

ARCHAEOLOGICAL EXCAVATIONS AT FROMM'S LANDING ON THE LOWER MURRAY RIVER, SOUTH AUSTRALIA

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PART I

In 1841, only 5 years after the foundation of South Australia, Edward John Eyre was appointed resident magistrate of the Murray District, with headquarters at Moorunde, S. of the modern Blanchetown. Both Eyre and George Grey, the Governor who appointed him, were sympathetic, though not always comprehending, observers of aboriginal life. Eyre (1845) wrote the most detailed description now available of the Murray valley aborigines. With Grey's encouragement, the artist George French Angas (1846) sketched a few visual impressions of the same people in these early years before the complete disintegration of their culture. Only the precipitous cliff face, blackened at intervals by the smoke of aboriginal camp fires and engraved at a score of localities by their artists, remains today as visible evidence of their prehistoric settlement.

Eyre described a way of life admirably adjusted to the riverine environment and seasonal changes in food supply. It combined the hunting of land animals and collection of edible plants with fishing, fowling, gathering mussels and catching turtles and seasonally abundant crayfish. He estimated that every mile of meandering river between Moorunde and the mouth sustained 4 people (II: 372). The aborigines were housed in bark or brush shelters, hollow trees, or under 'projecting or overhanging rocks' (II: 303). The present report describes the excavation of such a rock shelter 30 m. downstream from Moorunde.

The Excavation within its Historical Context

80 years elapsed between Eyre's administration and the first systematic attempts to reconstruct Murray valley prehistory. By that time the Europeanized aboriginal population was almost extinct, although N. B. Tindale, Anthropologist of the South Australian Museum (1935, and unpublished Museum records), has elicited some details of traditional material culture and mythology from the last full-blooded survivors of the Lower Murray tribes. Between 1925 and 1928 the valley between Blanchetown and Mannum was explored both by land and river by a group affiliated with the South Australian Museum. They recorded all sites where the smoke blackened cliffs or engraved and painted rock surfaces indicated concentrated aboriginal occupation. These discoveries formed the nucleus of a systematic card index of aboriginal camping sites compiled by the Museum (Sheard 1927 a, b; 1928).

It was on such an expedition in 1927 that rock shelters and rock engravings were discovered on Mr. A. M. Fromm's farm, near the landing where river boats unloaded supplies prior to the cessation of river freighting about 30 years ago. A trial probing of the floor in one shelter ascertained that ash extended throughout the 6 ft. of the deposit, although no artefacts were obtained (Sheard 1927 b). This is probably shelter 3 of the 1951 survey described below. During this visit, the desiccated remains of a 2 year old child, sealed beneath a layer of possum excreta, were discovered in

a fissure between the cliff and a huge detached mass of limestone N. of this shelter. The body was wrapped in a wallaby hide and a bundle of grass, held together within a vegetable fibre net bag. A stone spear point was apparently placed with the body (Sheard et al. 1927). This artefact, specimen A20517 in the South Australian Museum, was not found until after the publication of the burial, at the time when the wrappings were removed. Tindale subsequently claimed it as a pirri point (Tindale 1957, p. 43). It is certainly a pointed flake, but as it possesses little secondary retouch, it seems unwise to assign it to a specific type or cultural phase.

In the previous year, H. L. Sheard (1927a) had discovered a large shelter with rock engravings at Devon Downs 10 m. upstream from Fromm's Landing. His small scale sounding in the shelter floor was followed, in 1929, by systematic excavation by Hale and Tindale (1930), whose excavation will remain the classic of Australian prehistoric research; and not only because it was the first. Nothing comparable was attempted anywhere in the Pacific until this decade. Although the methods adopted by the excavators were their own, their techniques, records and inferences were comparable with the best overseas practice of that time (cf. esp. p. 175). An index of the care taken to preserve evidence is that bulk samples of the deposit were retained from each level. 25 years later, shells collected from one of them were submitted for a radiocarbon 14 test.

The site was stratified to a depth of 20 ft. On the basis of an analysis of implement types, the excavators divided the 12 strata into 4 distinct cultural phases. The validity of their 'cultures' will be critically examined later in this report; it suffices here to indicate that the most recent cultural period, represented by layers I to IV, was termed Murundian, after the local sub-tribal name of the modern aborigines. Layers V to VII contained bones pointed at both ends; the aboriginal name for these, muduk, was adopted as a cultural term. This Mudukian culture was preceded in layers VIII to X by characteristic leaf-shaped uniface stone points, for which the name pirri was adopted from Horne and Aiston (1924, pp. 90-108). (In 1953 shell fragments from Pirrian level IX gave a C14 age estimation of 4250 ± 180 years [*Science* 1956, 124: 164]). Although the 2 lowest strata (XI-XII) contained no artefacts of diagnostic value, they were assigned to a pre-Pirrian culture (pp. 203-6). It was evident from the character of the stone and bone artefacts in the sequence that there was a marked degeneration in production techniques in Murundian times. At all levels, the fauna was represented by living species. However, *Sarcophilus* (Tasmanian Devil), an animal today restricted to Tasmania, was present below layer V. In level X, tortoise (*Chelodina* cf. *expansa*), a species at that time recorded only in N. Australia, was identified. An analysis of molluscan remains led the excavators to claim that climatic changes, resulting in increased aridity, had occurred during the occupation of the shelter (pp. 211-15).

The Devon Downs excavation was opportune. Current authoritative opinion doubted claims of great antiquity for aboriginal prehistory; it was common doctrine that the nature of the stone utilized determined the implement type and that therefore cultural differentiation was an erroneous concept; there was a widespread belief that stratified sites did not exist and, in any case, excavation could provide no information which was not deducible from the analysis of surface collections. These assumptions have been criticized by the writer (1957, pp. 32-8). Hale and Tindale demonstrated that aboriginal prehistory was of some antiquity; that a stratified site did exist and that systematic excavation could produce varied material traces of the aborigines; that, as time passed, different implement types were manufactured from identical raw material on the same site. Unfortunately few drew these obvious conclusions and others still had reservations (Mulvaney 1957, p. 35). 27 years later,

except for some smaller-scale and less conclusive excavations in a few localities, Devon Downs remained the sole yardstick to measure the prehistoric cultural sequence of the continent. (See esp. Tindale and Mountford 1936, McCarthy 1948, MacIntosh 1950-1, McCarthy and Setzler 1950.) The excavation of stratified sites in many areas is a pressing need before the knowledge of Australian prehistory can be advanced. The Lower Murray valley is a crucial area in which to further the study, because any site excavated there is sufficiently close to Devon Downs to test the general validity for the area of its cultural sequence.

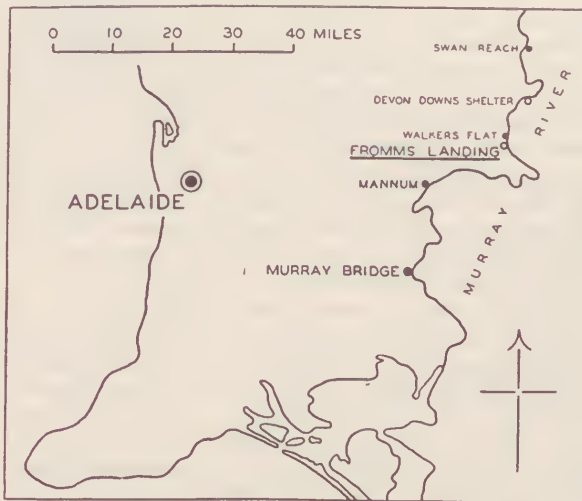


FIG. 1.

The writer is indebted to Mr. C. P. Mountford, one of the original discoverers of the Fromm's Landing rock shelters, for drawing his attention to their archaeological potentialities. The Landing area lies on the W. bank of the Murray R. on Section 302, Hundred of Ridley, County of Sturt, and is just over 10 m. by river S. of Devon Downs (Fig. 1). In 1952, Mountford led a party of students from St. Mark's College, University of Adelaide, which surveyed the vicinity. They increased to 6 the recorded number of rock shelters situated at the foot of the cliff, at intervals over a distance of 600 yds. The numbering of the shelters used in their published surveyed plan has been retained in this report. The depth of deposit immediately outside 3 of the shelters was determined with the use of a soil auger. At shelter 2, 2 bores reached depths of over 14 ft. and the cores contained considerable quantities of ash. A small trench was dug in shelter 6 to a depth of about 5 ft., but the only significant discovery was the burial of a baby wrapped in a kangaroo skin (Price 1952).

Early in 1955 Mr. Mountford visited the University of Melbourne and at that time raised with the writer the possibility of conducting systematic excavations at Fromm's Landing. In May of that year, accompanied by Mr. Mountford, the writer and two other members of the Department of History, J. L. O'Brien and R. F. Ericksen, visited the site. It was immediately apparent that shelter 2 offered the best possibilities for excavation. The 1952 survey had demonstrated that there was a depth of deposit, there were no indications that it had suffered any disturbance,

a level platform extended from the rear of the shelter to an average of 10 ft. outside it, numerous engravings were visible along the foot of the cliff race above the shelter and there was the possibility that more would be uncovered on the interior wall, the site was so extensive that any excavation would still leave most of the site available for future archaeological work. Preparations were therefore begun for the excavation of a section in shelter 2 during the University summer vacation of 1956.

The Site

When visited during summer, the environment immediately suggests comparison with the Nile Valley. Beyond the Murray valley the hinterland is marginal wheat growing country with an annual rainfall of from 8 to 13 in. Except where erosion has exposed outcrops, a thin film of red earth liberally mixed with limestone fragments covers the limestone bedrock. From the horizon to the cliff edge only clumps of olive green mallee scrub relieve the impression of aridity and heat conveyed by the sparse green brown grass and the red stoney ground. The river valley appears to belong to another latitude. Vegetation is green; branches of red gums (*Eucalyptus camaldulensis*) brush the top of the 100 ft. high Miocene cliffs; willows and peppers (*Schinus molle*), introduced little more than half a century ago, thrive in profusion and in time will replace the natural flora (Pl. VI, fig. 1).

The shelters, with an E. aspect, provided admirable protection for the aborigines. At least in the summer, their chief advantage would be the shade they offered from the morning sun whose rays were reflected by the cliff; after noon the shadow lengthened outwards from the cliff. Across a wide and shallow lagoon is the river channel, almost 100 yds. wide and, in places, over 40 ft. deep. Dead or dying eucalypts outline its banks, sacrifices to a water conservation scheme which has artificially raised the water level and extended the area of the lagoons. Alpine snows and rains result in an annual, though fluctuating, summer inundation, with consequential seasonal changes in aquatic life. In Eyre's time crayfish were abundant when water in the lagoons was at its height; once the flood waters began receding incredible numbers of fish were netted or caught in weirs (Eyre 1845, II: 252-4). Tortoise, shellfish and frogs could be procured without difficulty in the water. The valley teems with bird life; 23 species were identified during February 1958 including such basic items of aboriginal diet as swan, duck and cockatoo (cf. Eyre II: 283-8). Edible plants of considerable variety grew in the shallows and on land and many of these also provided important raw materials including reeds, vegetable fibre and bark (Eyre II: 269-72). Swarms of bees in the valley must have provided a ready supply of honey. The rock strewn margin between cliffs and water provided ideal cover for reptiles and rodents, while crevices in the cliffs still house countless possums. Small gullies, N. of shelter 2 and S. of shelter 3, enabled easy access to the land above. Before European activities denuded it of vegetation and soil, this mallee scrub country supported a considerable population of wild life, particularly kangaroo, wallaby and emu (Pl. VI, fig. 2).

Shelter 2 therefore combined proximity to permanent water and a variety of reliable food supplies with the natural advantage of being the largest of the series of shelters, commanding a view of the valley in every direction, yet being inaccessible from above. This shelter is almost 3 m. downstream from the Walker's Flat punt. It is best reached by following the track alongside the lagoon for approximately 1300 yds. This track leads off downstream from the Mannun-Walker's Flat road at the bend where that road first reaches the river and turns upstream, 2 m. from Walker's Flat.

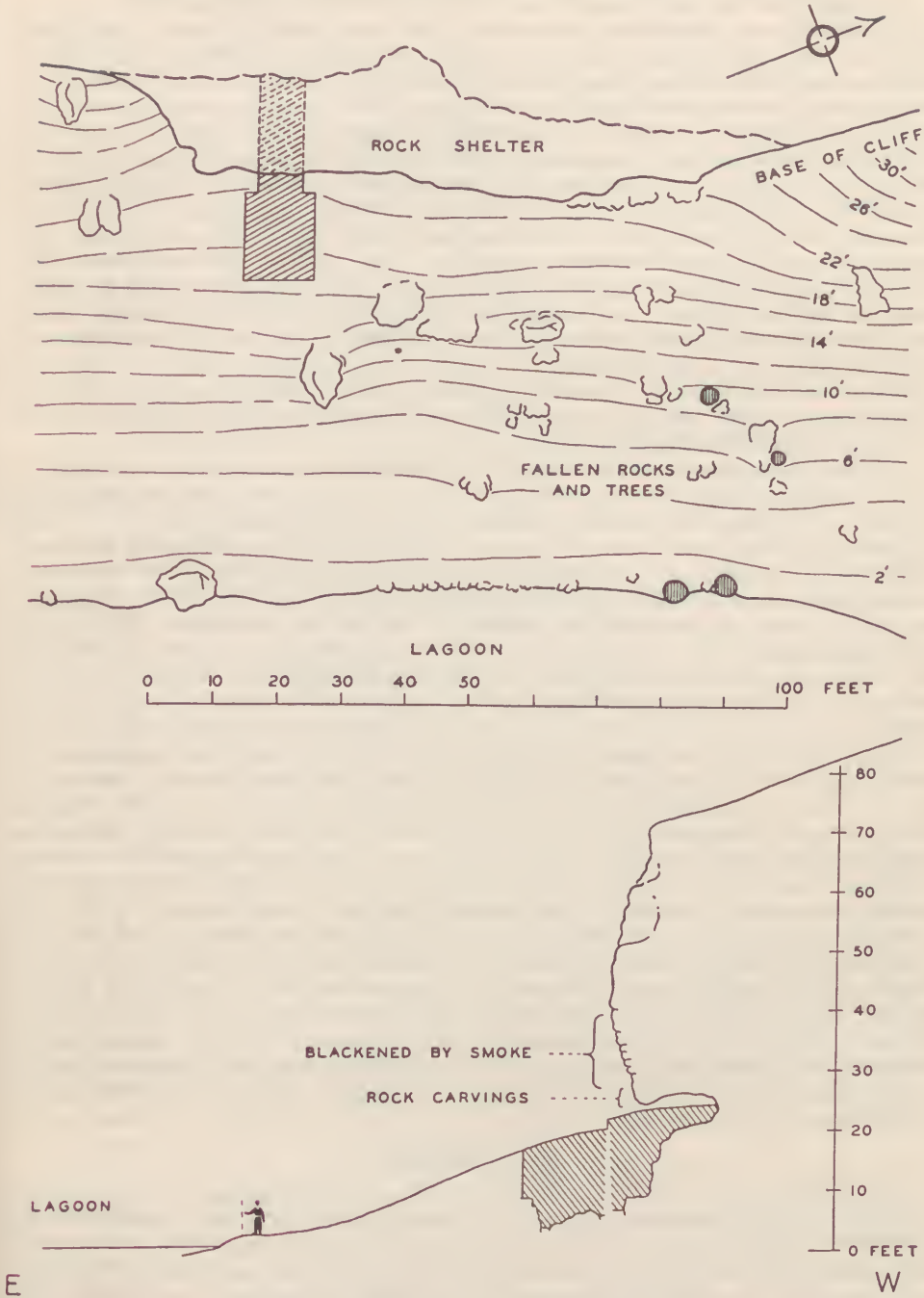


FIG. 2a and b.—Fromm's Landing rock shelter No. 2. Plan and vertical section of site. Contour heights are from normal river level.

The shelter is eroded from the base of the fossiliferous Miocene limestone cliff. It is reasonable to assume that it originated during a period of higher river level, at a time when the present billabong was the main channel. However, it is difficult in the present state of geological studies of the area to claim that its formation can be correlated with any Pleistocene or post-glacial climatic phenomenon. The 6 shelters at Fromm's Landing, all within a distance of 600 yds., and with one exception similarly situated in relation to the former river channel, have roof levels at varying heights above the river. The roof of shelter 6 is at least 12 ft. higher than the roof of shelter 2. This is of no obvious significance because it may be only the result of differential rates of subsequent weathering. On the other hand, the basal rock underlying the shelters seems also to be found at different levels. (See Price 1952 for surveyed plans and sections of these shelters.) If the single test bores made in 1951 in shelters 3 and 6 and the trial probing of shelter 3 in 1927 are to be believed, there is rock underlying these shelters at about 7 ft. in depth; at 16 ft. in shelter 2 it had not been reached. At least these differences cannot be attributed to the gradient of the river, which in its last 600 m. is never more than 3 in. in a mile and in this area is unlikely to have been markedly different in the recent past (Howchin 1929, p. 194).

It was important to determine the nature of deposition in the shelter because it affects the interpretation of the stratification. Observation in the field and subsequent discussions with geologists, soil scientists and a conchologist, have led to the conclusion that no part of the deposit was alluvial. The deposit was chiefly sand, which owed its origin to wind and the fragmentation of the cliff; there was no alluvial silt present. Nothing in the field evidence indicated that prehistoric floods had eroded occupation deposits or in any way interfered with the stratification of the site. Throughout the 16 ft. excavated, the section revealed unbroken lines of stratification and numerous continuous hearth levels, reaching from the rear wall to the limit of excavation outside the shelter. This was most evident in the marked changes between levels 2 and 3, 3 and 4, 4 and 5 and in the shell band contained within level 5 (Fig. 3). Had erosion occurred, these strata which sloped downwards from the rear of the shelter, must have been cut across in a step-like arrangement by the various floods. The two radiocarbon dates of 4850 ± 100 for level 10 and 3240 ± 80 for level 4 are consistent with a gradual accumulation of the deposit, although as approximately 6 ft. separated the two samples, and level 4 was also about 6 ft. below the modern surface, the time-rate of accumulation was not a constant one. If the river flowed in its present channel erosion cannot have been severe, because the current is slight and could have had little effect at this distance from the main stream. The only evidence indicating the proximity of permanent water was uncovered near the bottom of the trench, beneath the earliest evidence for human activities. Numerous bivalve molluscs, *Corbiculina*, were found with their valves still connected, thereby indicating that they had not been eaten by the aborigines. Therefore they must have been washed there and the presence of fine-grained silt in these shells, and in numerous specimens of the small univalve *Lenameria*, was a further indication that water was near at that time.

Field Methods

Expeditions were in the field for a total of 8 weeks during January and February of 1956 and 1958; the party averaged 12 members in 1956 and 9 in 1958. A new and more detailed survey of the area adjacent to shelter 2 has enabled the preparation of a contoured plan and section from cliff-top to lagoon. The excavation was almost on the line of the 1952 auger holes. Although this was at the S. end of the shelter, there was less indication of any rock fall here than in the more central

position. It was hoped that as at Devon Downs, aboriginal rock carvings or engravings would be discovered on the rear wall, and partly for this reason, the excavation began inside the shelter. Upon excavation, it was found that the rear wall sloped out sharply and therefore that areas of intensive occupation were situated around the entrance to the shelter while the interior was relatively unoccupied. As it was necessary to return for a second season to obtain a cross section through the entire area of effective occupation, the trench was covered with heavy planks and surrounded by a fence. The excavation was extended down the exterior slope in 1958. The composite trench was 32 ft. in length and its width varied from 7 ft. in 1956 to 11 ft. in 1958, except for the first 2 ft. in depth, where it was 14 ft. wide (Pl. VII, figs. 1, 2; Fig. 3). The excavation penetrated through all occupied strata and reached sterile soil which was apparently so close to water level that occupation would have been impossible. There is a hiatus between the drawn sections of the two seasons, because of the intervention in 1956-7 of the greatest recorded Murray R. inundation, which filled the trench with rubble and caused the timber cover to collapse into it. Despite this discontinuity, the lines of stratification in the 1956 section drawings were readily matched with those observed during the second season.

To ensure precise three-dimensional record, survey pegs were placed at 3 ft. intervals on either side of the trench. Timbering of the walls was unnecessary, although precautions were taken to protect the edges and excavated material was removed to some distance; the walls were kept as vertical as considerations of safety rendered expedient. It is interesting to note that the flood infilling in the 1956 trench stood firm when a baulk between it and the 1958 excavation was removed.

The basic excavation implement was the trowel; indications of stratification were carefully followed. All excavated material was removed by bucket and sieved. The sieves, held on a specially constructed cradle, were of 2 sizes— $\frac{1}{4}$ in. and $\frac{1}{8}$ in. steel mesh. Numerous stone, bone and shell remains were recovered with dimensions less than that of the mesh. For a time during the 1956 season, water level in the lagoon was sufficiently high to allow the sieve to be dipped in the water and its contents washed. This precaution made it evident that very little worthwhile material was being overlooked during the sorting of unwashed sieves; the practice was impossible when the water level receded.

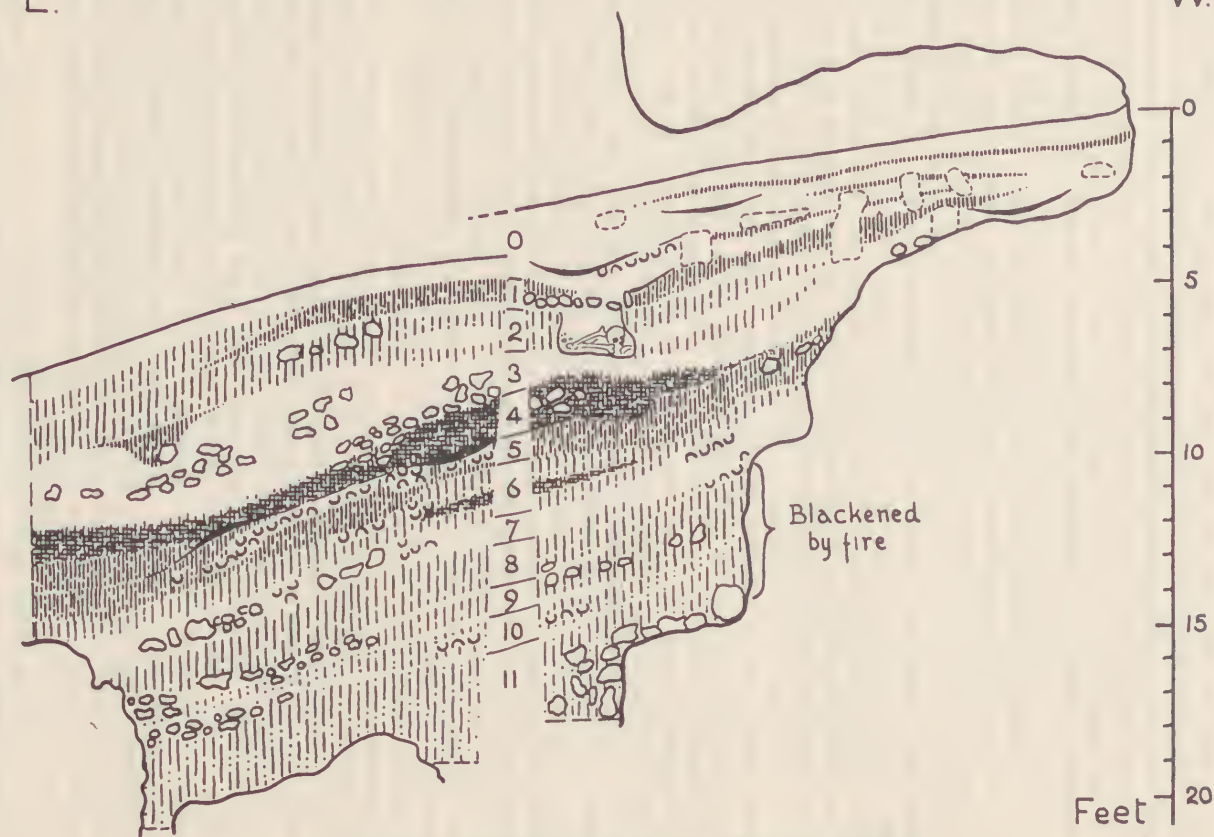
Each sieve was sorted and, in addition to artefacts, every stone fragment which was not limestone was retained; so were all bones and a large sample of shells including all small molluscan species. The finds were placed in separate containers and labelled according to the stratum from which they came. There were about 30 separate levels in each season. Flat-based, doubled-walled, white paper bags in 3 sizes, intended by the manufacturer to contain 1, 5, or 7 lb. of coffee or other merchandise, made ideal containers. Objects could be carefully packed, the bag stapled, labelled and stored for convenient transport. 11 ash and 17 shell samples were collected and stored in large screw-top tins for radiocarbon 14 testing. During the 1956 season 25 samples were obtained for pollen analytical examination; in 1958 a representative sample of the deposit, weighing several pounds, was retained from each important stratum; a complete photographic coverage was attempted of all engravings on the rock face above the shelter.

Subsequent analysis of the records of both seasons has led to the conclusion that 12 major stratigraphic phases can be recognized in the history of the site. This revised system of numbering has been adopted in this report and all finds have been renumbered in accordance with it. All excavated finds are in the South Australian Museum, which also holds the Devon Downs collection. All artefacts in this report have been given their South Australian Museum register numbers to facilitate future reference; the numbers range from A52001 to A 52157.

E.

W.

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D. J. MULVANEY:

uuuu = Concentrations of Mussel Shells

FIG. 3.—Vertical section of the deposit, along the south face of the excavation.

PART II

Description of Levels and Finds

Level o

Because the 1957 flood swept the surrounding surface material from outside the shelter into the open trench, it lowered ground level by 18 in. As this corresponded to level o of the first season, that level was unrepresented in the 1958 excavation and the composite section (Fig. 3) therefore shows two surface levels. In 1956 the shelter floor was only 2 ft. below the ceiling, but such confined quarters had not deterred the aborigines; thick ash deposits lay within 3 in. of the surface even at the rear of the shelter. Probably the fires warmed their sleeping bodies rather than cooked their food; this explanation accounts both for their apparent unconcern about headroom and the rarity of food refuse in the ash, but not for human survival in this smoke-filled crevice. The deposit was a dirty-yellow powdery dust, flecked with charcoal, except where intense burning had produced thick white or reddened ash bands. It was non-alluvial in origin, composed chiefly of limestone from the ceiling and rear wall. The rock was so decomposed that even on windless days, dust rained on the excavators and if swept with a soft brush the surface was marked. Under these circumstances, there was no possibility of engravings being preserved on the buried rock.

The site proved to be honeycombed with rabbit burrows to a depth of 3 ft. before the deposit was compact and undisturbed. Excavation and stratigraphic interpretation were unduly difficult owing to the combination of limited headroom and the burrow complex, the latter causing the disintegration of the surface beneath the excavator's feet. In order to stabilize the excavation on a solid surface, the first 40 in. were removed in horizontal 4-in. spits. This achieved, it was possible to piece together the undisturbed pillars between burrows, exposed on the section walls, and so ascertain the lines of stratification. Fortunately, the strata dipped only slightly from the rear wall and as finds were few and inconsequential, any stratigraphic distortion resulting from digging methods of rabbits and excavators was negligible.

ARTEFACTS: The 4 wooden artefacts recovered in the excavation all came from within 9 in. of the surface: A52001, a wooden stick 11 in. long and 1 in. in diameter, artificially tapered at one end and charred at the other; A52002 (Fig. 6) $1\frac{3}{8}$ in. in length and circular in section, rounded at one end, tapering at the other. What appears to be a resinous discoloration covers the tapered end. It is probably the tip of a spear-thrower, against which the base of the projectile shaft rested. A52003, an extremely sharp point $1\frac{1}{2}$ in. long and charred all over; A52004, is similar to the last, but is less well preserved. A52005, is the only bone artefact. It is a sharp awl 4 in. long made from a bird bone. Eyre figured a similar awl in his *Journal*, II, Pl. IV, fig. 9. 8 stone artefacts included: A52006, a red jasper adze-stone with resin adhering to the unworked rear margin; A52007, a rough chert adze-stone; A52008, a worn quartz adze-slug. These 3 adze-stones conform to McCarthy's Burren type (1946, p. 30), but A52009 (Fig. 4a), an adze-stone with a well defined, obtuse-angled striking platform, is an example of the Tula type. It measures $\frac{5}{8}$ in. by $\frac{1}{4}$ in., and the utilization fractures are so small that it must have been used for very delicate work and is best described as a micro-tula. A52010-11, two crude scrapers; A52012 a chert, nosed microscraper with very delicate retouch; A52013 (Fig. 4a) a small and crudely made point, triangular in section and retouched along the thick edge. Other finds included: A52014, a jasper core from which 3 narrow inch-long flakes were removed; A52015, a $1\frac{1}{2}$ in. pointed primary

flake; A52016, a cushion-shaped fossiliferous Pliocene limestone pebble 6 in. in diameter, used as an upper grindstone, one face of which showed wear; A52017, a large diorite fragment used as an upper grindstone, one face has a grinding surface; A52018, 4 river pebbles used as hammerstones.

WASTE FRAGMENTS numbered 601, including 391 quartz, 35 quartzite, 104 red, brown and yellow jasper, 55 chert, 4 sandstone, 2 granite, 1 flint, 5 micaceous schist, 1 muscovite schist, 1 amphibolite and 2 diabase. A single small fragment of red ochre was found.

BIVALVES: *Velesunio ambiguus* Philippi and *Alathyria jacksoni*; *Corbiculina angasi* Prime.

UNIVALVES: *Notopala hanleyi* Franenfeld (Paludina); *Lenameria tenuistriata waterhousei* Clessin (*Bulinus*); *Meroconomelon cassandra* Pfeiffer (an edible land snail); *Plotiopsis tetrica* Conrad (*Melania*), present only near the bottom of the level.

MAMMALS: *Macropus* (Kangaroo), *Bottongia* and *Potorous* (Rat Kangaroo); *Wallabia* and *Thylogale* (Wallaby); *Vombatus* (Wombat); *Perameles* (Bandicoot); *Pseudocheirus* and *Trichosurus* (Possum); *Antechinus* (Phascogale); *Hydromys* (Australian Water Rat); *Rattus* (Native Rat); *Oryctolagus* (European Rabbit).

REPTILES: *Tiliqua* (Blue Tongue Lizard), *Varanus* (Goanna); Serpentes (Snake).

OTHER ANIMALS: Carapace of *Chelodina* (tortoise); bones of Fish and Bird; egg shell fragments of *Dromaeus novae-hollandiae* (Emu); *Parachaerops* (Yabbie, or freshwater crayfish).

PLANTS: *Eucarya acuminata* (Quandong stones).

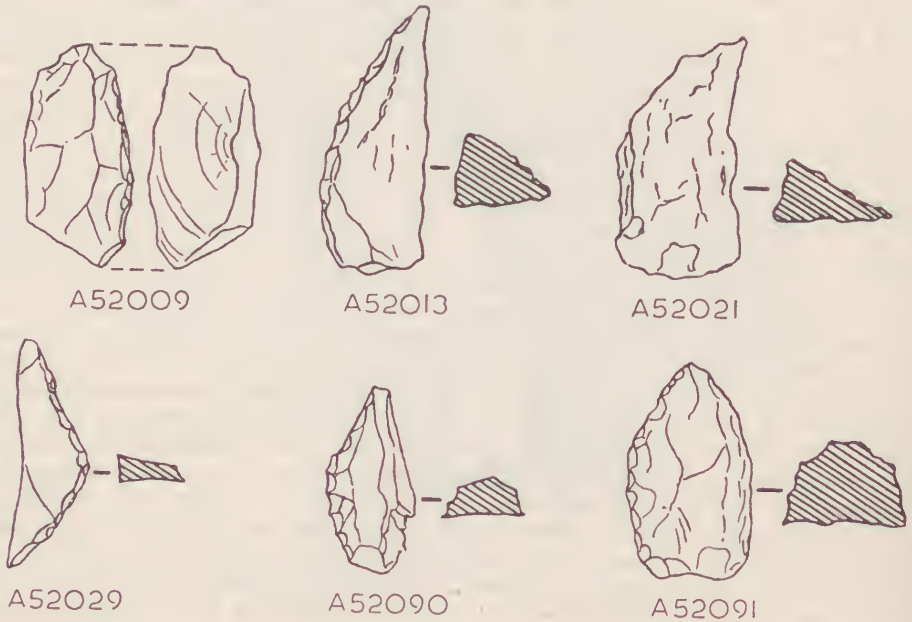


FIG. 4a.—Scale 2:1.

Level 1

Characteristic of this horizon was dark grey earth containing hearths, charcoal lumps and many living rootlets. Numerous limestone fragments had been used as hearth stones on the exterior slope. The rear wall commenced to slope steeply outwards and the deposit near this rock consisted of clean yellow decomposed limestone. Bone was uncharred. It was during this period of occupation that the human burial, described later in this report, took place. The abundant charcoal indicating human activities contrasted with the meagre stone material.

ARTEFACTS: Only 3 artefacts were found: A52019-20, two small scrapers, one of them a chert, nosed-scraper similar to A52012; A52021 (Fig. 4a), a crude quartz micro-point similar to A52013.

WASTE FLAKES numbered 198, of which only 32 came from the area of intensive occupation outside the shelter; 128 were quartz, 10 quartzite, 31 jasper, 21 chert, 2 sandstone, 1 muscovite schist, 3 quartz-biotite schist, 1 slate, 1 granulite.

BIVALVES: *V. ambiguus* Philippi and *Alathyria jacksoni*; *C. angasi* Prime.

UNIVALVES: *Notopala hanleyi*; *Austrosuccinea australis* Ferussac, a small land snail; *Meracomelon cassandra*; *Lenameria tenuistriata confluens* Hedley, 3 specimens of this species, which has only been recorded upstream in the Murray at Echuca, Victoria.

MAMMALS: *Macropus*; *Bettongia*; *Trichosurus*; *Antechinus*; *Rattus*.

REPTILES: *Tiliqua*; Serpentes.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell and *Parachaerops*.



FIG. 4b.—Scale 1:1.

Level 2

This stratum was distinguished from level 1 by its distinctly yellow sand, which was relatively clean inside the shelter. On the exterior slope there were several hearths of burnt limestone and ash and concentrations of mussel shells were common. The bottom of the grave dug in level 1 times reached the base of this level. The engravings on the rock face above the shelter cannot be older than this occupation level, because from lower levels the rock surface would have been out of reach.

ARTEFACTS: 7 stone implements included: A52022, a delicately retouched Bondi-point (Pl. VIII, fig. 2; Fig. 4b), which is discussed below; A52023-4, a red jasper and a chert adze-stone, both broken laterally; A52025, 4 chert and jasper scrapers; A52026, a small jasper flake bearing long, fluted, flake scars.

WASTE FRAGMENTS numbered 594, of which only 78 came from outside the shelter. Quartz 474, quartzite 26, jasper 37, chert 52, honey-coloured flint 1, mica schist 2, diabase 1, metamorphosed sandstone 1.

A bone point 2 $\frac{5}{8}$ in. long (A52027), bent by earth pressure, and one small fragment of brown ochre were also found.

BIVALVES: *V. ambiguus* Philippi and *Alathyria jacksoni*; *C. angasi* Prime.

UNIVALVES: *Notopala hanleyi*; *Plotiopsis tetrica* Conrad; *Lenameria tenuistriata waterhousei* Clessin; *Austrosuccinea australis* Ferussac; *Meracomelon cassandra* Pfeiffer.

MAMMALS: *Bettongia*; *Wallabia*; *Thyogale*; *Perameles*; *Trichosurus*; *Antechinus*; *Rattus*.

REPTILE: *Tiliqua*.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell and *Parachaerops*.

Level 3

The deposit was similar in appearance to level 2, but there were numerous limestone fragments packed tightly together as hearths. Inside the shelter 2 circular hearths were superimposed on one another. At the E. end of the trench, a large boulder was uncovered bearing marks of fires which had been built against it. Bones were usually charred and many had been cut, a feature rare in higher levels. Despite the hearths, the relatively clean yellow sand and the scarcity of bone, artefacts and stone chippings are evidence that occupation at this time was more infrequent and less intense than at any time in the history of the site.

This phase may represent a considerable time interval, the stratum was so deep that it had to be excavated in 6 separate trowel depths.

ARTEFACTS: Only 4 stone implements were found: A52027, the broken tip of a symmetrical, bifacially retouched chert point; A52028 (Fig. 4b), a milky quartz point, triangular in section and retouched around the base and thick edge; A52029 (Fig. 4a), a fragment of honey-coloured flint measuring $\frac{3}{8}$ in. by $\frac{3}{16}$ in., obviously broken off a larger artefact and bearing minute secondary work along one edge; A52030, a semicircular rough quartz scraper; also, A52031, a quartz pointed leaf-shaped flake $1\frac{1}{8}$ in. long, without retouch.

WASTE FRAGMENTS numbered 483, of which 417 came from outside the shelter. Quartz 398, quartzite 12, jasper 36, chert 28, indurated mudstone 2, sandstone 1, mica schist 2, granulite 1, diabase 1, slaty material 2.

One small fragment of reddish-brown ochre was present.

BIVALVES: *V. ambiguus* Philippi and *Alathyria jacksoni*; *C. angasi* Prime.

UNIVALVES: *Notopala hanleyi*; *Plotiopsis tetrica* Conrad; *Lenameria tenuistriata waterhousei* Clessin; *Lenameria tenuistriata confluens*, a few shells only; *Merocomelon cassandra* Pfeiffer.

MAMMALS: *Macropus*; *Bettongia*; *Potorous*; *Thylogale*; *Perameles*; *Trichosurus*; *Antechinus*; *Rattus*.

REPTILES: *Tiliqua*; Serpentes.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell and *Parachaerops*.

Level 4

This was a deep black horizon which covered the entire section and could be easily distinguished from the strata above and below it; there were some distinct hearths. Large numbers of limestone fragments occurred throughout. Despite the amount of ash present, there were few charcoal lumps and shells were infrequent; bones were broken and charred. The intensive occupation implied by the ash contrasted with the almost total absence of cultural evidence. Ash and charcoal was collected for radiocarbon 14 analysis. The age determination was 3240 ± 80 years (R 456/2).

ARTEFACTS: Only 2 specimens, both of questionable value were found: A52035, a small square tabular block of red sandstone utilized as a hammerstone and A52036, a heavily patinated white chert fragment bearing some marks of utilization as a scraper.

WASTE FRAGMENTS totalled only 53, of which 34 were quartz, 7 quartzite, 9 jasper and 3 chert.

BIVALVES: *V. ambiguus* Philippi; *Alathyria jacksoni* in lower part of stratum only; *C. angasi*.

UNIVALVES: *Notopala hanleyi*; *Plotiopsis tetrica*; *Merocomelon cassandra*; *Lenameria tenuistriata waterhousei* Clessin; *Austrosuccinea australis*.

MAMMALS: *Macropus*; *Macropus major* (Grey Kangaroo); *Bettongia*; *Wallabia*; *Thylogale billardierii*; *Rattus*.

REPTILES: *Amphibolurus* (Jew Lizard); Serpentes.

OTHER ANIMALS: *Chelodina*; bird.

Level 5

At this depth there was a marked change in the nature of the deposit. It was much lighter in colour and inside the shelter it was a clean yellow. Throughout the level there were great quantities of very fragile mussel shells. On the exterior slope it included a typical midden deposit of black ash and closely packed shells. The material was moist and when shaken on the sieve it formed small sticky lumps. Bones were broken and slightly mineralized; artefacts were common and included 6 of bone. The division between levels 4 and 5 is therefore an interesting one in the history of the site, as it marks a change from the occupation of level 5 by people with a fairly developed tool kit, to the apparent paucity of material culture of level 4 times; hearths and shell refuse seem to imply a relatively intensive occupation during both periods. It may be culturally significant that 96% of all bone artefacts found occurred in, or below, this level.

ARTEFACTS: The bone tools included: a muduk $\frac{7}{8}$ in. long and pointed at both ends (A52037, Fig. 6); a 3 in. spatulate bone (A52038, Fig 6) and a fragment of a similar but smaller specimen (A52039), which may be compared with Hale and Tindale (Fig. 222, from layer IX at Devon Downs). There were 3 simple bone points all snapped below the tapered portions, one of which was very highly polished. These specimens (A52040-2) measured $1\frac{1}{4}$ in., $1\frac{1}{8}$ in. and $2\frac{3}{8}$ in. respectively.

Stone artefacts numbered 11: A52044, a brown jasper burren adze-stone, broken in half; A52045, a worn quartz adze-stone; A52046-9, 4 adze-stones of quartz and jasper; A52050-3, 4 small scrapers, some with careful retouch; A52054, a nondescript flat scraper of chert; A52055, a small circular quartz core possibly utilized as an adze.

WASTE FRAGMENTS totalled 311, of which 250 were quartz, 19 quartzite, 31 jasper, 8 chert and 3 mica schist.

One small fragment of ochre was found.

BIVALVES: *V. ambiguus* Philippi; *Alathyria jacksoni*; *C. angasi* Prime.

UNIVALVES: *Notopala hanleyi*; *Plotiopsis tetrica* Conrad; *Meracomelon cassandra* Pfeiffer; *Lenameria tenuistriata waterhousei* Clessin; *Austrosuccinea australis* Ferussac.

MAMMALS: *Macropus*; *Bettongia*; *Wallabia*; *Wallabia rufogrisea* (Red-Necked Wallaby); *Thylogale*; *Perameles*; *Rattus*; *Rattus lutreolus* (Eastern Swamp Rat); *Dasyurus maculatus* (Tiger Cat).

REPTILE: *Tiliqua*.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell.

Level 6

Although slightly lighter in colour than level 5, this stratum was otherwise similar. Inside the shelter there was a distinct band of hearths and the heat of the fires had reddened the limestone on the rear wall across the width of the trench. The earth was moist, sticky and difficult to sieve. In fact, if a sieve had not been used, many of the bones and artefacts would have been missed, owing to their chemical discolouration or the film of earth adhering to them. There were numerous broken and charred animal bones.

ARTEFACTS: Bones were more frequently utilized than at any other period; artefacts numbered 20: A52056 (Fig. 6), a highly polished mudukian fusiform point $1\frac{1}{4}$ in. long, one point of which is broken; A52057 (Fig. 6), a probable muduk, with one point broken and much narrower than the last; A52058, a badly decayed fragment which was possibly a muduk; A52059-60, 2 very sharp and highly polished awls made from bird bone, $2\frac{1}{2}$ in. and $1\frac{1}{4}$ in. long respectively; A52061 (Fig. 6), a broken point, $1\frac{1}{2}$ in. long and $\frac{1}{2}$ in. wide, concave in section; A52062, a sharp-pointed split bone $2\frac{1}{2}$ in. long and slightly polished; A52063, $1\frac{1}{4}$ in. long and polished to a sharp point; A52064, a stout point, $2\frac{1}{2}$ in. long, broken in two pieces; A52065-74, various fragments of simple points, some with very high burnish; A52075, a porcupine quill which is burnished and may have been utilized; A52076, a fragment with a deep cut across the back.

Stone artefacts totalled 21: A52077 (Fig. 4b), a uniface brown jasper point, with the tip missing, carefully retouched around the base and lateral margins. This artefact possesses the characteristics of a pirri point. A52078, a chert tula adze-stone, broken in half; A52079 (Fig. 4b), a jasper burren adze-stone, utilized on all margins and pointed on one end. If mounted with the point protruding from the

resin, this adze would probably resemble the *koondi tuhla pirri* described by Horne and Aiston (1924, p. 89); A52080-87, adze-stones in varying conditions of wear; A52088, a fragment broken from the edge of a brown jasper artefact and most delicately trimmed; A52089, another fragment with minute retouch, which could only have been the product of a skilled craftsman working in the microlithic tradition; A52090 (Fig. 4a), a clear quartz fragment belonging to the same tradition of careful retouch as the two previous examples; A52091 (Fig. 4a), a clear quartz micro-adze, identical in all respects to A52079, thereby suggesting that the pointed end on them both was functional, perhaps used as an engraver; A52092-5, 4 clear quartz micro-scrapers, with careful retouch and ranging in size from $\frac{3}{8}$ in. by $\frac{1}{4}$ in. to $\frac{5}{16}$ in. by $\frac{3}{8}$ in.; A52097, a circular quartz scraper; A52098, crude jasper scraper; A52099-52103, 5 approximately leaf-shaped primary flakes should also be noted (e.g. Fig. 4b).

There were several small fragments of red and brown ochre.

WASTE FRAGMENTS (Stone) totalled 487, of which 403 were quartz, 15 quartzite, 37 jasper, 25 chert, 2 indurated mudstone, 1 sandstone, 1 chalcedony, and 1 mica schist and 2 quartz schist.

BIVALVES: *V. ambiguus* Philippi; *Alathyria jacksoni*; *C. angasi* Prime.

UNIVALVES: *Notopala hanleyi* Franenfeld; *Plotiopsis tetrica* Conrad; *Meramcomelon cassandra* Pfiesser; *Lenameria tenuistriata waterhousei* Clessin; *Austrosuccinea australis* Ferussac.

MAMMALS: *Macropus*; *Macropus major*; *Bettongia*; *Thylogale*; *Lagostrophus* (Hare Wallaby); *Vombatus*; *Perameles*; *Rattus*; *Rattus lutreolus*; *Dasyurus*; *Dasyurus maculatus*.

REPTILES: *Tiliqua*; *Amphibolurus*.

OTHER ANIMALS: *Chelodina*; fish, including broken point of *Bathytoshea* (Sting Ray); bird; *Dromaeus novae-hollandiae* egg shell.

Level 7

The deposit was light grey in colour and mixed with many limestone rocks, some of which had been used as hearthstones. There was no clearly defined demarcation between 6 and 7, largely owing to the dampness of the soil at this depth which, on the walls, took some days to dry. At the N. side of the trench, a very large limestone boulder was encountered. It was too large to move and to judge from the appearance of the cliff face directly above, it had fallen from there.

ARTEFACTS: Bone artefacts: A52104 (Fig. 6), a muduk $2\frac{3}{4}$ in. long and $\frac{3}{8}$ in. wide, which is the largest muduk from either this site or Devon Downs and was made from a kangaroo or wallaby fibula; A52105, a sharp awl $1\frac{1}{2}$ in. long made from a whole bird bone; A52106-11, various simple bone points, 4 of them highly polished, ranging in length between $\frac{1}{2}$ in. and $1\frac{3}{4}$ in.

Stone artefacts: A52112-14, 3 adze-stones, 2 of chert, 1 of quartz; A52115-6, 3 jasper scrapers, 2 of which are fragments only and all of which have very delicate secondary retouch; A52117, a large tabular sandstone pebble, showing signs in 2 places of use as a hammer stone.

WASTE FRAGMENTS totalled 272 pieces; 231 were quartz, 4 quartzite, 26 jasper, 6 chert, 3 indurated mudstone, 1 amphibolite, and 1 quartz-mica schist.

There was a single lump of dark brown ochre.

BIVALVES: As for level 6.

UNIVALVES: As for level 6.

MAMMALS: *Macropus*; *Bettongia*; *Wallabia*; *Thylogale*; *Lagorchestes* (Hare Wallaby); *Vombatus*; *Perameles*; *Pseudocheirus* (Possum); *Antechinus*; *Phascogale* (Phascogale); *Rattus*; *Dasyurus*; *Sarcophilus* (Tasmanian Devil).

REPTILES: *Tiliqua*; *Varanus*; *Amphibolurus*.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell and bone.

Level 8

This was a muddy yellow horizon which could be traced indistinctly all over the excavation. Apart from the colour, two characteristics distinguished it from the previous level; it contained numerous mussel shells and when trowelled, it felt more compact and coarser-grained. At this level, the fallen boulder covered a third of the 1958 trench. A black carbonaceous deposit extended over the rear wall of the shelter at this level, indicating that fires had been lit against the wall at even lower levels.

ARTEFACTS: Bone artefacts comprised: A52118, the tip of a well burnished point and A52119, a small triangular, flattened, fragment, with evidence of polish on one point.

Stone artefacts: A52120 (Fig. 5), a milky quartz pirri, with a median ridge and careful retouch on both margins and base; A52121 (Fig. 5), a thick and roughly made quartz point, with some retouch and a very sharp point; A52122 (Fig. 5), an abruptly trimmed milky quartz microlith, in the shape of an elongated-crescent and broken at one extremity; A52123 (Fig. 5), a granular quartz microlith, roughly trapezoid in shape, retouched on the 2 short sides; A52124 (Fig. 5), a semi-circular jasper microlith, broken across the middle and carefully retouched along all the remaining curved margin. A52125, a high-backed burren adze-stone; A52126 (Fig. 5), a chalcedony high-backed flake with adze utilization marks on all margins. Although not triangular in section, this artefact is otherwise similar to the Elouera of New South Wales. (At Devon Downs, specimen A29195 from layer VIII, is definitely Eloueran type—Hale and Tindale, Fig. 195.) A52127 (Fig. 5), a concave chert scraper; A52128, a worn adze slug; A52129, a small quartz scraper with careful retouch; A52130-2, two scrapers and a fragment from a third; A52133, a small chert core; A52134, a large flake, subsequently used as a core; A52135, a fragment of sandstone, probably used as an upper grindstone. A52136 (Fig. 6) is of some interest as it is a mussel shell with a circular hole pierced through it. The hole is an ancient one; the shell was broken out of a lump of moist soil and the film of earth, which covered the shell, extended around the edge of the hole. Evidence contained in South Australian Museum records proves that in the nineteenth century aborigines pierced mussel shells in this fashion and used them as spokeshaves.

WASTE FRAGMENTS numbered 154; quartz 117, quartzite 6, jasper 26 and chert 5.

BIVALVES: As for level 6.

UNIVALVES: As for level 6.

MAMMALS: *Macropus*; *Bettongia*; *Potorous*; *Thylogale*; *Vombatus*; *Perameles*; *Trichosurus*; *Antechinus*; *Rattus*.

REPTILES: *Tiliqua*; *Amphibolurus*.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell.

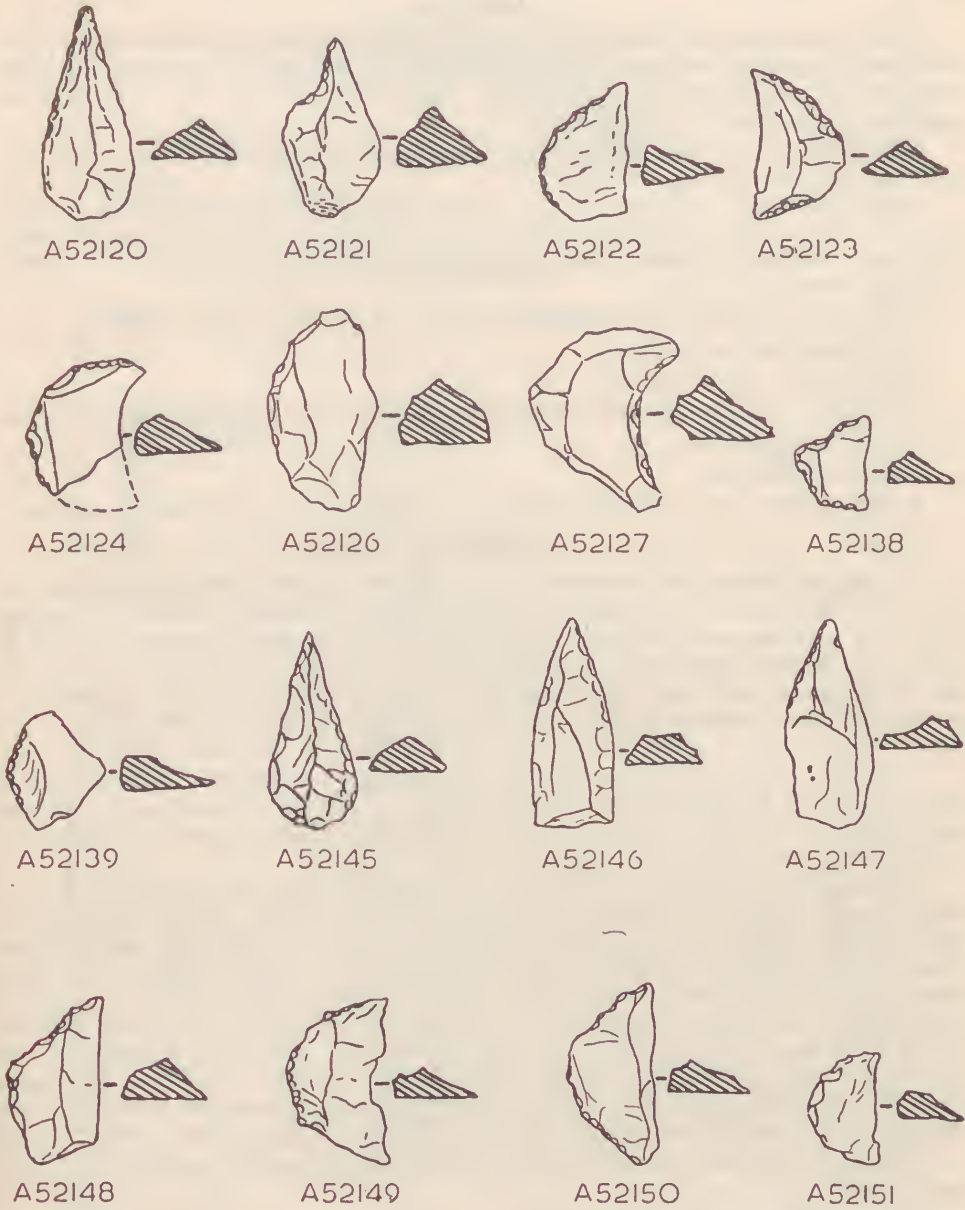


FIG. 5.—Scale 1:1.

Level 9

A fairly arbitrary distinction from level 8 was necessary, because the deposit was a similar muddy yellow colour and so moist that differences were only revealed after the exposed section walls had dried. Shells were common, but there were no concentrations of ash.

ARTEFACTS: There was a single bone point, A52137 (Fig. 6), $\frac{1}{4}$ in. in diameter, tapering to a well-ground tip.

Stone artefacts: A52138 (Fig. 5), a triangular chalcedony microlith; A52139 (Fig. 5), a crescentic chalcedony microlith, broken in half; A52140, a chert fragment with some utilization flakes along one edge, possibly an adze; A52141, a small, circular, clear quartz core.

WASTE FRAGMENTS numbered 108; 87 quartz, 14 jasper and 7 chert.

BIVALVES: As for level 6.

UNIVALVES: As for level 6.

MAMMALS: *Macropus*; *Macropids*; *Bettongia*; *Potorous tridactylus*; *Perameles*; *Rattus*; *Rattus lutreolus*.

REPTILE: *Tiliqua*.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell.

Level 10

A definite division between levels 9 and 10 was traced, particularly along the S. side of the trench. The excavated material was so damp that it resembled a thick paste and was extremely difficult to sieve. Fallen rocks made progress difficult in 1956; the boulder uncovered in 1958 occupied half the excavated area. In 1956 no artefacts and only one waste fragment occurred below level 10, although the smoke-blackened surface of the rear wall continued down into level 11. The C14 age determination on shells from this level was 4850 ± 100 years (R 456/1).

ARTEFACTS: Bone artefacts were all indeterminate fragments. A52142, a flat-tened piece $\frac{3}{4}$ in. long and broken at both ends, bore definite cut marks and had been well polished; A52143, the tip of a simple point; A52144, 2 minute bone points which show some evidence of polish.

Stone artefacts formed a rich collection. A52145 (Fig. 5), a chert pirri carefully retouched all over; A52146 (Fig. 5), a quartzite pirri; A52147 (Fig. 5), an asymmetrical uniface point, trimmed along one edge and typologically an Adelaide Point; A52148 (Fig. 5), a high-backed oblique point; A52149 (Fig. 5), a clear quartz microlith trimmed around the curved margin; A52150 (Fig. 5), a porcelanite microlith, almost triangular in outline and delicately retouched; A52151 (Fig. 5), a small, well finished, microlithic crescent; A52152, a slightly concave jasper scraper; A52153, a heavily patinated chert scraper, utilized on 2 edges; A52154, a patinated chert flake with utilization flakes along one side, possibly it was an adze-stone; A52155, a small chert core; A52156, a crude, pointed, primary flake.

WASTE FRAGMENTS totalled 62, of which 37 were quartz, 4 quartzite, 8 jasper and 13 chert.

BIVALVES: As for level 6.

UNIVALVES: As for level 7.

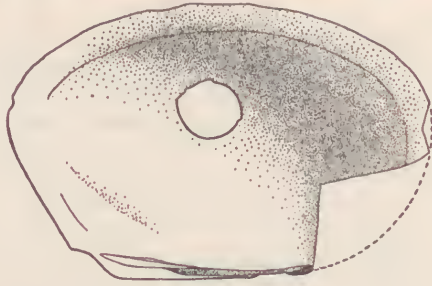
MAMMALS: *Macropus*; *Bettongia*; *Thylogale*; *Vombatus*; *Rattus*; *Dasyurus*.

REPTILES: *Tiliqua*; Serpentes.

OTHER ANIMALS: *Chelodina*; fish; bird; *Dromaeus novae-hollandiae* egg shell.



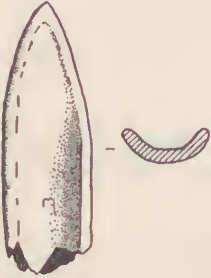
A52037



A52136



A52057



A52061



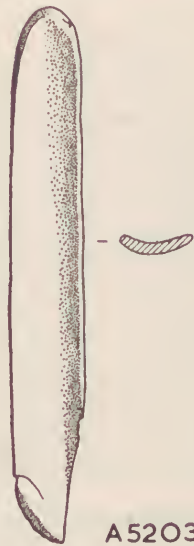
A52056



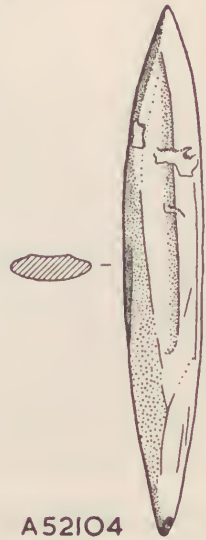
A52002



A52137



A52038



A52104

FIG. 6.—Scale 1:1.

TABLE 1
Artefacts according to Levels

Level No.	Stone						Bone		C14
	Adze-stones	Pirri points	Geometric microliths	Microlithic tradition	Total artefacts	Waste fragments	Muduks	Total artefacts	(Years before present)
0	4			2	8	601		1	
1				1	3	198			
2	2			1	7	594		1	
3				1	4	483			
4					2	53			
5	6				11	311	1	6	3240 ± 80
6	10	1		3	21	487	2 + 1?	20	
7	3				7	272	1	8	
8	2	1	3		15	154		2	
9	1?		2		4	108		1	
10		3	3		10	62		4	4850 ± 100
11					1	7			

Level II

A sticky yellow paste, which was only excavated over a confined area of the trench because the large boulder now covered almost the whole area. The lowest evidence of human activities came from near the top of this layer. On the N. and E. sides of the boulder it was possible to penetrate to some depth and the molluscan evidence indicated the proximity of water during the period at which this was the surface. It should be noted that at this depth the excavation was below the high-water level reached by a normal annual flood. It can be stated with confidence that the excavation had penetrated to a sterile deposit and that occupation at any lower level would have been impossible, unless river-level was considerably below that of modern times. There is nothing in the molluscan, faunal or geological evidence of these lower strata to suggest that the climate or environment was significantly different from immediate pre-European times; it is therefore unlikely that the river was lower.

ARTEFACTS: A single stone artefact was found (A52157); this was a patinated chert flake, retouched as an end scraper.

WASTE FRAGMENTS: 7 waste stone fragments were found, 3 of quartz and 4 of jasper.

BIVALVES: *V. ambiguus* Philippi and *Alathyria jacksoni*, rare; *C. angasi*.

UNIVALVES: *Notopala hanleyi* and *Lenameria tenuistriata waterhousei* Clessin were fairly numerous; *Meracomelon cassandra* and *Plotiopsis tetrica* were rare.

MAMMALS: *Macropus*; *Thylogale*; *Rattus*.

OTHER ANIMALS: *Chelodina*; *Dromaeus novae-hollandiae* egg shell.

PART III

Discussion

A comparison of the artefacts from Devon Downs and Fromm's Landing makes it evident that the new excavation has raised several crucial problems of Australian prehistoric research. Despite the factors conducive to concentrated occupation at Fromm's Landing and the great depth of deposit, cultural material was scarce throughout. The quick returns and aesthetic pleasures, derived from the excavation of many stone age sites in other countries, are unlikely here. Only 100 stone artefacts were found and less than half of these could be classified as anything but 'utilized stones'; the largest worked stone tool measured 1 in. by 1½ in. The Devon Downs material examined in the South Australian Museum is similar; almost half of the 125 stone artefacts are amorphous specimens, while the largest specimen measures 2½ in. by 1½ in. At both shelters the aborigines utilized their stone resources to such an extent that sizeable fragments were rare, although at Fromm's Landing the sample numbered 3300 pieces. In level 1, e.g., 340 quartz fragments weighed less than 8 oz., while the combined weight of 260 quartz pieces in level 3 was 7 oz.

Insufficient geological and related research on the location of aboriginal quarries and the exchange of raw materials in Australia make it difficult to reach definite conclusions concerning contacts of the Fromm's Landing aborigines with more distant areas. The evidence for exchange of goods over wide areas provided by this site is not impressive. For instance, although the excavators particularly searched for ochre, they found little. The two main sources of ochre, according to information

supplied by N. B. Tindale, were at Parachilna in the Flinders Ra. and Ochre Cove, S. of Port Noarlunga in South Australia. The latter site is only 75 m. distant.

Only 6% of the stone identified—the cherts and fossiliferous limestone, could have been obtained in the immediate vicinity. However, the source of most of the remainder was not far distant. Quartz (78%), quartzite (4%), the schists and sandstone are probably all from the Mt. Lofty Ra., or from creeks on their E. scarp, under 20 m. to the W. Hale and Tindale (p. 203) suggested that much of the raw material at Devon Downs was obtained in the bed of Marne Creek, a stream descending from the Mt. Lofty Ra., half way between their site and Fromm's Landing. The granite may have come from Mannum, only 20 m. downstream. The source of the jaspers (10%) is not certain, but in a personal communication N. B. Tindale has stated his belief that they were traded down the river. 'There is a native mine which I have recently located on the Wilabalangaloo property at Berri, owned by the National Trust of South Australia.' (Its existence is recorded in *Walkabout*, Oct. 1, 1958, p. 22.) Berri is over 150 m. upstream from the shelter, although there is no reason to believe that all, if any, of the jasper actually came from that particular quarry. The nearest known localities where flint and diorite were obtainable are respectively, SE. South Australia and W. Victoria, both over 200 m. away. However, these stones are very rare and their appearance in a total of 3300 pieces does not alter the fact that most of the sources of supply of raw materials probably lay within a radius of 20 m. This relative parochialism is surprising for a site admirably situated for valleyward contacts. It is relevant to any discussion of the evidence for migrations of people both here and at Devon Downs.

A striking characteristic of the stone industry is the marked degeneration in the craftsmanship of later occupants. Little in the upper levels compares with the pirris and microliths of earlier strata, which are equal to those of the best cabinet collections made on surface sites. At Devon Downs, also, the latest (Murundian) horizons contained only crudely made artefacts. The parallel between industrial skills at both sites extends to the utilization of bone. Only 2 of the 43 bone artefacts from Fromm's Landing were found above level 5; at Devon Downs utilized bones were entirely absent in the upper 4 layers, although there were 90 in the lower strata. A problem which future excavators could consider, is whether there is general significance in the decline in stone working and the apparent neglect of bone as a raw material in more recent times. As Eyre and Angas both illustrate bone artefacts from the Lower Murray area, it is possible that the pattern revealed by these excavations is accidental; yet it is also evident from their descriptions that the aborigines efficiently utilized a wide variety of organic materials, particularly wood, reeds and vegetable fibre. The archaeological evidence may be a true reflection of a change of emphasis in the cultural life of the aborigines as they adjusted themselves more completely to the riverine environment and the exploitation of its varied resources. It may be conjectured that the first craftsman came from more arid inland regions where stone and bone were the accessible and basic raw materials and that these traditions took time to change.

A study of adze-stones excavated at both sites supports the suggestion that stone was replaced by organic materials. In recent aboriginal society throughout much of the continent, some form of spear-thrower or handle, with an adze-stone embedded in gum on one end, has been the basic general purpose and wood-working tool. Use in wood-working produces a characteristic steep broken-back working edge. The first 2 definite worn adze-stones appeared in level 8 at Fromm's Landing and there were 20 more in levels 7-5 (single doubtful specimens were present in levels 9

and 10). Further evidence for wood-working activities in level 8 times was a concave scraper (or 'spokeshave') with its edge broken back through utilization. The first certain adze-stone at Devon Downs came from the latest pirrian horizon (VIII) and they were numerous in layers VII-V. Their earliest occurrence at both sites therefore coincided with the latest examples of well made pirris and microliths and they were most numerous after production of these types declined. The inference therefore is that the increasing emphasis on wood-working was accompanied by a deterioration in stone-working skills. If such cultural adaptation occurred, it is unnecessary to invoke successive racial or cultural invasions or racial degeneration to explain it.

There are interesting similarities between the implement types at both shelters. In both excavations pirris were common to the early horizons and they were overlain by bone muduks. It is significant that the character of the deposit changed considerably between the 4th and 5th levels in both deposits. (The agreement in numeration is coincidental.) There was intensive occupation in level 5 at Fromm's Landing, while in level 4 times cultural evidence was rare, bone utilization ceased and the quality of stone artefacts deteriorated. The excavators of Devon Downs told a similar story for their Murundian phase and remarked that 'exhaustive search did not bring to light any stone implements of definite type in layers above IV' (p. 183).

Hale and Tindale assumed that the sequence—Pirrian, Mudukian and Murundian—was a cultural one. Subsequently, Tindale applied these cultural labels to artefacts collected in various parts of Australia and has used the Devon Downs stratigraphic-chronological succession as a pointer to their age. A revision of such concepts is now necessary because, although the evidence outlined above confirms the Devon Downs sequence in a general way, there are also basic differences. Further it is questionable whether changes in implement types represented any cultural differentiation. An evaluation of the Devon Downs cultural terminology is desirable in the light of the new evidence. In the discussion which follows, the Devon Downs terminology and appropriate archaeological horizons are provided at the beginning of each section.

PRE-PIRRIAN (LAYERS XI-XII, DEVON DOWNS)

Because the Devon Downs shelter wall sloped out sharply, only a small area was excavated at this depth. A simple bone point and a fragment of another were the only artefacts found. The lowest pirris at Fromm's Landing came from level 10; level 11 contained a single artefact, a scraper of no distinction. In the sense that pirris were absent from the lowest occupation horizons at both sites, these levels could be termed pre-pirrian. But the application of cultural terminology to artefacts as generalized as a bone point and a stone scraper, is misleading and the term Pre-Pirrian should be abandoned. (In his latest writings Tindale appears to have done so.) The greatest need in Australian archaeology is the discovery of a site in which pirrian horizons are underlain by occupation debris of earlier aborigines and whose excavation would provide a worthwhile assemblage of artefacts from a demonstrably pre-pirrian occupation.

PIRRIAN (LAYERS VIII-X, DEVON DOWNS)

These horizons contained 34 pirris; the type was less common at Fromm's Landing, where 4 were excavated in levels 8 to 10 and one probable specimen in level 6. These points are uniform in size, but there is such variety of secondary retouch that 5 sub-types are represented. One of them A52147 (Fig. 5) is retouched

along only one edge and if it is accepted typologically as an Adelaide Point, this is the first stratigraphic proof that this type was a contemporary variant of the pirri. A similar diversity of sub-types characterizes the Devon Downs industry. As the pirris from both sites were made from local stone, during a well-defined stratigraphic time interval, the great variety of finish cannot satisfactorily be explained by reference to cultural or functional differentiation. It must relate to personal predilections of the toolmaker, or the recognition that each individual primary flake required finishing according to its condition when struck off the core. Attempts to formulate a typology of pirris, by splitting them into sub-categories, are therefore exercises of doubtful utility. (Campbell and Noone 1943, pp. 287-93; McCarthy 1946, p. 38.)

Associated with the pirris in levels 8 to 10 were 8 geometric microlithic crescents, trapezes and triangles. Quartz specimens were retouched as skilfully as those made from less intractable stone, although considerable variation in finish is represented. As both pirris and microliths belonged to the same occupation phases, there was no stratigraphic reason for separating their owners. Similar geometric microliths were not found at Devon Downs, although a single obliquely blunted micropoint, or Woakwine Point, present in a pirrian horizon, was unrecognized at the time of publication. This specimen, A29198, came from layer VIII (Pirrian) and was figured in the report as 'a pointed chert flake' (Fig. 198, p. 195). It must be emphasized that the knowledge of microlith typology was not far advanced in 1929. (Even overseas, Grahame Clarke's first definition of European microlithic industries was only published in 1932.) Therefore, although Hale and Tindale referred to the occurrence of 'microliths' in layers VI and VII, a re-examination of these artefacts has shown that they are merely small utilized stones, of a kind common to almost every implement assemblage. Unless the term microlith is applied only to geometric forms and their derivatives, it becomes misleading and meaningless. [The specimens concerned are the '6 nondescript microliths' from layer VI, referred to in the Devon Downs report (p. 189 and Figs. 92-7). Three further specimens from this layer are on exhibition in the South Australian Museum as 'microliths'. The 2 specimens with register no. A29253 are not true geometric forms; no. A29019 may belong to the microlithic tradition, but it is a poor specimen and resembles the backed points from levels 0 and 3 at Fromm's Landing, referred to later. The '3 crude microliths' from layer VII (p. 190) are utilized fragments of no typological significance (A29149, 50, 51).]

In subsequent years Tindale pioneered the systematic investigation of South Australian surface collections. Probably because of his initial failure to identify the micro-point in the pirrian context and the mistaken belief that there were several microliths in the mudukian levels, Tindale concluded that the microlith was a type-tool of his Mudukian culture (Tindale 1957, p. 23; 1955, p. 280).

The new excavation has demonstrated that at Fromm's Landing the microliths are as ancient as the first pirris and that they are stratigraphically earlier than the first muduks. The presence of microliths on one site and their absence on an apparently contemporary site 10 m. away, underlines the need for caution in correlating implement collections with cultural periods over wide geographic areas. The prerequisite for such systematization is further stratified excavation. The radiocarbon 14 date of 4850 ± 100 years for level 10 is consistent with the Devon Downs pirrian date of 4250 ± 180 years; it is the first age estimation from a stratified context for the microlith in Australia.

MUDUKIAN (DEVON DOWNS LAYERS V-VII)

In the Devon Downs collection there are 7 undoubted muduks; 4 occurred in levels 5-7 at Fromm's Landing. Hale and Tindale believed that the muduk was a

fish gorge (p. 205). McCarthy (1940) has since questioned this identification and argued that its function was primarily as a dual spear point and barb. The present writer has examined several spears with fusiform bones serving as point and barb. With the exception of one muduk at Fromm's Landing, the remainder from that site and all from Devon Downs, are too small to have been usefully hafted on a spear shaft and are best explained as aids in line fishing. It should also be noted that whereas some of the hafted spear points figured by McCarthy are asymmetrical in section, the archaeological specimens are relatively flatter and more symmetrical. Whatever their function in the Murray valley, these alternative uses have a wide temporal and geographical distribution. Fusiform-points of bone or wood were employed in Europe for spearing or angling from Palaeolithic to modern times and both functions have been documented during the last century for the Pacific area and Australia. [Palaeolithic spear points and barbs from the Aurignacian horizons at La Ferrassie are figured by Peyrony (1934); European fish-gorges are discussed by Clark (1948, pp. 46-7, and the references cited there); McCarthy (1940, p. 318) listed some Pacific occurrences of the dual barb and point; Massola (1956) surveyed the distribution of gorges in the Pacific. To Massola's list should be added the Chatham Islands (Skinner 1923, p. 98).]

It is significant that there are records of wooden gorges being used for line fishing by the aborigines in Victoria (Brough Smyth I, p. 391), and the Lower Murray area (*South Australian Museum Anthropology Notebook* mss., March 1932), during the last century. A midden deposit near Warrnambool in SW. Victoria, which contained bone muduks, has been radiocarbon dated to 538 ± 200 years ago (Mitchell 1958, p. 198).

It must be concluded that the muduk is a generalized type employed by a wide variety of prehistoric and primitive peoples and still used for angling during the last phase of Australian prehistory. Consequently, the discovery of 11 archaeological specimens on the Lower Murray cannot have much culture-chronological significance. Probably the muduk was used to catch Murray cod (*Oligorus macquariensis*), whose bones were represented in several layers at Fromm's Landing. It is relevant that one modern method of catching this large fish is to trail a lure, which simulates the movement of a live fish, behind a moving boat. Clark (1948) describes the baiting of gorges with live fish in some European peasant communities and this is an added reason for believing that the muduk, possibly baited with a living fish, was a fish-gorge. The disappearance of muduks from the later material assemblage is explicable in two ways. The aborigines may have substituted perishable wood for bone as the raw material, (the use, a century ago, of wooden gorges is documented above), or they speared and netted the fish in preference to angling for them. The evidence cited already supports the first alternative, but Eyre's account is relevant to the second and probably there is validity in both. Eyre stated in 1845 (II: 259-67) that he had never seen the aborigines of that area catch fish on the line; he supplied a long description of the methods adopted to spear and net them. For the group concerned, the social implications resulting from the substitution of co-operative techniques such as netting and canoe fishing, for the individualistic line fishing, may have been considerable. But this is no reason for believing that a new culture had arisen or a new migration taken place.

The Fromm's Landing excavation has raised crucial problems concerning the cultural identity and uniqueness of the Mudukian phase of Australian prehistory, with its type-artefacts, the muduk and the microlith. The muduk is so widely distributed in time and place that it should be abandoned as a cultural type. (In any case it has not been found on any 'Mudukian' site other than Devon Downs.)

Microliths are an integral part of the pirrian period at Fromm's Landing and therefore the claims of the Mudukian to be considered a cultural entity are extremely tenuous. This is borne out by an analysis of the stone industry in those levels (5-7) which contained muduks. In Hale and Tindale's view the change from Pirrian to Mudukian cultural phases was 'abrupt' and a result of migration (p. 213). There is no discontinuity in the evidence from Fromm's Landing, where in level 6 there is a pirri associated with 2 muduks. There are also 3 small artefacts in level 6 (A52088-90) which, although not truly geometric, are clearly made in that tradition. These and 4 micro-scrapers (A52092-5) are proof that very small quartz pieces could still be shaped by minute retouch. Although inconclusive, level 7 produced evidence of some interest. 5 leaf-shaped primary flakes were uncovered; all of these were simple, untrimmed, pointed flakes and some resembled potential pirri-blanks while others are good enough to use as they are. As only one other similar flake was found during the excavation, it is notable that 5 should have been buried in the one stratum. It is also relevant that layer VII at Devon Downs contained 4 pointed flakes (numbered A29264 and A29148), proportionately a high number to flakes in other levels. In both shelters the flakes were stratified immediately above pirrian horizons and it suggests that they were intended to perform the same function as pirris, although no premium was now placed on aesthetic appeal.

The unavoidable conclusion is that it is misleading to speak of a Mudukian culture suddenly succeeding the Pirrian. The muduk itself is a doubtful cultural indicator; the microlithic tradition in its classic phase at Fromm's Landing, antedated the first muduks and was associated with pirris; the analysis of the utilized stone made above, shows that there was continuity of productive technique. Earlier in this discussion it was suggested that the key to understanding the history of the site may be found in the new emphasis upon wood-working, indicated by the presence of adzes, and a more complete exploitation of the resources of the valley. In such circumstances, the social significance of well-made stone tools might decrease thereby leading to a lack of preoccupation with the appearance of an artefact. (Conversely, D. S. Davidson (1935) has cited the example of aborigines who abandoned utilitarian but unaesthetic stone spear points, when it became socially desirable to possess attractive but less efficient ones.)

It is interesting that pirris and microliths in their most finished form both disappeared at about the same time; the C14 date of 3240 ± 80 for level 4 proves that their production had ceased by that time. The possibility that they were associated on a composite tool should be considered. With a pirri as point and a microlith as barb, an admirable spear would result. The chief difficulty in this explanation is that the 2 types are mutually exclusive in surface collections made in many areas.

MURUNDIAN (DEVON DOWNS LAYERS I-IV)

As at Devon Downs, the implements in levels 0-4 were few and generally crudely made. It is premature, however, to claim that this represented occupation by a new cultural group. There was no change in the types of utilized stone and the traditions of stone-working established during the pirrian phase at both sites, continued through this period. The adze was used throughout, while very delicate retouch on 3 scrapers and long, fluted, flake-scars on 2 small cores, show that precision flaking and retouch was still possible, although uncommon. But the chief evidence for cultural continuity is obtained from a study of 4 asymmetrical backed points, occurring in each of levels 0 to 3. The largest example, $1\frac{3}{8}$ in. in length and made from inferior milky quartz, is abruptly trimmed on the thick edge and base,

while the other edge is sharp and unworked; despite the rough finish, these are the essential characteristics of the Bondi-point (McCarthy 1946, p. 36). 2 smaller and crudely made quartz bladelets from levels 0 and 1 were also steeply backed and are typologically similar. One edge of the Bondi-point from level 2 is carefully trimmed and the retouch is so delicate that it suggests comparison with the microliths of lower levels. In fact, a close examination of the microliths in layer 8 is of considerable interest. 2 of them are slightly more elongated than the crescents and triangles of levels 9 and 10. This type could reasonably have developed into the backed points characteristic of the upper layers, and a direct comparison is suggested between these artefacts and the 3 quartz Bondi-points. (Specimen A29019 from layer VI at Devon Downs is also best explained as a backed point, transitional between geometric and Bondi forms.)

If this interpretation is valid, it underlines the essential continuity of industrial traditions on the site from the earliest to the latest occupations. It also means that the Bondi-point at Fromm's Landing was later than the classic geometric microlith. Future excavators should keep this problem in mind because McCarthy has offered a different interpretation for New South Wales. While he stresses the essential affinity between geometric forms and the Bondi-point, McCarthy (1948, p. 31) has concluded that 'the full development of the geometrical microliths was . . . subsequent' to the invention of the Bondi-point.

The discovery of the Bondi-point in level 2 is of considerable interest to the controversial problem of the status and function of the microlithic industry in Australia. The extreme tip of this fine grained indurated mudstone point was broken in antiquity (Pl. VIII, fig. 2; Fig. 4b). It is now $\frac{7}{8}$ in. in length and is abruptly trimmed along the length of its thickest edge. A dark brown stain extends in a curve across half of one face, continues over the retouched thick edge and on the lowest margin of the reverse face there is a faint discolouration. This suggests the possibility that the artefact was part of a composite tool and that the manner in which it was mounted is indicated by the stain. That is, the adhesive material completely covered the carefully retouched edge and the working edge was the clean, sharp, thin margin. In an attempt to establish the origin of the stain, the artefact was submitted to the Chemical Physics Section of the Commonwealth Scientific and Industrial Research Organization. Dr. A. L. G. Rees, Chief of Division, stated in his report, that his chemists were 'tolerably certain that it is not a mineral stain, but foreign organic material. Such tests as it was possible to do indicate that the material is highly polymerized; in other words, if it is a natural resin, it has been modified either during the bonding process (perhaps by fire-curing) or by subsequent ageing. It is certainly not fat or dried blood and it is difficult to imagine that the aboriginals had any organic substances other than plant gums. Although it has not proved possible to establish the identity of the foreign substance positively, we are inclined to favour the suggestion that it is a natural resin.'

If this tentative conclusion is taken to warrant serious consideration, it opens up interesting avenues of speculation. The abrupt secondary trimming was intended to blunt the edge of the primary flake and not to sharpen it, because it was completely embedded in the resin. Its only function can have been to present a thick roughened surface, ensuring firm adhesion to the resin and at the same time reducing wear on the gum and the wooden shaft. It would be misleading to consider this particular Bondi-point as a point, because the tip must also have been covered by the resin; neither was it a 'backed knife' with the blunted edge intended as a finger-rest. It is relevant to ask whether the careful trimming on geometric microliths was also hidden beneath resin, while the primary flake edge was intended for use.

Reference is made here to the suggestion advanced earlier, that microliths may have been barbs to the spears of which pirris were the points. McCarthy advanced the opinion (1943, p. 149) that the Bondi-point was a dual spear-barb and point. Although this specimen is not large enough to have served a dual function, the best explanation of its purpose is as a barb. McCarthy's suggestion gains support from evidence recently obtained in Europe. At Loshult in Sweden, during 1951, peat-diggers uncovered a Mesolithic arrowshaft with microlithic stone point and barb still attached; that they were hafted on an arrowshaft and not a spear shaft is irrelevant. From a description and photograph, supplied by Professor Grahame Clark, it is clear that a roughly triangular microlith was mounted at the tip of the shaft, while the barb was an obliquely blunted type, with the sharp primary flake edge projecting and the worked margin embedded in the resin. The size and shape of this barb was almost identical to the Fromm's Landing specimen and the resin in which it was mounted made a similar slight curve across the face of the artefact. During his excavation at Star Carr, Professor Clark uncovered an elongated trapeze, with part of the retouched edge still embedded in resin; an examination of this artefact also shows close parallels to the Australian example (Clark 1954, pp. 102-3; Pl. XXf).

Because of the present lack of stratigraphic evidence relating to the introduction of the ground axe into Australian material culture, an inconclusive piece of evidence from this excavation may be mentioned. Although no axes of any description were found, it is perhaps noteworthy that small fragments of diabase were recovered in levels 0, 2 and 3. This stone must have travelled a considerable distance to the site and it was the only suitable material for axe production found there. Possibly, this is a clue to the relatively late introduction of the grinding technique in this area. This is certainly an important problem awaiting archaeological definition.

The excavation at Fromm's Landing has recovered some interesting evidence, but it is tantalizingly meagre. The suggestions made in this discussion are offered in the realization that they are largely negative and always tentative; only further excavations in many areas can contribute positive information. The time is not ripe for attempts at cultural and chronological syntheses of Australian prehistory. That pirris are an ancient type was established at Devon Downs; Fromm's Landing has confirmed this and added geometric microliths to the types whose stratigraphic provenance are known. But these discoveries relate only to the Lower Murray valley and should not be correlated at present with other areas. It is unfortunate that Hale and Tindale chose to apply cultural terminology to their material. The use of the terms Mudukian and Murundian, evocative of migration and sudden change is now shown to be misleading. It is improbable that the area was immune from tribal movements and the diffusion of ideas; but at this early stage of prehistoric investigation it is safer, though less satisfying and vivid, to refer to the evidence at excavated sites by reference to their strata numeration. Thus, Devon Downs VI and Fromm's Landing 7 may be said to contain muduks, without prejudicing the question of whether the inhabitants of both shelters were contemporaries, or culturally Mudukian.

Prehistoric Natural History and Climate

As both the samples of identified molluscan and mammalian remains numbered some hundreds of specimens, it is relevant to use this data in an attempt to assess prehistoric environmental conditions. It had been hoped to correlate this evidence with the results of pollen analytical examination. Dr. Suzanne Duigan of the Botany

Department, University of Melbourne, collected 25 samples from the section in 1956 for pollen analysis. Unfortunately this project proved fruitless.

The most striking characteristic of both the molluscan and mammalian evidence is that the species remained constant throughout the deposit; those in earlier strata were identical to those inhabiting the area at the time of European settlement. The only introduced species, *Oryctolagus* (the European rabbit), occurred in the surface stratum; it is worth remarking that no remains of dingo were recovered at this site.

The excavators of Devon Downs inferred that their evidence indicated a progressive modification in environmental conditions due to climatic changes in the direction of the semi-arid conditions of the lower watershed characteristic of the present time (p. 213). The evidence from Fromm's Landing cannot be used to support this suggestion. *Sarcophilus* (Tasmanian Devil), represented by one animal in level 7, was the only species which was probably extinct in the area at the time of European settlement; its extinction was possibly related to aboriginal activity. Some *Chelodina* (tortoise) bones from a Pirrian horizon at Devon Downs were identified as *Chelodina expansa*, a species at that time thought to be restricted to N. Australian waters (pp. 199, 215). At Fromm's Landing, only small fragments of carapace were recovered and these did not permit a determination involving the distinction between *expansa* and the common *Chelodina longicollis*. However, no climatic inference should now be drawn from the occurrence of *expansa* at Devon Downs. There exist records establishing that both *longicollis* and *expansa* were found alive in and near the Murray R. during recent years. Amongst the *Chelodina expansa* in the National Museum of Victoria are the following 3 localized specimens: No. D9722 Koondrook, Murray R., 3-1-1917; Nos. D9720-21 White Cliffs, Murray R., 15-4-1925.

At Devon Downs, fluctuations in the frequency of certain molluscan species were held to be environmentally significant. This inference is not supported by the new evidence. Although the proportions of the univalves *Plotiopsis* (*Melania* in the Devon Downs report), *Lenameria* (*Bulinus*), and *Corbiculina* varied at Devon Downs, there was no significant alteration at Fromm's Landing. *Plotiopsis* was rare, averaging from 2 to 10 specimens in a level; *Lenameria* was always more abundant, a level containing from 20 to over 100 shells. Hale and Tindale (p. 213) suggested that *Plotiopsis* was an indicator of brackish water conditions; it is now known to inhabit deep water, e.g. it is abundant in the Murray R. at Mildura. It may be significant that although *Austrosuccinea australis* was rare, it occurred in almost every level. This small land snail demands a dry habitation, similar to that which characterizes the area today.

Miss Hope McPherson, who identified the molluscan species, submitted some of the bivalves from lower levels to D. F. McMichael of the Australian Museum, Sydney, for further examination. He concluded that the mussels 'appear to be all the same pair of species, *Velesunio ambiguus* and *Alathyria jacksoni*, apparently an almost typical present day Murray R. population. The *jacksoni* is of the "selwyni" form and some of the *ambiguus* are of the "evansi" form.'

It can only be concluded that there is no evidence at Fromm's Landing, that any substantial modification of climate, water temperature or wild life, occurred during the 5,000 years tenancy of the land by the aborigines.

The Rock Engravings

Immediately above the shelter there is an almost continuous strip of engravings over 40 ft. long and from a few inches to 2 ft. wide; several engravings have also been made on the shelter roof. The rock surface in this panel is relatively smooth

and free from the smoke incrustation which covers the remainder of the cliff face and this suggests that the surface may have been artificially prepared at a relatively late stage in the occupation of the shelter.

Variants of 2 basic motifs formed the repertoire of the artists of this gallery; one design was linear and the other consisted of small circular holes, worn or drilled into the soft limestone (Pl. VIII, fig. 1). All the designs are similar to those recorded at Devon Downs and they conform to Hale and Tindale's Type C (p. 211), the latest art engraved at that shelter. The linear markings, fairly shallow grooves, occur both singly and in groups, and are frequently parallel and roughly vertical; they range in length from less than 1 in. to over 6 in. There are several bird tracks, possibly emu, and 'match-stick' figures which must be interpreted as representations of the human form. However, the most characteristic feature of the site is the hundreds of circular holes, which are sometimes over $\frac{1}{2}$ in. deep and vary from $\frac{1}{4}$ in. to 1 in. in diameter. Most of them appear to have been placed at random, although many are distributed in definite clusters and others form lines or rows, consisting of as many as 15 holes. Some holes are drilled into earlier linear grooves, but unlike some examples at Devon Downs, adjacent holes were not deliberately connected by grooves.

AGE: There is little doubt that these engravings are of relatively recent origin. They are on the exposed cliff face, yet they are not badly weathered or eroded; no smoke encrustation has developed since they were engraved; the designs are similar to the most recent markings at Devon Downs. Without the use of scaffolding, the surface would have been out of the reach of any occupant earlier than about level 2 times. It is relevant, that a close inspection of the holes reveals that they have been drilled by persons who stood level with the rock face and did not have to reach upwards.

PURPOSE AND AFFILIATIONS: The lack of any aesthetic appeal in the engravings is only too apparent; but they have characteristics in common with numerous sites recorded in the Lower Murray region by Sheard (1927a, b; 1928), Hale and Tindale (1925; 1930) and others.

It is a widely held belief in Australia that linear grooves are tally marks, periodic records of attendance at ceremonies, or time intervals. The functional nature of the circular holes has also been urged in conversation by N. B. Tindale, who suggests that they were produced by the makers of fire-drills when twirling the wooden drill on the rock in order to wear its point to a suitable shape. If these explanations are valid, it is incorrect to refer to these marks as 'art'.

However, this does not explain why, at times, both grooves and holes show purposeful design. It is also necessary to explain why so many fire-drill makers concentrated their activities on this particular section of the rock, while failing to leave any utilization marks on the rock above the other 5 rock shelters in the immediate vicinity. McCarthy (1958, pp. 16-17) has stressed that linear and circular spot designs of the types represented here are also represented among the cave paintings of E. Australia, and concluded that 'these motifs in both engravings and paintings had some meaning within the rock art itself apart from any utilitarian purpose . . .'. In this connection, it is interesting to note that dots, painted haphazardly or in lines on cave walls, are a little studied but characteristic feature of European Palaeolithic art. They occur, e.g., at Lascaux, Baume D'Oullins, Marsoulas and Castillo. The most interesting Palaeolithic site is Les Trois Frères, where in the 'Lateral Gallery of the Dots', long lines of painted dots appear on the same wall as what must be interpreted as engraved circular holes (Bataille 1955; Breuil 1952, figs. 124, 179, 258, 457).

A complete scaled photographic record of these engravings was made and the negatives have been deposited in the South Australian Museum.

The Human Burial

During the 1956 excavation, a shallow grave was uncovered immediately inside the shelter and was excavated by N. B. Tindale. The grave had been dug at the period when the top of level 1 was the ground surface and it reached to the bottom of level 2. The grave was oval in shape and its sides were undercut by several inches. Its maximum width at the bottom was 16 in. and its length 26 in.; it projected under the S. wall of the trench for 9 in. The infilling was a loose grey soil containing numerous charcoal lumps; several small limestone fragments had been placed over the top of the grave. As these stones and subsequent hearth deposits dipped downwards over the grave, this indicated that the loose infilling had subsided and created a hollow; it was only levelled out during level 0 times.

The body, which was orientated almost due E. and W., was flexed, and lay on its left side with its right arm extended and its left arm bent across its chest. The mandible was detached from the head and lay a few inches from it. This feature, and the fact that the body was tightly flexed and fitted into the small grave, is an indication that the body was desiccated at the time of burial. Such practices are well documented for this area at the time of the European arrival.

The skeletal remains, which are in a good state of preservation, are now in the South Australian Museum collection. The sex is female, and the chronological age is estimated at 30 ± 5 years.

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References

- ANGAS, G. FRENCH, 1846. *South Australia Illustrated*. London.
 BATAILLE, G., 1955. *Prehistoric Paintings of Lascaux*. Lausanne.
 BREUIL, H., 1952. *Four Hundred Centuries of Cave Art*. Montignac.
 CAMPBELL, T. D., and NOONE, H. V., 1943. South Australian microlithic stone implements. *Rec. S. Austr. Mus.* VIII: 281-307.
 CLARK, J. G. D., 1948. The development of fishing in prehistoric Europe. *Antiquaries Journ.* XXVIII: 45-85.
 ———, 1954. *Excavations at Starr Carr*. Cambridge.
 DAVIDSON, D. S., 1935. Archaeological problems of northern Australia. *Journ. Roy. Anthropol. Inst.* 65: 145-184.
 EYRE, E. J., 1845. *Journals of Expeditions of Discovery*. 2 vols. London. II: 147-500.

- HALE, H. M., and TINDALE, N. B., 1925. Observations on the aborigines of the Flinders Ranges . . . *Rec. S. Austr. Mus.* III: 45-60.
- and —, 1930. Notes on some human remains in the lower Murray valley. *Rec. S. Austr. Mus.* IV: 145-218.
- HORNE, G., and AISTON, G., 1924. *Savage Life in Central Australia*. London.
- HOWCHIN, W., 1929. Notes on the geology of the Murray River. *Trans. Roy. Soc. S. Austr.* 53: 167-195.
- MASSOLA, A., 1956. Australian fish hooks and their distribution. *Mem. Nat. Mus. Melb.* 22: 1-16.
- MITCHELL, S. R., 1958. An aboriginal bone industry. *Mankind* 5: 194-9.
- MULVANEY, D. J., 1957. Research into the prehistory of Victoria. *Historical Studies* 8: 32-43.
- PEYRONY, D., 1934. La Ferrassie. *Préhistoire* III.
- PRICE, A. GRENFELL, 1952. St. Mark's College scientific work at Fromm's Landing. *Proc. Roy. Geog. Soc. Australasia, S. Austr. Branch* 53: 25-7.
- McCARTHY, F. D., 1940. The bone point known as muduk in eastern Australia. *Rec. Austr. Mus.* XX: 313-9.
- , 1943. An analysis of knapped implements . . . *Rec. Austr. Mus.* XXI: 128-153.
- , 1946. The stone implements of Australia. *Mem. Austr. Mus.* IX.
- , 1948. Lapstone Creek excavation. *Rec. Austr. Mus.* XXII: 1-34.
- , 1958. *Australian Aboriginal Rock Art*, Sydney.
- McCARTHY, F. D., and SETZLER, F. M., 1950. A unique archaeological specimen from Australia. *Journ. Washington Academy of Sciences* 40: 1-5.
- MACINTOSH, N. W., 1950-1. Tandandjal cave, Arnhem Land. *Oceania* XXI: 178-213.
- SHEARD, H. L., 1927a. Aboriginal rock carvings at Devon Downs. *Trans. Roy. Soc. S. Austr.* 51: 18-19.
- , 1927b. Aboriginal rock shelters and carvings—three localities on the lower Murray. *Trans. Roy. Soc. S. Austr.* 51: 138-40.
- , 1928. Aboriginal rock paintings—north of Blanchetown. *Trans. Roy. Soc. S. Austr.* 52: 231-4.
- SHEARD, H. L., MOUNTFORD, C. P., and HACKETT, C. J., 1927. An unusual disposal of an aboriginal child's remains from the lower Murray. *Trans. Roy. Soc. S. Austr.* 51: 173-6.
- SKINNER, H. D., 1923. The Morioris of Chatham Islands. *Memoirs Bernice P. Bishop Museum.* IX.
- SMYTH, R. BROUGH, 1878. *The Aborigines of Victoria*, 2 vols. Melbourne.
- TINDALE, N. B., 1935. *Rec. S. Austr. Mus.* V: 261-74.
- , 1955. Archaeological site at Lake Menindee. *Rec. S. Austr. Mus.* XI: 269-98.
- , 1957. Culture succession in south-eastern Australia. *Rec. S. Austr. Mus.* XIII: 1-49.
- TINDALE, N. B., and MOUNTFORD, C. P., 1936. Kongarati Cave. *Rec. S. Austr. Mus.* V: 487.

Explanation of Plates

PLATE VI

- Fig. 1.—The shelter as seen from the lagoon.
- Fig. 2.—General view of the site looking south.

PLATE VII

- Fig. 1.—North face of the 1956 excavation as seen from inside the shelter.
- Fig. 2.—Baulk between 1956 and 1958 excavations looking west. Note: The darkening which shows in the lower corners of the section is caused by moisture and does not indicate any change in the nature of the deposit.

PLATE VIII

- Fig. 1.—A representative group of the rock markings.
- Fig. 2.—Microlith showing traces of gum. Scale 4: 1.