

THE DAMPIER ROCK ART PRECINCT, WESTERN AUSTRALIA

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Abstract: The world's largest concentration of petroglyphs, thought to exceed one million motifs, is briefly described. Located on the western coast of Australia, this monument has been progressively reduced by industrial development since the time of its rediscovery in the 1960s. The Dampier Archipelago was the territory of the now extinct Yaburarra tribe. At the current rate of destruction, most of the rock art seems to be consigned to suffer the tribe's fate of extermination, and may disappear by the end of the present century. The reasons for the monument's gradual destruction are discussed, both physical and chemical, and the campaign to preserve as much as possible of it is described.

Key-words: petroglyph, protection, preservation, patina, acid rain, indigenous ownership, site management, Western Australia.

Résumé : *L'ensemble d'art rupestre de l'archipel Dampier à l'ouest de l'Australie.* La plus grande concentration au monde de pétroglyphes, dépassant probablement un million de motifs, est décrite brièvement. Localisé sur la côte ouest de l'Australie, ce site a été réduit progressivement depuis sa redécouverte dans les années 1960 par le développement industriel. L'archipel Dampier était le territoire de la tribu Yaburarra aujourd'hui disparue. Au rythme des destructions, la plus grande partie de l'archipel risque de subir le même sort et pourrait disparaître avant la fin du siècle. Les raisons physiques et chimiques de cette destruction graduelle sont discutées et la campagne de conservation qui est menée est présentée.

Mots-clés : pétroglyphe, protection, sauvegarde, patine, pluie acide, propriété indigène, gestion des sites, Ouest de l'Australie.

Introduction

The Dampier Rock Art Precinct is located in the Dampier Archipelago, on the north-western coast of Australia, about 1700 km north of Perth (fig. 1a). It is thought to comprise the world's largest concentration of petroglyphs as well as Australia's largest body of megalithic stone arrangements. The archipelago consists of forty-two islands and islets of semi-arid environment (fig. 1b), dominated by vast expanses of dark-brown patinated boulder piles. The rock art and stone arrangement sites scattered among them occupy a total area of several square kilometres - the largest art gallery on Earth. Because calls for the establishment of a full inventory of this massive monument have been rejected for decades, the number of petroglyphs at Dampier remains unknown. The author discovered the Dampier rock art in the 1960s and spent three years recording 572 sites on the main island, which was then called Dampier Island. Renamed incorrectly "Burrup Peninsula" in 1971, its correct name is Murujuga. At the

end of the 1960s, the author estimated the number of petroglyph motifs on this main island to be in the order of 300,000, and others have since estimated that the number of petroglyphs in the entire archipelago should be well in excess of one million. The number of stone arrangements has also never been established, but is likely to be several tens of thousands.

The Dampier rock art, while bearing many similarities with that of nearby mainland regions, is quite distinctive in several respects. Whereas most Australian rock art regions show various continuities in motif range and a good deal of repetition, there is very little of this apparent at Dampier. Motifs are rarely repeated, and the endless diversity and variation is perhaps the most characteristic feature of this corpus. There are also forms of petroglyphs that seem to be entirely endemic to the Dampier Archipelago. Among them is the treatment best described as "negative petroglyph" (in the same sense as we have positive and negative geoglyphs), in which lines were created not by removing the dark patination to expose the light substrate, but by

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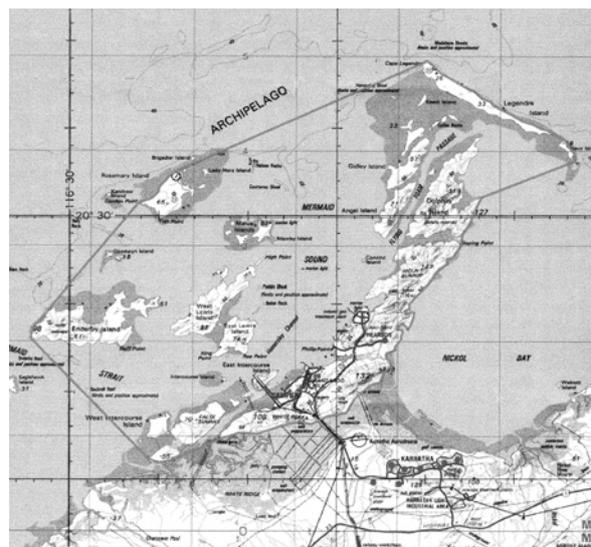
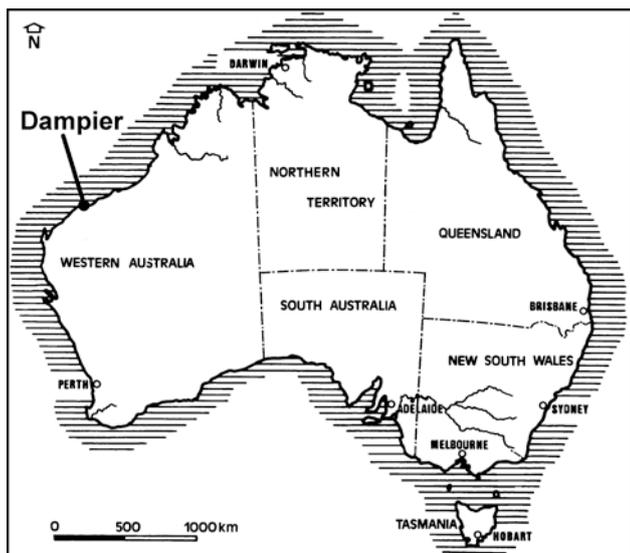


Figure 1 - (a) The location of the Dampier Archipelago. (b) The Dampier Archipelago. The surrounding line indicates the boundary of the cultural precinct nominated for the National Heritage, which will eventually be nominated for World Heritage listing.

Figure 1 - (a) Localisation de l'archipel Dampier. (b) L'archipel Dampier. Délimitation de la zone archéologique inscrite au titre du patrimoine national qui sera proposée pour figurer sur la liste du Patrimoine Mondial.

trimming the patination to retain patinated areas to define the intended forms (fig. 2). Most commonly, this unusual treatment is used in highly stylised faces that occur nowhere else. Through its profuse stylistic variability and almost inexhaustible abundance of motif forms, the art conveys a freedom of expression rarely seen in Aboriginal art.

The stone arrangements add to the impression of cultural sophistication. We distinguish five types of them, four of which remain unexplained, and today's local indigenous communities cannot interpret them either. The best-understood type is the standing stones or stelae, which occur in sometimes substantial numbers. They may be decorated with petroglyphs or bear other traces of anthropic modification, and they may be associated with specific ceremonial sites where supplication rituals (increase ceremonies) were held. A second type of stone arrangement consists of hollows created in the rock piles by selectively removing boulders. These are reminiscent of hunting hides, but this explanation is often unconvincing and their true former purpose remains unknown (fig. 3). Similarly, the functions of the other forms of stone arrangements often seen at Dampier have not been clarified so far, and the surviving indigenous have no traditional knowledge of them. These forms occur as stone walls, as circular formations and as terraced arrangements of boulders. Various speculations attempted to clarify their purposes have remained unconvincing so far.

History

Both the rock art and the megalithic arrangements are the work of the Yaburarra, who were a sub-tribe of the Ngarluma, a mainland tribe that shared with them the important ceremonial sites on the islands. European settlement of the general region commenced in 1862 with the establishment of the town Roebourne. Three years later pearl shell beds were discovered at the archipelago, and the local indigenous were enslaved in the rapidly booming pearling industry. In early 1868, a policeman who habitually raped Aboriginal women apprehended Coolyerberri, the husband of his latest victim after raping her at gunpoint. He chained the man to a tree overnight to prevent his escape, but a group of Yaburarra warriors sought to free the hapless prisoner. In the ensuing fight, the policeman, Constable W. Griffis, and two companions were speared to death. In response to this event, several contingents comprising police and sworn-in special constables, acting on instructions of the colonial government, were sent into the archipelago to "apprehend the guilty". Instead, they wiped out the entire tribe. The massacres commenced on the morning of 17 February 1868, when about sixty women and children were slaughtered indiscriminately in their camp on the south coast of King Bay, on Murujuga. The massacres ended in May, with only six male adult survivors recorded (Gara 1983; Bednarik 2002a). There is no record of any female, juvenile or elderly survivors. The total number of people killed is not known. In the only written historical record we have of it today, the actual number of dead was erased by a shocked relative of the writer, an eyewitness.



Figure 2 - Typical Dampier stylised face, negative petro-glyph, the lines of which consist of retained patina rather than pounded grooves.

Figure 2 - Visage stylisé typique de Dampier. Le pétroglyphe négatif résulte de surfaces patinées conservées séparées par des rainures piquetées.



Figure 3 - Large stone arrangement in Pistol Range, Dampier, heavily decorated with petroglyphs.

Figure 3 - Grand ensemble de blocs à Pistol Range, Dampier, entièrement couverts de pétroglyphes.



Figure 4 - Typical Dampier landscape with distinctive geological facies, Watering Cove, eastern Murujuga.

Figure 4 - Paysage typique de Dampier montrant les différents faciès géologiques, Watering Cove, Eastern Murujuga.



Figure 5 - The immediate proximity of the petroglyphs to Australia's largest polluter, a petrochemical plant.

Figure 5 - A proximité immédiate des pétroglyphes, le plus grand pollueur d'Australie : une usine pétrochimique.

This clear instance of genocide by the state had profound consequences for the wider region's Aboriginal population, still evident today. This event demonstrated to them that the colonisers were not restrained by any moral or legal code, and that they were quite capable of wiping out a tribe entirely. It is relevant to note that, as of 2005, no apology has been offered to the indigenous people of the region, and no attempt to compensate them for the state terror has been made.

The immovable cultural patrimony of the Yaburarra, however, survived undisturbed for the following 100 years, until the construction of a port and town on Dampier Island led to the author's discovery of this monument. It is the largest surviving cultural monument we have of any hunter and gatherer people. Commencing in late 1967, the author conducted a three-year survey of the Dampier rock art, recording the majority of the many hundreds of petroglyph sites on Murujuga (Bednarik 1977). The largest of these sites comprise as many as 30,000 images. In 1969 he began to lobby government agencies, especially the Western Australian Museum, to preserve the precinct. His endeavours remained without any success for more than twenty years. To the initial industrial development were soon added an iron ore processing plant, then in 1970 a solar salt operation, and in the late 1970s a natural gas liquefying plant. All these developments could have easily been sited elsewhere, the region has an extremely low population density and most of the land remains unoccupied. There are hundreds of potential harbour sites along the coast of Western Australia. Each of these progressive developments at Dampier caused the needless destruction of tens of thousands of petroglyphs and hundreds of stone arrangements.

In the early 1990s, the author's endeavours finally seemed to yield positive results. He had advocated for many years the return of the Dampier land to the care of the surviving local Aboriginal communities; the establishment of a National Park; and the nomination of Dampier to the World Heritage list. His efforts led to the government's decision of discontinuing industrial expansion at Dampier, and of nominating an alternative development area. This was to be the Maitland Heavy Industrial Estate, a vast area of 160 square kilometres on the mainland, dedicated to all future industries in the region. This alternative was proclaimed and promoted in 1996, but in late 2001, a new state government overturned the decision for purely political reasons and announced that it would place another dozen or so petrochemical plants at Dampier. These, it was stated, would occupy all suitable land of the main island (38% of the total land surface) plus several other islands. In February 2002, the International Federation of Rock Art Organisations (IFRAO) advised the government of its opposition to this plan and began the present campaign to save the Dampier rock art.

The Dampier rock art (fig. 6 à 15)

The Dampier Archipelago is a part of the Pilbara, a geologically ancient area almost the size of France. This remote and still barely settled, semi-arid region is very rich in mineral resources, especially iron ore, and consists of rugged mountain ranges, granite shields, sweeping plains and great

expanses of alluvial deposits. It is exceedingly rich in rock art, which occurs almost exclusively as petroglyphs. There are many thousands of sites, but only about five sites of rock paintings are known among them. In the eastern Pilbara, direct dating of a small number of petroglyphs on granite at Spear Hill has yielded ages of up to about 27,000 years BP (Bednarik 2002b), and it is clear that still older rock art is quite common in that region. The reason for the early occupation of the eastern Pilbara is that there, the aquifer is frequently exposed at the surface, having apparently given rise to favourable settlement conditions in the past.

Typically, the petroglyphs are found on rocks covered by the ubiquitous dark-brown to blackish ferromanganous accretionary deposit that conceals all rock surfaces of the region. This patina consists of rock varnish and other extraneous mineral matter, dominated by oxides and hydroxides of iron, manganese, accompanied by silica, clay minerals and aeolian particles (quartz grains, other crystals, organic particles, etc.). Typically it is underlain by a zone of the weathered host rock, of very light to whitish colour. Nearly all of the Pilbara's millions of rock art motifs are percussion petroglyphs. They occur in two basic technological forms. Where the motif was created by pounding away the dark patina to expose the light weathering zone, the sgraffito technique was used, which relies on the colour difference of discrete layers. The alternative petroglyph type relies primarily on relief depth for visibility, being therefore of much deeper grooves, and its more laborious use may indicate that the patinae were not well developed at the time of production.

The Dampier Archipelago comprises a variety of igneous rock types that have been exposed to intensive insolation for many millions of years. This has resulted in the development of huge clastic deposits of up to more than 100 m height, essentially broken-up bedrock now forming ridges visually resembling glacial moraines. Dolerite, granodiorite, rhyodacite, diorite, gabbro and occasionally granite substrates are exposed in this way (fig. 4). These are not discrete rock types, rather they often grade into one another, forming continuums, often being of similar components and petrography. Their differences merely reflect such variables as porphyric status or degree of metamorphosis. Dolerite appears to be the favoured rock type for petroglyphs, perhaps because it tends to feature the most distinctive ferromanganous crusts, commencing with oxidation of the rock's magnetite component. The spalling process that still continues to reduce the clasts, together with the process of patination of fresh surfaces (anthropic or natural) is of great significance to the study of the petroglyphs, especially the question of their relative antiquity (Bednarik 1979).

The petroglyphs of Dampier are generally thought to be of the Holocene, primarily because the iconography comprises a large maritime component. Until the end of the Pleistocene, the seashore was located far out on the continental shelf, and what is now an archipelago consisted of a group of rocky hills well over 100 km from the sea, amidst a waterless plain. It would have held no attraction for Pleistocene people at that time, and until convincing evidence to the contrary becomes available, it is assumed that all of the Dampier rock art was created during Holocene times. Lorblanchet (1992), who conducted brief studies at some of the Dampier sites, proposed an implausible sche-



Figure 6 - Petroglyphs of water birds at Murujuga, Dampier Archipelago, Western Australia.

Figure 6 - Pétroglyphes d'échassiers à Murujuga, archipel Dampier, Ouest de l'Australie.



Figure 7 - Petroglyph panel deteriorating from acidic emissions. Incorrectly called "Climbing Men Panel", part of this composition depicts in fact a sacred ceremony.

Figure 7 - Panneaux de pétroglyphes altéré par des émissions acides. Improprement appelé "le panneau du grimpeur", cette composition représente plutôt une cérémonie sacrée.

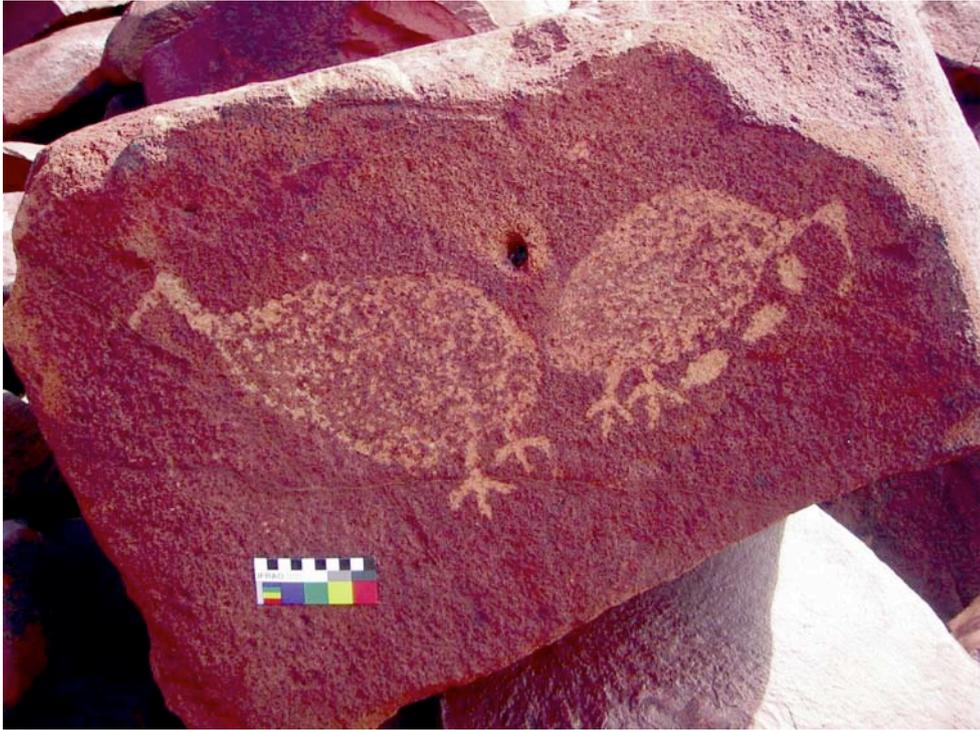


Figure 8 - Petroglyphs at King Bay, Murujuga.

Figure 8 - Pétroglyphes à King Bay, Murujuga.



Figure 9 - Presumed depiction of a thylacine (Tasmanian wolf), one of eight known from Dampier. The species is extinct in Tasmania since the 1930s, but extinct on the mainland for about 2000 years.

Figure 9 - Représentation présumée d'un thylacine (loup tasmanien), l'un des huit connus à Dampier. L'espèce a disparu en Tasmanie vers 1930, mais elle n'existait plus sur le continent depuis environ 2000 ans.

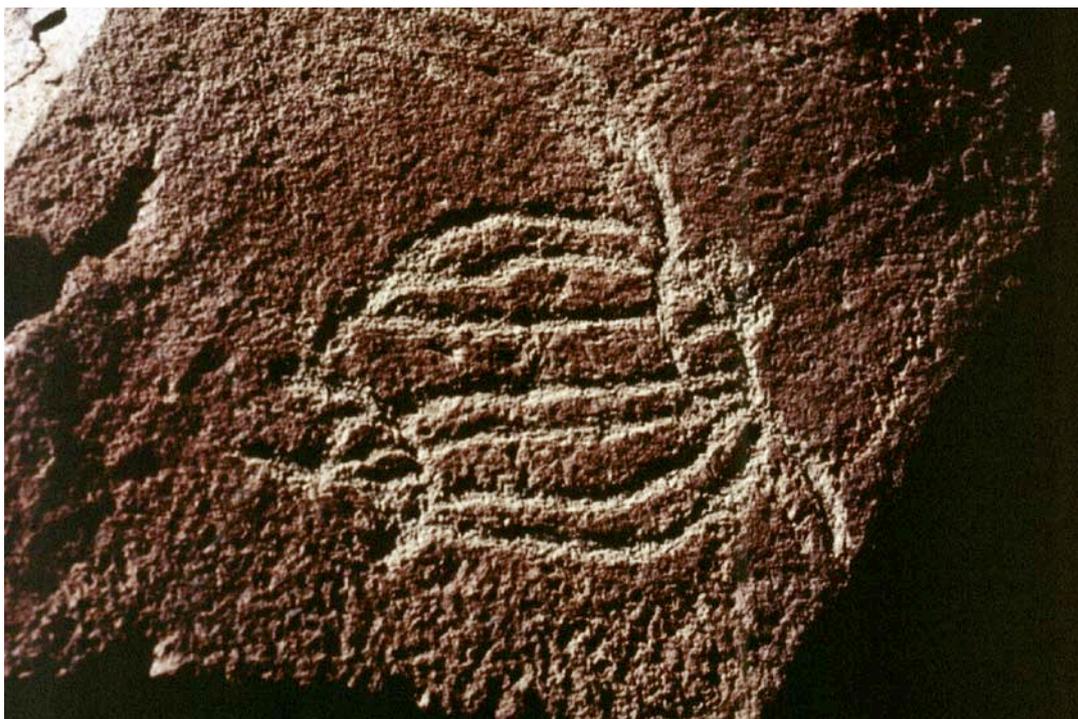


Figure 10 - Marine fauna is frequently depicted in the Dampier Archipelago.

Figure 10 - La faune marine est fréquemment représentée dans l'archipel Dampier.

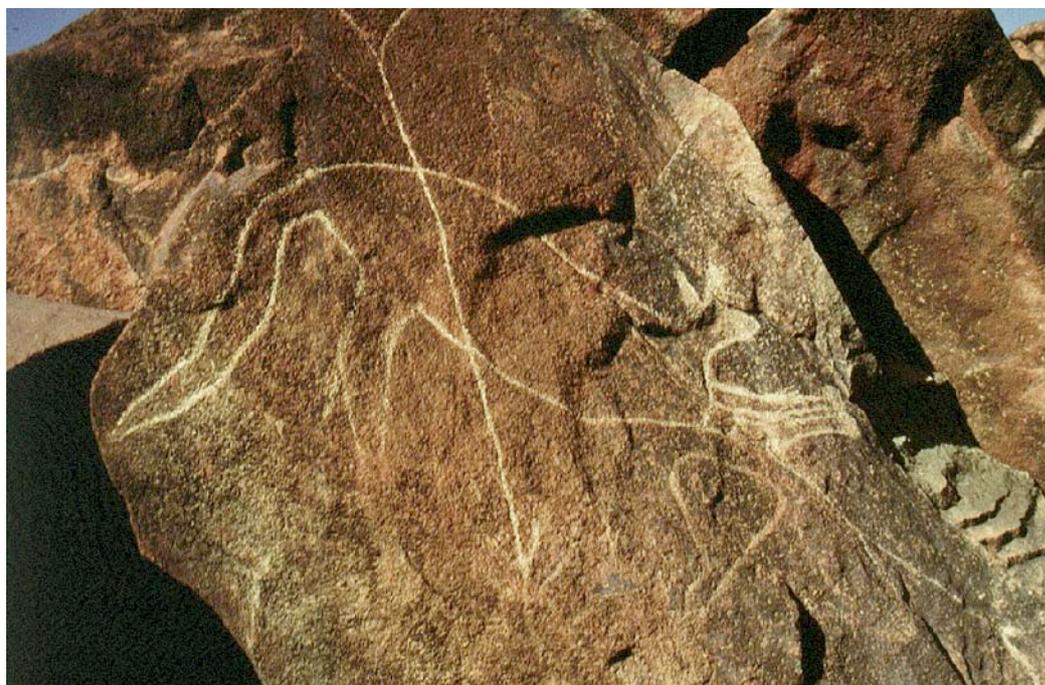


Figure 11 - Macropods still occur on the Dampier Archipelago, and are frequently depicted. This naturalistic depiction is from Happy Valley.

Figure 11 - Les macropodes existent encore sur l'archipel Dampier où ils sont fréquemment représentés. Cette représentation naturaliste est de Happy Valley.



Figure 12 - The interpretation of this petroglyph in eastern Pistol Range may not be conveyed to non-initiated people, including researchers.

Figure 12 - L'interprétation de ce pétroglyphe de l'Est de Pistol Range ne peut être révélée aux non-initiés, y compris les chercheurs.

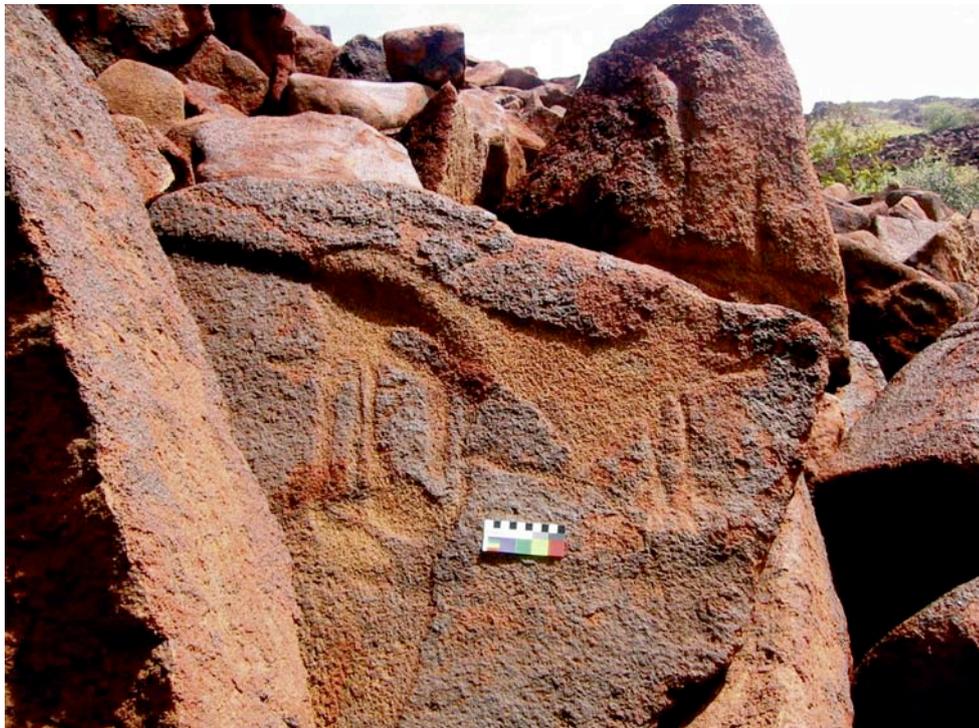


Figure 13 - Quadruped image from central Pistol Range, Murujuga, Dampier Archipelago.

Figure 13 - Représentation d'un quadrupède du Centre de Pistol Range, Murujuga, archipel Dampier.

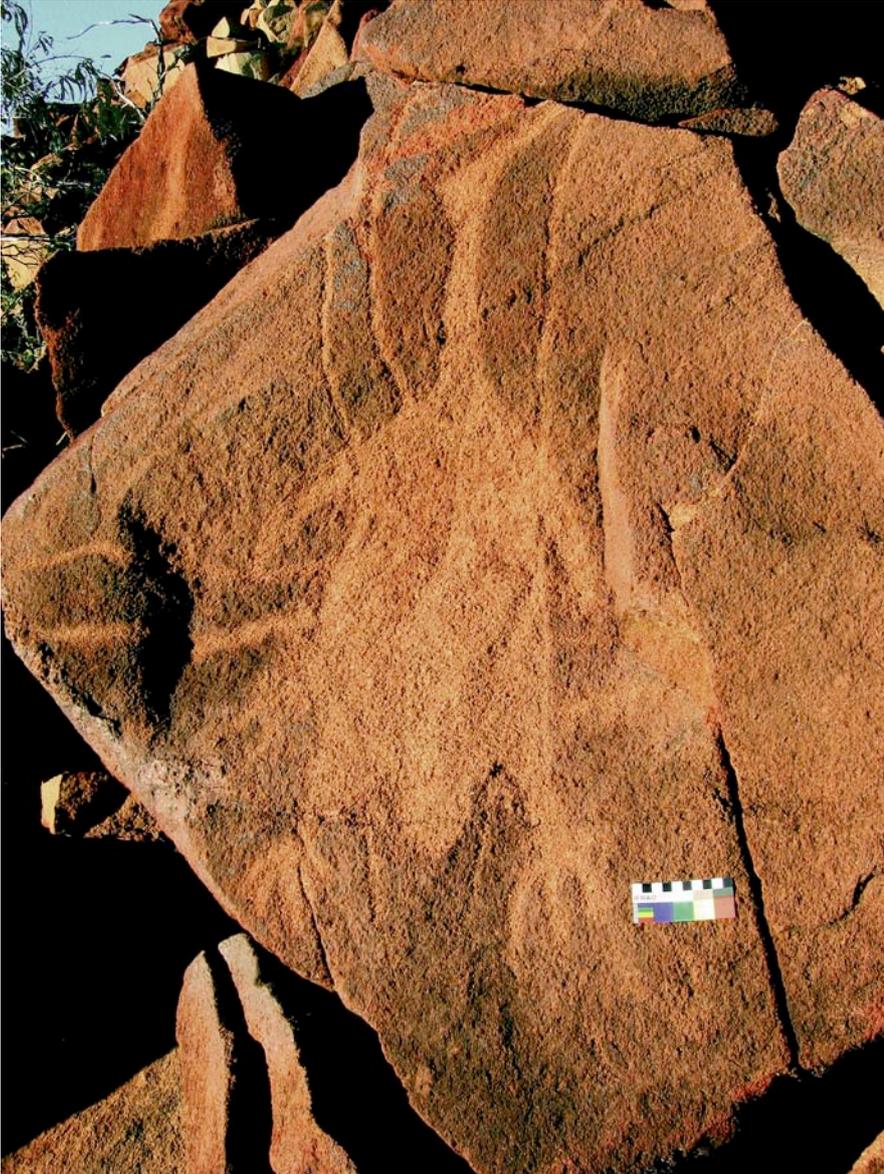


Figure 14 - Aviform petroglyph of known meaning, which may not be conveyed to non-initiated people, including researchers.

Figure 14 - Pétroglyphe aviforme de signification connue mais qui ne peut être révélée aux non-initiés, y compris les chercheurs.



Figure 15 - Petroglyphs at King Bay, Murujuga, of unknown meaning.

Figure 15 - Petroglyphes de King Bay, Murujuga, de signification inconnue.

me according to which the rock art would be as much as 18,000 years old. However, his chronology is entirely based on a single, doubtful ^{14}C determination of a seashell found on the surface, and which is unrelated to any rock art. In terms of its iconography, the Dampier rock art is of exceptionally great range. Repetition of motif types is rare among figurative images, and even the apparently non-iconic component offers great variation. The iconic imagery features vast numbers and varieties of zoomorphs, both terrestrial and marine, as well as anthropomorphs. Spirit beings occur commonly, as do sacred sites, especially *tharlu* sites, where supplication rituals were held in the past. Approximately one half of the Dampier rock art is of a sacred and/or secret nature and may not be viewed by the uninitiated. It cannot be shown here, or in any other public context. Some of the images included here are of a restricted nature, but the prohibition applies to meaning rather than iconographic features. Provided that the meaning is not explained, the author has been given permission to show them in an academic context. Any imagery of strong power is not available for consumption by researchers, access to it is entirely limited to initiates and it will never be published.

Deterioration of the rock art

From the early 1960s to the present time, between 20% and 25% of the rock art of Murujuga, the main island of the Dampier Archipelago, has been destroyed through the establishment of industrial plants that could easily have been built elsewhere (fig. 5). This destruction occurred in the course of constructing railway tracks, roads, service corridors, storage facilities, offices, a township and several industrial installations. In some cases, the rock art itself was not destroyed, but was removed for "temporary storage" where it has languished ever since (Vinnicombe 2002). One depot of "salvaged" rock art boulders, containing almost 1800, was further damaged by a grass fire. Rock art has in the past only survived fires where it occurred in vegetation-free areas, so by relocating the decorated boulders to make room for industry, the conditions of preservation were changed for the worse. Besides, removal of rock art from its site of occurrence destroys not only its scientific context, it also destroys the cultural context. It is strenuously opposed by the Aboriginal people, the rightful owners of the petroglyphs.

In addition to the physical destruction of rock art and rock art sites, there occurs, however, a second form of deterioration. This is by chemical degradation of the patina on which most of the petroglyphs depend for their colour contrast. During the 1980s, with the commissioning of the first petrochemical plant at Dampier, its acidic emissions began affecting the surface deposit on the rocks. This patina is highly susceptible to even minor downward fluctuations in ambient environmental pH, especially in the range from pH 7 to 6. Its crucial iron cations generally occur as goethite, hematite, lepidocrocite and similar salts, and solubility of iron increases significantly in that range. These salts are increasingly mobilised as the atmospheric water pH decreases. The effect is emphasised where plant cover occurs, because its foliage attracts the dry acidic emission

products, and these are then activated every time rain occurs. Therefore all over the archipelago, the rocks nearest vegetation have mostly lost their ferromanganous accretion entirely over the past twenty years. This effect is predicted to gradually extend to the other rock surfaces, resulting in the eventual "bleaching" of all petroglyphs relying on colour contrast for their visibility.

The largest of the acidic emissions of the first petrochemical plant at Dampier is that of nitrogen oxide, presently 12,000 tonnes per year. This forms nitric acid in the atmosphere on contact with water. However, the decision of the state government of Western Australia in late 2001 to increase the amount of industry at Dampier three-fold would lead to a corresponding increase in the level of acidity. Nearly all of the dozen or so new industries to be attracted to the Dampier Archipelago would also be petrochemical plants. They include manufacturers of ammonia, ammonium nitrate, urea, fertilisers and explosives. All of these industries require only one raw material, natural gas, which occurs in abundance offshore. They could all be established wherever a gas pipeline can be taken to, and there is no reason whatsoever why they would need to be situated at Dampier.

The IFRAO campaign to save the Dampier rock art

Since the beginning of 2002, when IFRAO notified the state government that it would endeavour to preserve the Dampier rock art monument, this organisation has engaged in various strategies designed to persuade the government to locate any future industries at alternative sites. IFRAO has also sought to secure the support of industry in this, and with considerable success. When in 2002 scientific evidence was presented that the acidic emissions from existing industries harm the rock art irreparably (Bednarik 2002c), the government commissioned its own four-year study of the impact of pollution on the rock art, which commenced in 2004. In support of the IFRAO campaign, the author established a very major web page (<http://mc2.vicnet.net.au/home/dampier/web/index.html>) to secure public support. At his request, the Dampier Rock Art Precinct was listed by the World Monuments Fund as one of the *100 Most Threatened Monuments* in the world in 2003. It will remain on this list at least until 2007. Many heritage organisations, such as the National Trust of Australia, now began to support the campaign. Support developed not only from environmental and heritage organisations, but also from the Aboriginal custodians and other indigenous interests, from much of the general public and most of the media, eventually even from most of the political parties and some of the corporate stakeholders. In late 2003, the author involved the Native Title Tribunal in his campaign to return the Dampier Archipelago to the Aboriginal people. It was through this surprise move that the state government found itself forced to quickly settle with the claimant groups, which led to a hurried legal back-down and a compensation package for the indigenes of \$26 million. Within a few months, in February 2004, the author then nominated Dampier to the National Heritage List, and two months later his nomination was duplicated by the National Trust. This created yet another quagmire

for the government, in that it could neither afford to support nor be seen to oppose the nomination. More than eighteen months later, it is still wrestling with this issue, and the federal minister who has to make the determination has deferred his decision until September 2006.

Next, the author commenced assembling a travelling public exhibition to present the plight of the Dampier rock art to the public. This was completed in early 2005, with the collaboration of the Wong-Goo-Tt-Oo, the tribe with the strongest claims on the Dampier rock art. In April 2005, the exhibition, named *Visions of the Past: the world's most endangered rock art*, was premiered in Karratha, only a few kilometres from the Dampier Rock Art Precinct. This led immediately to the formation of the Champions of Burrup Rock Art (COBRA), an action and advocacy group of local residents in the region strongly supporting the demand that there be no further industries established at Dampier.

The companies who had intended to establish major industrial installations have been withdrawing their proposals, or asked to have their plants located somewhere else, since 2003. For instance, one major company requested land at Onslow, some hundreds of kilometres to the southwest, for its huge proposed LNG plant. In retaliation, the state government refused to provide any infrastructure for this project. It had painted itself into a corner, having now expanded or committed hundreds of millions of dollars for infrastructure at Dampier that is probably never going to be used. Indeed, of the dozen companies or corporate conglomerates that had been interested in Dampier in 2001, only one Indian fertiliser firm has actually decided to establish a plant. All others have either withdrawn or show no inclination to express a clear commitment. Therefore the state government has effectively destroyed hundreds of sites in building infrastructure that appears to be redundant before it is even used.

The government remains unwilling to face up to its planning blunder and is still desperately trying to entice new industries to Dampier. At the same time it penalises companies wanting to establish their businesses elsewhere, because it does not wish to admit its mistake. At the present it is determined to significantly upgrade the port of Dampier, even though there is no need to do this until there are potential users committed. In the process of this work, which is planned over the next few years, thousands of petroglyphs and hundreds of stone arrangements will again be destroyed.

In the final analysis, the government's plan is not just damaging to the cultural monument, it is also imprudent for several other reasons. Already now the Dampier industry is the largest single-location polluter in Australia, and there is anecdotal evidence of a high incidence of cancers, especially breast cancers, in the two nearby towns, Dampier and Karratha. This is not surprising, the major existing petrochemical industry emits over one thousand tonnes of both benzene and cyclohexane into the atmosphere every year, as well as 2200 t of n-hexane, 1500 t of methylbenzene and 620 t xylenes (these are minimum figures admitted by the polluters). These harmful hydrocarbons include severe carcinogens and other toxicants.

The Dampier industry also represents the largest industrial concentration of explosive power in the world, with an equivalent explosive potential of 760 kilotonnes of TNT (i.e. 58 Hiroshima bombs) being currently stored in various explosive,

volatile and flammable substances. It is a serious planning error to cram into the very limited area of Dampier, amounting to just a few square kilometres, many further large industries that will store vast quantities of further explosive materials, such as hydrogen and ammonium nitrate. Since part of the industrial land is subject to occasional surge tides, this is likely to lead to an industrial disaster on an unprecedented scale. The companies concerned have now recognised this, as do most other stakeholders, but the government insists that it will not deviate from its plan to destroy the Dampier rock art and stone arrangement sites by pursuing its perverse development plan. Its principal argument is that if it did, it would impair its sovereignty. This is a very strange argument indeed, when we consider that its sovereignty over the Dampier Archipelago was gained through a blatant and undeniable act of genocide in 1868.

In September 2005, UNESCO and the Musée National de Préhistoire in Les Eyzies hosted a conference to consider improvements in the conditions under which rock art is preserved worldwide. On that occasion, the plight of the world's largest concentration of petroglyphs was presented, and it became a key factor in designing new UNESCO recommendations for the protection of rock art that should preclude a repetition of the mistakes made at Dampier.

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