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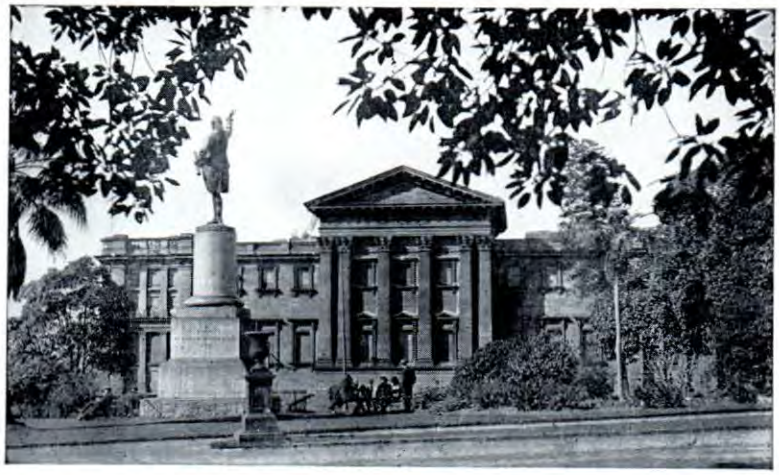

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[Photography by Howard Hughes, unless otherwise stated.]

● FRONT COVER: The Mountain Grasshopper, *Acripeza reticulata*. This is the flightless female of the species, which lacks hind wings. It is here seen adopting its "fright" pose, when the bright blue and red markings on the back of the abdomen are displayed. The male is a slender, fully-winged, flying insect. These grasshoppers are confined to Australia. In New South Wales they usually occur in snow-grass country on mountain tops. The specimen in the photo came from Katoomba, Blue Mountains, N.S.W. Its body length is about one inch.

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Ayers Rock

By H. O. FLETCHER

AYERS Rock is in the south-western part of the Northern Territory and must be considered as one of the greatest natural monuments in Australia.

The first white men to visit and record the immensity of this fantastic single rock mass were members of the Central and Western Exploring Expedition under the leadership of William C. Gosse. On July 28, 1874, the expedition established its Depot 8 on the southern side of the rock about one and a half miles from the now well known Maggie's Spring, a source of almost permanent water. In his diary of that day Gosse wrote: "This rock appears more wonderful every time I look at it, and I may say that it is a sight worth riding over 85 miles of spinifex sandhills to see". He named it Ayers Rock in honour of Sir Henry Ayers, at that time Premier of South Australia.

It is possible that Ayers Rock was actually first sighted by explorer Ernest Giles in October, 1872, when through a haze of smoke and dust he gained a distant glimpse of several ranges of hills including an "exceedingly high and abruptly ending mountain" which he named Mt. Olga. It seems impossible for Giles not to have seen Ayers Rock at the same time, as it is equally as large and impressive as Mt. Olga and only 20 miles distant from it. Giles sighted the high mountain from the northern shore of a vast low-lying salt-lake, estimating it to be at least 70 to 75 miles to the south with nothing in the intervening country but sandhills and spinifex. Giles made a number of unsuccessful efforts to drive his horses across the boggy surface of the lake in an attempt to reach the mountain. He named the great salt-lake Lake Amadeus, referring to it in his diary as "the bottomless bed of a terrible lake".

Nearly two years later, Giles while on a further journey of exploration was approaching Mt. Olga from the south when he crossed the wheel marks of drays used by the Gosse Expedition. His natural disappointment when he discovered that Gosse had reached Mt. Olga, which he had named earlier, before him is clearly indicated in his diary when he made the following entry on the day of September 16, 1874:

A typical view of Ayers Rock, showing the giant swollen buttresses and vertical erosion gullies.

"I thought I was monarch of all I surveyed and the lord of the fowl and the brute; but lo! a greater than I is here". Giles reluctantly continued his planned journey travelling over the same country already traversed by the Gosse Expedition a few months earlier. No mention was made of Ayers Rock by Giles which must have been visible to him on many occasions during his approach and stay at Mt. Olga.

The Aborigines Of The Ayers Rock Country

The Aborigines in the Ayers Rock country were for the first time in contact with white men and their horses when the two expeditions visited the area. According to Giles his party were surrounded on several occasions by hostile natives and shots had to be fired to keep them at a distance when threatening attacks were made with the throwing of spears. On the other hand, Gosse, during his stay at Ayers Rock, remarked that the Aborigines were peaceable and more frightened than hostile when they hesitantly passed his camp on their way to secure water from Maggie's Spring. At the present time very few Aborigines are seen in the vicinity of Ayers Rock even though it lies within the limits of a very large Aboriginal Reserve.

The early Aboriginal inhabitants of the Ayers Rock country were the Uluritdja (Aluridja) people and they built up many myths and legends to explain the origin of the rock and to symbolize its great size and many natural features with totemic meanings. At the base of Ayers Rock and continuing round its perimeter are many caves, clefts and overhanging rock-shelters, the walls and ceilings of which are covered with primitive paintings. These tell of the legendary giant, semi-human, totemic ancestors who supposedly inhabited the rock. Altogether there are 46 places of mythological importance on and surrounding Ayers Rock. Many of the more ancient Aboriginal paintings are now almost obscured by the process of time while many of the more recent paintings have been ruined by the seemingly inevitable vandalism which follows in the footsteps of tourists.

This view of Ayers Rock shows the vertical strata and steeply sloping sides.

Until a few years ago it was an adventure to negotiate the original tortuous and sandy track to Ayers Rock and as a result it had been seen at close hand by a comparatively small number of people. Today, however, air-conditioned coaches, buses, cars and planes carry an ever-increasing number of tourists to visit the great monolith, the vehicles travelling without any great hazards over a well surfaced and graded road. Lodges have been built to accommodate visitors and at present there is a move which will be possibly unsuccessful, because of strong opposition, to install a chair-lift or cable-car to convey non-climbing tourists to its summit.

Remains Of Old Tableland

Ayers Rock is one of three outstanding monoliths or residuals of an old tableland, each of which has a unique appearance and is therefore easily recognizable from any position. Sixty miles to the east of Ayers Rock is Mt. Conner, a flat-topped mesa, three miles long, about a mile wide and rising to a height of 1000 feet. The topmost 400 feet of the mountain is composed of horizontally bedded quartzite with a steep vertical scarp on all sides which is followed by a lower moderately steep slope leading to the desert surface. This lower slope has been weathered into a series of concentric ridges and intervening gullies.

Twenty miles to the west of Ayers Rock is Mt. Olga, one of the strangest looking mountains in the world. It covers an area of approximately 15 square miles, and originally a single mass was divided, by deep clefts or chasms, into a series of gigantic individual blocks or monoliths with domed tops. The rock forming this mountain is essentially a conglomerate made up of "pebbles", many of which must weigh several tons and were possibly carried into their present position by glacial action. The narrow clefts or chasms, carved out by active water erosion, separate the giant blocks which rise vertically to heights of up to 1500 feet.

Ayers Rock on the other hand is somewhat lozenge or loaf-shaped in outline with a domed, somewhat flattened top, and steeply sloping to almost vertical sides. It is two miles in length, bearing almost east and west, has a width of about one and a quarter miles and the distance round its base is more than five miles. Its greatest height, determined by a very sensitive altimeter, is 1143 feet.

Spectacular Changes In Colour

On a clear day Ayers Rock may be seen silhouetted against the skyline from great distances with its sides rising sheer and vertically from what is apparently a flat desert

plain. The presence of iron oxides has stained the rock a predominant colour of red and brown, a not uncommon effect under arid conditions, and a feature displayed by most mountains in central Australia. As the rock is approached its coloration changes according to the position of the sun and the clearness of the air. At times a shining and glowing red mass, its colour may change to a dull brown and usually towards the end of a day with a setting sun will range through a variety of subdued hues of blue, mauve and purple.

The old original track follows a most circuitous route in between sand-ridges and for many hours tantalizing glimpses of Ayers Rock are seen only as the high dunes are crossed. The rock is lost from view during the final approach but after rounding a large sand-dune it appears at close quarters with almost breath-taking suddenness. It is now that its full dimensions and impressiveness can be fully appreciated and particularly when first viewed from the southern side. Standing at the base of its vertical, at times almost overhanging, walls, rising abruptly from the desert plain like the hull of a ship, the rock is an awe-inspiring sight.

Ayers Rock is a great single rock mass of sedimentary origin and is composed of coarse arkose. Its rounded outline, the many weathered caverns, and the exfoliate type of weathering are somewhat typical of those found in large granite masses and many early visitors incorrectly classified the rock as a granite.

At close quarters there is little appearance of bedding but the rock actually consists of a definite banding of wide layers of a fine conglomerate imperceptibly grading into wide layers of a grit or coarse sandstone. The layers or bands are vertical in position and on the extensive and flattened top of Ayers Rock have been eroded into deep flutings and ridges which cut across the surface from the north-west to south-east and give the characteristic stratified appearance so plainly visible for considerable distances and particularly from the air. Erosion by wind and mainly water, acting on the softer bands of grit, has formed deep gutters with numerous large water-holes, whereas the harder bands of conglomerate stand out as distinct ridges up to 15 feet in height.

Effects Of Weathering

The walls of Ayers Rock are for the greater part comparatively smooth and even polished, but they also show some remarkable features of weathering by wind, rain and temperature. In various places, particularly on the north face, wind action over very long periods of time has worn through the case-hardened outer layer of rock and exposed the softer material to deep erosion. Weirdly-shaped caverns of all shapes and sizes and honeycombed hollows have been carved out into many fantastic designs, including one large area, visible from a distance of many miles, which resembles the intricate pattern of a brain-structure.

The extreme changes in temperature between night and day which are experienced in central Australia have resulted in the spalling or exfoliation of the outer surface

Deeply entrenched erosion gullies extending from the summit on to a vertical face of Ayers Rock.

of Ayers Rock by continual contraction and expansion. In some places this destructive agency has caused large slabs of rock to break away and fall to the desert plain, but generally the surface is covered with loose plates of various sizes which make the climbing of the monolith a hazardous task except on the north-western face, where a fairly easy slope leads to the summit. During a visit to Ayers Rock by an Australian Museum Expedition in 1952, two members of the party climbed to the summit up the steep wall alongside Maggie's Spring. To my knowledge this is the first time the rock has been climbed anywhere except on the north-western face and I doubt very much if their feat will ever be repeated.

A most remarkable feature which can be only attributed to weathering is exposed on the north-western face of Ayers Rock. A huge outwardly-curved strip of rock, referred to locally as the "Kangaroo Tail Rock", 200 feet in length, 20 feet high and about 15 feet in width, lying upright on about a 50-degree slope, is separated for most of its height from the main rock mass by a crevice of about four feet. This great strip of rock merges with the rock surface at both ends, but when viewed from the side daylight is seen through the narrow crevice along its complete length.

Near the north-western face a curved strip of rock (left), 200 feet long, has been separated from the main rock mass. The resultant crevice, through which daylight can be seen, extends for almost the complete length of the strip.

Huge Waterfalls

Many of the deep erosion gullies or grooves which cross the top of Ayers Rock continue down the walls and through the years have been cut back by active water erosion to form extensive vertical gullies. The great masses of rock in between the gullies have become rounded and stand out boldly as gigantic buttresses which sweep down for more than 1000 feet from the summit. The extensive top of the mountain serves as a large catchment area during heavy rain and, as the water spills from the summit, the vertical drainage gullies soon fill and great sheets of water, as they fall, curtain the vertical walls.

The explorer Gosse, in 1874, was the first person to record the extraordinary effect of the shedding of rainwater from the great monolith during heavy rain. In his diary on July 31, 1874, he made the following note: "During the night it commenced raining, and continued raining all night; water rushing in all directions . . . the rock presented a grand appearance this morning; close to our camp was a waterfall about 200 feet high, the water coming down in one sheet of foam". A few fortunate visitors have seen the spectacular sight presented by Ayers Rock during and following a heavy thunderstorm. They have described huge volumes of water pouring down in the form of waterfalls from heights of 800 feet with a deafening noise and almost all sight of the rock obscured by clouds of spray and foam.

Following rain the huge rock-holes and grooves on the top of the mountain remain filled with water for considerable periods of time while seepage from the rock-mass itself provides water for a number of pools round the base of the rock, including Maggie's Spring. The vegetation around Ayers Rock reflects the benefit obtained from the concentration of water which is soon soaked up by the desert sands. A belt of gums about 400 yards wide occur in the form of a great

circle around the mountain, followed by grassy plains and still further out occasional desert oaks and spinifex.

Origin Of Ayers Rock

Ayers Rock is virtually a great mass of rock composed of the same material and it has been said to be the greatest single "pebble" in the world. It has been referred to as "a great rock half sunk in a sea of sand" and naturally there is constant speculation concerning its origin, why it has remained in the form of a giant monolith and how the rock became tilted so that the strata are vertical in position.

To answer these questions we must proceed back in geological history for almost 1000 million years and well before the sediments which were to form Ayers Rock, Mt. Olga and Mt. Conner had been deposited.

A group of ancient mountains including the Musgrave and Everard Ranges extend almost east and west about 70 miles to the south of Ayers Rock. In early Palaeozoic time these ranges were covered with a thick ice-cap, and mountain glaciers were active in transporting rock material from the highlands to the low-lying country to the north. Huge boulders weighing many tons occur in the conglomerate at Mt. Olga, indicating that the glaciers possibly reached that position. The finer pebbles and grit of which Ayers Rock is composed were carried by melting ice-water and deposited as part of great outwash fans to finally build into a formation of great thickness and extent. This fluvio-glacial formation in time became cemented together by the finer siliceous sands and finally hardened into arkose and conglomerates containing varying sizes of constituent boulders and pebbles.

Following a later uplift of this area a huge tableland was formed, parts of which included the great masses of rock which were destined to survive as Ayers Rock, Mt. Olga and Mt. Conner. The effects of erosion now came into force, and as they continued through millions of years the original tableland became worn down and the detritus, swept away by flood-waters, no doubt served as material to build up sediments of a later geological period. Today the only remaining evidence of the old tableland is a number of scattered residuals including Ayers Rock. Their survival is due to the rock of the residuals being heavily cemented by indurated silica and hardened to such an extent that it was able to withstand weathering. Although the surrounding country rock is covered by desert sands several outcrops and outliers prove it to be similar to that found in the residuals.

The fluvio-glacial origin of the ancient tableland, now represented by the residuals, is suggested by the great variety of rock-types in the boulder and pebble conglomerates and a characteristic flattening of their surfaces due to glacial movement. Furthermore no traces of fossils have been found which would indicate deposition under marine conditions.

A very puzzling feature of Ayers Rock is that the gigantic monolith has been turned over on its side and the strata originally laid down horizontally are now vertical in position, whereas the strata comprising the not-so-distant Mt. Olga and Mt. Conner remain undisturbed. The only explanation which can be given is that in a past geological period great stresses were built up in the ancient tableland causing a local crumpling movement of sufficient strength to fault and tilt a restricted area of the sediments of which Ayers Rock is the only surviving remnant. The southern face of Ayers Rock is fairly straight and may correspond to a fault plane but any other geological evidence of movement is hidden below the sandy plain.

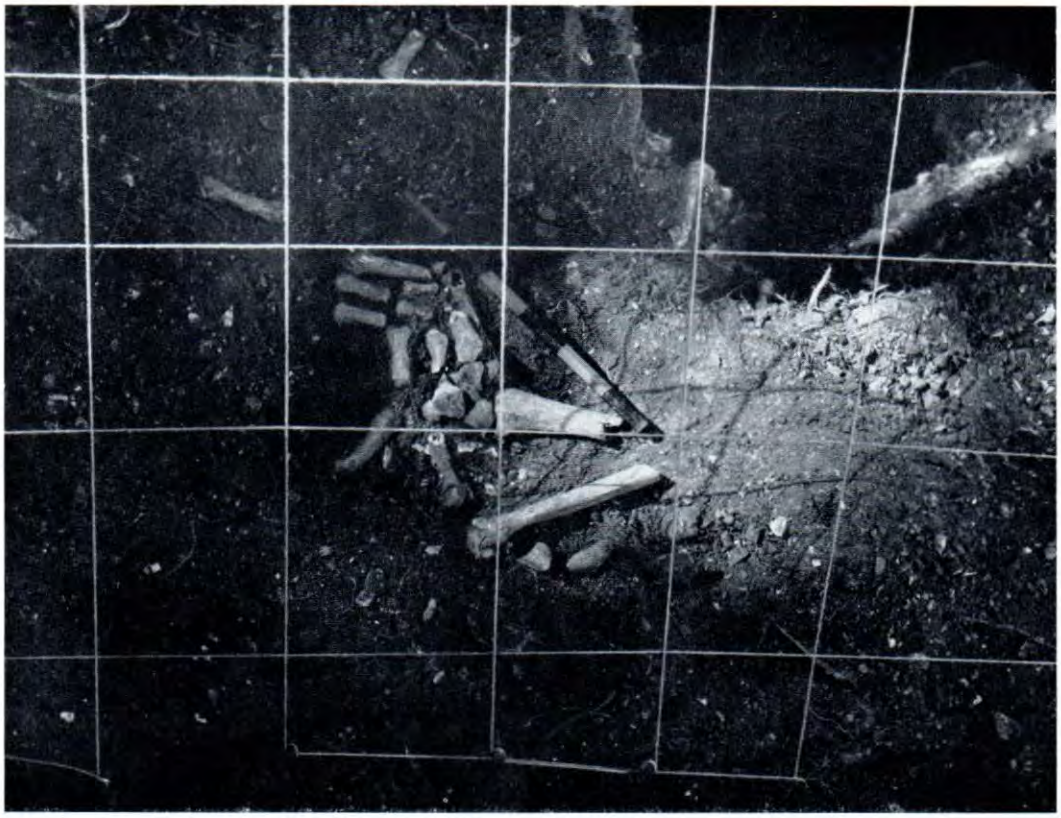
Bones found in the excavation of an Aboriginal rock shelter at Ball's Head are examined by a Sydney University anatomist in the early hours of the morning. [Photo: C. Turner.]

Preliminary Comments on the Ball's Head Archaeological Excavation

By DOUGLAS MILES

IN recent weeks the Australian Museum has received several score of inquiries by letter and phone which have arisen from the publicity given to its archaeological research project at Ball's Head, a small headland reserve on the northern shores of Port Jackson. Despite its proximity to the centre of Sydney it has remained a bushland area since the earliest settlement at Sydney Cove in the eighteenth century. The fact that Ball's Head was occupied by Aborigines is evident from the large number of rock engravings to be found on its sandstone outcrops and from the stencils of human hands and fish in some of its rock shelters. The Aboriginal occupancy of the headland is also evident from a detailed report made by one of the earliest of Sydney's residents, Maria Collins.

Archaeological research was first conducted at Ball's Head in the latter part of the nineteenth century, when the Surveyor, W. D. Campbell, recorded stencils and engravings in this area and published his research in a memoir issued by the New South Wales Department of Mines. It is only recently, however, that actual localities of these Aboriginal works of art were rediscovered when R. Taplin carried out a valuable survey of engravings and stencils in the Sydney district.



A string grid used as an aid for an artist in recording the position of hand bones. [Photo: C. Turner.]

For some years the Australian Museum has planned a programme of research on the archaeology of Port Jackson; the Curator of Anthropology, Mr. F. D. McCarthy, has compiled a detailed catalogue of all sites reported to the Australian Museum by citizens of Sydney. Several months ago Mr. L. Bryant made a report of a rock shelter at Ball's Head which seemed to have definite evidence of Aboriginal occupation; immediately beneath the rock shelter was a large shell midden. Mr. R. Wright and Mr. R. Jones, of the University of Sydney, independently reported on the same site and gave the opinion that the midden seemed suitable for archaeological investigation.

Work began on this excavation in early April, when Mr. D. Shatwell, of the Department of Mines, made a detailed survey of the rock shelter and the talus slope in front of it. Digging began several days subsequently, when a pilot trench was excavated immediately below the rock-overhang of the shelter. During the first few days of this work it became evident that there were a number of large rocks forming roughly a semi-circle on the floor of the rock shelter. Mr. D. Rogers, of the Mining Museum, carried out a graphic and photographic survey of these stones. It was postulated that these had actually been arranged by human beings.

What was most evident during this period was the fact that this rock shelter had been used by Aborigines whose subsistence depended very greatly on a diet of shellfish, particularly oyster. During the initial stages of the excavation a large number of flakes which remained from the manufacture of stone implements were also taken from the trench.

On the fifth day of operation Miss Patricia McDonald, of the Australian Museum, uncovered some human arm bones. Work slowed down considerably owing to the very great care necessary in uncovering the bones and in avoiding damaging them in any way. At this stage brushes of various grades were used rather than trowels and spades. During the subsequent weeks further bones were uncovered. These skeletal remains were photographed and sketched in situ immediately on discovery so that a detailed record could be kept of the actual position of the bones as they lay in the excavation.

As work continued it became evident from the stratigraphy of the excavation that a shallow pit had been dug into the original soil. The bones had been located in this pit. From the position of the bones in relation to one another it was also apparent that they had been placed there prior to the decomposition of the corpse. The fact that the teeth of the upper jaw were ground down almost to the gums suggested that the skeleton was Aboriginal. Material which was actually adhering to the bones seems to have been burned, and tests are currently being conducted with the aim of testing the idea that the bones are the remains of a human cremation.

A second trench has been dug in the vicinity of the first. From this many more flakes and a number of actual stone implements have been recovered. These flakes are being analysed by the Department of Minerals at the Australian Museum with the purpose of determining the locality of derivation of the stone used in manufacture of implements at Ball's Head. It seems that these Kammeray Aborigines may have imported material from Narrabeen and further afield.

A similar analysis is being made in the Museum's Department of Molluscs to establish from what radius these Aborigines acquired their shellfish. Several seashore and riverine shells have been found in this harbour midden.

Carbon samples have been taken from both trenches. At present most of the skeletal remains are located in a laboratory at the Australian Museum, where the bone fragments are being reconstructed. Both the bones and the carbon samples may be used in dating the implements found in association with them.

The excavation is by no means completed. Work will continue in the next few months but the Museum is very dependent on the availability of archaeology and anthropology students, which affects the regularity of work. The project has received considerable assistance from the North Sydney Council, which provided an armed guard when the bones were first uncovered and constructed a strong wire fence around the site. The Department of Public Works provided some of the material used in the construction of this fence, and the Police Department has been of considerable assistance in making available a mobile generator used during a stage when work was proceeding 20 hours a day. The Sydney University Speleological Society has been most helpful in providing electrical equipment and its engineers efficiently arranged the illumination of the site.

It is clear from the above account that where members of the public report on the existence of Aboriginal kitchen middens their initiative can be of considerable consequence. The Anthropology Department at the Museum will welcome any future reports of this nature for it is to a certain extent dependent on the public for the furtherance of the archaeological programme embracing Port Jackson.

DEATH OF DR. H. L. KESTEVEN

The death occurred in Brisbane last May of Dr. H. L. Kesteven at the age of 83. Dr. Kesteven had been an honorary zoologist of the Australian Museum for over 30 years, and was a junior member of its staff 60 years ago. He was noted for his studies of the skulls of fishes and amphibians and his theories on vertebrate evolution.

THE "GLORY OF THE SEAS"

The rare cone shell "Glory of the Seas", *Conus gloriamaris* Chemnitz, recently presented to the Australian Museum and mentioned in *Australian Natural History* (Vol. XIV, No. 9), has been photographed in colour and 35 mm. colour-slides are now on sale at the Museum at 4s. 6d. each (posted, 5d. extra). A short descriptive leaflet accompanies each slide.

THE TASMANIAN NATIVE HEN

By M. G. RIDPATH
Division of Wildlife Research, C.S.I.R.O., Hobart, Tasmania

THE rail family, consisting of 132 species of birds, is distributed in every continent of the world from sea-level to 16,000 feet. Rails even occur on many remote oceanic islands of volcanic origin, such as Ascension and Tristan da Cunha (1,500 miles from the nearest land) in the Atlantic and New Caledonia in the Pacific, which have never been connected to other land. Yet nearly all rails are rather poor fliers, and many of those on islands have lost the power of flight altogether and have evolved into distinct species in their isolation. It is probably the very fact that they are poor fliers that has led to their arrival on islands, because they are easily blown out to sea.

These flightless rails of islands have a melancholy history of destruction by man, especially European man, and his dogs, cats and commensal rats; and several have become extinct. The flightless rails of Ascension Island (a *Rallus*-like species) and Tristan da Cunha, *Porphyriornis nesiotis*, became extinct probably because of the introduction of rats; and the flightless Takahe, *Notornis mantelli*, of New Zealand, now reduced to a few hundred individuals, has been hastened on its way towards extinction by man, although climatic changes may have been the long-term factor. The flightless White Gallinule, *Porphyrio albus*, of Lord Howe Island, about 400 miles off the coast of New South Wales, was exterminated by the first settlers within a few years of its colonization.

Fifteen species of rails occur in Australia, of which six can be described as gallinules—that is to say, rather plump, heavily-built rails with powerful legs and short bills. The Tasmanian Native Hen, *Tribonyx mortierii*, is a large, dull, greenish-brown gallinule with a white patch on its flank, a greenish-yellow bill, a bright-red eye and thick, very strong legs. Just like other island rails, it has evolved into a distinct species as a result of isolation and it has become flightless too. It presumably evolved from the stock of the somewhat similar Black-tailed Native Hen, *Tribonyx ventralis*, of the Australian mainland. Evolution of such island species has taken place in about 10 per cent of the Tasmanian avifauna.

A Tasmanian Native Hen running with its tail cocked in the "alarm" attitude.

Feeding Habits

The Tasmanian Native Hen mainly eats the short, young shoots of grasses and low herbs and seeds. It lives in areas where there are patches, or more extensive areas, of short grass, especially where grazing mammals have created lawn-like swards, interspersed with the cover of low vegetation such as tussocks, reeds, ferns and

The study area in "The Hunting Grounds," southern Tasmania. Native Hens nest in the marsh in the foreground and by the creek in the middle distance.

shrubs. It always lives within a short distance of water, whether it be lake, creek, marsh or water-hole, even though they may regularly dry up in summer.

Before the arrival of Aboriginal man in Tasmania, such areas of short grass as existed would only have occurred because of steady grazing by marsupials such as the wombat, *Vombatus ursinus*, Bennett's Wallaby, *Protemnodon rufogrisea*, and others. Dr. W. D. Jackson, of the Botany Department of the University of Tasmania, has discovered that such patches of grass are created particularly along the edges of creeks and lakes where the marsupials concentrate to drink, and has described them as "marsupial lawns". Such situations can still be found here and there to-day, and provide suitable conditions for Native Hens. Indeed, the hen can be thought of as a secondary grazer which requires a habitat that is being kept well mown by another animal, thus allowing it a dense supply of short tender shoots of the native grasses which grow under such conditions. The arrival of the Tasmanian Aborigines, at least 8,000 years ago, would have increased the hens' habitat a certain extent because they used fire widely, especially near water, to produce bigger areas of green sward to attract and concentrate the wallabies for hunting purposes. Indeed, my studies of the Native Hen were carried out on a small but dense population living in a grass-covered basin with a creek in the hills, in a place called "The Hunting Grounds" in southern Tasmania. There is a high density of Bennett's Wallabies in the surrounding woodland and I have found over 130 Aboriginal stone artefacts by casual searching in about 40 acres, which suggests that the Aborigines may have used the basin as a magnet for wallabies or other prey, which it still is, even to-day.

The next stage was the arrival of European man in 1803 and his extensive clearing of woodland to create pastures, and the introduction of two very efficient grazing animals—the sheep and the rabbit. This must have produced a great increase in the amount of habitat suitable for the Native Hen and an increase in its numbers. In turn, this led to complaints by farmers that Native Hens damaged young cereal crops near water, and the bird is traditionally regarded as a pest. For this reason it has been studied by the Division of Wildlife Research, C.S.I.R.O. Extensive field trials carried out in co-operation with the Tasmanian Agricultural Department have shown that Native Hens can reduce young oat shoots by about one quarter at the age of six weeks on the edge of crops bordering their habitats. The damage is usually less in the centre of the crop and the oats normally recover to some extent later on (in fact sheep are usually put on to graze for a while at about six weeks to promote extra sprouting). Sometimes, however, the damage is more severe, while at other times it is negligible. No campaign of extermination is necessary or desirable, though some control is justified where there is significant local damage.

A Native Hen in the "challenge" position giving its territorial defence call.

This small population of Native Hens was watched intensively for three years from 1961. Every bird in the isolated basin was caught and given its own combination of coloured leg-bands so that it could be recognized. Thus, about 400 individual histories were obtained to get a picture of the typical life of a Native Hen, though few histories are complete because many birds lived more than three years and many others left the study area. We built a small hut there and by living there for 60 per cent. of the year the hens accepted our presence as normal and their behaviour seemed little affected by the observers.

Territoriality

Native Hens live in groups of two, three or four, together with their young of the previous year. They hold a territory of up to five acres of open grass with an area of cover. The territory is sharply delimited and any trespasser from a neighbouring group is vigorously repelled within a few yards of crossing the invisible boundary line which separates their territories. The first reaction to an intruder at a distance is a staccato monosyllabic call rather like two stones being knocked together. Then the defenders lower their head and neck till they are parallel to the ground and run very quickly towards the intruder. When they get close they often stop just short of it and parade aggressively in front of it with neck still horizontal and their feathers expanded to stand out from the body, making them look very much larger than normal. This display is accompanied by an extremely raucous two-syllable call which is repeated quicker and quicker and harsher and harsher. Next comes the position which I call the challenge, in which the bird, still fluffed up like an animated football, lifts its neck and head and stretches high upwards, still calling vigorously. If the intruder, which may answer in the same way, still does not go, the final stage of the display takes place. They stop calling and stand stock-still, looking at the opponent for up to 30 seconds. Then they fight.

Usually the intruder leaves before it comes to a fight, or soon after it has begun.

In the breeding season they may really harm each other. One bird has been temporarily blinded in one eye and another had almost every feather removed from the lower part of its back, which bled. The birds face one another and peck and also jump up at each other, using their sharp toes to tear. Finally one gives up and runs away, making a characteristic screaming call, pursued by the winning bird. Most trespassing birds lose the fights they have in the strange territory yet they may win fights in their own territory against the identical opponents. The harsh two-syllable aggressive call is actually made by two birds (and more sometimes). One note is of higher frequency than the other and they follow each other in rapid succession, the female supplying the low note and the male the high note. The timing is such that the call sounds as if it comes from one bird. Such duetting is not unique but it is known only from a few other species of birds in the world at present.

One of the most unusual features of this bird is the habit of many of living in groups of more than two. Such groups may consist of three or four adults which remain together apparently for life, feeding, breeding and defending their territory as one cohesive unit. A non-parasitic Cuban cuckoo, *Crotophagi ani,* lives in groups of a similar kind and so do a few other species, but the condition is rare. These groups of Native Hens normally consist of only one female with the males, all of which mate with her. The sex ratio in samples of adults and chicks shows a preponderance of males and this must underlie such grouping. All members of the group, equally, fight to defend the territory, help to build the nest, incubate the eggs and feed the chicks, and this similarity between the sexes as regards behaviour is paralleled by their very similar appearance. Even in the hand it has been found impossible, so far, to tell the sexes apart, though the males have longer legs and bills (but there is an overlap with females). They probably recognize sex themselves mainly by behaviour, including, perhaps, calls.

Breeding

Breeding starts between July and September. The onset and end of breeding seem to be determined by rainfall, probably through its effect on the growth of food, and this has a big effect on the production of young, as one brood is produced in a dry and two in a wet year. As well as a well-concealed nest for the eggs beneath vegetation near water, "nursery" nests are built

A nursery nest to which Native Hens take their chicks at night to brood them.

later in more open situations in which to brood the free-living chicks at night, probably because it is easier to detect the approach of nocturnal predators from such clear sites, and to escape. The young remain with the parents till the beginning of the next breeding season, when they begin to wander and find breeding partners. The first move in courtship is generally taken by the young females, which display sexually to strange males in other territories. If the young male or males respond a new group is formed. Occasionally a young female will supplant an adult female of another existing group by many violent fights in the breeding season, in which the male takes no part. Sometimes a male will persistently attach itself to an existing adult pair in the breeding season, in spite of violent attacks by the male, and eventually becomes accepted (here the female takes no part), but usually young hens lose fights against adults.

Some young Native Hens, with their partners, are able to establish a territory on the edge of that of their parents, while others have to walk up to eight miles before settling down. Thus, some Tasmanian Native Hens may spend their entire lives within less than 20 acres, whereas their somewhat nomadic relative, the Black-tailed Native Hen of the swamps of inland continental Australia, sometimes moves hundreds of miles because of its unstable habitat. It has retained the power of flight and thus the ability to escape the various changes and vicissitudes of its environment, unlike the flightless island species which has taken a dangerous evolutionary cul-de-sac.

[*The photos in this article are by Mrs. P. J. Ridpath.*]

A Stinging By A Crown-of-Thorns Starfish

Recently a fully authenticated case of a "stinging" by a Crown-of-Thorns Starfish, *Acanthaster planci*, was reported to the Australian Museum by Mr. C. Marston, who was at that time purser of the M.V. *Tulagi*, plying in tropical seas. While swimming over a reef at Gizo (British Solomon Islands Protectorate), he noticed an unusual starfish and carefully placed it in some sea-water in a plastic bag. He was wearing gloves and manoeuvered the star about with a knife and so escaped injury. He proceeded to narcotize it with Epsom salt. Later, as he was transferring it to preservative in a jar, he inadvertently ran one of the many long, sharp spines (that suggest the popular name of Crown-of-Thorns) into his thumb. Immediately sharp and intense pain was experienced.

Blood was running from the puncture, so Mr. Marston sucked the wound to clean it while squeezing his thumb, and spat out the blood. There appeared to be no foreign body in the wound. The area around it, however, became tender and he began to experience "some slight tingling around the lips, but this could have been nervousness", so he sought medical aid. Under treatment with Pethedine hcl. tablets and application of an anti-histamine cream to the affected area, the pain and swelling abated by the next day. Only a little tenderness remained round the wound for several weeks.

The actual specimen which caused the trouble was brought to the Australian Museum for identification and found to be a species known to cause pain and trouble among the Melanesians of New Caledonia. Some time later, at Bougainville, when a second *Acanthaster planci* was being handled (again Mr. Marston was wearing heavy gardening gloves) a second injury was received on the same thumb. Once more intense pain was felt immediately and, to quote Mr. Marston's own words, "I withdrew my hand quickly and jabbed at the seastar with my spear-gun in an effort to knock it back on the reef, so I could recover it later. I missed and in doing so barely grazed the creature, between its thorns, with the side of the spear . . . I was startled to see that where the spear touched, there burst forth a blossom of orange pink substance. I then came to the surface and squeezed and sucked the wound as before".

Within an hour, the pain had disappeared and the wound was well washed with soap and hot water. Some pus gathered the next day but cleared up after treatment, and a week later a small, brown, hard, foreign body—the size of a pin-point—was seen below the skin and removed with a needle. No lasting ill-effects followed the second wounding.

Later, at the Australian Museum, several of the spikes of the now dried starfish, which had caused the trouble, were broken off and found to be hollow. Investigations will have to be carried out on freshly caught specimens to try and detect the poison mechanism, if any, but it is probably to be associated with the pincer-like pedicellariae which en masse do look like minute flower bunches.—*Elizabeth C. Pope.*

NATIONAL PARKS IN NEW SOUTH WALES

By T. W. MOPPETT
Member of the State Council of the National Parks Association of N.S.W.

AT the time of writing, the term national park has no legal definition in N.S.W., so perhaps some examples will best explain the title.

The New England National Park, about 46,000 acres, situated on the headwaters of the Bellinger River: there is a narrow strip along the edge of the New England plateau which includes Point Lookout (5,250 feet), the major portion of the park being the escarpment and the ridges and creeks forming the head of the Bellinger River and, in addition, Five Day Creek.

The Warrumbungle National Park, about 14,000 acres, near Coonabarabran, which preserves spectacular relics of volcanic activity. At the end of an off-shoot range of the Great Divide, it overlooks the western plains and, in addition to its geological interest, possesses a wealth of fauna and flora.

Bouddi Natural Park, about 1,200 acres, occupies the seaward slopes of the coastal ridge north of Broken Bay, with angophoras, semi rain-forest gullies and heaths, surrounding beautiful Maitland Bay and Pretty Beach.

The Kosciusko State Park, approximately 1,500,000 acres, situated on the Great Divide, reaches from the Victorian border north almost to Canberra. It contains Australia's highest mountains and the mainland's most extensive alpine area and only glacier-affected topography.

General National Park Concepts

It seems to be generally accepted that the uses of national parks are recreation pertaining to natural surroundings, preservation of wild life, and scientific research.

The "recreations" include not only activities such as camping, walking, nature study, sightseeing, picnicking, but, perhaps more important, contemplation and mental and spiritual re-creation. Those family picnics in the bush, and the opportunity to "get away from it for awhile", become more necessary as the tempo of modern life quickens.

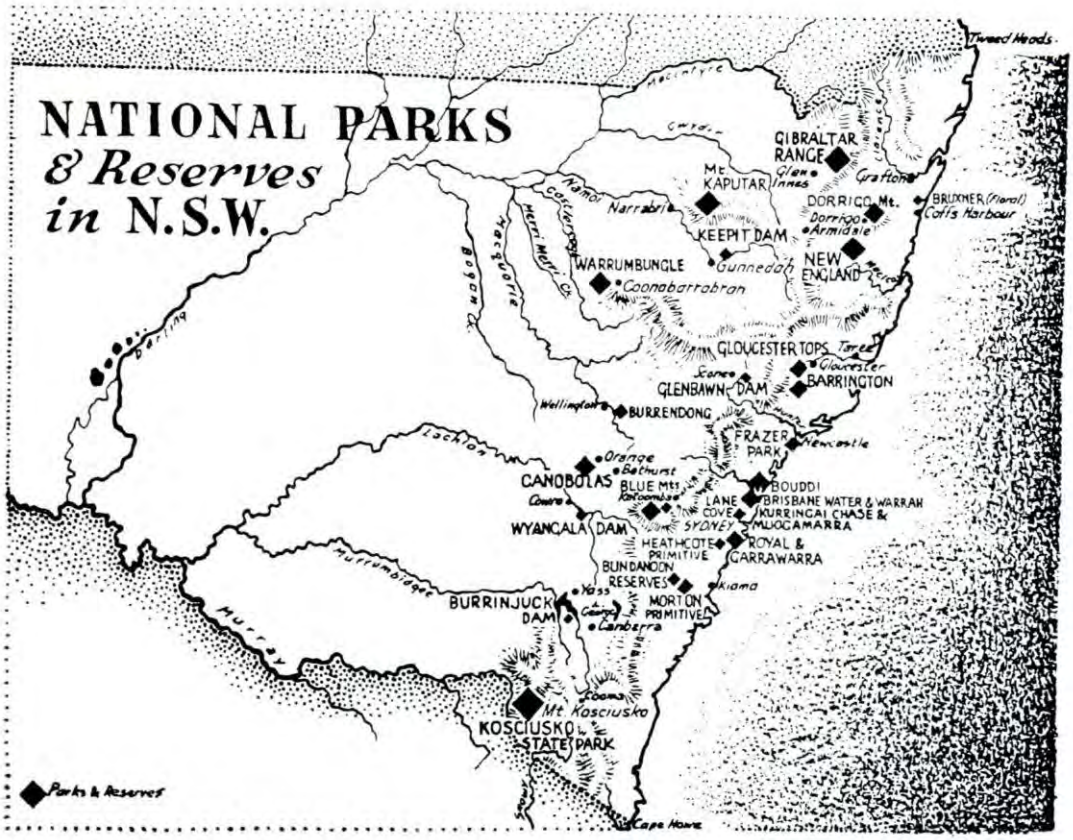
Sigurd F. Olson has written of national parks: "Because of their character it is impossible to evaluate them from any other point of view than that of the intangibles. Their wilderness quality places them in this category. While they may have great additional value as museums of nature, archaeology, history or physical phenomena, their real worth will always lie in what they are capable of doing to people's spirits and emotions."

A national park minus the preservation of wildlife could not be.

The use of national parks for research is fairly new. The population explosion is causing scientists to realize that food production must be increased to the limit. Unfortunately, reduction in natural areas throughout the world is the destruction of living laboratories which have yet to be used.

Perhaps it is natural to look to the United States National Park system as the leader in this field, because it was there, in the Yellowstone Canyon in 1870, that the national park idea came to Cornelius Hedges, a member of an exploring party. He originated the thought that an area of such beauty should belong to all the people, and that it should be retained just as it was. As a result the world's first National Park, Yellowstone, was established in 1872. Since then a great deal of money has been spent in establishing and developing the United States National Parks, and many millions of people visit them each year.

A very popular feature of their parks is the educational or interpretive services. There are museums, displays, nature trails,



publications and trained staff to give lectures, slide and film shows and generally explain the parks to visitors.

I think it follows from the foregoing that a short definition of national parks might be: natural areas for the inspiration, enjoyment and benefit of the people.

Probably the most difficult problem for park administrators is the conflict between preservation in a natural state and availability to the people, which, in most parks, requires places to park, picnic and camp, and walking tracks. Other facilities might be museums, displays, look-outs, accommodation and roads. Roads are particularly difficult because usually they are an eyesore and cause considerable disturbance to wildlife both during construction and after. They should be kept to a minimum. It is essential that all these developments be carefully planned and constructed so as to cause as little disturbance as possible and to be as inconspicuous as possible. Even in developed areas there should be some feeling of being in natural surroundings. Parking and accommodation should be in parts of less interest and beauty. The basis of every park is natural wilderness, and a great proportion of every park should be retained as such.

A further danger is that parts of a park can easily deteriorate through over-use, simply by being used by too many people.

Bushfires are the greatest destroyers of parks, but what is best to do about this is not yet clear.

If a national park system is to allow the uses for which it exists, and withstand the abuses it will meet, it must include the finest of our scenic areas, and samples, at least two, of each environment type, so that all species of wildlife are represented. Each park must be of sufficient size, and located

to make preservation of natural values possible, with additional parklands, if possible, near large populations.

The Position In New South Wales

About one per cent of N.S.W. is reserved as nature reserves. This is not enough, but there is little use in saying we should have four or some other percentage. What is required is an assessment of the best uses of vacant lands and that all the proper uses be catered for, long-term use being paramount. The establishment of a land-use authority possessed of outstanding wisdom is an urgent necessity.

The examples of national parks given at the commencement of this article have varying acreages, all, except Kosciusko, being small by world standards.

Although the Royal National Park was established in 1878, only a few years after Yellowstone, unlike the U.S.A., where large areas have been reserved, the N.S.W. Government has been reluctant to make reservations, and now the opportunity has been largely lost.

It is necessary, therefore, to include as national parks areas of worth-while scenery which, on world standards, might be considered too small. This is possible where there is some protection from natural deterioration and the introduction of exotic species by boundaries being located on high ground and watercourses rising within the area. Bouddi Natural Park is an example.

There are some 2,000,000 acres of vacant Crown land scattered over the eastern half of the State in areas of fair size. Their location has been placed on maps by Mr. J. G. McKern, for the Fauna Protection Panel, as a voluntary effort. The National Parks Association of N.S.W. is attempting to investigate these areas for suitability for nature reserve purposes. As this, too, is a voluntary activity it will be a slow process. In the meantime, there is the danger of these areas being put to the wrong use.

The accompanying map shows national parks and the more important areas used as such, the total area being about 1,950,000 acres, of which 1,500,000 are in one park, Kosciusko.

Proposals for national parks placed before the authorities refer to the following areas: Barrington Tops, Myall Lakes, Deep Creek (Narrabeen), Clyde-Shoalhaven Rivers, Mt. Warning, extensions to Lane Cove National Park, extensions to Mt. Kaputar National Park to form a Nandewars National Park, Kanangra-Boyd area in the southern Blue Mountains. The Department of Lands and other interested authorities, such as the Forestry Commission and Cumberland County Council, are giving sympathetic consideration to these proposals and it is expected that eventually national parks will be established or extended in these areas.

A glance at the map will show at least two conspicuous blanks, the western half of the State and the north coast. Probably most of us think of the west as flat and uninteresting but there is real beauty in, for example, billabongs and River Red Gums, and the largest number of wildlife species occurs, not in the coastal region as might be supposed, but in the semi-arid. Mootwingee, north-east of Broken Hill, now a reserve for Aboriginal relics, merits national park status. On the north coast, sand-dune environments undoubtedly should be represented.

It seems impossible to discuss national parks in isolation from other nature reserves. They are all closely linked by reason of their common use for the preservation of wildlife, but otherwise they have distinct uses.

National Parks and the faunal reserve system are the most important of our nature reserves—national parks for human use, and faunal reserves, in the words of the Fauna Protection Act, for "the protection and care of fauna, the propagation of fauna, and the promotion of the study of fauna".

In addition to national parks and faunal reserves there are thousands of small reserves of which many have natural cover. Collectively, they are of considerable value for public use and for the preservation of fauna and flora, but are too small or too liable to deterioration or not of sufficient significance to be regarded as national parks or faunal reserves.

State forests under the control of the Forestry Commission and water catchment

areas under the control of water supply authorities also play an important part in the preservation of habitats. Both provide to some small extent for public recreation, which might well be increased in the future.

The Forestry Commission, in addition to providing fire-places and picnic tables in some State forests, have flora reserves "for the preservation of native flora", declared under the Forestry Act. These have considerable value for public recreation and the system could well be extended.

Probably the most significant of the flora reserves is one still to be dedicated. It is part of a proposal, put forward by the National Parks Association and agreed to by the Forestry Commission and the Department of Lands, for an area on the southern slopes of Barrington Tops—a flora reserve of 16,000 acres on the heads of the Patterson, Allyn and Williams Rivers, associated with a national park of 1,800 acres on the Williams River.

Development In National Parks

The parks close to Sydney—Royal National, Ku-ring-gai Chase and Lane Cove—have been developed for years with an extensive system of roads and picnic areas, and they have staffs of rangers. However, there does not appear to have been any planning to provide for unroaded primitive areas of adequate size or to prevent destruction of the vegetation by over-use.

The parks further away from Sydney have been almost entirely undeveloped except during the last few years. This has been due to park trusts having been starved of funds, although those near Sydney were able to obtain Government grants for the development mentioned.

During the last few years the Government has at last become conscious of the importance of national parks and grants to trusts have increased considerably, enabling the employment of rangers and the undertaking of some small developments.

The number of rangers now employed is either one part-time, one, or two, except that Kosciusko, Royal National and Ku-ring-gai have larger staffs.

The development has been in the form of walking tracks, picnic areas, camping areas, parking areas, short access roads and small accommodation huts and ranger's cottages. This development has been sound and well planned, and has been due mainly to the appointment to trusts of individuals who have studied national park procedures in their spare time and have had their views accepted by their fellow trustees, and to publications and activities of organizations such as the National Parks Association. Probably it is as well that development has been delayed until the spread of some real appreciation of the purposes of national parks.

The Warrumbungle National Park was the first to start its planning and development, which is now well advanced. There are three camp-sites on the access road, which finishes at the third, Camp Pincham, where the only buildings are a small shelter with water tank, and toilets. From here a system of well-made walking tracks leads visitors up to and along the top of the range, where they can see to best advantage the results of volcanic activity which are the principal feature of the park, and enjoy extensive views in which the road and tracks are not obvious. On the way there is much of interest in the trees—eucalyptus, cypress, occasional kurrajong and fig—flowers and abundant bird life. The main camp is lower down, Canyon Camp on Wombelong Creek. Here there are hut accommodation, a ranger's cottage and kiosk. The need for and appreciation of such development are attested by the increasing number of visitors.

Kosciusko State Park is the exception as regards development in parks away from Sydney. Prior to the establishment of the park there was the road to the summit and accommodation for skiers at three points along it. During the last 10 years there has been a tremendous upsurge in skiing, requiring accommodation, transport, parking and tows. Although tows are not things of beauty and to the national park purist quite out of place, as Kosciusko is the only snowfield of significance for skiing in N.S.W., some flexibility is necessary. Large numbers have visited the Snowy Scheme and have stayed or come again for the scenery and alpine flowers. I understand that now there are more summer than winter visitors, and development is proceeding at Yarran-

gobilly Caves; the camp-site at Sawpit Creek, with its walking track to the Thredbo River, is being transformed into a major camping area, with some cabin accommodation and a visitor centre, for all-year use.

Legislation

In New South Wales, administration of national parks comes under the Department of Lands. Most parks are reserved and trusts appointed to control them under one or other of the Crown Lands Consolidation Act, Public Parks Act and Public Trusts Act, Kosciusko State Park being an exception with its own Act. In the *Government Gazette* notices, the reservations are made "for public recreation" or/and "for the preservation of flora and fauna" or similar purposes, and then follows "to be known as —— National Park".

There is no legislation which defines a national park, its uses, or the manner in which it is to be preserved or administered. The only obligation of trusts is to adhere to the purpose as stated in the *Government Gazette* notice and submit to the Department annual reports and balance sheets.

As few people have made a study of national parks, inevitably the majority of trustees have only the vaguest idea of national park purposes and administration.

It seems that we need a strong authority, possibly on similar lines to the Fauna Protection Panel, to decide policy and where necessary to maintain the integrity of national parks against other interests, and to press for the reservation of areas which it considers are necessary to and most appropriate for inclusion in our national park system.

A further need is a trained national park service to carry out the policy of the authority, in place of untrained rangers employed by separate trusts.

That the present system has continued so long has been due to public apathy. Now the apathy has gone and improvement is imminent.

In 1957 a deputation representing a large number of nature conservation societies met the Minister for Lands and presented proposals for a National Parks Act. Later that year the National Parks Association of New South Wales was founded, and one important phase of its work has been to continuously press for this Act. A resolution supporting the proposed Act was signed by about 100 organizations and submitted to the Premier in 1960.

The main points which the deputation requested be included in the Bill are as follows:—

- A definition of the purposes of national parks.
- The setting up of a National Park Authority and a National Park Service.
- Provision of a flexible system, particularly valuable for the early years of the Act, whereby management of parks could be directly by the National Park Service, with or without Local Advisory Boards, or by Park Boards answerable to the authority. In this way members of trusts could continue their direct interest in national parks, at least for some time, and could assist in the introduction of the new system while the National Park Service was building up and training its staff.
- Provide for the security of national parks by legislating that they be not diminished in size except by Act of Parliament, and by excluding the operation of other Acts such as the Mining Act.

The future of a vital part of our heritage, our national parks, rests with the possession of the wide and long view by those who plan our national parks system and those who administer it.

[*The map accompanying this article is by courtesy of the N.S.W. Fauna Protection Panel.*]

Henbury meteorite craters. The main group of three craters, which are joined together, stands out in the background. Further forward two smaller separate craters are easily seen, one on the bank of a creek and the other behind it. [Photo: Author.]

SEARCHING FOR METEORITES

By R. O. CHALMERS

[This is the concluding part of an article on the Australian-American Meteorite Expedition, of which the author was a member, in central Australia, northern New South Wales and northern South Australia, last year. The first part appeared in our last issue.]

AS already stated, the origin of australites, and indeed tektites in general, is not generally agreed on. It can be said that the majority viewpoint is that they are of cosmic origin, but there is still a considerable body of opinion that they are of terrestrial origin.

Tektites differ from iron and stony meteorites in three important respects. They occur only in southern Australia, Philippines, southern China, Indo-China, Thailand, Malaya, Indonesia, the Ivory Coast of Africa, Czechoslovakia, and Texas and Georgia in the U.S.A. They have never been seen to fall and are thought to have landed in distinct showers, one in Czechoslovakia, one in Australia and possibly contemporaneously in south-east Asia and

A selection of the best of the australites from the sand-hills fringing the eastern side of Lake Torrens. The primary shape of the top four was spherical and the flanges were produced by fusion of the surface during flight through the air. The one on the right end of this row shows ring-waves near the centre. The largest australite in the photo, a spherical type, has only four small fragments of flange remaining. The dumb-bell shaped ones and the elongated ones mostly show flanges which formed during flight through the air. Their primary shapes were elongated. All are about half natural size.

so on, at various times in the past. Age determinations show them to be very much younger than iron and stony meteorites, and because of this they have certainly had a quite different origin.

As a confirmed believer in the cosmic origin of tektites, I feel that adherents of terrestrial origin are hard put to explain many of the features of tektites. For example, all tektites have a very similar chemical composition and, being glass, the original rocks from which they were formed by fusion must have had a remarkably uniform chemical composition. It is difficult to envisage where on the earth's surface such great expanses of uniform rock types might be and what mechanism could have fused the vast quantities of homogeneous rock and scattered the fragments over isolated areas of the earth's crust, some of them, such as the whole southern part of Australia, being of vast extent. One recent ingenious theory is that a giant crater-forming iron meteorite fell with terrific force on the Antarctic continent and melted the rock on the surface to form a glass. It is then postulated that the force of impact was sufficiently great to put the glass fragments into orbit round the earth and that they then re-entered the earth's atmosphere and fell in Australia.

A unique feature of australites is their regular shape, the most characteristic being that of a "button" surrounded by a flange which represents the melted front portion of an originally spherical australite that flowed back and surrounded the button in the shape of a flange. This indicates that australites have travelled through the earth's atmosphere at high speeds and that the surface layers have been fused by heat generated by friction.

Intensive work over many years by Dr. George Baker, of Melbourne, and more recently by aerodynamicists in the National Aeronautics and Space Administration of the U.S.A., has shown that australites were initially formed, by some mechanism outside the earth's atmosphere, as fused masses of glass the majority of which assumed spherical shapes because they did not rotate. A minority of these glass masses did rotate and while still in a molten condition formed elongated shapes. With prolonged revolution some of these elongated shapes

became constricted in the middle like a dumb-bell. On entering the earth's atmosphere as cold solid bodies fusion of the surface layers took place in the manner described. Spheres up to a certain size fell to earth as flanged buttons. If they travelled too far at high speeds after the flange formed the flange itself would be dissipated and a lens-shaped form would result. Other rounded forms without flanges are known as "cores" or "bungs". If the original sphere was above a certain critical size, flanges probably would not form at all. The elongated forms are known as boats or canoes and the forms with the constriction in the middle are aptly known as dumb-bells. All of these elongated and constricted forms can develop flanges.

Two Theories

Admitting a cosmic origin, what then is the mechanism that forms the original spheres and elongated shapes? Astronomers and mathematicians seem to favour a theory that the earth, on passing through the head of a comet once every million years, sucks the fine dust of which a comet is composed towards its surface and that in the process high temperatures are generated by collision between the minute particles due to turbulence. These temperatures are sufficiently high to fuse the fine particles, causing them to coalesce into glass fragments which then undergo fusion of the surface layers and assume the characteristic shapes. Another theory is adhered to mainly by geologists and aerodynamicists and seems to be the best substantiated. It is considered that the original glass fragments were formed by the fusion of the surface of the moon by the explosive impact of the giant meteorites that have caused the craters on the moon. The lack of atmosphere on the moon would mean that these glassy fragments would have no difficulty in attaining the escape velocity which would enable them to travel straight into the earth's atmosphere and fall to earth.

Very few tektites from strewnfields other than Australia show regular shapes. This may be because some, like the moldavites from Czechoslovakia and bediasites from Texas, have been on the earth much longer and have had the regular shape removed by weathering. The south-east Asian and Australian tektites are quite young, having formed only half a million years ago. The reason for the absence of regular shapes in the south-east Asian types may be because, since they have continually been subjected to wet tropical conditions, the rate of corrosion may have been accelerated by the action of groundwater, acidic in nature. On the other hand, the reason for the unique regularity of australite shapes may be that their angle of entry into the earth's atmosphere was such that they travelled to earth over longer distances and at higher speeds, causing more fusion of surface layers than in other types of tektites.

Prospecting for meteorites near the Henbury Craters, central Australia. At left, Dr. Brian Mason, of the American Museum of Natural History, New York, is using a metal detector which gives a high-pitched note when close to a metallic object. Mr. P. D. Boerner, of Alice Springs, who gave great assistance at Henbury, is running a powerful magnet through the soil, which has been dug out, to pick up any meteorite fragments. [Photo: Author.]

Lake Torrens Australites

It was quite clear that these australites in the Lake Torrens sand-hills had been washed out of the sand-hills and remained uncovered on wide flat clay-pans. In other parts of this same general area, where there was a soft sandy surface between the dunes, australites were just not to be seen although they may still have been present buried in the sand-hills. In common with all others who have collected australites, we found it easier to see them when walking over the clay-pans in bright sunshine but with the sun behind us. At first the universal presence of dark-brown ironstone pebbles, dark-grey fine-grained silicified sediments, charcoal fragments and even pupal cases of wasps and wing cases of beetles was confusing. However, the eye rapidly became accommodated to the lustrous intense black colour of the australites and after a while they could be readily distinguished at a glance from the other objects that bore a superficial resemblance.

The occurrence was indeed an outstanding one. The total area of clay-pans examined was not very large and from these we personally collected 184 specimens. These, together with the collection from the same area donated by Noel Smith, made a total of 291. All were extremely fresh and showed little signs of abrasion. One hundred and thirty-six were complete forms. Of these no fewer than 24 were complete flanged buttons.

The journey to Alice Springs could not be completed in the vehicle. North of Leigh Creek, roads were impassable due to the heavy rain so the party went north with the vehicle on the train. It was disappointing not to have completed the trip by road because there were other known meteorite localities to visit and always the possibility of finding more australites. Once in Alice Springs we were 150 miles away from Charlotte Waters, the most northerly of the australite localities in this particular region.

Henbury And Box Hole Meteorite Craters

My remaining stay with the expedition was spent principally at two meteorite crater localities, Henbury, 70 miles south-west of Alice Springs, and the single one at Box Hole, 120 miles north-east of Alice Springs. The larger an iron meteorite is, the more spectacular are the effects when it hits the ground. Meteorites up to 10 tons in weight, by the time they approach within a short distance of the earth, are falling under the influence of gravity and scarcely make a dent in the ground. When larger than this they retain some of their high velocity of entry into the earth's atmosphere, which may be as fast as 44 miles per second. When really large ones of unknown size, but perhaps in the order of thousands of tons, strike the earth their great energy is transformed into tremendous pressures and temperatures. Craters are blown in the earth's surface, the mass of the meteorite is shattered into countless fragments, and the country rock is sintered or fused to form fragments of natural glass. This is the exact mechanism that may have thrown tektites from the moon's surface.

At Henbury there are 13 craters, the largest 660 feet across and 60 feet deep. Over the last 30 years thousands of iron meteorites have been found on the surface around these craters, ranging in size from 300 pounds to a fraction of an ounce. Very seldom are they found inside the craters because the force of the explosion shattered the main mass and blew the fragments right out of the craters. Apparently the Henbury fall approached the earth in the form of an immense shower, the largest masses being of an unknown order of size but huge enough to blast out the 13 individual craters. The countless smaller fragments are either small individual masses from the shower or contorted and twisted fragments torn from the huge masses by the force of the explosion. Many of these twisted fragments were picked up on top of a ridge 400 feet high a mile away from the craters. Many of the smaller masses near the craters were buried under a few inches of soil but an Army-type mine detector we had with us helped us to find them. Box Hole is a single crater and the iron meteorites we found there had the same distribution pattern as Henbury. At Henbury we found about 600 fragments, the largest 2¼ lb., and at Box Hole 76 fragments, the largest 3 lb.

TASMANIAN DEVILS

By ERIC R. GUILER
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THE separation of Tasmania from the Australian continent apparently has resulted in the survival in Tasmania of several species of marsupials which are now extinct on the mainland of Australia. One of these species is the Tasmanian Devil, *Sarcophilus harrisii*. In passing, it is of interest to note that the specific name for the Tasmanian Devil used to be *satanicus*, perhaps a more suitable name than that at present in use. Another specific name, also discarded nowadays, was *ursinus*, meaning bear-like. This name was used on account of an alleged resemblance to bears, a resemblance which I cannot see. However, the laws of zoological nomenclature give priority to *harrisii*.

The Tasmanian Devil is assigned to the Family Dasyuridae and its closest relatives are the native cats, tiger cat, thylacine and marsupial mice. According to some authorities the Dasyures are Polyprotodont marsupials, a grouping which relates them to the bandicoots and opossums, but more recent workers do not adhere to this older classification and give the Dasyurids equal super-family status with the Didelphoids (American opossums), Perameloids (bandicoots), Caenolestoids (opossum-rats) and the Phalangeroids (possums, kangaroos, etc.).

The Tasmanian Devil is a black creature about the size of a cocker spaniel with a very powerful head, jaws and forequarters and having relatively weak hind parts. The strength of the head is one of the most remarkable features of Devils and is reflected in the structure of the skull and jaws. The bones of these structures are all massive, especially those associated with the eating muscles. The teeth also are very strong. The powerful jaws are used for crushing bones and devouring prey and can administer a severe bite. Consequently, the Devil is a species which has to be handled with considerable care. The teeth usually are of a clean white colour and contrast sharply with the bright pink or red of the mouth and the black of the head to form a fearsome picture. The arrangement of the teeth in mammals is important not only in their classification but also as an indication of the type of food which they eat. It is convenient to describe the order and number of the teeth as a dental formula. For the Tasmanian Devil this is: Incisors $\frac{4}{3}$; Canines $\frac{1}{1}$; Premolars $\frac{2}{2}$; Molars $\frac{4}{4}$, thus showing that there are four incisors in the upper jaw and three in the lower, and so on.

The Tasmanian Devil. [Photo: Animals and Birds Protection Board, Tasmania.]

Tasmanian Devils' general colour is black, though old animals may be a brownish colour. A white band is nearly always present on the chest and often there is a white rump patch. Melanic specimens are not infrequent in some parts of the State.

Tasmanian Devils Numerous

Devils are found over most of Tasmania where there is scrub or rocky country suitable for their concealment by day. Until some 10 years or so ago Devils were not very common except in some west coast

districts, but nowadays they are very numerous in the west, north-west, central and north-east parts of the State and are appearing in the more open country of the Midlands. They are most common on the west coast and as many as over 100 have been taken from about 100 acres.

The presence of such large numbers of Devils has resulted in some agricultural problems. It is claimed by pastoralists that young lambs are killed and eaten by Devils and there is no doubt at all that any fowls in unlocked pens will be killed and devoured overnight. A brief investigation into the food of some 50 Devils showed that some lambs' wool was in the stomach of some specimens but there was no evidence that the Devil had killed the lamb before eating it. In other words, it could have been dead and then devoured as carrion.

Feeding Habits

Devils eat a wide variety of food. Macropods, particularly the Scrub Wallaby, *Thylogale billardieri,* are an important item of diet but any other form of meat is eaten either as prey or as carrion. Native rats, birds, wallabies, ringtail and brush possums, lizards, insects, berries, twigs, bark, leaves, other Devils and even snakes are to be found in stomach samples, though the last-mentioned may not be popular as an item of diet. The introduced species—rabbits, rats, cats and agricultural animals—are also eaten, and dead cows are rapidly eaten by Devils in some districts. A feature of the feeding of Devils is that all of the prey is eaten, including the skin and bones. The only bones to resist the jaws of the Devil are the strong skull of wombats and the long bones, pelvis and skull of cattle.

The feeding habits of Devils make food studies simple. The droppings can be identified from their size, shape and often from the nature of their contents, which mainly comprise fur, bones and other animal remains. However, native cat and tiger cat droppings also contain animal remains and care has to be taken that these are not mistaken for Devil droppings. The former are smaller, thinner and more twisted than the latter. A collection of Devil droppings can be made and on examination yields fur, teeth, bits of bones, claws and sometimes even complete feet up to the size of those of a rabbit. Detailed examination of droppings gives us a picture of the food eaten by Devils in any area. A surprising amount of vegetable material may be found in some samples. This is not an indication of starvation or privation, as such animals are in good to excellent condition with much fat on the intestines. The vegetable material may be eaten as an aid to digestion.

A survey carried out on the west coast near the Pieman River, an area containing native species, and at Glen Huon in the south, where there were many rabbits, showed that the southern Devils had replaced the wallaby by the rabbit as the major food item.

The Devil can be described as a useful animal in the bush, eating all manner of carrion and very materially helping to keep the number of wallabies under control. In this way, the farmer is being assisted by the Devils, although the price may be some hens devoured.

Breeding

Devils breed in March; the gestation period is about 31 days, and three or four young are born. The young, like all marsupials, are nourished on the teat for some time. At about 10 weeks they are too big to be retained in the pouch and hang out, still attached to the nipple, but at about 15 weeks they leave the nipple. By 22 weeks of age the young cease nursing and eat solid food.

In the wild state the young run with the mother from a fairly early age and a mother has been trapped, together with a young of 10 inches crown-rump length. Young Devils are caught living a solitary life in the bush from late October and presumably have left their mother by this time. By February the young are still only half-grown so that breeding does not occur until the animal is at least two years old. Trapping during October-early March did not yield any female Devils with pouch young, so it would appear that there is little, if any, out-of-phase breeding, pointing to a monoestrous cycle.

Devils are shy of man and are nocturnal in habit, being rarely seen in daylight, even in areas frequented by large numbers of

the creatures. Many people are unaware of the fact that Devils live in the bush immediately around their homes, but their footprints are easily distinguishable, as they characteristically show one print then two, more or less side by side, then one, and so on. These can readily be found around sheds and outbuildings. The gait is a shuffle, and they move rather slowly. I have not seen any Devil capable of a turn of speed. Rather than run when approached they adopt a defensive pose and show fight. However, they do not attack man unless cornered and may then make only a short rush.

The slowness of their pace forces one to the conclusion that they must hunt by stealth, relying on their jaws to kill or incapacitate their victim after a quick leap from hiding. They travel more or less continuously and even scramble up trees to take meat.

Under normal circumstances Devils are silent animals but they make a great clamour should a fight take place. The noise is quite unearthly, consisting of loud hisses, yells, grunts and snorts. Zoo animals are adept at putting on this turn for the benefit of patrons.

Little is known of the cycles in the population of the Tasmanian Devil. It is certainly on the upgrade of a cycle at the time of writing and now is known from areas where it has not been seen in living memory. It was suggested that about 1908 all the Dasyures, the family to which the Devil belongs, were affected by a disease which decimated their numbers. Native cats, tiger cats, Devils and even the thylacine were believed to have been reduced in numbers. The Devils certainly became scarce due to some cause or causes, but now have recovered very fully.

The Tasmanian Devil is one of our unique mammals and as such must be preserved vigorously, but it is also a part of the very numerous Tasmanian population of small, ground-dwelling marsupials. These animals have become scarce or rare on the mainland of Australia, partly due to the activities of introduced species, and it is a matter of great concern to Tasmania that the richness of this fauna be preserved.

THE ORNAMENTAL SEA-TOAD

This photograph shows the carapace, or shell, of the Ornamental Sea-toad, *Schizophrys dama*, a "spider-crab" from Broome, north-western Australia (length up to about 2½ inches). Only one other illustration, now rare, of this distinctive crab has appeared since an initial hand-coloured plate was published in Berlin, in 1804, by the German naturalist Joann Friedrich Herbst with his original description of the animal. *S. dama* is found intertidally and in shallow water from the Albany area of south-western Australia, through western and northern Australia to northern Queensland, and in life has the carapace often partly concealed under a cover of sponge and other marine growths. Note the two thorn-like spines laterally from each of the elongate rostal horns at the front of the carapace. This feature serves to distinguish *S. dama* from the closely-allied Red Sea-toad, *Schizophrys aspera*, which has only one lateral spine on each rostal horn. *S. aspera* is known from similar depths through South Australia, Western and Northern Australia and along the entire Queensland coast and Barrier Reef area. It has not yet been recorded from New South Wales or Victoria, and should be watched for in these waters. (Photo: Anthony Healy.)—*J. C. Yaldwyn.*

Aerial view of the Strickland River in western Papua, showing the mud-banks on which the Pitted-shelled Turtle, *Carettochelys*, lays its eggs. This photo also shows the nature of the Western District lowlands.

A Reptile-collecting Expedition to New Guinea

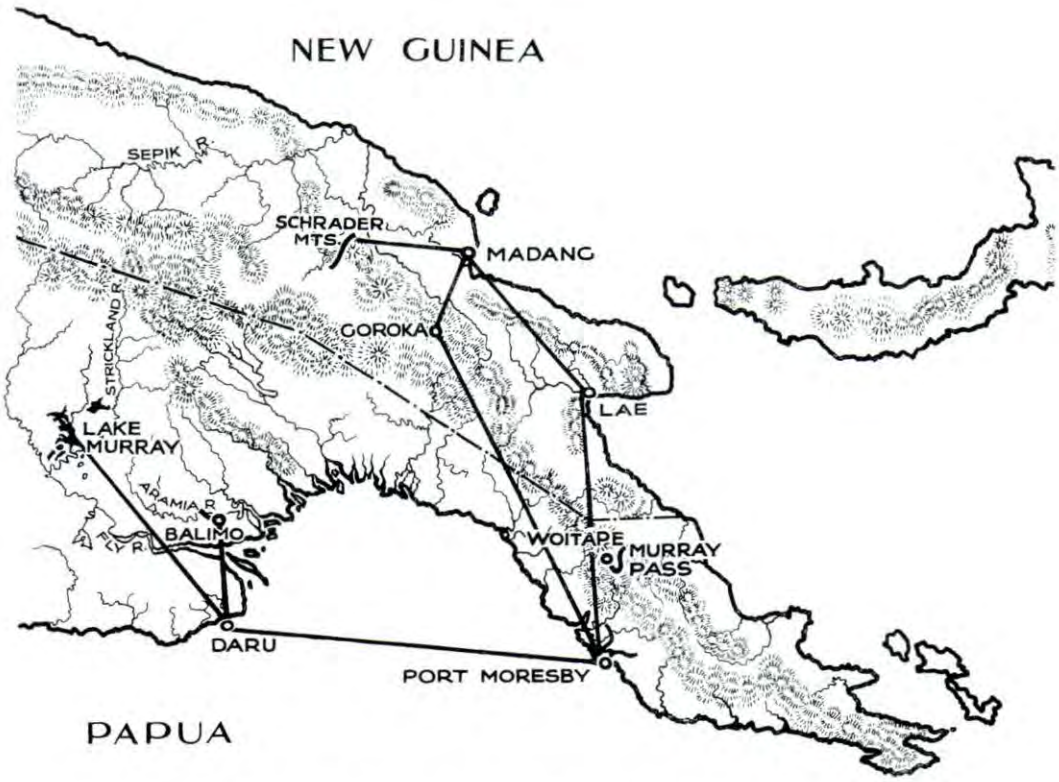
By HAROLD G. COGGER

SINCE European man first learned of its existence, New Guinea has been a Mecca for zoologists; indeed, the fabulous plumes of the Bird of Paradise were well-known in Europe centuries before their island home.

Yet despite world-wide interest in New Guinea and its fauna, our knowledge of most animal groups within the area is still pitifully small.

Between October, 1963, and January, 1964, the author and the Museum's Assistant Curator of Insects, Mr. D. K. McAlpine, visited various parts of Papua and New Guinea in search of reptiles, frogs and insects for the Australian Museum's research collections.

Apart from the intrinsic interest in learning more about a poorly-known fauna, there are a number of factors which make New Guinea an area of exceptional biological interest. Firstly, by virtue of its geographic position, the animals and plants reveal a great deal about the relationships between the faunas and floras of Asia and Indonesia on the one hand and Australia on the other; indeed, a study and knowledge of the animals of New Guinea are essential to an understanding of the origin, radiation and



The route and major collecting localities of the expedition.

relationships of the Australian fauna, and to the zoogeography of the whole Pacific region.

Secondly, the topography and climate have resulted in a wide range of environments which provide excellent opportunities for the study of the evolutionary processes of species formation and adaptation. Conspicuous altitudinal and habitat barriers to animal dispersal allow the zoologist to study the effects of separation and isolation on populations of the same species.

The origins and relationships of the reptiles and frogs of New Guinea are poorly known, although the herpetofauna of this region can be divided into three basic groups. The first is a large endemic group whose origins are obscure; the second is a small Indo-Malayan group which is clearly of fairly recent western origin, and the third is a relatively large "Australian" group, whose representatives are of recent Australian origin, and many of which are not or but slightly differentiated from their Australian counterparts.

Many present-day distribution patterns are the result of faunal exchanges which took place as recently as 20,000 years ago. At that time, as the result of the accumulation of ice at the poles, there was a lowering of the sea level to more than 300 feet below that of today. This resulted in a broad land connection between Australia and New Guinea, and a narrowing of the sea barrier between various islands to the east of New Guinea. But even at that time there was still a deep-water barrier between the islands of Indonesia to the west and the Australia-New Guinea continent to the east. However, the composition of the contemporary faunas of these areas has always been an intriguing question for biologists, for there is a sharp division between the Oriental and Australo-Papuan faunas and

floras which is not readily explained on the basis of existing barriers to animal dispersal.

Topography And Vegetation

Topographically, New Guinea consists of a central chain of mountains running roughly in an east-west direction. They rise in places to more than 15,000 feet in altitude, and vary considerably in width. It is not a continuous chain, but a complex of individual ranges intersected in places by broad upland valleys. Surrounding the central mountains is a lowland coastal zone; at its widest part, between the Fly and Digoel Rivers in the south, it extends more than 200 miles inland without rising higher than 300 feet. However, except for the southern coast and the broad valleys of the Markham, Sepik and Mamberamo Rivers, the remaining lowlands are largely restricted to a fairly narrow coastal fringe.

The vegetation of New Guinea and its island archipelagos to the east is rich and varied, in keeping with the wide range of climatic conditions produced by its proximity to the equator and its topography. In the southern lowlands, drainage and rainfall patterns produce a mixture of swamp forest and grassland, monsoon forest and open savannah. The highlands are clothed in rich sub-tropical forests to an altitude of about 6,500 feet, except where the clearing and gardening activities of the natives have given rise to large areas of grassland and secondary forest growth. Above this altitude these forests are replaced by Antarctic beech and coniferous forests which extend to about 11,000 feet, and these are in turn replaced by alpine scrubs and grasslands. Permanent snow is found only in West Irian, above 16,000 feet.

The route taken by the author is shown on the map. Transport to the major collecting localities was by air, the only practical and available transport throughout most of New Guinea, while local transport was by Landrover, launch, canoe or foot.

When one first arrives at Port Moresby, it is difficult to believe that one is really in New Guinea. The bare, dry hills with their eucalypts form an open savannah closely resembling that of Cape York Peninsula, and this impression is heightened by the similarity of many of the reptiles of these two areas. But only a short distance from Port Moresby, in the foothills of the ranges, one enters a world of dense, wet monsoon forest which is the antithesis of the coastal savannah.

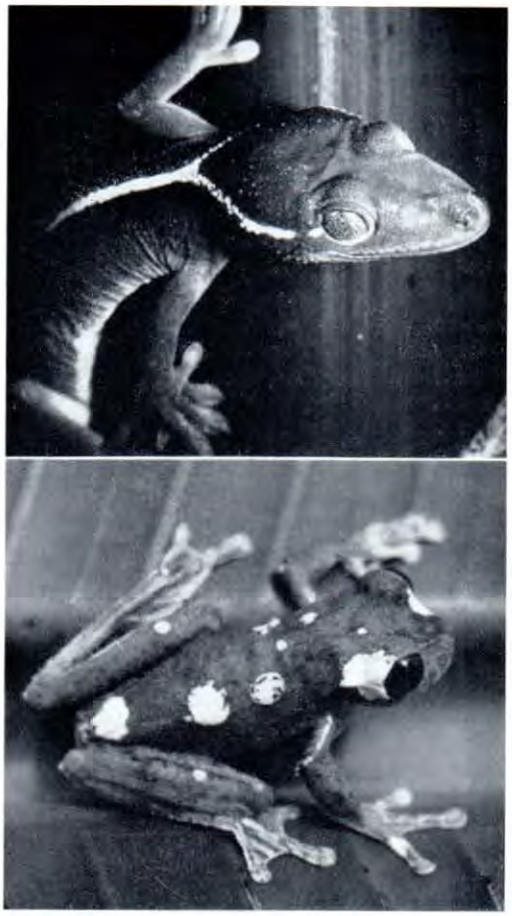
Interesting Frogs

Only half an hour's flight from Port Moresby is the settlement of Woitape, situated in a valley below the Wharton Ranges, and at an altitude of approximately 4,500 feet. Here our first work was carried out, and several days were spent collecting in the surrounding forest, where numerous reptiles and frogs were found. Among the most interesting were frogs of the hylid genus *Nyctimystes*; these tree frogs are chiefly characterized by their possession of a pigmented venation or reticulum on the transparent portion of the lower eyelid. This reticulum varies considerably in pattern and colour from species to species, and its function is not fully understood.

At Woitape I was able to obtain many interesting frogs by first making recordings of their calls, and then playing these recordings back to the local school children. The children recognized the calls and collected the frogs responsible for them, frogs which I had earlier searched for without success.

We left Woitape with a party of natives to spend a week at Murray Pass, at an altitude of between 10,000 and 11,000 feet. Here large tracts of forest have been cleared by past generations of local people, so that enormous areas are now covered with nothing but tree ferns and alpine grasses and ferns. It is an unworldly landscape, at times rather eerie, and frequently in cloud or fine rain. Throughout the day the country echoes to the solitary calls of a tiny frog, *Cophixalus pansus*, which lives in many thousands in the grass or under fallen fern trees. This frog, which is a member of the family Microhylidae, lays a number of large eggs joined together by a string of mucus; they are laid on land, and tended by the female until they hatch, not as tadpoles, but as fully formed frogs; and for a short time they are carried about on the back of the parent.

These frogs, and a colourful scincid lizard which also occurs in large numbers in the same habitat, were the object of the Murray



Gekko vittatus (above), a large gecko occurring in many parts of Papua and New Guinea. It is often found at the bases of leaves of coconut, pandanus and sago palms. *Nyctimystes kubori* (below) is a tree frog common in some parts of the New Guinea highlands.

Pass visit. On returning to Port Moresby some of them were kept alive under refrigeration, and were subsequently returned to the Museum in the cold room of a coastal steamer for further study.

Immediately after returning to Port Moresby I left for Daru, a small low-lying island just off the coast of south-western Papua which is the administrative centre for the vast Western District. From there I travelled on the small launch *Aketa* to the Agricultural Extension Station on the Oriomo River. The station is situated on the bank of the river, about 30 miles upstream; here the river is fringed by a narrow but dense zone of forest in which the important sago palm is conspicuous, while the country behind is a mixture of monsoon forest and open savannah. The reptiles and frogs found on the Oriomo are an interesting mixture of Australian and New Guinean forms. One of the most interesting reptiles encountered was the brilliant emerald-green pigmy goanna, *Varanus prasinus*.

Turtles And Tortoises

After only a few days on the Oriomo, I returned to Daru and then flew to Balimo, a Patrol Post and Mission on a large lagoon which opens into the Aramia River. Along its lower reaches the Aramia River is lined by grassy banks with scattered clumps of trees and bamboo. Behind these banks are enormous areas of country which are periodically or permanently inundated, resulting in swamplands or lagoons which abound in fish and crocodiles, and scattered through the lagoons are small islands, usually capped by groves of coconut palms. One of the main objects in visiting the Western District was to obtain specimens of freshwater tortoises, and large numbers of these were collected in the partly-dry lagoons behind the river. These tortoises are closely allied to the Australian tortoises, and are members of the so-called Snake-necked Turtle family Chelidae, whose members are found only in Australia, New Guinea and South America. Some of the New Guinean species, which belong to the same genera as those occurring in Australia, are very colourful. The common short-necked species in Papua, *Emydura subglobossa,* has its plastron brightly suffused with red or orange, this colour also being present on the limbs.

From Balimo I returned to Daru, and the next day boarded the Catalina for Lake Murray. From the air, Lake Murray appears as an enormous half-finished jigsaw puzzle, its edges confused by numerous islands which gradually merge with the country behind. Again, the main purpose of this visit was to collect turtles and tortoises, and the low level of the lake resulted in many of these animals being collected. Probably the most common reptile at Lake

Murray was the Javan File Snake, *Acrochordus javanicus*, a water snake which grows to more than five feet in length, and whose coarsely-ridged scales give the snake its popular name. It is virtually helpless on land, and spends its entire life in the water, where it feeds on fish.

Because of the dry conditions prevailing at the time, few frogs were found, but numerous species of snakes and lizards were collected. On a visit by launch down the Herbert and Strickland Rivers, numerous tracks and nests were found of the Papuan Pitted-shelled Turtle, *Carettochelys insculpta*, but no adults were found. All of the nests examined were either old ones in which the young had hatched, or the eggs had been collected by the natives for food; or, as in the case of several nests, tracks revealed the raiders as goannas. Only one nest was found undisturbed, evidently freshly made, and 19 eggs were collected and brought back to Sydney. These subsequently hatched several months later, and the young are still alive at the time of writing. *Carettochelys* has a short, blunt head with long, tubular nostrils, and grows to more than two feet in length. Subsequently an adult specimen was procured for us by a local naturalist and crocodile shooter.

Another reptile which was greatly sought after, and which was collected both at Lake Murray and at Balimo, was the New Guinean freshwater crocodile *Crocodylus novaeguineae*, a fish-eating species which grows to more than 10 feet in length. In appearance, the New Guinean freshwater crocodile is more or less intermediate between the narrow-snouted freshwater species of Australia, *C. johnsonii*, and the blunt-snouted Estuarine Crocodile, *C. porosus*. The latter is a known man-eater, and is found together with *C. novaeguineae* in some of the Papuan rivers.

From Lake Murray I returned to Port Moresby, and then flew by commercial and charter aircraft via Lae and Madang to Simbai Patrol Post in the Schrader Mountains. From there it was only a few hours' walk to the village of Fungoi, situated at about 5,500 feet in the beautiful Kaironk Valley, between the Bismarck and Schrader Ranges. Here, as everywhere else in New

Children offering frogs for sale at a village on the Aramia River, Papua. Children were found to be the best collectors of the small lizards and frogs which were being sought on this expedition.

Guinea, the local people proved to be excellent collectors of frogs and lizards, although their fear of snakes resulted in few specimens arriving intact at my hut. My time at Fungoi was divided between receiving specimens brought in by the local people and exploring the surrounding country and studying the various reptiles and frogs found in each of the major habitats. As elsewhere in the New Guinea Highlands the lower parts of the valley are generally taken up with gardens, or grassland in old garden areas. In some areas secondary forest growth has invaded old garden areas, while primary forest is now restricted to the tops of the ranges, above about 7,000 feet. Each of these habitats has distinctive reptilian and amphibian faunas, although there are a number of species which have been able to adapt to all habitats, and are found from the valley floor to the tops of the ranges. In the high-altitude primary forest, for example, frogs of the Family Microhylidae are dominant, whereas in the grass and garden areas frogs of the Families Hylidae and Ranidae are more commonly encountered. As a result of these various habitat preferences, the distribution of various animals is governed to a large extent by the distribution of their habitat, so that as these habitats are enlarged or reduced by the gardening and clearing activities of the natives, so significant changes are brought about in animal distribution.

After leaving the Kaironk Valley, brief periods were spent collecting at Madang and Port Moresby before returning to Australia.

New Guinea is indeed a land of contrasts. Lying only 90 miles from the tip of Cape York Peninsula, it is an island known to relatively few Australians, and little understood by them and the rest of the world. Events in recent years—from the accession of the western half of the island to Indonesia, to the recent elections in the Australian territories—have resulted in a growing awareness of New Guinea and its importance in world politics.

Need For Research

Less frequently appreciated, however, is the fact that in New Guinea the world has a unique opportunity, soon to be lost forever, of studying a rich tropical environment which as yet has been remarkably little disturbed by man. As has been demonstrated throughout the world, man has wrought such vast changes in the natural environment during the past century alone that few parts of the world remain in which the present environment can be said to be essentially unchanged by modern man's activities. It might be argued validly that such changes are inevitable as a result of man's industrial and agricultural needs to meet his expanding population, but this surely means that we have an even greater responsibility to study fully all facets of the environments that we are about to change, and which are irretrievably lost to future, and perhaps more enlightened, generations.

Inevitably, New Guinea must follow the rest of the world. Even now, vast herds of deer along the southern coast of Papua and West Irian, and giant South American toads introduced in many areas to combat insect pests, are typical of contributors to a rapidly changing ecology. Not unreasonably, anthropological studies are being given priority in terms of the volume of research being carried out to-day in New Guinea, but it is vital that research in the natural sciences follow close behind. We must not perpetuate the follies of past generations, and the time for action is now.

[*Photos in this article are by the author.*]

SEARCH FOR AUSTRALITES

The Curator of Rocks and Minerals at the Australian Museum, Mr. R. O. Chalmers, accompanied Dr. Brian Mason, of the American Museum of Natural History, and Dr. Edward P. Henderson, of the United States National Museum, in a search for australites in South Australia from June to August this year. Particular attention was devoted to the Lake Torrens region and along the Birdsville Track from Maree. A search was also made in the Windorah district, western Queensland, for stony meteorites that may still remain undiscovered from the Tenham meteorite shower of several hundred individual masses that was seen to fall in 1879. This work was a continuation of that carried out by the meteorite expedition of last year.

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Gifts of even the commonest specimens of natural history (if in good condition) and specimens of minerals, fossils and native handiwork are always welcome.

The office is open from 9.30 a.m. to 1 p.m. and 2 to 4.30 p.m. (Monday to Friday), and visitors applying for information there will receive every attention from Museum officials.

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