

**PLATYPUS ROCKSHELTER (KB:A70), S.E. QUEENSLAND:  
STRATIGRAPHY, CHRONOLOGY AND SITE FORMATION**

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**INTRODUCTION**

Platypus Rockshelter is an archaeological site within a double-chambered weathered cavity in conglomerate cliff on the Brisbane River some 60km from the city of Brisbane. It was originally recorded by Richard Robins in 1976 during archaeological impact work associated with the building of the huge Wivenhoe Dam on the Brisbane River just upstream from Fernvale (Figure 1). A small fossicker's hole revealed stratified cultural deposits which were considered to warrant salvage excavation before the site was drowned by the dam waters. This project was subsequently undertaken by J. Hall and archaeology students from the University of Queensland between November 1977 and July 1981. In 1985 the dam waters rose sufficiently to cover the site. This paper is the first of three in this issue of QAR which report the findings from Platypus Rockshelter and deals primarily with the site's stratification, chronology and formation.

**THE SITE AND ITS SETTING**

Platypus Rockshelter is one of a series of weathering cavities in an outcrop of Mesozoic conglomerate, some 20m above the Brisbane River on the north flank of Pine Hill near the town of Fernvale (Lat. 27° 21' 57" S. ; Long. 152° 36' 41" E.). This site is actually made up of two adjoining cavities, the smaller some 12m and the larger some 18m long. The larger cavity extends for some 4.5m inside the dripline, the smaller for some 3.0m. The ground surface of the larger chamber slopes steeply towards the dripline and appears to have been reworked by seepage emerging from the rear walls. In the smaller chamber, a near-level bench of occupation deposits has been truncated by dripline erosion and slumping. A gentle slope of reworked deposits extends beyond the dripline and then steepens above a large block of conglomerate which has fallen from the cliff above. At the eastern end of the small chamber a residual deposit of blocky cobble clay adheres to the rear wall. Its upper surface slopes to the centre of the smaller chamber.

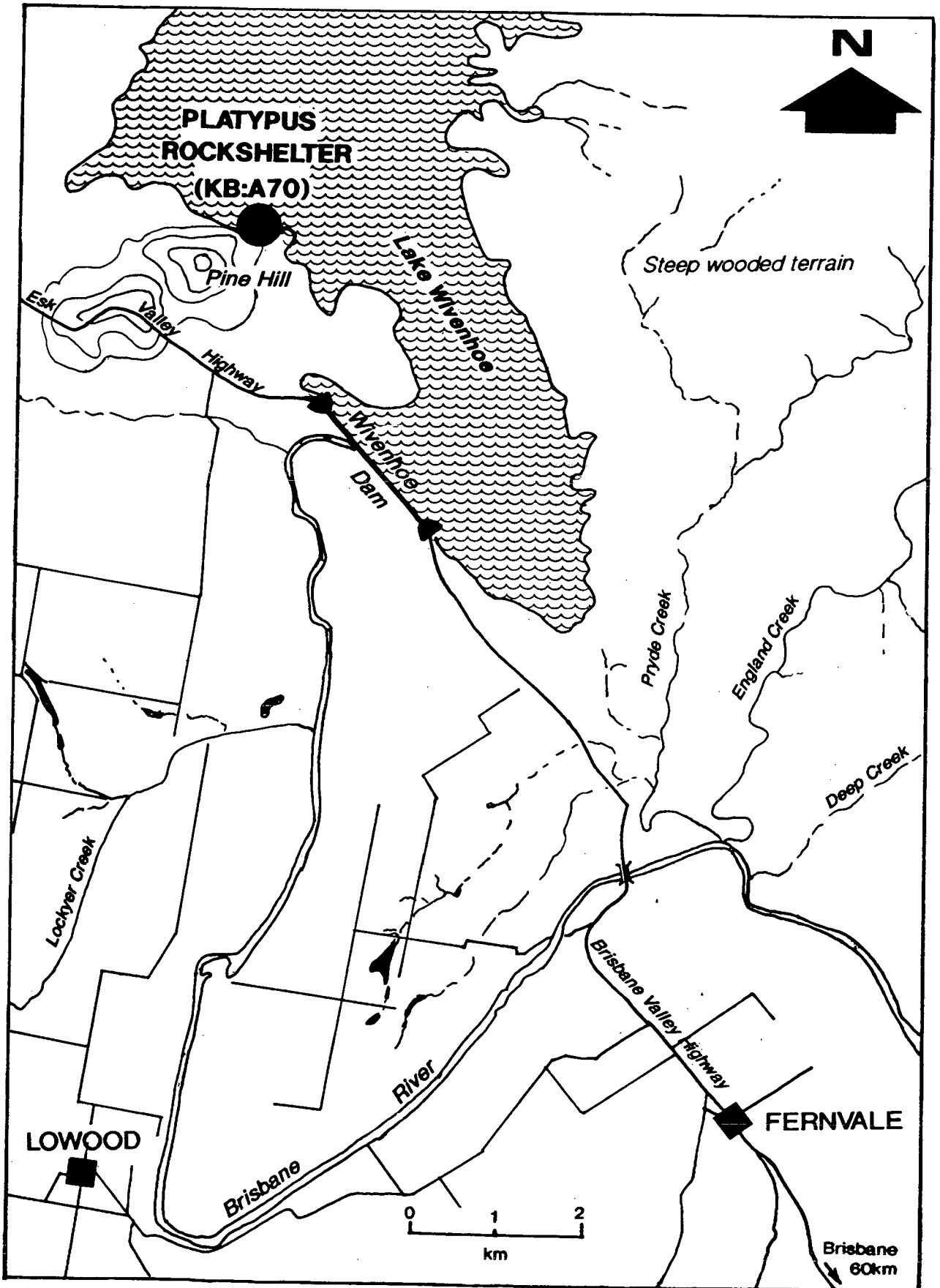


Figure 1. Map showing location of Platypus Rockshelter (KB:A70).

A line of similar weathering cavities extends along the base of the cliff which is the result of meander incision by the Brisbane River. Above the cliff, steep straight slopes extend to the summit of Pine Hill, while below the cliff, convex slopes (ca. 35°) extend to a narrow construction terrace about 1m above low water level (prior to flooding of the Wivenhoe Dam). The cavities have formed at the junction of a conglomerate unit and a pebbly sandstone. Structural benches are present at this point and these have a thin veneer of alluvial soil. The cavities, which are variable in size from small pockets (1-2m long) to large rockshelters like Platypus, appear to be the result of seepage water sapping the base of the cliff by hydration (Ollier 1984:237). The level of the largest rockshelters accords with the remnant second terrace of the Brisbane River which, at this point, is 50m above sea level. The likely age of this terrace, which has well-developed duplex soils, is possibly last Interglacial in age (Beckmann and Stevens 1978), and may provide a limiting age for the cavities.

In the general study area the Brisbane River runs through the subcoastal zone of the Moreton Region. This zone supports lowland eucalypt open forests which, although variable in terms of communities due to microenvironmental differences, provide the majority of habitats for most animal species (Lilley 1984). The site locality, prior to clearance for the Wivenhoe Dam, exhibited fringing and gallery forest as well as aquatic habitats which harboured a variety of animals; some of these moved to this locality from the surrounding eucalypt open forests during drier seasons (Lilley 1982:21).

#### EXCAVATION

After first constructing a 2m x 2m alpha-numeric grid (subdivided into 4 x 1.0m x 1.0m units) over the site (see Figure 2) a 2m-wide trench was dug (in 1-metre-wide units) from the talus slope into the smaller of the two chambers in order to expose the site stratigraphy. The small shelter was chosen because the fossicker's trench had revealed rich cultural material and because the deposits appeared less disturbed and than those in the larger chamber. This phase of work employed arbitrary excavation units (5-10cm) until natural layers were discovered, after which 5cm units were employed within natural ones. In order to gain better control over the recording of deposits excavation procedures were changed after the first field season to incorporate the "bucket" method developed by Johnson (1979). All excavated sediment (apart from bulk samples) was sieved through a nest of 6.0mm and 3.0mm sieves.

As this was a salvage excavation, it was considered important to excavate as much of the site as practicable before the site became inundated by the rising waters of the Wivenhoe Dam. Thus, 23m<sup>2</sup> were excavated in the smaller chamber, 16m<sup>2</sup> of which were excavated to bedrock. Two small (50cm x 50cm) pits were dug in the larger chamber and both revealed thin undifferentiated and disturbed deposits. Consequently, salvage strategy dictated concentrated excavation of the small chamber which contained the better integrated sediments. Hence, this report concerns only the results from the small chamber.

#### STRATIGRAPHY

Excavation revealed a complex stratigraphic sequence of deposits which was divisible into seven stratigraphic units on the basis of

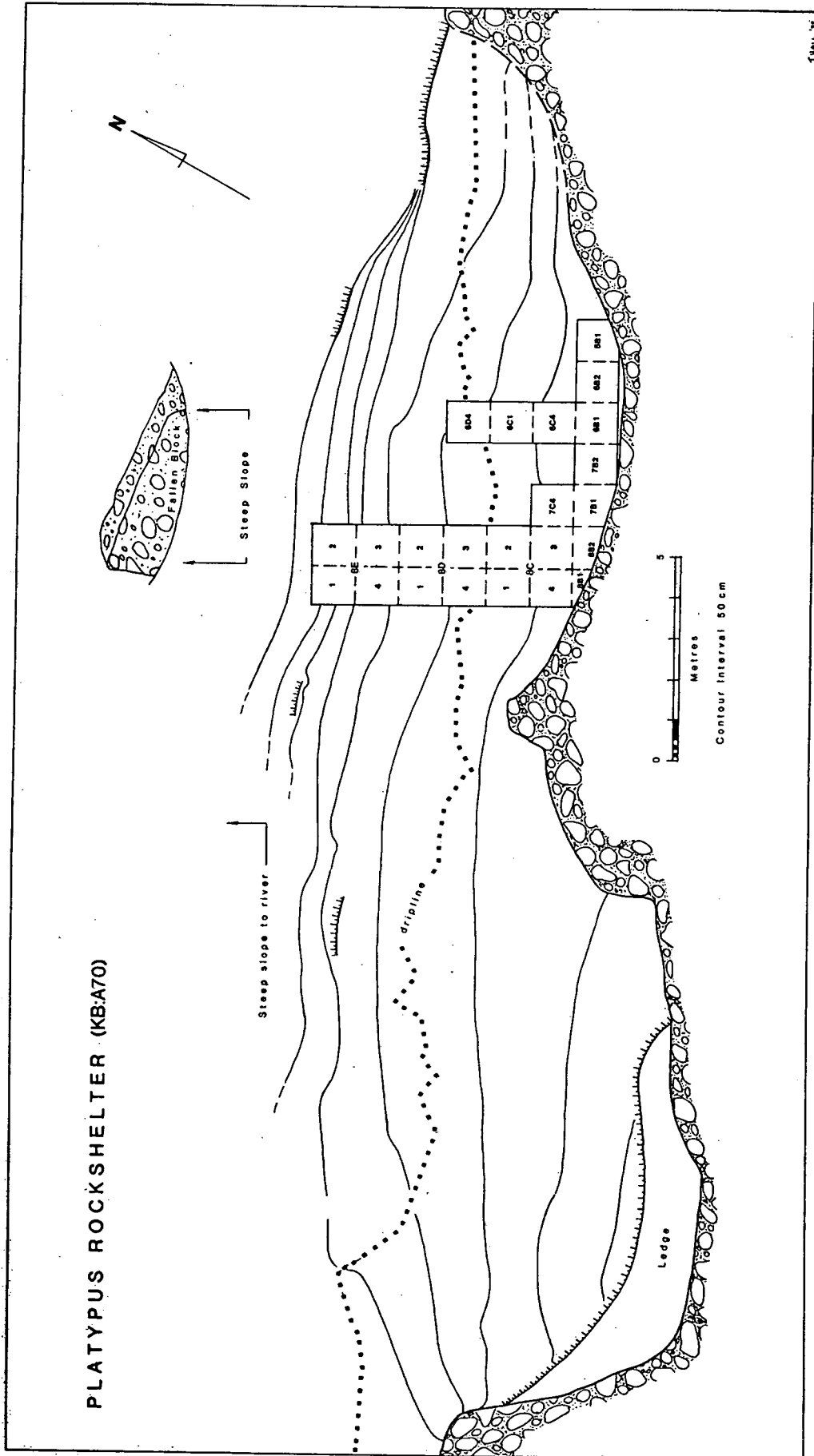


Figure 2. Site plan of Platypus Rockshelter.

colour, texture and content. The complexity derived from the nature of geomorphic processes involved in site formation and this aspect will be dealt with in a later section of this paper. Composite stratigraphic profiles are given in Figures 3 and 4 and the stratigraphic units (SU's) are defined below.

The deposits were essentially of two types. Five units contained undifferentiated to weakly laminated strata containing cultural material whereas two units were composed of a thin relatively undisturbed layer of cultural debris lying on a compacted surface and sandwiched between layers of the former type. These thin strata have been called "living floors" as they conform to Bordes' (1975) original definition of a largely undisturbed ancient surface upon which people camped and discarded the products of their activities (see also Margada-Campbell 1986). If subsequent site abandonment is of sufficient duration and/or if subsequent deposition is sufficiently rapid to permit the burial of such cultural remains with sediment, then a living floor may be created. If human visits are more frequent or post-occupation deposition less rapid, then a mixing of later with previous cultural material may occur; this mode is consistent with the first type of deposit.

**SU1** - This unit comprises the apex of an apron of slumped and washed sandy silty clay incorporating sub-angular pebbles and cobbles as well as cultural material. Munsell colours ranged from brown (7.5YR 4/3) inside the dripline to dark greyish brown (10YR 4/2) beyond the dripline. SU1 began just inside the dripline and sloped away to the S.W. at an angle of 15-20°. Outside the dripline it carried a mat of low vegetation and exhibited incipient soil profile development. At the dripline the sediments were more sandy and gravelly within a shallow (ca 20cm) trench (ca 120cm wide at surface) running parallel to the cliff face (see Figure 3). This feature is thought to be the result of sediment sorting by water at the dripline, the finer sediments being washed downslope. At about 10cm below the ground surface, a thin layer of freshwater mussel shell in Grid Units 6D4 and 6C1 (Figure 3) indicated human activity on an old surface. Although it was not defined as such, it may represent another living floor. A large anvil (a river cobble with impact pits on its upper surface) was found at the interface of SU1 with SU7; this is also suggestive of human activity on the SU7 surface outside the dripline (Figure 3). SU1 was up to 60cm thick and disconformably overlay SU7, the explanation of which is given in the site formation section of this report.

**SU2** - A stratum of dry, ashy, dusty soil containing cultural material which was restricted to the rear of the shelter within Grid Units 6B2 to 8B1 (max. length 6m). It had a maximum thickness of 12cm where it met the rear wall of the shelter and wedged out to SU3 at some 60cm (max.) forward of that point.

**SU3** - A thin (ca. 2.0cm) layer of relatively abundant cultural material (shell, stone artefacts, bone, charcoal). As the scatter of mussel shells included very few broken examples, this unit is considered relatively undisturbed. SU3, being sandwiched between SU2 and SU4, was found to be continuous only where SU2 existed above it. Beyond this point it was indiscernible from SU4 fill which formed the site's surface for a short distance (see Figure 3) The cultural material lay in a loose sandy matrix which lay on a harder-packed surface. Due to its integrity and its disconformity with SU4 below, it was considered a good example of a living floor and thus warranted stratigraphic differentiation.

**SU4** - A very weakly stratified ashy deposit of up to 16cm thick in the rear of the shelter which contained cultural material. In Grid Unit 6C4 it extended 1.5m from the rear wall and was at least 7m wide (from square 5B1 to 9B2). It underlies SU3 where that layer exists; where it does not, the top of SU4 comprises the modern surface until it meets SU5 and SU6 (see Figure 3).

**SU5** - A second living floor of about 2cm thickness which, like SU3 above, was composed of relatively undisturbed charcoal, bone, mussel shell and stone artefacts in a loose matrix lying disconformably on a harder-packed surface of SU6. It was discernible only where it was sandwiched between SU4 and SU6; thus its extent mirrors that of SU4 (see Figure 3).

**SU6** - A weakly stratified ashy soil below SU5 which exhibited a maximum thickness of 18cm and rested disconformably on SU7. It contained a cultural assemblage throughout and extended some 10m along the rear of the chamber and up to 2m out from the rear wall. While discrete patches of charcoal and ash, associated with more compacted soil, were found near the interface of this unit with SU7 below, the discontinuity of such features did not permit an interpretation of other living floors. Nevertheless, such features did permit the inference that SU6 comprises more than one occupation episode.

**SU7** - A continuous pebbly and stony silt-clay deposit disconformably overlain by SU6 in the rear of the chamber and SU1 in the front and beyond the dripline. Between these units it formed the surface of the site (Figure 3). It overlies the conglomerate floor of the shelter. Normally the deposit was yellowish brown in colour but where burning in SU6 above has occurred the deposit is discoloured a reddish brown (probably through burning of the SU6 sediments above). This unit has been subdivided into three sub-units on the basis of cultural remains and texture. Unit 7a sediment was quite compacted but below it was looser, more gravelly and stony and incorporated the cultural remains found in SU7. Below this the sediments of SU7b were more sandy and were culturally sterile. The basal sediments (SU7c) were made up largely of weathered cavern floor debris.

#### C14 DATES AND CHRONOLOGY

Charcoal samples were selected from five localities in the deposit and submitted for radiocarbon determination of age. The resultant ages are given in Table 1 in both C14 years b.p. and calibrated into years B.P. using the CALIB (Rev. 2.0) software program (Stuiver and Reimer 1986).

Table 1. Radiocarbon ages and calibrated dates for Platypus Rockshelter.

Stratig. Unit	C14 age (years bp)	Lab. No.	Calib. age (years BP)	Calib. range two sigmas
SU1 (15-20cm)	560±60	Beta 3076	541	500-660
SU3	2420±90	I 11094	2356	2200-2749
SU5	2480±70	Beta 3075	2479*	2339-2749
SU7 (top 2cm)	3850±170	SUA 1502	4237	3726-4819
SU7 (16-22cm)	4540±80	Beta 3074	5305	4873-5446

\* Youngest of three possible calibrated dates (2701, 2658, 2479)

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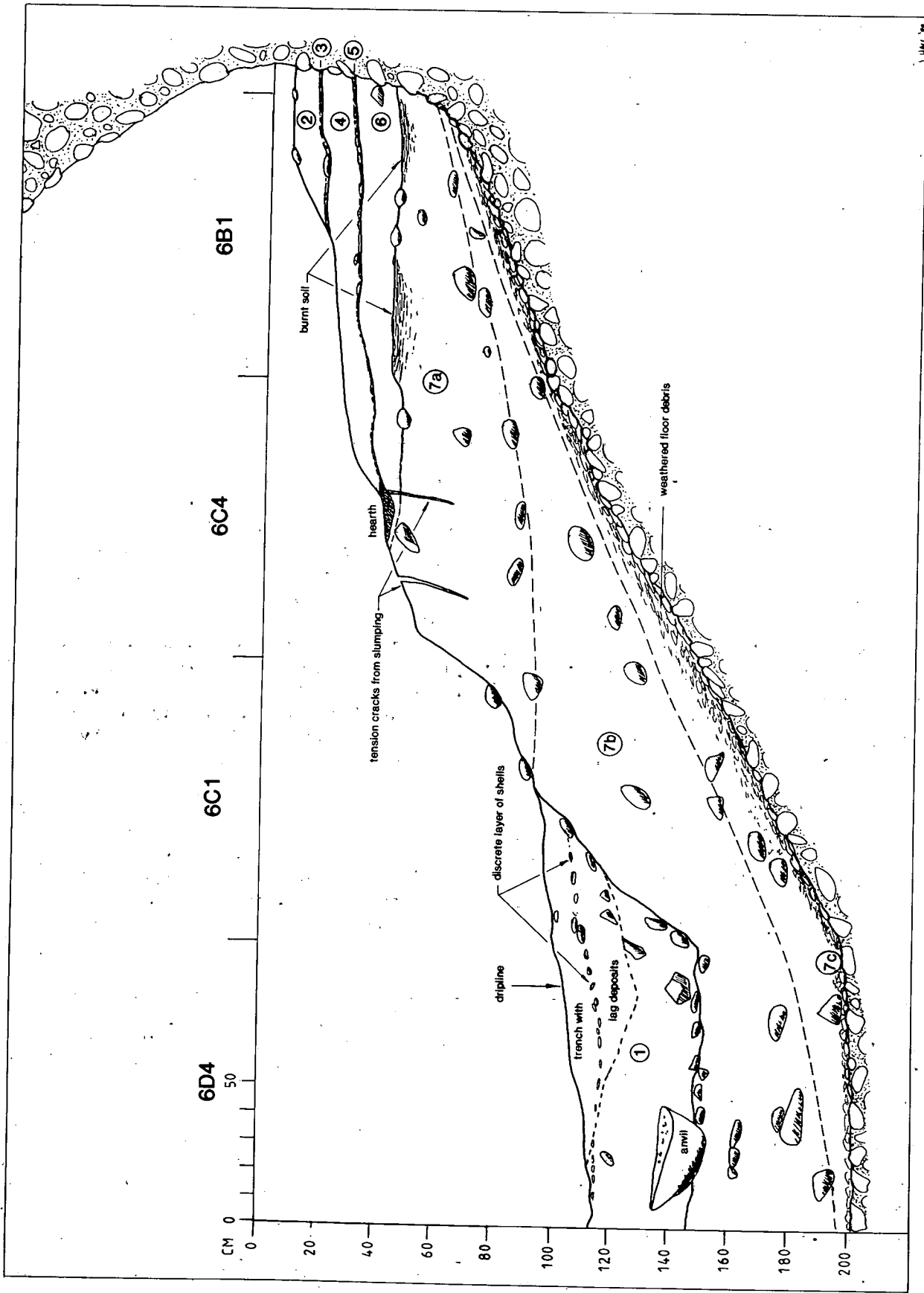


Figure 3. Composite stratigraphy (NW-SE) in small chamber, *Platypus* Rockshelter.

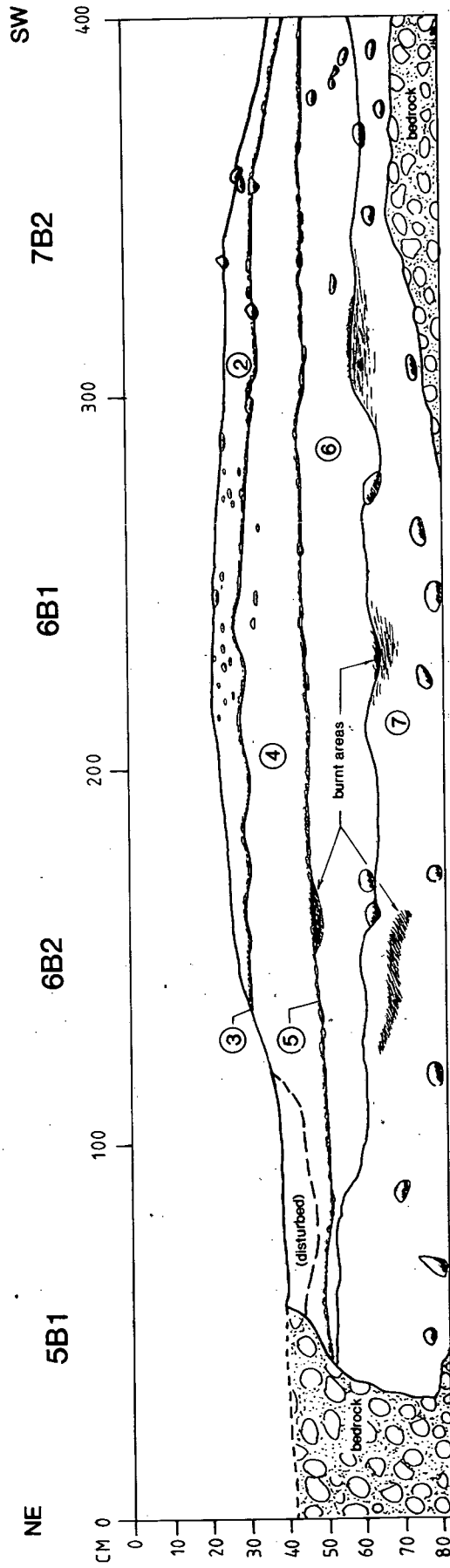


Figure 4. Composite stratigraphy (NE-SW) at rear of small chamber, Platypus Rockshelter.

This internally consistent dating series adds support to field observations that this site exhibits stratigraphic clarity (albeit quite complex) and indicates that Platypus Rockshelter was used by humans from over 5000 years BP until the recent past. The basal date of 5305 BP came from Excavation Unit 4 in Grit Unit 7B2, only 15cm (av.) above the bedrock floor and the lowest XU found to contain cultural material in this square. Although SU7 deposits in other squares exhibited a greater thickness, it is doubtful that they would yield a significantly earlier occupation since cultural deposits appear to give way to sterile ones at about the same relative level (SU7b) in SU7 throughout the site.

It is inferred from the series that the rate of cultural deposition was not uniform over the past 5000 years or so. The dates bracketing SU5-SU2 indicate a rapid deposition whereas it took at least 1000 years for the top 22cm of SU7 to be deposited. Although no date is yet available for SU6, on chrono-stratigraphic grounds it must have been deposited within the ca. 1750-year period between 2479 BP and 4237 BP. This issue concerning age, depth and deposition is dealt with in a separate paper concerned with change and periodicity of occupation (Hall and Hiscock 1988).

#### SITE FORMATION

The horizontal disconformity which was found to exist between SU1 in the front and SU's 2,3,4, and 5 in the rear of the smaller chamber, posed a problem in terms of interpreting the site's formation until weathering cavities elsewhere along the cliff were examined. Investigation showed that these ranged from empty to full of sediment and that the full cavities exhibited an apron of soil which had built up within and outside their driplines (Figure 5a). Some caverns were devoid of such an external apron but contained soil inside with a "sheared" vertical face parallel to the cliff, suggesting that a once-existing apron had, through downslope instability or some other agency, collapsed and left a truncated deposit within the shelter (Figure 5b). Some cases also exhibited a new incipient apron well below the truncation (Figure 5c). This variability, coupled with results of particle size analysis of the sediments from the site, permitted the development of the following geomorphic model of site formation which explains the stratigraphic disconformity noted above.

Granular disintegration of the conglomerate matrix results in periodic fall of cobbles and pebbles; and the build-up of weathering debris from roof fall keeps pace with bedrock retreat, resulting in the formation of a cavity which becomes almost filled with its weathering products. A mound of such material thus fills each cavity and its upper surface slopes back into the cliff. Erosion of soil through runoff occurs on the hill above the cliff and this material also adds to the mound via the "teapot effect" (cf. Jennings, in Lampert 1971:74). Also, large blocks break from the cliff face and land in the soil below further creating a sediment trap. This process creates a stable convex slope of regolith and silty clays which extends to the river (Figure 5a).

As a result of undercutting of the slope by periodic floods, instability is introduced and slumping occurs. These slumps progress upslope producing a concave slope profile and truncation of deposits in the cavities (Figure 5b). Reworking of the sediments by dripline water, and some accession of soil from above also occurs. Slumped material may

accumulate on bedrock benches and fallen blocks while deposits at and just inside the dripline are reworked by splash erosion. This latter process results in a dripline trench with a coarse sandy lag deposit such as that found in SU1 (see Figure 3).

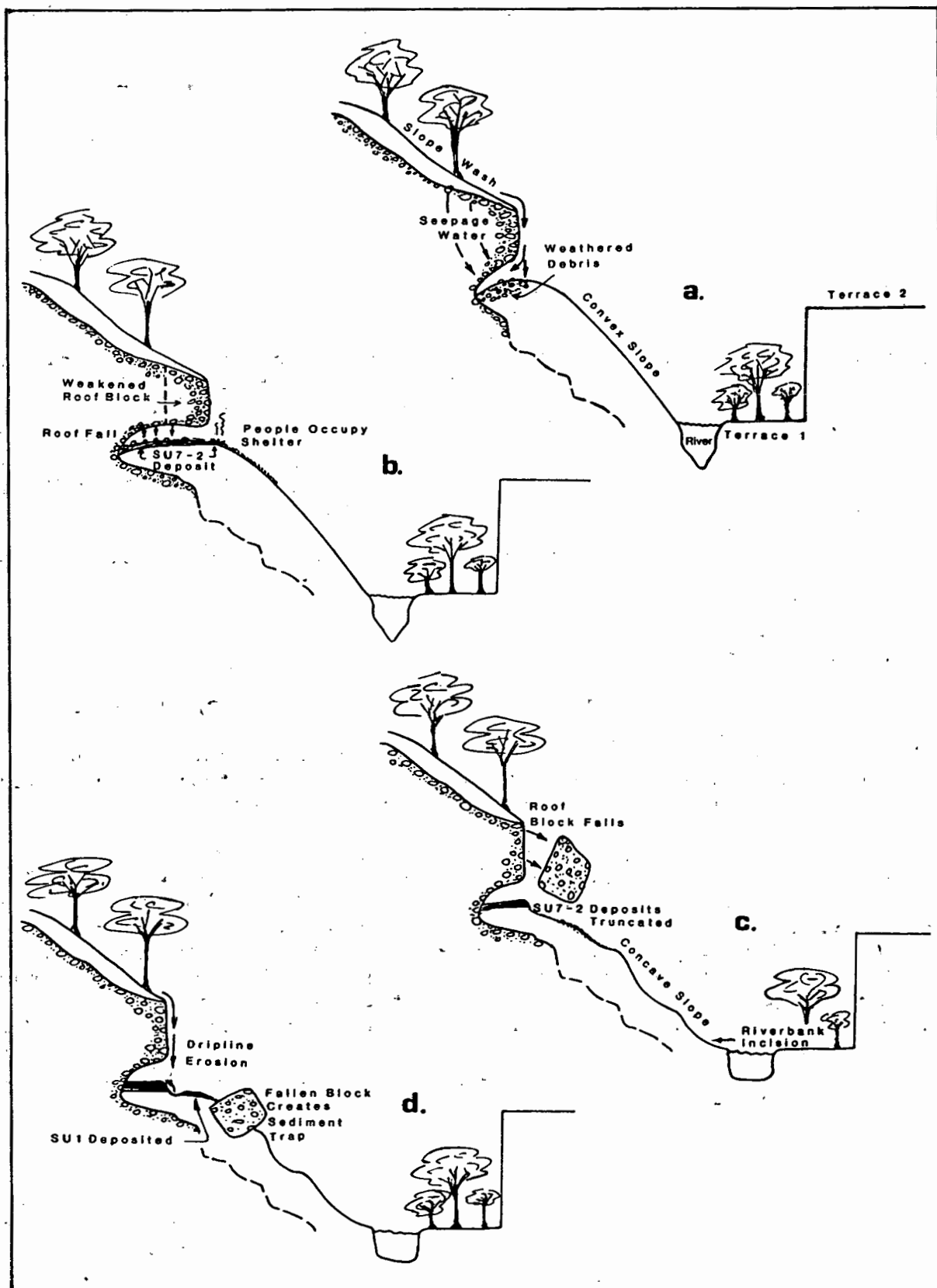


Figure 5. Sequence model of site formation at KB:A70.

Thus, the formation of the site may be explained as an intermingling of both geomorphic and anthropogenic processes as proposed by the following general model.

1. By about 5300 BP, the cavity and the mound of weathering debris and soil is sufficiently developed to allow people to climb up into the cavern for shelter. People light campfires and discard cultural material then leave. The cultural material is trampled and redistributed by their activities. The relatively few cultural remains in SU7 suggest a sporadic occupation and slow build-up of deposits during the period 5300 - 4200 BP.

2. The hard-packed nature of the surface of SU7 and the presence of well-preserved burnt areas and artefacts suggests a period of minimal deposition followed by more rapid deposition of SU6 deposits after ca. 4200 BP. SU6 is really a wedge of sediment deposited in the rear of the shelter, suggesting that people camped on the side of a low mound of debris and discarded their debris around it. This occupation was possibly sporadic between about 4200 and 2500 BP.

3. The hard-packed nature of the top of SU6 also suggests a minimal depositional period followed by the formation of the SU5 living floor. Subsequently, deposits of slope wash and reworked weathered roof fall buried SU5. Since SU5 was in a well-preserved state, it is inferred that a significant period of abandonment took place after its deposition and/or natural deposition was fairly rapid. This event was followed by sporadic occupation and deposition of SU4 over a ca. 200-year period.

4. An hiatus in occupation was followed by deposition of the SU3 living floor at ca 2350 BP; this was very quickly buried by weathered roof fall. Perhaps the occupation influenced an increase in roof-fall rate (cf. Hughes 1977). This event was followed by occupation which resulted in the deposition of SU2 materials.

5. At some time after 2350 BP but well prior to 541 BP, the deposited apron became destabilized by river bank undercutting. As a consequence the slope slumped causing truncation of the cultural deposits, and all but the innermost sediments of SU2-6 moved downslope towards the river (along with a significant portion of SU7 near the dripline)

6. The deposits restabilized and sporadic human occupation began at some time prior to 541 BP, outside the dripline where the mound once existed. Due to the slumping event the new living surface was considerably lower (ca. 75cm) than it once was and cultural debris was not discarded on top of SU2 in the rear of the shelter. The stone anvil set into the new SU7 surface (Figure 3) provides evidence of the location of cultural activities. During this late phase of occupation, dripline splash eroded relict earlier deposits inside the dripline and a lag trench was created at the dripline in SU1 deposits. Thus, SU1 not only reflects human and non-human depositional agents but it could well have gained cultural materials from the earlier strata.

This scheme is supported on at least four grounds. First, the C14 dating series (which is supported by relative ESR dates [Caddie *et al* 1984] indicates that SU1 is later in age than the units inside the shelter and that the latter are internally consistent with respect to age and superposition. Secondly, unit SU7, which provides a continuous base for all upper strata and which is culturally sterile at its lower levels, currently exhibits vertical shear cracks just inside the

dripline (Figure 3) which accords with the postulated slumping event at the dripline and some residual downslope instability. Thirdly, observations of the suite of other cavities along the cliff line yielded examples of all stages of the process proposed in the scheme.

Finally, indirect support comes from a sedimentological analysis conducted by D. Gillieson to test particular implications of the scheme. Thus, if these aprons or mounds were being built up by weathered roof detritus, deposition from upslope runoff and human cultural discard, the chemistry and textural characteristics of the soil in the site should reflect this colluvial history. Analysis of bulk samples was conducted on all stratigraphic units plus samples from the bedrock roof and soils above the cliff. Figure 6 gives a representative composite sedimentary profile based on these results from selected and relevant attributes.

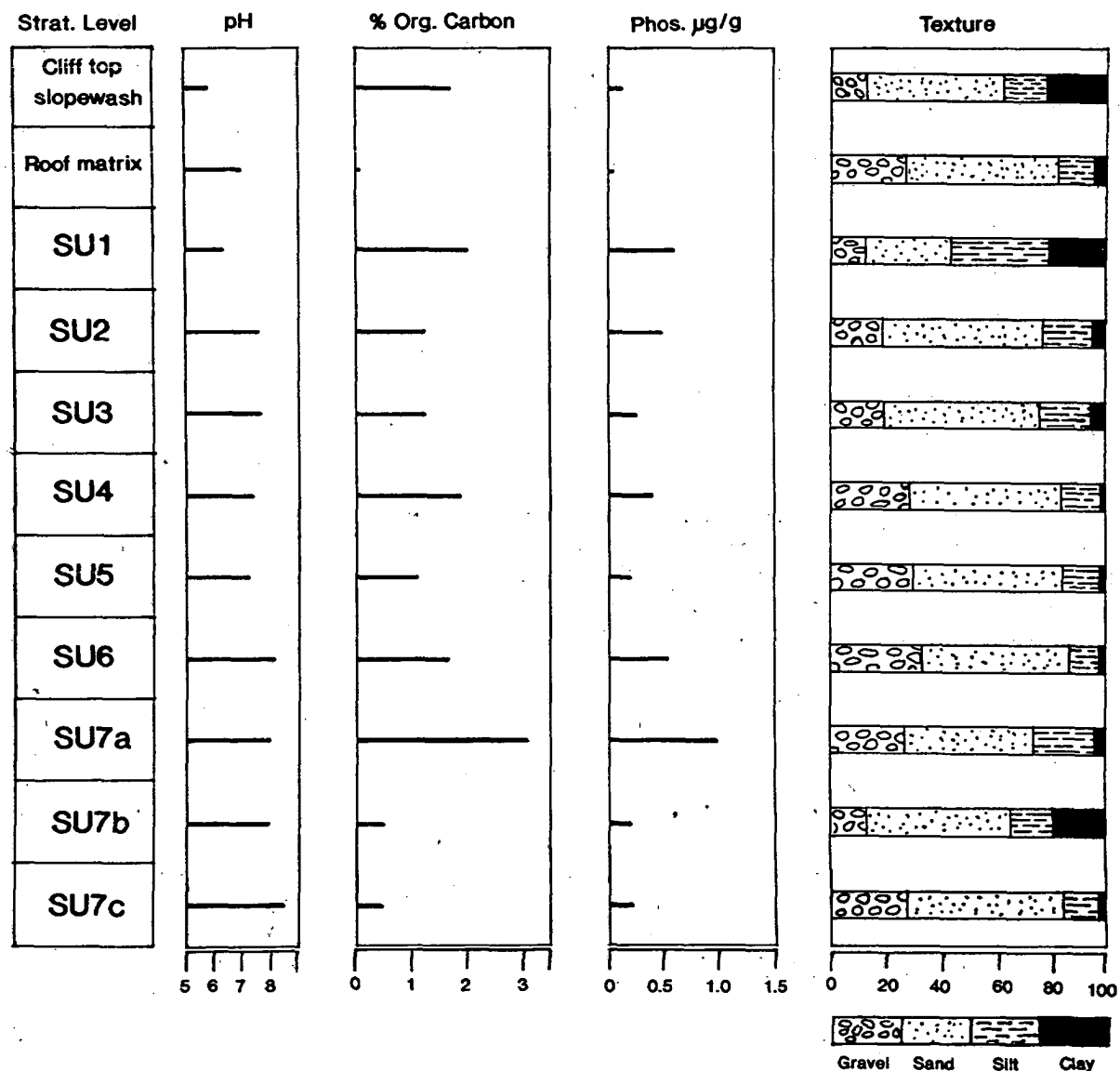


Figure 6. Soil chemistry and texture from Platypus Rockshelter.

In general these results support the site formation scheme quite well. Particle size distributions for SU7 are readily divisible at the SU7a and SU7b boundary, below which the sediments show a strong mode in the sand range and show less silt (albeit weathering products influence a minor clay mode here). Above this boundary the SU7a sediments have no strong modes but tend to exhibit a weak mode in the sand range. A textural contrast is apparent between the exterior SU1 deposits and those from inside the dripline. The strong sand mode exhibited by the layers inside the dripline suggests accession of matrix material mainly by roof fall. In contrast the SU1 exterior deposits exhibit higher silt and clay proportions which are indicative of greater sediment accession from slope wash.

The chemical profile generally indicates that SU7b and SU7c are distinct, being high in pH, low in organic carbon and phosphate in comparison to the cultural levels above. This result suggests an accumulation of weathered bedrock and essential absence of occupation debris until SU7a times. Organic carbon and phosphate results are consistent with field observations for SU7a and above, indicating discard of organic material during human occupation. The chemical constituents are not in major proportions (cf. Gillieson and Mountain 1983) and support as scheme of sporadic, low intensity occupation. The increased values in SU1 may reflect the increased clay percentage in the sediment.

#### POST-DEPOSITIONAL DISTURBANCE

A number of agents have been responsible for disturbance of the site's matrix including various natural erosion factors, animal burrowing reworking of deposits and human action. The extensive slumping event after ca. 2350 BP not only sent a section of stratified cultural material downslope to the river but, by vertically truncating these deposits, set up the profile for their further erosion and addition of older material to SU1 deposits as these built up after the event. This erosion and admixture would have been the result of splash erosion from the dripline. Development of a dripline lag trench may also have locally removed and reworked cultural material. It is difficult to ascertain whether or not such post-slump erosion and sediment reworking significantly affected the SU1 cultural assemblage. For the present however, the integrity of SU1 must be considered suspect until further analysis clarifies the issue.

Rodents provide another disturbance mechanism set up by the slumping event. The truncated face of the rear deposits exhibited several rodent burrow openings and the burrows extended into the deposits, tending to follow the looser sediment between compacted living floors. During excavation, these burrows were easily identified and their fill (which was presumably of mixed provenance) was collected separately. The cultural material within them was omitted from data analysis. However, since the rodents' main centre of activity was along the truncated face of the rear strata, they may have sent cultural material down the slope to mix with SU1 as it accumulated. Thus, while rodents contributed to post-depositional site disturbance, their activities are considered not to have biased the cultural assemblage except possibly that of SU1.

Human disturbance of the site is difficult to gauge accurately. Without doubt the fossicker's pit dug into the centre of grid squares

7B1, 8B2, 7C4 and 8C3 removed about  $0.125\text{cm}^3$  of cultural deposit. Further, while this pit was carefully cleaned out and no skirt of backdirt was noted around it's edge, it is possible that the fossicker placed some of this material on the surface of the site. Thus, some pit material may have become incorporated into SU1 and SU2 matrices. With this possibility in mind, care was taken to remove surface material separately and omit it from analysis.

Scuffage and treadage by humans, past and recent, should also be expected to have caused some dislocation of cultural materials. While it is difficult to measure such disturbance horizontally, one may gain a measure of vertical displacement by reference to the nature of the strata and their contents, and specifically the distribution of raw materials used in stone artefact manufacture. With respect to the stratigraphy, the living floors SU3 and SU4 as well as the shellfish feature in SU1 indicate little or no disturbance. Qualitatively speaking, the shell remains in these strata showed significantly less fragmentation in comparison with shells from the other units. Although quantitative taphonomic results for shell and bone are not yet complete, this observation suggests that little horizontal or vertical movement has taken place within these units since they were laid down.

Some vertical dislocation of materials may also be expected. This possibility was investigated via an analysis of the vertical distribution of different colours of chert artefacts. It may be assumed that colour is not an important variable in determining the extent to which an artefact may move vertically through a deposit. All else being equal, it is thus likely that extensive inter-stratigraphic movement would reduce differences in the colour composition of their assemblages. Conversely, minimal vertical movement should preserve what colour differences originally existed in the assemblages from raw material selection. Table 2 compares the difference in chert colours between SU6 and the stratigraphic sandwich made by the two living floors (SU3, SU5) and SU4. These results indicate that the two assemblages contain distinctly different proportions of colours, from which we infer that little vertical movement of artefacts has taken place - at least at this level in the deposit. In sum, while further detailed work of this nature is required incomplete, initial findings support the argument that the older deposits at the rear of the shelter have not been significantly disturbed.

**Table 2. Colour proportions of chert artefacts (> 0.5cm) in SU6 and SU3-5 in squares 6B1 and 7B2.**

% Chert Type	SU6	SU3-5
% Spotted Chert	20	8
% Spotted Chert of flakes >1.0cm	26	13
% Yellow Chert	11	2
% Yellow Chert of flakes >1.0cm	16	4
% Red Chert	5	16
% Dusky Red Chert	4	11
% White Chert	0	3
% Brown Chert	3	0
N =	100	48

## CONCLUSION

The salvage excavation of Platypus Rockshelter has yielded significant results and this paper has outlined the stratigraphy and associated ages and has offered a scheme of site formation. This site represents one of the earliest dates for human occupation of the subcoastal zone in S.E. Queensland and thus facilitates further investigations into the prehistory of the study area. Further, its clear stratigraphic sequence, which is framed within an internally consistent dating series, offers an opportunity for investigations concerned with the discard rate of cultural material and site use by humans as well as those dealing with cultural change during the Holocene. The discovery of well-defined living floors spanning the mid-late Holocene offers potential for ascertaining human activities in rockshelters. In addition the geomorphological work has provided a useful insight into the nature of human interaction with geomorphic/geological processes. Other papers will take up the above issues as results from assemblage analyses come to hand.

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