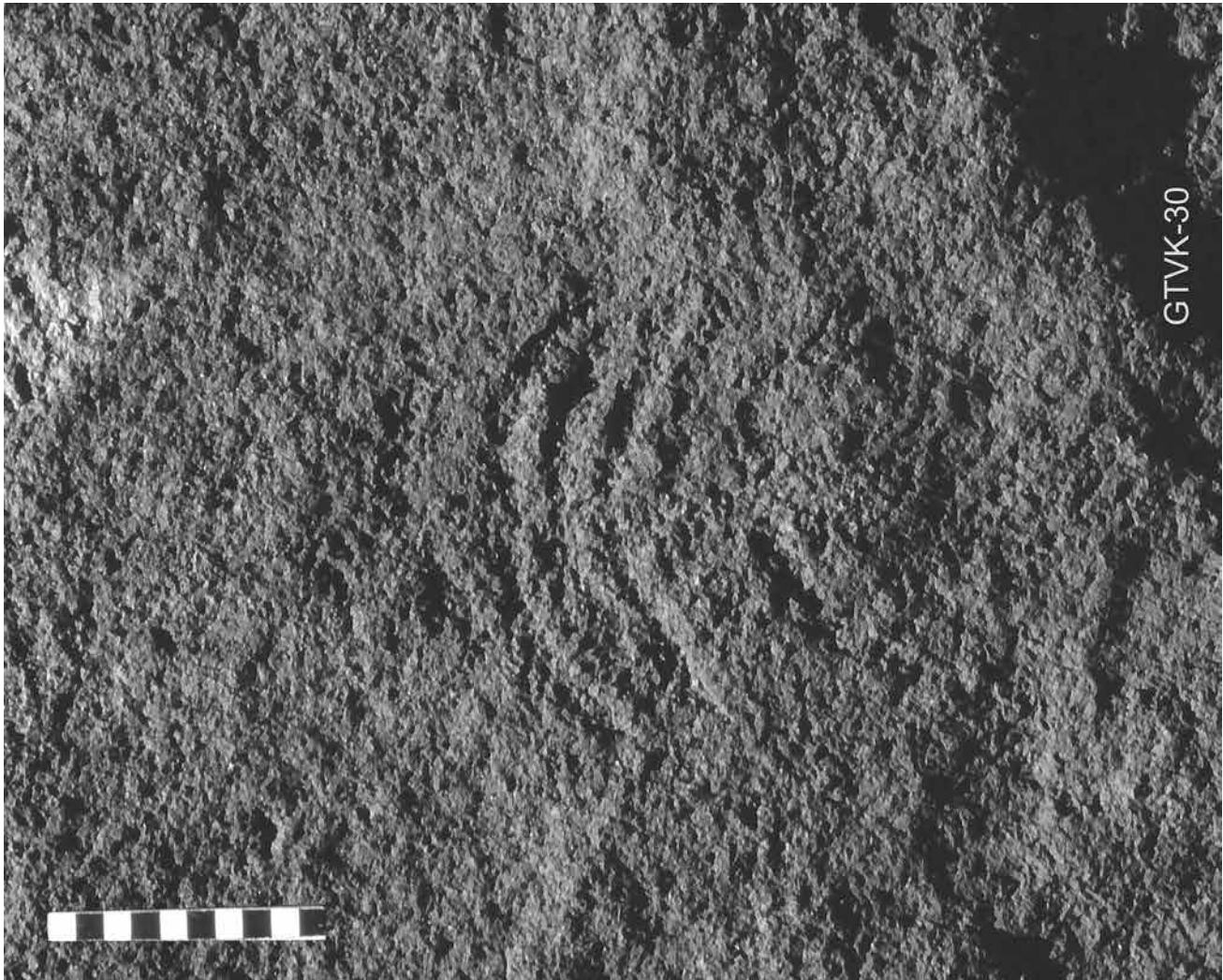


Figure 5.53

GTVK-31+35

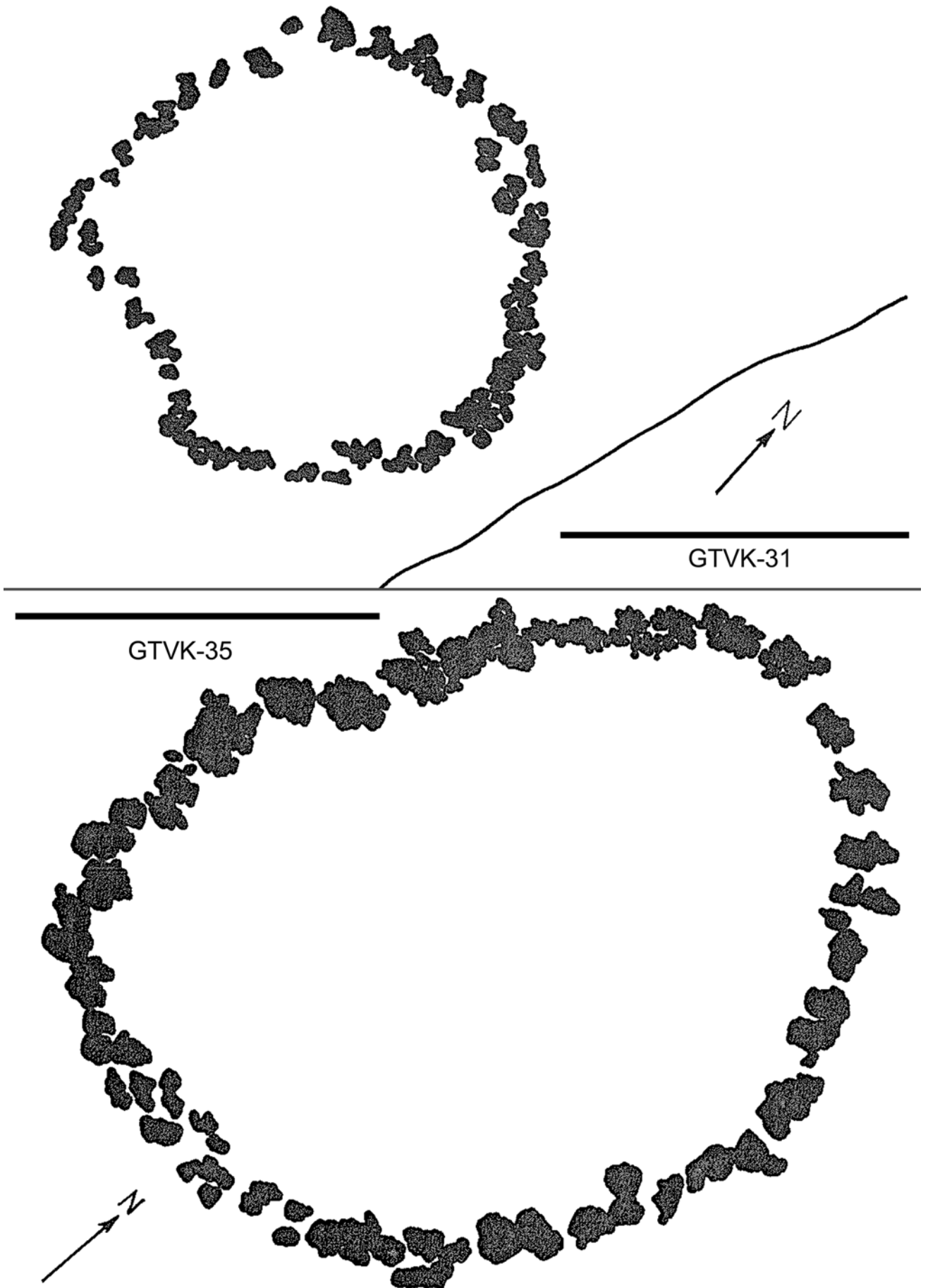


Figure 5.54

GTVK-32+34

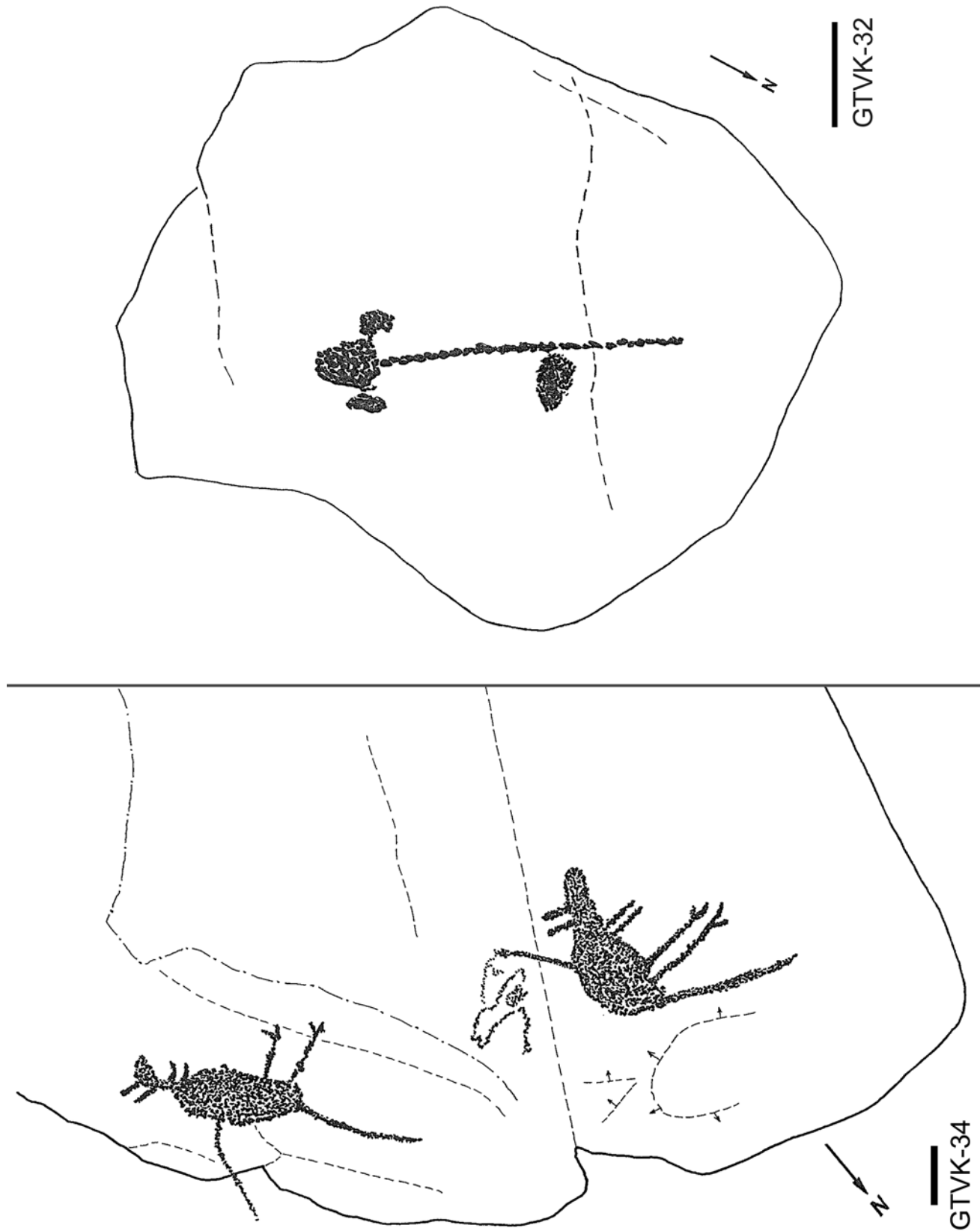


Figure 5.55

GTVK-36+39

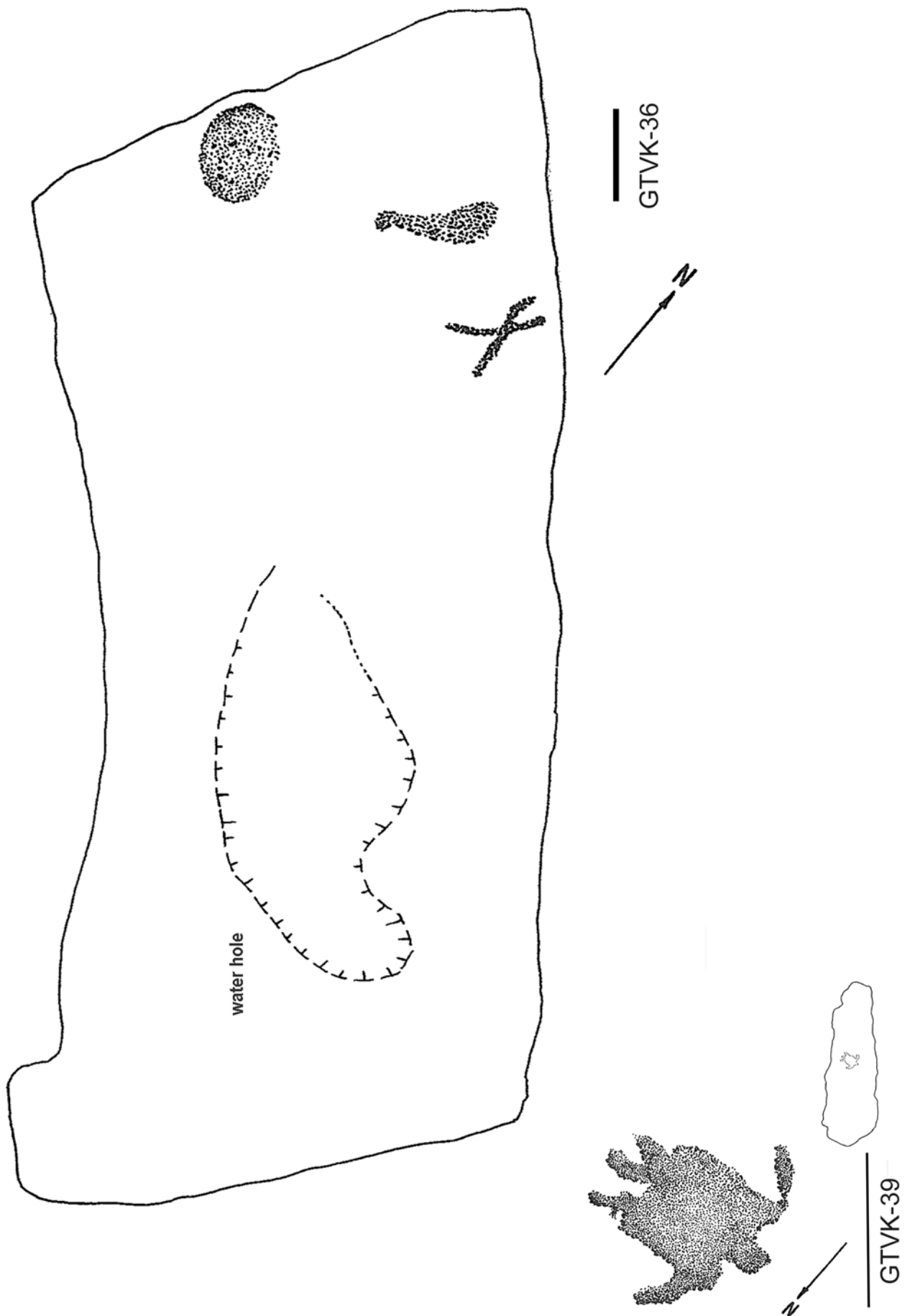


Figure 5.56

GTVK-37+38

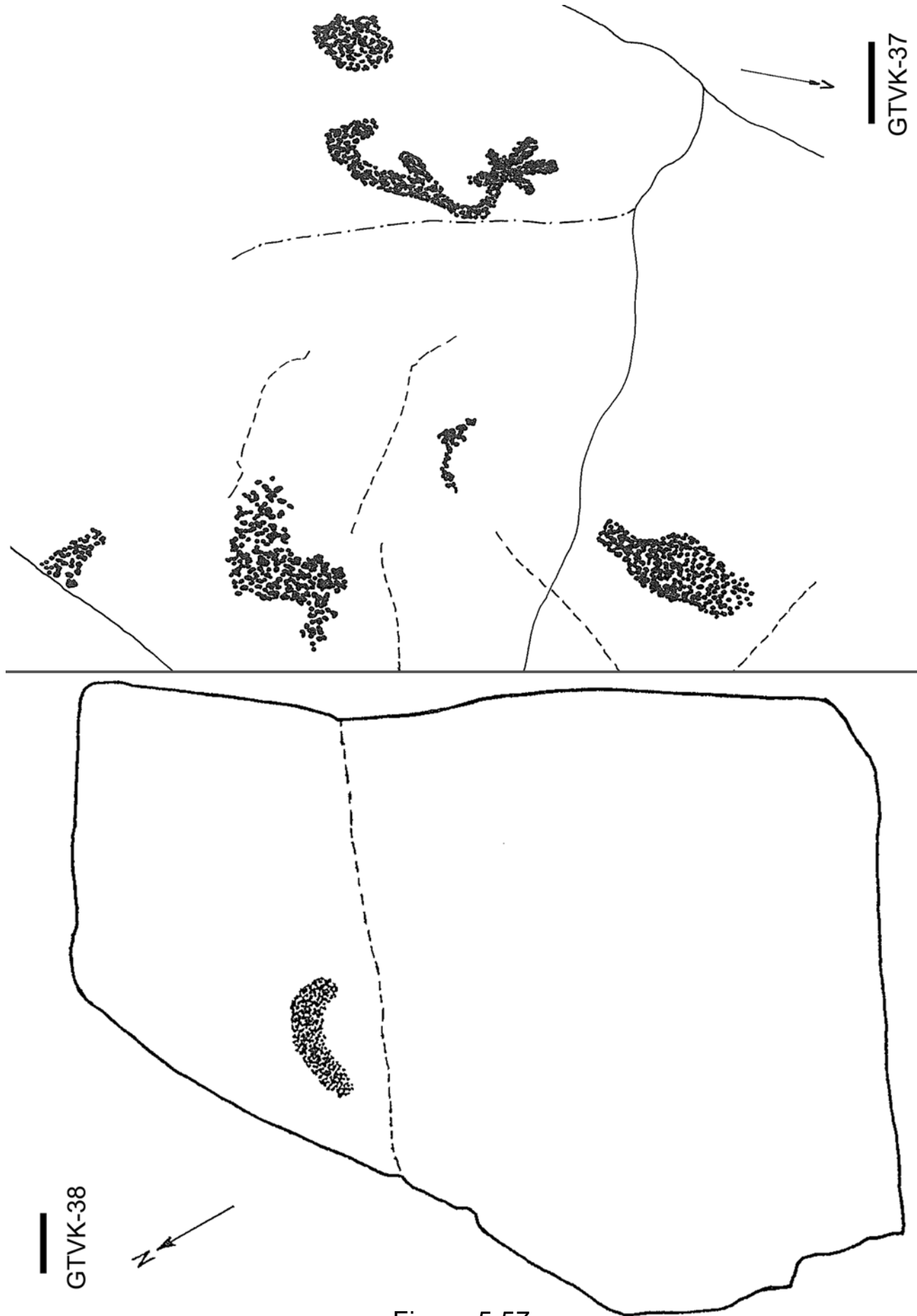


Figure 5.57

GTVK-42-3

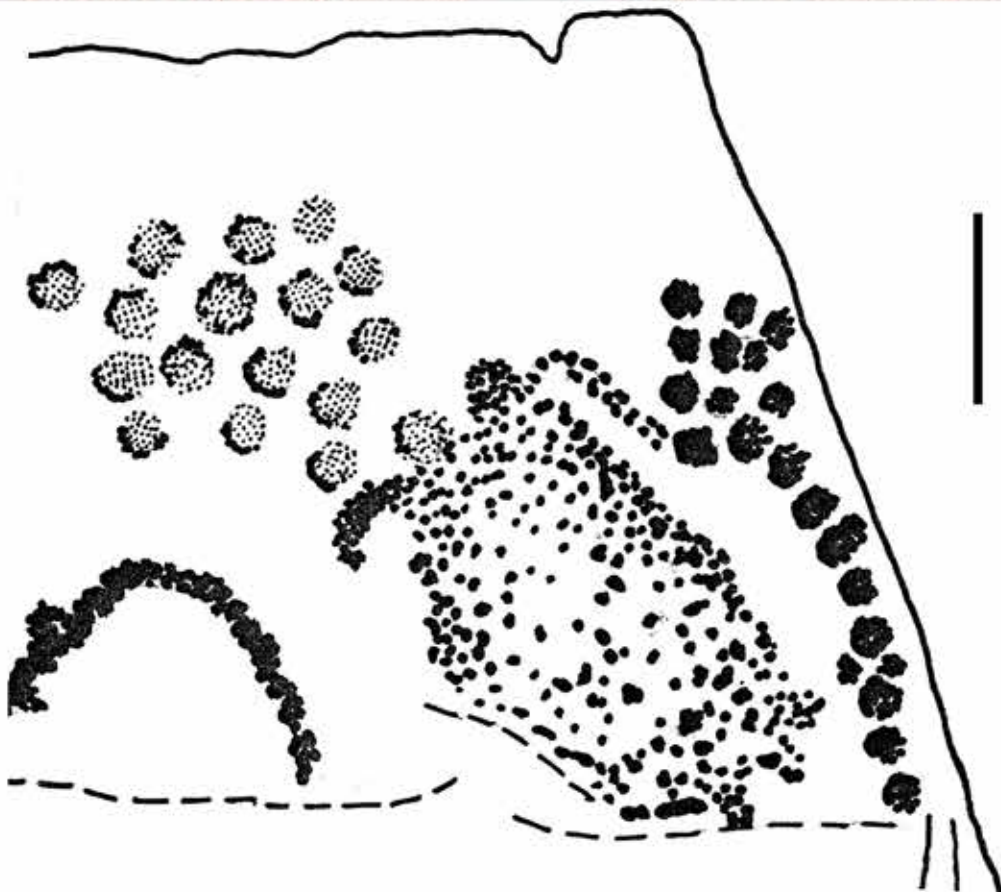


Figure 5.58

GTVK-42

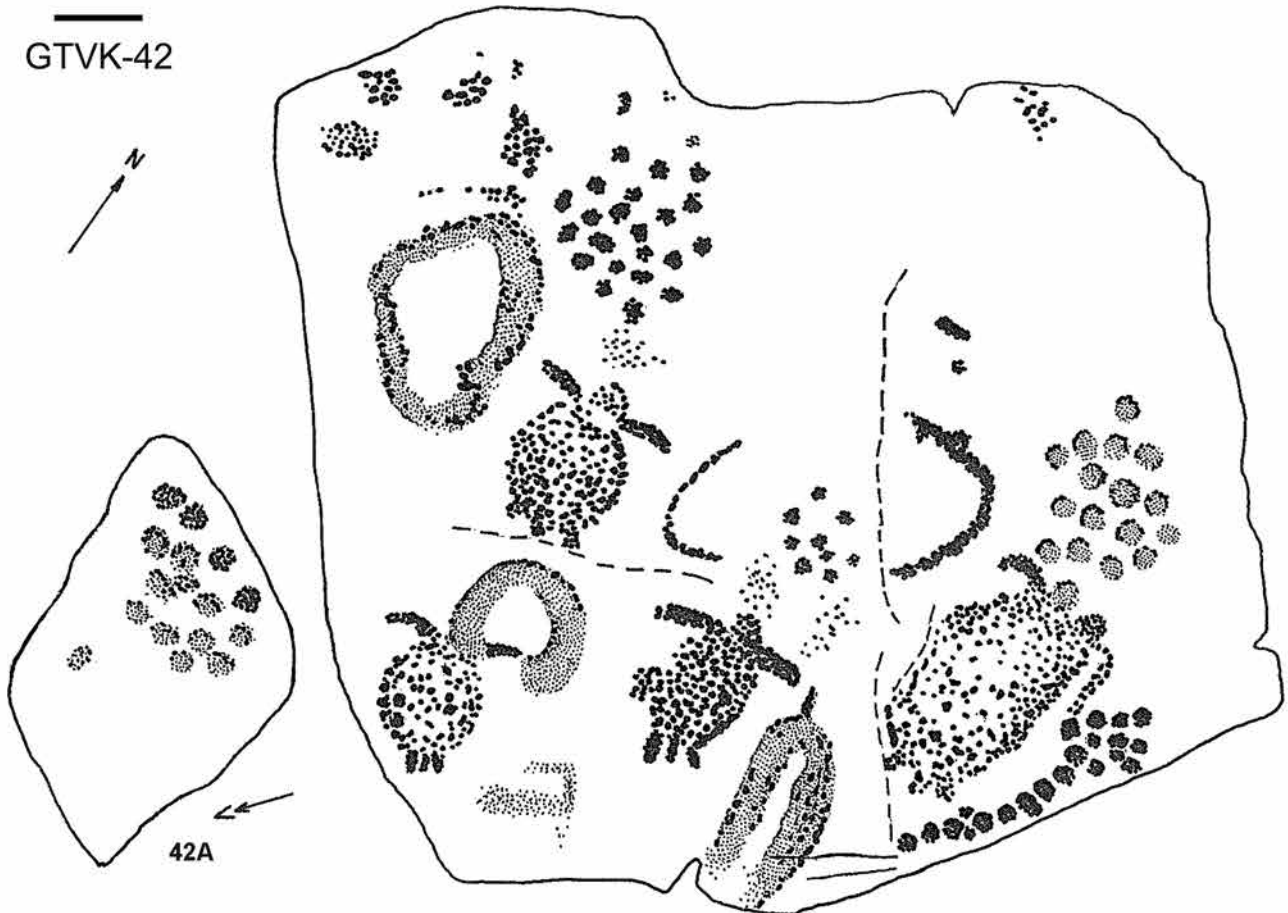


Figure 5.59

GTVK-43+45

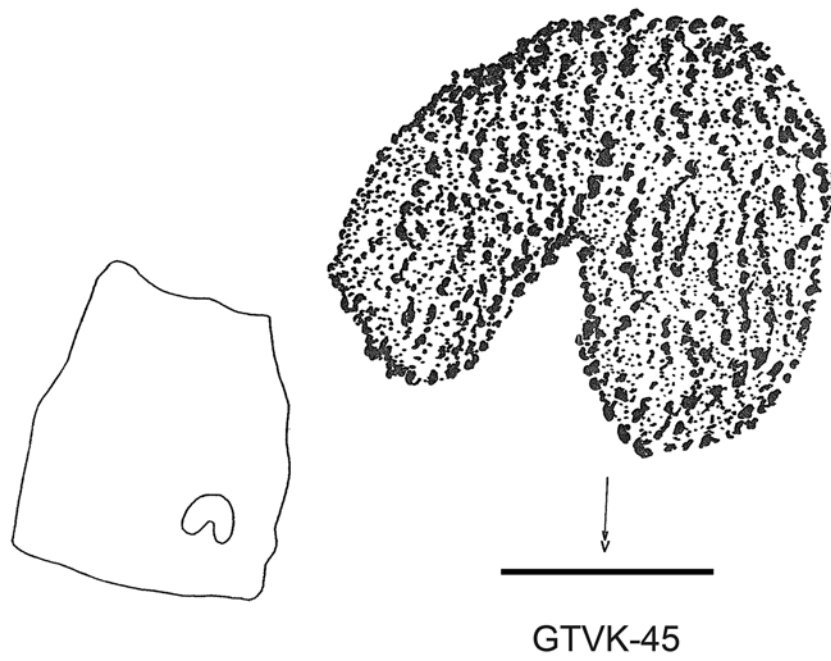
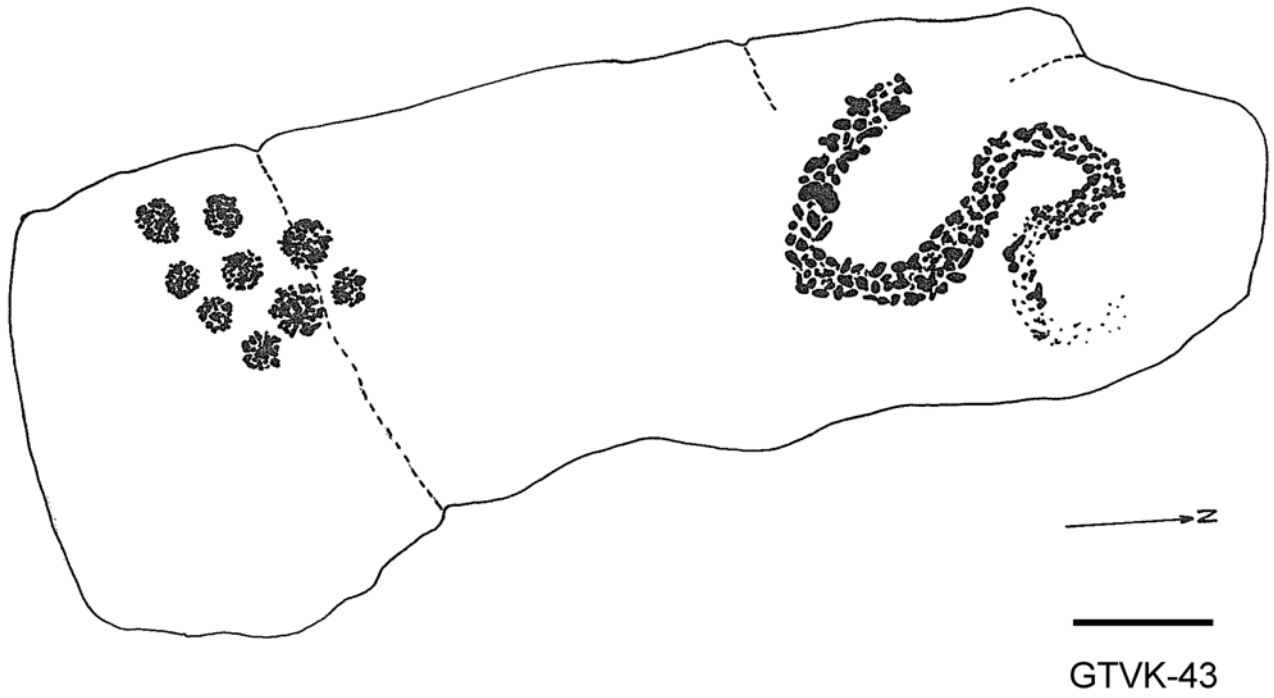


Figure 5.60

GTVK-44+46

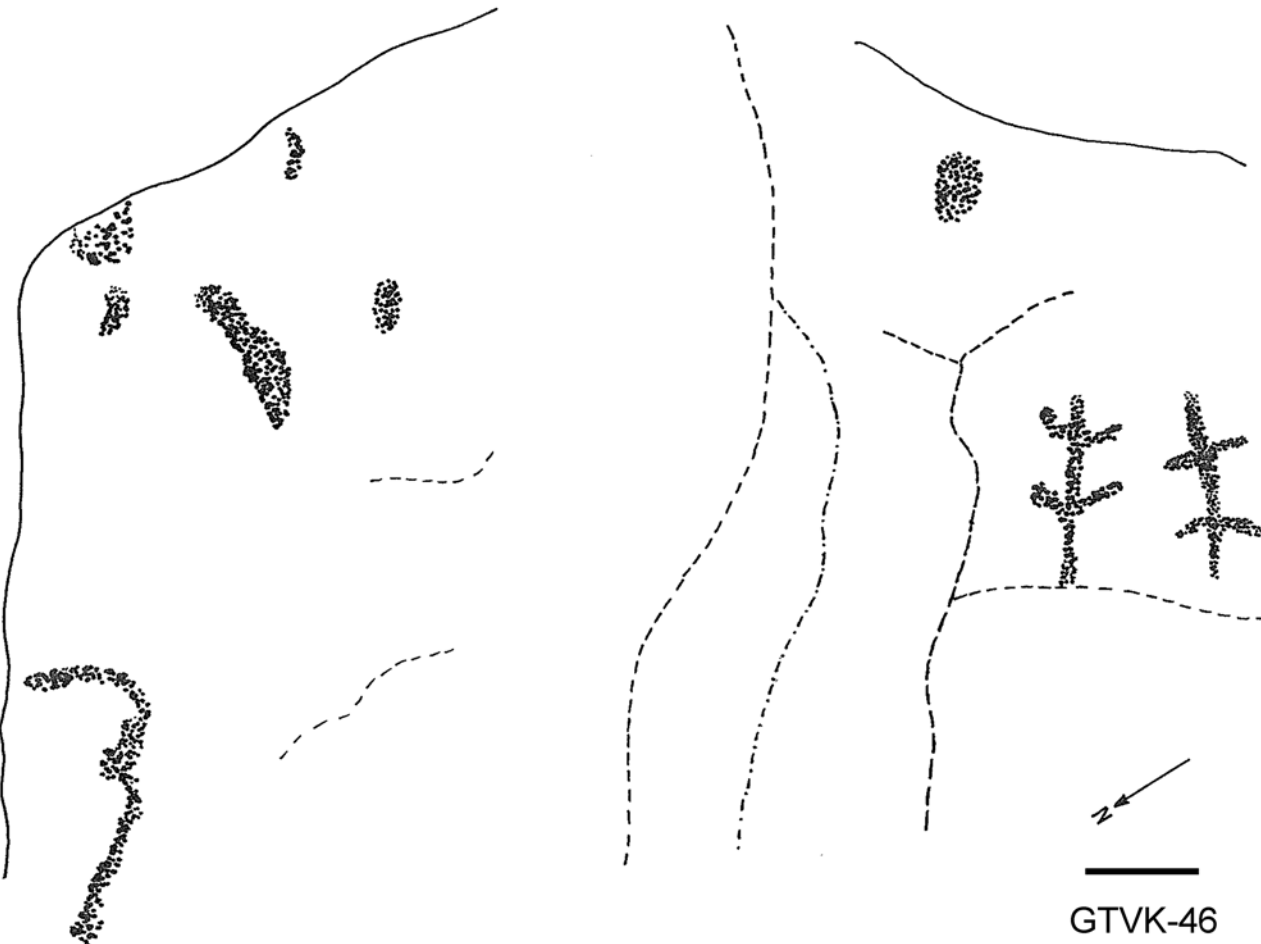
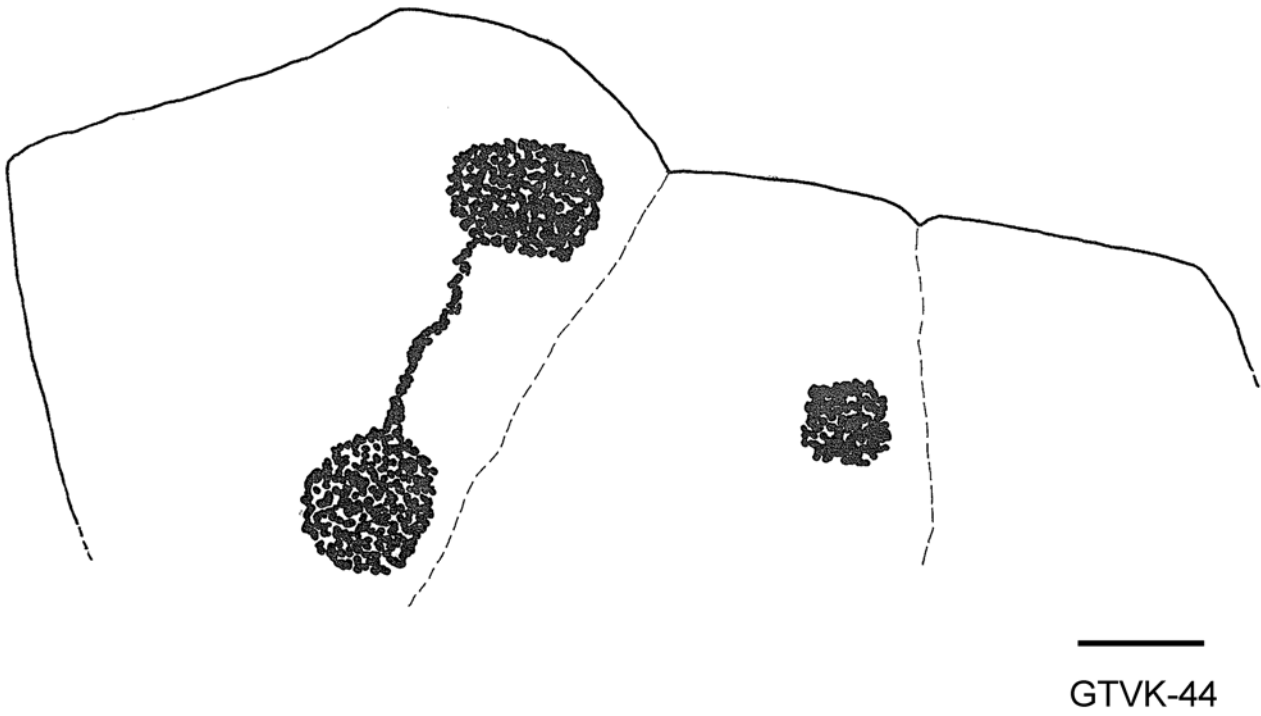


Figure 5.61

GTVK-48+49

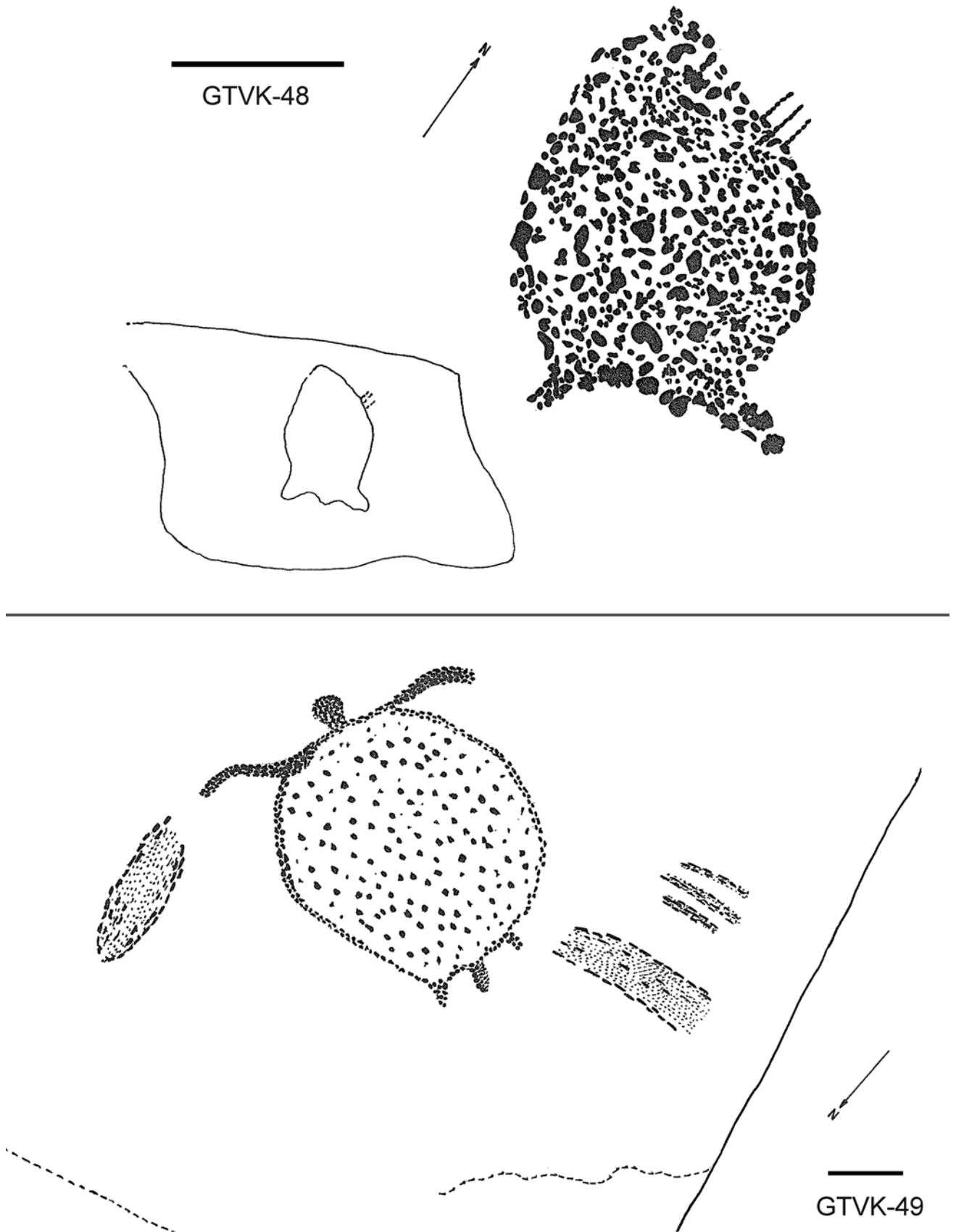


Figure 5.62

GTVK-50+51

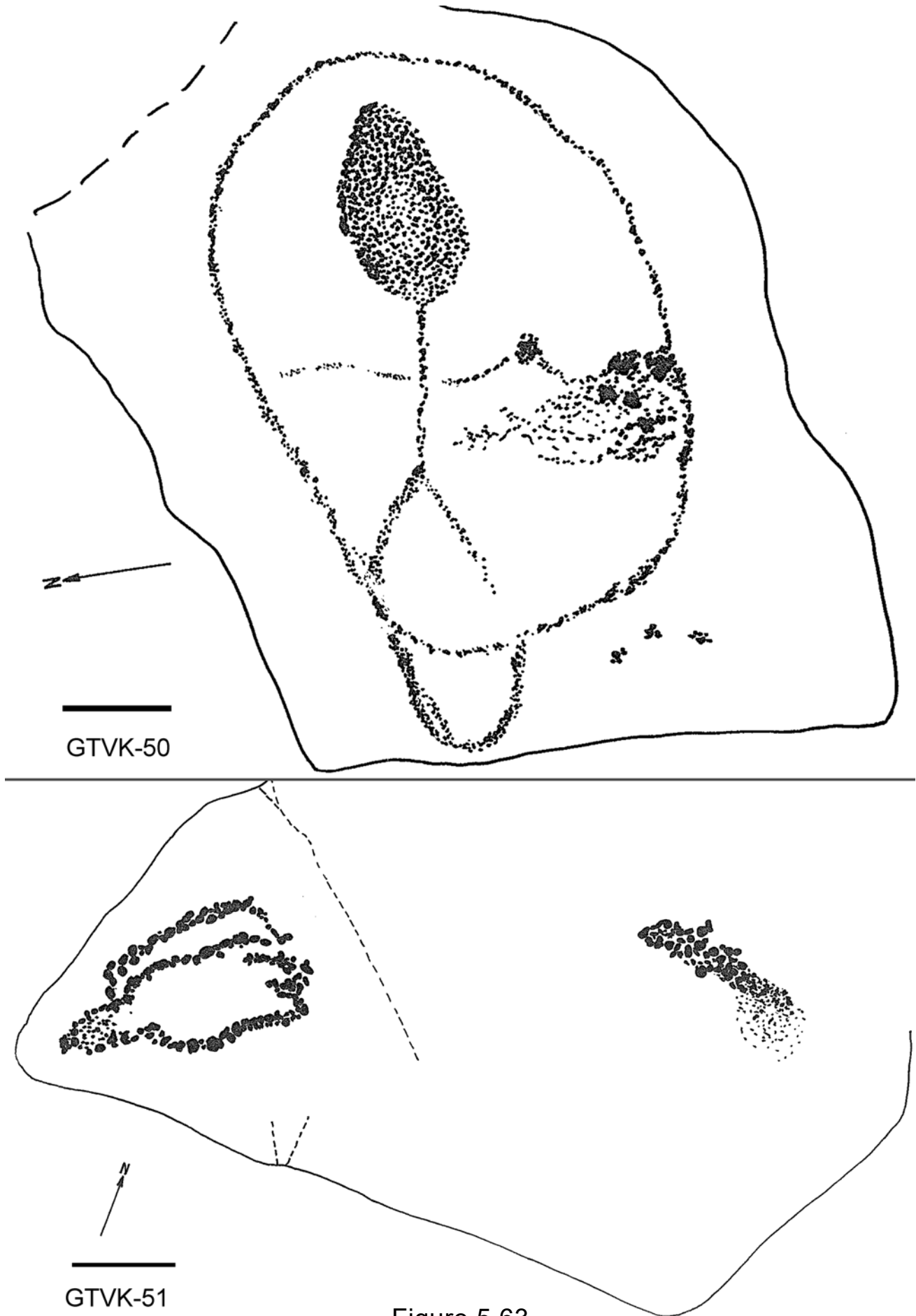


Figure 5.63

GTVK-52+54

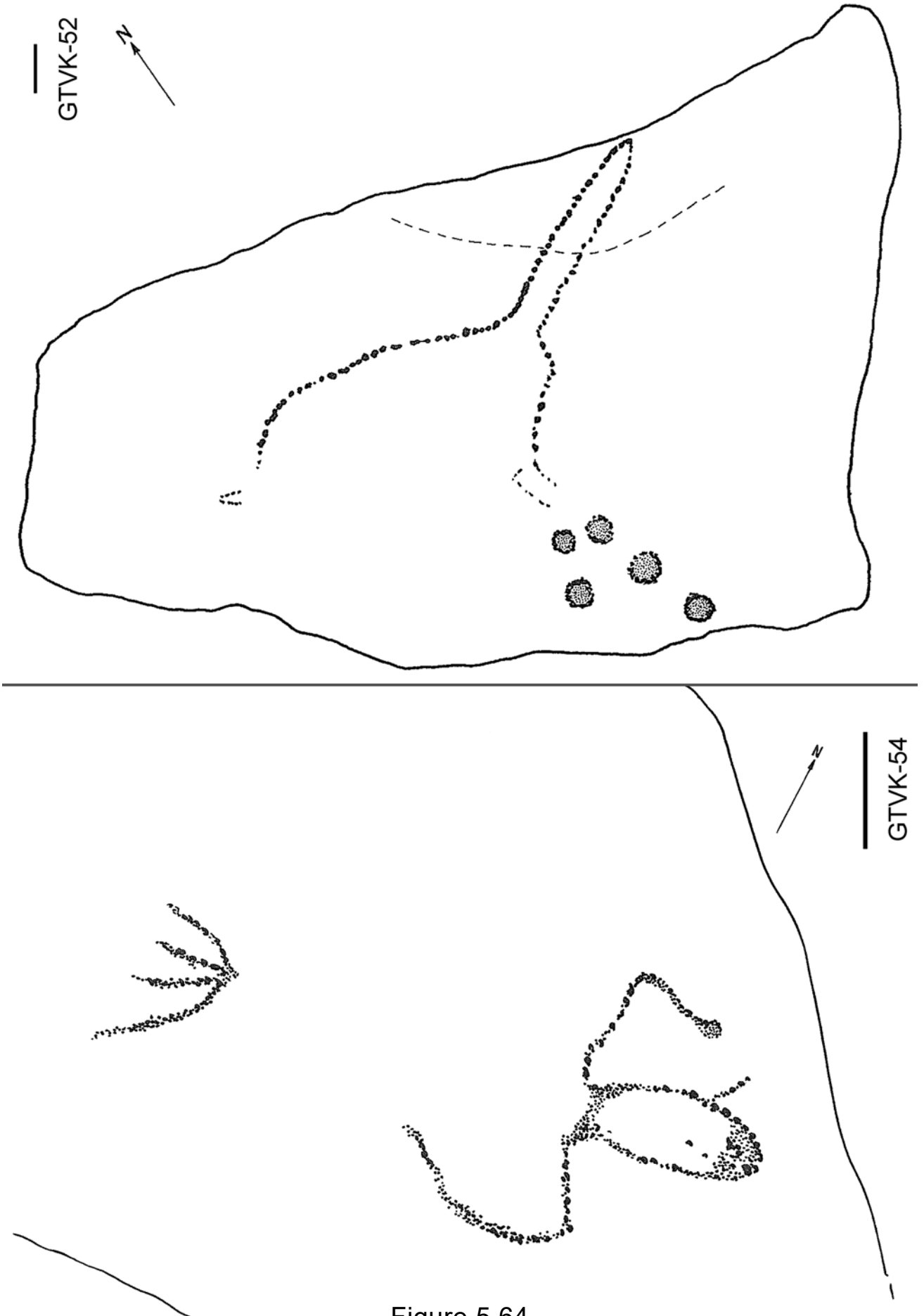


Figure 5.64

GTVK-53+58

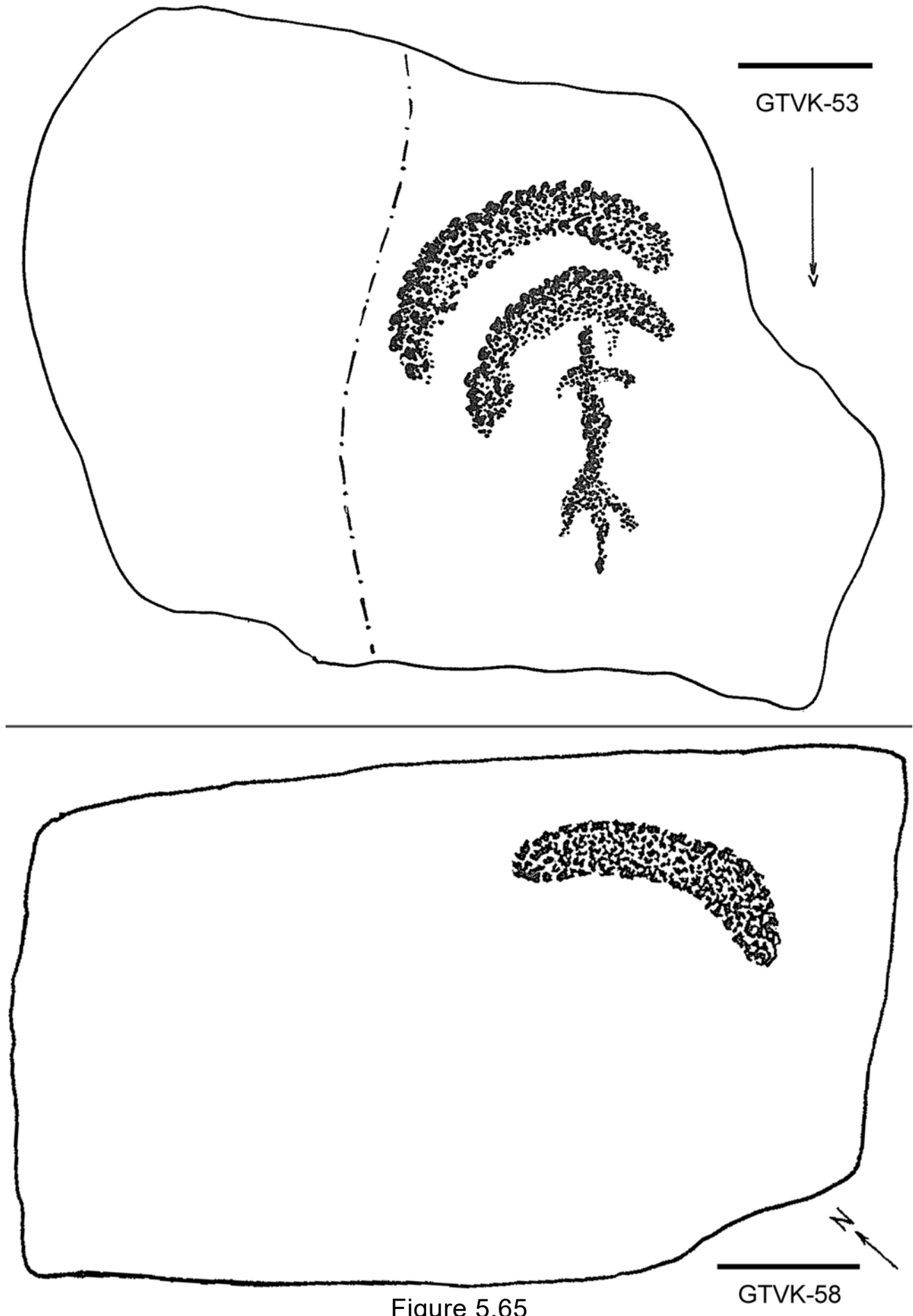


Figure 5.65

GTVK-55+60

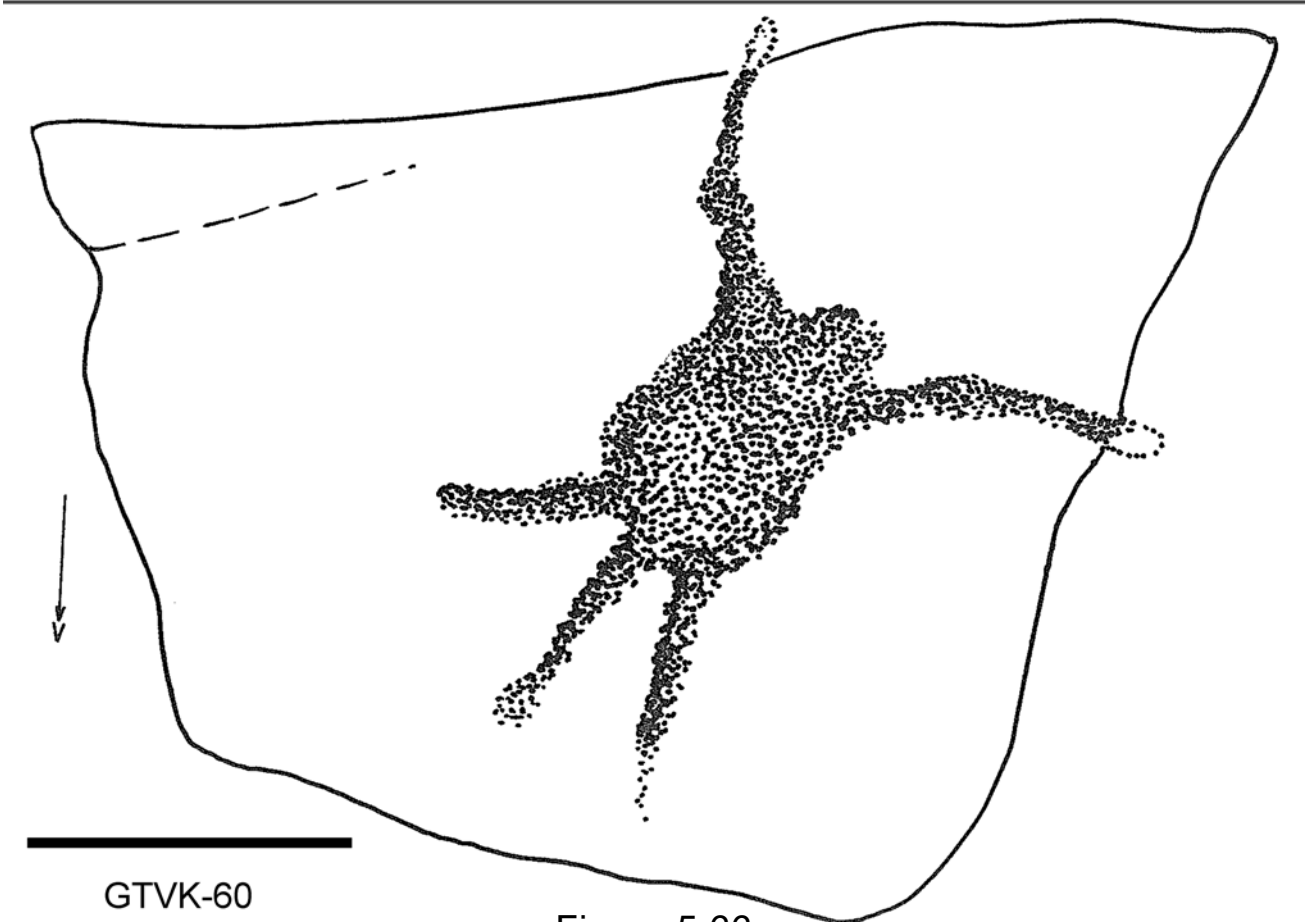
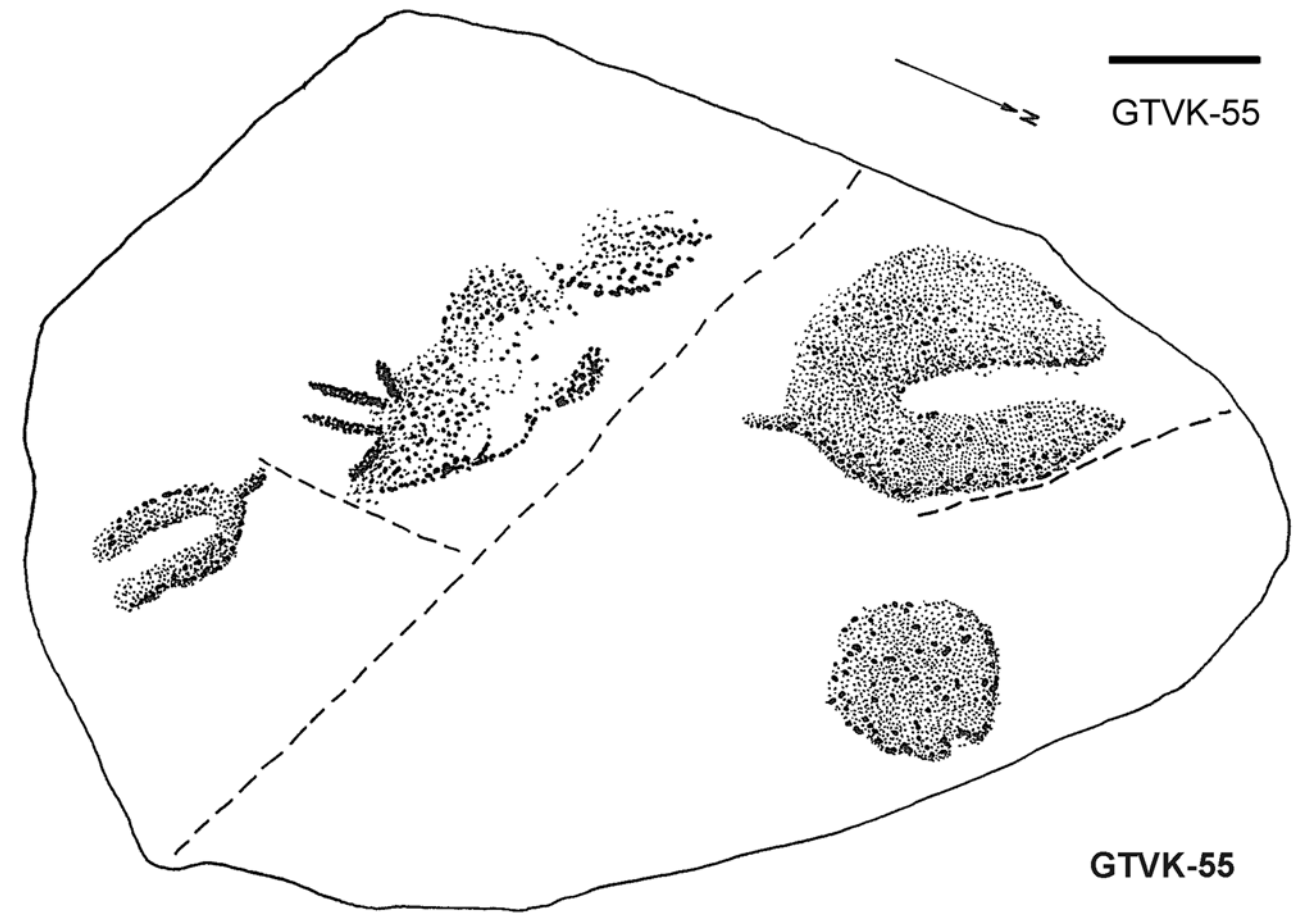


Figure 5.66

GTVK-61+62

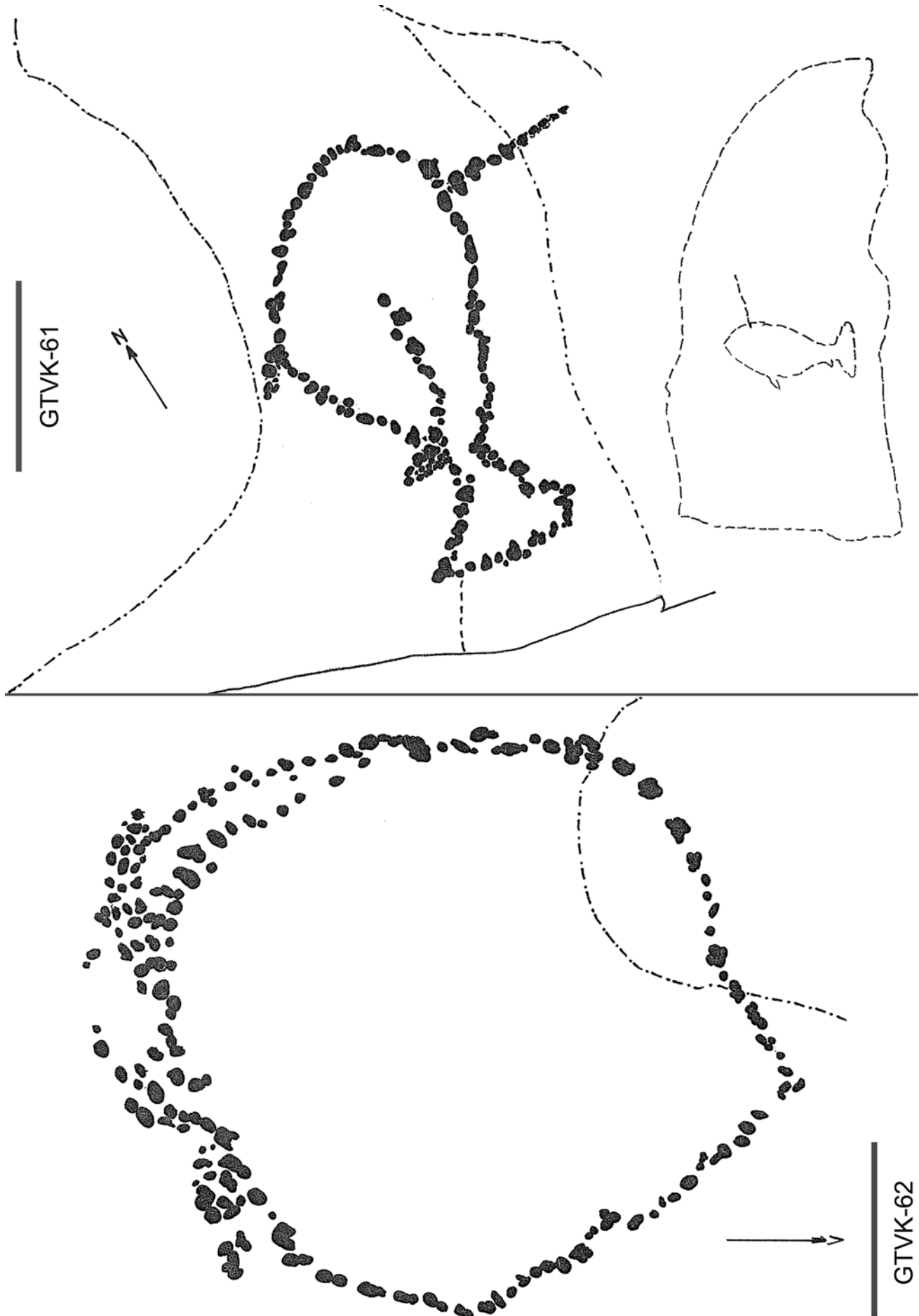


Figure 5.67

GTVK-63+64

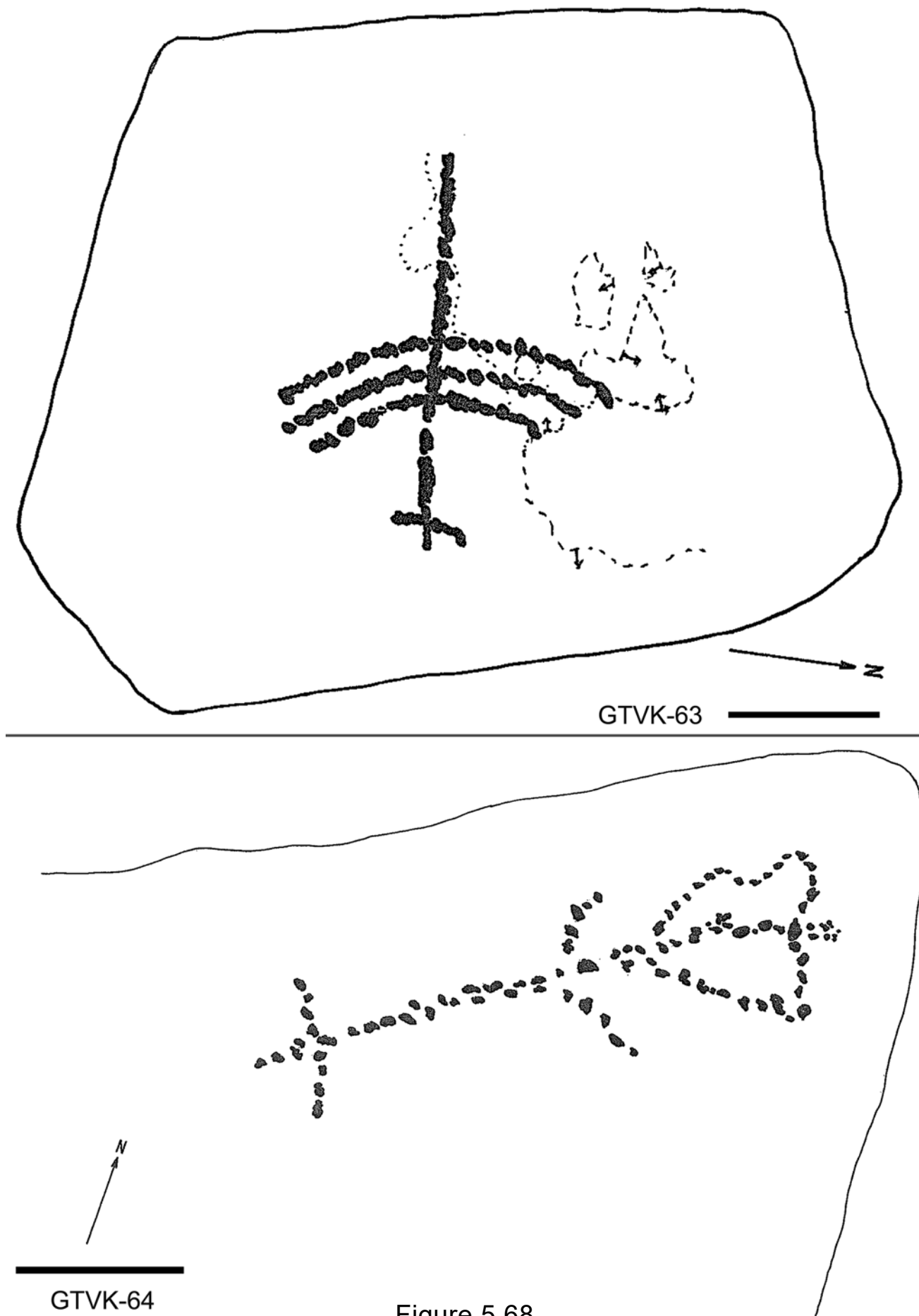


Figure 5.68

GTVK-65+66

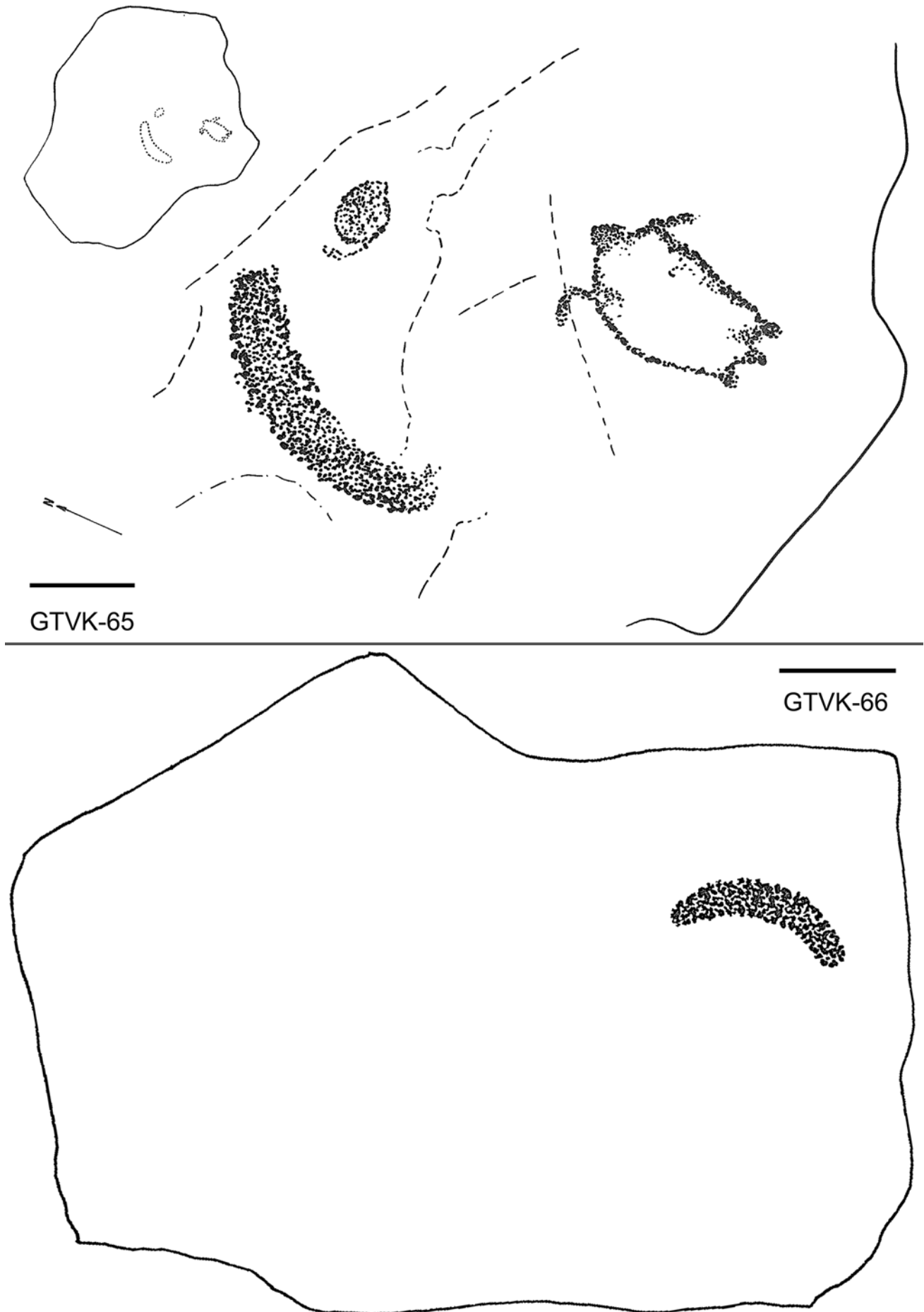
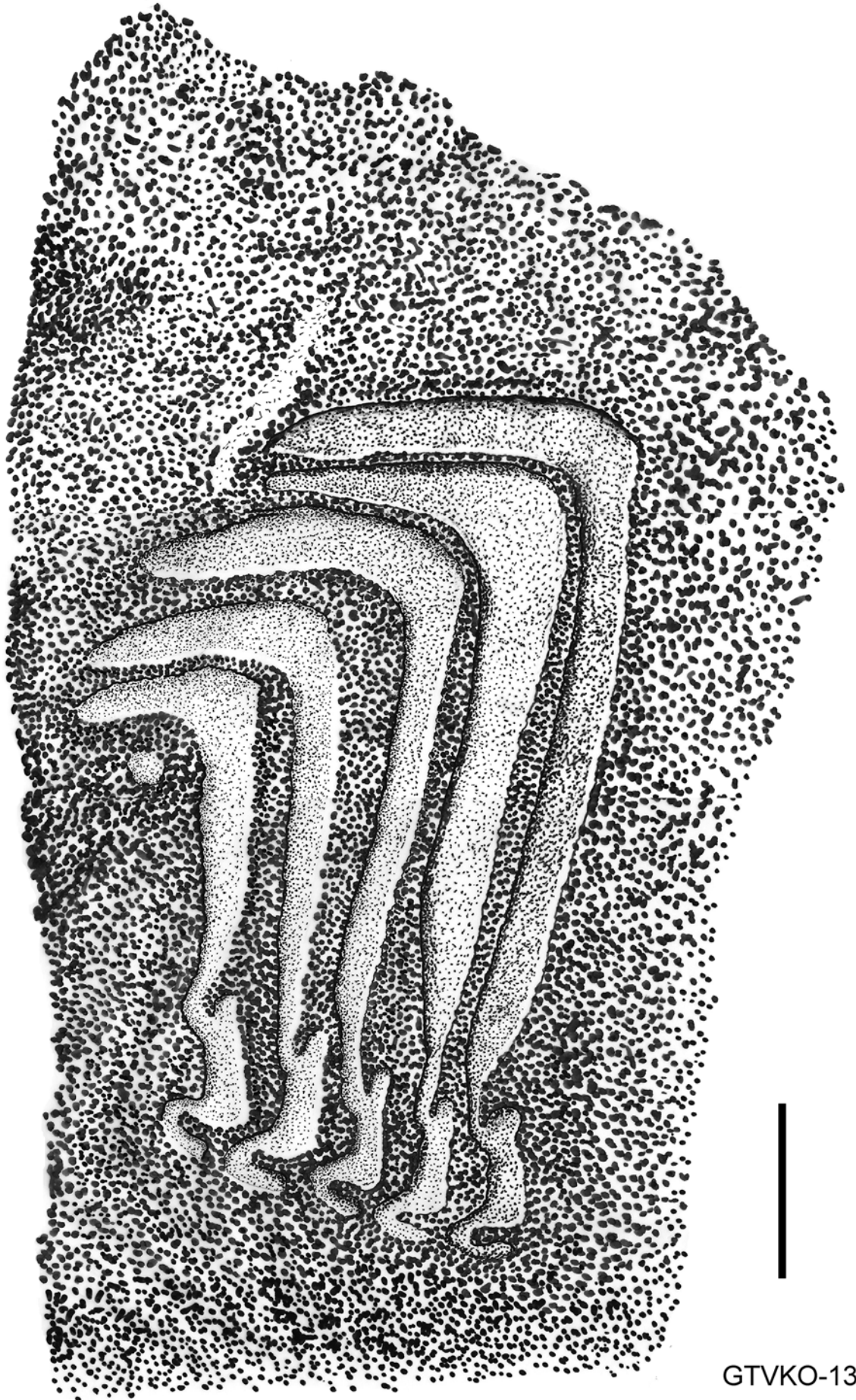


Figure 5.69

GTVKO-13



GTVKO-13

Figure 5.70

Fig. 5.1	418	Fig. 5.65	482
Fig. 5.2	419, 420	Fig. 5.66	483
Fig. 5.3	421	Fig. 5.67	484
Fig. 5.4	422	Fig. 5.68	485
Fig. 5.5	423	Fig. 5.69	486
Fig. 5.6	425	Fig. 5.70	487
Fig. 5.7	425		
Fig. 5.8	426		
Fig. 5.9	426	GTVK-1	454
Fig. 5.10	427	GTVK-2	455
Fig. 5.11	427	GTVK-3	456
Fig. 5.12	428	GTVK-4	456
Fig. 5.13	428	GTVK-5	457
Fig. 5.14	429	GTVK-6	457
Fig. 5.15	429	GTVK-7	458
Fig. 5.16	430	GTVK-8	459
Fig. 5.17	430	GTVK-10	459
Fig. 5.18	433	GTVK-11	460
Fig. 5.19	435	GTVK-12	458
Fig. 5.20	436	GTVK-13	461
Fig. 5.21	436	GTVK-14	462
Fig. 5.22	437	GTVK-15	461
Fig. 5.23	438	GTVK-17	463
Fig. 5.24	438	GTVK-18	462
Fig. 5.25	439	GTVK-19	464
Fig. 5.26	440	GTVK-20	465
Fig. 5.27	442	GTVK-21	465
Fig. 5.28	443	GTVK-22	466
Fig. 5.29	445	GTVK-23	467
Fig. 5.30	446	GTVK-24	467
Fig. 5.31	447	GTVK-25	466, 468
Fig. 5.32	448	GTVK-28	469
Fig. 5.33	449	GTVK-29	469
Fig. 5.34	450	GTVK-30	470
Fig. 5.35	450	GTVK-31	471
Fig. 5.36	451	GTVK-32	472
Fig. 5.37	454	GTVK-34	472
Fig. 5.38	455	GTVK-35	471
Fig. 5.39	456	GTVK-36	473
Fig. 5.40	457	GTVK-37	474
Fig. 5.41	458	GTVK-38	474
Fig. 5.42	459	GTVK-39	473
Fig. 5.43	460	GTVK-42	475, 476
Fig. 5.44	461	GTVK-43	477
Fig. 5.45	462	GTVK-44	478
Fig. 5.46	463	GTVK-45	477
Fig. 5.47	464	GTVK-46	478
Fig. 5.48	465	GTVK-48	479
Fig. 5.49	466	GTVK-49	479
Fig. 5.50	467	GTVK-50	480
Fig. 5.51	468	GTVK-51	480
Fig. 5.52	469	GTVK-52	481
Fig. 5.53	470	GTVK-53	482
Fig. 5.54	471	GTVK-54	481
Fig. 5.55	472	GTVK-55	483
Fig. 5.56	473	GTVK-58	482
Fig. 5.57	474	GTVK-60	483
Fig. 5.58	475	GTVK-61	484
Fig. 5.59	476	GTVK-62	484
Fig. 5.60	477	GTVK-63	485
Fig. 5.61	478	GTVK-64	485
Fig. 5.62	479	GTVK-65	486
Fig. 5.63	480	GTVK-66	486
Fig. 5.64	481	GTVKO-13	487