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AUSTRALIAN NATURAL HISTORY

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COVER: Symbols of the Centre, the Olgas, rise from a wilderness of red sandridges. Among the ubiquitous spinefex and mulga are a fascinating flora and fauna—Ayers Rock/Mt. Olga National Park. (Photo: Allan Fox)

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TOUCH THE EARTH

Few of us experience nature with all our senses. When contemplating 'the beauty of nature' we think of it primarily as something to look at. Some find it awesome and inspiring—some merely pleasant—but is perceived as an essentially visual experience. Even blind people, whose other senses are sharpened due to loss of sight, are encouraged to 'see' nature through the descriptive interpretations of the sighted. These descriptions *usually* leave out a great deal that could add to the total experience—for the sighted as well as for the blind.

Fragrance gardens are not new. Here, strongly scented flowers and herbs are planted and described by braille signs, and visitors are invited to touch the plants, smell them, even pick them and taste them. This approach, however, has only recently been applied to natural bushland.

The idea of a nature walk for the blind was brought to Australia by Tony Groom, former manager of Binna-Burra Lodge at Lamington National Park in Queensland, after he had seen a similar trail in Yellowstone National Park, USA. He and John Luscombe, the lodge's present manager, together with a small group of dedicated individuals, brought such a trail into being—the first and, so far, the only one in this country.

The total length of the Senses Trail at Binna-Burra is one kilometre, making it the longest of its kind in the world. This trail zig-zags through subtropical rainforest and out into open eucalypt forest; it then branches, one section turning back into the rainforest, the other continuing along a narrow ledge around the mountain below the lodge. The entire length of the trail is bordered by a guide rope marked with knots to indicate steps. At various stops along the way, there are braille signs describing the surroundings and asking people to touch the bark and leaves of certain trees and plants, to listen for various bird calls, to smell certain types of wood and the leaf litter on the forest floor, to feel the textures of different rocks, mosses, ferns, etc. and to notice changes in the density of the forest canopy and in the direction of the wind. For the blind who cannot read braille and wish to walk the trail alone, cassettes and players are available from the lodge. Printed pamphlets are also available for those accompanied by sighted friends.

There have, as yet, been few blind visitors to use the

trail, which was opened on 19 October, 1975. Those who have, and some who have only heard of it, praise its concept, saying that it makes the blind feel more 'normal' and independent. There are, of course, intrepid blind adventurers who, with sighted companions, brave the bush anyway; but even these have lauded the Senses Trail as offering others the opportunity to taste 'raw nature'. Perhaps by this they will be encouraged to venture further into it.

The Senses Trail has, however, not gone unused or unappreciated. Hundreds of sighted visitors have gone blindfolded along the trail and have found a new 'natural' experience. In a setting so filled with majestic scenery, this experience brings one back to the beauty of fine detail—to texture and form.

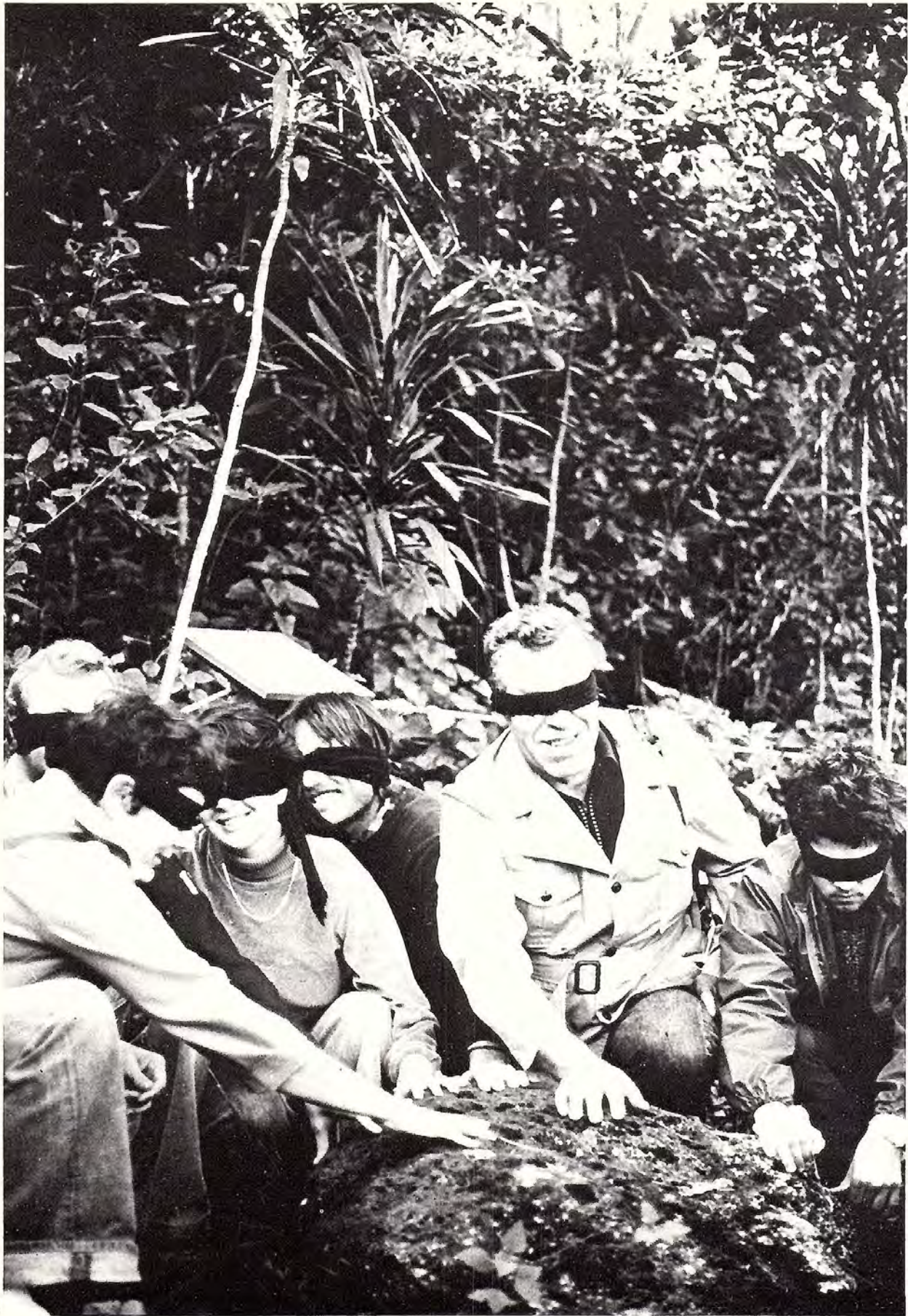
I spent a week at Binna-Burra during which I accompanied many blindfolded visitors on the Senses Trail; their ages ranged from 5 to 83. The overwhelming response was enthusiasm—in varying degrees—and expressions of a new-found sense of awareness. Everyone welcomed the new experience—knowing, of course, that their blindness was quite temporary. Some of the more enthusiastic, especially the children, wished it had lasted longer and asked to do it again. Several groups immediately returned to the beginning of the trail, without blindfolds, to fill in with vision the gaps in their encounter with the forest.

The Senses Trail obviously fills a need—for some of us, a need we didn't know we had. Are there other, similar needs going unheeded? The dedicated group of individuals who gave us this Senses Trail believes that there are. Not only are they planning to establish similar trails in other Queensland National Parks; work has already begun at Lamington on a trail which can be travelled by wheelchair.

They have set a fine example. Who will follow.

—N.S.

The Senses Trail was completed through the cooperative efforts of the Welfare Association for the Blind (Qld.), Binna-Burra Lodge and the Lamington Natural History Association, with assistance from the National Parks and Wildlife Service (Qld.) and volunteer labour from the Westbrook home for boys, near Brisbane. Financial assistance was also provided by the National Society of Blind Citizens, the National Fitness Council and the P & C Committee of the Blind School (Brisbane). The signs were made by the Braille Writers' Association of Queensland.



Blindfolded visitors feel the holes in a piece of vesicular basalt at one of the stops along the Senses Trail.

N. SIMON

PROBING PONERINE ANTS

BY PHIL WARD



P. Ward

One *Chalybaea* worker transports another by holding it over the back by the head and thorax.

Upon being asked what Nature revealed of the Creator's temperament, the eminent British biologist, J.B.S. Haldane, is said to have replied: "An inordinate fondness for beetles". In Australia one is tempted to additionally suggest a strong partiality towards ants, since this continent is blessed with a conspicuously rich and abundant ant fauna of incomparable magnitude for a subtropical-temperate area. Dr. Robert Taylor of CSIRO, Division of Entomology, estimates that there are about 2000 species of ants in Australia, perhaps two-thirds of which remain undescribed. Myrmecology, the study of ants, has flourished in the relatively depauperate regions of North America and Europe, while in Australia our knowledge of the ecology and behaviour of most species is fragmentary or non-existent. We are likely to remain forever ignorant about many of these species because of their localised populations and the widespread destruction or alteration of natural habitat in Australia.

Ants comprise the family Formicidae in the insect order Hymenoptera. All ants (except for a few parasitic species) are social insects, that is to say, they live in

long-lasting colonies and co-operate in food gathering, brood rearing, and colony defense. Most remarkable of all, the ant workers themselves are non-reproductive, sterile females; mating and reproduction are restricted to a distinct caste of females (queens). The winged queens and their short-lived male consorts typically mate in swarms, and the fertilized females search for suitable nest sites (such as hollow twigs, between stones, etc.) where they rear a small brood of worker ants. A mature ant colony usually contains one or several queens, a large number of workers, and an assortment of immature stages (eggs, larvae, and pupae). Winged reproductive forms (virgin queens and males), called alates, are produced periodically. There are many variations of this scheme, and one of the interesting features of the Australian ant fauna is the diversity of life history patterns which accompanies taxonomic diversity.

All of the major ant subfamilies are represented in Australia. These include the archaic Myrmeciinae (bull-dog ants), and the more 'advanced' subfamilies, the Dolichoderinae, Formicinae, and Myrmicinae.

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Examples of species belonging to the last three groups are meat ants (*Iridomyrex purpureus*), sugar ants (*Camponotus*), and funnel ants (*Aphaenogaster*), respectively. The other important subfamily is the Ponerinae, many of whose species are considered more primitive in morphology and behaviour than those of the higher subfamilies.

A characteristic element of the Ponerinae in Australia is the large and successful genus *Rhytidoponera*, which contains about 100 described species (and several dozen more undescribed). Most of these occur on the Australian mainland, but there are a few species in Melanesia. A well-known Australian species is *Rhytidoponera metallica*, the so-called greenhead ant, which is common over much of eastern Australia, even in suburban gardens where it is respected for its potent sting.

Rhytidoponera species have collectively occupied almost every major habitat in Australia, and many 'species' are notable for confusing patterns of inter-population variation and a bizarre social colony structure in which distinct queens are replaced by fertile, mated workers. This latter trait stands in interesting contrast to the social system found in most ant colonies, where a mass of more or less sterile workers toil on behalf of the reproductive activities of one or several morphologically distinct queens.

I have begun genetic and ecological studies of several *Rhytidoponera* species which are known as the *impressa* complex. These are relatively well-defined taxonomically, restricted to the higher rainfall areas of the east coast, and are considered primitive both on morphological grounds and because of the apparent simplicity of their social systems. Thus they provide a good starting point for a comparative study of the genus.

The common southeastern representative of this complex is *Rhytidoponera chalybaea*, a handsome, metallic blue ant about 5mm long, with a coarsely sculptured body. The posterior body segment, called the gaster, is covered in fine striations, and equipped with an effective poison sting which allows the worker ant to immobilize prey, and to defend the colony against intruders. *R. chalybaea* inhabits rainforest and wet sclerophyll from Victoria to southern Queensland. The ants nest in hidden places such as rotting log cavities and in soil under stones; in the richer rainforest areas, they frequently occupy fallen epiphytic fern masses on the forest floor, often accompanied by several other ant species. A typical mature nest or

colony of this species consists of a single queen and several hundred workers, with eggs and larvae and, at certain times of the year, pupae (enclosed in cocoons) and sexual winged forms (alates) of both sexes. Although the alates begin emerging from their cocoons in February, they do not immediately mate and disperse; in fact many remain in the nest throughout the winter, finally leaving in September and October. Unfortunately, the presumed mating flight swarms of *chalybaea* have not been observed, although I have seen single alates (mostly males, but on one occasion a lone female) flying between April and October, and colony-founding females with clusters of eggs are most frequently found from October to December.

Many, if not all colonies of *chalybaea* are started by a single winged fertilized female ant who searches for a suitable nest site in the soil or in rotting wood, sheds her wings and excavates a small cavity. She lays a few eggs and, in 8-12 months, rears a small brood of workers. To feed her young she forages outside the nest and returns with arthropod prey. This primitive method of colony foundation is typical of most ponerines, and contrasts with the completely claustral colony foundation of higher ants where the queen seals herself in a cavity, and rears her first brood almost entirely on nutrients derived from the metabolism of her own body tissues including wing muscles. It is also distinctly different from nest-founding in the 'queenless' *Rhytidoponera* species, which presumably occurs through colony fission in which groups of workers, some fertilized, leave the main nest.

In this regard it is interesting to note that colonies of *chalybaea* are quite prone to move nest sites, especially if disturbed. This involves moving the entire colony, including brood. Some workers even carry other workers, a common habit in other *Rhytidoponera* species. Worker transport usually occurs in a distinct, stereotyped fashion in which the transportee remains immobile while being carried by the mandibles over the head of transporter. Such worker transport and nest-moving habits are well-developed in higher ants and appear to be advanced traits.

In this well-regulated broad production and occurrence of winged females, *chalybaea* colonies approach the typical situation in ants, and seem removed from the usual 'queenless' colony structure of other *Rhytidoponera* species. However, a significant proportion of *chalybaea* colonies contain no distinct queen and produce only males and workers. (no winged



D. Ward

An exposed nest (stone cover removed) reveals light brown cocoons, several small clusters of eggs and scattered larvae.

females). So it seems likely that the habit of replacing distinct queens with mated and reproducing workers, so prevalent in other *Rhytidoponera* species, is developed to a limited degree even in *chalybaea*. Why the monarchy has not been completely replaced by a workers' confederacy remains a challenging mystery.

The foraging habits of *chalybaea* workers are quite diverse. Like many ponerine ants, they are largely predatory on other arthropods, but are also attracted to seeds, fruit, and decaying animal and vegetable matter. Workers can be successfully baited with honey, sardines, and with human excrement. The diverse dietary regime of this ant is reflected in the following list of food items which were recovered from 80 workers returning to a single nest: 19 ants (of other species), 12 insect larvae, 5 springtails, 3 embiids, 3 slaters, 3 terrestrial amphipods, 2 millipedes, 2 beetles, 2 lepidopteran pupae, 2 insect fragments, 1 psyllid nymph, 1 procturpoid wasp, 1 fly, 20 pieces of vegetable matter (mostly fig fruit and seeds), and 4 pieces of unidentified organic matter. Most of the prey is fed to the developing brood and the actual diet of the workers may be more restricted. These ants were recorded over a total observation time of only 8 hours, so it is clear that *chalybaea* consumes large quantities of terrestrial invertebrates, and the same is probably true of other *Rhytidoponera* species. Indeed it has been suggested that the common greenhead ant (*R. metallica*) is of considerable economic importance because it destroys large numbers of noxious insect pests.

Chalybaea workers forage singly and usually return unaided to the nest. Capture of live prey appears to be largely elicited by tactile stimuli and is effected by a short lunge forward with a rapid snapping together of

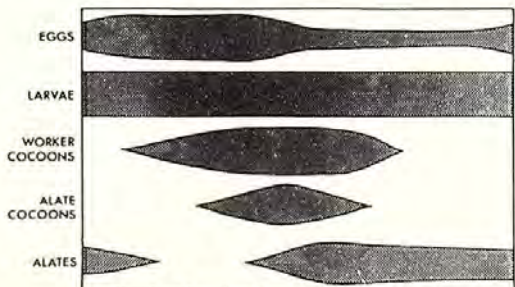
the mandibles. A struggling prey item is usually subdued by stinging. The capture of other live ants by *chalybaea* is an interesting phenomenon which sometimes involves preying at the nest entrance. I have observed several *chalybaea* workers clustered around the soil nest entrance of a small myrmicine ant (*Pheidole* sp.) grabbing unsuspecting workers as they emerged from their nest.

A *chalybaea* worker forages in a somewhat random manner, but, having located and captured prey, it returns to the nest in a straight line. This acute sense of direction is typical of ants in general, and it has been demonstrated that some species use sun-compass orientation. Since *chalybaea* forages extensively at night as well as in the daytime, it is clearly not orienting by the sun all the time. Perhaps a sense of smell directs it back to the nest. Certainly recognition of nest odour is prominent in ants which, like *chalybaea*, can discriminate against workers from an alien nest. So perhaps orientation by nest odour gradient is not too far-fetched a theory.

Although the *chalybaea* worker is usually a lone forager, group retrieval of food items does occasionally occur. Workers will come to the assistance of a single worker struggling with a large prey item. When a large food source is located some distance from the nest, workers are somehow recruited from the nest, possibly following an odour trail to the food. Such co-operative behaviour is, of course, much better developed in many of the higher ants, where it results in very efficient retrieval of food resources unavailable to a single foraging ant.

As in other ants, the workers of *chalybaea* are very meticulous about nest sanitation. The removal of garbage (dried insect cuticle, vegetable matter, empty cocoons, dead workers, etc.) from the nest often entails as much activity as food gathering.

About most aspects of communication between *chalybaea* workers nothing is known. Contacts between individuals of the same nest usually involve brief reciprocal antennal tapping. An alien worker

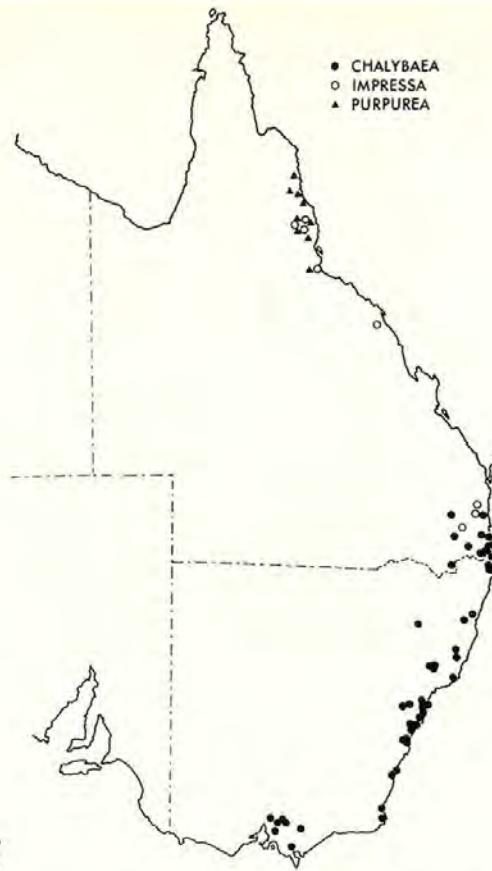


(from another colony of the same species) is generally recognized and treated with hostility. *Chalybaea* and other *Rhytidoponera* species have the ability to produce a high-pitched audible sound, by grating their abdominal segments back and forth. This sound is usually produced under stress conditions, and seems to function as an alarm call. Self-grooming and meticulous licking of brood are very pronounced in *chalybaea* (as in all ants), while grooming of nest-mates (usually on the gaster) is less common.

One of the most interesting aspects of ant societies is the development of a large array of symbiotic relationships with other arthropods which feed in the nest on food provided directly or indirectly by the ants. Such animals are called myrmecophiles. *Chalybaea* has a relatively limited fauna of nest associates, but these include slaters (Oniscidae) prostigmatid and uropodoid mites, entomobryid springtails, atelurid thysanurans, and limulodiid beetles of the genus *Rodwayia*. None of these myrmecophiles has become so closely integrated into the colony that they are fed and accepted by the ants. The atelurids and limulodiids move with extreme speed and agility, which may help them to escape hostility. Some of the tiny uropodoid mites attach themselves to the legs of workers, and I have seen one attached to a winged male, indicating a possible means of dispersal.

Colonies of *chalybaea* are not immune to attacks by parasites. Nematodes (internal parasitic worms) occasionally infest adult workers to the point of swelling the gaster, and causing atrophy of the head and thorax. In a few colonies I have found eucharitine wasps (*stilbula* sp.) parasitizing *chalybaea* pupae. Such wasps apparently begin their life-cycle as free-living larvae, called planidia, which find their way into ant nests. In one *chalybaea* nest several ant larvae, which had just spun cocoons and were about to pupate, had a single planidium attached to them, just below the mouthparts. It appears that the wasp larva thereafter loses extensive mobility, consumes the host, and pupates within the host cocoon.

Although *chalybaea* occurs naturally in moist forests, a Sydney population which is probably derived



from *chalybaea* has become adapted to urban conditions and is common in certain tree-shaded city parks; foraging workers have even been recorded as entering households in search of food. So despite its possession of several behavioural traits deemed primitive in relation to those of higher ants or of other *Rhytidoponera* species, this enigmatic ant has shown considerable adaptability to human-induced environmental change.

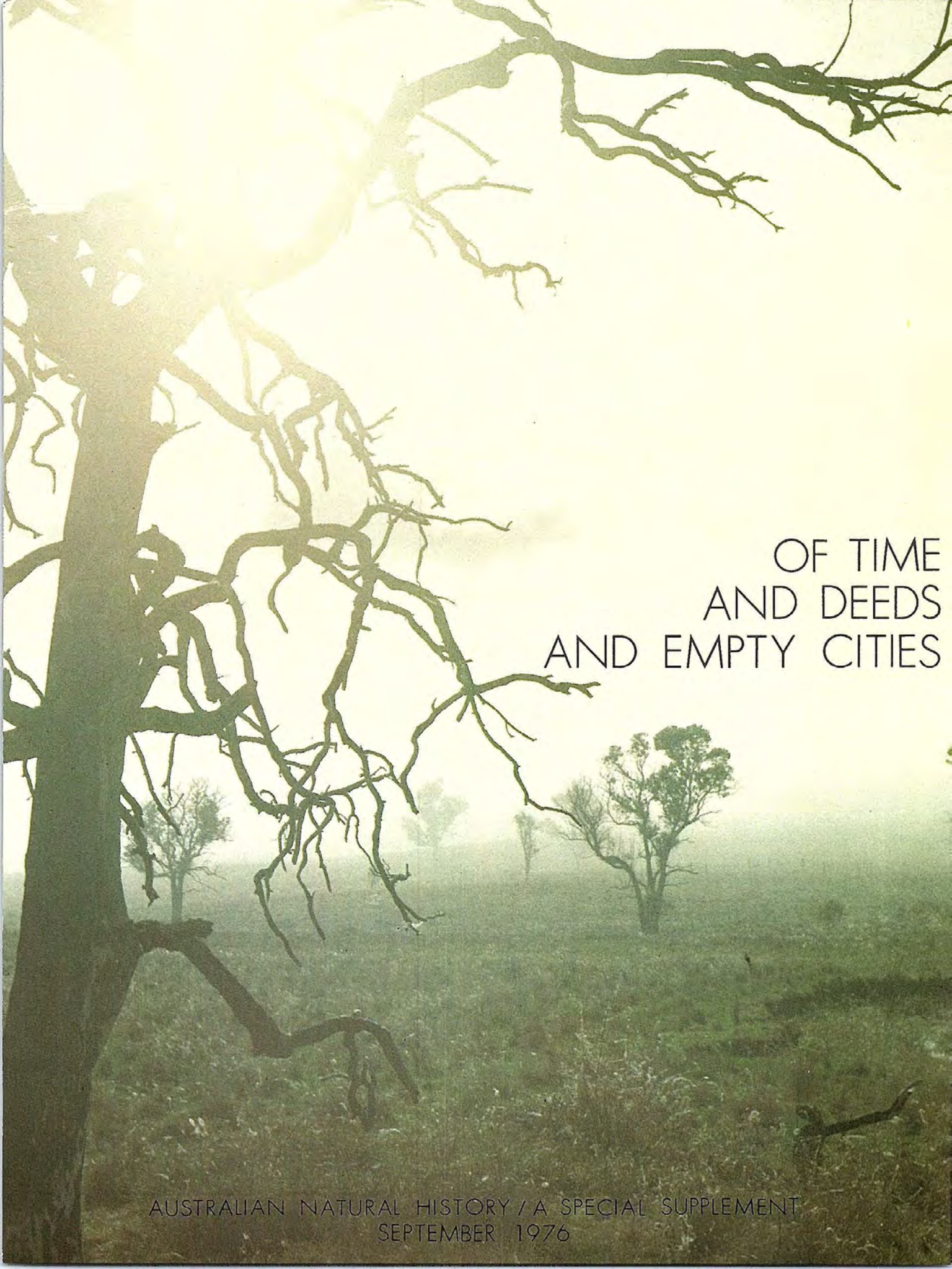
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Chalybaea workers co-operate in carrying a dead earthworm to their nest.

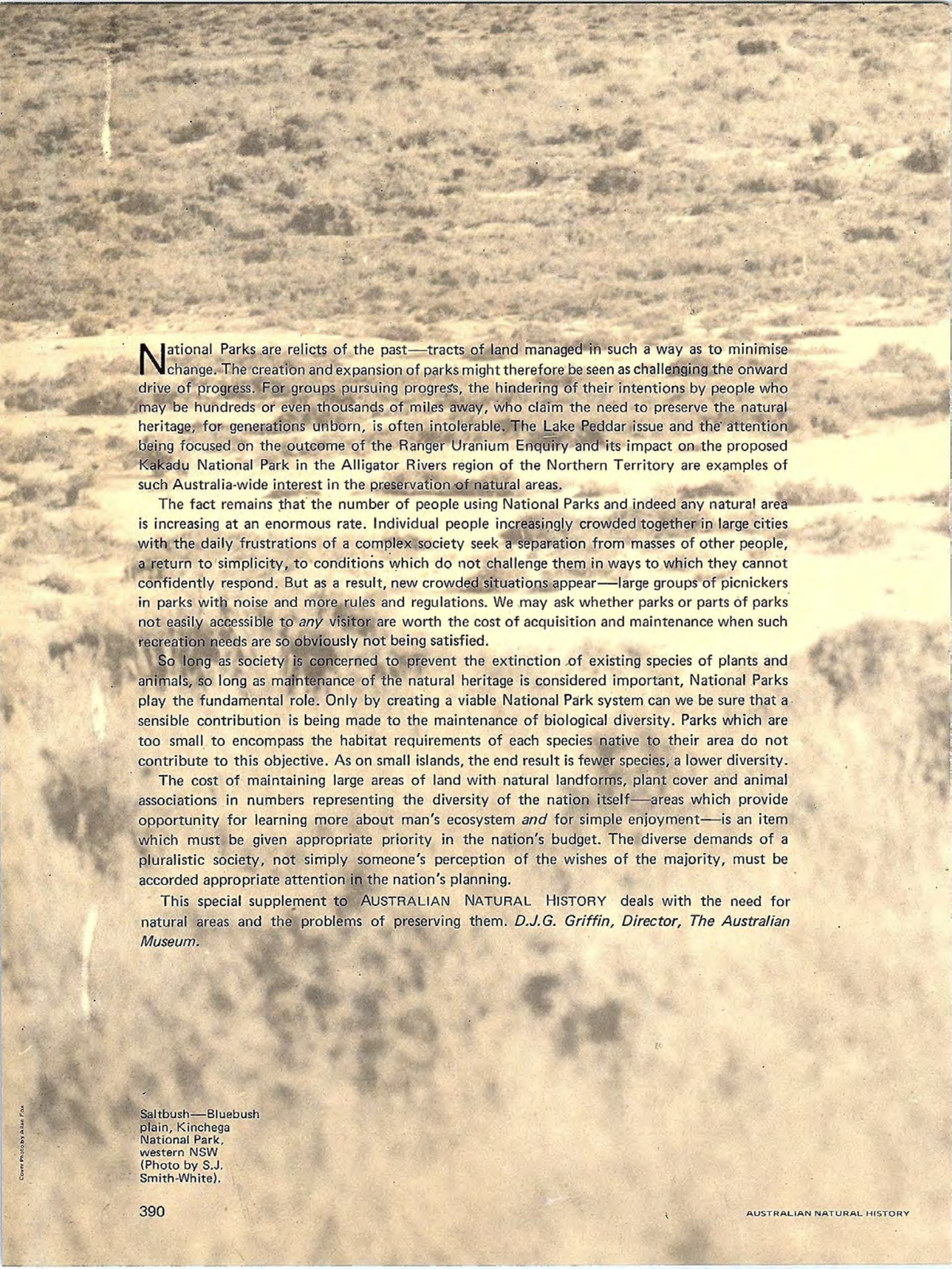






OF TIME
AND DEEDS
AND EMPTY CITIES

AUSTRALIAN NATURAL HISTORY / A SPECIAL SUPPLEMENT
SEPTEMBER 1976



National Parks are relicts of the past—tracts of land managed in such a way as to minimise change. The creation and expansion of parks might therefore be seen as challenging the onward drive of progress. For groups pursuing progress, the hindering of their intentions by people who may be hundreds or even thousands of miles away, who claim the need to preserve the natural heritage, for generations unborn, is often intolerable. The Lake Peddar issue and the attention being focused on the outcome of the Ranger Uranium Enquiry and its impact on the proposed Kakadu National Park in the Alligator Rivers region of the Northern Territory are examples of such Australia-wide interest in the preservation of natural areas.

The fact remains that the number of people using National Parks and indeed any natural area is increasing at an enormous rate. Individual people increasingly crowded together in large cities with the daily frustrations of a complex society seek a separation from masses of other people, a return to simplicity, to conditions which do not challenge them in ways to which they cannot confidently respond. But as a result, new crowded situations appear—large groups of picnickers in parks with noise and more rules and regulations. We may ask whether parks or parts of parks not easily accessible to *any* visitor are worth the cost of acquisition and maintenance when such recreation needs are so obviously not being satisfied.

So long as society is concerned to prevent the extinction of existing species of plants and animals, so long as maintenance of the natural heritage is considered important, National Parks play the fundamental role. Only by creating a viable National Park system can we be sure that a sensible contribution is being made to the maintenance of biological diversity. Parks which are too small to encompass the habitat requirements of each species native to their area do not contribute to this objective. As on small islands, the end result is fewer species, a lower diversity.

The cost of maintaining large areas of land with natural landforms, plant cover and animal associations in numbers representing the diversity of the nation itself—areas which provide opportunity for learning more about man's ecosystem *and* for simple enjoyment—is an item which must be given appropriate priority in the nation's budget. The diverse demands of a pluralistic society, not simply someone's perception of the wishes of the majority, must be accorded appropriate attention in the nation's planning.

This special supplement to AUSTRALIAN NATURAL HISTORY deals with the need for natural areas and the problems of preserving them. *D.J.G. Griffin, Director, The Australian Museum.*

Saltbush—Bluebush
plain, Kinchega
National Park,
western NSW
(Photo by S.J.
Smith-White).

THE GODS OF URBAN MAN

BY DEXTER DUNPHY

AN ECOLOGIST'S VIEW THE FAILURE OF OUR NATIONAL PARKS SYSTEM

BY HARRY RECHER

THE UNWRITTEN COMPACT

BY ALLAN FOX

DEXTER DUNPHY is Professor of Business Administration and Head of the Department of Behavioural Science in the Graduate School of Business, University of New South Wales, Sydney, Australia. He has published many articles in social science journals and is author of several books. He has conducted several major research studies and has had a wide range of consulting experience with business, industry and government.

HARRY RECHER, a Senior Research Scientist, is head of the Department of Environmental Studies at The Australian Museum. Dr. Recher is an ecologist and is especially interested in the ecology of bird and mammal communities.

ALLAN FOX is in charge of the Environmental Education and Wildlife Extension Section of the NSW National Parks and Wildlife Service. He sees nature as the greatest store of information with which man might ultimately learn to live in greater harmony with his environment. Man's options remain open only so long as a wide range of reserves of nature remain. To him, environmental education is the key to man living a richer life and to his species' survival.

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The quotation from Thoreau is published through the courtesy of Houghton Mifflin Co. Boston U.S.A.

THE GODS OF URBAN MAN

Modern man is increasingly urban man. In Australia, 87% of the population is urbanised now. Population experts predict that, by the year 2000, over half the world's population of 6.5 billion will be living in cities. Some of the world's cities are growing at fantastic rates. Population growth rates of 70 to 106% over the next ten years are forecast for cities such as Bogota, Kinshasa, Lagos, Addis Ababa, Teheran, Baghdad, Karachi, Delhi, Bangkok and Bandung. Throughout the world a human avalanche of migration is redistributing world population from villages to towns and cities so that the *average* doubling time for city populations in the less developed regions is now fifteen years. The medical revolution which began in the West reduced the death rate and created the population explosion. Land shortages and mechanised farming resulted in a vast surplus of redundant agricultural labourers who continue to stream to the world's bulging megalopoli.

To move to the city is to lose a sense of one's direct dependence on the natural world for life. In hunting societies, there was a daily realisation of the vital but tenuous thread connecting the band's continued existence with the land in which band members foraged for food. There were animals to be hunted, fish to be caught, seeds, nuts and roots to be gathered, water to be found. With no food storage, survival was the day's central task. Consequently, primitive man was animistic. His world was a living universe of unpredictable passionate cosmic spirits and man's role was best fulfilled by fitting in with these archaic forces. To attempt to control them was a dangerous undertaking for the individual (as in sorcery) or a serious total collective involvement for the whole tribe (as in fertility increase or rain ceremonies).

Agriculture gave man larger and more permanent communities and a sense of greater control over the natural world. But agriculture also emphasised, perhaps

deepened, man's sense of dependence on the earth. The focus of religion moved to death and rebirth based on the rhythm of seasonal sowing and reaping. There was a growing confidence that collective conformity with the cycles of the natural world could win salvation. Ritual was a rehearsal, re-enactment, celebration of sowing, germination, growth, death and rebirth. At the same time man's activities began to have their first large impact on nature. Forests were felled and the earth's tree cover began to diminish significantly. Population began to increase substantially. Hunting bands typically practised effective forms of population control to regulate the size of the band and maintain its viability—abortion, infanticide and abandoning of the elderly were common. Agricultural groups could store surpluses to cover poor seasons so these traditional forms of population control were abandoned. While agricultural man realised his dependence on the earth he did not understand fully how to cooperate with natural processes to ensure the earth's renewal. Slowly, sizeable areas of arable land were vitiated.

The move to cities began the process of extinguishing, for a proportion of the population, a sense of identity with the earth. Most urban dwellers had no direct experience of winning food from the land and consequently their sense of awe and reverence for the natural world diminished. Man rather than nature is central to the experience of the urban dweller. So, with the rise of cities, for the first time a significant proportion of humanity was alienated from the natural world. To live in the city is to lose a sense of man's limited place in nature and of the shortness of human life so apparent to those whose nights are spent under the stars. To live in and with nature is to be confronted continually with one's own mortality and relative insignificance. To live in the city is to make man supreme in the universe. The gods of urban men are simply men writ large.

JOHN CARMOLITA





Gregory Millen/Australian Museum

The massive rise of urbanism began, of course, with the industrial revolution. Industrialisation grew out of Western science and was the pragmatic application of new scientific discoveries. Science and industrialisation created a new set of social values, a new texture of social thought. With their world dominated by machines, people began to view nature, not as a living and responsive organism of which man is part, but as a machine apart from man himself. People began to act on nature as if it were an alien and inanimate object. Newton's brilliance laid the basis for a mechanistic science which reinforced this view and which still dominates Western thought today. Scientism became the religion of urban man—a kind of cargo cult which would usher in a new age of affluence for all as nature was subjugated to man's needs. The typical 'natural' area in the city today is not natural at all, but is laid out in clipped hedges, beds of annuals and concrete paths. It is in fact a celebration and demonstration of man's ability to subjugate, direct and confine nature.

In the industrial revolution man developed a mode of relating to the world that is basically manipulative and exploitative. Nature was seen as God's gift to man for man's use—a limitless source of raw materials to be won for factories, to be transformed into goods to be sold for profit in the cities. As Max Weber pointed out in tracing the rise of capitalism and the Protestant ethic, material success came to be viewed as a practical index of salvation, as 'God's favour'. Darwin's evolutionary theory was also taken as evidence that the strong triumph.

Economists increasingly became the high priests of urbanism and they redrew our picture of man and nature to fit the new world ethos. Economic man was viewed as a voracious gobbler of goods and resources, with a keen rational sense of where to get the most profit for his labours. The economists, largely unwittingly, also redrew our picture of nature. Economic

value was regarded as virtually synonymous with social value so that anything without economic value was worthless. Man-made items were valuable whereas anything natural was valueless except as something potentially transformable by man. Fresh air was worthless, natural beauty was worthless, unless framed by a window, a forest was worthless except as potential lumber. Economics largely ignores man's dependence on nature. It magnifies the minor transactions between men and minimises the major transactions in nature such as the exchange of oxygen between plant and air, the exchange of water between land and sky, the slow safe transition of decaying materials into life-supporting humus.

It is not surprising that with such a philosophy, natural areas have been increasingly modified to serve economic and utilitarian purposes. Particularly in cities, natural areas are defined as wasteland. Wetlands and gulleys are seen as suitable for filling with garbage; streams are obstacles to be confined and turned into drains. Wasteland is then increasingly replaced by such 'useful community assets' as factories, parking lots and playing fields.

This is a direct result of the fact that economics, now our 'common sense', has no place in its basic model for man's dependence on nature. Economics does not treat natural resources and processes as capital and yet, as Schumacher has pointed out, "If we squander the capital represented by living nature around us, we threaten life itself". Natural areas in urban settings are, in economic terms, an unproductive luxury because, suitably modified, they could bring in revenue. And yet the most superficial reading of the 'homes for sale' section of any urban paper will reveal that parklands, rivers, lakes and coastlines add substantially to the value of homes. Similarly, on holiday weekends our highways are crammed with carloads of urban dwellers abandoning the city in search of

natural areas. Ecologically, of course, substantial natural areas within city limits are our only guarantee of continued fresh water and other basic life sustaining and renewing elements we need to survive and live whole, healthy lives.

Society is increasingly organised to reward those with a bulldozer mentality. Unfortunately, the industrial revolution coincided with the opening up of vast new areas of the earth's surface—North and South America, Africa, the South Seas including Australia. Their abundance of natural resources reinforced our belief that the world was an inexhaustible cornucopia created for the profit and pleasure of man. With ships, steam engines and horse-drawn carriages at first and later with planes, trucks and bulldozers,

native plants at considerable expense.

Our concentration on short-term economic benefit, our enshrining of the 'rip-off', has led us to lose our sense of the wholeness of life. We fail to see that nature consists of interdependent life support systems and that our incursions into the total ecological system have inevitable repercussions on other parts of the system. Natural areas in urban settings are a reminder of the interrelatedness of the different species of plant, insect and animal life. A wetland area consisting of swamps and mangroves, for example, is a living laboratory where such interrelatedness can be studied. Here the small fish can be seen gathering nutriment from plants and mud in the shallows; waterbirds and larger fish can be seen feeding on small fish and insects;



the frontiers were pushed back, mountains and beaches were forced to yield up their metals, forests were pulped, swamps filled, rivers dammed and animal species decimated or eliminated, until there are no more frontiers except the sea and we begin to calculate how long the remaining non-renewable resources will last.

Only now when natural areas are dwindling fast is there an emerging appreciation of bushland and its native life. Only recently has any variety of native plants been deliberately planted in backyard gardens and suburban parks. Ironically, the bulldozer often scours off the bush, houses are built and then the new inhabitants buy back topsoil, bushrock and cultivated

a fisherman can be seen offshore catching larger fish. Municipalities need natural areas as a focus of educational activity.

Aldous Huxley in his last novel *Island* draws the image of an ideal community to counter the image presented in his earlier novel *Brave New World*. In it, Will Farnaby is introduced, amongst other things, to the education system of this ideal island, and he asks:

"How early do you start your science teaching?"

"We start it at the same time as we start multiplication and division. First lessons in ecology."

"Ecology? Isn't that a bit complicated?" "That's precisely the reason we begin with it. Never give

children a chance of imagining that anything exists in isolation. Make it plain from the very first that all living is in relationship. Show them relationships in the woods, in the fields, in the ponds and streams, in the village and the country around it. Rub it in."

Natural areas in a locality are places where adults and children can learn these lessons. And learn to value nature for its own sake not for what it can buy us. When we elevate economic values above all else we lose our souls. Paradoxically, we also destroy a viable economic base for society in the longer term. There is no sound economy without sound ecology.

Alienation from nature is alienation from self for we are ourselves part of the natural order. The modern city is an image of ourselves—fragmented, chaotic, hurried and out-of-control. The more the modern city gets out of control, the more we try to bend it to our will forcibly. We cut wider swathes through it, lay more concrete, erect taller buildings. All is hard lines and harsh sounds, taut shapes, surfaces reflecting heat and light. The bush by comparison may be equally impressive in size but has softness of form and colour, light and sound, and moves at less hurried rhythms.

The ways we typically use concrete and steel reflect the ways we manipulate each other and ourselves. In learning to live we learn basic modalities that are often so fundamental that we do not consciously reflect on them. Western urban man is a doer—he learns to approach the world instrumentally rather than appreciatively or responsively. His fundamental orientation to the world is to change it—to make it over again—to bend it to his will. This has been borne home to me in recent months since I have bought 40 acres of bushland. Friends and acquaintances alike have asked the same question: "What are you going to *do* with it?" That we might simply want to look at it, live with it, respond to it, be in it, seems to many people quite unbelievable.

An attitude of manipulation is so fundamental a way of facing the world that we make no nice distinctions between man and nature. We similarly try to bend others to our will too—to change, to modify, to force, to manipulate to 'get the best deal out of life'. And so with ourselves—we are in the end the victims of our own manipulations. We display a similar contempt for the deeper natural systems of our own natures. We try to force ourselves into shape, to replace the ebb and flow of feeling with the kind of unchanging moral facade society prescribes as 'good'. We prefer appearing good to being real. We acquire neurotic defences which protect at first others, and finally ourselves, from being 'in touch' with ourselves. Thus to be out of touch with the natural world is to be out of touch with ourselves for we are still, despite our denial of it, part of that living, organic, pulsating whole we call nature. To get in



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Douglas Bagin

touch with nature—the basic uncontrollable rhythms of life, is to regain a sense of wholeness—to develop a response to life is to begin to be response-able. Responsiveness is the beginning of responsibility. Our Western intellectual heritage, in large part, cuts us off from responding to the non-rational parts of our own nature—our ‘wildness’—and so we try to restrain the wildness or wilderness outside us also. Modern man needs to get out of his mind and regain his senses. Accepting wilderness or wildness in urban areas has a deep psychological significance. It is the beginning of learning to stop constantly manipulating the environment as if it were an inanimate external object and stopping long enough to appreciate it, respond to it and have our behaviour modified by it. In this way we may rediscover what it means to respond, to be responsive to our environment—in all its aspects—personal, social and natural. When we stop manipulating long enough to respond, we may then learn to act cooperatively with the world rather than exploitatively and destructively. We may then begin to act responsively and humanely to each other.

The notion that there is a direct parallel between the way we respond to nature, to each other and to ourselves may seem farfetched at first. But consider, for example, modern chicken farming. It depends on razing expanses of natural bushland and replacing it with a monotonous and vulnerable monoculture to provide feed for the chickens; it involves the raising of thousands of immobilised chickens in uniform batteries where they are reduced to egg laying or fattening machines; it involves duplicating the same merciless conditions for migrant workers in chicken processing plants. These workers are dehumanised by robot-like work, minimal pay and a poor working environment. It results in the production of food which is both dreary and low in food value. Because we treat the physical environment, each other and ourselves as machines, the whole process becomes

more and more difficult to control. The system reacts against our insensitivity at all levels—disease, pests and floods reduce the effectiveness of the farming; disease strikes the chicken farm; strikes, absenteeism, low morale and ill-health plague the workforce in the chicken processing factory; poor food makes the consumer more prone to illness. We try in turn to control the process more vigorously with heavier pesticides, more use of industrial arbitration, more cost cutting and inferior inputs in the production process, heavier antibiotics in disease control. Because the urban dweller is alienated from the full cycle of food getting, he is out of touch with the futility and destructiveness of such manipulation. To restore natural areas and small agricultural lots to the city, and make them generally available is to begin to strike a blow against such insensitivity.

Modern man is immersed in business which for many becomes simply busyness, i.e. a flurry of activity designed to fill time and make it possible to forget the meaninglessness and fragmentation of so much of our daily lives. I recently congratulated an acquaintance of mine on being promoted to the position of marketing manager in a large multinational firm. “I’m not sure whether congratulations are in order”, he said. “A few years ago this would have been the pinnacle of achievement for me. Now I feel that it is largely an exercise in futility. I don’t believe that society needs much of what we manufacture—in fact people might be better off without many of these products. If I could afford to maintain my family at a modest but reasonable standard of living, I would leave the company and the city tomorrow”.

For many people today, working is a futile and meaningless exercise, and leisure activity not much better. Keeping busy is one way to forget meaninglessness, but the existential despair persists despite it. We simply use frenetic activity to drive the question of meaning from the forefront of our attention.

Significantly, increasing numbers of people are turning to forms of meditation; I have lost count of the number of businessmen I know who have taken up transcendental meditation recently.

Meditation can be practised anywhere, but is practised most readily in a quiet place alone. Wilderness areas in and around cities provide opportunities for anxious, busy people to wind down and practise solitude. The rediscovery of meaning and significance often occurs at a distance from man's hurried activity. Hugh Prather writes in his delightful book, *I Touch the Earth, the Earth Touches Me*:

"Tonight I discovered nature. For the first time I saw it—not with my ears, although I did that too, but with my eyes. Instead of pushing out at it, trying to understand it, I let it speak to me. On my left, some distance away, was the highway. From there I could hear man—man always arriving, never quite there. Then I looked at the stars. They were silent, and powerful beyond all effort. They were stars, living stars and therefore brilliantly alive . . . how puny are words about stars."

Urban man needs the opportunity for such experiences. Can we put a price on them?

The alienation of urban man from the matrix of the natural world and from himself carries a heavy price. We have plenty of sociological evidence now of the decline of physical and mental health in urban areas. The early Chicago school of sociologists were able to demonstrate that the closer an area was to the centre of the city, the higher was its crime rate. The same phenomenon has recently been demonstrated for Sydney.

However, the phenomenon is not limited to crime rates—the same is true for physical and mental health. It is now clear that, despite advances in modern methods of hygiene and medicine, we in the cities are experiencing a major deterioration in life style, an increase in tension and anxiety, and a series of typical urban symptoms of increased crime rates, drug abuse, mental and emotional instability and physical ill health.

The unavailability of open areas is not the only factor in the urban decline, but it may well be a significant one. The rich tend to acquire the more expensive real estate with trees, parks and gardens. The poor tend to get real estate surrounded by concrete and asphalt. In the ugly US summer of 1967, 83 persons died in rioting in US cities, 1,900 were injured and property damage exceeded \$50 million. The National Advisory Commission on Civil Disorders mounted an investigation into the causes of discontent in over 20 US cities. Lack of recreation facilities was the fourth most important grievance voiced in the black urban ghettos, ranking after police brutality, overcrowded housing and unemployment, and was

seen as serious a grievance as inadequate education. Of the deprivation of the urban poor, environmental deprivation ranks as a serious cause of discontent.

Maintaining or restoring natural areas in our cities is part of the process of restoring wholeness to the city and to urban industrial man.

Open land in the city is also an insurance that, in the event of major crises, we can survive. In Britain during the second world war, unused land, such as that along railway lines, was made available for cultivation. These areas are still being cultivated by families in many parts of London. Similarly, in Scandinavia and Germany, areas of land in and about cities are made available at nominal rental for vegetable gardens. Until recently in Australia, a substantial portion of fresh food was produced in and about our major cities and many families had backyard vegetable gardens. Higher density building is progressively eliminating backyards and has already substantially eliminated market gardens in urban areas. Our modern cities are thus extremely vulnerable, being increasingly dependent on basic supplies brought long distances by high-priced transport. Strikes, civil disturbances and war can now effectively threaten the day-to-day survival of millions. The healthy city has a balanced admixture of natural areas, cultivated land, residential dwellings, factories and offices.

In reclaiming our cities, we could all learn from Lincoln, Massachusetts. I have often walked its nature

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trails, enjoying the pine needles underfoot, the ponds and marshes where white birches are silhouetted against the dark pines. I have even plucked corn cobs from standing corn and enjoyed their sweetness while walking across a meadow. All this is fifteen miles from Boston and right by Route 128, Boston's busiest superhighway. Lincoln has a town conservation commission that, since 1960, has acquired about 700 acres of land. Much of this land has been turned back to nature, other land has been kept agricultural although it could have been 'developed'. Two years ago I attended a town meeting at which citizens voted money to resume and demolish five houses and resettle the families so that the two major areas of conservation land could be linked together to provide miles of a continuous nature area for the enjoyment of the entire community. It would not be an exaggeration to state that the creation of this natural area not only formed a significant and priceless community resource, but in the process the community was drawn together and became a more real community. Cooperation in this area led to cooperation in others also.

Urban man has little sense of community. Only a national threat such as war now creates large-scale community consciousness and commitment in the modern city. New York's deterioration is a parable of

the self-destructiveness of the megalopolis. One way a sense of community can be regained is for those who wish to restore the quality of life of their communities banding together to fight for the provision of natural areas and ensuring their maintenance and appropriate use when the battles are won.

In their intriguing book *The Secret Life of Plants*, Tompkins and Bird have written:

"There is nothing lovelier on this planet than a flower, nor more essential than a plant. The true matrix of human life is the green sward covering mother earth. Without green plants we could neither breathe nor eat".

Urban man's most urgent need is to rediscover the truth of this statement. The task of those who realise this already is to work to reorganise city life to remind urban man of this simple truth so that we may come to our senses and enjoy the natural matrix of our lives before we destroy it and ourselves.

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AN ECOLOGIST'S VIEW THE FAILURE OF OUR NATIONAL PARKS SYSTEM



DORIS BROWN

As an ecologist, I have come to question the traditional concept of national parks because the parks system we are building in Australia does not sample the continent's natural diversity and fails to recognize the ecological consequences of fragmenting natural areas into increasingly small units. It would be best to adopt a set of values which recognizes the obligation and need of all land owners to conserve wildlife and manage the land as part of a world ecosystem. Conservation cannot be assured by simply dedicating more parks. We must redefine our goals and accept that the quality of our life depends on how well we treat our environment.

In 1970, I asked, "Do we need more national parks?" I asked that question in an atmosphere of controversy over the importance of national parks and at a time of increasing concern for the quality of our environment. My answer was an unequivocal 'yes':



national parks contribute importantly to our society and need to be given equal consideration with other forms of land use. Since 1970, we have seen a significant change in the attitude of Australians to their environment and to national parks. Few would now question the need to protect environmental quality or the importance of parks for recreation and conservation. Indeed, during the 70s we have seen quite considerable areas reserved as parks; the concept has been extended to the marine environment and a national parks service established in one form or another in all the states.

In view of these considerable achievements, it is appropriate to see where we stand. *Do we need more national parks?* Even more importantly, will the parks system we are building in Australia do the job we expect of it? Will it preserve our wildlife heritage for the future, provide recreation and cater for the needs

of the scientific community? I don't think it will. What are we doing wrong and how can we correct the situation?

To answer this, we must have a clear idea of what we expect from our national parks. Why have national parks at all? We must then consider whether the system of parks developing throughout Australia is meeting these objectives and, if it is not, where does it fail.

Without the pressures of an expanding population and the irresponsible use of technology, there would be little reason for national parks and nature reserves. Large tracts of country would remain undeveloped or be used so infrequently as to ensure the survival of pre-European environments and wildlife and accommodate the needs of people for outdoor recreation. Parks are for people, but the need for parks is a direct consequence of the impact of humans on the environment.

Australia has some of the most beautiful coastal environments in the world yet coastal parks are small and in eastern Australia mining has been allowed in some of the most important ones—Myall Lake pictured, Angourie in NSW and of course in the proposed park on Fraser Island, QLD



Douglas Baglin

Fraser Island, the largest sand island in the world in both area and volume.

A national parks system should seek to conserve for all people and all generations the distinctive ecosystems and wildlife of Australia and to protect areas of outstanding scenic and historical value. There are important reasons for retaining representative and viable samples of Australia's natural heritage. Natural areas, places where Europeans have had minimal impact, are important for recreation, research, education, retention of genetic diversity and the protection of naturally productive environments. *All these needs are equally important.*

The recreation values of national parks are recognized. Indeed, there is an alarming tendency to consider recreation the prime value of parks and to relegate the retention of diversity, scientific research and education to lesser roles. The idea that, 'parks are for people', does not mean they are playgrounds. It

means that all people, now and in the future, will benefit from the retention of natural areas; recreation may be a benefit, but people will also benefit from the results of research, education and the protection of wildlife.

There is also an ethical constraint on our use of the world's resources: all life is of equal value and we are morally obliged to ensure that no plant or animal becomes extinct as a result of our activities. In some cases, this may demand the reservation of natural areas to the exclusion of any use by humans.

Human activities, whether tourism, farming or forestry, tend to simplify the environment. The numbers and kinds of plants and animals are reduced and complex ecosystems replaced by simple ones. In essence, national parks are dedicated to the preservation of diversity and the success of our national parks system can be judged on the basis of how well it samples and preserves the natural diversity of the Australian continent.

Despite the growth of the last few years, less than 2.5 per cent of Australia has been reserved as national park and much of this is in the arid regions of the centre. There is also, in my view, a growing reluctance to commit more land to parks and, in particular, to reserve areas which may contain valuable forest, water and mineral resources. Yet the area of existing national parks in Australia is only half that recommended by the United Nations as a minimum goal for conservation and in no way adequately samples the full range of habitats and wildlife which are distinctively Australian.

In a recent review of the major plant alliances occurring in Australia, it was shown that about half were not recorded or were poorly represented in existing reserves. When it is realized that some of these communities occur on very small areas and are threatened by exploitation or development, we begin to see the ways in which our parks system has failed.

The tragedy of our rainforests encapsulates the difficulties faced in establishing a system of reserves which will represent the full range of Australia's natural environments and adequately conserve its wildlife. Rainforest occupies only a small part of Australia and large areas have already been cleared for agriculture. It is a distinctive and important ecosystem with a large number of plants and animals occurring nowhere else; yet, rainforest is poorly represented in existing reserves and proposals to reserve additional large areas have been effectively resisted by commercial interests. Despite strong representations by a committee of scientists advising the Minister of Lands for their reservation as national park, the important Border Range rainforests in New South Wales may be logged. In Queensland, large areas of rainforest on the Cape York Peninsula are being cleared to provide pasture for cattle. In terms of the national economy the exploitation of these areas of



Gregory Millen/Australian Museum

rainforests means little, but as representative samples of Australia's rainforests their reservation is critical. Indeed, when it is considered that Australia may be one of the few nations affluent enough to afford to reserve its rainforests from commercial exploitation, the rainforests of northern New South Wales and Cape York attain special importance to the conservation of world ecosystems. Yet we dither, and in deference to local interests and short-term gain seem ready to sacrifice our last opportunities to include adequate samples of rainforest in our national parks system.

Not only does our park system fail to sample the continent's diversity, but within our parks we allow mining and resort development. Lands are excised for airports and logging or incinerated through 'control burning' to protect adjoining properties. Two of Australia's grandest coastal environments are being defaced by mineral sands mining: Myall Lakes National Park in NSW and Fraser Island in Queensland. Uranium mining threatens Kakadu in the Northern Territory and Tasmania's wild southwest is exploited for non-essential hydro-electric power. A close study of Australia's national parks becomes a study of environmental desecration. In Australia, national parks have been largely established on land, with no value for forestry, agriculture, mining or development. They have not been selected for their importance to Australia's heritage or as part of a system setting out to rationally sample the nation's wild resources and ensure the needs of the community for recreation, research and education. Nor have we chosen parks to ensure that they contain the full range of habitats needed by wildlife.

Unless we substantially change our objectives as a society, there is no reason to believe that Australia will differ from elsewhere and our parks will increasingly be isolated in a sea of development, agriculture and intensive forestry. They will be islands and, though they are often beautiful and interesting, islands are not good places to conserve a continent's wildlife.

The theory of island biogeography is simple but useful in creating a system of national parks: islands have fewer species of plants and animals than similar sized areas on the mainland and small islands have fewer species than big ones. To double the number of species in a park or on an island, we must increase its size ten times over. We also know that islands which

Australia has the smallest area of forest of any continent and only small areas of rainforest, and yet rainforest has been cleared for agriculture and forestry and little is protected by the formation of national parks.

Mangroves at Lizard Island, Great Barrier Reef, QLD. It is as important to conserve estuarine and marine communities as it is to conserve terrestrial communities. Australia has few marine parks and national parks generally end at high tide mark. Such boundaries are highly artificial and illustrate the need to rethink our whole approach to conservation, giving recognition to the continuity of ecosystems.

P. U. Weate





Douglas Beppin

Domestic stock at Kosciusko. Cattle and sheep have no place in a national park but permission was recently given to graze in the Snowy Mountains as a drought relief measure. Such action reflects the shallowness of the commitment of the community to national parks and illustrates the need to think more clearly about what we wish to achieve by the reservation of park lands.

are isolated from one another or from the mainland have fewer species than islands close to a source of colonization. It follows that if we wish to preserve naturalness and maintain diversity, we must either reserve large areas *or* arrange our parks in a pattern which allows the easy movement of plants and animals between parks. We might, for instance, connect them by corridors or cluster them together. These are simple things to do and should be an integral part of park planning, but unfortunately our approach to national parks is different. Most Australian parks are small, have irregular boundaries and are not clustered or connected by corridors. We cannot expect them to adequately sample our wildlife or ensure its survival.

How big is large? One biologist has estimated that a national park would have to be at least 20,000 hectares in size before it could accommodate all the different species of macropods found in Western Australia. Even then it would probably be too small to maintain a viable population of the Red Kangaroo, the largest species. Ornithologists working in New Guinea have found that islands as large as 5,000km² (500,000ha.) lost, in about 10,000 years, around half the species of birds present when the island was cut off from the mainland. Smaller islands of only 100km² lost ninety percent of their species of birds during the same time. Though 10,000 years seems a long time, the rate of extinction on the islands is probably highest during the first few centuries of isolation and small islands have been observed to lose ten to twenty per cent of their avifauna in less than a century. Were they islands, few parks in Australia would be large enough

to retain even ninety percent of their wildlife 'for the future'.

Besides the indications given by islands, there is another way that biologists have begun to estimate the minimum-sized areas which need to be reserved to ensure the long term survival of species. For a population to remain viable, it must retain enough diversity in its gene pool to respond to changing environmental conditions. Though there is some controversy on the subject, it is generally accepted that populations need to be in the order of thousands to retain sufficient genetic diversity to be able to withstand the effects of such catastrophes as drought or fire or to adapt to more slowly changing environmental conditions. Large animals or wide-ranging species which naturally occur in low densities will therefore need very large reserves for their survival. The population densities of a few large Australian mammals are reasonably well known and it has been estimated that 10,000ha is the minimum-sized area needed to protect a genetically viable population of the Greater Glider in forests of the southeast, and between 1,000 and 10,000km² to reserve viable population of the Red Kangaroo in an arid region.

It is clear that parks must be large. They must also contain the full range of habitats to which the wildlife of this region has adapted. This is not to say that small areas are useless; quite small reserves can be important in the conservation of particular species of plants and animals. However, the smaller the area reserved, the fewer species sampled and the greater the risk of extinction of species with only small populations. Each extinction reduces the diversity of the environment and in turn probably leads to new extinctions until an equilibrium is achieved between the remaining sets of species and their new environment. It is also worth



noting that small parks have proportionately more edge than large parks and that if the surrounding habitat is cleared, species favouring edge conditions will fare very well, but those suited to the habitats of the centre of the reserve will do poorly. This is why small bushland reserves in cities are so hard to maintain free of weeds. Boundary effects are intensified if the reserve has an irregular border or it is long and drawn out. The best shape—the one with least boundary and edge effect—is a circle, but few parks in Australia approach this ideal. Most have borders drawn to conform to a previously existing division of lands to suit human activities and not the requirements of wildlife. While we may not wish circular parks in practice, we could recognize existing biological boundaries in reserving lands for conservation. For instance, in dedicating the Nadgee Nature Reserve in southeastern New South Wales, the borders should have included the entire catchments of the rivers flowing through the reserve. Were this done, we could be certain of protecting the freshwater ecosystems of these rivers and retaining them as important scientific reference areas. As it is, both rivers, the Nadgee and the Merrica, will be affected by logging and road construction at their headwaters.

As astute readers may already have guessed, I am not as optimistic about national parks as I was in 1970. I am firmly convinced that the reasons I have outlined for reserving natural areas are valid and that the quality of life depends very much on the retention of wildlife and wild areas. Practically, I don't see a way to create a national parks system in Australia which will achieve the goals I have set out and yet conform to the political and economic realities of Australian society.

We have made a major error in establishing a system



David Middleton

of parks so divorced from ecological realities. Our national parks might best be viewed as a legacy of 19th century conservation attitudes and of value only as a temporary expedient. Proposals to partially correct the situation by creating a system of 'ecological reserves' based on our greater understanding of ecology and designed to sample representative ecosystems do not really come to grips with the problem. Such a system of reserves must inevitably encounter the same ecological limits as the existing system of parks. An ecosystem, a population of birds or a species of plant recognizes no boundaries, be they political borders or the bounds of a park. Distribution and abundance is determined by environmental factors, not lines on a map.

The forests of eastern Australia, for example, form a single system which changes gradually from north to south, with altitude and with topography. We should manage the forests as a system, dispensing with boundaries between parks and state forests, between states and between private and crown lands. To be sure, we would need a system of zones which recognize the value of one place for timber production and the value of another for wildlife or recreation but, like the forest, these zones should be dynamic. The application of ecological management in this way would greatly

Extensive areas of Australian forest are cleared for the cultivation of exotic pines. The future may see national parks as islands, isolated in a sea of development.

Controlled burning in the Warrumbungles National Park, NSW. Park authorities and other managers of the land throughout Australia have adopted a program of regularly burning forests with the object of preventing or being better able to control wildfire. Unfortunately this has been undertaken with little research into the effects of fire on wildlife. Many biologists are extremely concerned that regular fires will change and simplify the environment.





THE UNWRITTEN COMPACT

"An unwritten compact between the dead, the living and the unborn requires that we leave the unborn something more than debts and depleted natural resources."

Washington State Supreme Court.

Our feet hadn't made a sound for half an hour or more after leaving the sucking bogs of Philips Lead. Deep moss muffled everything in the beech forest, the floor, the logs, the trunks—just the faint air sound as the canopy above disappeared in white mist. We were away in the 'antarctic' forests of southwest Tasmania—away and alone, except for a friendly pot-bellied scrub wallaby which we fed later that night by the campfire, and which later still snored its head off until its life was snuffed out by a padded thump then a hurried munching.—Devil? Tiger? Wilderness.

Yet another wilderness, tropical rainforest—I untangled myself from the wait-awhile palm 'thongs' into which I had blundered chasing the unbirdlike sound of a green catbird which had turned out to be an Albert Lyrebird keeping his mate happy going through his repertoire while she tirelessly turned over the soft brown earth in search of food. Large eyes adjusted to the dim light of the forest floor directed the feet and the bill in search of worms and crustaceans. Like rocket fins, the buttresses of the booyongs and the fig trees supported great grey cylinders of tree

trunk as they reached for the sun so far above the trees themselves, thrusting through a ceiling of soft green 'dinner plates', leaves of the stinging tree with splashes of red marking the newly shooting red cedars. Orchids, ferns, mosses, lianas, fungi—almost any plant of any shape which could get a hold seemed supported by the forest trees and some of these plants contained drugs of possibly great value to man—but we don't yet know.

Desert red sandhills, soft, still cool in the early dawn—footprints fresh in the sand. The tiny paired prints of *Antechinomys* ahead of the deep careering paw marks of the dingo and then a wild turn as the dog veered past a mulga stump—beyond, only the dog prints. With upjerking tails a pair of crested pigeons argued in the dead top of a beefwood while beyond, the liquid call of the western bellbird floated on the stirring breeze. A line of higher boxtrees under their shrill crown of wheeling galahs and corellas marked Bancannia waterhole. But all around was sky, sky right to the ground, blue to red, no ridges or mountains to intervene, sky and air which later would turn hot and maybe tinged with dust, when the red kangaroo would push himself deeper into the sand under the meagre shelter of a mulga or emu bush. Desert.

Sturt, Lamington and Frenchman's Cap National Parks, just three of the many elements of the Australian landscape.

What is the Australian landscape? What makes it

Bluegum Forest
in the Blue
Mountains National
Park was saved
from destruction
by Sydney bush-
walkers who
purchased the
area for the nation.



A. Fox

increase the probability that our forests and heaths, deserts and swamps would survive as natural places.

The removal of 'fixed' boundaries would permit the manager of the land to respond in an ecologically responsible manner to natural changes in the forest (or heath or desert), to the changing economic and cultural requirements of society and to the different needs of wildlife. As the forest is dynamic and changes through time with change in climate, the maturation of trees and the effects of fire and storm, our system of conservation should also be dynamic. Our existing system of parks and reserves cannot respond to change; it will not and it cannot achieve the goals we have set for it.

Alligator River, Northern Territory site of the proposed Kakadu National Park. The conflict between dedicating this scientifically important area as a National Park and mining for uranium illustrates the lack of commitment of the Australian people to the conservation of their heritage, which should be a national priority.

live? Why is it different? What has European man done with it? Will it survive? Should it survive?

Australia today is one of the more stable areas of the Earth with few quakes and tremors. We are, in fact, on a part of a large wandering continental mass now called the Australian plate which broke free from the Gondwanaland supercontinent probably earlier than sixty million years ago. Until some seven million years ago this land drifted northwards a few centimetres each year, until it came into collision with the Asian plate. We still move inexorably northwards throwing up before us a 'bow wave' of broken and twisted land—so slowly but sometimes so violently as the stressed northern lands crack—the Indonesian quakes and eruptions of this year.

However, it is this unique sequence: early connection with the southern continents, breakaway and 5000km drift, and the later collision with the northern landmasses which led to our diverse biota. Unique circumstances which have produced the unique Australian wildlife.

While much of the detail remains for further discovery there seems to be little doubt that the marsupials and the monotremes along with many plants have Gondwanaland origins. Much later the eutherian rats/mice and many tropical rainforest plants have crossed the narrowing seas from Asia to become successfully established, a process which still continues in the testing grounds of northern Australia. Of the source of the two overwhelmingly Australian



genera *Acacia* and *Eucalyptus*, there is still some doubt, but it is thought that *Acacia* was probably a tropical genus; it has radiated forming over 500 species, to become established from cool mountain tops to the desert. *Eucalypts* probably have a southern origin.

Between seven and three million years ago, perhaps due to forces set up by the Plate collision, a slow uplifting of the eastern rim of Australia began building the Eastern highlands which today contain the most elevated lands, those from the Brindabella-Kosciusko region to Mt. Baw Baw. Subsequently along the Pacific seaboard a narrow coastal plain developed as the slopes of the highlands retreated before the erosive forces of rains borne on the easterly and southerly winds. The fluctuating levels of the sea further modified this narrow strip, barring off bays, forming lagoons, sandy lowlands and sweeping lengths of beach. On the continental shelf off Queensland, the greatest chain of coral reefs has developed in the clear, warm waters.

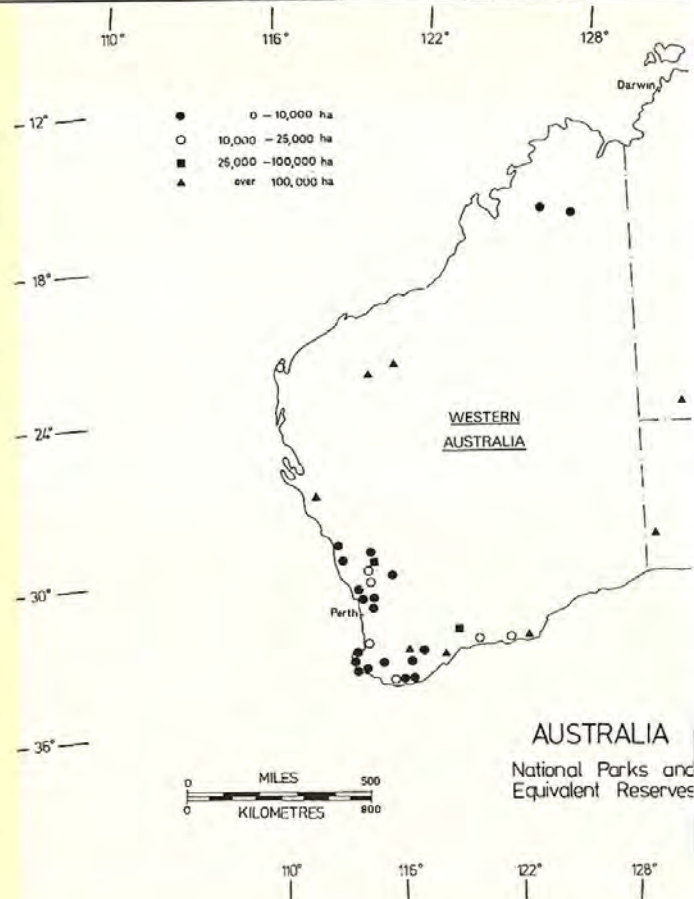
West of the highlands the land slopes gently to the Murray-Darling and the Lake Eyre basins broken only by residual ranges of older hills and by the remnants of shield volcanoes (Warrumbungle Mtns, Mt. Canobolas and Mt. Kaputar). There are few hills which break the endless horizons of the western plains and dune field of the mallee and mulga lands. Beyond the meandering channels of the senile rivers, the land rises to the low ridges of the ancient Barrier Range which fades into still more dune areas, beyond which the Cretaceous mesas of the Grey Range run off into the channel country of Queensland.

Beyond the shimmering pans of the Lake Eyre region, where water is usually a mirage, the second half of Australia remains an arid land where rain, when it falls, is accidental. Like arid lands in most places, rain when it comes, may be a deluge on a broad front or it may be a chain of storms briefly bringing a surge of life—germination, growth, flowering, seeding—food for nomadic animals to stimulate breeding—sometimes the breeding of plagues to provide food for the gathering flocks of predatory birds. Then death for many as the residue, protected by their adaptations, await the next spell of life-giving rain.

Thus Australia has a humid south-west, south-east, east and northern rim, lands of the forests merging with woodland areas which fade into an arid interior of scrubland, shrubland and grassland. The altitude and varied aspect provided by the low ranges and mountains vary this general pattern, in detail.

Each State presents a similarly diverse pattern of communities, but each differs in the component parts of those communities. An Australia-wide nature conservation system therefore demands the activity of all states.

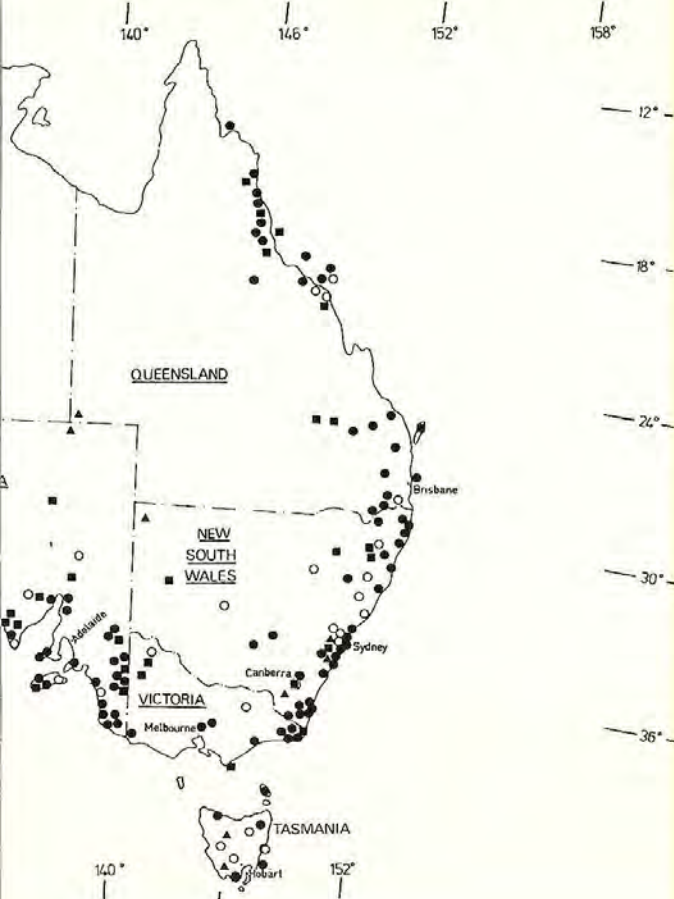
Whether our conservation interests are with the animals which have the vegetation as their main habitat



component, whether our interests are with the scenery or are aesthetically oriented or whether they be with a concern for the maintenance of bits of pristine Australia for enjoyment or science, the quality and condition of the vegetation is one of the most widely used measures of the success of nature conservation activity.

Aboriginal man, a hunter/gatherer, arrived in Australia from the north more than 40,000 years ago bringing with him the firestick and, probably later, the dingo. These added to the shifts being wrought by the climatic changes of the last 'ice age'. From fossil discoveries made in the lunette dunes of Lake Menindee (Kinchega National Park) we are certain that many species of marsupials, particularly the larger herbivores and carnivores, among them, *Diprotodon* sp. (giant wombat), *Procoptodon goliath* (giant kangaroo), and *Thylacoleo carnifex* (marsupial lion) became extinct during this period.

Eighteen years after discovery of the east coast by Cook, settlement began on the shores of Port Jackson (1788). Sydney, on the coastal plain lies within a crescent of rugged infertile sandstone country rising to 1000 metres. For 25 years the settlers remained tied to the plain but in 1813 a way over to the productive western slopes was discovered and soon the pastoralists and their flocks were moving down the valleys and into the interior. There was little to bar their progress—preceding the sheep, exotic disease decimated the Aboriginal camps. By 1850 the best



been shown to have caused spectacular habitat changes when coupled with sheep and rabbits—1865-70 the old man saltbush sub-stratum of the Riverina myall scrub, *Acacia pendula*, associations, all but disappeared as drought feed while in the succeeding 1875-7 drought, the myall itself followed. This scrubland is now grassland. The 1901 Royal Commission into the drought disaster of 1892-1901 noted similar changes in the mulga communities. Accelerated wind erosion was beginning to cloud the skies of the continent's humid fringe with dust.

While the 'civilizing' of the countryside was taking place, the majority of Australians were settling in the towns.

As one of the most urbanised and industrialised societies, we have developed an insatiable demand for resources of the land—for power, minerals and plant/animal products—and in so doing have become enmeshed in the larger world systems of supply and demand. Whether we like it or not we have a multi-national orientation which further deepens the drain on our natural resources. Urban living, however, has freed the population from the daily and seasonal rhythms of the primary industries and—through industrial bargaining, shorter working hours—longer leisure time and a greater share of the profits of work have been won. Spare time, spare cash and mobility are becoming more widely available and, as a consequence, a greater demand is developing for recreational use of natural resources.

The question now being asked is whether forests producing woodchips can also provide a recreational resource or, for that matter, does the individual or corporate organisation have the right to pre-empt common resources of scenery and space for personal profit. The rutil miners complain that it's costing a million dollars of public relations to counteract the conservationists' \$10,000 campaign. Pedder, Kanangra Boyd, Barrier Reef, Kakadu, Precipitous Bluff, Myall Lakes, Little Desert, Border Ranges and Fraser Island all have two things in common—that they are National Park proposals but they are, or were, also under threat of conflicting land use which is potentially destructive of the National Park value. The controversial study of the Club of Rome, 'Limits to Growth', points out that man has very few years in which to make amends in his squandering and fouling of resources. Even if the forecasts are exaggerated threefold, the days of reckoning will still fall in the lifetime of people now alive. It does not seem profitable to quibble about the few years involved.

Perhaps the earliest demonstrations of the error of assuming that Australia could be managed by its European settlers after the style of Europe occurred in the colony's first four years when it very nearly starved due to drought and to the low productivity of the Sydney soils. Then followed the disastrous floods of

parts of the coastal plains of NSW had been taken up by farmers and by 1870 sheep had reached the northwestern corner, preceded by the miners. Settlement and population growth both received a great boost when gold was officially discovered in many areas from 1851 onwards. John Gould, the naturalist, in 1863, expressed fear for the survival of the large indigenous animals while in that year the sheep population of NSW was already passing 40 million. At the same time, wool production was given an added stimulus by the cotton famine in North America.

The combined effect of clearing, overstocking and rabbits proved disastrous to the habitat of the smaller native mammals, but the droughts following the mid 70s began to reveal the huge build-up of kangaroos on the Monaro and New England. In 1880, the kangaroos were placed on the vermin list.

By 1884, railways had broken the yoke of distance, tying the crop-producing western slopes to the ports and setting the seal against the retention of the natural communities in that area. Meanwhile, the hunger for land was beginning to completely consume the resource, so the Crown Lands Amendment Act of 1889 was passed to make available for leasing, the second quality and difficult marginal lands.

However, sheep and rabbits were gnawing away further inland, with every available hectare of the NSW arid land by the turn of the century being taken up by lessees. At least two major drought periods have



A. Fox

Pandanus palms grow on the edge of Heron Island in the Capricorn Group of reefs and cays of the Great Barrier Reef.

Mootwingee Historic Site in western NSW is a land of tormented cypresses and dry red sandstones, deep in gullies which were permanent waters. Aboriginal art and campsites are scattered throughout the area.

the Hawkesbury. In response to resource problems, Governor King in 1802 forbade the cutting of red cedar without his permission and in 1803 prohibited the felling of timber on the banks of the streams.

However, Australia was a huge place with more horizons always beyond the last. Before his onslaught, the wilderness fell back. But there were among these people some who developed a fascination and a love for their new land. These people began to band together or to act individually to bring pressure to bear on the governments. Large numbers of reserves for public recreation and scenery, and reserves for the preservation of flora and fauna began to be set aside after the mid-nineteenth century. Among these are the reservations which we now find so useful around coastal estuary and lake shorelines, probably the single most important recreation resource, and the

cave reserves, e.g. Jenolan Caves, 1866. By far the greatest initiation of these was by the Departmental officers of the day. In 1879 for instance, a total of 700 miles of shoreline crownlands of Victoria were reserved for public purposes alone.

In the meantime New South Wales dedicated the second national park in the world on April 26th, 1879 to be known as The National Park, comprising 18000 acres of the dissected sandstones along the coast just south of Sydney. In 1892 a group of citizens petitioned the New South Wales Government for the establishment of a national park to the north of Sydney to encompass the grand scenery of the flooded river valleys of the Hawkesbury River. Thus Ku-ring-gai Chase was dedicated as a national park in 1894 to conserve the scenery and natural wonders of the sandstone bushland. The following table lists the introduction of the first national parks in the Australian states.

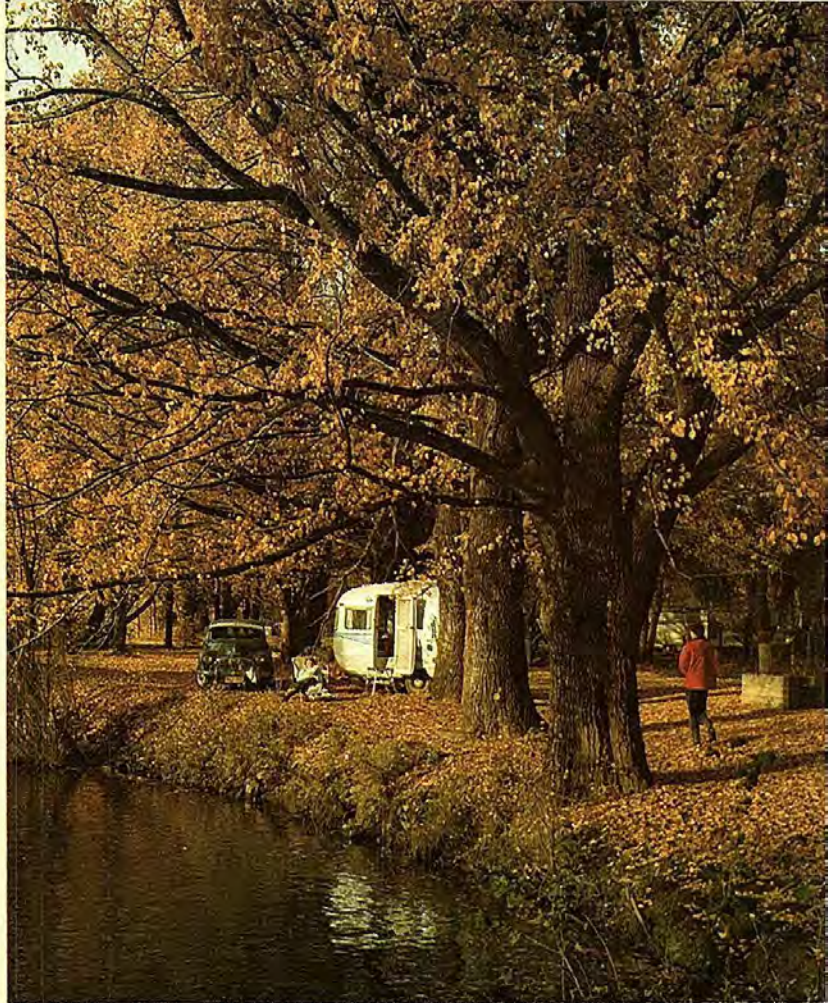
First Significant National Parks in the Australian States.		
1879	NSW	The (Royal) National Park
1891	SA	Belair Recreational Park
1898	VIC	Wilson's Promontory National Park
1900	WA	Kings Park
1908	QLD	Bunya Mountains National Park
1916	TAS	Mt. Field
1958	NT	Ayers Rock/Mt. Olga

An awareness of the need for the preservation of the Australian heritage appeared to have its origin in the '80s as a result of a ground-swell of public opinion which also saw the development of an Australian school of impressionist painters (Condor, McCubbin, Streeton and Roberts).

Concurrently with the growth of Australian schools of art and literature, much progress was made in the development of new strains of wheat which resisted



the fungal disease 'rust', removing the greatest uncertainty from crop success. This led to an unprecedented clearing of the Australian landscape to make way for the crops. History of the time also records that probably Australia's most remarkable botanist J.H. Maiden was producing a phenomenal output of publications relating to the 'unique Australian flora'. Most important was his emphasis on the aesthetic quality and usefulness of the native vegetation in contrast to the introduced plants from Europe. All this activity about the turn of the century produced the first of the protection-oriented activist organisations—the Wildlife Preservation Society of Australia (1909). Then, in 1933, another small but extremely active and highly competent group of bushwalkers banded together in the activist group called the National Parks and Primitive Areas Council of New South Wales. Bushwalking was becoming a pastime for city dwellers, particularly from the professional classes—people who were generally well able to express their sentiments as they were related to aesthetic appreciation of the Australian countryside. As far back as the '30s some of these groups actually purchased land threatened by development to be added at some future time to a National Park (Blue Gum Forest, now in Blue Mountains National Park). Individuals stimulated by this cause generated further organisations and created focal points for the expansion of these ideas in schools, teachers' colleges and universities. From these organisations evolved the New South Wales National Parks Association. The impact of these organisations cannot be overestimated for until the advent of the National Parks and Wildlife Service in 1967, no National Parks were dedicated which did not have their origins in the investigation and promptings from one or more of the amateur groups. Major National Parks arising from these groups include Kosciusko, Blue Mountains, Morton, New England,



Douglas Bagin

The Warrumbungles, Kaputar, Bouddi and Brisbane Waters. As well as the Park proposals, the NSW National Parks Association has played a leading role in the drafting and testing of the National Parks and Wildlife Act. Only in the last nine years has it been possible to systematically build a nature conservation reserve system and by this time many of the habitat types had already disappeared.

1967 saw the passage of the National Parks and Wildlife Act which scheduled National Parks,

Exotic trees in Autumn provide a delightful sight for visitors to the Tumut Valley.

Snowgums on Round Mountain lean away from the icy blasts of the south-west winds which lash the Kosciusko National Park.



A. Fox



A. Fox

Perched on a dolerite column, a man experiences the glorious isolation of the great mountains, Ossa, Pelion West and Cradle Mountain, Tasmania.

established a professional National Parks and Wildlife Service and also established the principles of management by planning rather than by the earlier ad hoc decisions based upon the quantity of moneys made available by the Treasury on an annual basis.

Today, the National Parks of New South Wales include 38 areas with a total of 1,400,997ha covering landscapes ranging from the beaches of the coast, the rainforests of the north and the wet forests of the mountains, from the alpine areas of Kosciusko to the arid desert of the northwest corner. These occupy some 2.5% of the total area of the state.

I have sketched the NSW story here and even this has, because of a space limitation, omitted the extremely important roles played by the Nature Conservation Council, The National Trust, The Australian Conservation Foundation, the professional societies and individuals. Each State, and Australia as a whole has a similar story to tell, some in many ways more dramatic. Increase in Government activity in the field of nature conservation was due almost entirely to the work of voluntary societies and a scattering of tireless and selfless individuals. The total story must soon be recorded before the actors in it pass on.

What does the NSW public want of National Parks in 1976?

A survey of this year conducted by the National Parks and Wildlife Service questioned the following 495 randomly selected public: school children (119), randomly selected adults (336), adults from a conservation society (40).

The table right shows the functions of National Parks and the percentage of the total population sampled who selected the different functions as very important.

FUNCTION	% SELECTING FUNCTION AS VERY IMPORTANT
Protection of native animals	94.5%
Allowing people to see and experience nature	75.7%
Research and scientific study of the environment	61.1%
Education	54.1%
Providing an escape from the city	46.9%
Recreation	41.6%

Several points of interest arise from the above table: (1) Most people surveyed considered the prime function of National Parks to be one of conservation. (2) Active recreation was of lowest priority. (3) Seeing

Onyiah Basim



An Aboriginal family rediscovers their cultural heritage in the Royal National Park. Filling the grooves with sand may eventually obliterate carvings, destroying them for future generations.

nature was considered quite important and would be expected to incorporate passive recreation. (4) The use of National Parks for research rated far higher than expected and this occurred in all of the sub-samples within the surveyed population.

From 1969 to 1975 in NSW there has been an increase in numbers of Parks of 105% while the area has increased by 70.9%. In the same period the number of Nature Reserves has increased by 68% while the area of them is up by 121%. As well, Historic Sites, with special problems of management, increased in number by 50%. Within the same period very significant changes in visitation pressure have also been observed.

Visitors to Selected Australian National Parks

Park	1970	1974
Ayers Rock, Mt. Olga (NT)	27,095	53,067
Kangaroo Island (SA)	20,500	39,000
Rottneest Island (WA)	93,140	188,347
Ferntree Gully (Vic.)	75,000	135,000
Fraser (Vic.)	32,500	56,000
Wilson's Promontory (Vic.)	94,000	152,000
Mootwingee (NSW)	7,800	15,468 *
Yarrangobilly	24,225	31,280

* 1973 figure

NOTE: Statistics may not be directly comparable because of collection methods.

There have been murmurings from some critics of the government's policy in rapidly acquiring land specifically for nature conservation purposes that it would be better to reduce this programme and to start providing facilities, to encourage visitor use and to better manage what we now have.

But this is short-sighted when we consider that the Service's estate, the public's estate, now encompass only 2.5% of the surface of NSW and consumes but .28% of the State budget (1975-76).

Consider the purpose of this acquisition programme—to provide:

- areas of natural landscapes for the recreation of the people now and in the future.
- areas of where interesting, useful, potentially useful and endangered species may be maintained.
- areas providing a source of natural systems for the study of their dynamics and of man's interaction with them.
- a series of 'bench mark' areas, against which systems affected by man's activities may be measured.
- a source of natural systems and phenomena for educational and interpretive purposes.
- areas for the retention of significant landmarks in the development of human culture in Australia.

Consider also the accelerating demand for resources to fill the ever widening gap between demand and supply—10 years ago 200,000 hectares of Eden



Douglas Baglin

forests were wilderness of no great monetary value, today they are the basis for the massive Harris-Daishowa woodchip operation—an example of the way in which advances in technology change our view of natural resources.

Consider the words of E.G. Whitlam (1972):

"There is no greater social problem facing Australia than the good use of leisure . . . it is above all the problem of urban societies and thus in Australia, the most urban of any nation on Earth, a problem more pressing for us . . . for such a nation as ours this could very well be *the* problem of the 1980's. So we must prepare now, prepare the governments of the 80's."

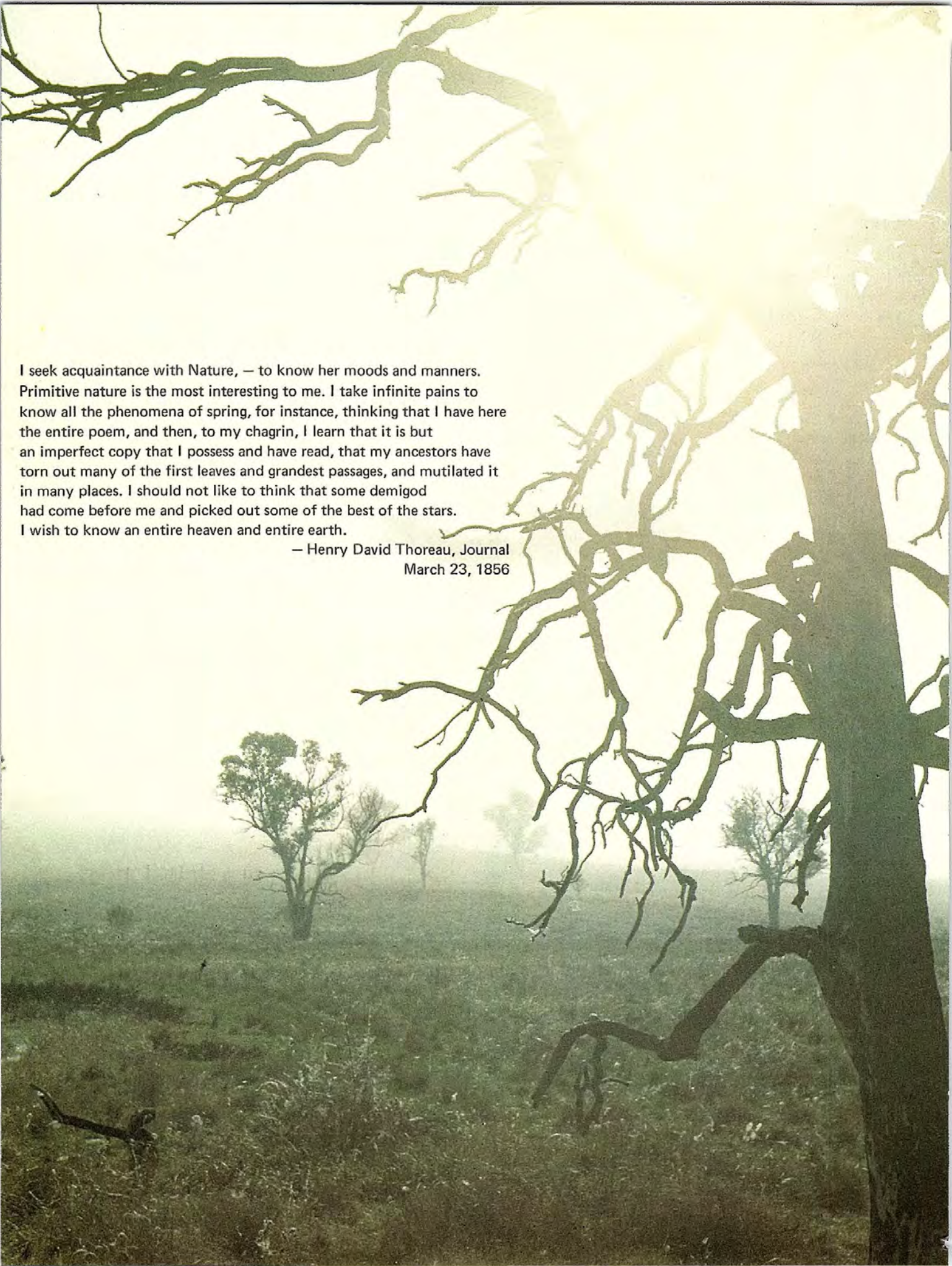
Are we acquiring too much too quickly?

Each generation has a deep and abiding responsibility to the next in ensuring that these special lands are set aside, wisely managed, preserved, and carefully used—the unwritten compact.

FURTHER READING

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Picnic set-up in Myall Lakes National Park. Some people are now so tied to the trapping of civilisation that they must take it with them in true 'ocker' fashion.



I seek acquaintance with Nature, — to know her moods and manners. Primitive nature is the most interesting to me. I take infinite pains to know all the phenomena of spring, for instance, thinking that I have here the entire poem, and then, to my chagrin, I learn that it is but an imperfect copy that I possess and have read, that my ancestors have torn out many of the first leaves and grandest passages, and mutilated it in many places. I should not like to think that some demigod had come before me and picked out some of the best of the stars. I wish to know an entire heaven and entire earth.

— Henry David Thoreau, Journal
March 23, 1856





THE HIDDEN WORLD OF MBOTGO'T

BY KIRK HUFFMAN

Malekula, the second largest island in the New Hebrides, is approximately 89km long, and 40km across at its widest point. The southern interior is split by a mountain range rising at points to approximately 853 metres above sea level, interspersed by numerous complex ravines and rivers. The extreme difficulty of penetrating the interior from the coast has maintained the isolation of Mbotgo't people, the most traditional in the New Hebrides.

Malekula now has a population of over 15,000, making it the most densely populated island in the group. Most, however, live on the coast and have become strongly influenced by the government or missions. Government and mission policy here, until very recently, has been to leave the inland inhabitants alone, until they eventually decide to come and settle on the coast. Most inland groups have now either almost died out, or have already moved, especially towards the eastern coast. The Mbotgo't, however, maintained their almost complete isolation until only approximately ten years ago, when the village of Fienbatap decided to move down towards the eastern coast and found the present-day 'refugee' village of Boudine. Smaller numbers of Mbotgo't descended south to the village of Borumvor, and west to Dixon Reef. Most, however, still remain in the interior, and although numbering only approximately 120, are spread over an area of 200 square kilometres.

Mbotgo't social life is centred around the ritual centres of Yabktass, Kommanlwiver and Londombwey. Londombwey, the most important centre, had not been visited by Europeans until November 1968. Other isolated settlements—M'barrek, Iapkemavis, Tambimbarraman and Laitampus—are spread around the rain-forested slopes of the interior.

Mbotgo't economy is based upon gardening, hunting and gathering, with the main emphasis on gardening. The gardens, cleared by slashing and burning, are on steep slopes often an hour or more walk away from the settlement. The staple food crop is taro, but yams, sweet potato, manioc, sugarcane, bananas, plantains, 'island' cabbage and pumpkins are also grown. Coconuts, sweet oranges, and breadfruit are found nearer the settlements. Gardening is mainly the work of women and consumes their time from dawn until

dusk. The men spend short periods of time hunting with bow and arrow in the jungle for birds (especially wild pigeon) and wild pigs, which are caught with the help of specially trained dogs. A special delicacy is the 'flying fox' (*Pteropus*), the only mammal indigenous to Malekula, and often caught in the early evening by nets stretched between trees across their possible gliding path.

There is a great distinction between the daily and social life of men and women in this area. Women's life is mainly concerned with child-rearing, gardening, food and firewood collecting. Men's life is mainly concerned with complex and time-consuming rituals associated with initiation, social rank, and the world of ancestral spirits. A married man may spend as much as two-thirds of his time away from his family while arranging, preparing, or taking part in the ceremonial life. Women, most of the time, play an insignificant role in this aspect of society.

Let us take a hypothetical (and ideal) example of a man's life from birth to death. Birth takes place in an isolated, specially built hut away from the village. If the child dies within twenty days, the body is placed in the fork of a tree and no mention is made of it. If the child survives after the twenty-first day, the mother's brother will give it a name, normally that of an ancestor. From this time on, until the male child goes through his circumcision initiation rites between the ages of 9-12, he lives within 'the world of women'.

Each Mbotgo't settlement is divided into male and female sections. In the three ritual centres, the focal point consists of a large hut, *namal*, the men's sacred house, where initiated males gather, eat, sleep, and discuss the more important aspects of life. This *namal* is shielded from public view by a 2m high barricade of woven bamboos, and planted crotons and cycas. Between this and the rest of the settlement is a flat cleared area called *bunsara*, the public dancing ground. Near the centre, and a bit to one side of the *bunsara* is an orchestra of upright and horizontal wooden slit-drums, *n'dem nambulkai*. Women are only allowed near the *bunsara* on special occasions. Separated from this area again is yet another which may contain special

Mbotgo't wearing typical leaf penis wrapper and *Nampuki* mask worn to approach *Napet* (funerary bed containing the headless body of a recently dead male) Yabktass village 1974.

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huts for visitors from neighbouring villages. On the edge of this, and bounded again by barricades, are the huts for women and children. This latter compound of huts—and the gardens—constitute the women's world, and that of young male children before initiation. Special pigs, raised almost as pets, also often sleep in these huts. This area then, is the world of young male children with their mothers and sisters. For a male child to be thought properly brought up, he must have *natalbatkar*, an elongated skull-form produced by stringent binding of the skull shortly after birth when his head is covered in a tightly woven basket called *nambencantei*. Also, the lobes of his ears and his nose septum are pierced. From this early age until initiation he shares the women's gardening activities, and participates in a small way in the raising of pigs.

Pigs (*Sus papuensis*), as in much of Melanesia, are ritually important in south Malekula. The 'pig cult',

ultimately associated with the world of the ancestors, has possibly reached its most sacred and prestigious point. Pigs are wealth, power and prestige. Young pigs have their upper canines removed so that the lower tusks will continue to grow: within 7-10 years, these tusks have formed a complete circle and begin to re-appear through the side of the mouth. It is this tusk curvature which is really the basic symbol of wealth: it signifies the amount of work which it has taken to raise the (now ailing) pig. Therefore, pigs are used as an item of payment and exchange. Pigs purchase wives, who raise pigs, who purchase more wives, and so on. Amongst the Mbotgo't, the pig (*nambuas*) is used as an exchange item to obtain the 'right' to perform initiations, to make the art pieces associated with them, and so on through the social ranking and funerary ceremonies until the life after death.

When it is decided that a young male should be 'initiated' he is taken from the 'world of women', and isolated in a special hut in the jungle along with other young males preparing for ceremonies. Initiated elders forbid them to cut their hair (to preserve, grow and maintain their male powers), keep them out of the sunlight as much as possible, and feed them on special fattening foods. During this period of seclusion, they are subjected to ritualised frightening hoaxes and displays, produced to inculcate in them a respect of the power of the ancestral spirits and a fear of the secret, malevolent powers of the female sex. During this period of seclusion, numerous pigs pass from members of the boy's family in payment to those who direct the final ceremonies—*nalwan*—the ceremony of life. On the appointed day the young males emerge from seclusion under the eyes of *nambat'r'vaikinkin*, (ritual boards covering the interior roof of the exit and representing numerous faces of ancestral spirits) to be circumcised. Numerous art forms, such as *metaniele* ('the eyes of the sun') and *nekampao* are fabricated and placed by the seclusion hut, *namal*, dancing and circumcision ground to show that particular ancestral spirits and powers are present and partaking in the rituals. For approximately one year after *nalwan*, the now initiated male is forbidden regular contact with the 'world of women', and his younger brothers and sisters. He now begins his life in the 'world of men'.

Relatives will give the young man pigs, and help him with his gardens, for now he must amass wealth and prestige to be able to purchase his first wife. Most men marry relatively late in life, as it takes them many years to amass proper riches with which to get a wife—and a certain degree of social rank.

Mbotgo't people have no system of chieftainship. Powers of leadership and influence belong only to

Kailap'n Amb'ym'p of Londombwey village wearing special dyed penis wrapper for mourning. 1974.



those males who have obtained a reasonable rank in the graded system which is known as *nimangi*. *Nimangi* is based upon the raising and subsequent sacrificing in public of numbers of the specially raised tusker-pigs. By publicly sacrificing his material wealth the man raises himself higher in social prestige. Each time, he takes a new name and a new and higher social rank. *Nimangi* can be looked upon as a form of communion—at one level of analysis, the pigs to be sacrificed represent aspects of the sacrificer, as well as the ancestral spirits. Regular *nimangis* or pig killings can possibly be looked upon as steps up the ladder of social grades reaching ultimately to the abode of the ancestral spirits.

The Mbotgo't *nimangi* system is still in the process of change, expansion and contraction. The number of social grades involved are numerous, ranging from approximately thirteen to twenty in various villages. Londombwey itself has two distinct, but partially parallel, grade systems 'available' to interested members. Each social grade has a special name, a new name for the individual, and complex painted body designs, dances, masks, decorations and art forms produced and erected for it. Each male making a new *nimangi* must not only sacrifice a large percentage of his own pigs but often those of other males who have loaned them to him for the particular ceremony (with the idea of a subsequent repayment in the future). The concepts of 'copyright', debt, loan and interest are so highly developed here that it makes our Stock Exchange look like a child's game. These concepts also serve to unite, often through several generations, groups and villages which are widely separated. However, such arrangements, and consequent misunderstandings, are often the cause of much antagonism, fighting, and sorcery accusations.

Before 'making *nimangi*' an interested male must first have a sponsor, usually one who belongs to the aspired grade, or one who has taken it a long time before. The sponsor is paid in pigs to initiate and direct the ceremonies, to whom all must be invited. The essence of *nimangi* is that although it is sacred, it must be public—otherwise who will recognise the 'new' man's status? Vast amounts of time and work are consumed in gathering together food and gifts to be distributed after *nimangi*. The approximate date for the man's *nimangi* is advertised months beforehand, and Mbotgo't (and often peoples from related cultural or linguistic groups) trek for miles across the mountains to be there on the appointed day. The public dancing-ground of the village is bedecked with special flowers, plants, and specially erected carvings, and the slit-drum orchestra continually beaten to spread the news across the mountains. Each slit-drum and each rhythm has a special meaning; each tune has



particular reference to the man's genealogy, social rank, name, accomplishments, and the types of pigs he has accumulated. (The slit-drums can also be beaten to send complex messages from village to village.) The man then gathers the required tusker pigs for the social grade on the dancing ground, and rapidly kills them with a club, spear or axe. Mbotgo't psychology is difficult for us to fathom: for years previously, these pigs have been carefully raised and fed, and often looked upon in the same way as we do pets. It is a common sight to see men sitting, talking, while making pig ropes—special leads to tie around the necks of their favourite pigs to take them for a walk in the jungle. Favourite pigs will be frequently stroked and spoken to in a way similar to that in which many European peoples react to cats and dogs. One sometimes sees men carrying their favourite (younger) pigs in their arms. But pig sacrifice is a means to an end—a higher social rank for the man while he is living, and a better life in the world of the ancestors after he is dead.

Muleon Mulonasor of Yabktass village in the womens area, 1974.



Playing slit-drum orchestra on *Bunsara* (dancing ground) of Yabktass village, 1974.

Moreover, the spirits of the pigs he has sacrificed during his lifetime will be waiting for him in the afterworld.

Mbotgo't women have their own graded pig-killing system, but this seems much less complex and less associated with the ancestral spirits than that of the men. For women, the system is *nimangitenes*, and consists of only four to seven grades. During the second of the *nimangitenes* grades, called *e'lingel*, the young girl has one of her upper incisor teeth removed in a long drawn-out ritual performed by her mother's brother. Performed before marriage, this tooth extraction is deemed to purify the woman's blood and to enable her to produce children more easily. Women normally marry at a very young age, between twelve and fifteen, usually to a much older man who can then help them with the small number of pigs needed for sacrifice in their own ceremonies. When an older man dies, his wife (or wives) are inherited by his younger brother or other close relatives.

Only after many years of planning, work, borrowing, loaning, intrigue and increasing influence can a man reach the higher grades in *nimangi*. Each time he rises in rank, he is permitted to hear and to try and understand more the secrets surrounding the world of the ancestors. With each new grade comes new rights, responsibilities and powers over society and those males lower in the system. Today, the two highest-ranking Mbotgo't males are Muleon Mulonator* (of Yabktas) and Kailap'n Amb'ym'p (of Londombwey), both in their mid 50s or early 60s. Muleon Mulonator has sacrificed over 300 single-circle tusker pigs during his life. In late September 1974, Kailap'n Amb'ym'p made *nimangi* to give him the name Muleon Miel ('the red Muleon'). Although there are grade titles higher than *Muleon*, there are no Mbotgo't at present who hold them. These two individuals, then, are the highest ranking men in south-central Malekula and as such, are traditionally the most influential. They are not chiefs in the understood sense, but leaders and directors of society. Because of their height in the *nimangi* system, and subsequent nearness to the world of the ancestral spirits, their ideas, comments and

advice are listened to with much more reverence than those of lower-ranking males. Such high-ranking men have their own seats within the men's sacred hut, *namal*, and must not eat food cooked within the same fire as lower males.

When a high-ranking male dies, his body is placed in a communal hut, where his male associates, relatives, wives and children come to mourn. The body may lie there for as much as one month, while proper funerary rituals, which the man had previously paid for during his lifetime, are being prepared. Various funerary structures, *naitlelei*, are built to one edge of the dancing ground, and eventually the decomposing body is laid on a funerary bed under a lean-to, *na-pet*, on the edge near the men's sacred hut. The leaf-wrapped body is covered with *Nambon'namor'raow*, a painted, rectangular leaf covering. After decomposition, the skull is removed and taken to the *namal* area. Here, a close relative, who has purchased in pigs the right to do so, overmodels the features on the skull with a papier-mache like mixture of shredded vegetable fibre, coconut milk and breadfruit paste. Eventually a life-size body of the dead individual is fabricated on a bamboo or wooden base, overmodelled with the same material, and vegetable and mineral colours used to paint the man's social rank and significance on the figure. During this time, numerous funerary masks, objects, dances and songs are produced to please his spirit, to assist his entry into the ancestral world, and to ensure the benevolence of other ancestral spirits

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Metaniele ('Face B'long Sun') disc made for *Nalwan* initiation rituals, standing against *Nambulukai* (upright slit-drum), Yabktass village, 1973.



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who are considered ever-present.

Approximately one year after death, the over-modelled skull is placed upon the remade body to form a mortuary effigy called *rambaramp*. Complex preparations result in the culminating ceremony *matamastamp/temes nevimbur*, when for one day, the *rambaramp* is put on public display on the edge of the dancing ground and male relatives and colleagues pay their last respects. Women and children may watch and partake from a distance, and there is a puppet-theatre-like display of *temes nevimbur* statuettes who re-enact ancient legends possibly concerning Kailap, a mythical hero who was supposedly the first male inhabitant of this area. When all is finished, the *rambaramp* is placed upright in the men's sacred hut by the wall farthest from the entrance—nearest the seating positions of the highest ranking males. Here, the more important *nimangi* men, so high in the social ladder that they are already considered partially dead and thus in closer communication with the spirit world, can more easily pass on to other Mbotgo't, the wishes of the ancestral spirits for the benefit of their society. In fact, the concept *natamastamp* ('he is now dead') includes ancestral spirits, recently dead high-ranking males, and living high *nimangi* individuals who have already partially stepped off the 'ladder of the living' into the spirit world.

Mbotgo't society is 'hidden' in two ways: firstly, their territory is very inaccessible, and for this reason has retained so much of the traditional life. Secondly, so much of the culture is so sacred that only particular aspects of it can as yet be gathered by an anthropologist. Moreover, in spite of the fact that they have as yet little knowledge of the outside world, they have strongly rejected it, and since September 1974 have politely but forcibly told at least two visiting Europeans to leave their territory rather rapidly. They look down upon the few members of their group who have recently settled upon the coast of Malekula, and regard them as 'weak women'. The latter are relatively nervous about returning to the interior, for they fear the anger of the ancestral spirits and the

spiritual powers possessed by the 'jungle' Mbotgo't. How long the diminishing population and culture in the area will last is debatable, but what is certain is that they should be left alone as much as possible to continue the ritual life of one of the most traditional peoples of Melanesia.

New Hebridean tusker pig, *Sus papuensis*, awaiting sacrifice during grade-taking ceremonies. 1974.

Editors note: The author is presently in the New Hebrides again. In a letter received in September 1976, he informs us that Muleon Mulonasordied in February of this year. He also said, "Since returning to the islands after an eighteen month's absence, I have seen many changes. Early in 1975, the Mbotgo't had their first introduction to national politics. Under very recent pressure from art dealers and travelling photographers, who spend a minimal period of time in the area, the Mbotgo't have now reacted strongly to pressures from the outside world. Very recently, an American traveller who tried to break taboos and enter a sacred area in the village of Yabktass, was sent back to the coast after one night. In 1976, the Mbotgo't requested medical aid and a road into their area. Although recent population movements have always been to the coast from the interior, the Mbotgo't seem determined to remain in the territory of their ancestors and to try to force 'civilisation' to come to them".

FURTHER READING

There is as yet no *major* published work on the Mbotgo't. Various short articles and photographic essays have appeared since 1972 on 'The Small Nambas'. (Nambas is a general Bichelamar term for the penis-wrapper worn by the men.) The term 'Small Nambas' should not be used for these people; it was originally used by planters and government officials in the New Hebrides to describe a people living in north-northeast Malekula near the borders of 'Big Nambas' territory. In southern Malekula, language and culture are quite different. It is also necessary to point out that although Mbotgo't culture possesses many aspects similar to that of the coastal areas of south and southwest Malekula, there are innumerable differences and variations.

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Siē, Lia Épēlen and Elen preparing food. Yabktass village. 1973.

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LIFE OUT WEST

MOOTWINGEE—THE ROCKHOLES, by John Gerritsen, Broken Hill, 1976: 69 pages, illus., \$3

Scattered throughout New South Wales is a network of remarkable men and women whose lives are wholly devoted to the practical problems of conservation in the field—conservation of flora, fauna, historic sites, and Aboriginal relics—against natural and human depredation. These men and women are, of course, the rangers of the National Parks and Wildlife Service, a task force whose work—preserving our heritage for future generations, while at the same time making it available for contemporary education and recreation—goes mostly unhonoured and unsung. One of the most experienced members of this admirable band is the author of this book.

John Gerritsen, who is now Senior Ranger for the far northwest of the state, was previously for four years in charge of the beautiful and important Aboriginal art site of Mootwingee, about 125km north-east of Broken Hill. During his time there, he initiated a long-term project to consolidate the famous engraved rock slope which was in serious danger of destruction by natural and human forces, and he also discovered innumerable new engraved and painted Aboriginal sites in the Bynguano Range area.

This book, which he has published privately, presents for public interest and education a distillation of the historical, anthropological, biological and geological information collected by Gerritsen during his time at Mootwingee. It is obviously essential reading for anyone intending to visit the Mootwingee Historic Site, but should also reach a wider readership because it contains much fascinating information obtained by the author from old people still living in western New South Wales.

'The Rockholes', which was the old name of the Mootwingee site, refers to a series of natural water catchments adjacent to the main engraved galleries. It was this which attracted the Aborigines to the area and also made it an important stopping place for early explorers; later it became a staging point for travellers to the mineral fields to the north.

This book provides a complete guide to the natural and cultural history of the area. Gerritsen's approach to the subject is essentially an ecological one. He first deals with the way in which human beings have adapted to and survived in the extreme conditions of the western part of the state, initially by describing in some detail the way of life of the Wilyakali—the

Aboriginal group in whose territory the Mootwingee region was contained—and then by recounting the European impact—through exploration, pastoral expansion, prospecting and mining, and finally the present-day situation. This section contains a number of intriguing anecdotes not previously published.

In the second half of the book Gerritsen describes the natural environment. Appropriately, the climate is first dealt with, since it is crucial to any understanding of the region, with temperatures ranging from freezing to 40°C and an annual rainfall that has ranged from 3.59 inches in 1902 to over 36 inches in 1974. Then he describes the geology and geomorphology of the Bynguano Ranges, which explains why the Mootwingee engraved rockface is in such grave danger of destruction, and introduces such curiosities as the 'fossilised porcupines' found in some small caves. Contrary to local myth, these are in fact lime-gypsum formations which are still growing through the deposition of salts leached out of the sandstone massif.

Finally Gerritsen describes the flora and fauna, of which he can speak with the most intimate personal knowledge. This section is full of fascinating and useful information. He sums up the interdependence of all facets of the habitat in the following neat formula:

"Soil + rain = seeds + insects = birds + animals = food for other animals and birds, who in their turn are also preyed upon, ultimately all returning to the parent soil, to be renourished by a shower of rain."

Although one could criticise the slightly amateurish arrangement and layout, or the quality of some of the photographic plates, and there are a number of printing errors, it would be churlish to carp at such minor defects when Gerritsen has produced this valuable book in the public interest entirely out of his own pocket. This is, in fact, precisely the type of book that should be published by the National Parks and Wildlife Service for each of its major public areas and it is hard to understand why it was not produced by the Service. However, publishing is an expensive business and National Parks has a long list of urgent priorities; so it is unlikely, unless there is strong public pressure, that the Service's budget will be augmented to allow for the production of such invaluable handbooks. It would be gratifying to see this book sell in thousands, not only to give its author some profit from his not inconsiderable outlay, but also to encourage the National Parks and Wildlife Service itself to undertake such desirable projects.—D.R. Moore, *Department of Anthropology, The Australian Museum.*



Left: Snake track



Right: Mootwingee View

Below: Aboriginal stone arrangement



Left: Rock engravings depicting mythical figures

Below: Ruins of Capalaba mailcoach changing station



