

THE WESTERN AUSTRALIAN MUSEUM

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DEPUCH ISLAND

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Edited by

W. D. L. RIDE
and
A. NEUMANN



Watering Valley, Depuch Island.
By Frank NORTON.

Frontispiece

REPORT
on the
ABORIGINAL ENGRAVINGS
and
FLORA AND FAUNA
of
DEPUCH ISLAND
WESTERN AUSTRALIA

BY

W. D. L. RIDE, I. M. CRAWFORD, AND G. M. STORR,
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AND

R. D. ROYCE,
THE WESTERN AUSTRALIAN HERBARIUM.

Press Release

During the past week the Government has announced the signing of contracts between mining interests in Western Australia and steel manufacturers in Japan. These contracts are the fruition of our hopes for the development of a great iron industry in the Pilbara. In making these announcements we have said that the outlet ports for this industry will be at Port Hedland and at King Bay in the Dampier Archipelago, so it has now become clear that Depuch Island is no longer being considered for the harbour development which was visualized at the time this Report on Depuch Island was written.

This does not mean that the valuable work published here is wasted. Now, as the result of it, we have an accurate statement of the Island in its context as one of the most remarkable native art sites in existence and of which we, as Western Australians, can be justly proud.

We also have a set of recommendations from an authoritative and responsible body, the Western Australian Museum Board, which shows how the Island can be developed as a port if the need should ever arise.

The Government is very much aware of the great artistic and anthropological value of Depuch Island and I am pleased to be able to point out that it is already under protection as a native reserve controlled by the Native Welfare Department of which I am Minister.

E. H. M. LEWIS,

Minister for Education and Native Welfare.

23rd December, 1964.

Foreword

During recent years the development of Western Australia has shown rapid advances. However, in the wake of progress has come change to old and familiar parts of towns and to the countryside. It is clear that we must accept many of these changes—but we must also behave responsibly, so that needless destruction is avoided and the future is not robbed of some of the outstanding features of the past. Among the things that we should not wantonly destroy, because of their scientific, aesthetic, and tourist value, are examples of our unique native rock art and Aboriginal culture.

Today in Western Australia we are on the verge of exploiting the natural wealth which we possess in the great iron-ore deposits of the Pilbara. At the same time, Depuch Island is being examined with a view to developing it as a deepwater port to make ore shipments possible. The consternation which was expressed by various scientific and responsible bodies, when the intention of the Government became known, was the outcome of genuine anxiety regarding the safety of the outstanding Aboriginal art of the Island. In recognition of this, the Government adopted the suggestion of the Western Australian Museum Board that Dr. Ride and his colleagues should survey the unique features of this Island and make recommendations to the Government concerning their preservation.

During the time that the survey party was working on Depuch Island I visited them in company with Mr. Frank Gare, the Commissioner of Native Welfare. On that occasion I saw something of the remarkable engravings which have such importance and I feel that I can recommend this report to its readers with some understanding of the problems which are discussed in it.

As Minister responsible for the Museum, and Minister for Native Welfare, I have great pleasure in presenting the result of this survey. The recommendations which are printed here clearly show that the most important localities and their engravings can be preserved and the Government is grateful for this advice.

E. H. M. LEWIS,
Minister for Education and Native Welfare.

The Honourable the Minister for Education and Native Welfare,
Mr. E. H. M. Lewis.

Sir,

The Western Australian Museum Board has pleasure in presenting the results of the survey of Depuch Island which was carried out at your request following our offer to you of the services of this Museum. My Board appreciates the confidence you have shown in the Museum in asking us to undertake this task.

As the result of expeditions which have visited Depuch during the last 120 years, the engravings of the Island have become widely known in anthropological circles. They have become justly famous and have been hailed as the most important collection of Aboriginal engravings in Australia. It is small wonder the announcement that the Island was possibly to be used as a port, and that a causeway was to be built from it to the mainland, aroused disquiet among informed circles; moreover, the spontaneous expressions of concern from responsible bodies and scientific institutions must also be taken as a measure of the regard in which these engravings are held. Accordingly, the Western Australian Museum Board is grateful for the opportunity which your instructions gave to our staff to make permanent records of the majority of these carvings which can be kept in safety for all time. A small number of the 1,700 photographs which were taken of the engravings are reproduced in this report.

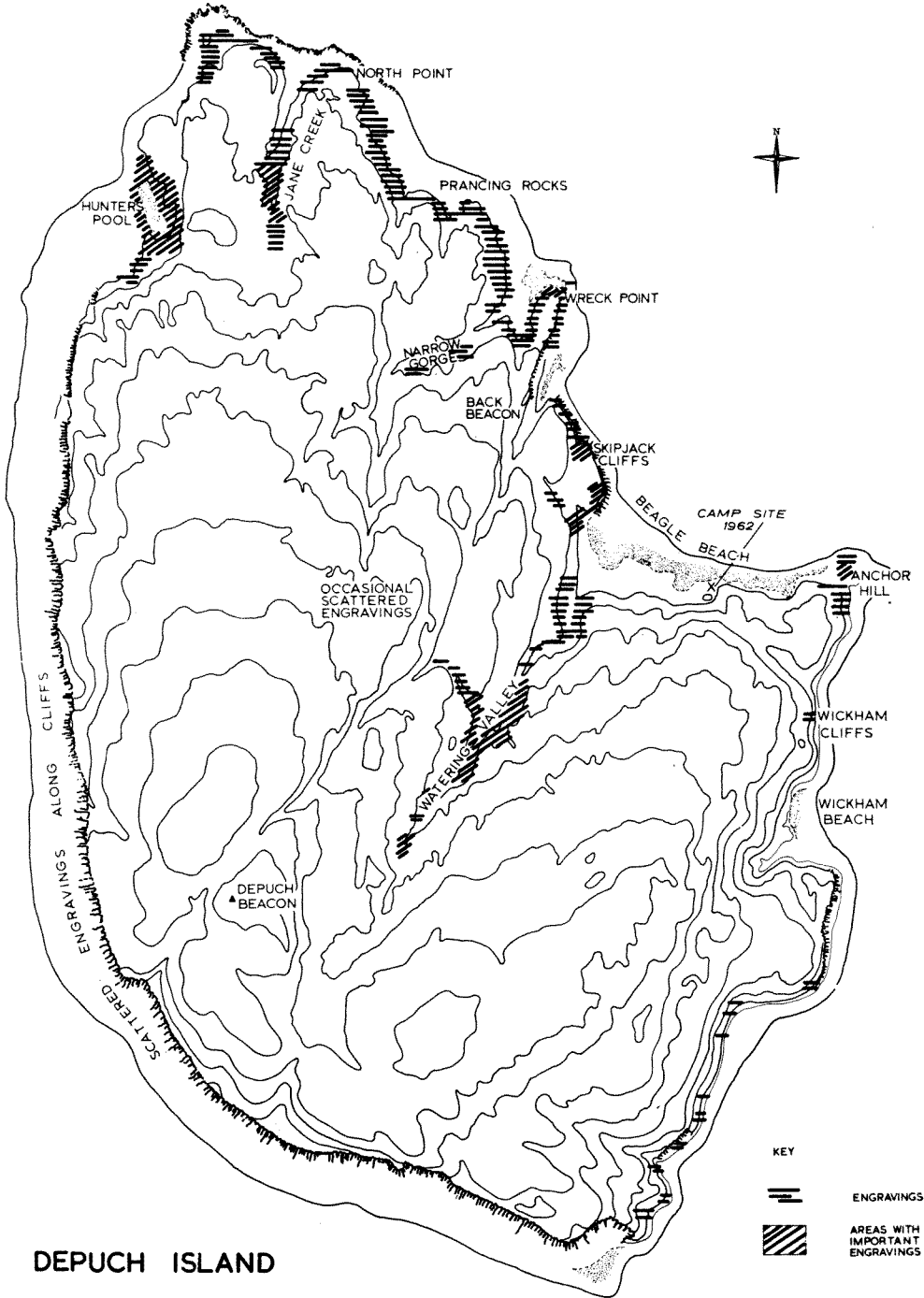
The recommendations which have been made by the expert party which visited the Island are set out herein and are endorsed by the Museum Board. In endorsing these we are more than ever impressed with the great scientific and cultural value of the Depuch Island engravings, and also with their potential tourist value. We have on this Island a repository of Australian prehistory no less significant than such world-renowned prehistoric art galleries as the caves of Lascaux in the Dordogne, and Altamira in northern Spain—sites which are now most carefully preserved and which attract great numbers both of tourists and scientists studying the prehistory of Man. The Museum Board urges you to do all in your power to ensure preservation of this priceless heritage.

In conclusion, the Museum Board wishes to draw your attention to the need for anthropological work to be done with the Aborigines of the Roebourne area in an attempt to gain some interpretation of the meanings of these engravings; it may yet be possible to collect some information on them from old people. This task will require the participation of trained social anthropologists but, as Dr. Berndt has stressed in his contribution to this report, the time is fast approaching when it will be too late. In the great centres of primitive art elsewhere in the world (and in most parts of Australia), the interpretation of motifs can only be speculation—here at Depuch, there may still be a little time in which to gain traditional knowledge.

Yours faithfully,

THOMAS MEAGHER, Kt.,
Chairman.

INDIAN OCEAN



DEPUCH ISLAND

R.F. approx. 1 : 30,000

Contour intervals 50 ft.

Ht. of Depuch Beacon 530 ft.

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Recommendations

It is recommended :

1. That Depuch Island (excluding that part to be set aside for harbour development and residential areas) be gazetted a Class A reserve for the preservation of Aboriginal Art and Fauna and Flora.
 2. That it be vested in a responsible statutory body having control of other reserves and National Parks and having power to enforce regulations and penalties for the destruction, removal or defacement of engravings, and for the destruction of protected animals.
 3. That harbour works, developments, etc., be constructed to avoid the whole or partial destruction of the following outstanding assemblages of engravings :—
 - (a) Hunters Pool and the adjoining cliffs.
 - (b) Watering Valley above the 100 foot contour line.
 - (c) Anchor Hill.
 - (d) Jane Creek.
 4. That these areas be clearly marked with boundaries and notices drawing the attention of visitors to their importance.
 5. That roads be sited to avoid the destruction of groups of engravings at :—

Wickham Cliffs,
Skipjack Cliffs,
Wreck Point,
North Point, and
Prancing Rocks.
- Where this is not practicable, that the engravings be removed from the line of the road.
6. That a well illustrated handbook or leaflet giving information on the Island, its history and engravings be prepared and distributed to visitors to the Island through the Port Authorities, Tourist Bureaus, Authorities in Roebourne, Port Hedland, etc. This handbook should attempt to create an appreciation among visitors of the value of the engravings and the need for their preservation.
 7. That following the construction of vehicle access to the Island, easily movable engravings (i.e. those on small boulders) be collected and put in places of safety such as the local harbour authorities' grounds, a park or institution in Roebourne, the Western Australian Museum and the Western Australian Art Gallery in Perth.

NOTE.

The members of the party which investigated the problem on the Island believe that (with the possible exception of the engravings on Anchor Hill) engravings are not so much endangered by the building of the proposed Harbour Works as they will be by the visitors who will gain easy access to the Island through them.

Vandalism is clearly the main danger to the engravings. Already, names of people, ships' names, and drawings have been carved by visitors. In fact, from the number of them, it would seem that most visitors to date have left some mark. Because of the nature of the rock of the Island, an individual can destroy in five minutes of thoughtlessness, or by deliberate vandalism, the enjoyment of others for many hundreds of years.

We believe that the increase in vulnerability of the engravings can only be combated by education and perhaps by setting aside some at-present-unengraved hill to serve as a visitors' book in stone upon which the creative or destructive impulses of visitors might be recorded.

Introduction and General Narrative

BY

W. D. L. RIDE.

From across the flat Roebourne Plain in the vicinity of Balla Balla and Whim Creek, Depuch Island looks like a massive, abrupt-sided, rocky headland rising above the mangroves. In fact, it is an island separated by two miles of shallow water and mudflats from the mainland coast, which, at this place, is a tangle of mangroves and mud. From the distance, the Island has a regular and even smooth contour which is deceptive. Actually, however, the whole island consists of a jumbled mass of great angular blocks of dolerite. There are a few small beaches on the southern and eastern sides and small patches of soil occur between the strewn rocks on the summit and in the upper parts of some of the valleys which deeply incise it.

The hills, slopes and tableland of Depuch are the roughest places I have ever been to. It is true that the gorges and breakaways of other parts of Western Australia are scarcely comfortable, yet I know of nothing to compare with Depuch for its enormous, haphazard rockpiles. In most places these are devoid of soil and the gaps between the rocks are the entrances to a labyrinth. A dropped object falls between these great blocks and the unhappy loser can hear it progressing beneath him into the very bowels of the Island.

Vegetation on the Island is sparse and shade is scarce. The main grass (where it occurs) is spinifex (*Triodia*) and in some parts of the plateau the underlying rock is hidden by the spiny clumps so that aerial photographs show what look like soft grassy areas (see Pl. 1a). Most of the trees of Depuch are in the gorges and valleys, and where these valleys broaden out in their higher parts there are some quite beautiful areas of savannah. Here, pockets of soil between the red rocks carry a fairly considerable growth of spinifex, and stunted white-stemmed trees are scattered about at intervals. Yet the whole scene is always dominated by the glaring red and black angular rocks of the surrounding hillsides.

Depuch lies off the north-west coast of Western Australia in latitude 20° 37' S. and is three miles long, two miles wide, and more or less oblong in shape. The highest point (Depuch Beacon) is 530 feet above low water and much of the rest of the Island is over 300 feet above sea level.

THE ISLAND'S HISTORY.

Depuch Island was first discovered by the French Commander Nicolas Baudin in the ship *Géographe* on the 27th of July, 1801. It was named after M. Depuch, a geologist with the expedition, and was visited by M. Ronsard who seems to have spent part of a day and one night on the Island (Péron 1807, p. 129 ; 1809, p. 103). Unfortunately, no naturalist of the expedition was permitted to go ashore by Commander Baudin and little information of scientific interest is available in Péron's account. Ronsard considered that the Island was not constantly inhabited by Aborigines but, because he found remains of fires and pieces of newly broken rock, he suggested that it was visited by mainland natives. Ronsard reported having seen a dog, and one of his seamen thought he saw a small kangaroo.

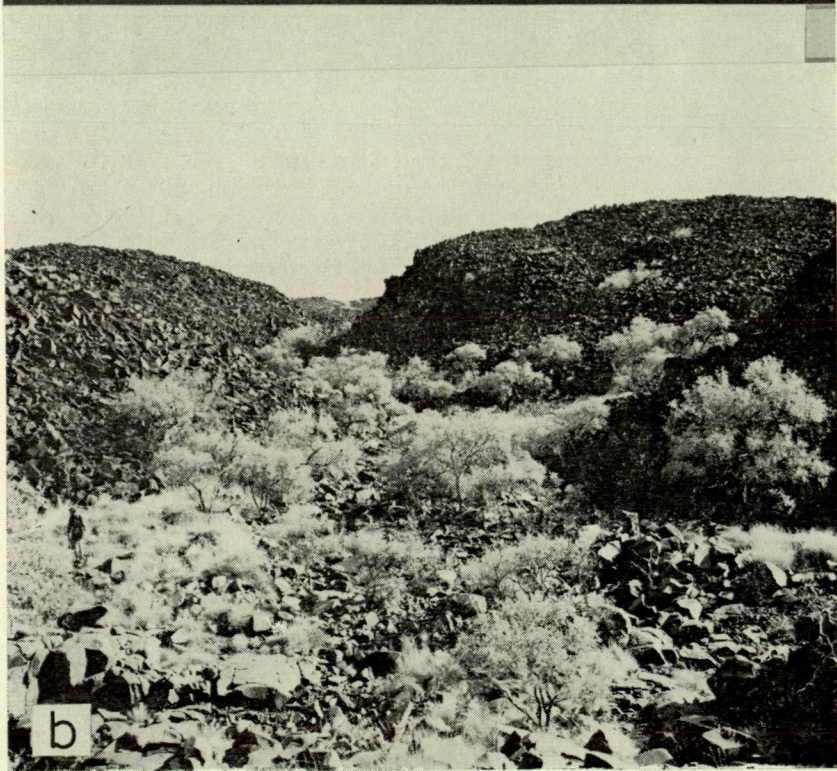


Plate 1. (a) View of Depuch Island from the air. North Point and Hunters Pool in the left foreground. Balla Balla Creek is in the background behind the wing-tip.

(b) View up Watering Valley with *Triodia* and *Terminalia circumalata*.

In all, the French were not impressed by Depuch Island, except as a rather melancholy and unusual geological feature. By some mischance they did not notice the engravings.

Following the departure of the Baudin Expedition the Island was left alone for almost forty years and then was visited by H.M.S. Beagle under the command of Captain J. C. Wickham who, in June 1840, was exploring and surveying the north-west coast (Stokes 1846). On this occasion the Europeans found the Aboriginal engravings which were unlike any that they had seen before and these so impressed Wickham that he described and illustrated a number of them in a note to the Royal Geographical Society (Wickham 1843). Stokes subsequently (Stokes 1846, pp. 170-1) republished Wickham's illustrations and descriptions and added his own impressions of the Island. These important accounts describe not only a number of engravings which are recognizable on the Island today (for example, the two men up on the face of a very conspicuous block of stone set high above Watering Valley; see Pls. 13 and 14) but also the details of the construction of the native huts they found on the Island (Stokes p. 169, Wickham p. 82) and some of the fauna. Commander Stokes and Surgeon Bynoe in particular were interested in the natural history of the area and they obtained specimens of a rock-wallaby, a small finch (the original specimen from which John Gould described the Painted Finch) and a species of snail.

While the crew of the Beagle were on Depuch they engraved on the rocks at least three inscriptions to record their stay. Two of these are on Anchor Hill (see Pl. 5) and another, not recorded until our visit, is in Watering Valley. These inscriptions are important today because they clearly show how little weathered the engravings of 1840 have become and thus by comparison give some measure of the age of the Aboriginal carvings.

In addition to being struck with the high quality of the native art, both Wickham and Stokes remarked upon the absence of sexual motifs in it. This is somewhat puzzling, since, as can be seen from the descriptions of more modern workers like McCarthy (McCarthy 1961) and ourselves, the engravings of Depuch have a very high proportion of anthropomorphic figures showing enlarged genitalia, and scenes of copulation are common. It seems unlikely that these have all been engraved since the visit of the Beagle and one can only surmise that these very highly stylized figures differ so much from those of European pornographic and "suggestive" art that Wickham and Stokes did not recognize their nature.

In subsequent years, various surveying vessels visited the Island, and visits by anthropologists produced further accounts of the engravings. In particular, Drs. H. E. Petri and A. Schulz (1951) recorded the visit to the Island of a party from the Frobenius Institute of Frankfurt, Germany, in 1939 (although Professor Petri was not a visitor to the Island himself) and F. D. McCarthy of the Australian Museum, Sydney, visited the Island on two occasions in 1958 with A. Day of the Native Welfare Department and published the most complete account yet available (McCarthy 1961). Day also wrote a report which is held in manuscript in the Department of Native Welfare, Perth.

Thus, by 1961, Depuch Island was well known to anthropologists as a most important site of native rock art. In fact, the anthropologists of the Frobenius Institute stated that the engravings, in careful execution and

attention to detail, surpassed, or were at least the equal of, those known elsewhere in Australia and that only a few centres of Aboriginal rock art have a similar richness in motifs (Petri and Schulz 1951, p. 77); and McCarthy said . . . "on this Island the occasional use of the shape of the rock to show the form of the body, the innumerable compositions of a ritual, hunting, fighting and sexual nature, the great variety of human and spirit figures and the many excellent figures of animals, warrant its being denoted as one of the most artistically interesting sites of naturalistic engravings in Australia." (McCarthy 1961, p. 146.)

In 1908, the State Mining Engineer, Mr. A. Montgomery reported on the mining industry in the west Pilbara and there suggested that Depuch Island (if connected to the mainland by a causeway) might provide a satisfactory port for the district (Montgomery 1908, p. 428), but nothing further was done until 1961 when a series of reports appeared in the press (*Daily News* 14/1/1961 and 4/12/1961) to the effect that surveys were being made in order to determine whether or not Depuch Island should be developed for use as a deepwater port for iron interests in the Pilbara District. It was said in these reports that a breakwater, and causeway from the Island to the mainland, were to be built, using the stone from the Island. It was thus scarcely surprising that anthropologists and scientific bodies in Australia and many other parts of the world expressed considerable concern for the safety of these very famous engravings. The staff and Board of the Western Australian Museum were impressed by the need for a policy regarding the preservation of the engravings and the Board offered its service to the Government to survey and record them and to examine the position on the Island with the view to ensuring their safety. This offer was accepted and a party was formed to visit the Island and, as a result of the visit, to make recommendations to the Government as to how the carvings might best be preserved if the decision was made to carry on with the harbour development in the area.

The party consisted of Drs. W. D. L. Ride (leader and zoologist), R. M. Berndt (anthropologist), G. M. Storr (zoologist), Messrs. R. D. Royce (botanist), F. Norton (artist), I. M. Crawford (anthropologist), R. Penrose (photographer), W. Boswell (anthropologists' assistant), and Misses H. Williams and M. MacDonald (preparators). The party was requested to record the distribution and details of all engravings on the Island and in particular to search for carvings not previously recorded; to seek interpretations of the subjects depicted from the natives of the Port Hedland and Roebourne area; to carry out a brief survey of the fauna and flora of the Island in order to recommend whether special measures would be necessary to preserve them; and to examine other adjacent areas (with particular reference to the Dampier Archipelago) to see if similar engravings and fauna and flora were represented in another place which would be suitable to preserve them.

This report is the result of that expedition but we must make it clear that it presents only a small fraction of the data resulting from the fieldwork of the party because, in addition to the few plates and figures published here, permanent records were made of over 5,000 individual engravings and of these some 3,500 were sketched, described, or photographed and their positions recorded. These details are preserved in the Western Australian Museum and are now available for further study should the originals be

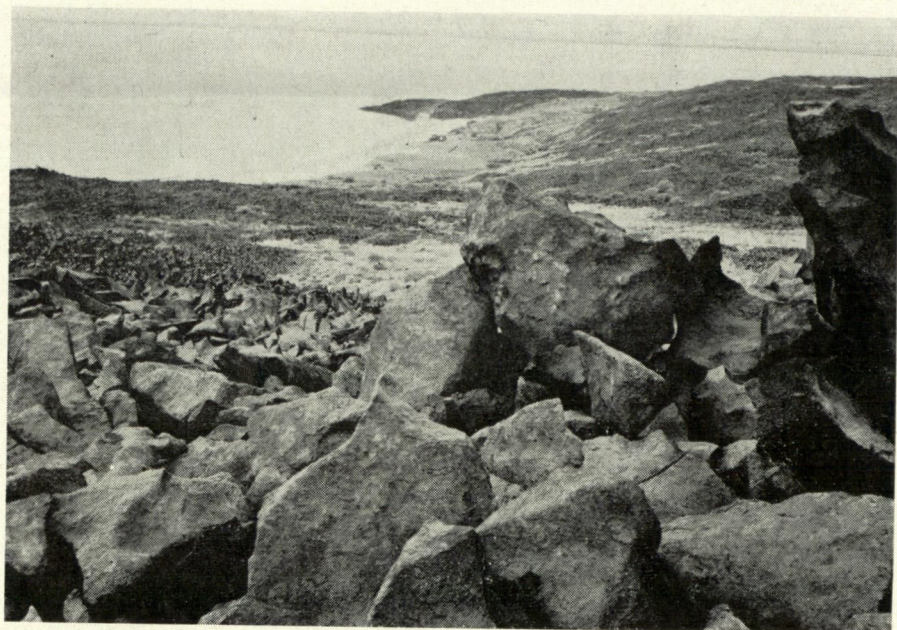


Plate 2. Overlooking Beagle Beach.

destroyed inadvertently. In addition, small collections of the plants, birds, mammals and reptiles were made and these are also preserved in the Western Australian Museum and the Western Australian Herbarium.

NARRATIVE.

We assembled in Roebourne on the afternoon of the 26th of May, 1962, and moved out to the flat plain immediately inland and above the marshes which surround the ghost of the old copper-ore port of Balla Balla. Balla Balla lies in a mangrove creek immediately opposite the Island. At first light the next morning we met Mr. R. McIlrick from Point Samson who had agreed to ferry the party over in a series of trips in his small fishing boat. We were accompanied by Mr. Graham Wilson of the Native Welfare Department, Roebourne, and Dr. Catherine Berndt. Beagle Beach was the obvious landing place and we found an extremely good campsite between the dunes about half way between the entrance to Watering Valley and Anchor Hill, both of which places were well known to have good engravings. Those of the party who stayed behind to load stores through the mud and mangroves at Balla Balla experienced great difficulty and the party was not fully established on Depuch until the afternoon.

The plan upon which the expedition would work was as follows. Wilson and the Berndts, after having had a brief look at the engravings at Anchor Hill and Skipjack Cliffs, would return to Roebourne to try to find natives who knew anything about them and, if possible, to try to encourage some of these to come out to the Island. Crawford with his assistant Boswell and R. Penrose (the Government photographer) would sketch, describe and photograph all carvings. The remainder of the party

would move as widely on foot over as much of the Island as possible during the first few days in order to search for zoological and botanical specimens and to locate engravings for the recording party. It was intended that the biologists should complete their work in one week and would then transfer their activities to the islands of the Dampier Archipelago, and the nearby mainland, in order to discover whether or not similar carvings existed elsewhere and whether the fauna and flora of Depuch was unique in species. Crawford and his party would stay on Depuch for two to three weeks more to complete their work and would then meet Ride and decide whether they would need to pay a brief visit to any of the localities in the Dampier Archipelago to examine engravings there.

As the members of the party made their first tentative trips into the area surrounding the camp, it soon became clear that Depuch was going to be anything but a picnic. Beagle Beach was attractive in itself and the dunes behind it carried a vegetation of miscellaneous bushes and some grasses (e.g. *Spinifex longifolius*). There were also a number of eucalypts at the entrance to Watering Valley, and several species of birds were to be seen although they were not numerous. But the vast piles of the rock behind the beach were extremely forbidding and awkward to move over because of their size and shape. The intervals between "steps" were much too great for comfort, they were irregular, and the "steps" themselves were apt to move unexpectedly as weight was placed upon them. It never ceased to be a source of wonder that there were no serious accidents or broken limbs among the party, but badly bruised feet sorely reduced the mobility of some members.

On the first night Storr and Ride were lucky enough to shoot one of the rock wallabies. Quantities of wallaby droppings lay everywhere among the boulders and indicated that animals were plentiful but because the stones had so many cavities between them and rang with a loud metallic sound when they were being walked over, the wallabies were alerted and, as Stokes of the Beagle reported, were seldom seen. In fact, the specimen collected on the first night was the only rock wallaby obtained by us during our stay on the Island. As Stokes reported, the Rock Wallaby of Depuch is the Western Rock Wallaby and not, as we expected to find, the Pilbara (or Rothschild's) Rock Wallaby which occurs on the Dampier Archipelago and the adjacent mainland.

In subsequent days, the work of the expedition went as planned; the recording party under Crawford worked first on Anchor Hill, then at the Skipjack Cliffs, and then up in Watering Valley. The biologists started by working up Watering Valley and out into the broad upper part of it where it opens in the centre of the Island to form an attractive but harsh and very prickly savannah of spinifex dotted about with stunted bloodwoods. Here Pardelotes, Singing Honeyeaters, Grey-headed Honeyeaters, and Grey Fantails were common. Some of the party traversed the southeastern part of the chaotic surface of the plateau while Royce more than anyone else explored the narrow valleys which extend from the centre of the Island northwards towards Wreck Point and North Point.

As the small parties moved about the Island in the first week of field-work, a clear picture began to emerge of the distribution of the carvings on the Island. Isolated carvings, of varied degrees of detail and scope, could be found almost anywhere. The more sceptical biologists were of the opinion that these were the result of occasional impulsive acts on the part



Plate 3. Carved rocks at Anchor Hill.

of the artists—doodles of the moment, or practice runs. However, in certain places like Anchor Hill, Watering Valley, and Hunters Pool (visited by Crawford's party after the biologists had left Depuch) almost every rock was engraved. I, for one, will never forget the wonder of going up Watering Valley for the first time, pausing to rest on a stone slab by a small pool and then, suddenly, coming to realise that the rocks on all sides of me and above me were covered with carvings—birds, fish, turtles, boomerangs, little stick-men, and dancing men. Some, like the emus and kangaroos, were as tall as men, while others were no longer than a finger. And there, above all, high in the wall of the gorge were the two carved men described by Wickham more than one hundred years before. How could these be meaningless—these great carvings which look down the gorge towards the sea and dominate the lesser carvings and pools below them? (P. 39.) In this situation I could not help wondering what the Aborigines thought of the strange carvings which appeared at Anchor Hill and Watering Valley in June, 1840. The natives do not appear to have made any attempt to alter them—were they puzzled by their presence and their strange designs, or did they see the white men and decide to accept their work without interpretation?

Our knowledge of the meaning of Aboriginal engravings is extremely scanty. Often the subject which is depicted is obvious, but even here, as Berndt and Crawford point out later (pp. 23-67), it is seldom that we

know why the carvings were made. In the cases where images are highly stylized, we are even unable to recognize the objects which they represent.

Animals, both marine and terrestrial, are well represented among the carvings of Depuch and most can be recognized in the present fauna ; but one member of the present-day animals of the Island is not immortalized in stone. This is the fox, a newcomer. Today foxes are common on the Island. Their tracks are everywhere on the sandy beaches and in parts of the lower valleys wherever the ground is not too rough to record their impressions. Their droppings are common and the many eaten-out carcasses of rock wallabies all over the Island clearly show the part that they play in the economy of the wallaby population. However, in spite of this, it would seem that the wallabies are holding their own among the tumbled rocks and it is possible that they fall victims to the foxes only when they stray out of this cover, to which they are so magnificently adapted, into the dunes or places with soil in order to obtain food. Remembering the dog which Ronsard reported on the Island in 1801, the party sought for signs of dingoes but none were seen ; however, this does not throw doubt on that earlier record since it is not at all unlikely that dogs did cross over to the Island before the advent of stations on the Roebourne Plain confined most of them to the Hamersley Range and the edges of the Tableland. Dogs are pictured among the engravings and it would be scarcely surprising that the Frenchman should see one.

On the 1st of June, the Minister for Education and Native Welfare (Mr. E. H. M. Lewis), the Commissioner of Native Welfare (Mr. Frank Gare), and the Director of Primary Education (Mr. S. Wallace), together

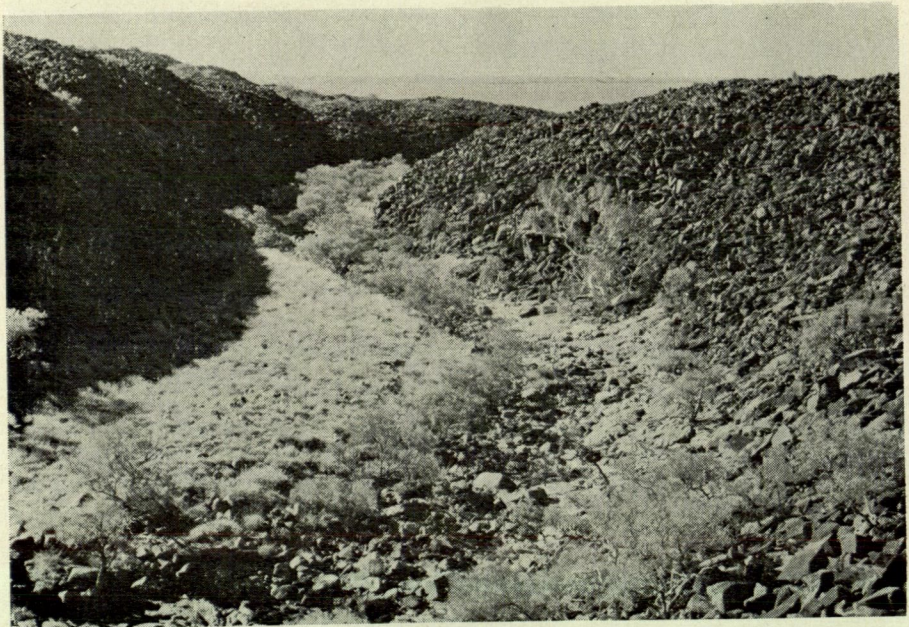


Plate 4. View down Watering Valley from the two carved men.

with the Native Welfare District Officer of Port Hedland (Mr. E. Roberts), visited the Island. Mr. Lewis was visiting the North-West at the time and was able to pay a brief visit to the Island through the mud of Balla Balla. Mr. Lewis was determined to see all he could in the short time he was able to spend on the Island and not only visited Anchor Hill but also went up along the tumbled boulder bed of Watering Valley to see the great gallery of engravings around the pools there. The ministerial party returned to the mainland at 2 p.m. on the same day.

Following the Minister's departure the biologists struck camp and, once more with the help of McIlrick, returned to the mainland and thence (via Roebourne) to the Dampier Archipelago. The results of their work in this Archipelago will be published elsewhere, but it can be said here that, in contrast to Depuch, the fauna and flora of Dampier Archipelago is of very great richness. Unfortunately, while there are numbers of carvings on the islands, nowhere do they approach those of Depuch in number and general quality.

From the 1st to the 18th of June, Crawford's party was isolated on Depuch Island. During this time they were in wireless contact with the Flying Doctor base at Port Hedland. Fresh water could have been a problem but, fortunately, it rained on several occasions and the water in the pools of Watering Valley (which was practically undrinkable when the large party was on the Island) freshened up and remained drinkable for a fortnight. During those days of isolation they completed their task in Watering Valley, worked around the north-eastern coast examining and recording in the gorges and on the cliffs as they went, and then spent four days at the fantastic gallery of Hunters Pool which has somewhere around 1,200 carvings grouped about it. From there they worked down along the cliffs of the western coast towards Wickham Beach.

When Crawford's party was finally taken off at the end of that time, they were satisfied that they had located and recorded all major concentrations of engravings on the Island. Of course, there are many scattered and isolated carved stones on the plateau which would take many months to locate, so they could not pretend to have an absolutely complete record. After a brief night's rest in Roebourne, they then went to the Dampier Archipelago to see for themselves and to photograph for comparative purposes some of the engravings which had been located by the other party during their longer stay on these Islands. After this, they paid a rapid visit to several mainland sites, including that at Black Hill Pool at the foot of Mount Herbert where there is an important group of engravings which had been discovered by a party from the Western Australian Museum in 1958 (see Ride 1959).

The comparisons which these additional data have made possible show quite clearly that Depuch is absolutely outstanding in its Aboriginal art. The incredible concentration of well finished and well preserved engravings is known nowhere else in the Pilbara and possibly nowhere else in Australia although they are exceeded in number by those at Port Hedland. The Depuch engravings have certain unique features (described by Petri and Schulz, by McCarthy, and by Crawford, p. 23), which make their preservation a feature of considerable anthropological importance. Others will judge their tourist potential.

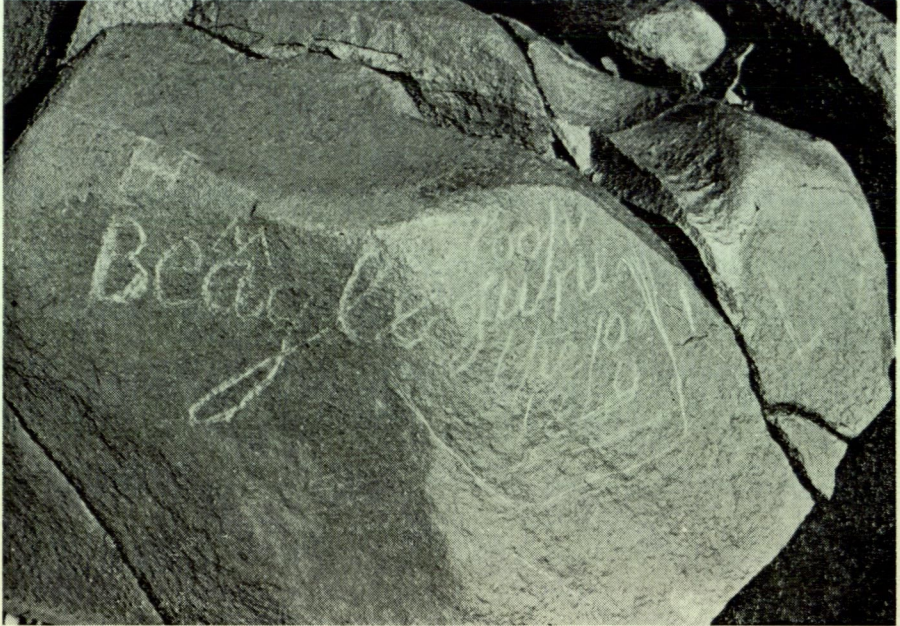


Plate 5. Beagle inscription, Anchor Hill.

We are certain that the carvings of Depuch are of great importance, but how can the administrator decide between the claims of their aesthetic and scientific value on the one hand and on the other the practical value of the rocks of the Island? At first it seemed to us that he would be called upon to make such a decision but, fortunately, our field work has revealed that the most important engravings occur only in very limited areas in this Island. Elsewhere there are enormous quantities of unengraved rock just as useful as the carved rock for breakwater filling. Even if it is decided that it is necessary to develop the Beagle Beach area the vast majority of the engravings can be left untouched.

Although the proposed engineering works need cause little damage, the increased accessibility of the Island to the vandal will weaken the security of the carvings and because of this danger the most important achievement of this expedition has been the accumulation of a large collection of accurate photographs, sketches, and descriptions of large numbers of the engravings. Thus the scientific information contained in these Aboriginal designs is now available for study, and this will remain, independently of the continued preservation of the artifacts themselves.

Anthropologists and archaeologists still have many unanswered questions, questions which can be solved only by further work on the Island itself. Let us hope that the future will deal with Depuch as kindly as the past has, and that other parties like our own will be able to continue the task of interpreting the history and beliefs of our forerunners on this Continent.

The Engravings of Depuch Island

BY

I. M. CRAWFORD.

INTRODUCTION

Although the engravings of Depuch have been known for a long time, no comprehensive survey has been made of them. Captain J. C. Wickham made drawings of them when H.M.S. Beagle visited the Island in 1840 (Wickham 1843, Stokes 1846). Members of the Frobenius Expedition examined some areas of the Island just before the last War (Petri and Schulz 1951). In 1958 Adrian Day and F. D. McCarthy, the Curator of Anthropology at the Australian Museum, Sydney, went to the Island together. McCarthy's descriptions (McCarthy 1961) are the most thorough so far published. Day returned to the Island on several occasions and discovered new areas of engravings. His report is a manuscript held by the Department of Native Welfare. While all of these visitors to the Island have been impressed by the unusual quantity and variety of the engravings, their reports are an incomplete record, being based on very short periods of field work in which only small areas of the Island were visited. It was considered desirable that an attempt be made to examine all of the engravings on the Island and to make a permanent record of as many of them as possible.

In a period of 22 working days, the recording party of three (i.e. Crawford, W. Boswell and R. Penrose) examined most of the Island, although some of the cliff areas on the western side of the Island were not closely studied. The location of all important engravings was recorded and descriptions and photographs were made of them. As a result of this work, it can be stated that there are about 5,000 engravings on the Island, a number which exceeds that at any other known site.* Not only are the engravings more numerous than at any other site, but they have characteristics which make them a unique group. Every effort should therefore be made to protect them in future.

DESCRIPTION OF THE ENGRAVINGS

GENERAL

Depuch Island has probably a greater concentration of Aboriginal engravings than any other place in Australia, yet we do not know why they were made. Some observers assume that they are simply the idle drawings of a people who had nothing better to do, while, on the other hand, it has been suggested that the engravings were enormously important to the Aborigines in ritual and ceremony. Until anthropological research has been carried out among the remnants of the Ngaluma people who have inhabited the area in recent times, we will not know which interpretation is correct. However, there seems little doubt that at least some of the engravings were of ceremonial significance (see p. 65).

* Since this Report was submitted to Cabinet, F. D. McCarthy has published a description of the Port Hedland engravings. He found about 7,000 engravings in the eight miles of ridges near Port Hedland. He also found many more human figures than have been previously recorded. McCarthy, F. D. (1962). The rock engravings at Port Hedland, Northwestern Australia. *Pap. Kroeber anthrop. Soc.* No. 26.

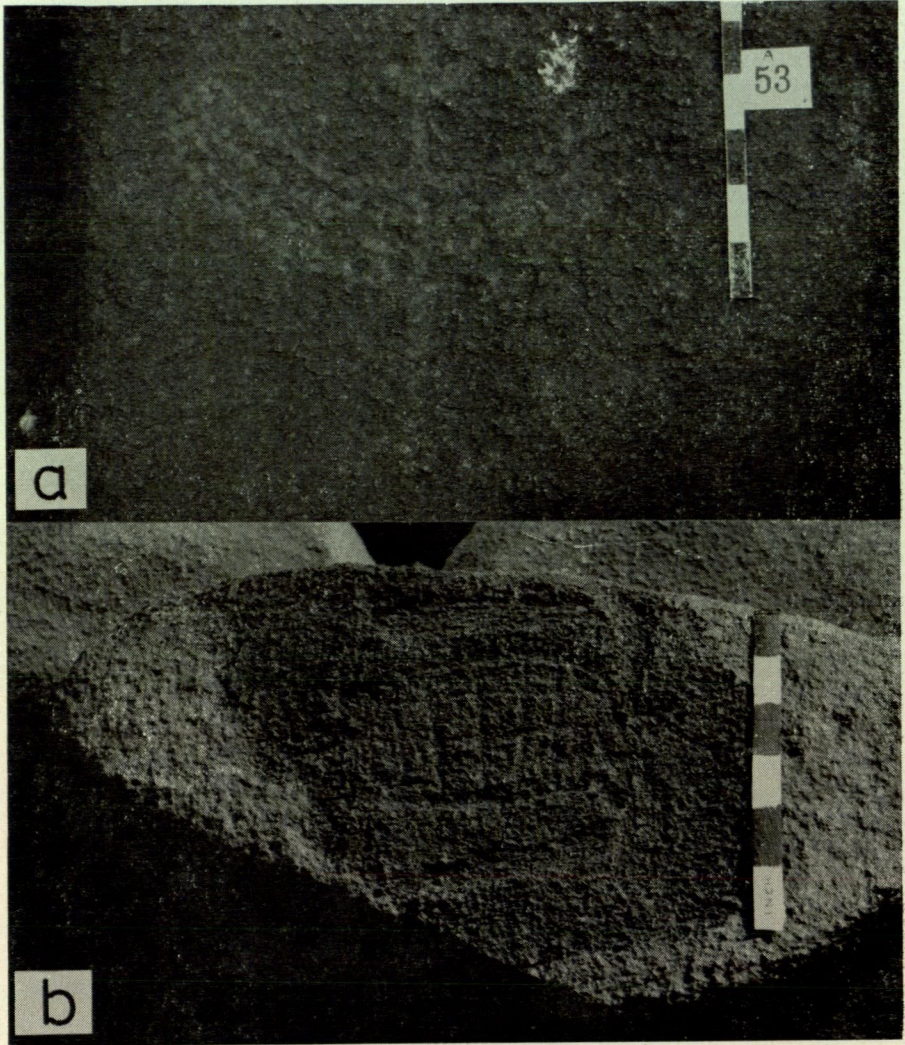


Plate 6. (a) Very weathered figure, Anchor Hill.
(b) Weathered turtle, Anchor Hill.

Even if the majority of the engravings were found to be devoid of ritual significance, this would not alter the fact that they are a record of the thoughts, beliefs and legends of the people who once visited or lived on the Island. In non-literate societies, traditions are passed by word of mouth, and when such a society is overwhelmed by European civilization the traditions are soon forgotten. While this has largely happened with the Ngaluma people, the rock engravings are evidence of the past existence of their traditions. Even when we do not know exactly what the engravings represent, we interpret them as being related to religion (mythical beings),

the quest for food (animal and hunting scenes), and sex (copulation scenes). Such subjects are of concern in all societies, but it is unusual to have any record of them from a non-literate society.

We know very little indeed about the traditions which were once associated with the engravings. For instance, although some engravings clearly represent mythical figures, we are ignorant of the relevant legends. We do not know in what way animal engravings would have been connected with hunting; they may have been made to increase the catch by magical means or to record a successful hunt. If the engravings were made for magic, the ceremonies which accompanied their making have not been recorded. Copulation scenes may have been connected with fertility ceremonies, love magic, or even the record of past events. The interpretation of particular engravings would be assisted by the recording of all existing legends or myths.

From an artistic point of view, the engravings fall into a category often called "Primitive Art"; that is, they lack perspective.* In some cases, for example in the birds in Watering Valley, the natural shape of the rock gives some indication of dimension in depth; but for the most part, the figures are shown in two dimensions only. In the depiction of scenes, the relationship of one figure to another is often "twisted" (e.g. Figs. 6 and 7). **

The fact that the engravings are "primitive" in this respect does not mean that they are poor from the artistic point of view. Many of the engravings are excellent examples of "Primitive Art," although there is, of course, a wide range in quality and some are not well drawn. Any engraving must appear to be fairly rough, since the technique involves hammering the design into the rock surface and any delicacy of line is lost.

In any one area of Depuch some 80-90 per cent. of the engravings are the same as those found in other areas of the Island. Thus, in order to save repetition in the descriptions which follow, these common motifs are separately described first, under the general heading *Recurrent Forms*. The unique or less widely distributed kinds of engravings (*Exceptional Forms*) are described separately under the headings of the localities in which they occur.

RECURRENT FORMS

(a) HUMAN STICK-FIGURES.

Stick-figures 4 to 6 inches long are the most characteristic feature of the Depuch engravings (Figs. 1 and 2). Sometimes these little men are alone, but more often they are in groups. Some carry boomerangs and shields (Fig. 1), or are armed with spears and arranged in scenes. The simple spearing scenes in which one man spears another are common; but there is a full range from scenes of two figures to those where many figures are arranged in a circle or square. The complete scenes are rare and are described separately as being *Exceptional Forms*; I believe that they are just a variant of the simple spearing scene.

* There is some disagreement as to whether the term "Primitive" should be applied to this two dimensional but stylized art. Here it is simply used as defined. See Berndt, R. M. 1958, and Berndt, C. H. 1960.

** Figs. referred to in this section are grouped together on pp. 56-63.

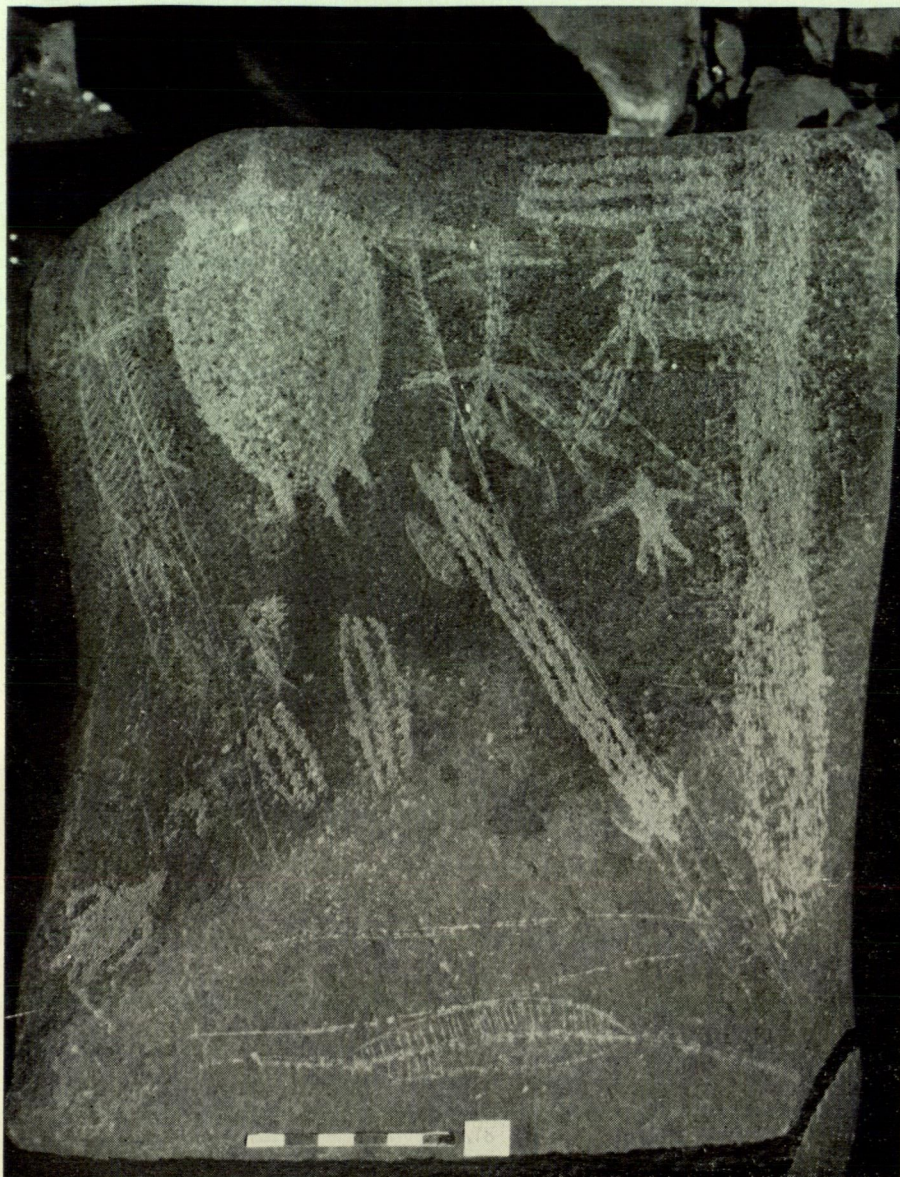


Plate 7. Rock with various figures, Anchor Hill.

Many of the stick-figures have hair or head-dresses represented (Figs. 2 and 4). Head-dresses in this area were made from whittled sticks with the shavings left at one end. It is impossible to tell whether the design of the engravings represents this or merely hair. These figures often hold a spear, boomerang, or shield. An alternative form shows the hair as drooping with blobs at the end (Fig. 3). Figures with this type of hair may be female,

as they seldom hold any weapons and moreover are occasionally associated with the figure with "upright hair" in scenes which may represent copulation (Pl. 9).

The stick-figures are the basic forms representing men and women, but there is a whole range which runs from the stick-figure to anthropomorphs of fuller shapes and sizes (e.g. Pl. 18b). It is difficult to draw a line and say where the classification "stick-figures" ceases and these other Exceptional Forms take over.

(b) HUMAN FEET.

Often a natural depression in a boulder has been made into a foot by the addition of toes (Pl. 8a). Occasionally there are five toes on one foot; however, this is exceptional and the number varies between 3 and 11. Examples where the whole foot has been pecked-in were found, and these often tread on top of other engravings (Fig. 7).

(c) *Kadaicha* SHOES.

Shoes of some kind are quite frequently engraved (Fig. 26); McCarthy (1961, p. 134, Figs. 267-8) has interpreted these as *kadaicha* shoes. In some cases they appear to show the track where a man has walked; they start with two feet together and then mark his paces, left and right feet taking alternate paces. Bob Chanside (an Aboriginal living in Roebourne; see p. 66) identifies the objects shown in McCarthy's Fig. 268 as stone axes.

(d) FRINGED APRONS.

These look like the end of a rake (Fig. 3). The interpretation of them as an apron is McCarthy's (1961, pp. 134-5, Fig. 233). Sometimes they occur by themselves, but often they are associated with human figures. There are no actual engravings showing these worn, and it is possible that engravings which appear to be similar represent a variety of things. For instance, the apron may in some cases be a trap either for fish or for wallabies (Pl. 17b) or it may even be part of a hut, as suggested by Wickham (1843, p. 82) and Stokes (1846, pp. 169-70).

(e) BOOMERANGS.

Many of the stick-men hold a boomerang which is represented by one or two curved lines (Fig. 1). Sometimes very similar engravings are arranged in parallel lines above a man's head, in this case they look more like a rainbow. Petri and Schulz (1951, p. 92) considered that these so-called boomerangs were probably sacred motifs.

(f) SPEARS.

Spears are usually shown with barbs along one side only (Fig. 6). However, some examples showed the typical Roebourne style with bilateral barbs. One spear had only a single angled barb of the desert style.

(g) WALLABIES.

An old Aboriginal in Port Hedland (Deaf Paddy, one of the Ngaluma people), informed me that the wallabies on Depuch were very plentiful in the old days. They are certainly quite frequent in the engravings. Some are large outline figures such as that in Plate 11d (McCarthy 1961, Fig. 127), and figures such as these are so large that they may represent kangaroos.



Plate 8. (a) Human foot, Anchor Hill.
(b) Kangaroo track, Anchor Hill.
(c) Turtle, Anchor Hill.

Small figures are pecked-in (e.g. Fig. 25). McCarthy (1961, p. 128, Fig. 129), interprets one of them as a jumping mouse, but these are not known to occur on the Island.

Engravings of wallaby tracks are found all over Depuch. Sometimes they are the tracks of the animal jumping along, while at other times they represent those of a wallaby moving slowly, or squatting with its forepaws on the ground (Pl. 8b) (McCarthy 1961, p. 128, Fig. 114).

(h) DOGS.

These are quite rare, but one or two examples occur in each large group (Fig. 24) (McCarthy 1961, p. 126, Fig. 94). It is not known whether these are domestic dogs or dingoes. All examples show the tail held erect.

(i) BIRDS.

Some of the figures of birds are beautifully engraved (Figs. 19-22). Plate 17a shows two emus, probably father and offspring. Fig. 19 shows two birds, possibly herons, in attitudes typical of birds on the reefs. Other birds appear to be mangrove bitterns, wimbrels, and rails, although no identification can be very certain. Some of the very large emus (we measured one 8 feet 4 inches long) are outline figures, while all the smaller birds have been pecked all over. Birds' tracks are quite common, and seem to be the tracks of the same species of birds as represented in the engravings.

(j) SNAKES.

Some of the snakes are shown coiled around boulders. Others are just wiggly lines (Fig. 29). The snake is not a common motif and Petri and Schulz (1951, pp. 84, 91-92) decided that their absence was a feature of the art of Depuch; the Museum Party collected only two small living pythons on the Island and they are not an obvious part of the fauna.

(k) LIZARDS.

Lizards are often represented in a similar fashion to the stick-men and the only difference between these two categories is in the angle of the legs (Fig. 27). There are few well engraved lizards on the Island.

(l) FISH.

Several kinds of fish are represented in the engravings. Stingrays (Fig. 47), sharks (Fig. 42), and mackerel (Fig. 43) are identifiable, while a number of fish do not belong to recognizable species. Engravings which, according to McCarthy (1961, pp. 132-3, Fig. 191), represent stingray livers are very common (Fig. 50); that this interpretation is correct is suggested by engravings found by us which show the liver within the outline of the stingray (but see the remarks on sea-cucumbers below). However, Bob Chanside's statement to Berndt that these represent the symbol for a vulva cannot be dismissed lightly (see p. 67 of this report).

(m) TURTLES.

Turtles are frequently represented in the engravings. They are very common near the coast; for example, at Anchor Hill they comprise 35 per cent. of the engravings. In areas away from the coast such as Watering Valley they are less frequently found.

The engravings show a wide range of artistic skill; in some the shells are merely outlined, while some are pecked-in all over (Fig. 36) or represented by irregular lines (Figs. 38, 44) or regular lines (Fig. 35, Pl. 6b). The

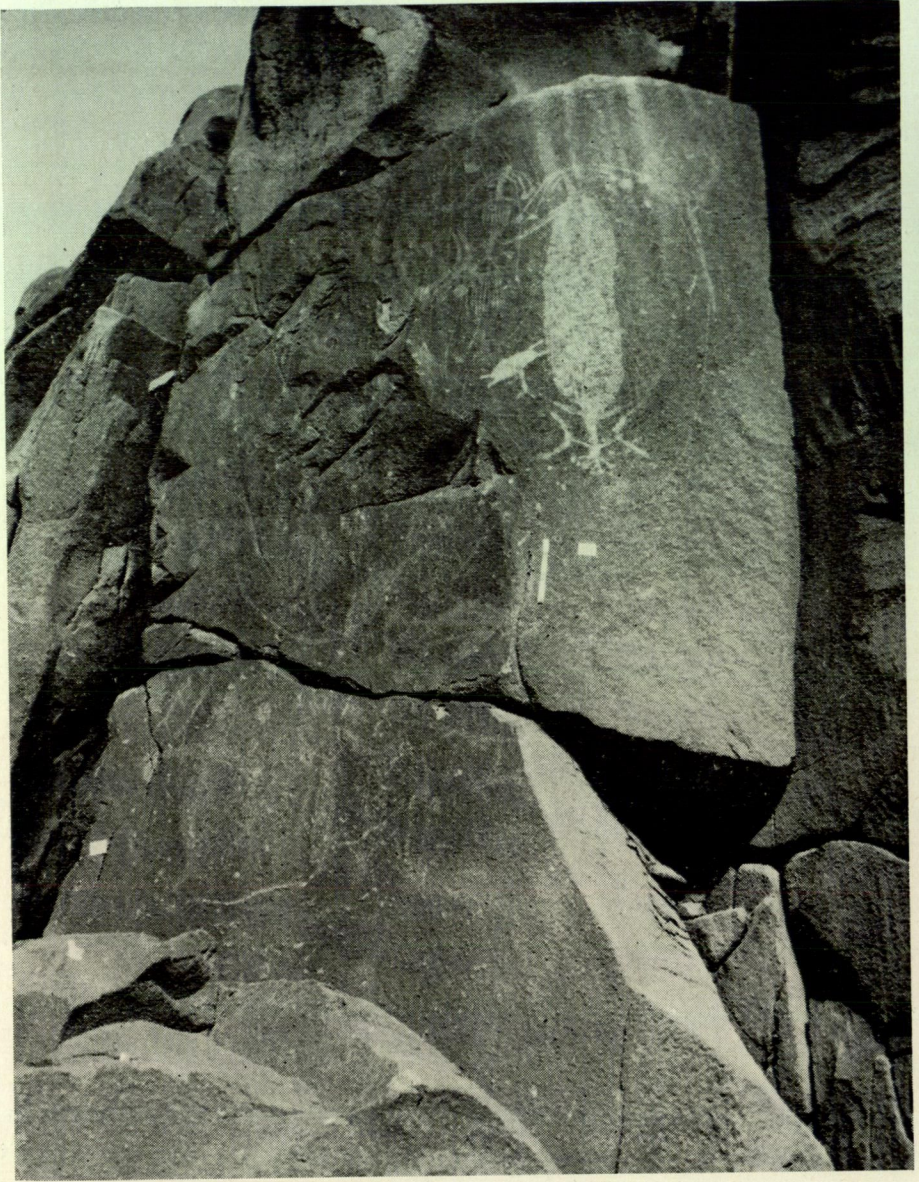


Plate 9. Copulation scene (?), Cliffs at Anchor Hill.

turtles are represented in a variety of sizes : some are as small as four inches, while others exceed five feet. As well as turtles, there are engravings of turtle tracks and turtle eggs. The tracks are represented by three parallel lines often marked directly behind the turtle (Fig. 41, Pl. 8c). The turtle eggs are shown as small circles (Fig. 39).

Turtles are quite common in the waters around Depuch and we found evidence suggesting that they used to deposit their eggs on the Island. There is no doubt that they were caught for food, as turtle shell was common in the excavation at Hunters Pool. Some engravings show a man spearing a turtle (Pl. 20) while others show a group of men rounding up a turtle (Fig. 44).

(n) MARINE MAMMALS.

Whales are often very well drawn (Fig. 40). Dugongs are also represented among the engravings.

(o) MARINE INVERTEBRATES.

Crabs are not common among the engravings, but are widely distributed. There appear to be two species; those with heavy nippers are probably mangrove crabs (Fig. 49), while those with longer, thinner nippers are swimming crabs (Fig. 48) (McCarthy 1961, p. 132, Fig. 193).

Other marine invertebrates can be seen in the engravings but their interpretation is highly subjective; sea-cucumbers (holothurians) may be among them (e.g. Fig. 51), and some of the engravings which we have interpreted as stingray livers are quite similar and may actually represent sea-cucumbers. Objects resembling chitons were occasionally seen by us, and octopus-like carvings are rare (Fig. 45, compare with McCarthy 1961, p. 134, Fig. 234).

THE ENGRAVINGS OF ANCHOR HILL

The site called Anchor Hill is a promontory at the north-eastern end of Beagle Beach. It consists of a plateau edged by small cliffs, and below are relatively flat areas of water-worn stones. The division between the plateau and the cliffs seems to be an important one because, while the plateau is strewn with engravings of Recurrent Forms, the cliffs have a high proportion of Exceptional Forms. This may be simply because the vertical cliffs were more suitable for the larger engravings, but it seems possible that the cliffs were used as a ceremonial area.

On the plateau the engravings are almost entirely Recurrent Forms, but within the Recurrent Forms there is an exceptionally high proportion of turtle engravings (35 per cent. of the total). The only Exceptional Forms are two concentric circles which are rare elsewhere on the Island. Petri and Schulz (1951, p. 92) discuss problems of their interpretation.

On the cliffs are some of the most remarkable engravings of the Island (Pls. 9-11c). McCarthy (1961, pp. 124-5, Fig. 25) shows a figure of the one illustrated in Plate 9. On the right hand side is a stingray and beside this are two figures which, according to McCarthy (p. 124), Petri and Schulz (1951, Fig. 8b) interpreted as a mythical dugong. The top part resembles a person with a drooping type of head-dress (compare with Fig. 3), while the other figure has a radiating head-dress (compare with Fig. 2) and is upside down. I do not know what the engraved area connecting the two figures represents. It may be amniotic fluid, or it may be a ceremonial ground with the figures standing at either end, or it may be some means of representing copulation. In this context, Chanside's interpretation of McCarthy's Figure 304 is important (see p. 66 of this report). He considered that it represented a "female ancestress (with genitalia)." Further left is a little

figure with a large object on its head. This object may be a head-dress or possibly, as Chanside suggested to Dr. R. Berndt, swags carried on the head (see p. 66). These three figures seem to be the earliest in this panel. Beside them, and superimposed on them, are two more figures, probably a man and a woman, which are less deeply engraved. Covering the whole area is a criss-cross pattern very lightly scratched into the rock surface, and this resembles a net.



Plate 10. Copulation scene (?), Cliffs at Anchor Hill.

Close to this is an extraordinary bird (Pl. 11a). This does not look to me like Aboriginal work, and it is possible that some European has engraved this. However, it is worth publishing since it is an engraving in a very different style. The bird is probably a hawk of some kind and appears to be protecting, or laying, two eggs.

On the opposite cliff face is the creature interpreted by McCarthy as a praying mantis (McCarthy 1961, p. 130, Fig. 154). He points to the similarity between this figure and those at Woodstock (see p. 53).

Around the corner, but still on the cliff face, are several scenes showing sexual intercourse. Plate 11b (compare with McCarthy 1961, Fig. 303) shows two figures interpreted by McCarthy as a birth scene, although it could equally well be a scene of sexual intercourse. Chanside described it as an ancestral man with head-dress (see p. 66). A few feet away is a copulation scene (Pl. 10) (McCarthy 1961, Fig. 305). In this case the female figure has been more recently engraved than the male. Chanside interpreted the engraving as two dancers, or actors facing each other in sacred ceremony (see p. 66). Nearby are two women, with thin bodies about 20 inches long. They have greatly exaggerated genitalia and compare closely with the Woodstock engravings (Figs. 66 and 67).

Just near the top of the cliffs are two little wallaby figures, one of which is reproduced in Plate 11c (McCarthy 1961, p. 128, Fig. 117). They are drawn as if the artist were vertically above the animal. These are the only wallabies depicted in this way on the Island, and are therefore quite unusual.

At the bottom of the cliffs, the engravings are mainly Recurrent Forms. However, there are several little figures like that in Plate 9, with the large objects on their heads. Also the dingo catching a bird (Fig. 24) (McCarthy 1961, p. 126, Fig. 94) is important, since there are very few examples on Depuch of scenes involving animals in action.

Close to the main Anchor Hill area there are other engravings. They are mainly of men, but that of a bird eating a fish (McCarthy 1961, p. 126, Fig. 93) is, like that of the dingo catching the bird (Fig. 24), a most unusual example of Aboriginal art.

Anchor Hill requires full preservation and since it is a promontory, a fence could be constructed to isolate it, or at least clearly to demarcate it.

This promontory has two inscriptions left by the crew of H.M.S. Beagle in 1840 (Pl. 5) and inscriptions recording the visit of Penguin (1909) and later ships.

THE ENGRAVINGS OF WATERING VALLEY

Watering Valley runs from north-east to south-west almost across the Island; its mouth is at the northern end of Beagle Beach, while its watershed is less than 400 yards from the water at the south-western edge of the Island. Situated about half a mile up the Valley are a number of deep pools in the rock in the creek bed. These pools were freshened by rain during our visit, but had turned rather bitter after two weeks. No doubt the water was a great attraction to the Aborigines. There are more pools half a mile further up the Valley.

The engravings are concentrated in areas near the water. On the sides of Watering Valley, near the first series of pools, are some 800 engravings. Near the second series of pools are 200. Another 200 engravings are

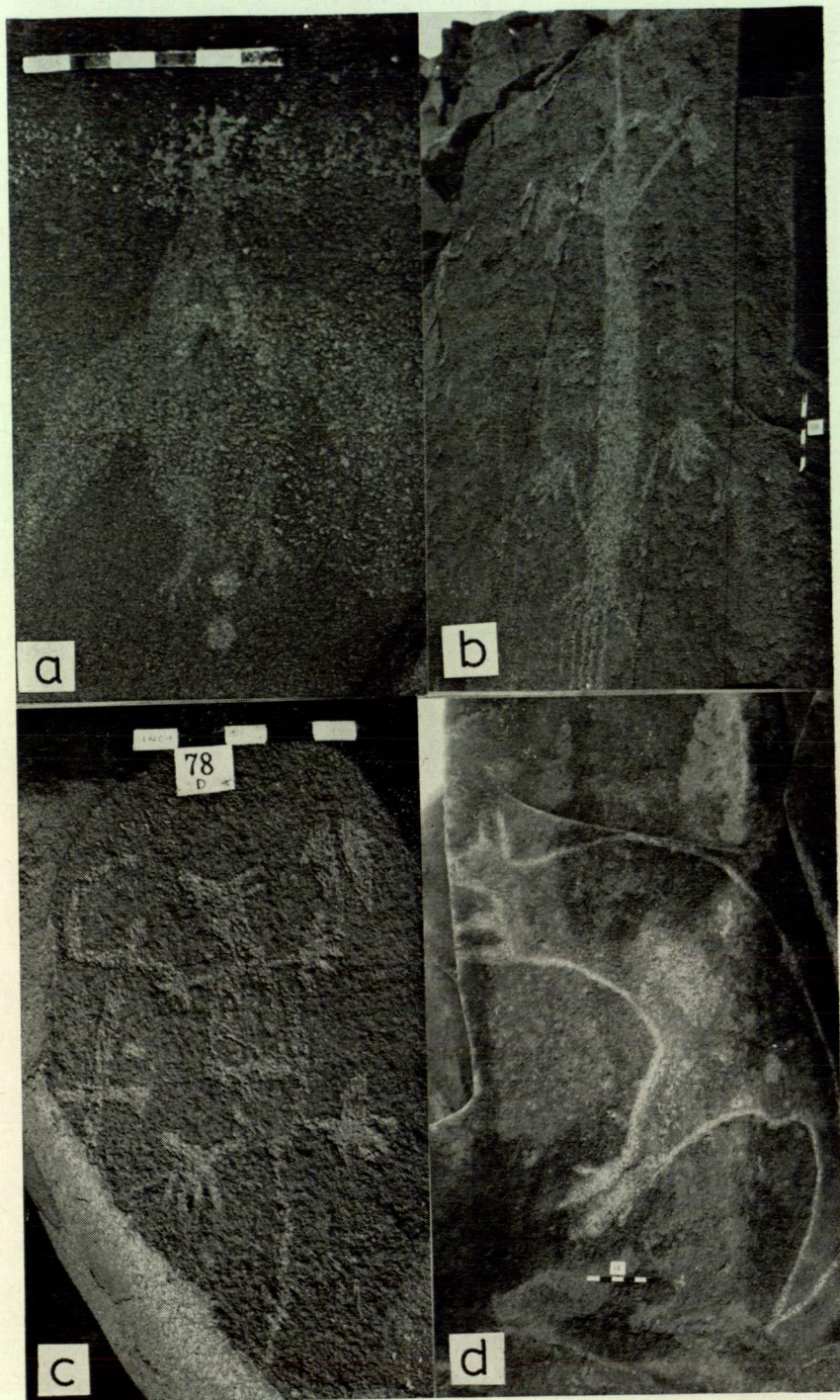


Plate 11. (a) Bird, Cliffs at Anchor Hill.
(b) Copulation scene, Cliffs at Anchor Hill
(c) Wallaby, Cliffs at Anchor Hill.
(d) Wallaby, Watering Valley.

scattered along its entire length. With a total of 1,200 engravings, Watering Valley is one of the very rich areas of the Island.

Recurrent Forms abound, but the proportion in which the different motifs are represented is different from that present in some other localities, e.g. Anchor Hill.

In Watering Valley wallabies and birds are much more common whereas turtles are much rarer. This change may be due to the fact that this area is inland. There is also a great number of stick-figures, whereas these are rare on Anchor Hill. Some of the birds represented show an interesting feature: their heads have been situated around a corner of the rock on a different plane from the body. In this way, the rock surface gives dimension in depth; it is just as if the bird were peering at something ahead of it and had turned its head to see. It is not known whether this is a deliberate technique to achieve these dimensions, or whether to the Aboriginal artist, it did not matter whether his entire picture was on a single plane.

There are many Exceptional Forms in Watering Valley.

Two men (Pls. 13 and 14) (McCarthy 1961, p. 123, Fig. 5; Wickham 1843, p. 83) have been engraved on vertical faces high above the eastern side of the Valley, and look down it towards the sea. They appear to have long penes and are probably urinating. Lightly pecked figures beside the main rock support the interpretation, for they too are urinating. It is tempting to speculate that some myth linked these figures with the creation of the rock pools. A similar single figure occurs up the tributary to Watering Valley, once again very close to a rock hole.

There are several examples of a small griffin-like figure (Fig. 14) (McCarthy 1961, p. 138, Fig. 307). These are found only close to the rock pools. The figure apparently represents a human, for the engraving represented in Figure 15 shows a copulation scene. The engraving shown in Figure 14 was interpreted by Chanside as a dancing man in a ceremony (see p. 66). The engraving seems to me to be a particularly fine example of Aboriginal art. Nothing is known of the significance of the figure.

High up on the left hand side there are two very unusual figures. Plate 15a (McCarthy 1961, p. 125, Fig. 2) shows two little men in profile approaching a large figure with an elaborate head-dress. The head-dress looks like a series of hands. The large figure has a boomerang and a shield. Profile figures are extremely rare on Depuch, and we saw only one other. The head-dress, without the man, occurs again at Hunters Pool.

Beside this figure is another unusual one (Pl. 15b) (McCarthy 1961, Fig. 306). It has a radiant head-dress with little knots on the end. This may well represent a ceremonial head-dress of this area, made from little sticks with whittled ends. The male genitalia are represented in some detail. The man holds a boomerang. Both this and the figure beside it show men with elaborate head-dresses, and it seems likely therefore that these are people dressed for a ceremony.

Ceremonial and spearing scenes also occur (Pl. 12b, Fig. 7) (McCarthy 1961, p. 138, Fig. 316). These are essentially similar to that of the man spearing another man which is described under Recurrent Forms. The only significant difference is that in these scenes groups of men are all spearing a central figure.

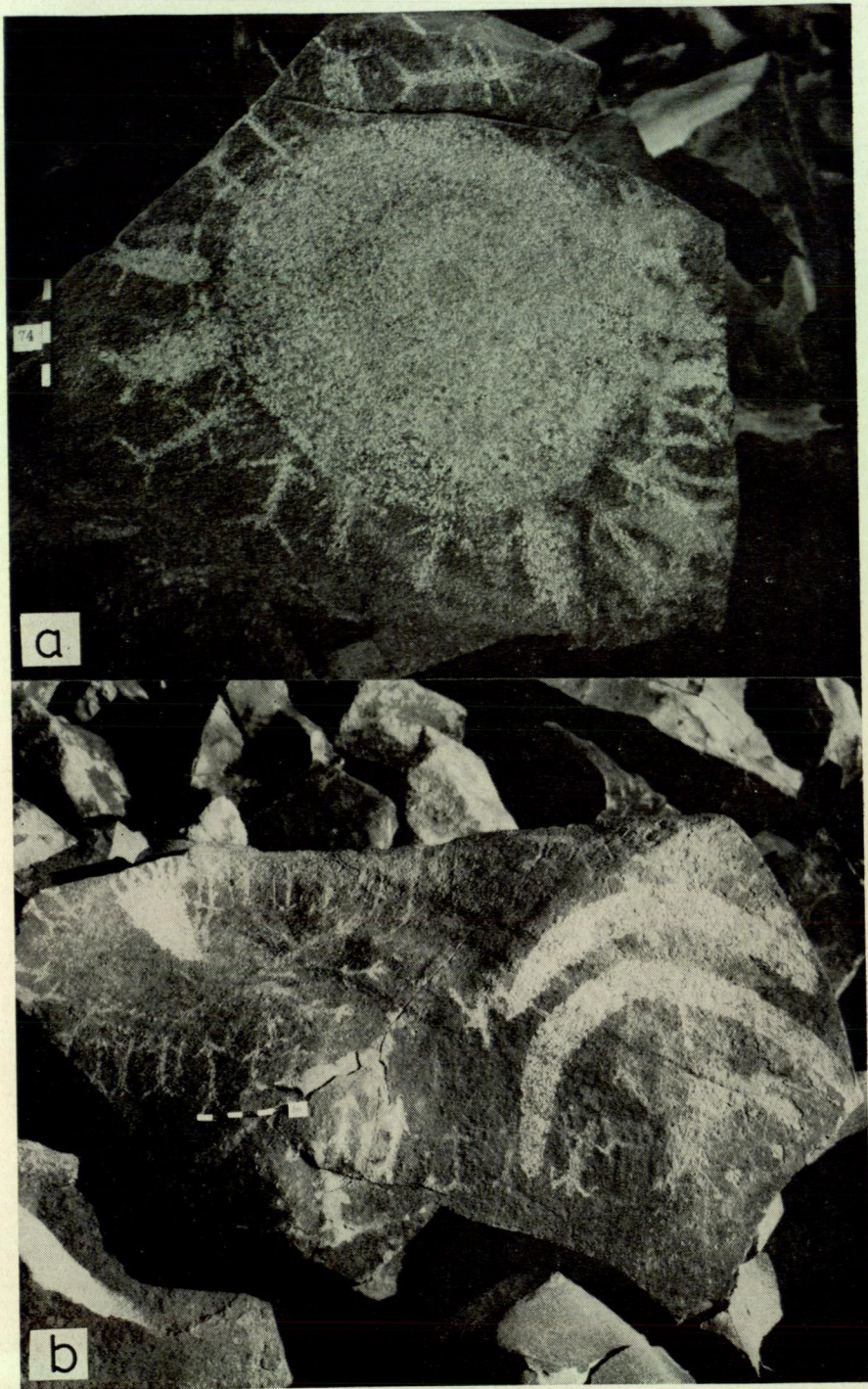


Plate 12. (a) Ceremonial scene, Watering Valley.
(b) Ceremonial scene and boomerang, Watering Valley.

Another exceptional engraving is shown in Plate 12a (McCarthy 1961, p. 139, Fig. 329). It shows figures of stick-men and fatter turtle-like figures arranged around a circle which McCarthy interpreted as a turtle egg. Another possible explanation is that it is a ceremonial ground and this, indeed, is the interpretation given by Chanside to Berndt (see p. 67). Whatever the correct interpretation may be, the engraving remains an excellent example of the care and precision of the Aboriginal artists. Figure 11 (McCarthy 1961, Fig. 326) shows a single figure with a similar circle. Chanside interpreted this as a man carrying sacred emblems on his head (see p. 66).

Watering Valley also contains an inscription (not previously recorded) which was left by the crew of H.M.S. Beagle in 1840.

This area is likely to be a major attraction to visitors and it should be reserved. A fence should be erected across the entrance to the Valley.

THE ENGRAVINGS OF HUNTERS POOL

Hunters Pool is a lake bed at the north-western end of the Island, and was so named by A. O. Day in a manuscript report to the Department of Native Welfare. It resembles an arena in shape, with rocky stands all around. The pool apparently fills to a maximum depth of 3 feet after heavy rain, but was dry when we visited the site. It is separated from the sea by a single ridge of rock. The bed of the lake is only a foot or so above high water mark. Digging, however, failed to find water, and there is apparently no connection with the sea: the lake depends entirely on rainfall for its source of water.

Abutting the cliffs of the Island at that point is an extensive reef and flats. Marine life abounds and we saw turtles, sharks, and a dugong, as well as many small fish. Sea-cucumbers live in the water; shellfish, especially oysters, are common on the rocks. Wading birds search the reef at low tide. There can be no doubt that this area was a hunters' paradise. The concentration of engravings in this area confirms this view.

There are 1,200 engravings surrounding Hunters Pool. One has only to stand on the lake bed and look around to see these engravings on all the surrounding rocks (Pl. 16a, b, c). It really is an inspiring view. Nowhere else on the Island is one so conscious of the concentration of engravings. It is a natural gallery.

The engravings at Hunters Pool differ in some respects from those elsewhere. Recurrent Forms are very common, but a great number of these engravings surpass in quality and form those found at other sites. Many of the figures of animals are very fine; among them, birds, wallabies, and crabs are outstanding representations. Men and women of all shapes and sizes, and in all kinds of attitudes, abound.

Most of the figures are pecked all over, and do not appear to be deeply weathered.

Plate 17a shows two emus. This is just one of many superb bird scenes. Figure 19 shows two herons. Plate 17b shows another emu together with a wallaby and what may be a trap of some kind (McCarthy 1961, p. 139, Fig. 345). Other birds from this area are represented in Figures 20 and 21.

Just as one can illustrate in this way a great variety of birds, so one can illustrate other animals. The wallaby, for instance is represented in

Plate 17b. Other wallabies are reproduced in Figures 23 and 25 and these show some variations in the style in which the animals were depicted.

At Hunters Pool human figures deserve the most careful consideration. Stick-figures (Fig. 2) abound, but they are common anywhere on the Island. Spearing scenes, while not as complex as those in Watering Valley, are

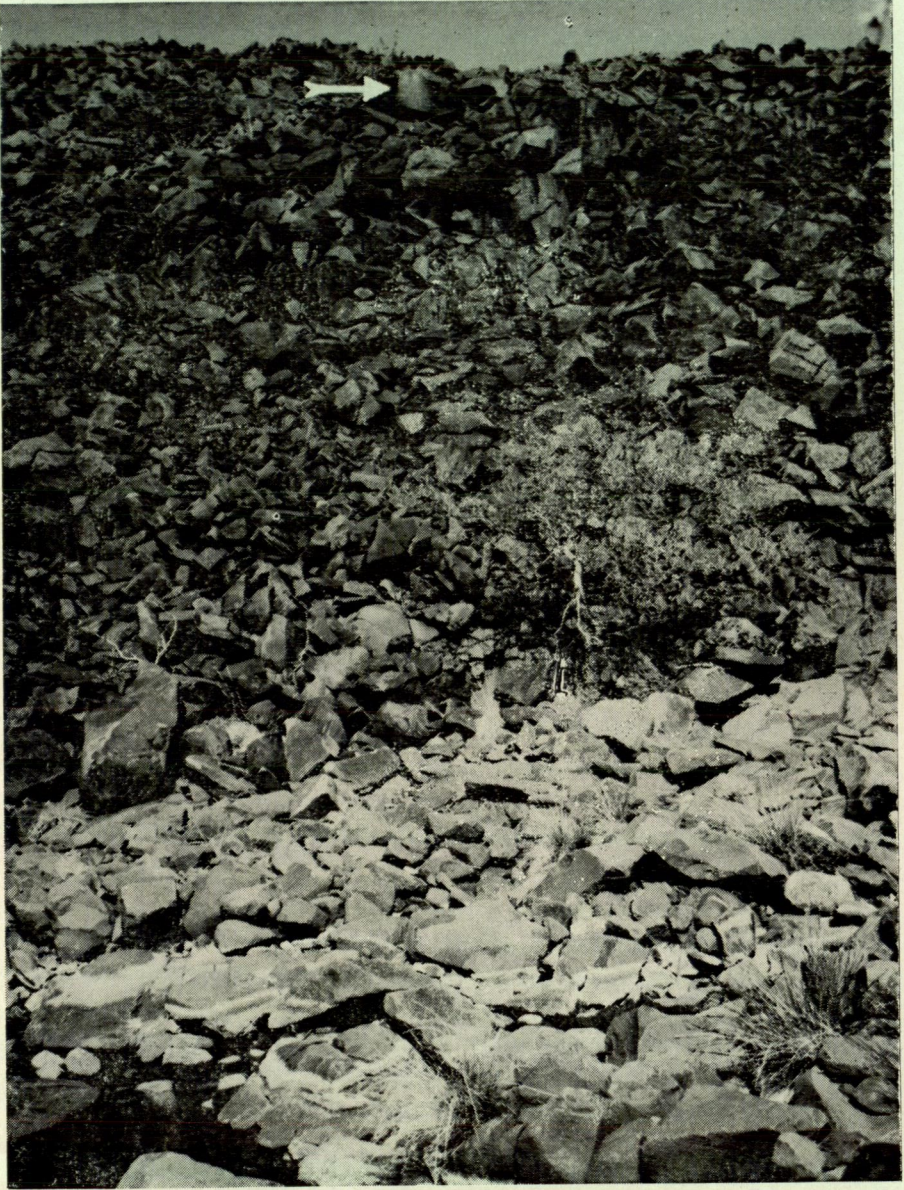


Plate 13. Two men, Watering Valley.

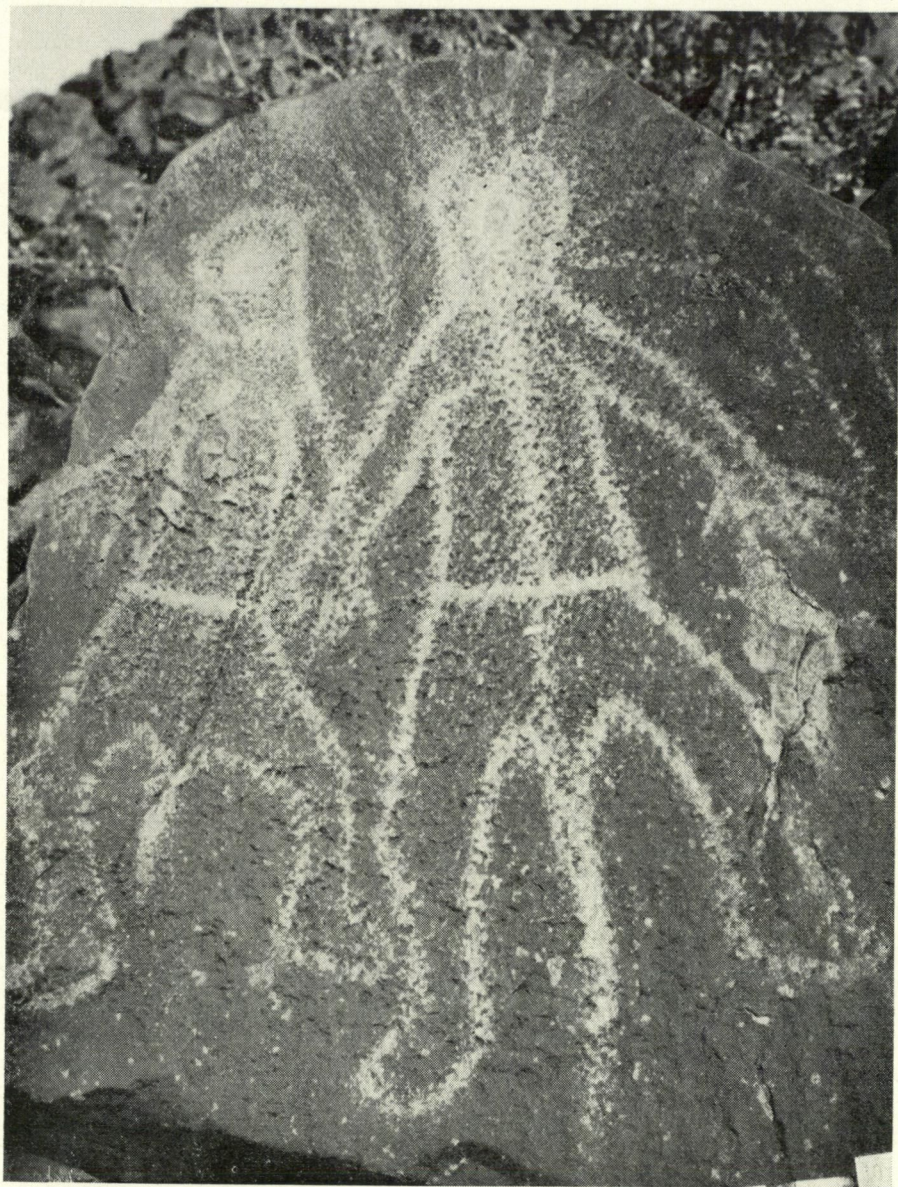


Plate 14. Two men, Watering Valley.

nevertheless very fine. Figure 17 shows a person armed with boomerangs, and perhaps a shield ; there are two small figures under his arms. Figure 16 shows two men with an object on their heads. This is very similar to that shown in Plate 9.

Of outstanding importance among the Exceptional Forms found here is the engraving shown in Plate 18a. This shows a little stick-figure man

at the end of a twisting line. The line possibly represents a track. This type of scene is sometimes incised on sacred boards (e.g. Western Australian Museum No. A.14542). McCarthy (1961, p. 139, Fig. 344) interprets the engraving as a snake.

Particularly noteworthy features of this area are the vertical stone slabs at the eastern end of the pool. Separate slabs of stone resembling boundary stones have been deliberately placed upright and they are usually engraved; however, they do not seem to define any area. Elkin (1933) has published information on the use of stone slabs, heaps, and arrangements in Western Australia and it is clear that heaps of stone may be used to mark sacred sites and increase centres. The upright slabs at Depuch may have had a similar significance.

Hunters Pool is well protected by the natural ruggedness of the Island, and I believe that few people will ever bother to visit this area. It should be reserved, since it is one of the most important sites on the Island. Several notices should be erected in the area. Providing no deliberate attempt is made to provide easy access to the spot, no other protective measures need be taken.

THE ENGRAVINGS OF JANE CREEK

Jane Creek is the name which we gave to a valley immediately to the west of North Point cairn. In it, we found rock pools which contained quantities of algae in the water, but the water was drinkable.

The valley makes an easy route from the sea to a spinifex covered plateau and this, in turn, gives easy access to the Hunters Pool area. Judging by the water, position, and density of engravings, this was a frequented area. There are about 800 engravings along both walls of the valley.

Just as there is a marked similarity to Watering Valley in the physiography, so there is in the engravings. Exactly the same type of engravings occur, but some of the fine human figures of Watering Valley are missing. Nevertheless spearing scenes are very finely executed; one of them (Fig. 10) shows a fish being speared.

The rest of the engravings are Recurrent Forms. There are several good snakes, intercourse scenes, and the usual varieties of fish, turtles and birds.

This area should be fenced, in the same way as Watering Valley. It is well worth preserving as a typical site, although few of the engravings are of exceptional value.

ENGRAVINGS IN AREAS OF LESS IMPORTANCE

WICKHAM CLIFFS.

The area between Sandy Spit and Anchor Hill contains about 40 engravings which for the most part are Recurrent Forms, and not particularly good examples of these. The only exceptions are three figures high up on Wickham Cliffs. There are two men, one of which is reproduced in Plate 18b, and the other is very similar. The men are the same in form as those at Wreck Point, at the end of the Skipjack Cliffs. This type of figure is otherwise extremely rare on this Island.

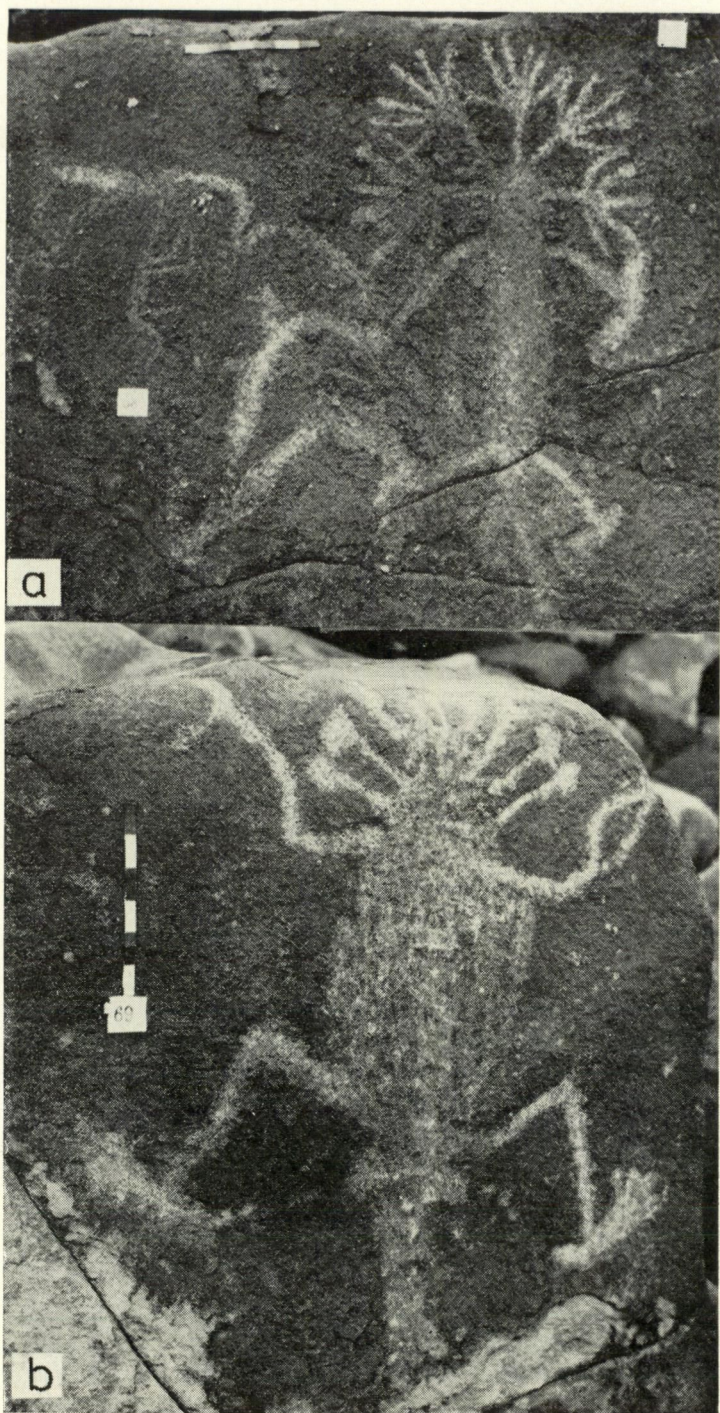


Plate 15. (a) Man with headdress, Watering Valley.
(b) Man, Watering Valley.

SKIPJACK CLIFFS.

At the end of Beagle Beach there is a line of cliffs reaching to Wreck Point. These have been referred to by A. O. Day, in his manuscript report to the Department of Native Welfare, as the Skipjack Cliffs. The sea is gradually eroding these cliffs, and rock falls are fairly frequent. Small clusters of engravings occur both on the cliff face and on the fallen boulders.

On the whole, there are few figures of great importance in this area, Recurrent Forms outnumbering restricted varieties. Exceptional Forms are limited to ceremonial and fish spearing scenes similar to those in Watering Valley, and one group of engravings (Pl. 19b) is similar in subject matter to the cliff engravings of Anchor Hill.

In one place, the coarse grained rock is replaced by a fine grained one, and on it the engravings are much more delicately executed. Instead of being hammered into the rock face (a method which necessarily gives a fairly rough outline) it was necessary only to rub the surface with a hard rock. Finer lines resulted (Pl. 20). There are about 200 engravings in this area.

WRECK POINT.

At the end of the Skipjack Cliffs, there are several male figures similar to those described from Wickham Cliffs (Pl. 18b), which are otherwise rare on the Island. They are important, for they resemble engravings on the mainland, particularly the "Gurangara" engravings on Woodstock (Fig. 68). There are about 50 engravings in this area.

NARROW GORGE.

This is a gorge in an unnamed stream bed north from Watering Valley. The name of the gorge is taken from A. O. Day's report. Beside a rock pool there are about 50 engravings of Recurrent Forms, the only Exceptional Forms are three groups of small men whose heads are represented by small hollows in the rock (Fig. 9). These have been deliberately pecked more deeply than the rest of the body area, and the style in which they are executed is not represented elsewhere on the Island.

PRANCING ROCKS.

The rocks between Wreck and North Points carry many engravings. The name Prancing Rocks is a new name suggested to describe the figures engraved on the rocks.

In this area there are outcrops of rock, on each of which are groups of engravings. Typically they show turtles, copulation and simple spearing scenes, stingrays, *kadaicha* shoes, and fish. One clump of rocks has a very nice group of little figures; these are rows of little men holding hands. There are over 300 engravings on these rocks.

NORTH POINT.

On the west side of North Point, rock pools of fresh water were common after rain, although these would not last long.

The engravings are concentrated on the rocks near the water's edge. Most obvious of these are the giant turtles with patterns on their backs, some of them over 5 feet long. Among the Recurrent Forms *kadaicha*

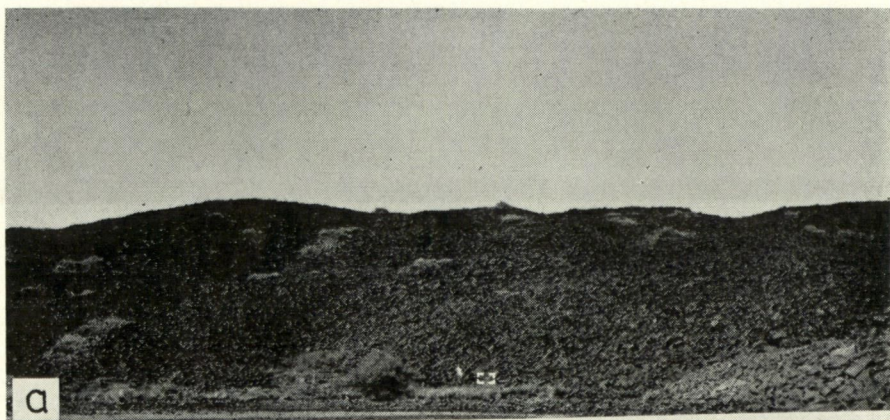


Plate 16. (a)-(c) Hunters Pool.

Three views of the same rocks showing the large number of boulders and the frequency of engravings.

shoes (Fig. 26), fish, and stingrays are particularly common. Among the Exceptional Forms, some of the copulation scenes repeat motifs found elsewhere on the Island. At North Point the rock has weathered to red, and there is no great colour contrast between the engraved lines and the natural rock surface.

WESTERN CLIFFS.

South from Hunters Pool, along the western side of the Island, the coast is very rocky and steep. Small groups of engravings are concentrated in the vicinity of the reef and these groups are generally situated close to bushes, especially *Phyllanthus*.

This area was not thoroughly examined, and so the total number of engravings in it is not known. However, one Exceptional Form (Fig. 18) shows a pregnant woman, perhaps giving birth. It is remarkable in that it has unusually curved lines for a Depuch engraving.

THE TECHNIQUE OF ENGRAVING ON DEPUCH

The rock of the Island has weathered on the surface to an orange-brown colour. Underneath this is a yellow layer before the greenish grey of the unaltered rock is reached. The Aborigines used to break through the brown crust, and the engraved areas stand out yellow against the brown. The yellow gradually weathers to brown, but the majority of the engravings are clearly defined by their colour.

The figures are usually pecked into the rock: that is, the surface of the rock was hammered with the edge of another rock until the surface disintegrated. Several loose stones were found with very battered edges and these are probably the hammer stones used (Fig. 31). It is remarkably easy to engrave on the rock of Depuch. A few taps on the stone and an engraving has been made. An engraving which takes only a minute or two to make could very well last for hundreds of years.

From the technical point of view, two types of engraving can be distinguished. Some figures are represented by outlines only. These are usually very large figures of emus, kangaroos, turtles, or fish (Pl. 11d). The majority of the engravings however were pecked-in completely (e.g. Pl. 17a). McCarthy (1961, p. 145) has suggested that the outline figures are older than the pecked-in figures. This suggestion is discussed in the section on Sequence in this report (p. 46). The difference between the two types seems to me to be essentially a matter of size; the effort involved in pecking-in a large figure would have been very considerable.

There is some evidence that the outline of a figure was drawn with a sharp piece of stone or shell before the engraving was hammered in. One turtle, for instance, has head and flippers pecked-in, while the body has only been scratched. This is presumably an unfinished engraving (Fig. 37). In some cases, however, scratching the design appears to have been a deliberate method of producing an engraving with no attempt to hammer the design into the rock. Presumably the sharp edge of a flake of stone would have been used for this purpose. The lines are often quite deep. This scratching technique was used to produce fine lines which often form the criss-cross pattern that I have suggested represents a net (Pl. 9). The men and spears in Plate 20 have been engraved in the same way.

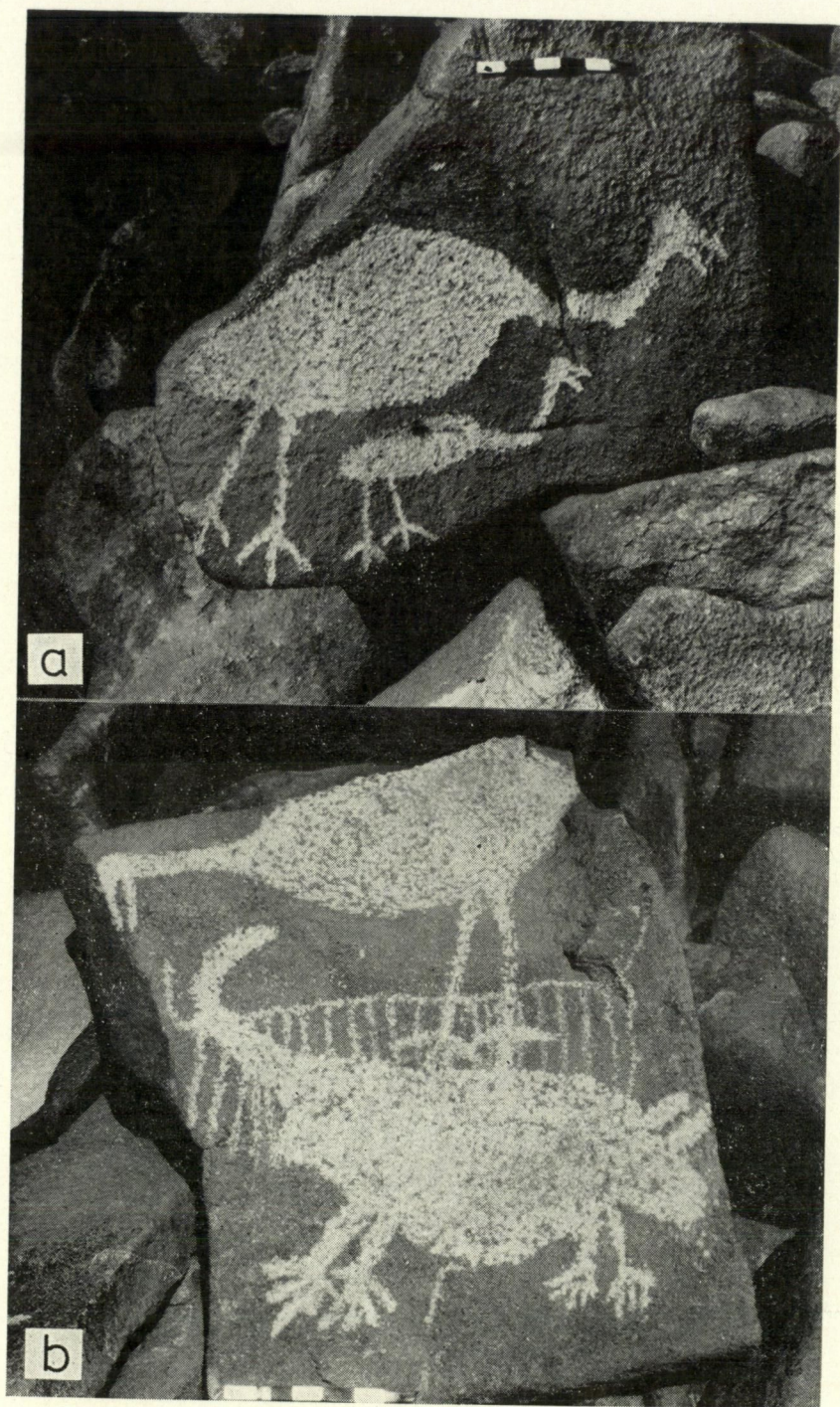


Plate 17. (a) Two emus, Hunters Pool.
(b) Emu trap (?) and wallaby, Hunters Pool.

THE AGE OF THE ENGRAVINGS AND THE SEQUENCE OF THEIR PRODUCTION

THE AGE OF THE ENGRAVINGS.

There is no known way of establishing the age of the Depuch engravings, but it is probable that they were made over an extensive period even into the present century. Daisy Bates* wrote: "The present day natives of Balla Balla and Port Hedland continue their artistic productions on the remaining rocks of Depuch, and on those parts of the sandstone ridge [at Port Hedland] which have not been touched by traffic." Many of the engravings were extant when the H.M.S. Beagle visited the Island in 1840 and are therefore more than 122 years old. The earliest engravings may be hundreds, or thousands of years old.

A date of thousands of years would not be exceptional in Australian prehistory. Hale and Tindale (1930) found a slab of rock with engraved tortoises in the excavation at Devon Downs in South Australia. Carbon dates for layers with similar artifacts, from the nearby site of Fromm's Landing (Mulvaney 1961), suggest a date of at least 3,000 years for the engravings. Engravings have also been reported from Tasmania. If, as some anthropologists think, the Tasmanians had reached Tasmania before the sea level rose at the end of the Last Glaciation (e.g. Tindale 1957, p. 10), and the petroglyphs of both Tasmania and the mainland possess a common "ancestry," then the idea of engraving as an art style must have been introduced into Australia at a date in the order of 15,000 years ago.

SEQUENCE OF STYLES.

It would be expected that, if engravings were made over a long period, changes in style would have taken place. However, in practice it has not been found possible to distinguish the stages in this change (if, indeed, it did occur). Engravings of ritualistic significance were probably rehammered at regular intervals, and it is likely that engravings of this type would have remained in use, and be kept fresh by retouching, for hundreds of years. If this were the case, engravings might have remained in use even when their art forms were archaic. Such engravings would tend to confuse any attempts to establish a sequence of art forms.

Attempts have been made by McCarthy and by me to determine the sequence of artistic style and technological changes on Depuch. McCarthy's attempt is discussed below. My own attempt, based on the apparent state of weathering of the engravings, proved unreliable although in the field it appeared to be soundly based. Other research workers (for example Mountford 1929) have been similarly tempted to judge the age of engravings in other places by their old appearance, and no doubt yet other attempts will be made in the future. I include here a description of my method, and of the reason why my first hypothesis of relative ages is now untenable. I give these details because I consider that the method will prove useful in circumstances where petrological analyses support its use.

* Bates, Daisy (n.d.). Transcripts of collected papers in the National Library of Australia. [Vol. 9 in typescript copies of the above unpublished data, held by Battye Library, Perth.]

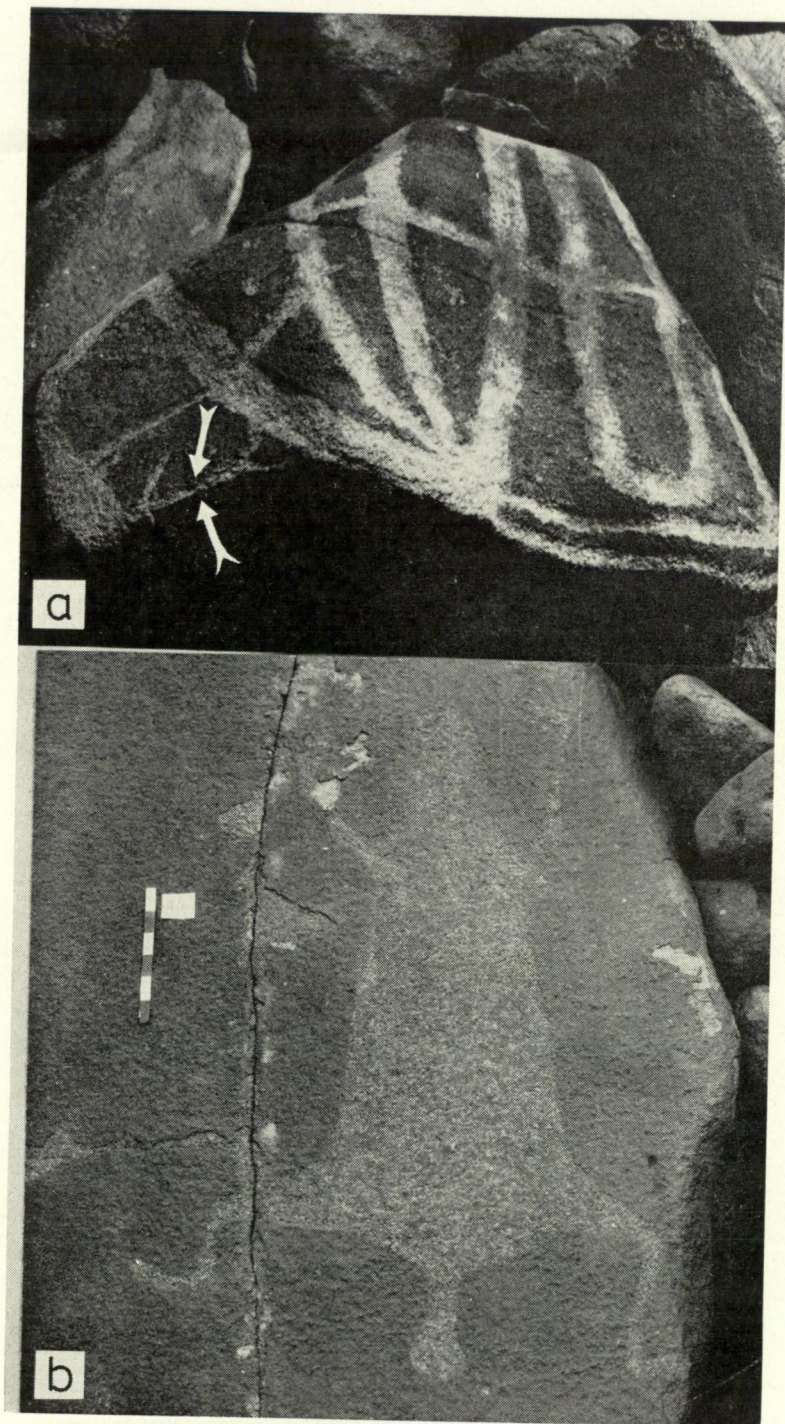


Plate 18. (a) Man at end of track (?), Hunters Pool.
(b) Large human figure, Wickham Cliffs.

McCARTHY'S STUDY OF SUPERIMPOSITIONS.

McCarthy has used the study of superimposition of engravings as a means of determining change in art styles. The assumption is, of course, that an engraving made over another one is more recent.

Using this method, McCarthy suggested the following succession of styles on Depuch :

1. Naturalistic outline figures and stick-men.
2. Spirals and geometric motifs.
3. Pecked intaglio figures.

Study of superimposition leads inevitably to the conclusion that pecked-in figures are superimposed on outline figures. This, however, does not prove that pecked-in figures represent a later style. It is almost impossible to engrave an outline figure over a pecked-in area where the rock surface has been largely removed, but it is relatively easy to engrave a pecked-in figure over an outline figure. In these cases the superimposition dating method seems to be at fault.

Some of the engravings show a combination of outline and pecked-in techniques. For example, several large outlined dugongs have pecked-in tails and fins. Such combinations do not indicate a change in technique unless one supposes that the fins and tails were later engravings.

STUDY OF THE EFFECTS OF WEATHERING.

When on the Island I adopted the following method. The engravings range in colour from light yellow to brown, and it appeared to me that the alteration from yellow to brown was probably due to weathering. Assuming that the weathering rate was reasonably constant from one engraving to the next, the state of weathering appeared to be a sound basis on which to construct a relative sequence. I therefore classified the engravings into three groups :

1. Those which were brown and similar to the rock surface in colour. I assumed that these engravings were the oldest.
2. Those which looked yellow and contrasted sharply with the colour of the rock surface. These engravings were assumed to be recent. None appeared to be more weathered than the Beagle inscription on Anchor Hill (122 years old).
3. Those which fell in between the two extremes, which I assumed were moderately weathered.

I assumed that, if there had been changes in style, these changes would be clearly discernible if the oldest and youngest engravings were compared. Therefore any engravings which in my opinion still showed traces of yellow colour were excluded from Group 1, and any which showed any deterioration of the yellow were excluded from Group 2. The majority of the engravings fell, therefore, into the intermediate Group 3.

The weathering rate was clearly not constant in all areas. My studies were confined to the plateau at Anchor Hill, the eastern side of Watering Valley and Hunters Pool. All of these were exposed areas, away from damp and the sea spray.

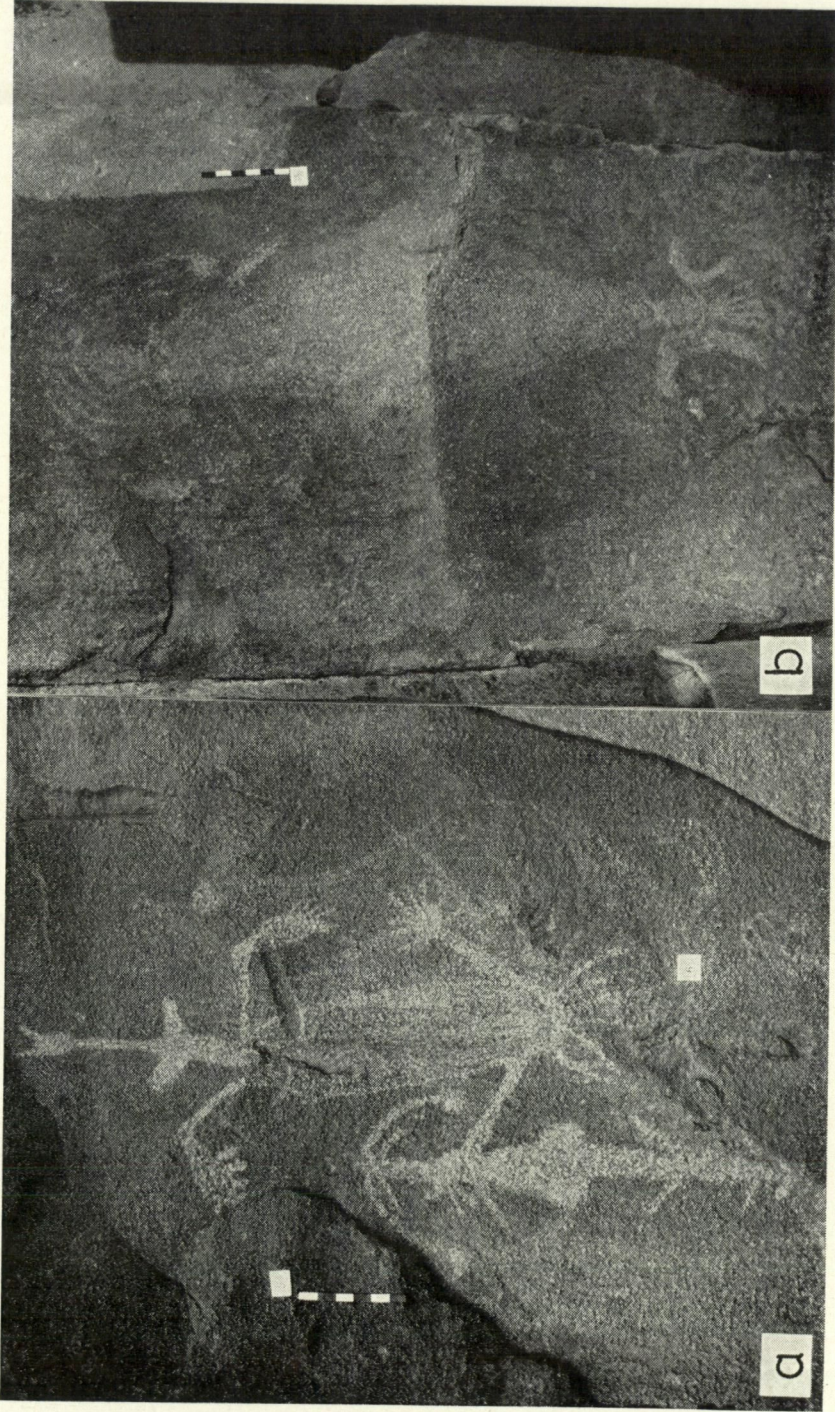


Plate 19. (a) Human figure, Skipjack Cliffs.
(b) Copulation scene (?), Skipjack Cliffs.

The conclusion reached was that there was no difference either in subject or technique between Groups 2 and 3, but that the engravings in Group 1 were rather different. Group 1 engravings consisted almost entirely of line engravings and did not include pecked-in figures. Groups 2 and 3 included both line engravings and pecked-in figures. It therefore appeared probable that line engravings were the earliest stage, and that pecked-in figures were a later addition.

When we returned to Perth, the problem of assessing weathering rates was discussed with a number of geologists. During these discussions, Professor R. T. Prider suggested that samples of the engravings ought to be examined petrologically in order to discover whether the various colours of the engravings did, in fact, represent degrees of weathering. Six specimens comprising two very weathered examples, two fresh examples and two intermediate examples were collected on a return visit to the Island. These were passed to Dr. A. F. Trendall, Petrologist of the Geological Survey, for analysis (see pp. 83-88). It is worth reiterating his statement that, in the process of making thin sections, the powdery limonite skin over the engravings and rock surfaces is inevitably lost. This limonite is presumed to be an important factor producing the colour changes due to weathering, and his studies would not, therefore, disprove the threefold grouping which I made if it were not for the further evidence which he found relating to depths of weathering.

Dr. Trendall's studies show the presence of variations in the rock surfaces which were not recognized in the field. His tabulation of the depths of the weathered crusts of the rocks suggests that the rocks may be divided into two groups which I shall call A and B. Group A rocks have a weathered layer of about 0.08 inches deep, while Group B rocks have a weathered layer of about 0.25 inches. If the six samples are then divided into these two groups, my fresh engravings fall into Group A, my weathered engravings fall into Group B, and the intermediate engravings divide between the two, the fresher of the intermediate group falls into Group A and the more weathered falls into Group B. It is then apparent that there is a correlation between fresh appearance and shallow weathering crusts on the one hand, and weathered appearance and deep weathering crusts on the other.

The actual engravings in Group B are cut to varying depths (0.14-0.07 inches), and the depth of the cut through the various weathering zones probably influences the colour of the engraving (and possibly its subsequent weathering rate). It therefore appears that the colour of the engravings in Group B has been produced by several factors, only one of which is weathering. It is therefore impossible to correlate colour variation with age within this Group, and it is also impossible to say whether the engravings are older, younger or contemporary with engravings in Group A. The predominance of line engravings in Group B probably reflects the artist's appreciation of the potentials of the rock surfaces.

The engravings in Group A are cut to a standard depth (0.02-0.03 inches) in a fairly uniform crust. It is therefore probable that the colour variations seen in the engravings accurately reflect degrees of weathering. If the engravings were arranged in a sequence reflecting degrees of weathering, it is doubtful if any artistic sequence would be observed, since this Group includes my Groups 2 and 3 between which no artistic or technical difference was discerned in the field.

Neither of the two methods so far used in attempts to establish an artistic sequence has produced a valid scheme. Any attempt to use the state of weathering as a criterion for age on Depuch, or elsewhere, ought to be accompanied by petrological analysis. Attempts to use superimpositions suffer from the theoretical flaws already mentioned, and ought also to be accompanied by petrological studies since, in judging one engraving as superimposed on another, one judges the relative states of weathering of the engravings.

EXCAVATION

We excavated a small area of an old camping site in the hope that we would be able to get some idea of how long the Island had been occupied. We had hoped to find that the stone tools used in the past were different from the tools in use at the time Europeans came. If changes of this type could be identified, dated, and correlated with changes in the styles of the engravings, many problems would be solved.

The site selected for excavation was at the end of Hunters Pool, in a sandy area. It was hoped that the floods of the past would have built up a series of sandy deposits on which the Aborigines would have camped. Had this hope been realized, we would have found a series of sealed deposits. In fact, the sequence was rather different with charcoal and ashes staining a sandy matrix for a depth of 24 inches. Seven inches from the surface was a shelly layer which interrupted this matrix. Therefore three main strata were recognized before sterile sand was reached (Fig. 72).

Right through the whole of the 24 inches of occupation levels, the stone tools remained the same. The flake illustrated in Figure 32 is typical of the 400 flakes excavated, therefore there was no change in the stone tools within this particular excavation. Carbon was collected for Carbon 14 dating.

Remains of a very weathered skull and skeleton of a child were found at the bottom of the deposits. It appeared to be in a crouched position, although careful examination failed to reveal any sign of a burial.

The excavation, therefore, failed to produce evidence of cultural changes. In any case, we would have been extremely fortunate had we been able to correlate cultural changes with changes in art style in one excavation. However, it is to be hoped that future excavations will achieve this end.

A COMPARISON OF THE ENGRAVINGS ON DEPUCH WITH THOSE FROM OTHER AREAS IN WESTERN AUSTRALIA

At the moment, there are recorded in Western Australia a large number of different kinds of engraving: each area of which we have sure knowledge seems to have distinct characteristics of its own, while at the same time having much in common with those from other areas. We have only just begun to study the problems raised by these engravings, and many engravings still remain unrecorded. It is clearly premature to draw any definite conclusions about the distribution of types and styles of engraving.

This report has described the Depuch engravings. For comparative purposes it is important to note that there is enormous variety in the kinds of engraving on the Island and, further, there is some variation in the techniques used in making them. Engravings from other areas I have examined

in Western Australia are more limited in variety of subject matter and in techniques. Engravings (in contrast to paintings) in Kimberley have rarely been recorded. There are engraved tortoises on the Ord River near Kununurra, together with rather indeterminate lines (Fig. 60). Sir George Grey (1841) reported an engraved head in West Kimberley (Glenelg River area), but no one has been able to re-discover this and Grey's figure of it does not look like an Aboriginal engraving (Grey's figure was reproduced by Davidson 1936, p. 61, Fig. 25 who also comments on this). As far as is known, engravings in Kimberley are limited to animal designs.



Plate 20. Man spearing turtle—fine grained rock, Skipjack Cliffs.

Outlined animals are typical of the Port Hedland area, although there are other engravings showing shields, boomerangs, and spears (Figs. 57-59). It is debatable whether human figures are represented, as there are figures which look something like humans but may not be (see Worms 1954,

Fig. D).* I saw at Port Hedland only one which I interpreted as a copulation scene, but this was less weathered than the other engravings and may have been made by Aborigines coming from another area in recent times. It is the only engraving which is pecked-in, all the others being outline figures.

Outline engravings of animals make up only a small proportion of the Depuch engravings. The outline engravings on Depuch are, however, very similar to those from Port Hedland.

The Woodstock engravings are very different from those at Port Hedland. Father Worms (1954) has described them, and I visited them in 1961 with E. Roberts of the Department of Native Welfare. On Woodstock there is a considerable emphasis on sexual organs. Father Worms believes that they are associated with fertility ceremonies and has assumed that they belong to the Gurangara cult. In these Woodstock engravings, there is a wide range of figures; in some, the body is represented by two parallel lines, but occasionally giant figures are represented with pecked-in bodies. Large outlined pentagonal figures of ghost-like beings also occur. Stick-figures are extremely rare. The great majority of the figures represent men and women (Figs. 65-69).

Worms (1954) considered that copulation scenes were more recent than outline engravings of animals. He suggested that these constitute evidence that Gurangara ceremonies had spread to Woodstock from the Desert, and (as a result of his detailed comparison between the Woodstock/Abydos engravings and those of Port Hedland) that the spread of Gurangara was interrupted by the arrival of the Europeans before it had reached the coastal areas (in particular, before it had reached Port Hedland).

Many of the Depuch human figures have some resemblance to those from Woodstock yet the overall impression is that the two groups are not closely related. When one compares the ratios of the different figures there is a clear difference between the groups. The Woodstock figures nearly all have a sexual emphasis, while the Depuch engravings include only a small proportion of this type.

Certain figures from Depuch can be selected to show the similarity of styles, in particular, the figures from the cliffs of Anchor Hill. McCarthy has already noted the similarity between the "Praying Mantis" and the Gurangara engravings and one could easily add the two women and the other large copulation scenes from Anchor Hill (see pp. 30-34).

The little stick-figures of Depuch appear to be quite a distinct group, since only a few poor examples of these occur on Woodstock Station. Some of the giant male figures from Depuch bear comparison with those from Woodstock, being similar in size, style, and technique. The similarity of the engravings is thus limited to a few unusual figures on Depuch. The majority of the Depuch engravings bear no resemblance to those at Woodstock, and it seems better to regard the two groups as being only distantly connected. If the figures in the two places were related, Father Worms's assumptions as regards the halting of the spread of Gurangara would be no longer tenable. The whole problem of the relationship of these figures, and their relationship to the Gurangara cult, clearly demands further study.

* McCarthy has recently published a number of human figures which he found near Port Hedland. See footnote on p. 23.

The Dampier Archipelago was visited by our party to see if engravings similar to those on Depuch were to be found there. A separate report will be prepared on these. However, it may be said that the engravings on these Islands are similar to the Depuch ones, but that they do not form such a rich display; various sites were visited, but few had more than 20 engravings. Instead of standing in an area surrounded by hundreds of engravings of birds, animals, men, and so on, one had to search to find them and then only a few examples of each kind could be found in any one spot. Spearing scenes with stick-men are common on Depuch and may be seen in any of the most important areas of engravings, but on Dolphin Island we found only one spearing scene. Our conclusion was that the Dampier Archipelago contains fewer engravings per unit area and is altogether much less impressive than Depuch.

I visited one group of engravings on the mainland on Mt. Welcome Station just before we left Roebourne. At a permanent pool called Pindari, in the Druchena Ranges, we saw quite a number of engravings. Small figures were common. Plate 21 shows a group of them on a boulder. The curvature of the legs and arms is a striking feature, and the figures seem to be arranged as if to make a line of dancers. Also at Pindari we saw engravings of kangaroos, birds and lizards. These were pecked-in all over. There were several copulation scenes (or possibly birth scenes) and one ghost-like figure, of the type described at Woodstock, was also seen (Fig. 54).

It is not easy to compare these Mt. Welcome engravings with those on Depuch. We saw only a small selection of them, and there are many we did not examine in detail. We did not see any spearing scenes, but this does not mean that they are not there. All that can be said is that figures with curved arms and legs do not look exactly the same as anything on Depuch; but, on the other hand, the animal engravings are identical.

A short visit was made to Black Hill Pool, near Mt. Herbert, where a group of engravings had been found by a Western Australian Museum Party in 1958 (Ride 1959). We found them to be similar to those at Pindari. One figure (Fig. 61) is very much like some of the so-called "Gurangara" engravings on Woodstock, another with curved parallel lines crossing a vertical line, resembles the "early" style of engravings on Depuch. Other figures are of elongated men with curved limbs, holding boomerangs which are similar to those in the Mt. Welcome engravings. Outlines of kangaroos and turtles, pecked figures of animals, all appear, but are rare. Stick-men are very rare, but do occur; one spearing scene was discovered.

This site, therefore, bears much the same relationship to Depuch as does Pindari. Forms similar to Depuch make up the majority of the engravings, but "Gurangara" engravings are more common.

From the Yalgoo area in the Murchison District, we have had reports of engraved concentric circles. This motif occurs in the desert, and we have further photographs of such engravings from near North Pool (near Wiluna). Concentric circles are typical of some of the designs on sacred boards and other objects from the desert. This motif is present on Depuch and Dolphin Islands but, as far as we know, is absent elsewhere in the north-west. On Woodstock Station and at Black Hill Pool, there is an engraved snake curled up upon itself, and this has some resemblance to a spiral (Fig. 70). Petri and Schulz (1951, p. 92) say that circles at Depuch, Port Hedland

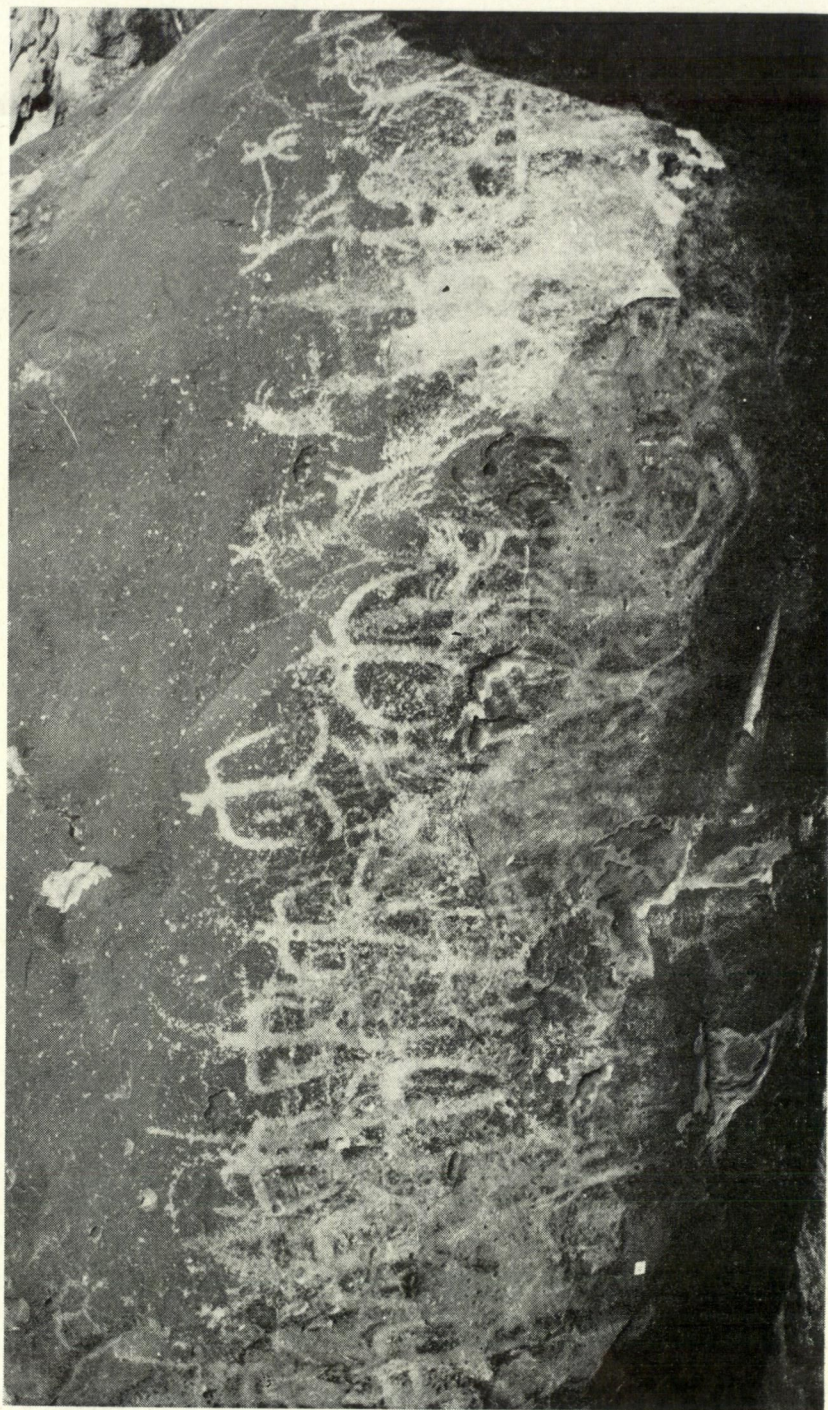


Plate 21. Human figures on boulder, Pindari.

and Abydos/Woodstock could not be interpreted in the light of the knowledge which they possessed of the Pilbara tribes.

In comparison with known sites, Depuch shows a much wider range of motifs and greater variety in technique than are to be seen in the engravings in any other area. Elements characteristic of the engravings from Woodstock, Port Hedland, Mt. Welcome, Yalgoo, and the desert areas, are all present. Yet more is involved than just a combination of figures from other areas, for many figures from Depuch have no parallels elsewhere. The only area in which the art closely resembles that of Depuch is the Dampier Archipelago, and there it seems to be poorer in quality and quantity. As far as we know at the moment, the engravings on Depuch are unique. No doubt, in time we will find more sites with engravings, but we will be fortunate indeed to find a site with such rich variety, excellent quality, and enormous quantity, as represented by the engravings on this Island.

TABLE I
Numbers of Engravings on Depuch Island, compared with other sites in Western Australia.

| | | |
|------------------------|-------|-------------|
| Depuch | | 5,000 |
| Kimberley | | Few only |
| Port Hedland | | 800* |
| Woodstock Station Area | | Over 500 |
| Dampier Archipelago | | 200 |
| Hamersley Ranges | | Unknown |
| N.W. Cape Area | | 20 |
| Desert | | Few reports |

The figures in the Table are all very approximate, and there are large areas of Western Australia about which we know very little. Reports of more sites are rapidly accumulating at the Western Australian Museum, but it will take several years before a comprehensive report on these can be prepared.

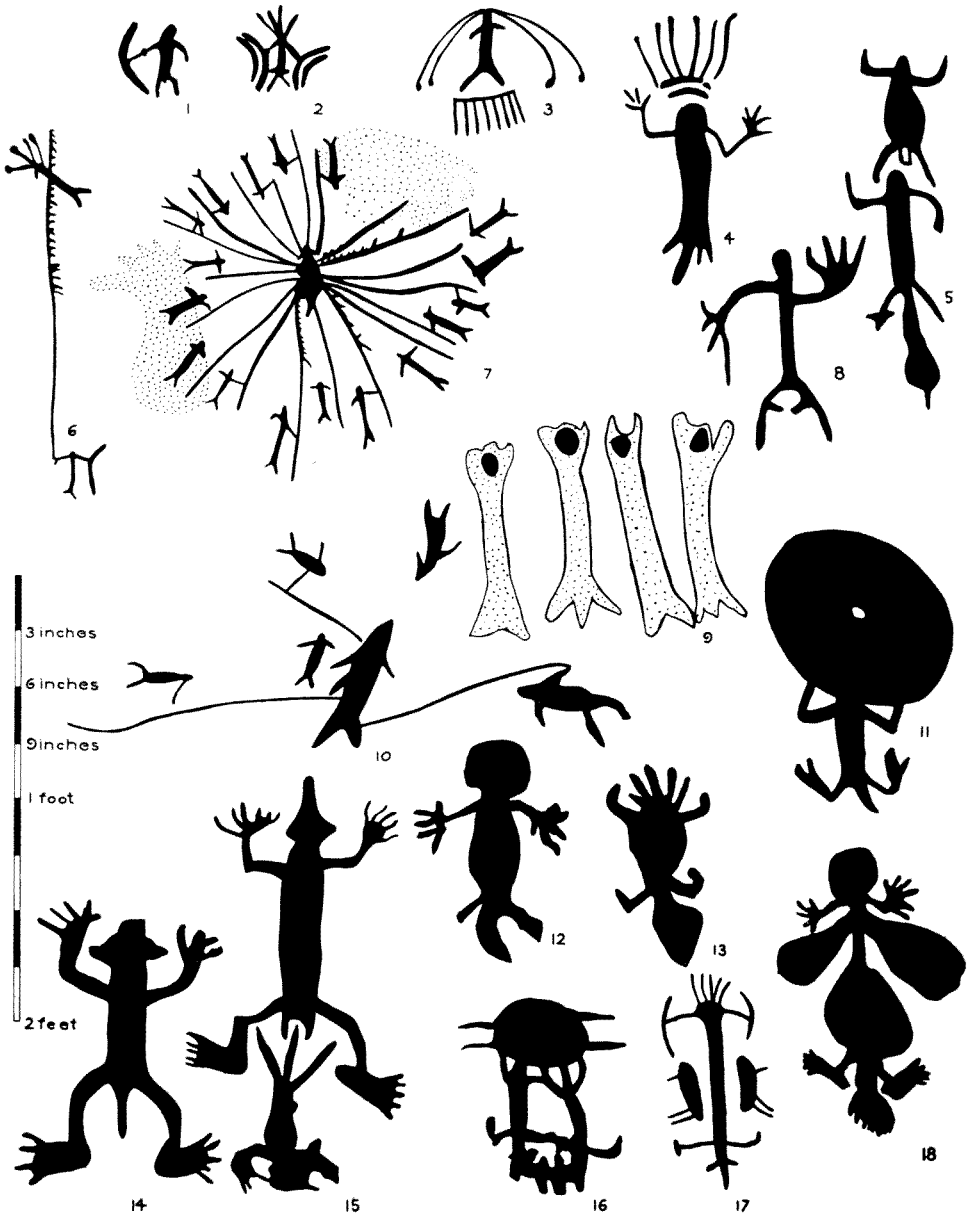
FIGURES

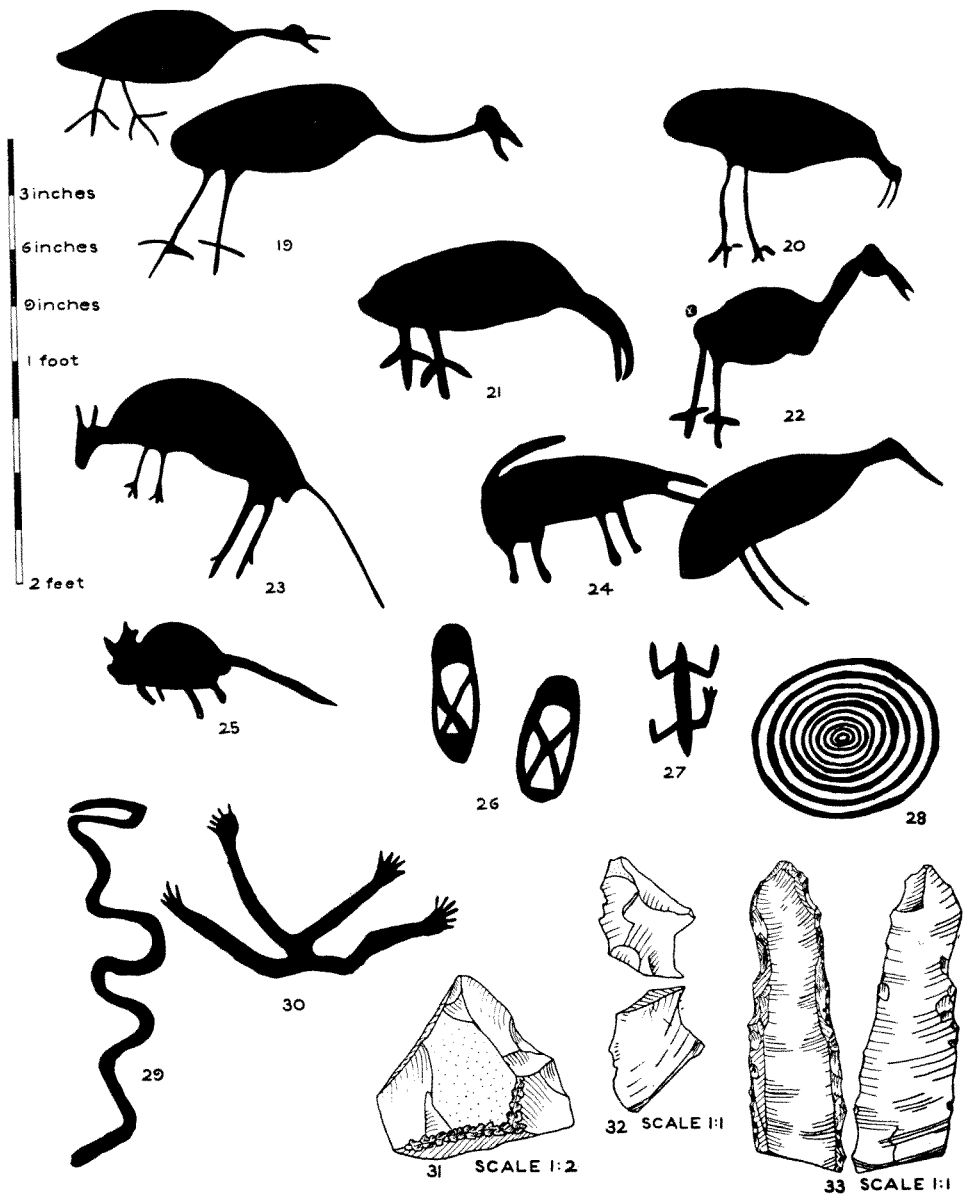
- Fig. 1. Man holding boomerang, Anchor Hill.
 2. Man with radiating head-dress, Hunters Pool.
 3. Figure with drooping head-dress and apron, Anchor Hill.
 4. Figure with elaborate head-dress, Watering Valley.
 5. Two figures (? copulation scene), Hunters Pool.
 6. Simple spearing scene, Hunters Pool.
 7. Elaborate spearing scene, Watering Valley.
 8. Woman, Hunters Pool.
 9. Row of men with deeply pecked heads, Narrow Gorge.
 10. Men spearing a fish, Jane Creek.
 11. Man and circle, Watering Valley.

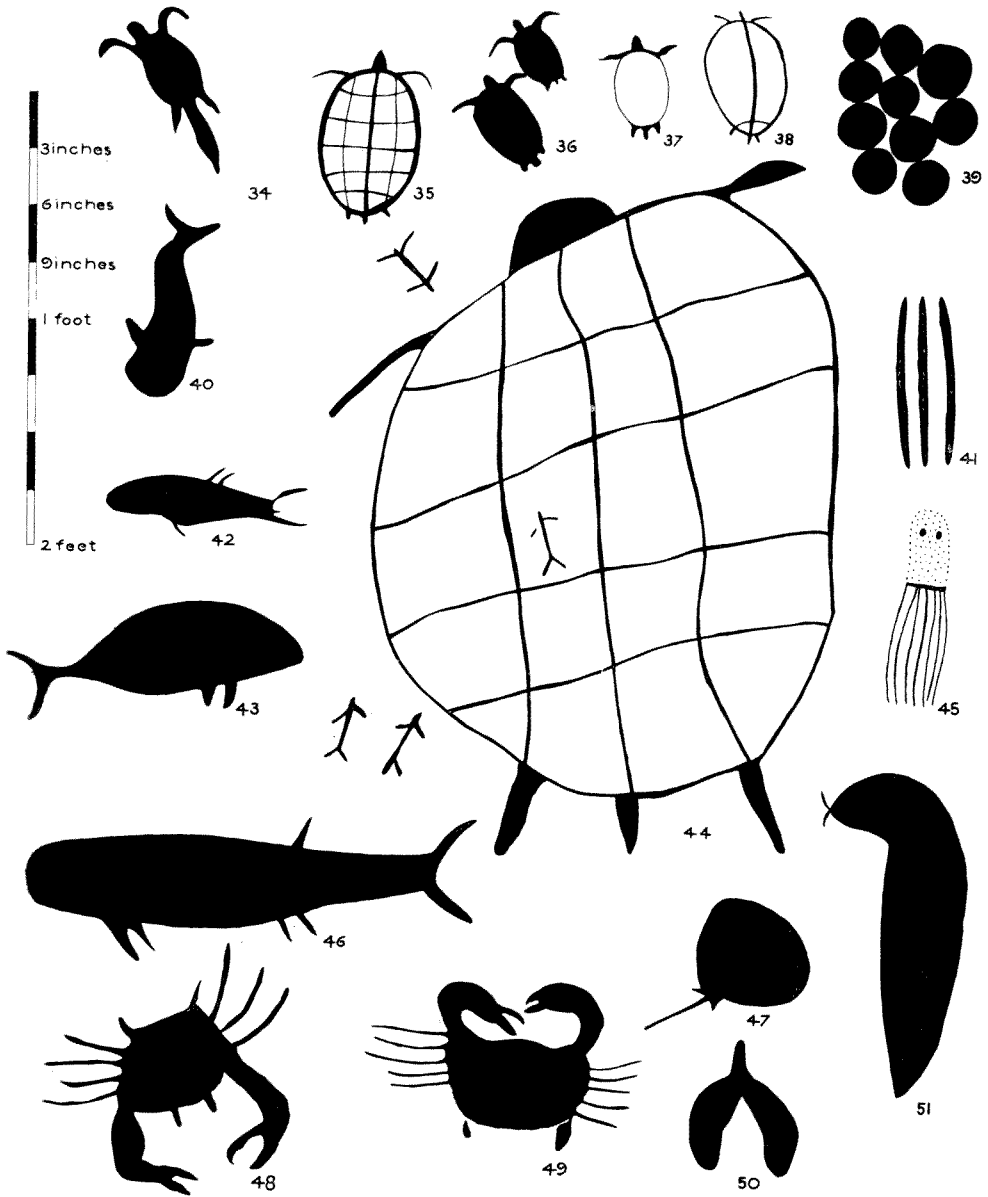
* McCarthy (1962) has shown that this figure is very inaccurate. It was based on a very short survey in 1961.

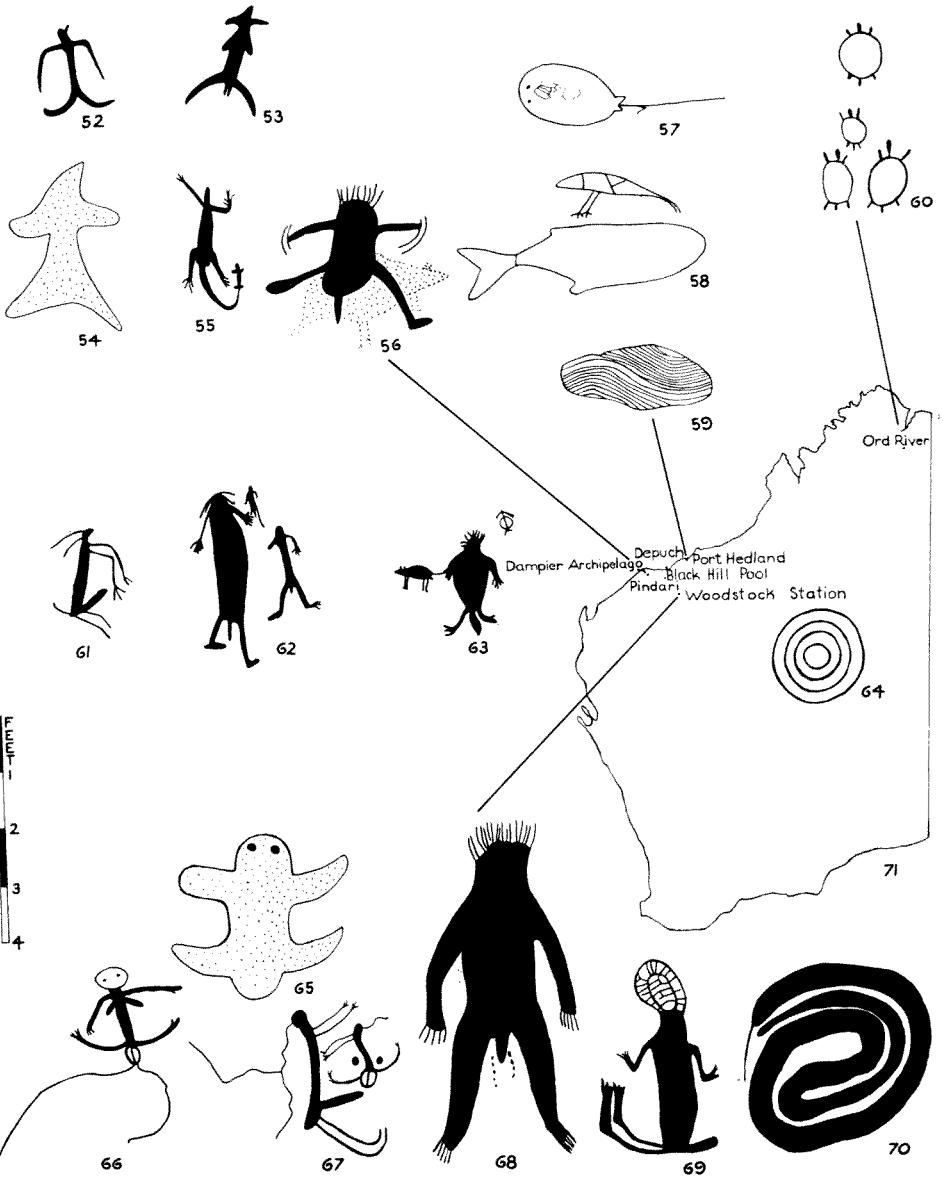
- Fig. 12. Figures, Hunters Pool.
13. Man (or ? lizard), Hunters Pool.
 14. Griffin-like figure, Watering Valley.
 15. Figures copulating, Watering Valley.
 16. Two figures with head-dress or carrying boards, Hunters Pool.
 17. Man sheltering two figures, Hunters Pool.
 18. Pregnant woman, Western Cliffs.
 19. Two herons, Hunters Pool.
 20. Wimbrel, Hunters Pool.
 21. Mangrove Bittern, Hunters Pool.
 22. Wimbrel, Watering Valley.
 23. Wallaby, Hunters Pool.
 24. Dingo and bird, Anchor Hill.
 25. Wallaby, Hunters Pool.
 26. *Kadaicha* shoes, North Point.
 27. Lizard, Hunters Pool.
 28. Concentric circles, Anchor Hill.
 29. Snake, Jane Creek.
 30. ? Head-dress, Hunters Pool.
 31. Engraving tool, Watering Valley.
 32. Flake from excavation, Hunters Pool.
 33. Worked blade, Beagle Beach.
 34. Turtle, Anchor Hill.
 35. Turtle, Anchor Hill.
 36. Turtles pecked-in, Anchor Hill.
 37. Turtle ? unfinished, Anchor Hill.
 38. Turtle, Anchor Hill.
 39. Turtle eggs, Anchor Hill.
 40. Whale, Anchor Hill.
 41. Turtle tracks, Anchor Hill.
 42. Shark, Hunters Pool.
 43. Mackerel, Anchor Hill.
 44. Giant turtle and stick-figures, Skipjack Cliffs.
 45. Octopus, Skipjack Cliffs.
 46. Whale, Skipjack Cliffs.
 47. Stingray, Anchor Hill.
 48. Swimming crab, Hunters Pool.
 49. Mangrove crab, Watering Valley.
 50. Stingray liver, Hunters Pool.
 51. Sea-cucumber, Skipjack Cliffs.
 52. Man, Pindari.
 53. Woman, Pindari.
 54. Ghost-like figures, Pindari.
 55. ? Copulation scene, Pindari.

- Fig. 56. Large man superimposed on kangaroo, Pindari.
57. Stingray, Port Hedland.
 58. Bird and whale, Port Hedland.
 59. Shield, Port Hedland.
 60. Tortoises, Ord River.
 61. Man, Black Hill Pool.
 62. Group of human figures, Black Hill Pool.
 63. Group of figures, Black Hill Pool.
 64. Concentric circle, North Pool.
 65. Ghost-like figures, Woodstock Station.
 66. Woman, Woodstock Station.
 67. Man and woman, Woodstock Station.
 68. Giant figure, Woodstock Station.
 69. Man, Woodstock Station.
 70. Snake, Woodstock Station.
 71. Map of Western Australia showing localities mentioned in this section.
 72. Plan of northern end of Hunters Pool showing area excavated and two sections of the excavation.

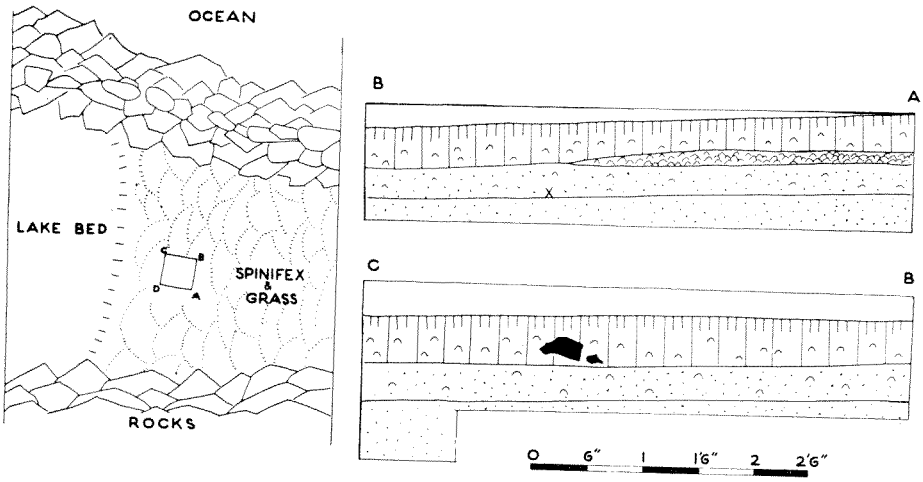








HUNTERS POOL EXCAVATION



SOIL & CHARCOAL
 SHELL
 SAND
 ROCK
 X SKELETON

72

The Problem of Interpretation and the Significance of the Engravings of Depuch Island

BY

R. M. BERNDT.

On May 26th, 1962, I visited Depuch Island and, with my wife, Dr. C. H. Berndt, and Mr. Ian Crawford, made a brief inspection of the engravings within the Beagle Beach area, at both Skipjack Cliffs and Anchor Hill. Although this was merely a cursory inspection, it was enough to convince me of the importance of these sites, and of the variety both of subject matter and of art styles. While a number of the engravings I saw were familiar to me, as they were similar in design to examples of Aboriginal art I had seen elsewhere (particularly in the Kimberleys), I was naturally reluctant to guess at their meanings. In my own view, this would be permissible only after all other available channels through which information concerning them could be obtained had been exhausted.

Obviously, one would assume that the most rewarding way would be to explore what could be offered by Aborigines now resident in Roebourne and Port Hedland or thereabouts. This would apply particularly to the older people; they might reasonably well be expected to possess some first-hand knowledge of those who originally lived on and owned Depuch Island. The second, less reliable, way would be to compare designs at Depuch with those we know something about in other areas and, through this form of comparison, to suggest possible meanings of the subjects they treat. A procedure even less reliable would be to get local Roebourne and Port Hedland Aborigines to examine the designs and ask them to make guesses on the basis of their own experience—in much the same way as I could do myself, but in this case relying on their (ideally) deeper knowledge of local traditions.

In this particular instance, my work consisted of coming to a decision as to what should be done to preserve the Depuch engravings: and my comments here are incorporated in the final list of recommendations made generally in this Report. The other facet of my work was to make enquiries among local Aborigines in order to see if any of them had first-hand or indirect knowledge of these engravings.

My enquiries produced very little information. At Port Hedland I could find no one who professed knowledge of them, although several men had heard about them. At Roebourne, Bob Chanside (whose Aboriginal name is Bararulu), a Ngaluma man of the *banaga* section, claimed to know a little about them. On closer enquiry it turned out that he knew very little indeed. The inference has been that Ngaluma people would be in a position to discuss the significance of the Depuch engravings. According to McCarthy (1961, p. 123), Ngaluma "is virtually extinct today," but this is not entirely so; there are still a number of Aborigines who claim to belong to this tribe and who speak Ngaluma. For most of this area, however, traditional Aboriginal life has been almost supplanted by what passes for Australian-European—or what is now called, by some, "cowboy cul-

ture." The fact that Ngaluma, Indjibandi, Njangomada, and Madudunara (to name four local languages) are still spoken is no guide to the retention of traditional knowledge.

Depuch Island, which is easily accessible from the mainland, was called Womala by the Ngaluma. McCarthy (1961, p. 121) notes that it was called Womalantha. I was told that Depuch, as well as all the coastal area toward Onslow, originally belonged to the Madudunara. Around Roebourne and further inland the Ngaluma territory extended, linking with the Kariera to the north and north-east. Tindale (1940) gives a slightly different positioning for the Madudunara. However, I prefer to rely on my Aboriginal informants' comments in this respect, recognizing that the more inland Indjibandi were drawn into the coastal area soon after European settlement in this region.

Depuch and the surrounding coastal region were (and are) rich in sea foods and, so I was told, were used for seasonal hunting and fishing. But, more importantly, the Island possessed sacred sites, where these engravings are now located. These sites were increase centres, containing—so it was said—the spiritual essence of the natural species that were depicted. Some of these engravings are known as *bugaridjalgu* in Ngaluma (or *gabugari* in Indjibandi), or "Dreaming"; that is, they relate to the Creative or Formative era when the world was made, and are associated with the eternal spirit, ancestral, as well as mythical, beings. And some of these, together with their adventures, are recorded on the rock facings. Some, therefore, were suggested to be "very ancient" indeed, belonging to what the Aborigines would regard as "the beginning of things." However, all we can infer from such information is that they were, in all probability, mostly engraved before first European contact. Unless archaeological information is forthcoming to enable us to state specifically what their age might be, we cannot hazard a guess. However, some of these engravings were evidently done in recent times.

I said before that such sites were increase centres, or records of the mythical beings enshrined in local Aboriginal religion. The usual way to release the spiritual essence for the increase of natural species would be to retouch or partially to re-engage, either in part or in whole, a particular figure; or, alternatively, to repeat a design. (This would explain the duplication of designs. It would also underline the difficulty of gauging the age of an engraving, especially when retouching is practised). Novices would be brought to such sites to inspect and to receive instruction about the meanings of the designs. Ceremonies too would be held on the beach, the abundance of food providing an ideal situation for that purpose. Chan-side mentioned that it was formerly possible to walk across the mud-banks to Depuch.

Regarding the large number of such engravings on this Island (see I. Crawford's discussion), it should be remembered that the maximum population of the Madudunara, at any one time, would be only approximately 400 persons (adults and children of both sexes) at the outside; that it is extremely unlikely that any more than the members of three or four hordes would be present at one seasonal collection (possibly a maximum of 150 to 200, adults and children of both sexes); that increase rituals would be performed only once a year (at the most) for any particular natural species; and that only fully initiated men would be in a position to carry out the task of engraving (at any one time possibly no more than 30 to 40,

probably fewer, would be available). In my view, many years would have had to elapse before such a large number of engravings as are now available could be made.

In my opinion, too, a certain amount of information about these engravings and their subject matter could be obtained from the local Aborigines within this broad area if a social anthropologist were prepared to spend a period in systematic and concentrated fieldwork among them. This would take at least six months, or more, and the research would have to be focused on the surviving elements of traditional Aboriginal life. Although the Aboriginal culture has been considerably modified, and so much of it has disappeared, it would still be possible to recapture from the old people at least a sketchy picture of what it was like. But this work would have to be done almost at once; in another five years it will have virtually disappeared.

I was told that two Madudunara men, Willy Cooper, Galiguru, a *garimara* section "half-caste," and Mibun, a full-blood, of the *banaga* section (also called Bidjandjaga, after an island out at sea near the entrance to Sherlock River, where he was born) might know something of Depuch. But only a full-scale social anthropological research project, in which all Madudunara and Ngaluma people were contacted, would provide at least some of the information we are seeking.

During my discussion with Bob Chanside, Bararulu, we went through McCarthy's (1961) article on Depuch. He identified the following:

McCarthy's
Numbering

- | | |
|-----------|---|
| 36 | dancing men, in sacred ceremony |
| 42 and 44 | fighting, with spears, boomerang, and shield |
| 65 | dancing figures |
| 72 and 73 | carrying swags on head |
| (41-85 | human figures said to represent "all men and women when the world was made") |
| 243 | yams growing |
| 268 | stone axes |
| 275 | men standing around a fire |
| 298 | turtle |
| 303 | ancestral man with head-dress |
| 304 | female ancestress (with genitalia) |
| 305 | two dancers or actors, facing each other, in sacred ceremony |
| 307 | dancing man in ceremony |
| 308 | man with stingray |
| 309 | ceremonial emblems |
| 311 | <i>banguana</i> head-dress |
| 312 | <i>magunda</i> barbed spear used in fighting |
| 313 | man with ceremonial head-dress—whittled sticks with shavings |
| 317 | <i>nugu</i> stars (Mars ?), with <i>nagarara</i> , short-tailed lizard, and <i>biguda djina</i> (kangaroo tracks) |

| | |
|-----|--|
| 321 | ancestral being, with large penis |
| 322 | man spearing <i>biguda</i> kangaroo |
| 324 | crab, and men spearing it |
| 326 | man carrying sacred emblem on head |
| 327 | spearing kangaroo and emu |
| 328 | large and small fish |
| 329 | men around sacred "ring" place (<i>bundur</i>) |
| 330 | snake |
| 331 | lizards and vulva symbol |
| 333 | goanna |
| 334 | fish |
| 335 | boomerang |
| 336 | fish |
| 337 | scorpion |

In conclusion, therefore, I must report that at present very little is known of these Australian Aboriginal engravings. We know (in general terms) by whom they were made, but not when. A number of the figures themselves are naturalistic and can be identified quite easily: but we do not know the context in which they were made, and why. The evidence suggests that the majority were engraved for ritual purposes—magically to cause the natural species to propagate and increase, to ensure that they continued to appear seasonally in a regular way. The number of scenes depicting copulation suggests this particular theme. Nevertheless, although this explains the function of the majority of such engravings, it does not provide us with the detailed meanings which a social anthropologist would look for. For instance, nearly all the engravings would most certainly have connected with them stories and/or myths. This would be the case, particularly, with many of the scenes containing human figures and those wearing ritual head-dresses and emblems. This is the kind of information which it is important to have, but would be extremely difficult to obtain today. Whatever we could get now would only indicate in outline what these myths might be. It is possible too that many of the scenes, especially those referring to fighting, represent contemporary events (that is, contemporary at the time of their being engraved). In other words, these may have no ritual significance at all, and may have been used to illustrate a non-mythical story. (This was common, for instance, in the western Arnhem Land area.)

The most intriguing question is, however, how so many engravings were made by a people who, generally speaking, had little leisure time. A reasonable explanation is the one already mentioned—that the majority were made for ritual purposes: that duplication or design repetition was itself a necessary feature of the ritual. I would not expect the engravings (even the rather poor ones) to be made simply to while away an idle hour.

The sites on Depuch Island are of vital importance anthropologically, and as many as possible must be preserved. The immediate problems of commercial undertaking should not be permitted to override the long-range view of protecting this unique national monument.

The Flora of Depuch Island

BY

R. D. ROYCE

The general character of the vegetation of Depuch Island is similar to that of the adjoining mainland districts. None of the plants collected differs to any extent from those of the mainland populations, and there are no known endemic species. All of the plants which have been listed for the Island flora, as a result of this visit, are recorded from the Pilbara District, and the Island is, in fact, an integral part of that area, with no specific floral character of its own.

At the time of the visit of this party, most of the summer flowering species of plants had already set seed, while many of the later flowering plants had not yet commenced to bloom. Approximately half of the plant species on the Island were collected in flower, and of the rest, some could be recognised in the vegetative condition, while others must for the present remain unnamed.

The collection made by this party is the second to be gathered on the Island. Although several botanists have visited the north-west coast and adjacent islands, only Surgeon Bynoe of H.M.S. Beagle had collected from Depuch. He made a collection of 17 plants which were written up by Bentham in the *Flora Australiensis* (1863-1878). Eleven of these were found again on the Island during the visit of this expedition.

The Island consists very largely of barren piles of rock on which no vegetation is able to survive, save a few species of encrusting lichens. There are, however, certain areas where soil has developed as a result of the weathering of the rocks, and it is in this environment that the vegetation has become established.

The soil types represented on the Island are three in number. These are the white sands of the beach dunes, the red soils of the interior, and the limestone soils derived from deposits of caliche. Each of these soil types supports a characteristic vegetation.

(1) THE VEGETATION OF THE BEACH DUNES.

Wide beaches have been formed at three points on the eastern end of the Island. Here the three large streams drain the central valleys and empty into the sea, and each has formed a sandy beach at its mouth. The creek in Watering Valley is the largest of these streams. It discharges at the northern end of Beagle Beach which is nearly one mile in length; here the beach dunes are of considerable width. The other bays, one to the south and the other to the north of Beagle Beach, are smaller in extent, but both contain broad sandy beaches backed by a certain development of dunes.

On the seaward front of these beaches are scattered clumps of *Spinifex* and *Salsola* with *Triodia* providing the main cover over the low dunes as far back as the rock face. Amongst the *Triodia* are low shrubby species such as *Indigofera enneaphylla*, *Cleome*, *Trichodesma* and *Euphorbia* spp., as well as prostrate plants such as *Tribulus* and *Boerhaavia*.

Larger shrubby species such as *Carissa*, *Adriana* and *Acacia bivenosa* are common, particularly in the depressions while the most noteworthy trees are *Eucalyptus microtheca*, *E. dichromophloia*, *Ficus* and *Clerodendron*.

(2) VEGETATION OF THE RED SOILS.

Red sandy-loam soils have developed in many of the valleys between the rocky hills. Some of these areas are a few square yards in extent, while others (particularly one to the north-east of Watering Valley), cover many acres. For the most part, the soils of both the smaller areas and the edges of the larger valleys are stony or pebbly in nature and only in the centre of the plains is the soil free of stone.

Triodia is the dominant plant throughout the red soils, and forms an almost complete cover. Associated with it are *Indigofera monophylla*, *Crotalaria*, *Stemodia* and many other shrubs, together with *Mallotus*, *Notoxylonon*, *Grevillea* and several species of *Acacia*.

(3) VEGETATION OF THE LIMESTONE SOILS.

Deposits of caliche are evident in many places throughout the Island. They have formed on the tops and sides of the rock piles, and are a striking feature of the seaward cliffs. Here they occur as isolated patches or as long bands running the full length of the rocky cliffs.

In the centre of the Island, one of the tributaries of the Watering Valley has cut a 5 foot deep channel through one caliche deposit, while a 15 foot cliff of the same material can be seen on the northern stream not far from its mouth.

The most characteristic plants on these areas are *Capparis*, *Jasminum* and *Phyllanthus reticulatus* var. *glaber*. Other species are *Trichinium*, *Phyllanthus maderaspatensis* and several species of *Acacia*.

LIST OF PLANTS RECORDED FROM DEPUCH ISLAND

The species are here listed in systematic order according to the Engler and Prantl system as set out for the Western Australian flora by Gardner (1930).

Naturalised species are indicated by an asterisk, while those which were neither flowering nor seeding at the time of the visit, are prefixed with a †. These species were identified by comparing the specimens with sheets in the collections of the Western Australian Herbarium.

The species gathered by Surgeon Bynoe and recorded in the Flora Australiensis are indicated by ‡.

GRAMINEAE

Triodia

pungens, R.Br. Over the greater part of the Island. On the beach sand the plants are small and stunted with small few-flowered spikelets.

Spinifex

longifolius, R.Br. On foredunes along the beaches.

**Cenchrus*

pennisetiformis, Hochst. et Steud. On beach dunes.

Cymbopogon

exaltatus, (R.Br.) Domin. Among rocks, particularly along water-courses.

CYPERACEAE

Cyperus

vaginatus, R.Br. In sandy watercourse among *Euc. microtheca*.

Mariscus

cunninghamii, C. B. Clarke. Among rocks in Watering Valley.

MORACEAE

Ficus

puberula, A. Cunn. Along the base of rock piles and in water-courses.

PROTEACEAE

Grevillea

pyramidalis, A. Cunn. In red soils of the broad valleys.

CHENOPODIACEAE

†*Arthrocnemum*

leiostachyum, (Benth.) O. Paulsen. On salty flat near mouth of northern creek.

†*Salsola*

kali, Linn. On beaches.

AMARANTACEAE

Trichinium

†*obovatum*, Gaud. On the limestone and red soils.

†*obovatum*, Gaud. var. *grandiflorum*, Benth. On limestone soils.

‡*exaltatum*, Benth. Not seen by this expedition.

‡*Gomphrena*

canescens, R.Br. Not seen by this expedition.

**Aerva*

javanica, Juss. On beach dunes.

NYCTAGINACEAE

Boerhaavia

diffusa, Linn. Widely occurring in beach sand and red soil of the interior.

FICOIDACEAE

‡*Mollugo*

molluginis, (F. Muell.) Druce. Recorded as *M. trigastrotheca*,
F. Muell. Not seen by members of the expedition.

PORTULACACEAE

Calandrinia

sp. Specimens fruiting. In red soil. Not common.

LAURACEAE

†*Cassytha*

glabella, R.Br. On *Triodia*. Not common.

CAPPARIDACEAE

Cleome

viscosa, Linn. Common throughout the Island.

Capparis

nummularia, R.Br. (formerly included under *C. spinosa*). On
limestone soils and amongst rocks.

‡*umbonata*, Lindl. Not seen by members of this expedition.

MIMOSACEAE

Acacia

‡*bivenosa*, D.C. Widely distributed in red soils.

‡*coriacea*, D.C. Common in red soils and beach sand.

pyrifolia, D.C. Common in red soils. Occurs in green and
glaucous forms.

†*victoriae*, Benth. On red soils, not common.

xylocarpa, A. Cunn. In smaller valleys in red sand. Principally
in western half of Island.

CAESALPINIACEAE

Cassia

glutinosa, D.C. In red soils.

‡*desolata*, F. Muell. In red soil. Not common.

PAPILIONACEAE

Crotalaria

novae-hollandiae, D.C. In red soils, scattered throughout.

Indigofera

‡*enneaphylla*, Linn. In beach dunes.

trita, Linn. In red soils. Uncommon.

‡*monophylla*, D.C. Common in red soils.

Psoralea

†*leucantha*, F. Muell. A form with large crowded bright green leaves and large stipules. In red soil. Not common.

Sesbania

aculeata, Pers. In beach sand near mouth of Watering Valley.

‡*Swainsona*

occidentalis, F. Muell. Not seen by members of this expedition.

Rhynchosia

minima, D.C. In red soil. Not common.

ZYGOPHYLLACEAE

Tribulus

occidentalis, R.Br. On beach dunes.

EUPHORBIACEAE

Securinega

virosa, (Willd.) Pax. et. Hoffm. In red soil. Not common.

Phyllanthus

reticulatus, Poir. var. *glaber*, Muell. Arg. In both limestone and red soils. Common.

maderaspatensis, Linn. In limestone soils. Not common.

Mallotus

nesophilus, F. Muell. Common in red soils and among rocks.

‡*Adriana*

tomentosa, Gaud. In coastal sands.

Euphorbia

atoto, Forst. In beach sands. Not common.

australis, Boiss. In coastal sands.

‡*myrtoides*, Boiss. Not seen by members of this expedition.

careyi, F. Muell. In red soil. Not common.

SAPINDACEAE

†*Atalaya*

hemiglauca, (F. Muell.) Benth. In beach dunes near mouth of Watering Valley.

Heterodendron

oleifolium, Desf. In red sand. Not common.

MALVACEAE

Sida

corrugata, Lindl. On limestone and red soils. Not common.

Notoxylon

australe, (F. Muell.) Lewton. Common in red soils.

STERCULIACEAE

Brachychiton

australe, (Schott.) Terr. Single specimen in Watering Valley among rocks.

COMBRETACEAE

†*Terminalia*

circumalata, F. Muell. Common in red soil and on beach dunes.

MYRTACEAE

Eucalyptus

microtheca, F. Muell. In bed of watercourses.

dichromophloia, F. Muell. In coastal dunes and stony red soil.

Bentham recorded this species as *Eucalyptus pyrophora* Benth.

UMBELLIFERAE

†*Didiscus*

hemicarpus, Benth. In Watering Valley. Not common.

OLEACEAE

Jasminum

lineare, R.Br. Common in limestone soils.

APOCYNACEAE

†*Carissa*

lanceolata, R.Br. In beach dunes.

CONVOLVULACEAE

†*Ipomoea*

pes-caprae, (L.) Roth. On rocky beach. Not common.

BORAGINACEAE

†*Ehretia*

saligna, R.Br. In red soils. Not common.

Trichodesma

zeylanicum, (Linn.) R.Br. Common in red soils and beach dunes.

VERBENACEAE

‡*Clerodendron*

lanceolatum, F. Muell. Common on beach dunes, and occasionally in red soils.

†*Avicennia*

marina, (Forsk.) Vierh. On rocky shore. Not common.

SOLANACEAE

Solanum

cataphractum, (A. Cunn.) Benth. In stony creek bed. Not common.

‡*horridum*, Dun. In limestone soil and beach sand. Not common.

SCROPHULARIACEAE

Stemodia

viscosa, Roxb. Common along small watercourses in red soil plains.

MYOPORACEAE

Myoporum

acuminatum, R.Br. var. *angustifolium*, Benth. Bed of Watering Valley. Not common.

GOODENIACEAE

Scaevola

spinescens, R.Br. In red soil. Not common.

‡*cunninghamii*, D.C. var. *hispida*, Benth. Not seen by members of this expedition.

COMPOSITAE

Pluchea

rubelliflora, (F. Muell.) Druce. Form with white flowers. In sandy soil near mouth of Watering Valley.

squarrosa, Benth. In red soil. Not common.

Pterigeron

decurrens, (D.C.) Benth. In sandy bed of Watering Valley.

Pterocaulon

sphaeranthoides, (D.C.) F. Muell. Common in red soil along watercourses.

The Mammals of Depuch Island

BY

W. D. L. RIDE.

Two species of mammal have been recorded in earlier literature as occurring on Depuch. These are the dog, which was reported by Ronsard (Péron 1807, p. 131), and a rock-wallaby (recorded as a small kangaroo by Péron, and as *Petrogale lateralis* by Stokes 1846, p. 176). In addition to these records by Europeans, various terrestrial and marine mammals are depicted upon the rocks of the Island by the Aborigines, but it is not known whether the species so represented actually occurred there (see Crawford in this report).

DINGO, NATIVE DOG

Canis familiaris dingo Meyer, 1793.

There has been no report of the Dingo on the Island since Ronsard saw one and McCarthy (1961) has recently thrown doubt upon this early record ("Both were probably rock-wallabies" McCarthy p. 121 footnote). However, as Péron says, there is every reason why a dog might be expected on the Island.

Dingoes are numerous in the Pilbara and are particularly common in rocky places. Moreover, dogs are known to have been domesticated by natives in the North-west before the advent of the European (see A. C. and F. T. Gregory 1844, p. 42) and they would certainly have accompanied parties to the Island.

RED FOX

Vulpes vulpes (Linnaeus), 1758.

The fox first became obvious in the Roebourne District in 1930 (first bounties paid) and is now widespread. It is now well established on Depuch and is clearly a permanent member of the modern fauna. We obtained no specimens but tracks of foxes are numerous; deserted earths occur in the sandhills behind Beagle Beach; fox droppings containing fur, bone fragments, and arthropod remains are common; and the remains of rock-wallabies that had clearly been eaten by a carnivore were to be found in many of the valleys near fresh water and behind the beaches.

In spite of the apparent plentifulness of foxes, none were seen by members of the party. This is probably because the noise produced by walking over the loose dolerite rocks makes it very difficult to move quietly about on the Island; no special attempt to shoot foxes at night was made because of the hazards of movement in darkness. As is the habit of foxes, their tracks showed that they paid frequent visits to the beach and one individual even came to the refuse pit in the kitchen area.

The fox is clearly an important factor in the environment of the rock-wallabies; however, there is no evidence that the existence of the population is threatened by its presence.

WATER RAT

Hydromys chrysogaster caurinus Thomas, 1909.

No water rat has ever been recorded from Western Australia between the Moore River at Moora and Napier Broome Bay at Kalumburu. Therefore a specimen of *Hydromys* which Crawford found at Hunters Pool after the zoologists had left the Island is remarkable. It comprises a skull and mandible of a fairly recently-dead animal.

Among Western Australian *Hydromys*, *H. c. caurinus* of the Kimberley is easily distinguished from *H. c. fuliginosus* of the South-west by its pale buffy coloration, and sufficient remains of the fur on the head of the Depuch specimen to make its identification as *H. c. caurinus* certain. Only one specimen of *caurinus* is available in the Western Australian Museum and it is not possible to show whether it can be invariably separated from *fuliginosus* by dental characters. However, the length of the second upper molar (greatest measurement along lingual surface) of both the Depuch specimen and the other in the collection fall below the observed range of *fuliginosus* (*fuliginosus*, M² mm., range 2.7-3.1, mean 2.85 ± .026, n 16; *caurinus*, M² mm., Kalumburu 2.4, Depuch 2.3).

Tate (1951, p. 232, Fig. 1 as *H. c. beccarii*) maps the range of *caurinus* in the West as including Dampier Land and the Fitzroy River. I know of no material other than the Depuch specimen from south of Kalumburu. The holotype is from Parry's Creek near Wyndham.

BATS

Small unidentified microchiropterans were seen in flight in Watering Valley and around Beagle Beach but none was captured. Bats are common in the Pilbara, especially where there are caves and rock crevices.

DUGONG (Pl. 22)

Dugong dugon (Müller), 1776.

Several Dugongs were seen in the waters around the Island, and Penrose obtained a remarkable photograph of one from the western cliffs.

MARLOO, RED KANGAROO, OR PLAINEY

Macropus rufus (Desmarest), 1822.

A broken cranium, the mandible and parts of skeleton of a Marloo were found on a dune behind the southern end of Beagle Beach. The bones were about twenty feet above the line of driftwood.

While the Marloo is extremely common on the adjacent Roebourne Plain, it is difficult to understand why one of these animals should cross over to this Island which in all respects is utterly unlike the normal Marloo environment of grassy plains. It seems likely that the remains are those of a carcass cast up by the sea.

BLACK-FLANKED ROCK-WALLABY OR WESTERN ROCK-WALLABY

Petrogale lateralis Gould, 1842.

A specimen of this rock-wallaby was collected on the summit of the Island by Commander Stokes in 1840 (Stokes 1846, pp. 175, 6) and stated

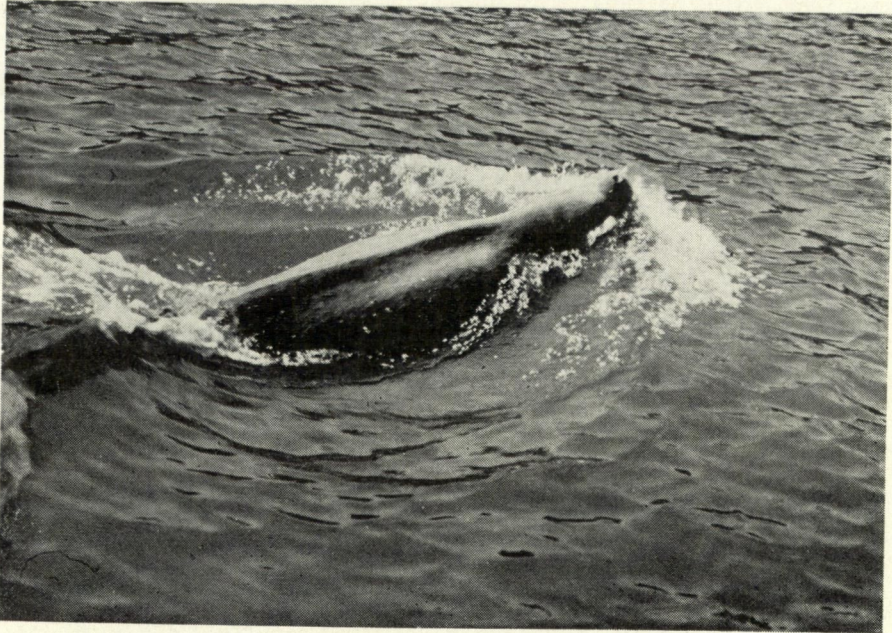


Plate 22. Dugong.

by him to be the same as the species figured as *Petrogale lateralis* by Gould (from a specimen taken at the Swan River). The specimen collected by Stokes is probably that presented by Bynoe, the surgeon of H.M.S. Beagle, to the British Museum and now labelled "42.8.23.2, N.W. Coast Australia" (= Gray 1843, p. 92, *P. lateralis* specimen *b* "West Coast of New Holland," and Thomas 1888, p. 69 specimen *a* "N.W. Coast of Australia").

Judging from the vast quantities of their droppings which lay everywhere among the rocks, the rock-wallabies were plentiful on the Island at the time of our visit, yet very few animals were seen. This was also the experience of Stokes who said: "The kangaroo I had myself the good fortune to knock over on the summit of the Island; it was the only one shot during many an excursion made over that dreary heap of desolation, the metallic sound the rocks yielded to our step giving ample warning of our approach to their quick ears" (p. 175).

One specimen only was collected by us. It was shot feeding among the rocks at night on the edge of Anchor Hill. This (WAM 5065) was an adult female with male pouch-young. The measurements of the adult were: weight 3,000 g., total length 920 cm., tail 460 cm., hind foot 13.0 cm., ear 5.5 cm. All teeth were fully erupted. The joey was furless, eyes closed, unable to squeak, without sense of balance, weight 27 g., total length 150 cm. (to nearest cm.), hind foot 2.9 cm., pinna of ear pigmented but folded down, second upper and lower incisors just visible through the skin. The joey was preserved entire, the adult was preserved as a skin, skull, and preserved carcass.

The Black-flanked Rock-wallaby is one of the most strikingly coloured of our native animals. It is a beautiful dark grey with dark, almost black,

flanks which are made the more obvious by the presence of a large angular patch of white (or light fawn-colour) between the black and the grey of the sides. This white patch extends from the shoulders nearly to the hips. The face is also prettily coloured with a white check-stripe which runs from the muzzle backwards below the eyes. The middle dorsal line of the back is marked by a streak of black extending onto the tail which terminates in a black brush. The feet are black and well furred and the animals move with great agility, seeming more like cats or monkeys than wallabies.

The confirmation of Stokes' identification of the Depuch rock-wallaby as *Petrogale lateralis* is important for zoogeographical and taxonomic reasons. Depuch must clearly be considered a part of the modern Pilbara mainland yet, except for this population, *Petrogale lateralis* is not known to occur between the Ashburton and De Grey Rivers on the mainland; this area and the Dampier Archipelago are known to be inhabited by Rothchild's rock-wallaby. This Depuch population is thus of great interest and clearly warrants preservation.

Today, rock-wallabies seem to be present on the Island in large numbers and it seems that foxes have not been successful in reducing the population to a low level. However, there are obvious signs of predation both by foxes and birds of prey and we cannot be at all certain that the relatively recent introduction of the fox will not have some long-term effect on the wallaby population. The foxes should thus be removed if at all possible. If human habitation is to occur steps must also be taken to ensure that the wallabies are not shot at or poisoned; and in particular it should be made an offence to keep or release cats on this Island. Providing water is available (as it would be around houses, dock installations, etc.) the cat might be a much more successful predator than the fox in the labyrinth of underground passages which are the wallabies' refuge.

The Reptiles of Depuch Island

BY

G. M. STORR.

Mostly rocky and sparsely vegetated, Depuch is herpetologically sterile compared with the opposite mainland. Only ten species were collected, all of them common Pilbara reptiles. More remarkable than the paucity of species was the general scarcity of individuals. In fact, it was only in the restricted areas of sand and *Triodia* round Beagle Beach that reptiles were at all common; most of the skinks (the dominant family on the Island) were found there. The Green Turtle (*Chelonia mydas*) was commonly observed offshore. No frogs were found on the Island, despite suitable conditions for them in Watering Valley.

Gehyra punctata (Fry). This rock-inhabiting gecko was probably more plentiful than the single specimen collected would suggest.

Heteronota bynoei Gray. Two specimens of this widely distributed gecko were obtained in the dunes of Beagle Beach.

Amphibolurus caudicinctus (Günther). This rock-loving species was the only Agamid found on the Island. Seven specimens were collected, mainly in the stony bed of Watering Valley.

Sphenomorphus lesueurii (Duméril & Bibron) and *S. ocellatus* (Boulenger). Two each of these widespread skinks were collected among the *Triodia* growing on sand behind Beagle Beach.

Rhodona bipes Fischer. As on the mainland this burrowing skink was abundant in sandy country covered with *Triodia*. Nine specimens were obtained, mostly by burning at night the *Triodia* on the sandy flats behind Beagle Beach.

Ablepharus boutonii (Desjardins). The single specimen collected belonged to the northern race *metallicus* Boulenger; it was feeding in the bed of Watering Valley. Unlike the south-western race *plagiocephalus* (Cocteau), which is almost entirely arboreal, *metallicus* is as often found on rocks as on trees in watercourses.

A. taeniopleurus Peters. This beautiful little snake-eyed skink is common on the Pilbara mainland, but only one was collected on the Island—in *Triodia*, on coastal dunes. I have followed Glauert (1960) in calling this form *taeniopleurus*, although it differs markedly from *ruficaudus* Lucas & Frost, which Loveridge (1934) considered synonymous with *taeniopleurus*.

A. greyii (Gray). One was collected in *Triodia* just above high-water, Beagle Beach.

Liasis perthensis Stull. Two specimens of a small red python were collected: one in the stony bed of Watering Valley; the other was dead in a recently burnt patch of *Triodia*. This species is common on the Pilbara mainland, where it is sympatric with *L. childreni* Gray. Its identification as *perthensis* is doubtful. There is probably another species of python on the Island; for a grey Boa-like snake, about five feet long, was reported by the French party under Ronsard in 1801 (Péron 1807, p. 132) but we saw no trace of it.

The Birds of Depuch Island

BY

G. M. STORR.

As with the reptiles, the number of species and individuals of land-birds was disappointingly small ; and again this was due to the paucity of habitats. Mangroves were restricted to small clumps at the mouth of gullies ; hence the rich avifauna associated with this formation on the mainland coast was all but absent. There were no grassy plains (that is of species other than *Triodia*) ; consequently larks, pipits, quail, and the common grassland parrots, pigeons and finches of the Pilbara were unrepresented on the Island. Woodland and scrub birds were largely confined to the vegetation in gullies. Elsewhere, the bare rock and scanty *Triodia* was virtually uninhabited by birds.

Silver Gull (*Larus novaehollandiae*). Only a few were seen round the Island, the largest flock being five birds on Beagle Beach.

Pied Oystercatcher (*Haematopus ostralegus*). Two pairs inhabited Beagle Beach.

Sooty Oystercatcher (*Haematopus fuliginosus*). A pair, usually observed among the rocks below Anchor Hill, occasionally joined the Pied Oystercatchers on nearby Beagle Beach.

Reef Heron (*Egretta sacra*). A single grey-plumaged bird was seen flying past Anchor Hill.

Little Eagle (*Hieraetus morphnoides*). There was at least one pair, usually observed soaring high over the centre of the Island.

White-breasted Sea-eagle (*Haliaeetus leucogaster*). A pair that flew over the ridge behind the camp were promptly attacked by the Anchor Hill Ospreys.

Red-backed Sea-eagle (*Haliaeetus indus*). Three were seen flying over the centre of the Island.

Peregrine Falcon (*Falco peregrinus*). One was observed chasing a Little Eagle over the ridge behind our camp at Beagle Beach.

Kestrel (*Falco cenchroides*). One was captured after it became entangled in the resinous foliage of a *Triodia*.

Osprey (*Pandion haliaetus*). There were at least two pairs in the Beagle Beach area ; one had its nest on Anchor Hill, which, though empty, was often visited by the birds. The other pair's nest was near North Point.

Boobook Owl (*Ninox novaeseelandiae*). One was flushed in the day-time from a River Gum (*Eucalyptus camaldulensis*), one of several growing in the main north-bank tributary of Watering Valley.

Budgerigah (*Melopsittacus undulatus*). A single bird flying back and forth one day had apparently strayed from the mainland.

Owlet-nightjar (*Aegotheles cristatus*). One was collected among rocks near the centre of the Island near the head of a narrow gorge which reaches the coast to the west of Wreck Point.

- Red-backed Kingfisher (*Halcyon pyrrhopygia*). There was a pair in the scrub at the mouth of Watering Valley ; occasionally they visited a small patch of mangroves nearby.
- Welcome Swallow (*Hirundo neoxena*). A single bird was seen with a flock of Little Wood-swallows at the mouth of Watering Valley.
- Grey Fantail (*Rhipidura fuliginosa*). Two were seen in the bloodwood savannah towards the source of Watering Valley.
- Willie Wagtail (*Rhipidura leucophrys*). There was a pair in the scrub at the mouth of Watering Valley, and another among bloodwoods in the small valley south-east of the camp.
- Rufous Whistler (*Pachycephala rufiventris*). A few were observed in Watering Valley. A female was collected.
- Black-faced Cuckoo-shrike (*Coracina novaehollandiae*). A pair occasionally visited the scrub at the mouth of Watering Valley.
- Little Wood-swallow (*Artamus minor*). A flock of eight inhabited the lower part of Watering Valley ; at night they clung in a compact group to the wall of the gorge.
- Painted Finch (*Emblema picta*). During the visit of the "Beagle," Bynoe shot one of these beautiful finches : it subsequently became the basis of Gould's description of the species. We did not observe any.
- Red-tipped Pardalote (*Pardalotus substriatus*). One was collected out of a flock of eight that settled in the bloodwoods south-east of the camp.
- Yellow Silver-eye (*Zosterops lutea*). There was a flock of about fifty in the flowering bloodwoods growing in the broad upper part of Watering Valley. Smaller flocks were observed elsewhere, notably in a patch of *Ficus platypoda*. Seven were collected from a flock in trees behind the camp (all specimens collected were males).
- Singing Honeyeater (*Meliphaga virescens*). Widely distributed in scrub and woodland. A male was collected.
- Grey-headed Honeyeater (*Meliphaga keartlandi*). Fairly plentiful in bloodwood savannah towards the source of Watering Valley. Two were collected.
- Crow (*Corvus ceciliae*). There were usually four high up on the ridge behind our camp, to which they would descend when it was deserted.
- Pied Butcher-bird (*Cracticus nigrogularis*). They spent much of their time singing in isolated shrubs high up on hills, occasionally descending to feed in gullies and on coastal dunes.

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APPENDIX

GEOLOGICAL SURVEY OF WESTERN AUSTRALIA

PETROLOGIST'S REPORT No. 59

BY A. F. TRENDALL

EXAMINATION OF ROCKS WITH ABORIGINAL ENGRAVINGS

INTRODUCTION

Six specimens, each with the whole or part of a rough engraving on one of the faces, were received. These were representative of a much larger group of engravings which Mr. Crawford had divided, on the basis of a subjective assessment of the state of weathering, into three groups : "fresh" (group II), "deeply weathered" (group I), and "intermediate" (group III).

In an attempt to assess the depths of pre-engraving weathering of the surfaces used, and to discover whether the limit of weathering was relatively deeper beneath the "deeply weathered" engravings than beneath the "fresh" engravings Mr. Crawford drilled holes to a subjectively judged "limit of easy penetration" with an $\frac{1}{8}$ inch tungsten carbide bit in a hand drill across some of the engravings. The problems which arose from these results led to the specimens being passed to the Survey for cross-sectional diamond sawing, and the preparation of smoothed faces and thin sections for more accurate assessment of the weathering.

In the following report the data for each specimen are first tabulated ; the fresh rock is then described, then the weathering, and finally the relationship of the engravings to the weathering is discussed.

TABLE 1
Details of Specimens with Engravings

| Specimen No. | Approximate Shape and Size (inches) | Engraving | Holes Drilled | Cuts Made | Thin Sections Made | Weathering Group |
|--------------|--|---|-------------------------------------|--|-------------------------|------------------|
| 14916 | Irregular block 5 x 6 x 4 All surfaces weathered | Figure with boomerang | None | 1—across legs of figure | 1—across legs of figure | Fresh |
| 14917 | Irregular thick plate 9 x 6 x 4 One freshly broken surface | Front paw mark of kangaroo | 3—1 in engraving and 1 on each side | 1—through holes | 1—through engraving | Intermediate |
| 14918 | Elongate rectangular block 17 x 6 x 4 All surfaces weathered | Figure with head-dress | 3—across waist of figure | 3—1 through holes and 1 at each end of block | None | Intermediate |
| 14921 | Blunt wedge 2 x 2 x 2 Two fresh faces—broken from larger piece | Not recognisable—single groove only present | 2—1 in groove and 1 out of it | 1—through holes | None | Deeply weathered |
| 14922 | Flake 6 x 1½ x ½ One surface fresh—chipped from larger piece | Face | 2—1 in groove and 1 out of it | 1—through holes | 1—through engraving | Deeply weathered |
| 15332 | Polyhedral block 12 x 12 x 10 All faces weathered | Turtle | 3—1 in groove and 1 on each side | 2—1 through holes and 1 at opposite end | None | Fresh |

Details of the material are set out in Table 1 below :—

MATERIAL

PETROGRAPHY

Fresh Rock

All the specimens are of dark green massive compact dolerite and are mainly bounded by smoothly curving brown-weathered faces clearly controlled originally by joint planes. Between these surfaces the rock is notably even-grained and homogeneous and partings, cracks or other planes of weakness smaller than the main joints are completely absent.

On the smoothed and varnished faces the rock of specimens 14917, 14918, 14921, 14922 and 15332 cannot be distinguished. In detail the dark green colour of the rock is divisible into irregularly shaped patches, mainly between 2 and 5 mm. across, with an even medium green colour set in a continuous matrix of darker green in which are flecks of pale green and very dark green. Thus four distinguishable shades of green in a closely speckled pattern contribute to the superficially even colour of the rock. It is not possible on the smoothed surface clearly to distinguish crystal form or identity, or original texture of the dolerite. 14916 has a finer-grained appearance caused by abundant pale green spots, less than 1 mm. across, lying in a homogenous dark green matrix. Very dark green spots 1-2 mm. across are irregularly distributed in groups.

The two thin sections (14917, 14922) of the coarser rocks again present a very similar appearance. The medium green material consists of (?) quartz in which roughly equant epidote grains 2-10 μ across are so closely packed that under lower power it appears opaque and effectively isotropic. Needles of (?) tourmaline and small ilmenite flakes are also present. There is a vague directional texture in places which has no clear pattern. The darker matrix differs in that relict random elongate plagioclase laths up to 1 mm. long, now mainly replaced by quartz, chlorite, epidote and sericite, and more equant subhedral pyroxenes completely replaced by epidote and chlorite, are recognisable in a comparatively small amount of interstitial matrix of material similar to that forming the medium green patches. Very rarely a little feldspar remains; this is mainly albite but occasionally, judging by zoning, some labradorite. The very pale spots are leucoxene patches after ilmenites and the darkest spots are individual pyroxenes replaced by dark chlorite. Magnetite octahedra are also thinly distributed through the rock. The rock with a finer-grained appearance, 14916, is more homogeneous in thin section. Laths of saussuritised plagioclase and pyroxene altered to chlorite and epidote lie at random in a similar epidote-filled matrix to the medium green material of the coarser-looking rocks. Small patches of clear quartz are present. The very dark spots noted above are the remains of euhedral pyroxenes replaced by chlorite and coarsely crystalline epidote. No original feldspar appears in this rock but some pyroxene laths have thin rims of (?) pigeonite.

It is a problem in these rocks, and particularly in the apparently coarser ones, how the speckled pattern of colouring is related to the original texture of the rock. The dirty quartz/epidote material could represent original glassy mesostasis or it could simply be an end stage, involving complete destruction of texture, of the deuteric alteration. This is a geological problem not of importance to the immediate problem of the engravings.

The rock is a homogeneous dolerite which has suffered intense deuteric (late hydrothermal) alteration.

The Weathered Zone

It will be shown below that the weathering zone is about 0.1–0.3 inches thick. Macroscopically, on the smoothed and varnished surface the zone can be roughly subdivided into three separate bands: the outermost has a reddish brown colour and the structure of the rock (i.e. the internal pattern of colouring) is almost completely obscured, although the material is still quite compact and hard; further in is a pale brown layer flecked with very dark brown lines; further in again a pale green band with brown lines separates the pale brown layer from the unaffected rock. Returning to the exterior there is a thin surface "skin" over all the three weathering zones of powdery limonite which is inevitably lost on thin sectioning.

The three bands of weathering can be related well in thin section to changes in the various components of the rock, but it is important to note first that texturally the rock is unaffected by weathering and there is no major volume change involved or important internal redistribution of material. The innermost zone, whose internal boundary can be taken as the inward limit of surface weathering effects, is marked by the growth of goethite, from the outside in, in cracks and internally, in the chlorite pseudomorphing pyroxene. This effect continues outwards to the crust with increasing intensity, but the coarsely crystalline epidote within such pyroxene pseudomorphs remains completely unaffected, and presumably finally weathers out as fresh crystals at the surface. The middle, pale, zone is defined by a bleaching of the medium green areas related to the removal of much of the finer epidote—here the enclosing material is recognisably quartz. Further out, in the outer zone, all the remaining epidote inclusions acquire a slight brown stain which is enough to give, macroscopically, an even colouring to the zone, although no important internal changes have occurred. These zones are gradational, and impossible to delineate sharply.

RELATIONSHIP OF WEATHERING TO ENGRAVING

The purpose of this study was basically to determine whether deeper weathering existed beneath engravings, and if so whether older engravings would have relatively deeper weathering than younger ones. To test this the following measurements were made:—

1. For each engraved surface the mean depth of the limit of weathering (internal edge of innermost band; mean of six random measurements) was measured on the immediately adjacent unengraved area.
2. The greatest and least depths (not necessarily those of the six above) were also recorded as an index of the evenness of thickness of the weathered zone.
3. The mean depth of weathering of the engraved area (at its base, ignoring the sloping marginal areas) was measured in a similar way.
4. The cut cross-sectional slab through each engraving was then placed face-down on a sheet of paper and a trace was marked of the surface with a pencil. The smoothed surface of the rock and of the floor of the engraving were then sketched in with a pencil and the approximate mean depth of the engraving was measured.
5. The measurements in "3" and "4" above were then added to obtain the increase in weathered depth since engraving (by subtracting "1").

All these figures are recorded in Table 2. From them the following conclusions may be drawn, with the proviso that the number of specimens involved is small, and the methods unavoidably subjective :—

1. There is no increased weathering beneath engravings. 14916, 14917 and 14918 show exactly the same depth of weathering and 14921, 14922 and 15332 show a slightly less depth beneath the engravings. Errors of observation and original variation in weathering depth could be expected to give departures of this magnitude.
2. There seems to be a correlation between subjectively judged age of engraving and depth of weathering. The two "newest" engravings are on the least deeply weathered surfaces and the two "oldest" are weathered 3- to 4 times as deeply. 14917, an "intermediate" engraving, is anomalous here in being most deeply weathered, but 14918, the other "intermediate" is also intermediate in depth of weathering.

TABLE 2
Weathering Depths of Engraved Surfaces (all in inches)

| Specimen No. | Outside Engraving | | | Within Engraving | | |
|--------------|-----------------------|--------------------------|--------------------------|-----------------------|--------------------------------|------------------------------------|
| | Mean Weathering Depth | Maximum Weathering Depth | Minimum Weathering Depth | Mean Weathering Depth | Estimated Mean Engraving Depth | Engraving Depth + Weathering Depth |
| 14916 | 0.08 | 0.13 (+63%) | 0.06 (-25%) | 0.05 | 0.03 | 0.08 |
| 14917 | 0.27 | 0.32 (+19%) | 0.16 (-41%) | 0.13 | 0.14 | 0.27 |
| 14918 | 0.10 | 0.18 (+80%) | 0.06 (-40%) | 0.08 | 0.02 | 0.10 |
| 14921 | 0.23 | 0.32 (+39%) | 0.18 (-22%) | 0.14 | 0.07 | 0.21 |
| 14922 | 0.25 | 0.29 (+16%) | 0.20 (-20%) | 0.13 | 0.10 | 0.23 |
| 15332 | 0.06 | 0.12 (+100%) | 0.04 (-33%) | 0.02 | 0.03 | 0.05 |

From examination of the drill holes it appears that there would be a statistical correlation between depth of hole and weathering depth, but the use of an $\frac{1}{8}$ inch drill can lead to serious errors due to local unevenness of weathering depth (Table 2, columns 2 and 3), unless a grid or random pattern of holes were drilled. Better results could be achieved with a $\frac{1}{4}$ inch drill, since the colour could be clearly seen in the inclined surfaces at the bottom of the holes, but cross-sectional sawing is far superior to drilling for assessing weathering effects. In this study the holes drilled have not therefore been used.

No attempt has been made either to measure accurately the weathering depths in cuts made on unengraved surfaces of the specimens, but it is clear from inspection that in those specimens completely bounded by weathered faces the weathering is either thick or thin *all round* the specimen. The conclusion here is that much of the weathering takes place beneath the surface, along joints, before actual exposure of the rocks. This conclusion, of course, would fit with the weathering being so slow, relative to the age of the engravings, that there has been negligible later effect. Accurate figures are impossible to give here, but it is quite reasonable geologically that a weathering skin 0.2 inches thick has been well in excess of 1,000,000 years in the making.