

Patterns in Caves: Foragers, Horticulturists, and the Use of Space

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Evidence concerning use of space in caves and rockshelters by present-day foragers and horticulturists in tropical and arid regions is reviewed. The implications of this evidence for cave/rockshelter archaeology are investigated. The various ways in which people from different cultural backgrounds adapt to naturally confined locations are described. Patterns of refuse disposal, the role of hearths, and the possibility of identifying activity areas are also explored. It is suggested that spatial adaptations to these sites are determined not by the constraints that these present to their occupants but by the ways in which the occupants perceive and experience space. An account is given of those dimensions of variability in site structure that appear likely to be useful in formulating a new agenda for spatial analysis of Palaeolithic and Mesolithic sites containing palimpsests of material. Finally, the necessity of adopting a comparative approach in order to understand the elements of spatial site structure is stressed. © 2000 Academic Press

Key Words: caves; ethnoarchaeology; spatial archaeology.

INTRODUCTION

Spatial analysis of Palaeolithic or Mesolithic sites is intended to shed light on the spatial behavior of prehistoric foragers in their campsites. Inspired by ethnoarchaeological observations concerning the use of space by living foragers, it has been furthered by the introduction and wide adoption of computers and quantitative methods in archaeology. Although analytical techniques for pattern identification have undergone considerable refinement, however, spatial analysis of caves and rockshelters^{1,*} has made only a limited contribution to our understanding of prehistoric spatial behavior. This is to a large extent because most of the interpretative models of spatial organization assume a context created by synchronic deposition of archaeological material. Such contexts

are seldom found. The vast majority of Palaeolithic or Mesolithic sites found in these naturally confined locations are palimpsests of debris from multiple superimposed occupations. In recent years prehistorians have on the whole agreed that there is a need for approaches that are specifically appropriate to sites containing palimpsests of cultural material (Carr 1987; Gamble 1991). If we are to acquire from these sites worthwhile information about space use, we must first identify the behavioral issues that appear most likely to be clarified by studying spatial variation in palimpsests. The units of observation and of analysis best suited to the drawing of valid inferences about past behavior in caves must also be found. As a first step, the ethnoarchaeology of c/r must be examined more closely.

Although c/r are an important source of information about how prehistoric foragers lived, few ethnoarchaeological studies

* See Notes section at end of article for all footnotes.

have made present-day use of these sites their principal concern. The vast majority of ethnoarchaeological projects, and therefore the majority of models of prehistoric forager spatial organization (along with the units of analysis chosen and the expected scale of spatial resolution), have had to do with the arrangement of open-air camps (e.g., Binford 1978; Stevenson 1985, 1991). During the past 15 years, however, new ethnoarchaeological research has concentrated specifically upon the sort of use made of c/r, and the spatial arrangements made within them, by some of the extant groups of indigenous people that subsist partly or totally by means of hunting and gathering. The information thus gathered, together with less detailed ethnographic and ethnohistoric accounts of space use in caves and rockshelters, makes up a small, yet highly informative body of evidence. I have already presented a comprehensive account of this evidence elsewhere (Galanidou 1997a). In this article I analyze it with three questions in mind: What causes people to make their various spatial adaptations to c/r? How visible are these adaptations in the archaeological record? and Which, if any, variables or units of archaeological analysis are sensitive enough to detect behaviorally significant spatial patterns? I refer to the concept of "spatial site structure" in describing the ways in which people organize space in naturally confined locations to transform them into familiar places used as dwellings or for ceremonial purposes (Tuan 1977). A site's spatial structure has a number of elements, such as its size and the nature and location of any hearth(s), sleeping and refuse disposal arrangements, divisions of space and activity areas. I discuss all of these components.

Thirty-five sites used by 10 separate cultural and linguistic groups from the southern hemisphere are considered here

(Tables 1 and 2). Some of these sites have been used by highly mobile foragers and others by semisedentary horticulturists. By choosing not to limit my sample to sites used by foragers, I have been able both to consider a larger number of sites and to compare how foragers use space in c/r with how horticulturists do so. As Table 2 shows, the sites discussed were occupied under various circumstances for various lengths of time and during different seasons. In examining this sample, rather than looking for direct analogs for interpreting sites used by prehistoric foragers, I investigate how spatial signatures within c/r are interwoven with cultural, economic, or social aspects of human behavior and what degree of variation is observed from one site to another within and across different cultures. The information about each site is presented in the form of simple pictorial and tabular summaries.²

SIZE OF SITES

The sites examined ranged in size³ from 12.5 to 260 m². The histogram of the sample examined is positively skewed, suggesting that smaller sites are more common (Figs. 1 and 2; Table 2). The caves in our sample were used for habitation irrespective of their size. Only in Australia did size appear to be a criterion in selecting a sacred shelter (Nicholson and Cane 1991), and this is in relative terms, since none of the Australian sites exceeded the medium size of our sample (Fig. 2).

HEARTHES

Types of Hearth

Hearths are present in all the sites in the sample. This is not surprising, since kindling a fire is a social action essential to taming the space of a natural niche.⁴ The types of hearth in our sample are scatters of ash and charcoal, which I call open

TABLE 1
The Groups Discussed: Countries of Origin, Cultural/Linguistic Groups, Subsistence Modes, Physical Geography, Types of Evidence, and Bibliographic Sources

Country of origin	Region	Cultural/linguistic group	Subsistence mode	Physical geography	Type of evidence	Source
Tanzania	Usandaue	Sandawe	Until recently hunting/gathering; Today horticulture/pastoralism, with a strong tradition of hunting and gathering	Tropical woodland and savannah	Ethnohistoric, site mapping, surface find collection	Lim 1983
Namibia ^a South Africa	Erongo Mountains Western Cape	BergDama Surviving bands of indigenous people after appearance of pastoralism	Hunting/gathering Hunting/gathering	Open grass steppe	Site mapping, surface find collection Ethnohistoric, site mapping	Clark and Walton 1962 Parkington and Mill 1991
Australia	Stansmore range	Western desert aborigines	Hunting/gathering	Eastern margin of Great Sand Desert	Site mapping, ethnohistoric information fro aboriginals	Nicholson and Cane 1991
Indonesia	Highlands of Iria Jaya	Yeleme and Faoui; West Dani linguistic group	Horticulture; manufacture and trade of handaxes	Tropical rainforest	Ethnoarchaeological	Pétrequin and Pétrequin 1988, 1993
Papua, New Guinea	Ok Tedi	Various	Horticulture		Ethnohistoric, information gathered from local informants, archaeological	Swadling 1983
Papua, New Guinea	Jimi valley	Melpa linguistic group	Horticulture, with some hunting and gathering	Tropical rainforest	Ethnoarchaeological, site mapping, archaeological	Gorecki 1988, 1991
Papua, New Guinea	Yuat gorge	Pinai linguistic group	Horticulture with small gardens and daily foraging manufacture and trading of bows and arrows	Tropical rainforest	Ethnoarchaeological, site mapping, archaeological	Gorecki 1988, 1991
Papua, New Guinea	Chuingai Hills	Sawos linguistic group	Horticulture and fishing; manufacture and trading o pottery		Ethnoarchaeological, site mapping	Gorecki 1991
Papua, New Guinea	Hinterland of New Ireland	Indigenous people	Horticulture with complex garden systems	Tropical rainforest	Site mapping	Gorecki 1991

^a The information about the Big Elephant Cave was published in 1962 and therefore refers to what is now Namibia as South West Africa.

TABLE 2
The Caves and Rockshelters Discussed: Sizes and Functions

Site	Size (m ²)	Function	Cultural/linguistic group
N!axuwe 1	36.9	Long-term habitation and temporary camp during harvesting, hunting, and honey-collecting expeditions	Sandawe
N!axuwe 2	108	Long-term habitation and temporary camp during harvesting, hunting, and honey-collecting expeditions	Sandawe
N!axuwe 3	24	Long-term habitation and temporary camp during harvesting, hunting, and honey-collecting expeditions	Sandawe
Cave of Rabbits	71.5	Permanent habitation	Sandawe
Big Elephant Cave NW	22.5	—	BergDama
Big Elephant Cave NE	—	Ostrich eggshell bead workshop	BergDama
De Hangen	116	Camp during intrusion by colonizing populations either of single families or closely integrated subsistence units	S. African indigenous
Diepkloof	260	Camp during intrusion by colonizing populations either of single families or closely integrated subsistence units	S. African indigenous
Andriesgrond	58	Camp during intrusion by colonizing populations either of single families or closely integrated subsistence units	S. African indigenous
Renbaan	29	Camp during intrusion by colonizing populations either of single families or closely integrated subsistence units	S. African indigenous
Yungubalibanda 1	24.5	Habitation during rainy season	Western desert aboriginals
Yungubalibanda 2a	13.5	Seasonal habitation	Western desert aboriginals
Yungubalibanda 2b	12.5	Seasonal habitation	Western desert aboriginals
Yungubalibanda 3	21	Seasonal habitation	Western desert aboriginals
Yungubalibanda 4	16	Seasonal habitation	Western desert aboriginals
Yungubalibanda 5	27	Sacred site	Western desert aboriginals
Yungubalibanda 6	31.5	Men’s initiation camp	Western desert aboriginals
Yungubalibanda 7	75	Sacred site	Western desert aboriginals
Yungubalibanda 8	24	Sacred site	Western desert aboriginals
Uyu	35	Mythological site	Western desert aboriginals
Ngandalarra	19	Mythological site	Western desert aboriginals
Yeleme-Wang-Kob-Me	200	Camp during a 3-day expedition of an all-male group to quarry basalt and manufacture axes; men’s initiation camp	Yeleme and Faoui; West Dani linguistic group
Pukl Kumanga	11.5	Overnight stay	Melpa
Tembinde Kumanga	105	Camp during foraging expeditions or trading trips	Melpa
Nip	111	Camp during foraging expeditions	Melpa
Kanamapin	112	Short-term camp	Pinai

TABLE 2—*Continued*

Site	Size (m ²)	Function	Cultural/linguistic group
Ritamauda	42.5	Camp either during foraging expeditions or en route to trade	Pinai
Luanana	59	Short-term camp; ossuary	Pinai
Ailegun	46	Short-term camp; ossuary	Pinai
Marindjila	—	Short-term camp during foraging expeditions	Sawos
Adjiga	89	Evening camp of two families during sago-starch processing; fire-drive hunts or gathering expeditions	Sawos
Pakara	214	Short-term camp during foraging expeditions	Sawos
Balof 1	16	—	New Ireland indigenous
Balof 2	40	—	New Ireland indigenous
Matapara	—	—	New Ireland indigenous
Lameus	—	—	New Ireland indigenous

hearths, stone-lined hearths, log-lined hearths, and roasting pits or ovens, at times associated with firestones. With the exception of the ovens, whose specialized function it is to roast game or vegetables, the data to hand suggest that there is no direct relationship between hearth form and hearth function. All the other types of hearth are used for multiple purposes, including cooking, sleeping by, giving warmth and light and acting as the point around which people relax, chat, interact socially, or perform ceremonies.

Since only the bare minimum of energy need be invested in building an open hearth, while the construction of any other type of hearth requires a greater investment of energy, we can test the intuitive hypothesis that the amount of energy invested in making hearths (and hence the types of hearth constructed) relates to the length of time for which a site is occupied. I have divided the possible types of hearth into two energy investment categories: the low-investment category contains the open hearths and the high-investment category every other type. I have also used the data from Table 2 to group sites according to whether they

are used for brief stays or for longer ones. The chi-squared test of independence between length of stay and amount of energy invested in hearths (Table 3) suggests that there is no significant difference in the distribution of high and low energy investments in hearths used during brief and longer term occupations. Therefore, hearths requiring a high energy investment do not necessarily relate to longer stays.

By the same token I have examined whether energy investment in making hearths relates to the degree of mobility of the occupying group. Unlike the previous test, the chi-squared test here suggests that in our sample there is a relationship between degree of mobility and amount of energy invested in hearths (Table 4). The strength of this relationship measured by means of the phi-squared coefficient is 0.49, suggesting a positive but not particularly strong association. Indeed, if we look at Table 6 we can see that the open hearth is consistently the only type present in the sites used by the South African and New Ireland indigenous people, the Australian Western Desert aboriginals, and the Sawos of Papua New

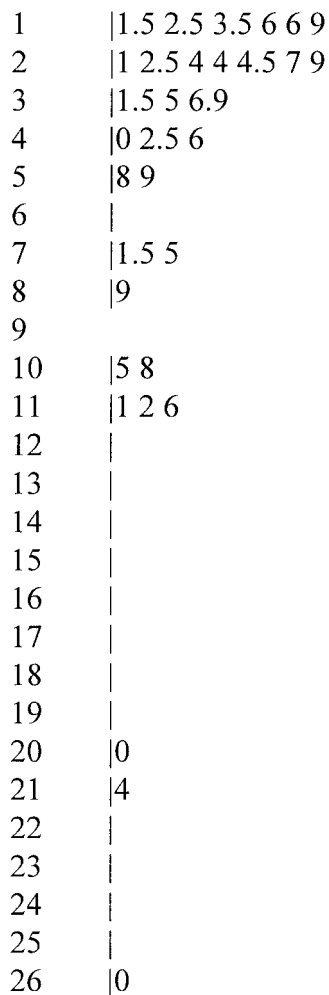


FIG. 1. Stem-and-leaf diagram showing the sizes in square meters of the sites discussed.

Guinea (Figs. 3–6). It is noteworthy that two foraging groups (the Australian and South African indigenous) of the three in our sample use this type of hearth, although open hearths are not the only type found in forager sites. They are, however, the only type present in the sites used by the Sawos, who make clay pots to cook in, and who, judging by their furniture (wooden beds and tables), appear to be one of the most sedentary groups in our sample (Gorecki 1991). In the Big Elephant

Cave, the site used by the third foraging group in our sample (the BergDama), only stone-lined hearths were found (Fig. 7).

To summarize the above, we have no evidence for any relation between length of occupation and type of hearth and there is a weak relationship between degree of mobility and type of hearth. Table 5 suggests that some relationship may exist between cultural group and type of hearth used. This pattern is much more robust in the foraging groups in our sample (the BergDama, South African indigenous, and Australian aboriginals) than among the horticulturists.

Number of Hearths

The scattergram plotting total number of hearths against site area for each site (Fig. 8) clearly suggests that the relationship between these two variables is not a linear one. Although the largest numbers of hearths are found in large sites, not all large sites have numerous hearths.

The number of hearths used during each episode of occupation is first and foremost a culturally defined element of habitation. It is only secondarily a function of the size or social composition of the occupying group and of the character of on-site activities (Table 6). The evidence examined clearly suggests that the way in which the above parameters affect the number of hearths used per occupational episode differs from one culture to another. For instance, Nicholson and Cane have observed that in Australia the number of hearths relates to the size of the occupying group (1991), while Gorecki has reported that in Papua New Guinea the Pinai people use only a single hearth per occupation regardless of the number of occupants (1991). At Yeleme-Wang-Kob-Me (Table 1) the West Dani gather and sleep around two separate domestic

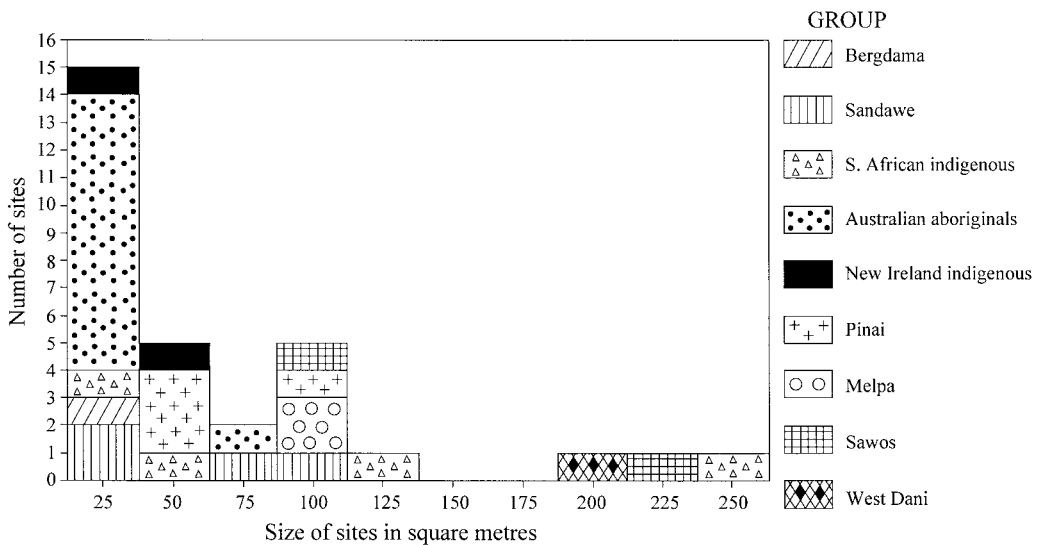


FIG. 2. Histogram showing sizes of sites in square meters with information about the cultural/linguistic group to which each site belongs superimposed.

hearths according to which of two villages they come from, but share a third hearth, in a communal area, for cooking (Pétrequin and Pétrequin 1988) [Figs. 9(2) and 9(3)].

The total number of hearths also depends upon whether the occupying group reuses structures used by previous occupants of the cave. Published information about reutilization of hearths is sparse, but nonetheless suggests that this is a culturally defined choice. In New Guinea some cultural groups tend to reuse existing hearths [for example, the roasting pits at Yeleme-Wang-Kob-Me (*ibid*)], whereas others (the Melpa, for instance) prefer to set up new

ones somewhere else (Gorecki 1988). In analyzing an archaeological palimpsest we may not be able to isolate discrete episodes of occupation and count the number of hearths used during each individual episode, but we can determine diachronically whether hearths were reused. Archaeological studies have never paid much attention to this aspect of spatial behavior, which is an expression of cultural identity. There is probably much more to be learned about spatial adaptation (and ultimately about group identity) by recording patterns of hearth reuse systematically and exploring how they vary between caves and rockshelters in the same region, in neighboring

TABLE 3
Duration of Site Use against Amount of Energy Invested in Making Hearths^a

	Low-energy investment	High-energy investment	Number of sites
Longer stay	9	5	14
Short stay	9	7	16
	18	12	30

^a $X^2_{\text{calc.}} = 0.20$; $X^2(0.01) = 6.63$.

TABLE 4
Degree of Mobility of Occupying Group against Amount of Energy Invested in Making Hearths^a

	Low-energy investment	High-energy investment	Number of hearths
Mobile people	15	1	16
Sedentary people	4	12	16
	19	13	32

^a $X^2_{calc.} = 15.67$; $X^2(0.01) = 6.63$.

regions and in regions distant from one another.

SLEEPING ARRANGEMENTS

Sleeping is one of the most elusive aspects of human activity in the archaeolog-

ical record. In spatial model building it is often treated as a variable about which cross-cultural generalizations may appropriately be made (see, for example, Binford 1983:162–163). The review of the present data has shown that sleeping areas are always adjacent to hearths, but that not all of a site’s hearths are used for sleeping by. There is considerable variation in the location of the sleeping area and the type of bedding preferred (Tables 7–9). In Melpa, Pinai, and South African sites the sleeping area is near the back wall of the cave (Figs. 10–11, 3) (Gorecki 1988, 1991; Parkington and Mills 1991). The Australian aborigines sleep at the centers of rockshelters, after clearing these areas of objects (Fig. 5) (Nicholson and Cane 1991). The West Dani at Yeleme-Wang-Kob-Me sleep around hearths in depressions that correspond to domestic units [Fig. 9(2)]. These units are distributed all over the shelter floor. Depending on their village of origin, and hence on their cultural habit, the sleepers either use pandanus mats as bedding or sleep on the bare ground (Pétrequin and Pétrequin 1988). The BergDama who use the Big Elephant Cave also sleep in living hollows, in this case consistently found by the rear wall of the site next to a hearth (Fig. 7) (Clark and Walton 1962). The sleeping area in Melpa sites overlaps with the general domestic activity area and has no fixed position; it can, for example, be by the back wall of the shelter, as at Nip, or in the center of the rockshelter, as at Tembinde (Fig. 10). Using plant materials

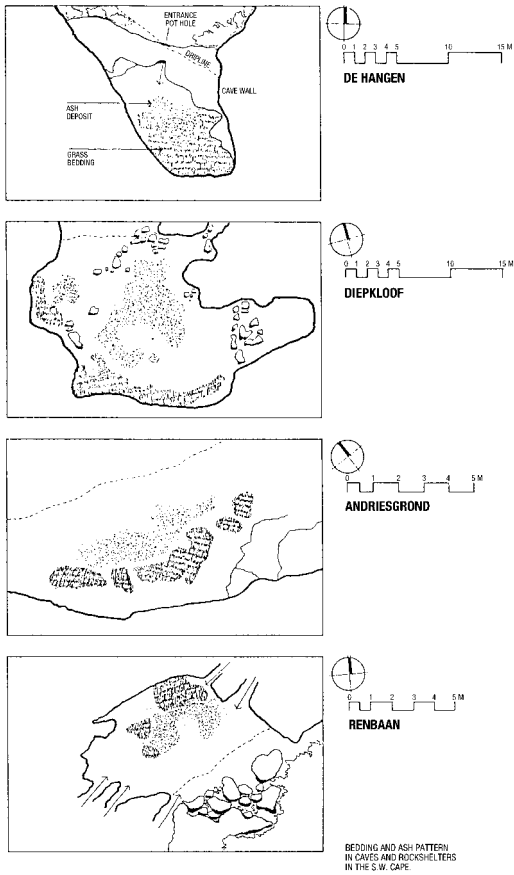


FIG. 3. Plans of four South African c/r (after Parkington and Mills 1991 with kind permission from International Monographs in Prehistory).

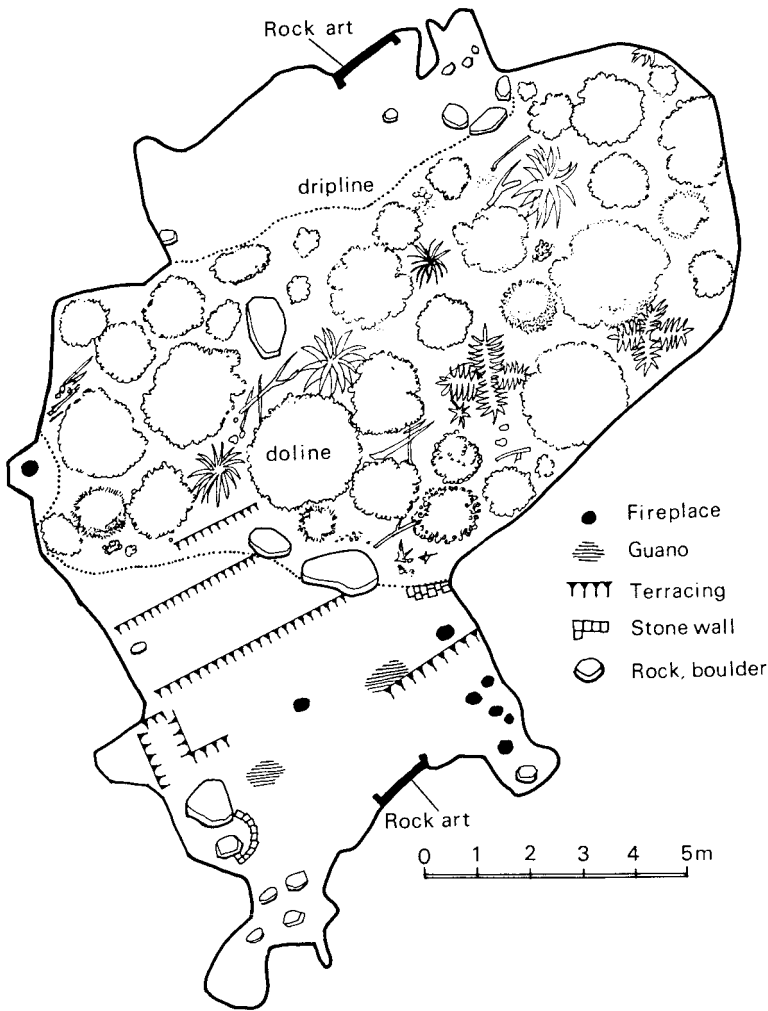
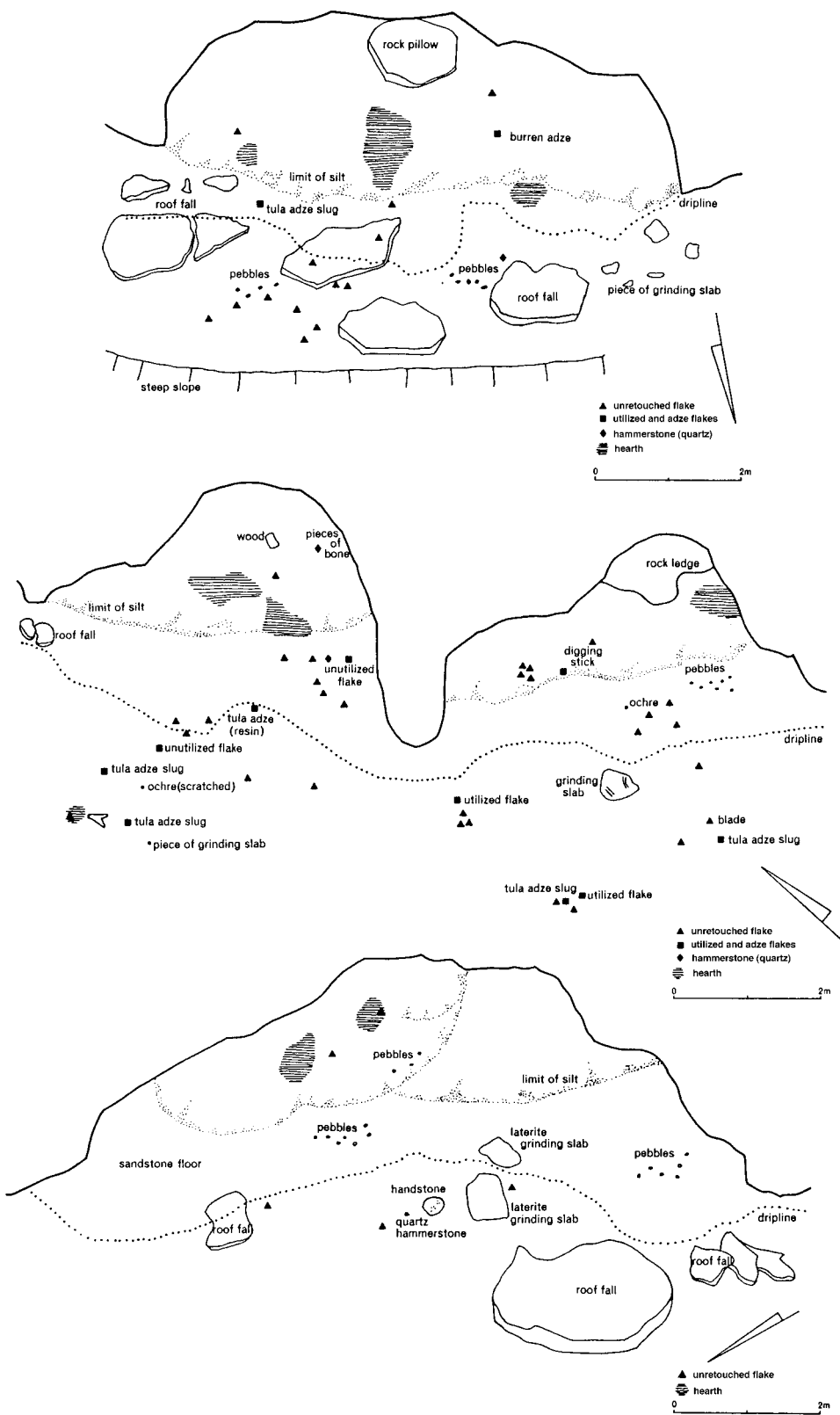


FIG. 4. Plan of Balof rockshelter, New Ireland (after Gorecki 1991 with kind permission from International Monographs in Prehistory).

as bedding and sleeping on the bare ground are the most usual arrangements, but Sandawe and Sawos sites contain wooden beds (Table 9; Fig. 6).

The variation in sleeping arrangements observed in our sample makes it clear that this is another culturally defined variable in spatial adaptation to c/r. Since this is the case, we could obtain far more information from archaeological contexts about how people slept by adopting an inductive research procedure consisting

of a descriptive and a comparative stage. My proposal would be that the researcher should begin by recording the location of the hearth in relation to cave features such as walls, drip lines, or talus slopes, then proceed to consider the site's function and duration of occupation. By this stage he or she will probably have some inkling as to where (if at all) sleeping may have taken place. This suspicion may develop into a plausible hypothesis once the location of the hearth or hearths has been compared



with those of the hearths in other sites used for similar purposes, both within the same region and in other regions. In fact, I would put this point more strongly by saying that *only* by expanding the comparative part of our research can we hope to reconstruct to some extent the sleeping areas and habits of prehistoric foragers.

PATTERNS OF REFUSE DISPOSAL

The spatial configuration of c/r sites is influenced considerably by the ways in which their occupants maintain their camp and dispose of their refuse. These elements of spatial behavior affect the amount of cultural debris left in a site and its arrangement. Patterns of refuse disposal exhibit variation according to consumption habits, religious beliefs, restrictions or taboos concerning what should be discarded and where, and perceptions of what is clean and what is not (Bulmer 1976; Pétrequin and Pétrequin 1988). In some horticulturist sites dogs tend to eat any faunal remains that fall on the floor (Gorecki personal communication, see also Kent 1981).

Two of the sites used by the Sawos contained distinct concentrations of food debris, suggesting that this was selectively discarded in particular areas (Gorecki 1991). At Pakara both bones and plant remains were found adjacent to the hearths, whereas at Marindjila only debris from plant foods was found by the shelter wall and at the center of the site (Fig. 7). The interesting point here is that the third Sawos site in our sample, Adjiga, contained no similar concentration of material. According to Gorecki, this may have had something to do with the dogs that are always found in Sawos sites (*ibid*:249).

The Pinai eat bone marrow and thus produce large numbers of bone fragments that are discarded at random onto the floors of their caves. The Melpa throw food debris away in their activity areas or in the talus. The discard of bones is governed by principles that are specific to their culture. Because the Melpa are afraid of the dark and believe that the smoke from burning bones attracts evil spirits, they never throw bones into their hearths at night. Instead they burn them in the morning or just before they depart from the cave. Although the Melpa and the Pinai occupy neighboring territories, the differences in their consumption and discard behavior mean that Melpa rockshelters are tidier than Pinai ones (*ibid*:246).

Pierre Pétrequin has reported that the West Dani dispose selectively of their refuse in various areas of Yeleme-Wangkob-Me (1988:73). Most food debris (vegetable peelings and certain bones) is discarded toward the rockshelter's talus, whereas bat bones and lizard heads and mandibles are thrown into the hearths (Fig. 9.3). These patterns of refuse disposal generate a robust pattern in the spatial distribution of faunal remains that can be dissected out from the palimpsest created by multiple events of occupation.

The aforementioned examples and the information in Table 10 show that patterns of refuse disposal are so similar within each cultural group as to support the hypothesis that this is another culturally defined variable of site structure. We have seen that patterns of human adaptation to c/r constraints are not universal, since spatial perceptions and feelings about comfort and impurity are culturally specific. The different consumption and

FIG. 5. Plans of Yungubalibanda 1–3 (rockshelters used for habitation), Western Desert, Australia (after Nicholson and Cane 1991 with kind permission from International Monographs in Prehistory).

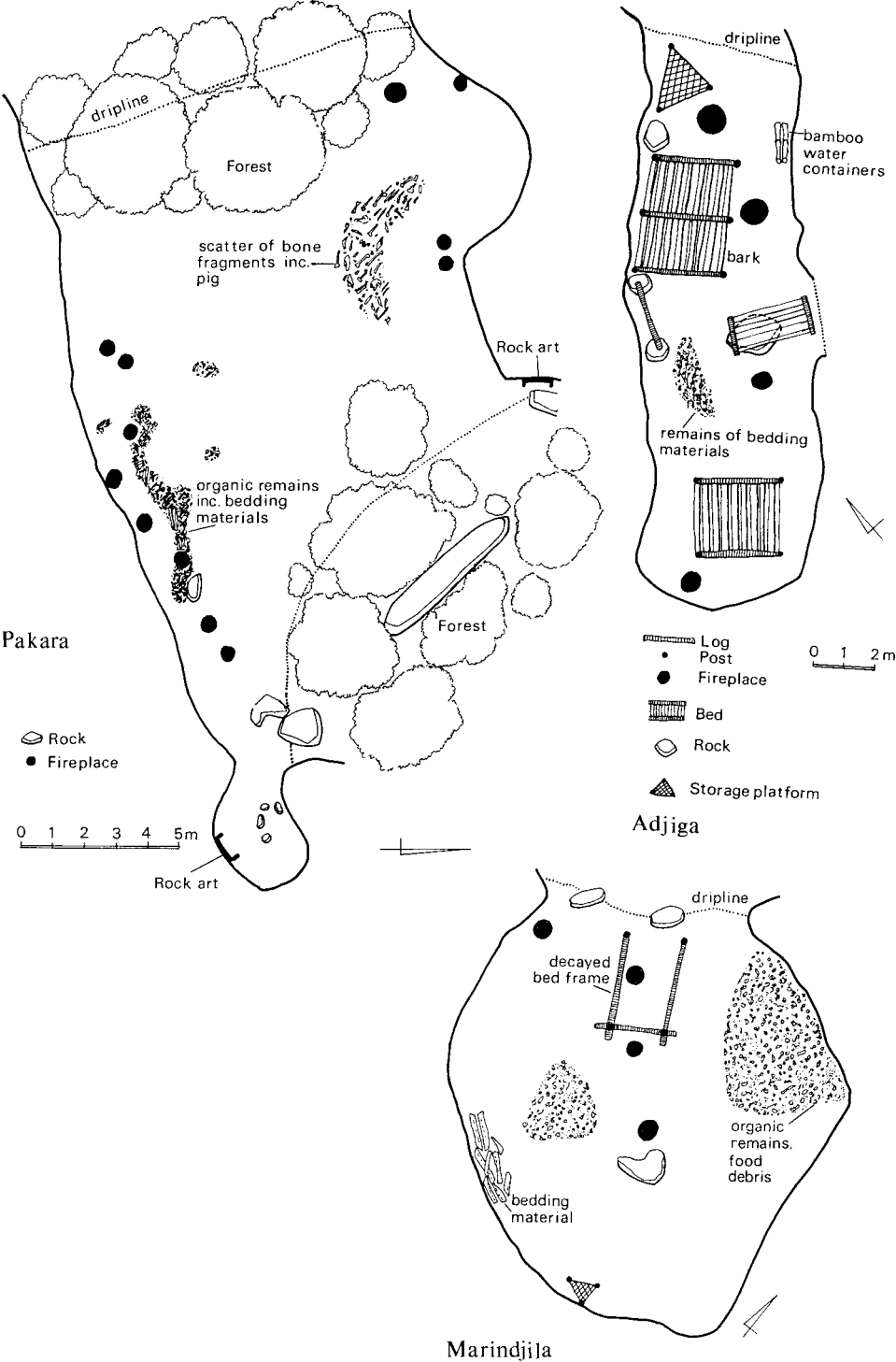


FIG. 6. Plans of Pakara, Adjiga, and Marindjila rockshelters, Chuigai hills, Sawos people, Papua, New Guinea (after Gorecki 1991 with kind permission from International Monographs in Prehistory).

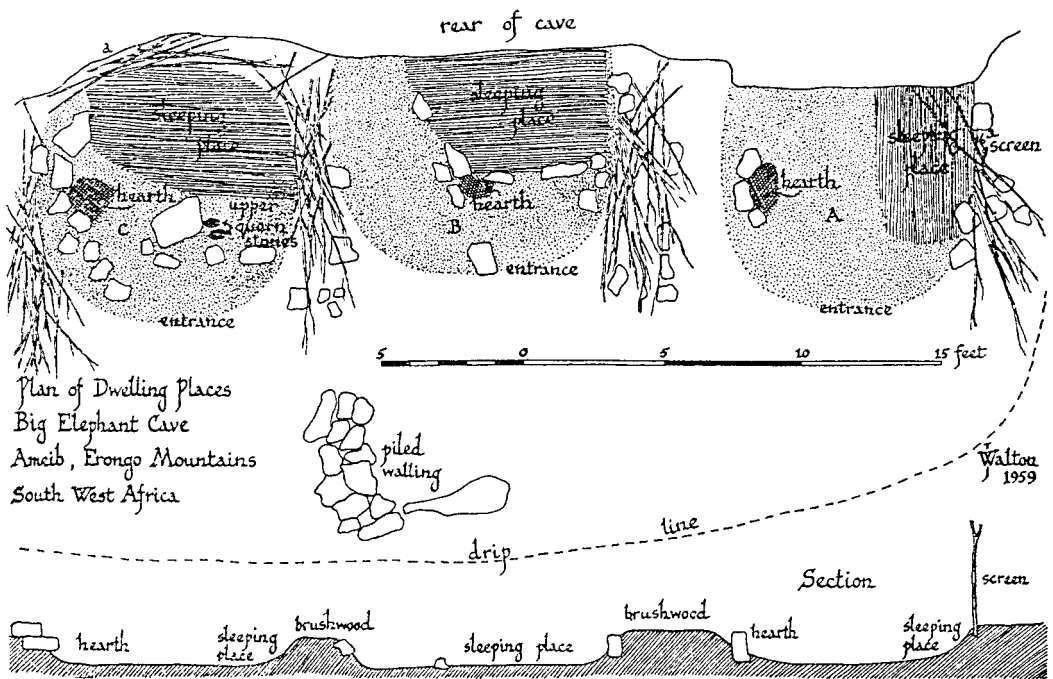


FIG. 7. Plan and section of Big Elephant Cave, BergDama people, Namibia (after Clark and Walton 1962 with kind permission from the Proceedings of Prehistoric Society).

refuse-disposal habits of different cultural groups give rise to sites of variable density and content. The sample of sites examined here has told us nothing about how discard behavior may vary according to the length of time for which the site is occupied, the nature of the activities carried out in it, or the social composition of the occupying group. Although we can safely argue that people discard their refuse in ways specific to their cultures, then, we do not as yet know how useful this general statement is to the study of archaeological contexts. If, on the one hand, the cultural imprint is as strong as our data are suggesting, archaeological sites used by the same cultural group should exhibit identical traits, generated by discard behavior that is specific to that culture. If, on the other hand, the details of an occupation (its length, the nature of the activities performed during it, or the social composition of the occupying party, for instance)

influence refuse disposal patterns more strongly than any cultural imprint, this should be detectable by comparing sites used by the same cultural group but for different purposes. In either case, the only viable way of learning more about discard behavior is to adopt a contextual approach, considering patterns of refuse disposal alongside a site's other traits (its function or any seasonality in its occupation, for instance) and seeking intersite perspectives upon intrasite spatial variation.

ACTIVITY AREAS

Since the 1970s activity area research has been at the core of most archaeological studies of Palaeolithic and Mesolithic spatial organization. In all this time, however, crystal-clear patterns of the sort revealed by ethnoarchaeological studies of open-air camps (Binford 1978, 1983; Yellen

TABLE 5
Types of Hearth in Site by Cultural/Linguistic Group*

	No evidence	Open (a)	Stone- lined (b)	Roasting pit (c)	Firestones (d)	Two types	Three types	Four types	Absent	Total no. of sites
Sandawe					2	2				4
BergDama	1		1							2
S. African indigenous		4								4
Australian aboriginals		11								11
West Dani								1 a-d		1
Melpa				1			1**			2
Pinai			1				1 a,c	1 a-c	1 a-c	4
Sawos		3								3
New Ireland indigenous	2	1							1	4
	3	19	2	1	2	3	2	2	1	35
	(8.57%)	(54.3%)	(5.71%)	(2.86%)	(5.71%)	(8.57%)	(5.71%)	(5.71%)	(2.86%)	(100%)

* Percentage of sites containing that type are shown in parentheses.
** Log-lined hearths, roasting pits, and firestones.

1977) have never been discerned in sites containing palimpsests [although activity area research has proved useful to studies of the use of space by sedentary societies in prehistoric and historical times (e.g., Kent 1984; Whitelaw 1983)]. Even in sites of high spatial integrity, such as Pincevent, multiple analyses of the spatial distribution of finds have failed to pro-

duce any plausible reconstruction of spatial configuration in terms of activity areas (see Carr 1991 for discussion). The activity area has persisted in the literature of spatial analysis because it is more interesting to discuss a site in terms of the activities that were performed there than in terms of the artifact concentrations recorded. We should, nonetheless, question

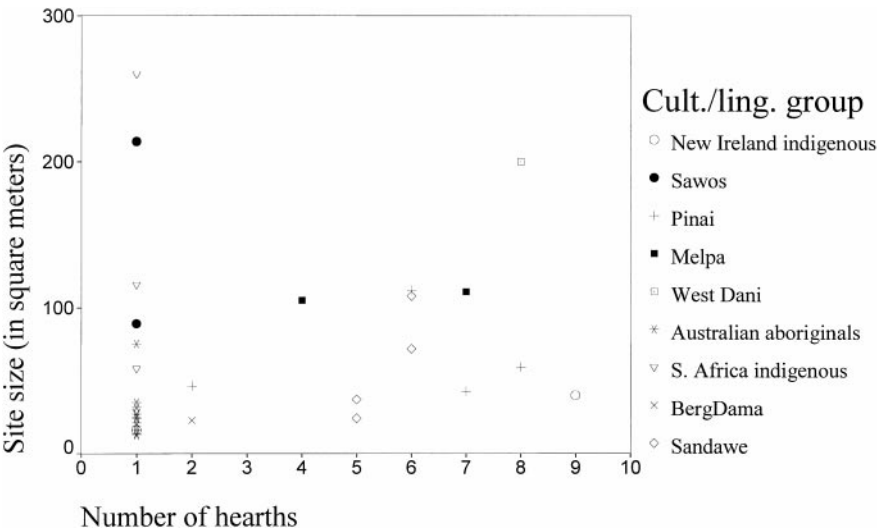


FIG. 8. Scattergram plotting total number of hearths against site area for each site.

TABLE 6
Circumstances in Which Two or More Hearths Are Used during an Episode of Occupation

Cultural group	Social unit	Reason	Source
Western Desert of Australia aborigines	One (e.g., a man and his two wives or two men)	Different activities taking place at different times of day (sleeping, cooking, socializing, and sitting in the sun)	Nicholson and Cane 1991:318
Melpa	One (e.g., a group of men on a foraging expedition)	Different activities taking place at different times of day	Gorecki 1991:241
Sawos	Two nuclear families	One hearth associated with separate domestic area of each group; third hearth used for shared activities	Gorecki 1991:249
West Dani	Two groups of men, from two villages (Yeleme and Faoui) whose habits differ	One hearth associated with domestic unit of each group; third hearth in communal space used for shared activities	Pétrequin and Pétrequin 1988

whether this translation of artifact or eco-fact concentrations into activities is valid (Galanidou 1997b:276–277). In this section I discuss the particular problems associated with attempting to identify and isolate activity areas in caves.

We do not have information relevant to this concept about every site in our sample, partly because some were examined during the absence of their occupants. The sites about which we do have this sort of information (only 11 of 35) fall into three types of arrangement with regard to activity areas (Table 11). In the first arrangement the general activity area overlaps with the sleeping area. This type is represented by two sites used by the Melpa people (Fig. 10) (Gorecki 1991). In the second arrangement sleeping is separated from other domestic activities. This type is represented by the four South African sites and by Big Elephant Cave NW (Clark and Watson 1962; Parkington and Mills 1991). The third type is represented only by Yeleme-Wang-Kob-Me, where, Pétrequin informs us, some activities are

rigidly segregated in space while others overlap (1988) (Table 11). Strict rules thus govern where certain activities should be performed. If we were to draw a cross-cultural conclusion from our sample, we would have to suggest that spatial segregation of individual domestic activities was the exception rather than the rule.

The question that we must answer is whether in archaeological contexts we can hope to identify *which* activities took place *where*. From habitation sites, among others, we recover the debris resulting from what are commonly termed “domestic activities”: stone and bone work; the distribution, processing, and cooking of food; sleeping; eating; and interacting socially.⁵ As we have already seen, cooking and sleeping are associated with hearths and sleeping is sometimes associated with bedding material. This, however, rarely survives in the archaeological record. Ovens are perhaps the only type of hearth that we can definitely associate with food preparation. It is almost impossible to identify the areas in which any other do-

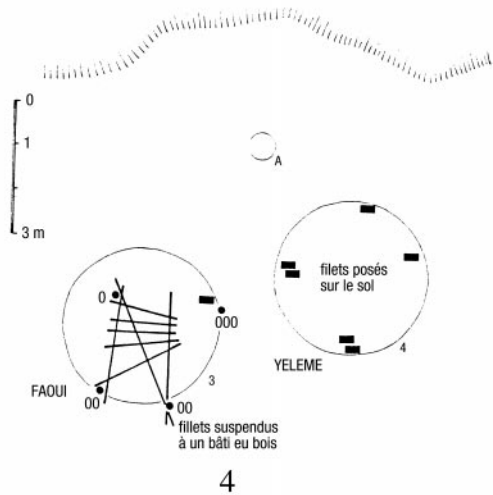
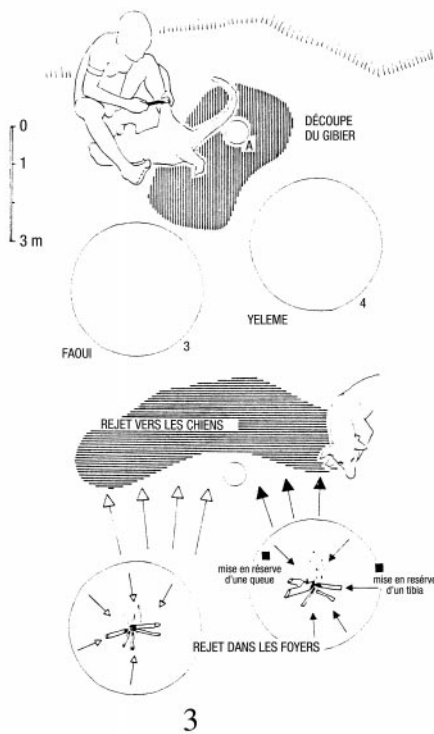
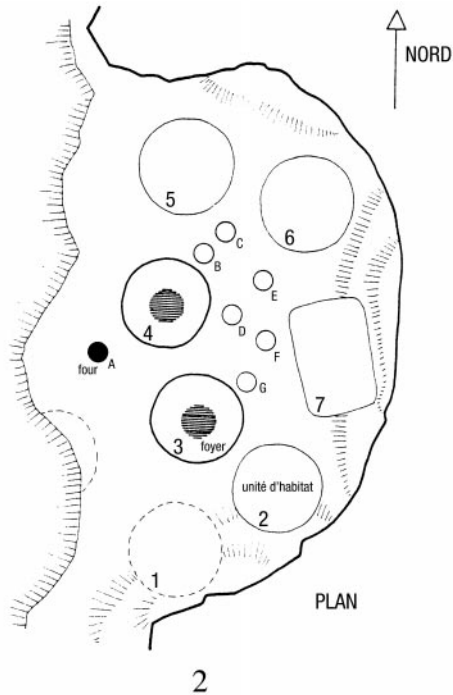
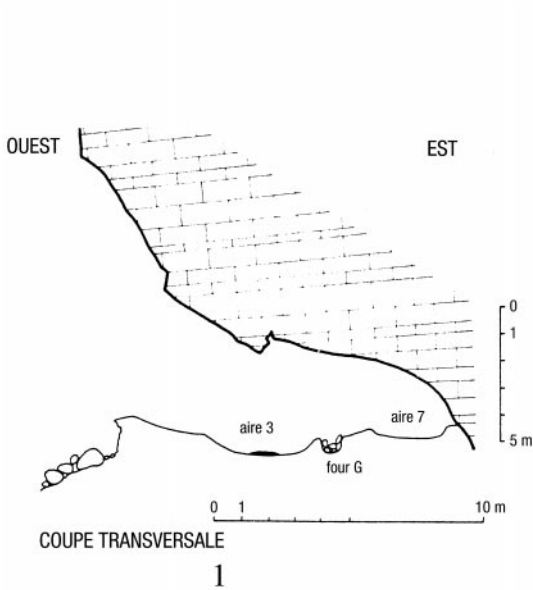


TABLE 7
Sleeping Location by Cultural/Linguistic Group^a

	No evidence	Within domestic depression	By wall	Centre	Activity area	Front	Total number of sites
Sandawe	3		1				4
BergDama	1	1					2
S. African indigenous			4				4
Australian aboriginals	5			6			11
West Dani		1					1
Melpa					2		2
Pinai	1		2			1	4
Sawos							3
N. Ireland indigenous	4						4
Total number of sites	15 (42.86%)	2 (5.71%)	8 (22.86%)	6 (17.15%)	2 (5.71%)	2 (5.71%)	35

^a The number of sites in which that location is used expressed as a percentage of the total number of sites considered is shown in parentheses.

mestic activities were performed. In some cases these activities may never have been confined to any particular area in the first place; in others the palimpsest effect may have obscured the fact that they were originally segregated in space. In either case the resulting debris will have wound up in a midden that we can call the area of general domestic refuse. Once the site has been abandoned it is impossible to work out whether this area contains material in primary deposition overlapping with an area of general activity, material in secondary deposition, or a combination of both. Middens of this sort were present in the majority of the sites discussed in Table 11. In Australian habitation sites, artifacts associated with subsistence activities tend to be found outside the sheltered area (Ni-

cholson and Cane 1991:345). It is, however, impossible to isolate individual activities (to separate the manufacture of stone tools from seed grinding, for example) because it is uncertain whether the artifacts associated with these activities arrived in the area by being dropped, tossed, or re-deposited.

We have seen that some cultural groups may indeed segregate their domestic activities in c/r, whereas others do not. In the former case, however, the constraints imposed by limited space and the superimposition of multiple occupational events upon one another obscure the horizontal and vertical boundaries between the areas in which various tasks were performed. Even when spatial structure is mapped shortly after the occupants have

FIG. 9. Yeleme-Wang-Kob-Me, West Dani, Indonesia. (1) Section; (2) plan; (3) activities around the two habitation units and around the communal hearth; (4) differences between storage patterns of the Faoui and those of the Yeleme (after Pétrequin and Pétrequin 1988 with kind permission from Bulletin du Centre Genevois d'Anthropologie and P. Pétrequin).

TABLE 8
Sleeping Location by Cultural/Linguistic Group Using a Division That Can Be Applied Universally to Caves and Rockshelters and without Taking into Account any Other Purpose for Which the Sleeping Area Is Used (Domestic Activity, etc.)^a

	By wall	Center	Front	Total number of sites
Sandawe	1			1
BergDama	1			1
S. African indigenous	4			4
Australian aborigines		6		6
West Dani		1		1
Melpa	1	1		2
Pinai	2		1	3
Sawos	1		1	2
Total number of sites	10 (50%)	8 (40%)	2 (10%)	20

^a The number of sites in which that location is used expressed as a percentage of the number of sites whose sleeping locations are known is shown in parentheses.

left a site it is impossible to resolve the palimpsest effect. Likewise, it is impossible to distinguish whether debris associated with an activity is in primary or secondary deposition. Discard behavior intervenes between domestic activities and archaeological recovery of concentrations of finds in particular areas. Before we can try to pin down activities to locations, therefore, we must first understand how the group that performed those activities discards its refuse. The multiple uncertainties surrounding the identification of activity areas in sites containing palimpsests (c/r and open-air sites alike) suggest that there is little to be gained by pursuing a research design that focuses exclusively on activity areas.

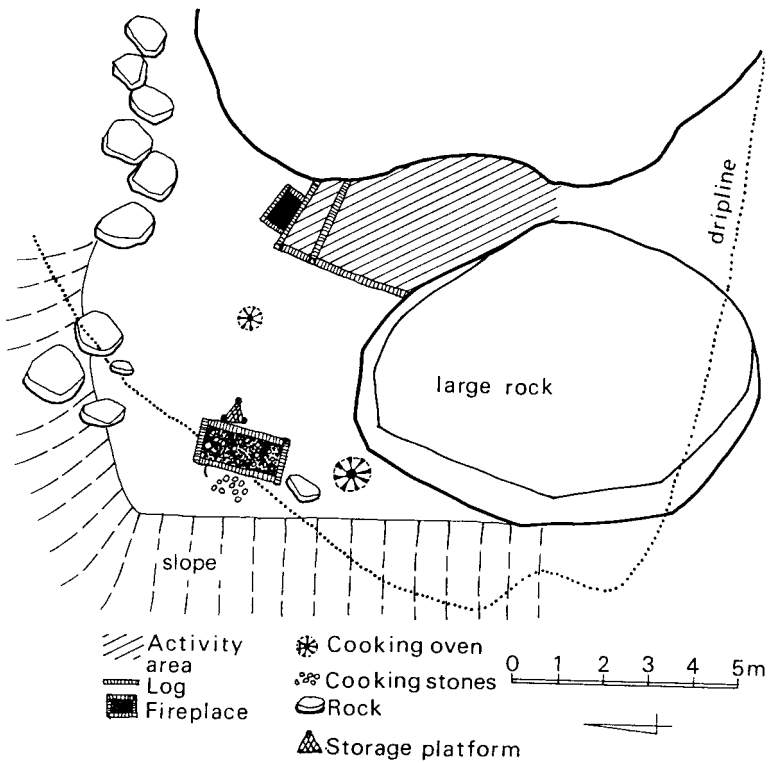
SIMILARITIES BETWEEN c/r AND OPEN-AIR SITES

The spatial adaptations to caves and rockshelters examined here have required various levels of energy investment. In

TABLE 9
Bedding Type by Cultural/Linguistic Group*

	No evidence	Wooden bed (a)	On plant bedding (b)	On bare ground (c)	More than one type (b,c)	Total number of sites
Sandawe	3	1				4
BergDama	1		1			2
S. African indigenous			4			4
Australian aborigines	10		1			11
West Dani					1	1
Melpa				2		2
Pinai			3	1		4
Sawos		2	1			3
New Ireland indigenous	4					4
Total number of sites	18 (51.43%)	3 (8.57%)	10 (28.57%)	3 (8.57%)	1 (2.86%)	35

* The number of sites containing each bedding type expressed as a percentage of the total number of sites considered is shown in parentheses.



Nip

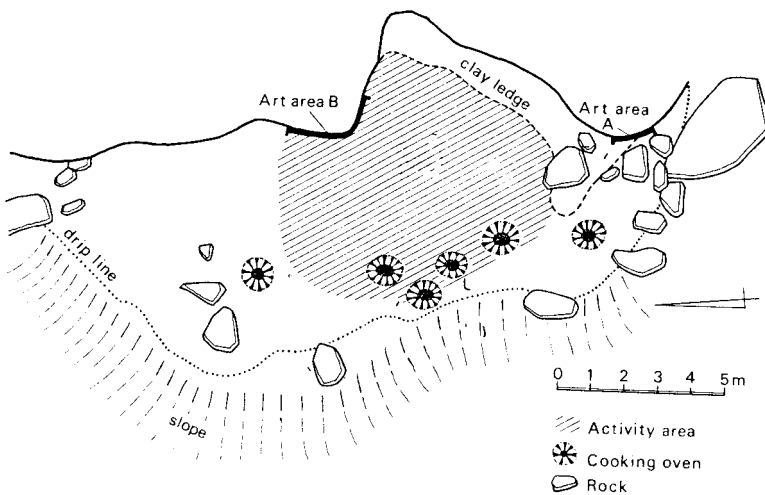
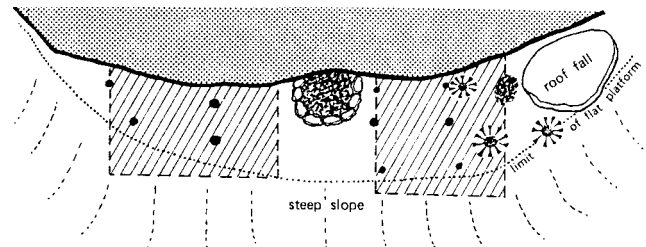
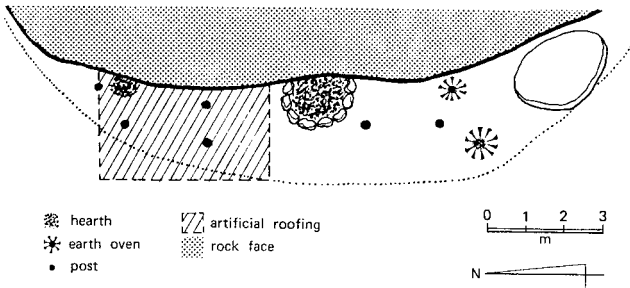


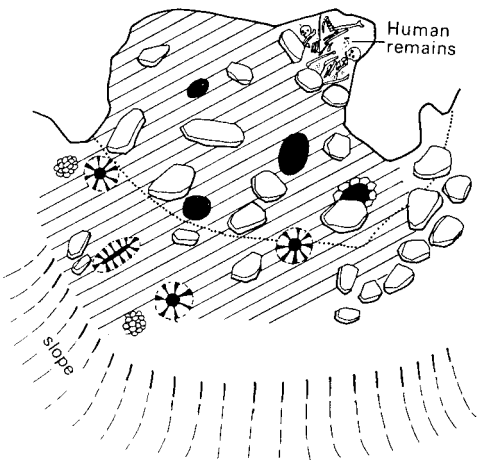
FIG. 10. Plans of Nip and Tembinde, Jimi valley, Melpa people, Papua, New Guinea (after Gorecki 1991 with kind permission from International Monographs in Prehistory and Paul Gorecki).



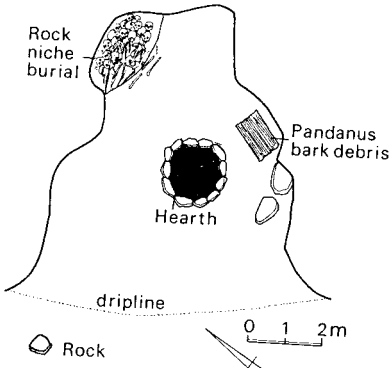
Ritamauda shelter, Upper Yuat: May 1983



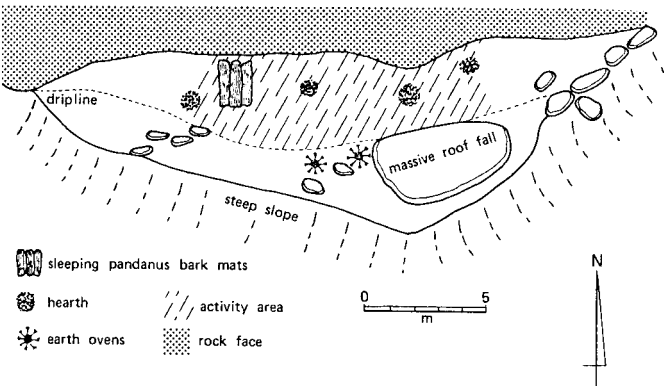
Ritamauda shelter, Upper Yuat: July 1983



Ailegun



Luanana



Kanamapim shelter, Upper Yuat

TABLE 10
Discard Locations and Types of Refuse

Site	Cultural/linguistic group	Discard location
Big Elephant Cave NW	BergDama	Inside the hollows, which act as middens
De Hangen	S. African indigenouss	Coterminous with activity area
Diepkloof	S. African indigenous	Coterminous with activity area
Andriesgrond	S. African indigenous	Coterminous with activity area
Renbaan	S. African indigenous	Coterminous with activity area
Yungubalibanda 1	W. Desert aboriginals	Mainly beyond drip line, some in front and central parts of site
Yungubalibanda 2a	W. Desert aboriginals	Everywhere
Yungubalibanda 2b	W. Desert aboriginals	Mainly beyond drip line, some in front and central parts
Yungubalibanda 3	W. Desert aboriginals	Beyond drip line and in rear part
Yungubalibanda 4	W. Desert aboriginals	In central part
Yeleme-Wang-Kob-Me	West Dani	Food debris (vegetable peelings and certain bones); in area (toward talus) in which firewood and dogs are kept; bat bones and lizard heads or mandibles; in hearths.
Tembinde Kumanga	Melpa	In activity area and talus
Nip	Melpa	In activity area and talus
Kanamapin	Pinai	Plant remains and bones thrown everywhere on the living floor
Ritamauda	Pinai	Plant remains and bones thrown everywhere on the living floor
Luanana	Pinai	Plant remains and bones thrown everywhere on the living floor
Ailegun	Pinai	Plant remains and bones thrown everywhere on the living floor
Marindjila	Sawos	Organic remains and food debris in two middens inside drip line
Pakara	Sawos	Two distinct piles inside drip line; one of plant remains and one of faunal remains

some cases considerable energy is invested in dividing space so as to reenact the forms of structures that the group would use in an open-air settlement. In others a bare minimum of energy is invested in simply kindling a hearth. The Australian and South African hunter/gatherers follow the latter course. The aboriginal campsites in the Western Desert are minimally furnished. Open hearths

are their main habitation feature, with the occasional addition of artificial mounds to prevent water from flooding the camp (Nicholson and Cane 1991:288) (Fig. 5). Open hearths were also the only evident features of the South African sites. According to Parkington and Mills, South African hunter/gatherers adapt c/r exactly as they would bush camps, hardly changing their environment at all (1991:359)

FIG. 11. Plans of Ritamauda, Luana, Ailegun, and Kanamapin rockshelters, Yuat gorge, Pinai people, Papua, New Guinea (after Gorecki 1988, 1991 with kind permission from Paul Gorecki and International Monographs in Prehistory).

TABLE 11
Segregation of Activities and Location of Activity Areas by Site^a

Site	Cultural/linguistic group	Spatial segregation of activities	Location of activity area
Big Elephant Cave NW	BergDama	Sleeping separated from domestic activities	Inside the hollows
De Hangen	South African indigenous	Sleeping separated from domestic activities	Under or just in front of rock overhang
Diepkloof	South African indigenous	Sleeping separated from domestic activities	Under or just in front of rock overhang
Andriesgrond	South African indigenous	Sleeping separated from domestic activities	Under or just in front of rock overhang
Renbaan	South African indigenous	Sleeping separated from domestic activities	Under or just in front of rock overhang
Yeleme-Wang-Kob-Me	West Dani	High	Bone and stone working, consumption of food, sitting and sleeping; within domestic unit around hearth. Manufacture of axes and wooden harpoons; outside depression in communal activity area. Butchering of animals and meat sharing; around oven in communal activity area. Storage of personal belongings: on perimeter of habitation unit.
Tembinde Kumanga	Melpa	Sleeping area coterminous with general activity area (where eating, and bow-and-arrow manufacture/maintenance take place); cooking done just inside dripline away from sleeping area	Inside dripline, extending from back wall to talus
Nip	Melpa	Sleeping area coterminous with general activity area; cooking done just inside dripline or at center, away from sleeping area	Inside drip line, near back wall (delineated by logs)
Kanamapin Luanana	Pinai Pinai		Inside drip line Inside and outside drip line
Adjiga	Sawos	Entrance communal area for smoking, playing, and talking	

^a Only those sites from which we have obtained data of this sort are recorded here.

(Fig. 4). Gould (1971) has observed the same sort of similarity between the open-air camps of modern aboriginals and the

Puntutjarpa rockshelter in the Australian Western Desert.
Division of c/r space into smaller units

has been recorded at four sites. The first two, used by BergDama hunter/gatherers, were found in the Big Elephant Cave in Namibia by Clark and Walton (1962). Two sets of roughly circular depressions, defining domestic units, had been dug in the floor of the cave, one set in each of the two sites into which the cave is divided. The depressions in the northwest site were to the rear of the cave (Fig. 7). They were separated from each other by brushwood screens and contained hearths and beds (made of plant materials). The depressions in the northeast site were smaller, revealed no traces of bedding or screens, and appeared to be much older than the ones to the northwest. We have no information about the social composition of the groups that used the depressions.

Pétrequin and Pétrequin report that at Yeleme-Wang-Kob-Me differentiation between the domestic and the communal domain is achieved by means of two different types of space division, one physical and one symbolic (1988). The physical division involved circular and rectangular depressions (Fig. 9). During the episode of occupation recorded two depressions were used, one accommodating four men from the village of Yeleme and the other a similar number from the village of Faoui. Each depression delimited its group's domestic area and had a fireplace at its center. (Depressions of this sort are sometimes used repeatedly during successive episodes of occupation.) Outside the depressions, in the communal space, activities such as stone or bone working and roasting and sharing game took place. Although the men from each village had their own way of using the "private" space of each depression (this could be seen in the manner in which they stored their personal belongings, for instance [Fig. 9(4)], both groups shared a single attitude to sitting down in the communal area: it was strictly forbidden to sit on the bare rock or earth. This relates to the symbolic

division of the site into areas of different degrees of impurity. The Pétrequins have shown that the organization of space that they encountered at Yeleme-Wang-Kob-Me transposed the spatial arrangement of the "men's house" (buildings in each village used for social, political, and religious purposes by men only) into this temporary rockshelter habitation (*ibid*:76–80).

The Melpa people who stay for short periods at Nip also incorporate elements of their permanent settlement into this temporary one. The Melpa use logs as pil- lows in their permanent dwellings. At Nip they choose logs as their means of dividing space tangibly, using them to delineate the overlapping sleeping and domestic activity areas (Fig. 10). The perimeter of the hearth immediately beside this area is also marked by logs.

The sizes of the sites that are divided into smaller units range from small through medium to large (Table 2). This clearly suggests that the size of the area used during an event of occupation is not directly related to the amount of space available. It appears more likely that certain groups use the space inside caves so as to reproduce the familiar spatial arrangements that they prefer in their open-air settlements.

It is also evident that a group's technical skills and experience of certain construction materials produce distinctive spatial patterns inside caves. This can be seen at Nip and also at Balof, a site used by the indigenous people of New Ireland, who divide up its space by means of terraces and stone walls (Fig. 4). There are similar structures in the stone-walled ridgetop villages that are their permanent settlements (Gorecki 1991). When setting up camps in naturally confined locations, these people make the same technological choices and use the same materials as they would if they were constructing a settlement or camping in the open air.

This last observation raises a number of questions. Do all cultural groups reproduce distinctive forms of spatial organization when camping in caves? How do the character of the occupation and the social composition of the occupying group affect these spatial arrangements? How many of these patterns are archaeologically visible? The second site used by the Melpa people, Tembinde, shows that our sample can give us no unequivocal answers to these questions. There are no logs at Tembinde. We do not know, however, whether site formation processes have destroyed logs that were once there or whether there never were any logs (Fig. 10). To answer our questions more satisfactorily would require a much larger sample of data. Nonetheless, the data to hand show that more often than not the layout of living surfaces in c/r incorporates at least some of the arrangements that the occupying group would make in an open site. Our data also suggest that the constraints imposed by a cave do not prompt cross-culturally uniform spatial adaptations, that each cultural group occupying a c/r uses its own particular technical skills and preferred materials to create in its temporary dwelling the living conditions with which it is familiar. Finally, our sample is sufficient to confirm that archaeological visibility should by no means be taken as read. Yeleme-Wang-Kob-Me shows us that site structure may not merely consist of its evident features, but may entail conceptual or symbolic organization of space. This sort of structure does not, of course, leave any tangible remains and thus does not survive in the archaeological record.

SITE FURNITURE AND GROUP IDENTITY

Site furniture is any artifact, feature, or structure that has been made or brought into a site to facilitate human activity. The plots showing the presence or absence of

certain site features and items of furniture suggest that there is a certain amount of consistency in the selection of artifacts and features found in the majority of the sites used by each cultural or linguistic group (Figs. 12–18). In many cases the most robust pattern is seen in the absence of certain categories of artifact or feature from the sites used by a single cultural group.

As we saw in the previous section, dug-out hollows that defined domestic areas were found in the two sites used by the BergDama and at Yeleme-Wang-Kob-Me. Windscreens were consistently present in all but one of the Sandawe sites (Fig. 13). The South African sites invariably contained sleeping hollows (Fig. 3). Walls made of stone were present in three of the four sites studied in New Ireland and in Big Elephant Cave (Fig. 14). Artificial sand ridges were raised at the edge of the site to stop water from getting in only at Australian habitation sites (Fig. 15). Grindstones were recorded in sites used by the Sandawe, the BergDama, and the Australian Western Desert aboriginals (Fig. 16). Only three of the rockshelters examined in New Guinea had stone-lined hearths; all three were in the Yuat gorge, and all three were used by the Pinai people (Table 5, Fig. 17) (Gorecki 1988, 1991). Not all of the Pinai sites contained stone-lined hearths, however (Fig. 11). Similarly, wooden beds were found only in sites in the Chuigai hills that were used by the Sawos people, but not all of the Sawos sites contained wooden beds (Fig. 18) (Gorecki 1991). Site furniture appears to be a strong cultural marker regardless of whether a site is as minimally furnished as the South African c/r or whether a lot of energy has been invested in creating built-in beds, storage platforms, or stone walls.

The site structure of Yeleme-Wang-Kob-Me acts as a marker of a gender-specific spatial organization of activities.

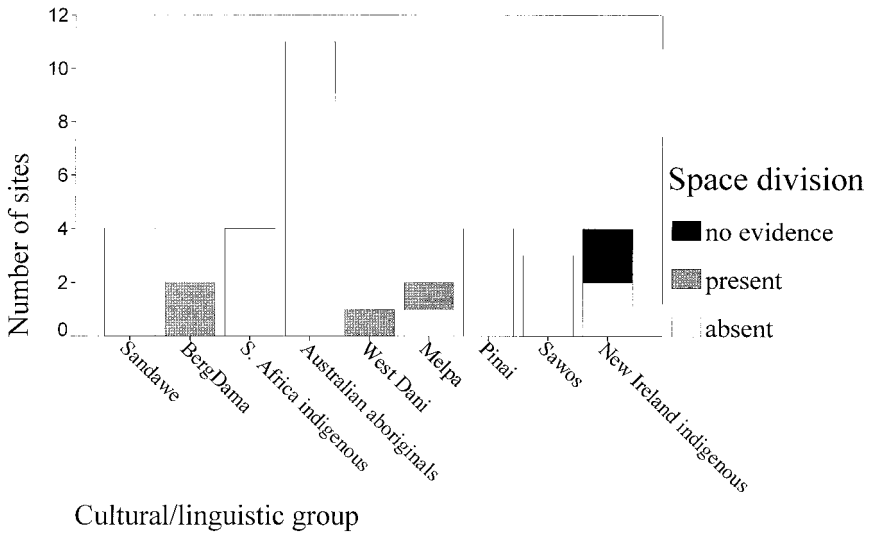


FIG. 12. Bar chart showing presence/absence of space division.

Yeleme-Wang-Kob-Me is used as a temporary camp during expeditions to quarry basalt and manufacture axes, which are subsequently exchanged for pigs. Women are strictly excluded from these expeditions, and it is therefore significant that the spatial organization should reproduce the arrangement of the equally gender-

specific “men’s house” (Pétrequin and Pétrequin 1988). The grindstones in some of the Australian Western Desert habitation sites have also been associated with gender-specific activities. It has been argued that grindstones are gender-specific artifacts used by married women, who, it is asserted, keep an upper and a lower

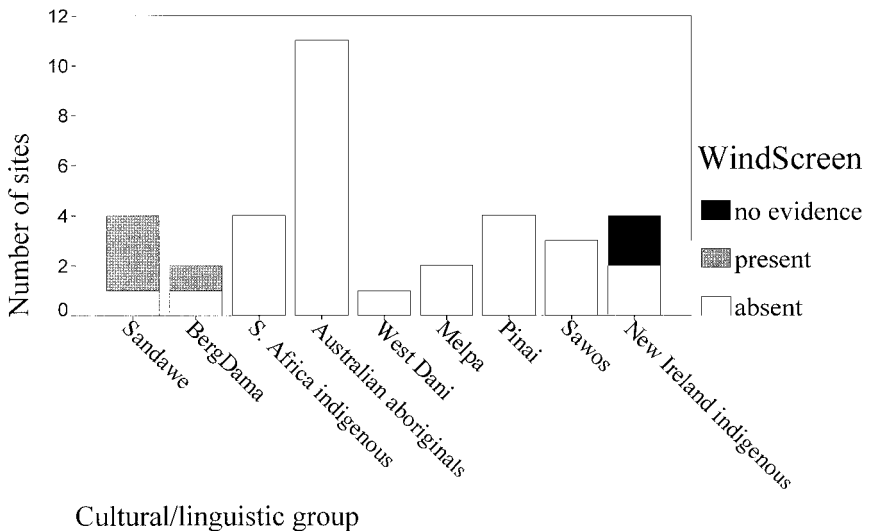


FIG. 13. Bar chart showing presence/absence of windscreens.

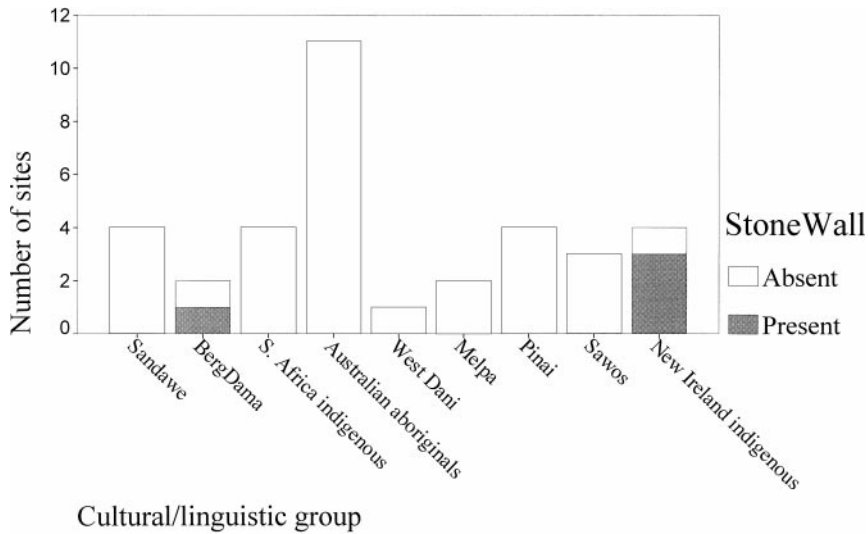


FIG. 14. Bar chart showing presence/absence of stone walls.

grindstone at each of the camps they visit regularly (Peterson 1968; Nicholson and Cane 1991). If this is true and if it can be assumed that none have been stolen, then the number of grindstones found will show how many family units regularly use the site.

Site structure can, like other aspects of

material culture, have a twofold function. During an occupation it expresses the occupying group’s ideas about spatial organization, thus ensuring familiarity and comfort. Cultural variation in site structure can, however, also be a means of non-verbal communication that transmits a message about cultural identity and rights

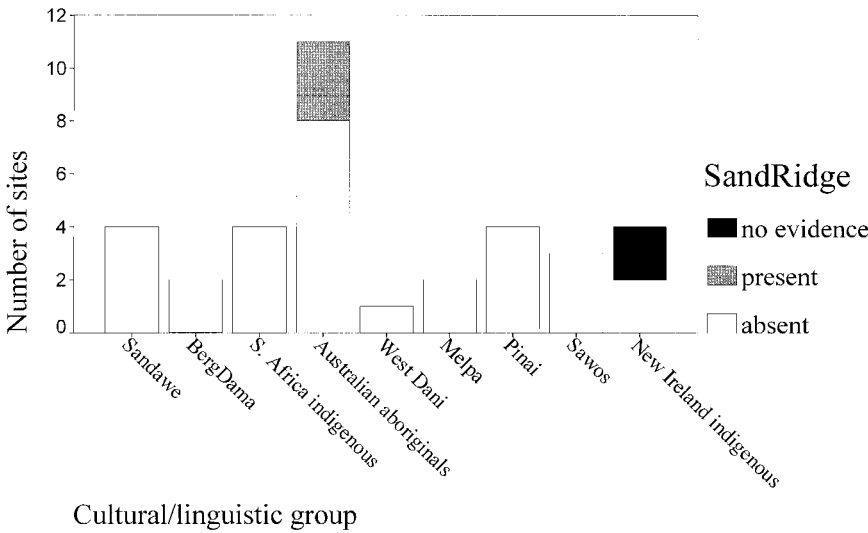


FIG. 15. Bar chart showing presence/absence of artificial sand ridges.

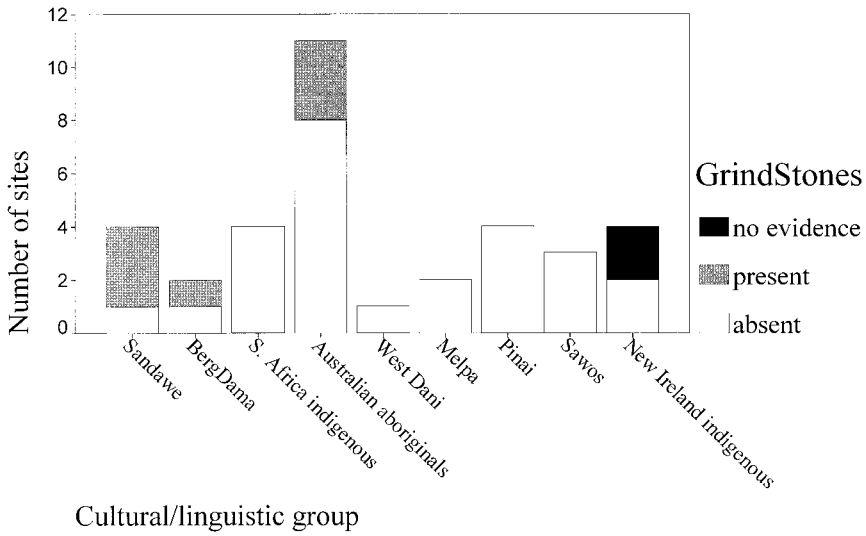


FIG. 16. Bar chart showing presence/absence of grindstones.

of access to rockshelters, as in Papua New Guinea. Caves and rockshelters used by groups that exhibit territoriality are regarded as resources within that group's territory. During the period that elapses between two occupations of a site, its site structure acts as a marker that lays claim to the site. A review of the literature listed

in Table 2 reveals that the rights of access to a c/r are always clearly defined. They belong either to a cultural group or to some subdivision of this group such as a family, a gender group or an individual. They are never shared by two or more different groups. Gorecki has informed us that rockshelters near tribal boundaries in

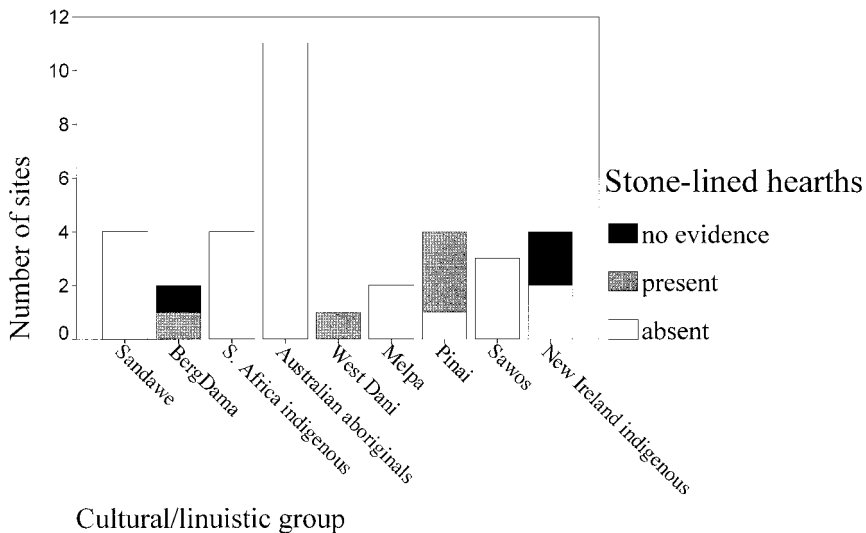


FIG. 17. Bar chart showing presence/absence of stone-lined hearths.

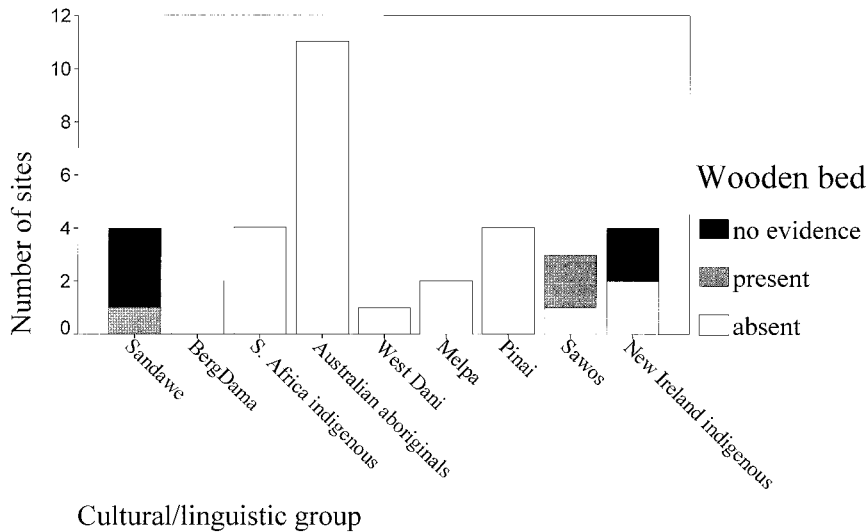


FIG. 18. Bar chart showing presence/absence of wooden beds.

Papua New Guinea are often inspected to establish whether any other tribe has been making use of them, by implication intruding upon or “stealing” a resource (personal communication). In the absence of the “rightful owners” of these sites, their site furniture clearly announces their identity and their claim to certain rights over the surrounding territory.

The particular spatial site structure of a cave or rockshelter is the result of a certain group’s way of adapting to specific constraints, and as such it signals group identity. It follows that site structure should have redundant characteristics that transcend individual episodes of occupation. This point may prove useful in making inferences about archaeological sites. We do not know whether any pre-historic foragers organized themselves territorially (see Layton 1986 for a discussion of territorial organization among modern foragers) or whether, if so, they expressed group identity and negotiated boundaries using spatial site structure as a means of nonverbal communication (Lightfoot and Martinez 1995). It would, however, be extremely interesting to test a

working hypothesis that they did so against the archaeological evidence.

DISCUSSION

The sample of sites discussed here, albeit small, illustrates the diversity of the ways in which different groups use c/r space. We have seen that these natural niches are resources whose size does not affect whether they are occupied or for how long. Although the sort of space they offer is much the same across the globe, each cultural group adapts to that space in a different way according to how it perceives and experiences space. This is best illustrated by Papua New Guinea, where c/r space is used in highly variable ways even though the c/r are used for similar purposes by groups who share the same habitat and have identical modes of subsistence.

Spatial adaptations to c/r may involve physically altering their topography, organizing their space conceptually, or doing both. Some groups set up camps in c/r in much the same ways as they do in open-air locations, using the technical skills and

spatial archetypes embedded in their culture or social category to produce the sort of spatial configuration to which they are accustomed.

Overall differences were observed between forager and horticulturist use of space. The sites used by the Australian and South African foragers are minimally furnished and lack durable structures of any sort. The West Dani at Yeleme-Wang-Kob-Me dig depressions in the shelter's floor and organize its space symbolically so as to make it a metaphor for their "men's house." Other horticulturist groups in New Guinea whose background is fairly sedentary choose to invest their time and energy in lining hearths with stones, in constructing wooden beds and tables, or in making artificial roofing. The data to date thus suggest that more energy is invested in the construction of habitation features by horticulturists than by foragers.

Our sample thus contains evidence of cultural and economic variation in site structure. We have also seen that the spatial structure of separate sites used by a single group may be different, as in the case of certain sites used by horticulturists such as the Sawos and the Melpa (Figs. 6 and 10). Although the small size of our sample and our lack of detailed site biographies do not permit elaboration on this issue, we may suspect that this difference probably relates to differences in site function or in the social composition of the occupying parties. In other words, it probably reflects variability in the identity of the occupants. For example, different gender or age groups within the same community may experience and use space in different ways. Bob Layton has recorded gender-specific rockshelters at Uluru (Ayers Rock) in central Australia, where Tjukutjapi and Pulari are associated with women's rituals and Warai Yuki and Kulpi Mutitjulu with men's rituals (personal communication).

Our review has shown that hearths domesticate a natural cavity by offering focal points around which humans can act and interact. They divide space physically and conceptually into smaller units according to the needs and beliefs of the occupying party. They are thus structural elements of spatial organization and media for the reproduction of spatial forms familiar to the occupants of c/r. We have seen that there is no evidence that the presence of hearths whose construction demands a high energy investment (stone-lined, log-lined, ovens) is related to longer term occupation. The forager groups in our sample consistently used a single type of hearth, either open or stone-lined, in more or less the same place with regard to the shelter's walls and the talus. The horticulturist groups were less consistent in their choice of hearth type and location. The number of hearths in a site does not appear to be a function of the size of the shelter. Instead, it is associated with a group's attitude toward hearth reuse, with the character of the activities carried out there and with the social composition of the occupying party. The type of hearth chosen, its location, and whether it is reused are three variables that are very important to the study of site structure in archaeological palimpsests.

Some of the sites in our sample were examined while their occupants were present. Their activities were recorded as preparing and consuming food, manufacturing objects, participating in leisure activities, and sleeping. When sites were examined in the absence of their occupants, although their floors could be divided into zones containing different densities of material (see Pakara and Marindjila in Fig. 6, for example) or concentrations of a particular type of find, it was impossible to relate these zones with any certainty to any specific activity. This is mainly because in the absence of the occupants there is no evidence to show whether

finds ended up in their current locations by being dropped, tossed, lost, or intentionally or unintentionally redeposited. It was, moreover, impossible to identify the habitation features that had been used contemporaneously or to distinguish the boundaries of the most recent living floor. This is because cultural material and features from previous occupations are incorporated into every current living surface. Amid this palimpsest we can only identify redundant patterns of site structure that may or may not correspond to activity areas.

A number of lines of evidence suggest that the c/r used intermittently by certain territorial groups tend to contain very similar site furniture not only because it provides them with familiar living conditions while they are occupying these resources, but also because it establishes their right of access to them even while they are somewhere else. In other words, spatial site structure in c/r serves just the same purpose as style does in material culture: it conveys information about group identity to target groups (Conkey 1990; Wiessner 1984, 1985). Architectural form, like stylistic form and the iconography of artifacts, is commonly considered to be an emblem of group identity that can permit such identity to be established in archaeological contexts (Shennan 1989). Architecture is a set of recurring processes that involves imagining, planning, constructing, and maintaining built structures. If we expand this definition to include spatial adaptations to c/r, which in effect comprise the same series of processes, though carried out inside an existing structure rather than involving the construction of something new from scratch, the relevance of c/r palimpsests to the discussion of social identity immediately becomes clear. By opening up our discussion in this way we can extend it much further back into a period from which very few architectural remains, in

the traditional definition of that term, have survived. This approach seems likely to be of enormous benefit to Palaeolithic and Mesolithic research.

A new approach to the sort of spatial variation exhibited in Palaeolithic or Mesolithic sites would not attempt to reconstruct individual moments of space use, but would instead seek redundant patterns (patterns that run through more than one event of occupation) in spatial structure. This approach could develop in several directions. The version that I favor would seek to identify (1) the type of any habitation structures present and their disposition in relation to each other and to certain universal features such as back walls, drip lines, and talus slopes; (2) the density and composition of the assemblages found around hearths or other elements of site furniture; (3) the methods of refuse disposal used; and (4) whether hearths were reused.

Within this approach the appropriate unit of analysis might be the layer (if that were sufficiently extensive), the stratum (comprising more than one layer), or, in some cases, the entire site. Choosing so large a temporal unit should not be problematic if we seek to identify patterns that are the result of repetitive spatial behavior rather than of individual episodes of deposition of cultural debris.⁶ The method essentially involves the same assumptions as those that a lithic specialist makes when he/she decides to study a site's lithic technology not by means of refitting, but by observing change through time.

Describing a site's spatial configuration should not be an end in itself, but a means of coming to certain conclusions about the Palaeolithic or Mesolithic society that gave rise to it. Once the general traits of a site's spatial structure have been identified, an attempt should be made to establish how these patterns are linked to the site's role within a larger-scale settlement

system and to compare them with the spatial patterns of other sites. Few comparisons of this sort have as yet been made (although see Galanidou 1999 and Kind 1985), but the undertaking promises to increase our understanding considerably. For example, it could reveal whether common patterns of spatial organization can be identified in sites whose functions were similar or in sites that are in the same region.

Archaeological excavation of a c/r site almost invariably results in the recovery of a palimpsest resulting from several occupational episodes. I have argued in this article that it is both useful and valid to study palimpsests in terms of large-scale, repetitive patterns of spatial variation. My survey has shown that the spatial site structure of c/r bears a very strong cultural imprint. This general statement is not, of course, the whole story; we have still to explore the individual traits and the amount of deviation from cultural norms that variation in site function may generate. We should also begin to treat redundant patterns in the use of c/r space as an aspect of material culture that may well have much more to tell us about cultural and social identity, never forgetting that intersite comparison is vital to our understanding of intrasite spatial variation.

Perhaps the most significant implication of this survey is that only if we are prepared to alter our theoretical expectations and our research strategies will we be able to extract new information from the Palaeolithic and Mesolithic spatial record. We still do not know how detailed or how useful to our discussion of past societies this information will turn out to be, but we are never going to find out unless we start somewhere. The potential value of the approach that I propose remains to be evaluated by means of future site-scale and intersite comparative studies of spatial patterns.

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NOTES

¹ From now on caves and rockshelters will be referred to in the text as c/r.

² As we have varying amounts of information about these sites (Table 1), most of the fields in the database used in this analysis are categorical variables recorded as presence/absence.

³ Where the investigators have not specified a site's size, it has been calculated approximately from the published plans.

⁴ The Melpa people kindle a fire as soon as they arrive at any rockshelter, using firewood that is already there. Before they go, they stockpile some more wood for the use of whoever uses the site next (Gorecki 1991).

⁵ The spectrum of activities performed in a habitation site is certainly much broader.

⁶ I have shown elsewhere that it is possible to describe palimpsest sites in terms of their spatial properties, albeit not at the sort of degree of resolution that is necessary if specific moments in the past are to be reconstructed (Galanidou 1997a).

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