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paradise

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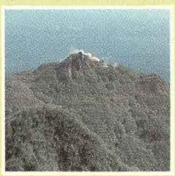
Papua New Guinea has had a long association with Canada's de Havilland organisation. Longtime travellers will recall the single-engined Otters, which were flying here well into the sixties, and the military Caribou freighter. And, of course, the Twin Otter is a familiar sight as a servant of third level operators around the country.

Things are looking good on Paradise Island. May I wish you everything for 1981 and the Eighties that I anticipate for Air Niugini.

Joseph James Tauvasa
General Manager



Cover: Plastic beads, a coin and the highly-prized kina shell add up to a lavish necklace for a Highlands lady from Mount Hagen. Maureen Mackenzie took the picture

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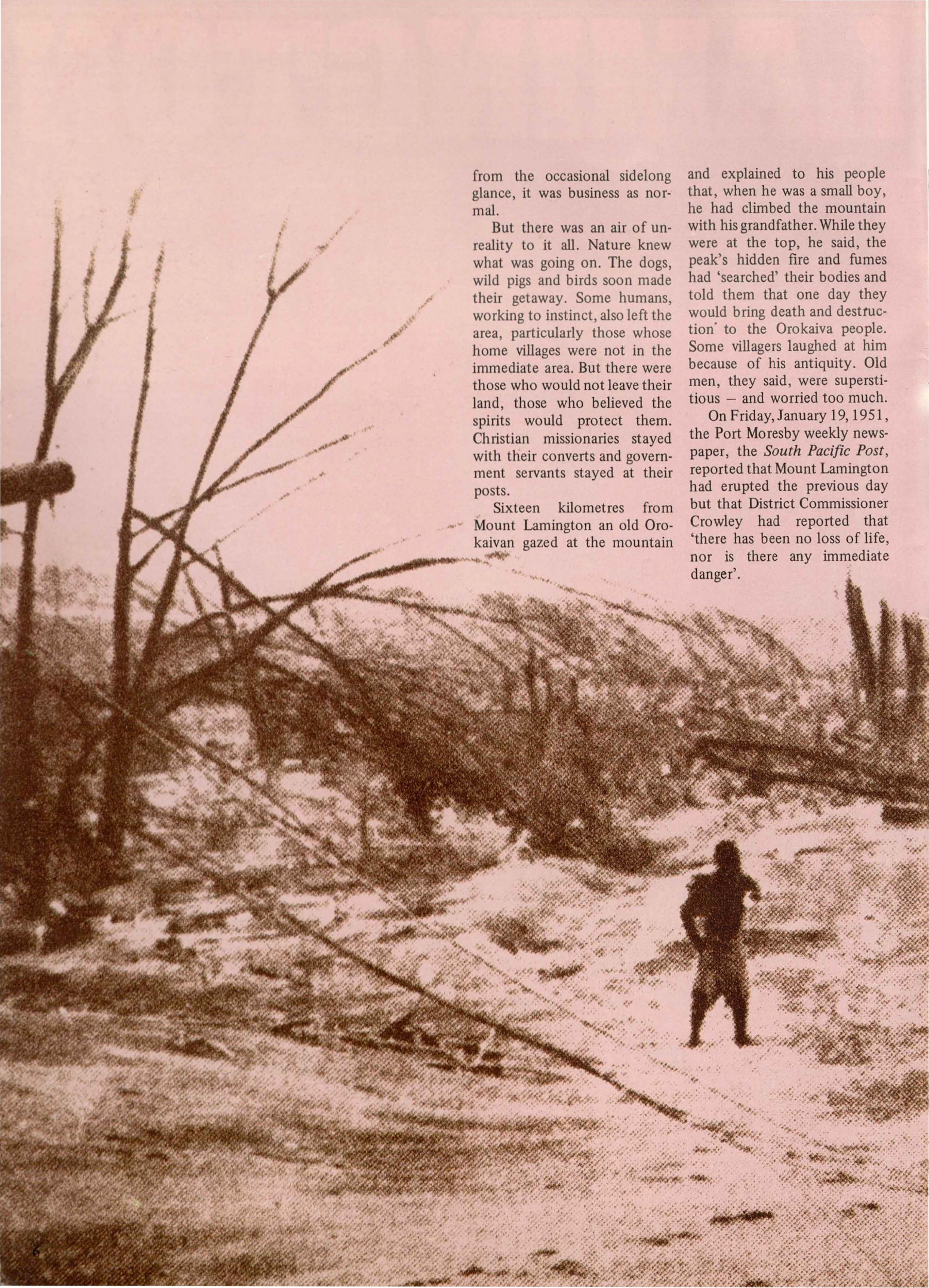
LAMINGTON

By Maclaren Hiari

The island of New Guinea is a busy stretch on the Pacific's volcanic arc. It has many active volcanoes, particularly on the islands to the northeast. But, back at the beginning of 1951, no one anticipated any trouble from mainland Mount Lamington, 150 kilometres to the northeast of Port Moresby and on the other side of the mighty Owen Stanley Range. But then the 1600-metre high mountain began to rumble . . .

MOUNT Lamington was not generally regarded as a volcano though it was known to be on a fault. The only other memorable recent volcanic activity in the Northern Province area had occurred during the Pacific War when Mount Victory near Tufi had rumbled, belched, issued forth a torrent of fire and steam – and then settled back to peaceful sleep.

When Lamington began to stir in mid-January 1951 vulcanological staff dismissed it as not serious. For a week the mountain complained. And the eyes of the Orokaivan people showed fear each time the earth shook. In the night they watched bursts of flames, sometimes mingling with lightning which crackled around the peak. By day they tried to ignore the danger by concentrating on their chores. There was coffee to be tended and at the Higaturu Government Station, apart



from the occasional sidelong glance, it was business as normal.

But there was an air of unreality to it all. Nature knew what was going on. The dogs, wild pigs and birds soon made their getaway. Some humans, working to instinct, also left the area, particularly those whose home villages were not in the immediate area. But there were those who would not leave their land, those who believed the spirits would protect them. Christian missionaries stayed with their converts and government servants stayed at their posts.

Sixteen kilometres from Mount Lamington an old Orokaivan gazed at the mountain and explained to his people that, when he was a small boy, he had climbed the mountain with his grandfather. While they were at the top, he said, the peak's hidden fire and fumes had 'searched' their bodies and told them that one day they would bring death and destruction to the Orokaiva people. Some villagers laughed at him because of his antiquity. Old men, they said, were superstitious – and worried too much.

On Friday, January 19, 1951, the Port Moresby weekly newspaper, the *South Pacific Post*, reported that Mount Lamington had erupted the previous day but that District Commissioner Crowley had reported that 'there has been no loss of life, nor is there any immediate danger'.

On Saturday, January 20, two teacher-evangelists – George Ambo (now Bishop Ambo) and Albert Maclaren Ririka – were sent by Father Dennis Taylor, the priest-in-charge at Sangara Mission Station, to help with the Sunday services at Isivita, a few kilometres away. He had sent them to safety.

As they made their way to Isivita they could see the column of smoke above Lamington, fed constantly by explosions, reaching to 8000 metres. Although people were later to say it happened without warning, others knew the truth: for almost a week Lamington gave fair warning to all. There were landslides near its summit, fireballs, earth tremors, red flashes . . .

On Sunday morning, January 21, the people filed into church. During the service the *South Pacific Post* article was read out. Services at Higaturu and surrounding villages finished about 10.40 am. Tremors had subsided but smoke continued to belch violently skywards. Then the side of the mountain blew out. Lamington had kept its promise to the old Orokaivan. Hundreds died instantly, suffocated by the vacuum created by the air being sucked up by the explosion. A dark grey cloud of ash soared to 15,000 metres. An avalanche of fire-charged particles described as 'a black cloud, whirling and billowing like an oil fire', swept down the mountain in all directions. About 275 square kilometres of surrounding countryside were devastated. Almost complete darkness prevailed at high noon.

The explosion was heard in Port Moresby and, 250 kilometres to the northwest, in Lae. Higaturu Government Station and the Sangara Mission Station had vanished. Forest was razed. A wartime Jeep finished as twisted metal in the stripped branches of a lone tree which had somehow remained standing. The Wairope Bridge, a famous landmark on the Kokoda Trail, was gone. The Kumsui River, normally a torrent rushing over rocks, was clogged with ash and debris and had become a placid flow.

Lava flowed over where villages had once stood. A cloud of poisonous gas added to the death toll. Thousands more were burned, maimed or in some way injured.

The total death toll will never be known. Some claim it was as high as 12,000. Official estimates put it between 3000 and 4000.

The limit of damage stopped just short of Awala where Clem Searle, who years before had been in charge of AWA's radio station in Port Moresby, opened his transmitter to give the world

the first news of the disaster.

In Port Moresby that evening, Fred Warren of the Australian Broadcasting Commission was about to farewell a dinner guest when a sound like the patter of rain was heard on the roof. It was the volcanic ash. They turned the radio on, just in time to hear '. . . and Higaturu has vanished'.

Next morning Warren was at Port Moresby's Jacksons Airport trying to get a plane to take him to the disaster area. It seemed all were busy loading relief supplies – except one, a Dragon which had just landed and was unloading. Warren rushed up to the pilot and asked: 'Can you fly us into Popondetta?' If they had money, he said, he would fly them anywhere.

Lamington is quiet today. The eruption area is again heavily-populated. There are coffee plantations and a multi-million dollar oil palm scheme where once devastation reigned. New jungle hides the scars of Papua New Guinea's greatest peacetime tragedy.

Firsthand news of Lamington's eruption reached Lae in the form of Ross Bidulph who had just left Higaturu on a routine run when the mountain blew. Shaken and white-faced, he reported to Morobe District Commissioner Horrie Niall (now Sir Horrie). Over the next few days aircraft from Port Moresby and Lae flew in rescue and medical teams and supplies. Tentatively helpers picked their way into the shattered, gas-poisoned area.

Frightened villagers, many with scorched flesh, began drifting into Popondetta, about 30 kilometres north of Lamington. Others, still in panic, rushed anywhere that took them away from Lamington which refused to be silenced. On January 26, the *South Pacific Post* reported that an area 13 by 21 kilometres had been reduced to 'desert'.

The mountain is easy to climb but unrewarding because there is no open crater. Climbing parties usually overnight on a ridge adjoining the main volcanic dome. Though, at 1600 metres, not tall by New Guinea standards, Lamington is the most prominent feature on the plain which surrounds Popondetta. Smoke still rises lazily from its summit. Sometimes it puffs a bit, forming a small mushroom cloud. Young Orokaivans living around it can only know of the horror of January 21, 1951, through a mixture of fact and myth. In many ways, the people who live in the shadow of Lamington are a tribute to man's courage in the face of unknown forces – and to his foolishness. – *Maclaren Hiari is a Papua New Guinean journalist with the Office of Information.*

Lamington today

Peter Lowenstein

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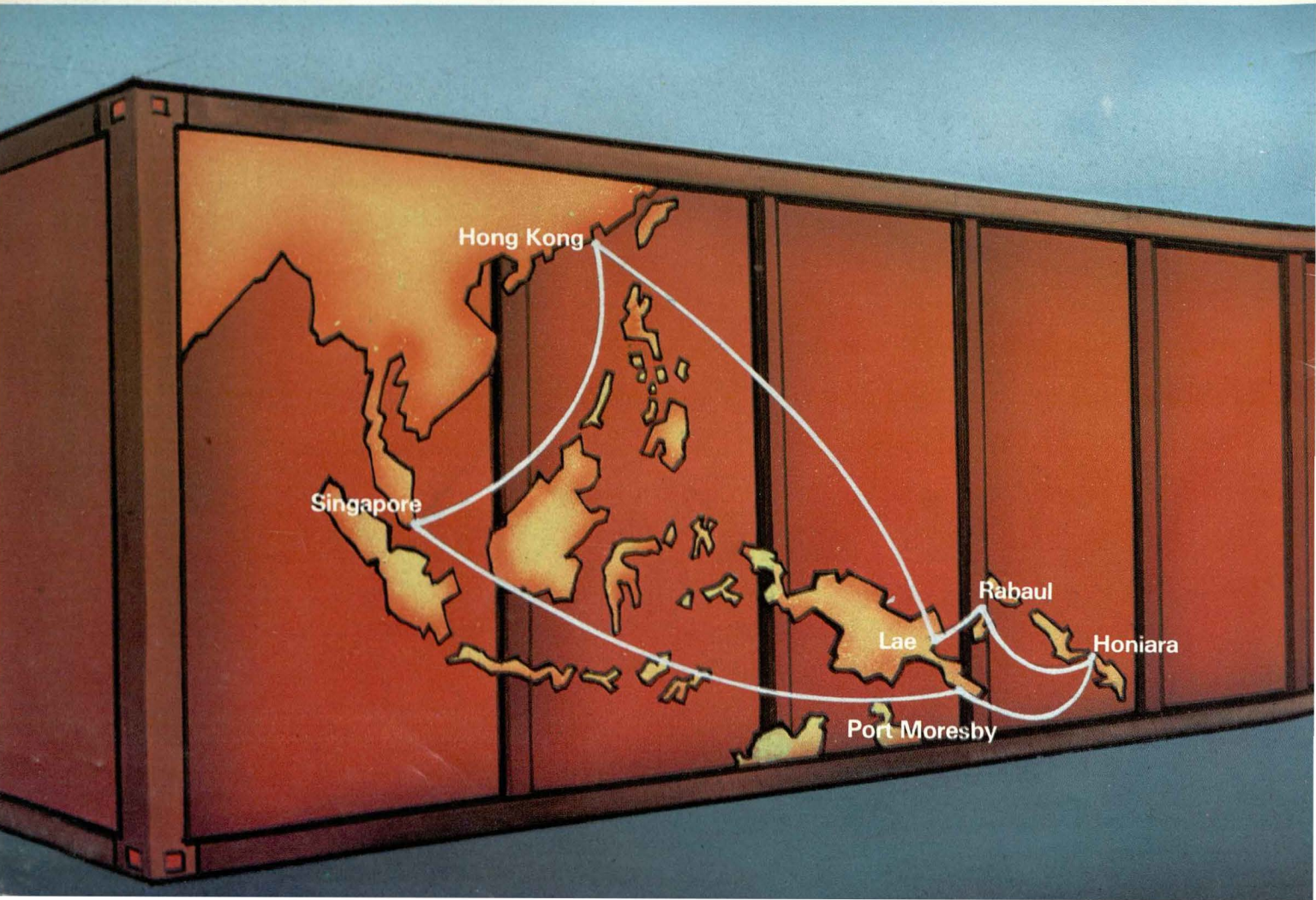

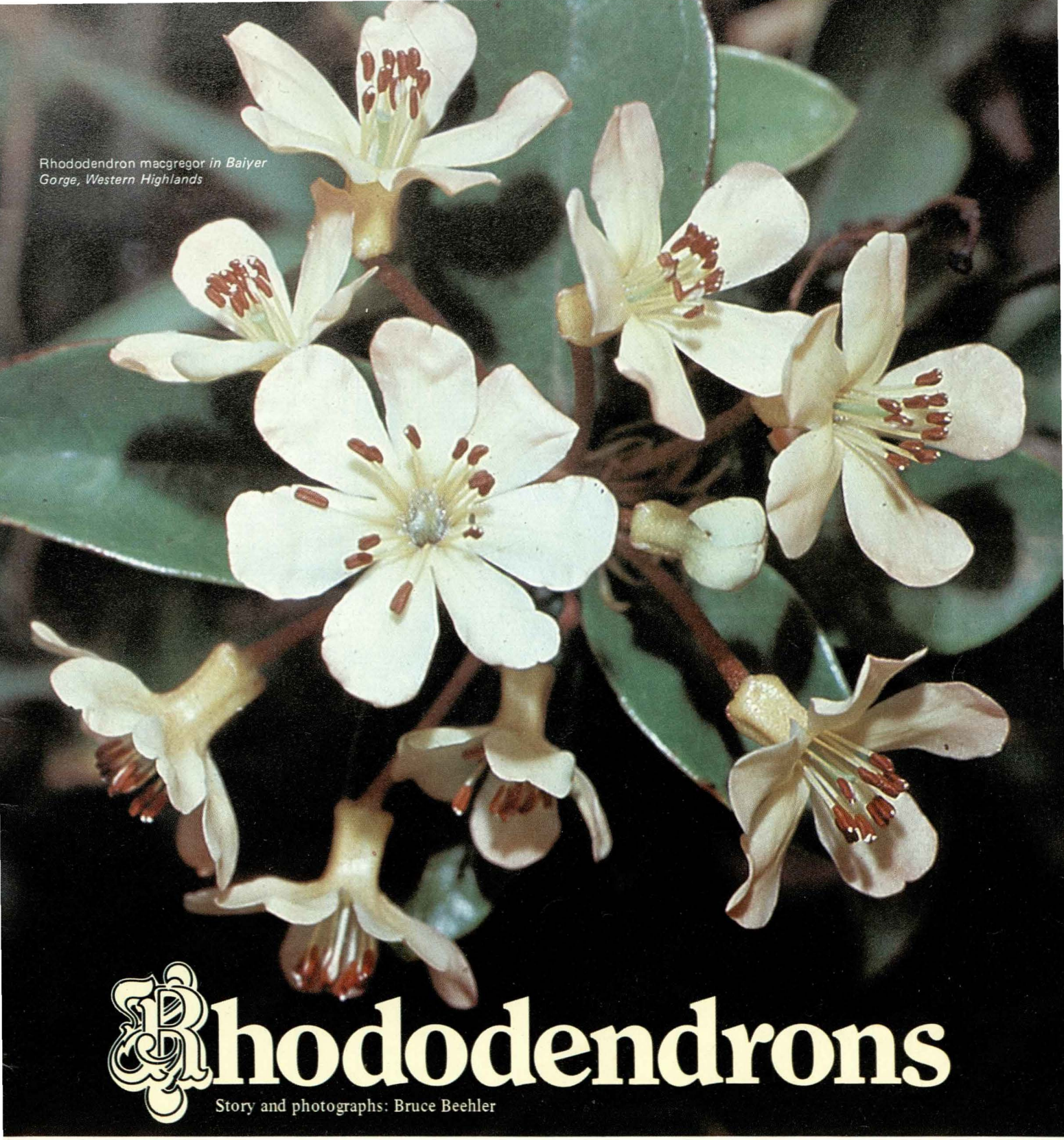

Rhododendron macgregor *in Baiyer Gorge, Western Highlands*

Rhododendrons

Story and photographs: Bruce Beehler

MY love affair with rhododendrons began just five years ago in the mountains of Papua New Guinea. I had no idea when I set off on a bush walk that there could ever exist in so much profusion such a bewildering range of rhododendron blossoms.

As we passed from glade to glade the colours changed – from red, to pink, to white and, occasionally, yellow. To add interest to my newfound delight, a colleague showed me that there was more to this rich diversity than the untrained eye at first perceived. Many apparently similar plants he showed me were in fact different species – some were hybrids.

A lesson I quickly learned was that any attempt to correctly identify a New Guinea rhododendron without the assistance of a specialist is nearly impossible. But this limitation does nothing to lessen the joy of a romp through the rhododendrons. I photograph nearly every flower I encounter, confident that some expert sometime will identify what I have seen.

New Guinea after tropical Asia is the richest home of rhododendrons. Of the more than 800 species identified, more than 150 are found on the island of New Guinea while a few more are found in the Bismarck Archipelago and the Solomons group of islands.

Despite their profusion, rhododendrons are unknown to many who live in Papua New Guinea because they are true denizens of the mountain forests, only a few atypical forms colonising accessible, man-disturbed habitats.

One of the best-known and most easily found species in

Top: R. alticolum *on Bulldog Road, Morobe;* **above:** R. Zoelleri *in Holuwon, Irian Jaya*

eastern Papua New Guinea is the *Rhododendron aurigeranum* which thrives in the sun-baked *kunai* grasslands in mid-mountain valleys. In the highlands to the west the smaller and more delicately-flowered *R. macgregoriae* abounds.

For the serious student, a trip into the deep mountains is a must. Above 2500 metres one begins to encounter species after species, often growing side-by-side. A botanist from the Wau Ecology Institute not long ago counted more than 20 species on one short section of the Bulldog Road, built during the war, south of Wau.

Other species are found in the high central range of western Papua New Guinea and even further west in Irian Jaya. At the upper limit of forest, where shrubs and grasses begin to dominate, one encounters a marvellous assortment of rhododendrons, large and small. *R. saxifragoides* grows in small cushions on the open waterlogged alpine pleateaus, the leaves of this diminutive plant poking only two centimetres above the soil while its single red flower stands six centimetres tall.

Other species, such as *R. alticolum*, assume the proportions of small trees. In undisturbed forest, many species live epiphytically, clinging to the mossy branches of canopy trees, sometimes 20 metres above the ground. Yet others grow as puny shrublets in areas where there has been a tree fall or other natural disturbance.

Many larger-flowered species produce nectar and pollen which are attractive to birds, bats and night moths. Honeyeaters of various sizes clamber over and dangle from the spindly outer limbs of the plants, poking their long curved beaks into the tube-like corollas in search of food.

Most remarkable to my eyes is the group of species with strikingly large white tubular or funnel-shaped flowers. Some produce corollas 14 centimetres in length and more than 10 in diameter. These are the largest flowers of the genus. Add to the image a delightful, carnation-like fragrance and the sensation is delicious. — *Bruce Beehler is a biologist at the Wau Ecological Institute.*

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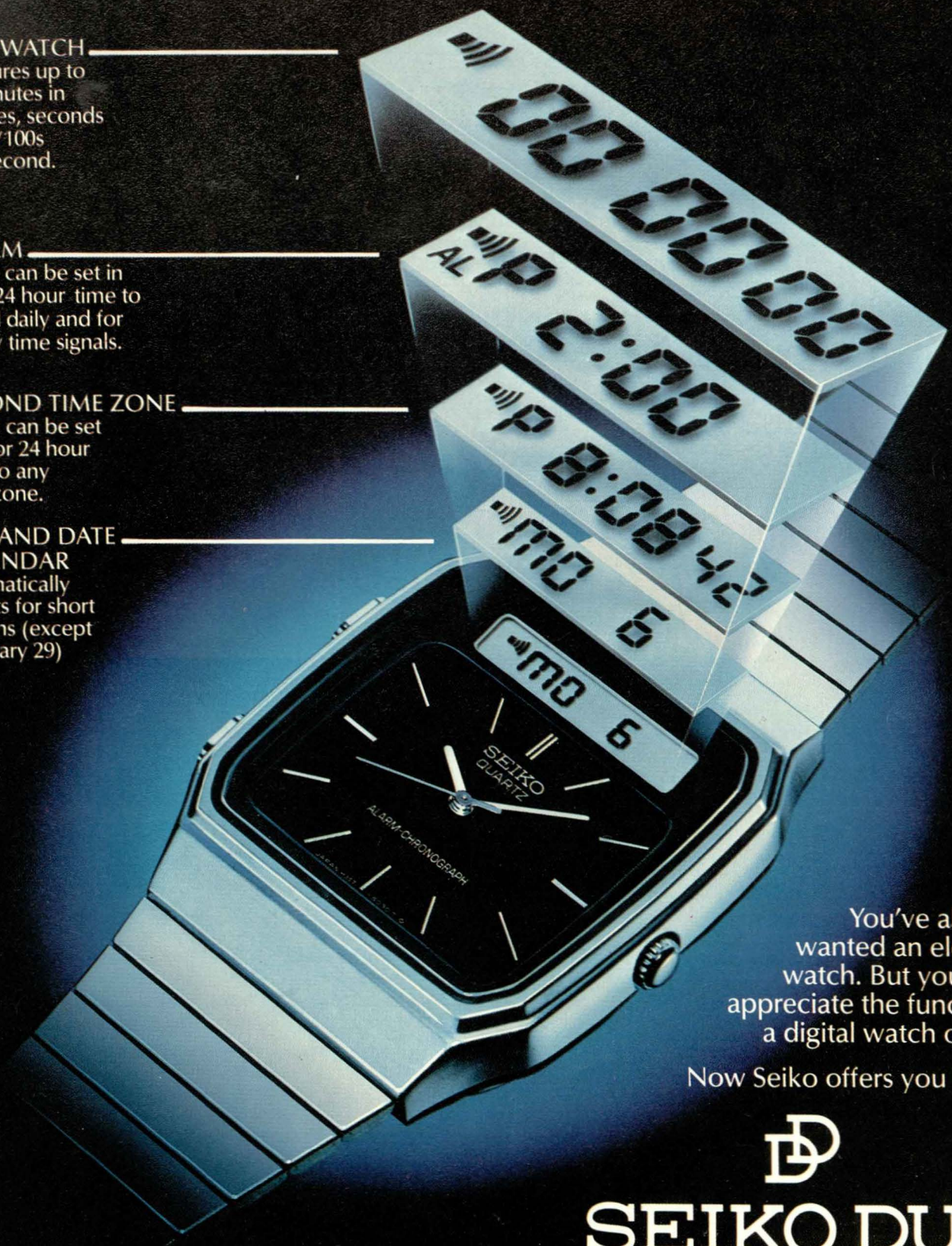

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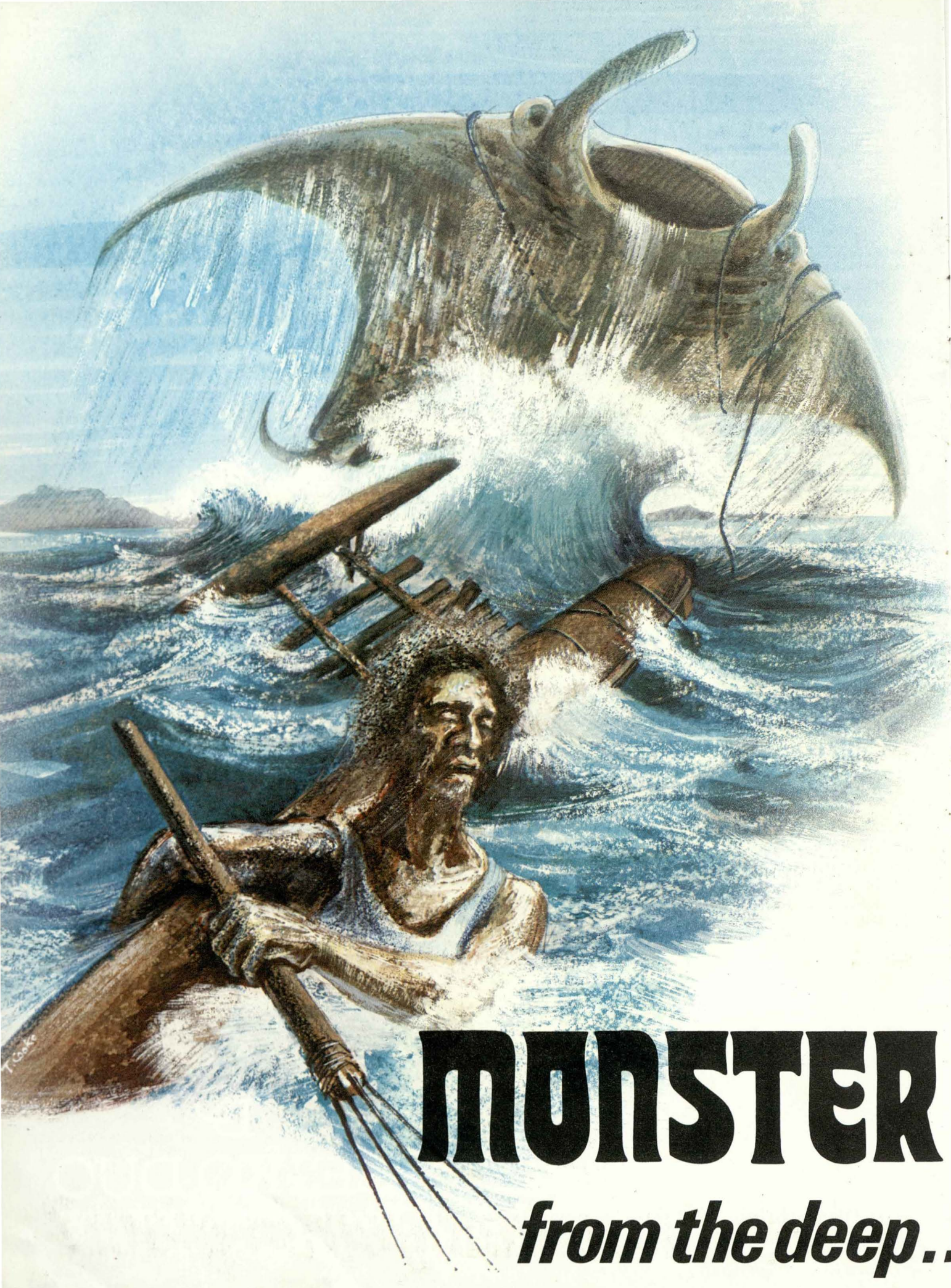

MONSTER
from the deep..

CHARLES Pinahai clambered on to his outrigger as the sun westered in the Bismarck Sea. There was to be no sleep for him that night. Fishing is his business and a reef, midway between his village and the island of Pityilu, his destination.

As the light breezes wafted his canoe toward the reef, Charles prepared two light lines. At his feet lay a four-pronged fish spear, a bait knife and a pole. There was no moon. But Charles knows the waters of the islands of Manus Province and can fish blindfold so he needed no lamp.

Dropping his make-shift anchor – part of an old engine on a finger thick blue nylon line – onto a reef 15 metres below the surface, Charles settled to fishing. By 2am he had 10 small fish. An hour later he was still fishing but sleep was creeping over him.

He was jerked back to consciousness as the anchor line tightened. The outrigger began to move. Soon it was skimming over the glassy water. Charles held on grimly, trying to work out what was happening. Then he was thrown into the water. As he surfaced, he saw the canoe roll over and disappear. Treading water on a moonless night, far from land, is not just a lonely experience. It is terrifying. But Charles kept his head. Within a few minutes the outrigger resurfaced, upside down. His fishing lines and the line on his spear were wound around the hull. Charles swam to it and pulled himself onto the stern. He worked to right the vessel but the taut anchor line resisted.

Then the canoe took off again in a westerly direction. Charles hung on. For an hour, as he careered through the black, Charles cried for help. His calls were heard but misinterpreted and no one came to his rescue.

At last his tormentor surfaced. It was a four-by-three metre manta ray. Under its belly was the anchor, the blue nylon line wrapped several times around its body. It threshed around trying to break away. As it crashed against the canoe, Charles was thrown onto the outrigger. In the third attack, Charles recalls, the ray broke its 'long barbed stinger' on one of the crossbars.

Charles, remembering stories of divers being enveloped in the 'wings' of manta rays and suffocated, hung on grimly through the night.

The last 'attack' came at day break. Charles, who said it came at him like a 'helicopter', had extracted his spear from the tangle of fishing lines. He braced himself for the onslaught and, as the creature's head came within reach, plunged in the spear. It broke off at the haft and the body of the manta settled onto the water just short of the canoe.

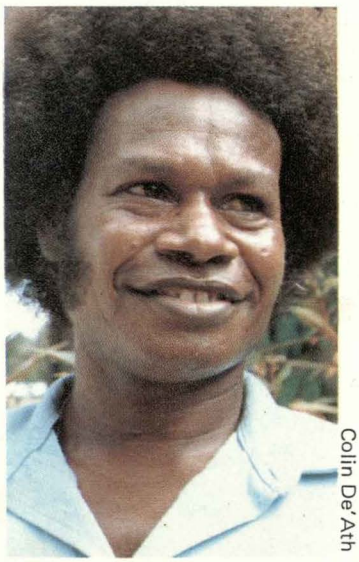
As the ray sank it dragged the canoe down with it and Charles was again forced to abandon ship. He swam around calling for help. At around 6.30am an old man, Powaniu and five children – fishing in a large, powered canoe – heard his cries wafting across the water. They raced to his assistance. As they pulled him aboard, Charles' canoe surfaced with the manta beneath it, trapped by the ever shortening anchor line.

As the manta rolled over the vessel, Charles disembowelled it. Its entrails slipped into the water and circling sharks, scenting blood, moved in for a feast.

Charles, Powaniu and company worked frantically to haul the ray across the canoe. Back on the beach at Charles' home village, Powat No. 2, the 'monster' of the deep tipped the scales at 250 kg.

Soon it was cut up and, according to custom, distributed to the people of five villages.

Charles Pinahai's story will go into Manus sea lore which already is rich in accounts of incredible heroics. – *By Colin De'Ath, an anthropologist who has been visiting Papua New Guinea for many years.*



Colin De'Ath

Charles Pinahai's brush with death ended in gory triumph for him and his helpers. But spare a thought for the victim, one of nature's truly gentle giants.

THERE are few creatures more graceful than the immense manta ray which 'flies' through all the world's oceans. For all its bulk, it is virtually defenceless. Unlike smaller sting rays, says Bob Halstead, the manta does not have a stinger or spine to strike with.

Let's try to imagine what went on in the mind of the ray which became entangled in the anchor line of Charles' boat. Its thought processes could have been along these lines: 'The waters are calm and the gliding is easy. Plankton a-plenty so the eating is good. Uhhhhh! What's that? Something is holding me back. I'll give it a tug. No use. I'll have to go up to see what it is. Ohhhhh! It's a line from that canoe which is holding me. I must fight it off. I'll dive and see if it will let go. Down, down, down. I'll hang on here for a while. It may give up and go away. (Time passes.) No good. Back to the top. Maybe I can fall on it and break it. I'll roll over a couple of times. Ohhhhh! I'm drowning. Turn over, turn over ... Ohhhhh! My head. I can't think ..., I'm suffocating ... Can't fight any more ... Water, water. Where is the water? ... I can't breathe ... I must have water ... Aaaaaghhhhh ... my stomach ... my belly ... my belleeeeeeee!!!'

Can any of us really imagine the dying moments of this terror-stricken fish? It meant no harm. Yet, because of the fear it instilled in the human with which it came into contact, it was doomed to die. All too often man feels a need to kill, especially creatures bigger than himself, irrespective of how defenceless they are, like an elephant at the end of a rifle barrel ... or a whale in the harpoon's sights.

Bob and Dinah Halstead have met manta rays on many occasions in Papua New Guinea and remember two meetings in particular. One was near Nuakata Island in Milne Bay Province. 'We were diving on a ridge of coral in shallow water,' recalls Bob, 'when, looking out to the deep, I saw the enormous bulk of an adult manta ray swimming directly for me. Awestruck, I

..or just a terrified gentle giant?

stopped. The manta approached on collision course. Then, just a few metres away, it rose and passed at arm's reach above me. Everything went dark for a moment. Then its huge body had gone. It was as if it hadn't noticed me.'

The second memorable meeting came one day when Bob and Dinah were feeding Nessie, a tame moray eel which lives in the wreck of the *Parama* in Bootless Inlet, a few miles southeast of Port Moresby. 'We turned to see a giant manta swimming our way,' said Bob. 'It obligingly posed for photographs and then swam around inspecting us.'

Bob remembers those two rays as being three-to-four metres across and estimates their weight at around 750 kilograms. He says rays have been known to reach widths of six metres. Stories of them becoming entangled in anchor lines are common, he reports. The usual solution is to cut the line to enable the creature to free itself. 'It's a pity Charles didn't have his knife handy before being tipped into the ocean,' says Bob.

With a multitude of awe-inspiring experiences behind them, Dinah and Bob Halstead do not believe in 'dangerous monsters of the deep'. They believe a diver armed with a speargun or knife is far more dangerous than any marine creature.

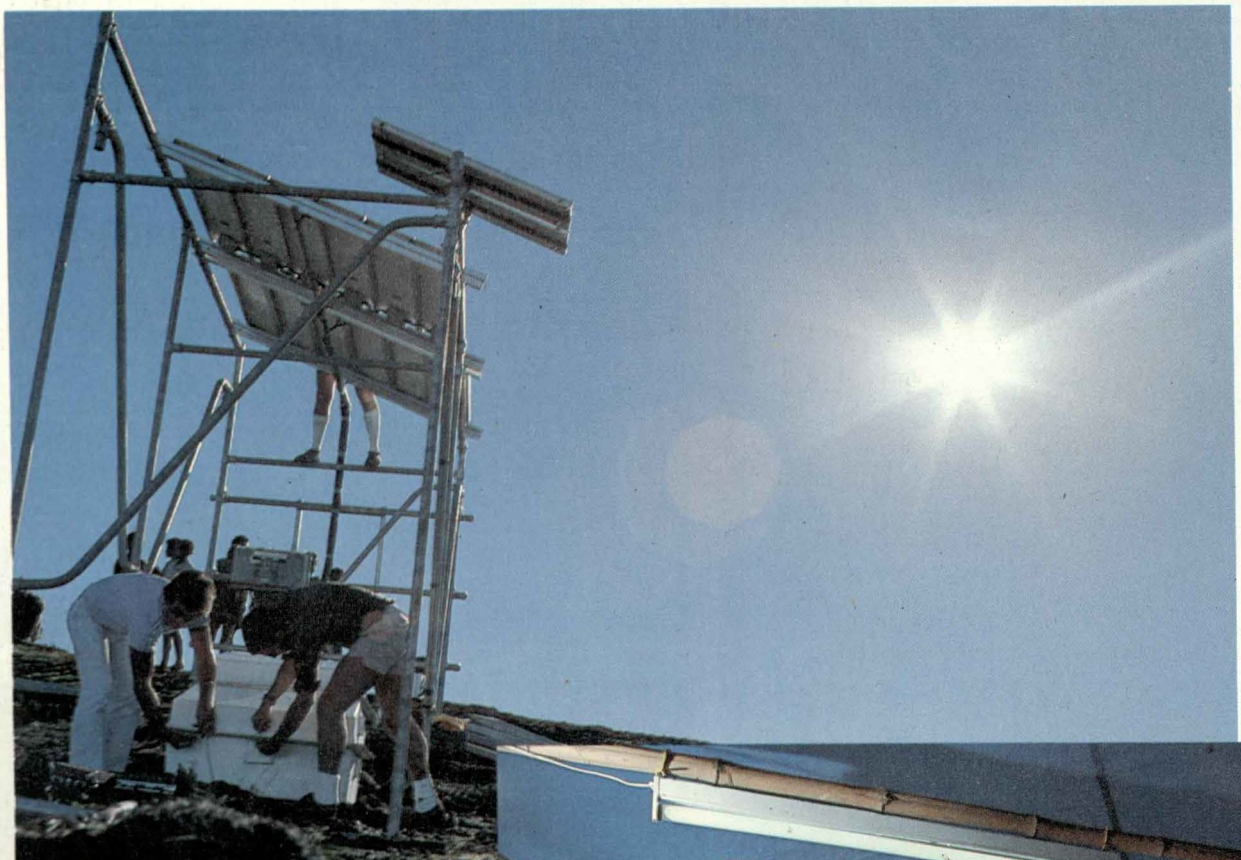
Their major success story is Nessie, 'a fearsome-looking beastie but with the temperament of a pet dog'. Nessie swims out of the wreck to meet the Halsteads, begging for titbits by gently taking an arm or leg in its mouth to win attention.

'Dinah cuddles him and he loves it,' says Bob. 'Unfortunately an uninitiated diver recently slashed Nessie with his knife when he swam to greet the diver. No doubt that diver is now telling stories of his 'miraculous escape from another monster of the deep'.

Left: *Dinah Halstead cuddles Nessie;* **top:** *manta ray glides through the gloom;* **above:** *Nessie's profile*

Underwater photography by Bob Halstead

Three more marine dwellers with bad names among trespassing humans: from top — the shark, sea snake and stonefish. None is likely to bother you if you don't bother them.



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ROK ROK

ROKROK! *Rokrok!* Say it to yourself. Put the sound right into the back of your throat. Now say it again. *Rokrok!* You've got to admit it: it has to be the sound of croaking frogs. *Rokrok* is a fine example of the onomatopoeic nature of so many words not just in the pidgin spoken in Papua New Guinea but in the hundreds of different languages which have been identified throughout the length and breadth of New Guinea.

Papua New Guinea has a wide range of frogs. More than 200 species have been identified and more are being discovered each year. Among them are some of the world's most colourful, as you will know if you are familiar with the issue of PNG postage stamps in 1968.

Town dwellers don't see many of Papua New Guinea's native frogs because they have been decimated by the voracious appetite of that introduced pest, the marine toad *(Bufo marinus)*. These can be seen in their hundreds on the roads, particularly on wet nights. An ugly customer, covered with a warty skin, the marine toad has large poisonous glands which exude a fluid which can kill dogs, cats, birds (except the crafty crow), and most of the smaller animal life around the towns.

Native frogs on the other hand, are delightful creatures. They range in length from the

One of the first frogs you'll meet in PNG – the acrobatic green tree frog (Litoria caerulea)

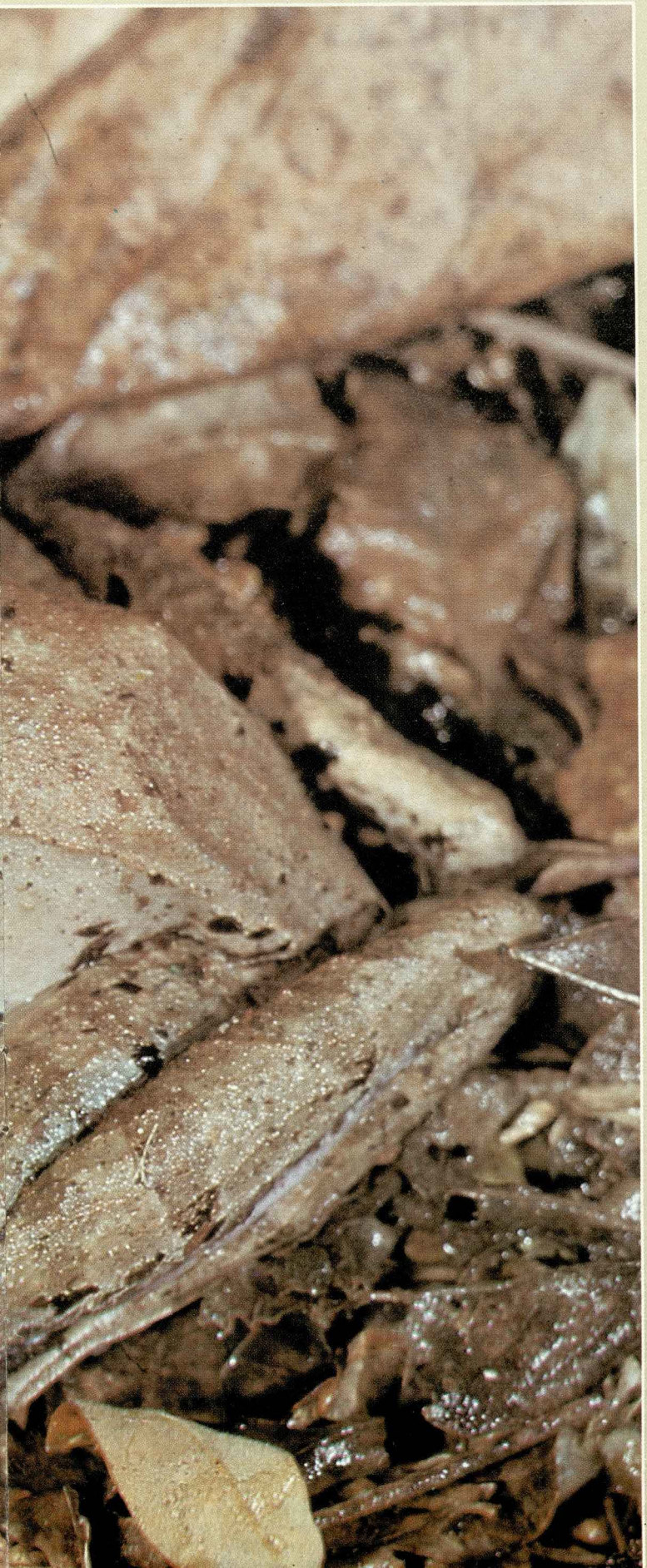
Story and photographs: Roy D. Mackay

tiny *Cophixalis spp* at 12mm to the giant *Rana arfaki*, known as the large river frog, at 160mm.

Litoria caerulea, the green tree frog, is among the best known of the southern lowland frogs and is occasionally seen in town gardens. During the wet season a host of them calling from the swampland can be deafening. Even worse is to hear a couple of them croaking inside a metal watertank. The reverberations they set up are tremendous.

Large numbers of frogs are found in the Highlands from about 1200m to 2500m where there are wet grasslands, swamplands, rivers and wet forests. Many are ground dwellers with tunnels under rocks, logs or mosses, but others live on trees, sometimes as high as 30m among the clumps of wet moss found in the cloud forests. They even lay their eggs up there.

Maybe it's not everyone's idea of a great night out to go

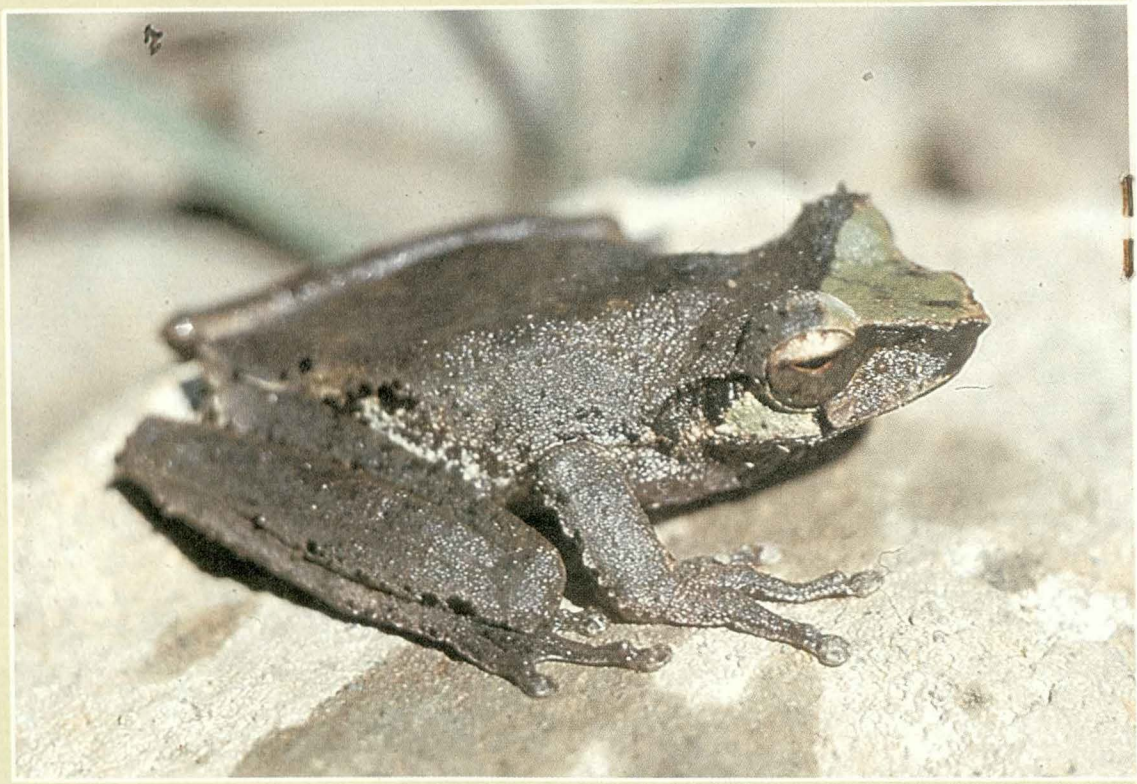


Left: *Fast flowing streams are the home of this long jumper of the genus* Rana; **above right:** *exotic Mr Ugly,* Bufo marinus; **right:** *this arboreal frog (*Oreophryne *sp.) is not related to the tree frogs but is an excellent climber;* **below:** Xenobatrachus *sp., a burrower*

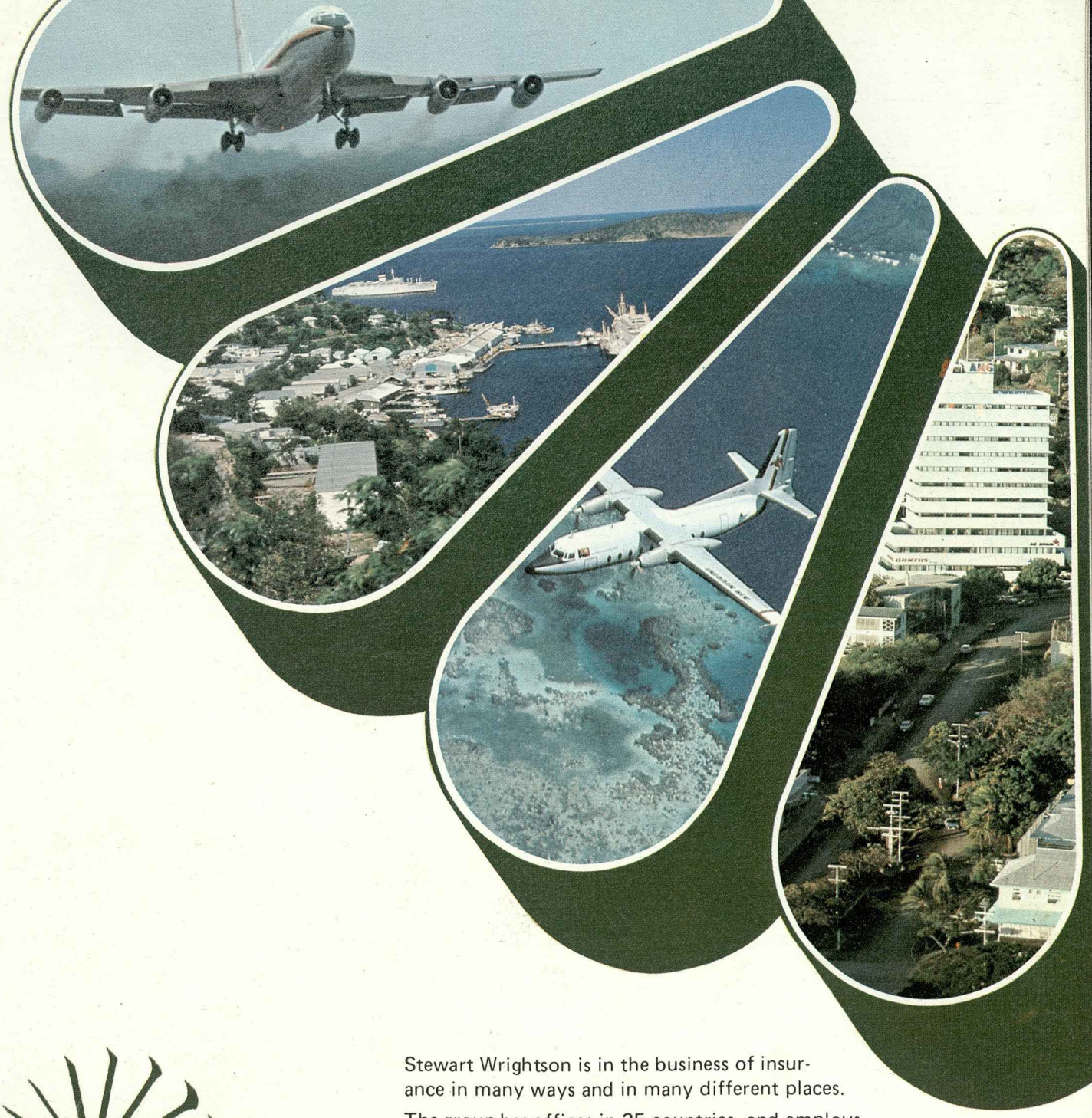
creeping up a rocky stream, casting around with a torch while light rain soaks you. Sometimes it can be extremely tantalising trying to follow up the call of a frog. You know it is nearby but such are the ventriloquial powers of some frogs it is extremely difficult to pin down their exact whereabouts.

Most nights near my home at the Baiyer River Sanctuary in Western Highlands Province, we can hear the calls of *Hylophorbus rufescens*, better known as the laughing frog. In a group they put up a high-pitched 'rat-tat-tat'. But a single one, heard at close range, does make a sound like a short laugh. A small burrowing frog, *Barygenys flavigularis*, found at Mount Kaindi in the highlands of Morobe Province, makes a noise exactly like tinkling bells.

Usually the dullest coloured frogs are those which burrow in the soil or hide under rocks and logs. By contrast, the tree frog genera, *Litoria* and *Nyctimystes* are beautifully marked with stripes and spots and variegations of green, brown, orange, red and yellow. In the *Nyctimystes* genus the lower eyelid is distinctively marked with intricate patterns of black, white and other colours. – *Roy D. Mackay is superintendent of Baiyer River Wildlife Sanctuary.*



Top: *Colour changes make this fellow,* Litoria arfakiana *a hard one to identify;* **right:** Rana grisea, *a familiar face in Varirata streams near Port Moresby*



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Waisted blade – possibly fashioned more than 10,000 years ago

Digging into Yesterday

Story: Mary-Jane Mountain
Photographs: Barry Shaw and Dragi Markovic

LUKIM! *Tit bilong man!'* The cry went up from a Simbu workman who had found a jawbone with teeth still in place. We were sieving archaeological material from an excavation in a small cave in the Simbu Province in Papua New Guinea's central highlands.

But once we had compared those straight rows of teeth with our own it was easy to see they were not human. In fact they were the teeth of a bush animal, the protemnodon, which lived in the region many thousands of years ago. Now extinct, it was a close relative of the modern kangaroo and, in size, a little larger than a wallaby. No animal of the type now exists in the Highlands of Papua New Guinea though the wallaby is still common along Papua New Guinea's south coast.

Those teeth and other remains of extinct animals are good indicators of the changes that have occurred in the Highlands over thousands of years. As an archaeologist teaching at the University of Papua New Guinea in the early seventies I tried to convince other people of the need to do research in this area. Today that research is being continued on a full-time basis from the Australian National University in Canberra.

I returned to work in Simbu

Province in October 1979 accompanied by my daughter, Emma (at that time five months old), and Barry Shaw, a photographer, surveyor, cook and medical man. In the months that followed, other specialists joined us for short periods.

We concentrated on a rock shelter known as Nombe which may well have been in continual use for 10,000 years or more, taking us back to before the end of the last cold period known as the Pleistocene.

Careful excavation and detailed analysis of this site may tell us much about changes in the environment and human behaviour in the period in which the people shifted from pure hunting and gathering to the beginning of agriculture.

Trained archaeologists and prehistorians are now sifting evidence of early habitation such as food refuse (animal bones and teeth, nuts, seed cases, shells, fish bones) and man-made artifacts (usually made of stone, shell and bone). Then there are the less obvious traces of human activity such as ash and charcoal from fires and holes from house posts whose wood has long since rotted.

Not only do people leave rubbish and other evidence around their eating or living places; their activities over the centuries can drastically change the landscape. Fire was sometimes used as a means of hunting in thick bush or to clear forest for gardens. Evidence from the charcoal left in the soil after the the bush has regrown, and pollen grains that are dropped by plants in the surrounding soil, can be used by botanists thousands of years later to build up a remarkably accurate picture of vegetation history.

We now know that much of the primary forest in the Highlands of Papua New Guinea was cleared over large areas, presumably for garden plots, at least 6000 years ago. At Kuk, near Mount Hagen in the Western Highlands, there is evidence that the forest on the surrounding slopes was cleared as long as 9000 years ago. This is one of the earliest documented cases of forest clearance for food production anywhere in the world.

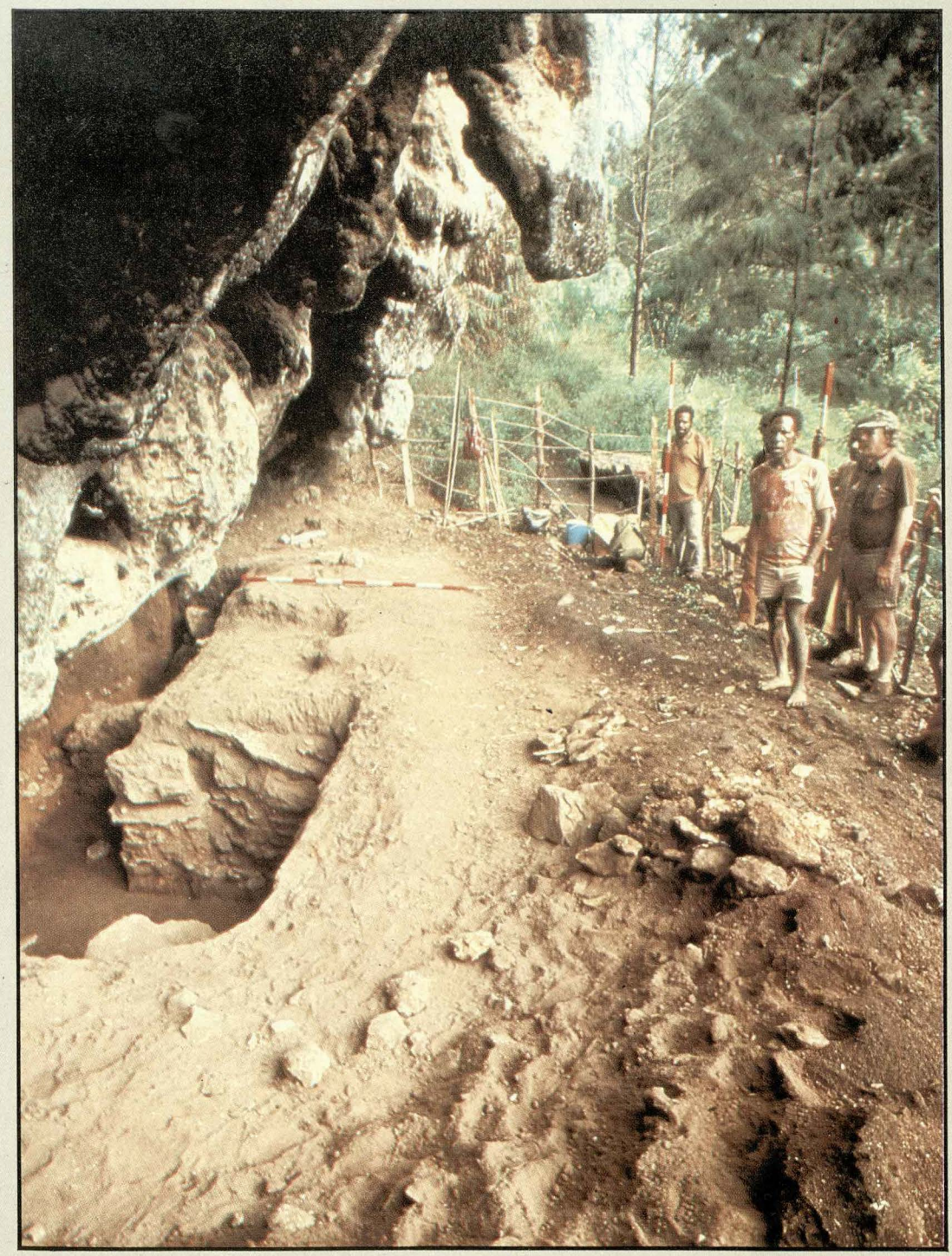
Above: *Emma's back pack view of the road to history:* **above right:** *teeth and jawbone of protemnodon;* **right:** *author's bush home*

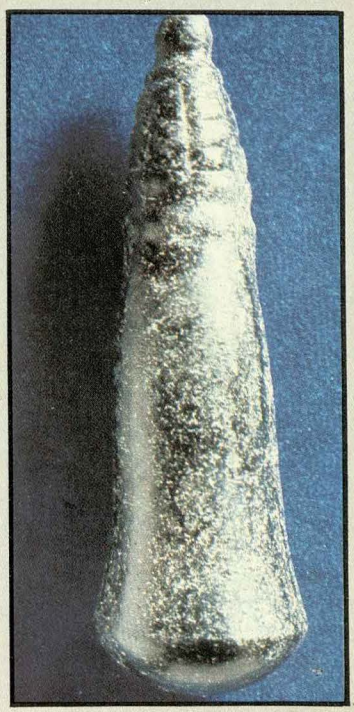
Another way of piecing together the human past is by interpreting the sediments in the caves and rock shelters commonly used as camps by nomadic and hunting peoples. The ash from their fires is now found well below ground level. Other deposits containing human artifacts are now found attached to cave roofs, a clear indication of how ground levels have altered. Scientific techniques can provide dates for certain past events or periods of human activity. So far they have told us that human beings have been in the Chuave area of Simbu at least 10,000 years.

Simbu is a densely inhabited zone of mountains and valleys. About 50 per cent of the land is over 2000 metres above sea level. Gardens hang on precipitous slopes, seemingly supported on the edges of steep drops by stout timber pig fences, or are divided by small stone walls to prevent the heavy rains from washing away the soil. The most common trees are casuarinas and cordylines planted around gardens and houses. Their presence is often a good indicator of the position of old garden plots now abandoned to fallow. There are few areas of dense bush except on the most inaccessible slopes or the higher regions of the mountains where frosts make sweet potato gardens impractical.

Archaeological research in Simbu began in the late 1950s with a survey by Dr Susan Bulmer. It was continued by Dr Peter White in the early 1960s. Our work at Nombe ended early this year. We returned to Canberra with about 200 kilogrammes of archaeological evidence. This is now being analysed, tested, recorded and thoroughly documented before being returned for safe keeping to the Papua New Guinea National Museum in Port Moresby.

The expedition began with a patrol to the western slopes of Mount Elimbari, that great limestone peak which dominates the Chuave District. We rented a house from the village magistrate, hired local people as guides, workmen, and baby carriers, and surveyed an area on Mount Elimbari. Rock shelters and caves were recorded and some small excavations made





Left: *Diggings in Nombe rock shelter;* **above:** *pestle found at Nombe*

at suitable sites, some of which indicated history of human activity in the area. Emma came with us up the mountain to over 2600 metres, camping with the survey expedition and thoroughly enjoying everything from her back-pack vantage point.

We then moved to continue excavations at Nombe rock shelter. I had been working there intermittently since 1971. The history of this site is very complex and requires many different types of evidence and analysis to unravel events of the past 10,000 years. Very little charcoal suitable for radio carbon dating has been found, but there are large amounts of bone and shell which can be used for dating. The limestone karst system also produces calcium carbonate which has been redeposited in various forms. One of these is a crystalline flowstone (in sheets several centimetres thick) whose formation can be dated by using uranium-thorium techniques.

The bones and teeth will give us an excellent picture of the range of animals hunted and eaten by people who have used the cave. The animals range in size from the protemnodon down to tiny rats. The most common bones are of possums and flying foxes, both of which are still abundant and utilised by local communities.

The cave is still used as a resting place for people walking from one village to another: women carrying large loads of food to home or market; men carrying a pig for a celebration or banana or sugar cane plants for new gardens; or young people returning from school or the stores in Chuave. People still stop and light a fire in the cave, sheltering from the rain as they have for centuries, cooking, throwing away food remains and moving on. These days it may include a beer bottle or a fish or meat can, as well as pig bones, corn husks and roasted *kaukau* (sweet potato) skins.

Hungry dogs and pigs soon dispose of anything edible, and what they miss is eaten by ants and other insects or rots quickly

in the high humidity. Archaeologists therefore could be easily misled as to the diet of the people if they only considered the food and waste that remains. Also, the large number of animal bones at Nombe does not mean that people 10,000 years or so ago ate predominantly protemnodon and possum. The bones have survived very well in the airfree clays, now over a metre below ground level, but the remains of plant foods that probably were eaten daily in large quantities have not survived at all.

The same kind of mistakes could be made if we assumed that tools and other artifacts found in the site represent everything that was used at that time. Stone survives relatively unchanged for thousands of years but wood rots rapidly. Hard-edged woods such as bamboo may have had many functions in the past – as cutting implements, in animal traps, as cooking tubes (sealed with a 'lid' of leaves or plant fibres), and water carriers. But bamboo and other wooden artifacts will not normally turn up as archaeological evidence. Any archaeologist working today therefore also needs to take notice of modern practices and oral history and relate them to the more distant past.

Fascinating finds which could give important clues about changes in both environment and human activity were very large numbers of snail shells varying in size from microscopically small to more than four centimetres across. How did the snails come to be there? Snails can be very sensitive indicators of minute changes in micro-environments: some are happy in wet, dark rocky areas with mushy vegetation while others prefer dry leaf litter from the nearby montane forest, or even live in tree bark. The larger snails could have been taken into the cave as food and may not have been inhabitants of the cave. We also collected many

Village with Nombe cliff in the background

different types of live snails living in a variety of conditions to help point to past environmental changes. These snails represent but one complex aspect of the evidence now being analysed – a process which will take many months.

Stone artifacts are important archaeological evidence. Before Europeans introduced steel tools, all axes – whether used as everyday work tools or valuable exchange items – were of stone. Often this was quarried from sources far from the place where the broken artifact was abandoned or lost for the future archaeologist to find.

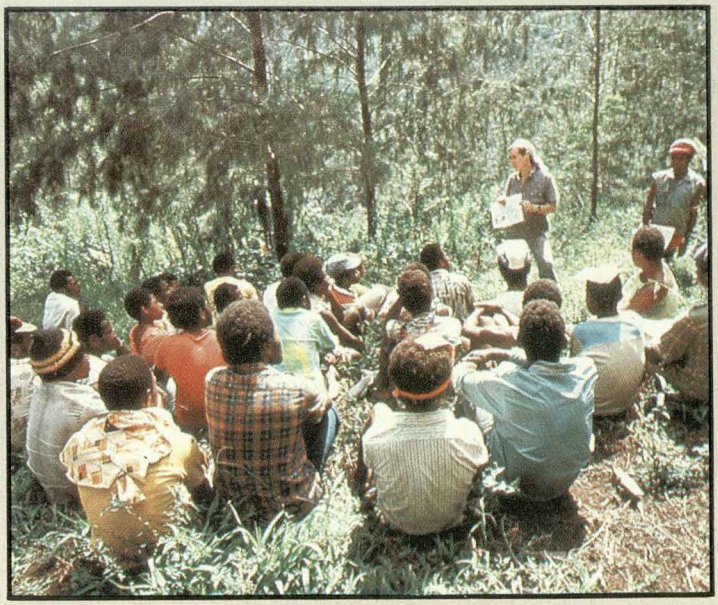
The original source of the stone can tell us a great deal about the complex trading systems which the older men in the Highlands still discuss. Many valuable items were exchanged – the plumes of various paradise birds, regionally manufactured salt (made from the ash of a variety of plants), necklaces of dogs' teeth, the resin and oil from trees.

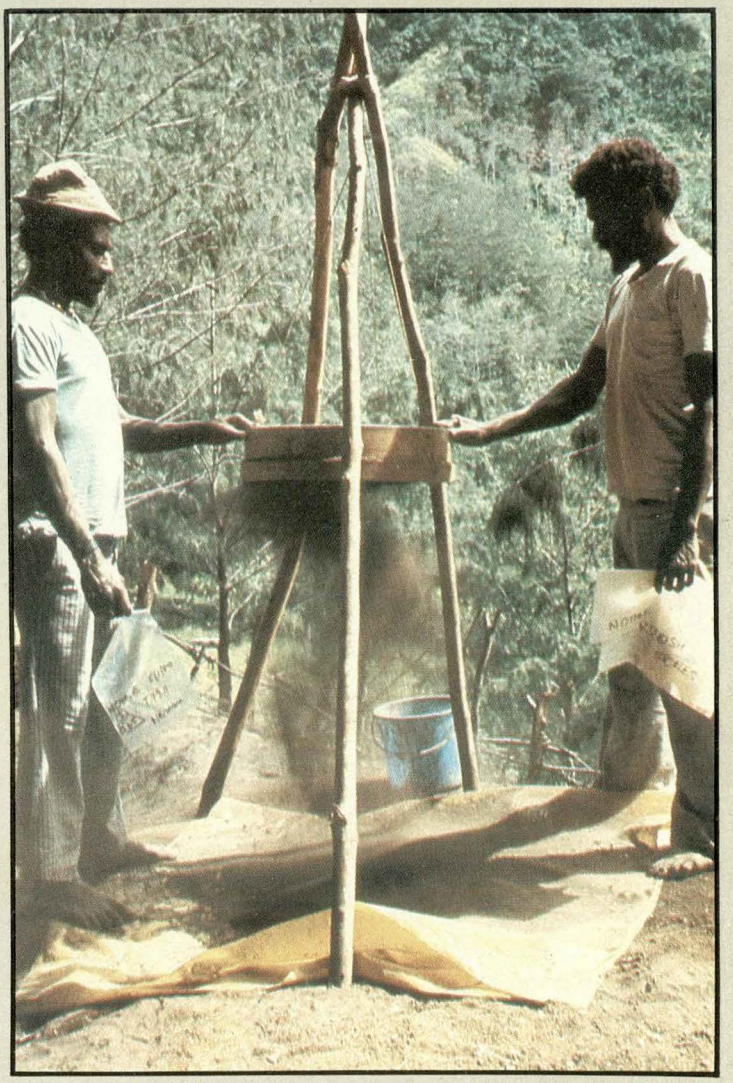
The types of stone artifact that were made long before people knew the skills of making the beautifully ground and polished axes of the recent past are less well known. Some of these artifacts may be more than 10,000 years old. Carved stone pestles and mortars, most probably used to crush and break up hard foods such as nuts or very fibrous roots, are still kept by people in the area, but we do not yet know who made them or over what period of time.

To recover all these various forms of evidence, excavation techniques had to be precise and painstaking. A fine meshed garden sieve was used on the dry dusty top levels but was of little use with the heavy clays further down. Wet sieving (using water from the nearby river), through a series of fine nylon strainers, recovered material as small as a couple of millimetres in diameter. This included fragments of charcoal, tiny rodent bones and teeth, and even pollen grains skimmed from the top of the water. Soil and sediment samples were taken for analysis, some to test theories about the origin of the deposits, or to verify similarity between deposits that superficially appear to be the same.

During the four month excavation we lived in the nearby village in a house built for us close to the *haus man*, traditionally the communal home for men and boys and sleeping place for many married men. It is now also used as a church, community meeting house and village centre. New gardens regularly were appearing in the bush around the village and new houses were being built at a rate of about one every two weeks. The community was just beginning to recover and rebuild after the effects of tribal fighting.

In late November 1979 several groups of senior students and staff from the provincial high school came to the site. They sorted finds, discussed techniques used on site, inspected the complex layers of deposits and asked questions about the value of such work and the eventual results. They began to see the effects that man has had on the landscape in which he has lived, collected, hunted, fished and gardened for thousands of years.





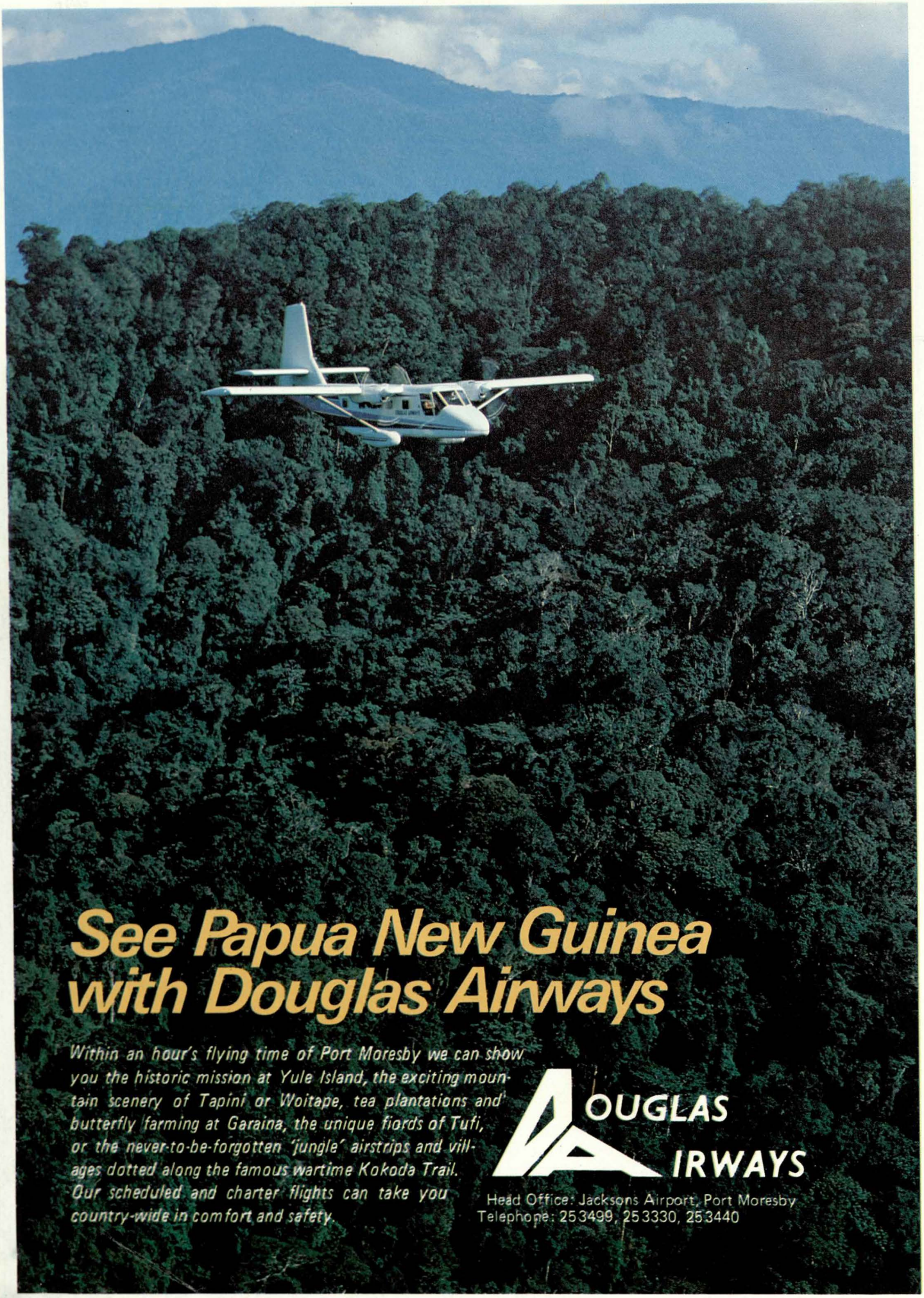
Left: *Mortar found at Elimbari;*
above left: *high school students get Nombe briefing from author;*
above: *Simbu men sift for secrets*

The small numbers of early inhabitants obtained their food and supplies from the forest, rivers and swamps. Their impact was fairly limited and the forest was able to rejuvenate and cover its scars. However, once forest clearance began on a larger scale for the extensive gardens necessary to support village populations, man's effect was magnified. Today most of the now extensive grasslands of the Highlands are the result of thousands of years of gardening which prevented forest regrowth, eventually allowing the coarse *kunai* grass to become dominant. The result is thin infertile soil which lacks the tree cover necessary to make humus to replace the soil washed away each wet season.

Climatic changes at the end of the Pleistocene period certainly caused some changes in the vegetation patterns but human activities have had an increasingly significant impact on the Highland landscape. It is not only modern man who is responsible for destruction and change in his environment, although the speed and devastation of the changes have escalated in recent years.

Some people may regard archaeology as an expensive luxury, suitable only for the so-called developed countries. But the developing countries are just as much in need of 'roots'. Papua New Guinea has a long and interesting history and is now realising the importance of recording and researching the past before the present eradicates all traces through urban growth and development.

Protemnodon was hunted by people in the Highlands when Papua New Guinea was joined to what is now Australia across the Torres Straits. The waisted blade, probably made by the hunters of protemnodon, is a symbol of the beginning of human achievement in Papua New Guinea. An increasingly complete story is emerging gradually from archaeological excavations and research which is now going on all over the country. —*Mary-Jane Mountain is a member of the Prehistory Department of The Research School of Pacific Studies, Australian National University, Canberra.*



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KUMU

Yu mas kaikai planti kumu. Em i strongim yu na daunim sik.

THIS message from the health department to the people of Papua New Guinea – exhorting them to eat lots of leafy green vegetables to stay strong and healthy – brought back to me memories of 'Eat up your greens now, my dear.'

But *kumu* (the pidgin word for all sorts of green and leafy vegetables) in Papua New Guinea can be delicious. We have eaten *kumu* in villages that would have matched the Chef's Speciality in a top Paris restaurant.

In Simbu Province we have gorged ourselves on mumu-ed *kumu*. Mumu Simbu-style is cooking in a hollowed-out log. Hot stones are laid in the bottom. These are covered with *kaukau* (sweet potato). Then another layer of hot stones and then a layer of *kaukau* and *kumu* and so on until the log is full. Water is poured over everything and, as the steam billows forth, the whole 'oven' is covered with leaves and left for an hour or two. The contents are then unpacked layer by mouth-watering-layer. Sprinkled with salt and dripping (bought from the local trade store), the result is delectable.

In our own garden there is a 'weed'. We used to throw it away until someone told us it was edible. A member of the Amaranth family, its tender leaves and shoots, cooked gently in coconut milk, have a mild but fresh taste. The little seeds

Roger Smith

Above: Kumu *at Goroka market;* **left:** *Amaranthus – mild, fresh with a 'scrunchy' bonus*

Celia Bridle

By Clare Claydon

have a slightly 'scrunchy' texture. Very pleasing.

In New Ireland one starry night we had aibika (a red-stemmed plant with large dark green leaves) cooked with onion and tinned fish over a wood fire. Served with rice, it was a magnificent meal.

Aibika is a handsome, robust plant, but its leaves when cooked can easily go slimy. This does not worry some people but it can be prevented by using very little water in the cooking.

The tips of pumpkin, choko, sweet potato and bean plants are very tasty. Take just the tender end shoots and stir-fry to make the most of their crisp texture and fresh flavour. Some ferns also make good eating. But be careful. Get a villager to tell you what is edible.

There is a story that some troops in the Pacific War were given a list of the plants they could eat if forced to live off the land. Unfortunately the descriptions were not accurate enough and several men died after eating ferns they thought matched the illustrations.

Tulip is, in my family's opinion, one of the most delicious kinds of *kumu*. I am not talking of the popular European spring flower but a local plant with a pidgin name pronounced 'too leep' – literally 'two leaves'. The edible parts are the shiny tender leaves (looking much like the leaves on a mango tree) which grow in pairs on the *tulip* tree. Cook them in coconut milk.

In a country where meat and pulses (lentils, dried beans and peas) are not regularly eaten, the health department sees *kumu* as an excellent source of protein, Vitamin C, iron, folic acid and calcium. For pregnant and lactating women and growing children the iron is very valuable, as is the folic acid which helps in the absorption of iron. Few Papua New Guineans drink any milk after they are weaned off the breast and this is where the calcium of *kumu* comes in.

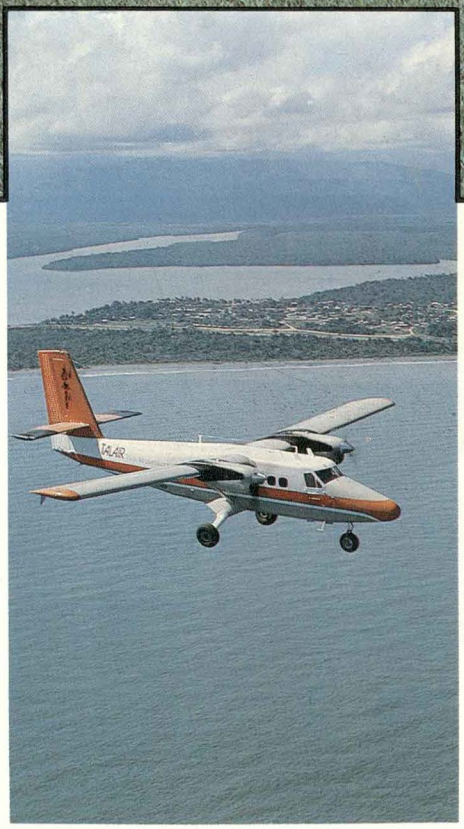
In many rural areas there used to be – and in some areas still are – taboos on pregnant and lactating women and small children eating meat, fish and eggs. In these areas an intake of fresh greens is vital.

The delights of *kumu* so far seem to be enjoyed mainly by the rural people of Papua New Guinea. The health department's campaign would get a good urban shot in the arm if restaurants and fast food outlets were to wake up to the succulence and flavour of these leafy greens. – *Clare Claydon, a member of the informal PNG breastfeeding organisation known as Susu Mamas, has made a study of nutritious indigenous foods.*

Aibika – magnificent with rice

Celia Bridle

Gulf airbus



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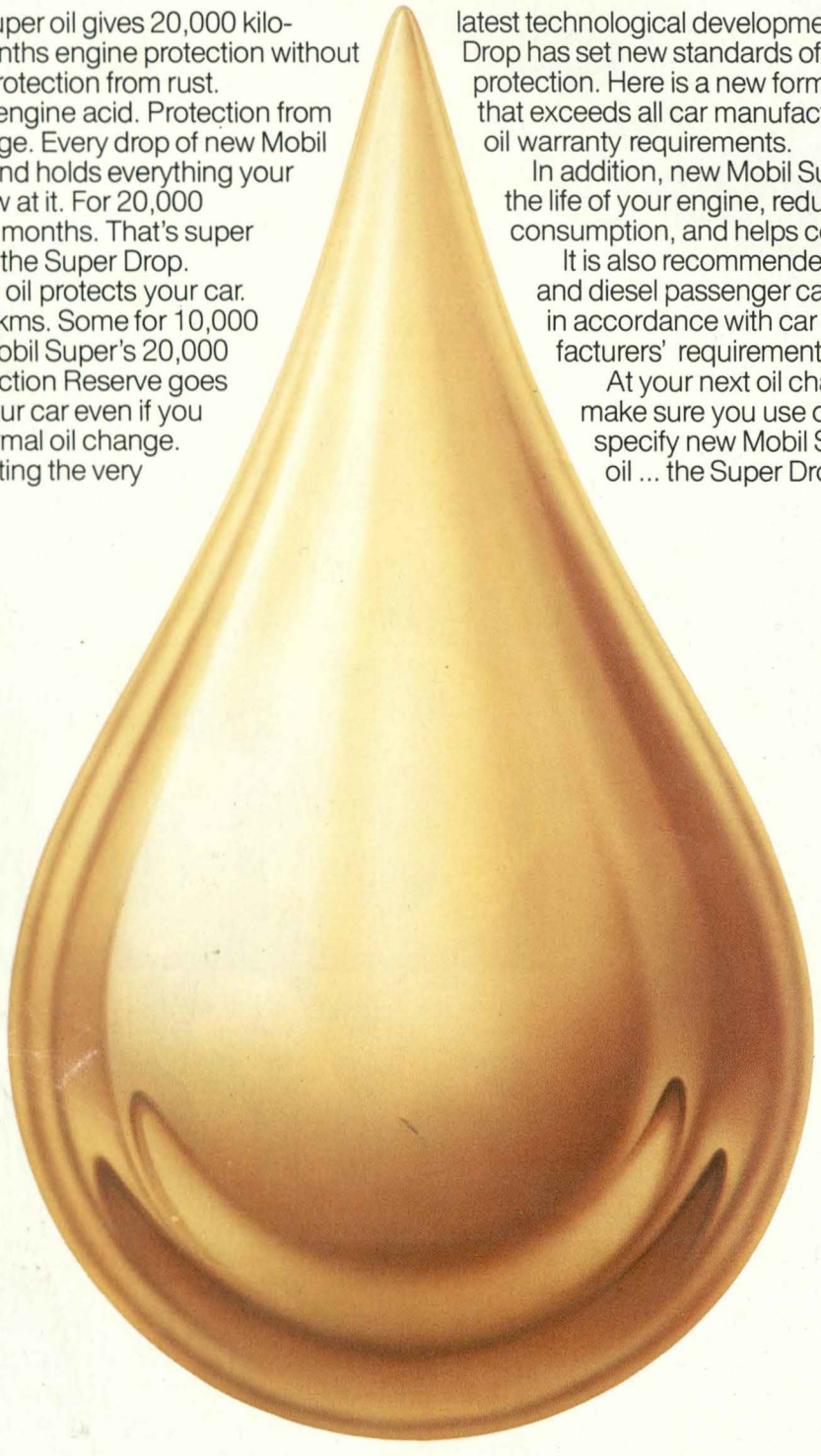


New Mobil Super Drop.

Sanguma

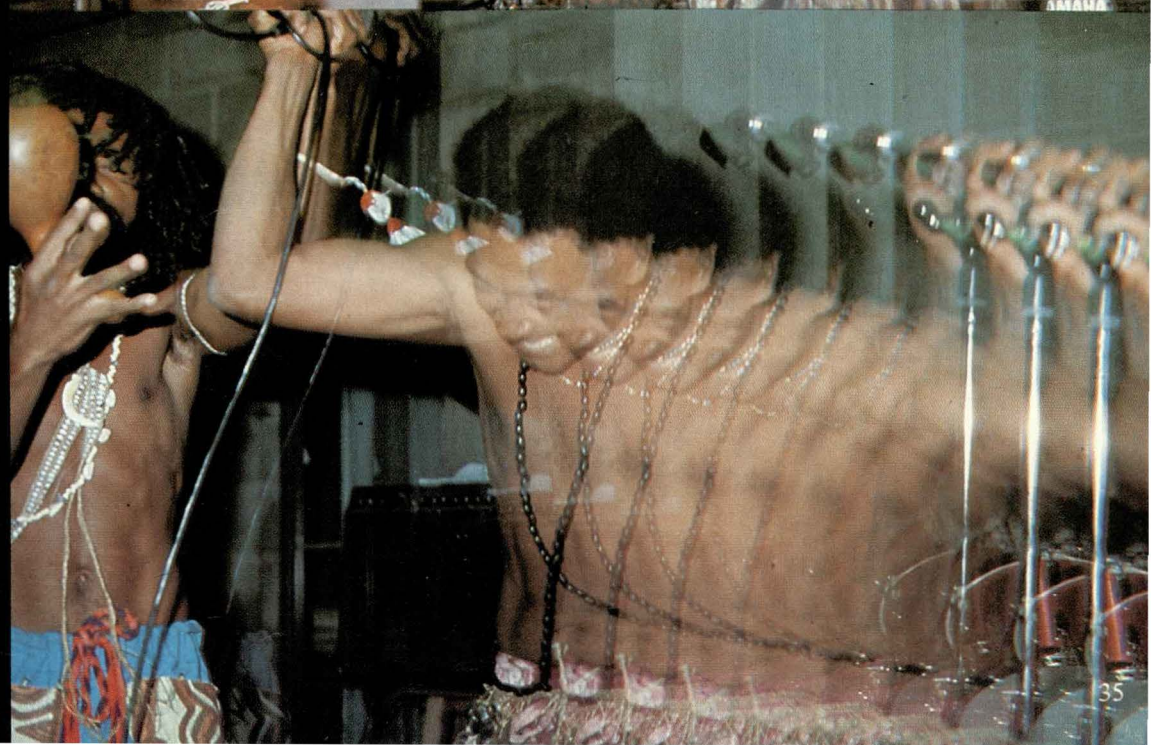
THE lighting dims. From the shadow a chant explodes. Kundu drums thump, bamboo and costume-shell rattle, wooden trumpets roar. The chant – in a Milne Bay language – is heralding an evening's merry-making.

Onto the stage come 10 young Papua New Guinean musicians – laughing, dancing. Pent-up energy. Two move to the large garamut drums and break into a Sepik rhythm – which then flows in to 'Yalikoe' played on synthesiser, electric piano, flute, bass guitar and drums, all with the underlying pulse of the garamuts.

In a matter of seconds, sounds, some thousands of years old, some only a few weeks young – and from societies which in ancient New Guinea would have been light years apart – have been blended by the most exciting musical grouping ever to rub instruments in Papua New Guinea.

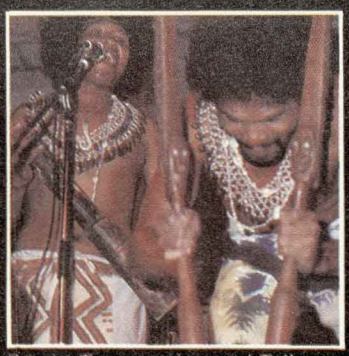
The entranced audience is watching Sanguma. The show goes on. Contemporary pieces intersperse with pure traditional music; the haunting sounds of Sepik flutes follow the intricate rhythms of Manus drumming; high energy bursts give way to sensitive interludes. There's lots of laughter and dancing. By the time the show tries to come to an end two hours later the audience is on its feet dancing, singing, shouting.

Sanguma – named after a Sepik word translating literally as 'magic man' – is one of those rare groups who combine originality with amazing energy and pure enjoyment. The group began in mid-1977 at the National Arts School, Port Moresby, with this philosophy: to create a contemporary music which would keep in touch with the musical developments of outside cultures but simultaneously keep its roots firmly planted in trad-



Sanguma

Raymond Hakena Apa Saun



Baruka Tau Leonard Taligatus

Paul Yabo

Tony Subam

itional Papua New Guinea music.

There is an inexhaustible supply of traditional songs and tunes. Sanguma players, to acquire the skills to handle this music, make field trips to remote villages where they learn both the music and the instruments upon which it is played. Papua New Guinea has an impressive range of musical instruments. As well as field trips, village musicians are invited to the National Arts School. The end result is a unique group of musicians – the only group in the country able to perform in a variety of musical cultures.

Not only that, the Sanguma players also are trained in western music techniques – classical and popular – and are able to play many modern instruments.

At last year's South Pacific Festival of Arts in Papua New Guinea, Sanguma made a tremendous impact on visiting artists and musicians, many of whom went away saying they intended to review their own music in light of Sanguma's philosophy.

Founder members and still with Sanguma are *Tony Subam* of Madang, *Sebastian Miyoni* of Milne Bay, *Thomas Komboi* of Sepik, and *Jesse James Pongap* of Manus.

Tony and Sebastian, both prolific composers, made major contributions to the score for 'Marabe' (PNG's first full length feature film) and 'Eberia' (PNG's first musical written by William Takaku) which was performed at last year's arts festival. Thomas, the electronics expert, plays just about every instrument in the band but specialises in the trumpet and synthesiser. He also is a talented arranger. Jesse, who specialises in traditional music, has published a study on the music of Sori Village in Manus Province. He also has published a book of his own 'Songs from Manus'.

Making up the 10 today are *Aaron Murray*, Sepik; *Buruka Tau*, Central Province; *Apa Saun*, Sepik; *Raymond Hakena*, North Solomons Province; *Paul Yabo*, Sepik; and *Leonard Taligatus*, Yule Island, Central Province.

Aaron is the dance specialist. His 'war dance' is a highlight of Sanguma concerts. He also composes, plays flute or keyboards and sings. Buruka composes and plays keyboards. Apa and Raymond, the Sepik flute specialists, play traditional flute pieces from the Chambri Lakes. They also work together to produce contemporary settings of traditional flute pieces. When not on the flutes, Apa is the bass player and Raymond the drummer. Paul, a talented pianist and trumpeter, is now composing. Leonard, lead guitarist, has been a professional musician in PNG for some years.

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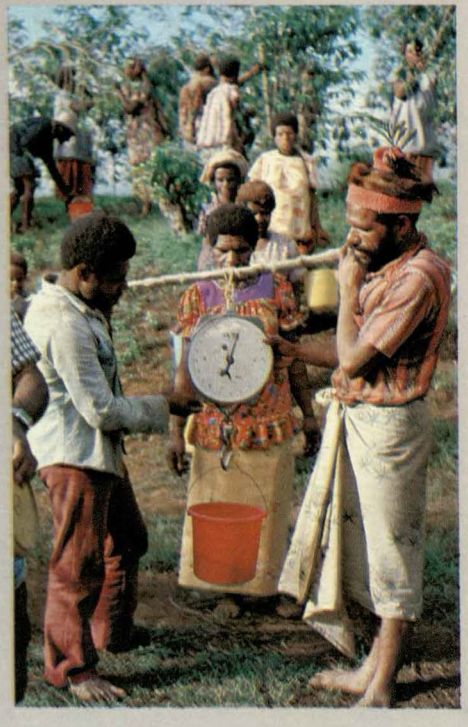


laws and people. I hope that you may be numbered among them.'

It is the role of the National Investment and Development Authority (NIDA) in addition to promoting, regulating and controlling foreign investment, to assist investors and co-ordinate all matters relating to foreign investment in Papua New Guinea. Your first point of contact is NIDA at the address below, if you are interested in looking at the investment opportunities and potential or if you need further information. Projects and business activities are divided into three main categories – PRIORITY, OPEN and RESERVED. These are reviewed annually.

Foreign investment in PRIORITY activities is considered to be an essential part of Papua New Guinea's development programmes over the coming years. OPEN activities are projects which are suitable for development by foreign investment but which are not Government priority.

RESERVED activities are those in which foreign investors will not, as a general rule, be allowed to establish new businesses or to take over existing businesses.

PRIORITY ACTIVITIES INCLUDE:

1. Mining: the development of mining and petroleum products.
2. Agriculture: the growing of legume and grain crops.
3. Forestry: sawn timber and veneer production; woodchipping in association with reforestation; further processing of timber; development of follow-up land use scheme.
4. Shipbuilding and ship repair.
5. Hotels.

OPEN ACTIVITIES INCLUDE:

1. Agriculture: growing of fruit trees, and oil palm, rubber, cocoa, seeds and spice – through nucleus estate development.
2. Wildlife: harvesting and farming of deer.
3. Forestry: integrated timber development in six provinces.
4. Fishing: farming of prawns, eels, pearls, edible oysters and mussels; aquaculture; fishing of sharks and mangrove crabs.
5. Secondary industries: the processing, manufacture and assembly of a wide variety of goods.
6. Construction: using specialist skills not available at competitive costs in PNG.
7. Trading: export of minor agriculture products.
8. Tourism, restaurants and motels: in conformity with a National Tourism Plan.
9. Technical and professional services.

The following new incentives have just been introduced:

1. First, the accelerated depreciation allowance:–
   This will allow a greater claim for depreciation in the year of capital purchase. It is intended that this incentive be made available to the manufacturing, transport and communication, building and construction and business service sectors for items of investment which have a useful life of over five years.
2. The next new incentive is a 200% deduction from assessable income for wages paid to apprentices registered with the Apprenticeship Board of Papua New Guinea.
3. Thirdly, the Government will provide necessary infrastructure, including buildings, to investors for new industrial projects in return for a negotiated user charge payable annually over the life of the project.

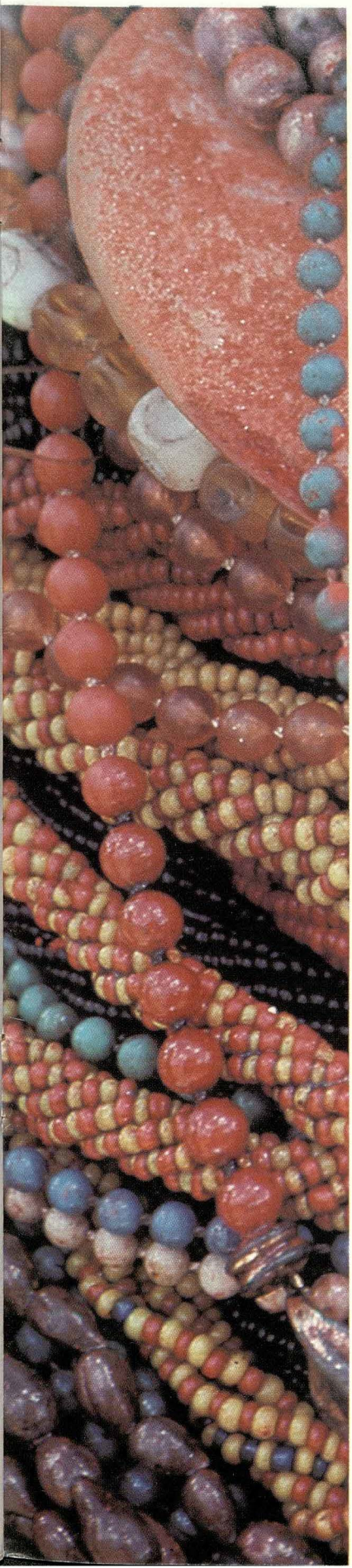
There are, of course, many other schemes and policies already in existence which are intended to assist investors.

We have an Export Incentive Scheme for manufactured goods under which 50% of profits related to growth in export sales are exempted from company tax; an Infant Industry Loan Scheme under which Government will consider providing an unsecured standby loan facility for firms which identify possible financial problems in the early years of a project; a Feasibility Studies Contribution Scheme for certain qualifying industries. We have no import duties on capital goods, other than the general levy of 2½% on all imported goods. Investors can also apply for exemption from the generally low rates of duty on raw materials if the latter are significant to project operations.

For further information, contact: The Executive Director, National Investment & Development Authority, PO Box 5053, BOROKO. Papua New Guinea

bilas

Story and photographs: Maureen Mackenzie



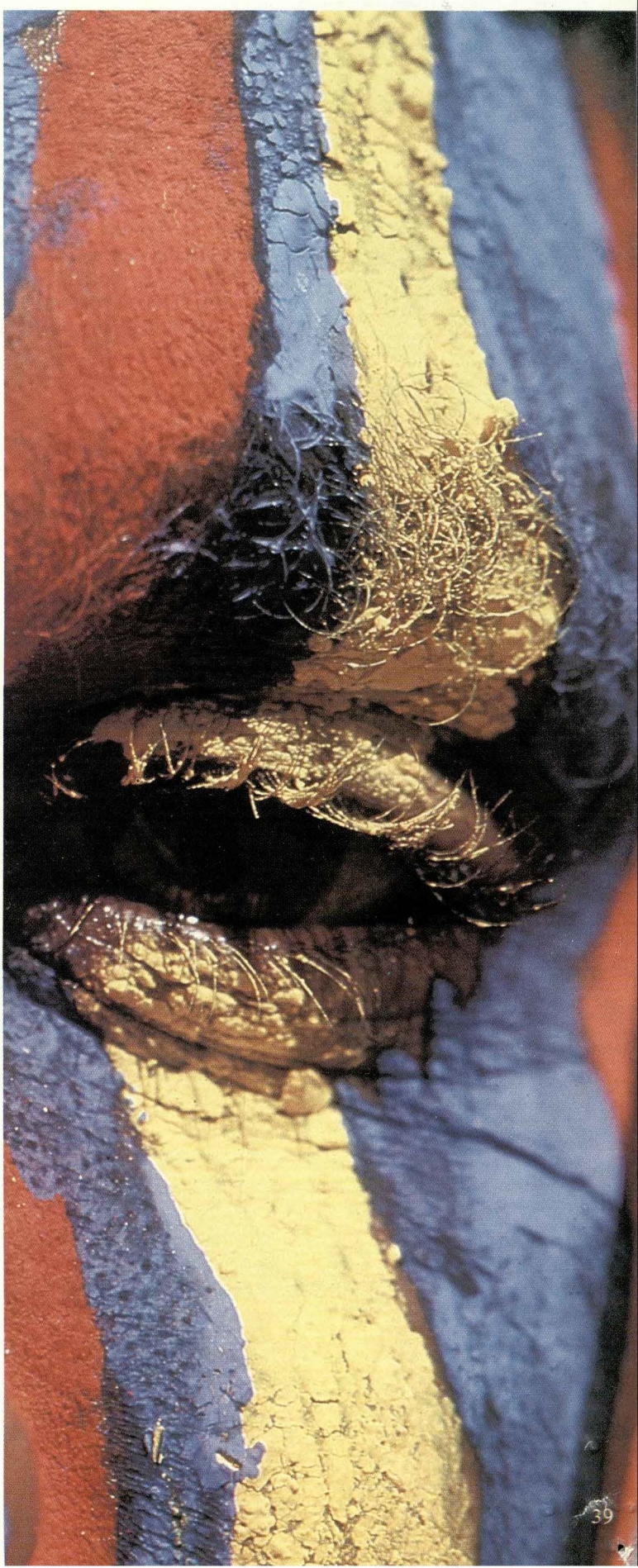
BEFORE foreigners marched into their mountain valley strongholds and forced serious changes upon their traditional lifestyle, the people of Papua New Guinea's Highlands existed in a state of almost continual inter-tribal ritual warfare. And when they were not fighting or preparing for battle they would quickly turn to their favourite pastime – a combination of dancing, ceremonial and feasting.

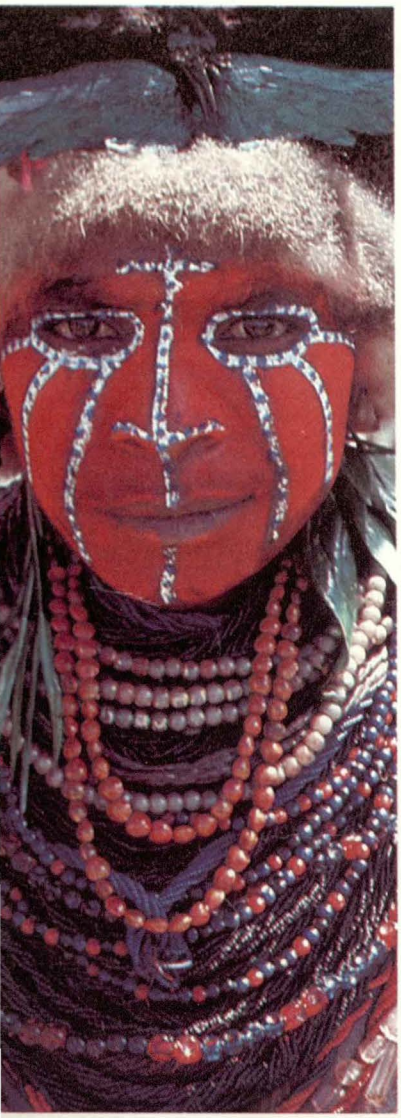
Integral to these activities is the process of dressing up which in the Highlands involves much more than just donning one's best clothes. In many areas, no matter how spectacular the finery, often involving magnificent bird of paradise plumes, most attention is devoted to the quality and originality of face and body painting.

Though the Highlanders produce few of the artifacts which are so abundant elsewhere in Papua New Guinea, their ventures into the art of human decoration have resulted in splendrous images. The intrusion of foreigners into their territory has done nothing to detract from this colourful art form. In fact, Highlanders possess a certain magpie-like, but selective, acquisitiveness.

At the last Goroka Show in the Eastern Highlands Province I noticed many tribespeople, in amongst their traditional finery, had included items drawn from cultures new to their valley. Sprays of branches and strings of beads were draped over white tradestore brassieres, beer bottle tops and tinfoil nestled among the paraphernalia of grand headdresses.

And the breakdown of tribal barriers has led to the creation of new groupings which are seeking to establish their own identities. One such group comprises the workers at the trout farm near Goroka. At the last show they asserted their indiv-





Above: *Young Hagen woman – headdress of swaying* doa *feathers capped by full plumage from the superb bird of paradise and a single golden yellow crest feather of the white* koki*; silvery brown cuscus fur trims the woven headnet and small sprays of sweet smelling singsing bush hang from the ears; the elegant breast shield is of plastic tradestore beads; face contours are highlighted by tracery of fine white lines across vibrant red pigment;* **right:** *a tradestore towel makes this Wahgi man's wig unique*

iduality as a *singsing* group by wearing 60-centimetre-long silver foil trout-shaped headdresses which, in the afternoon sun, flashed like a school of fish.

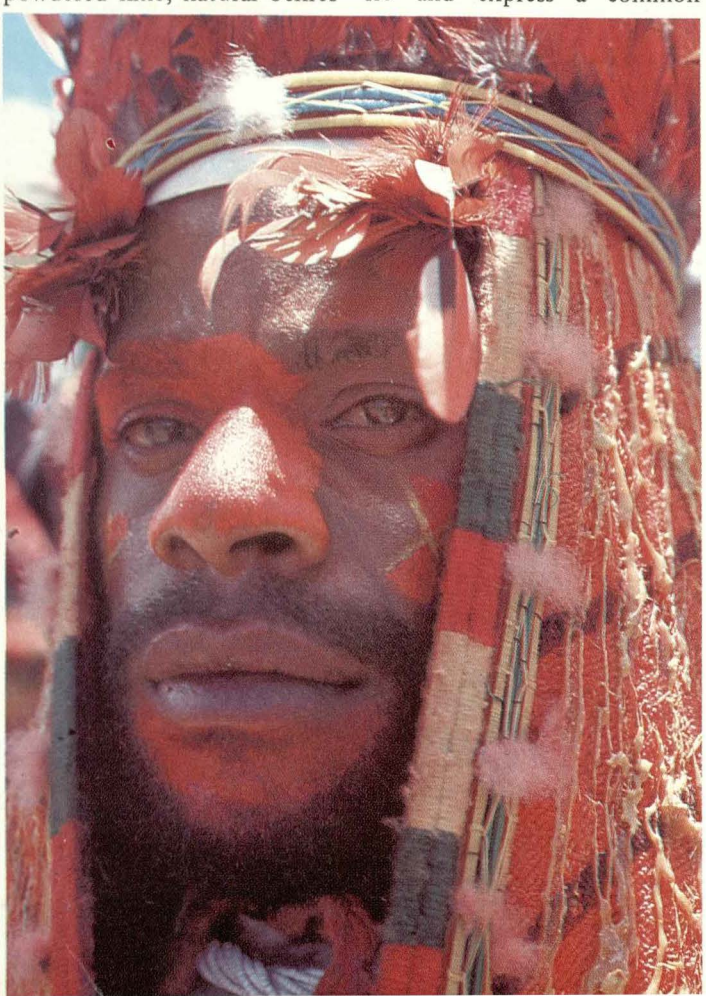
In the past, both tribal wars and festive occasions provided opportunities for the Highlanders to express themselves through ceremonial dress. Body decoration and facial painting for tribal clashes developed as a means of establishing an individual uniform.

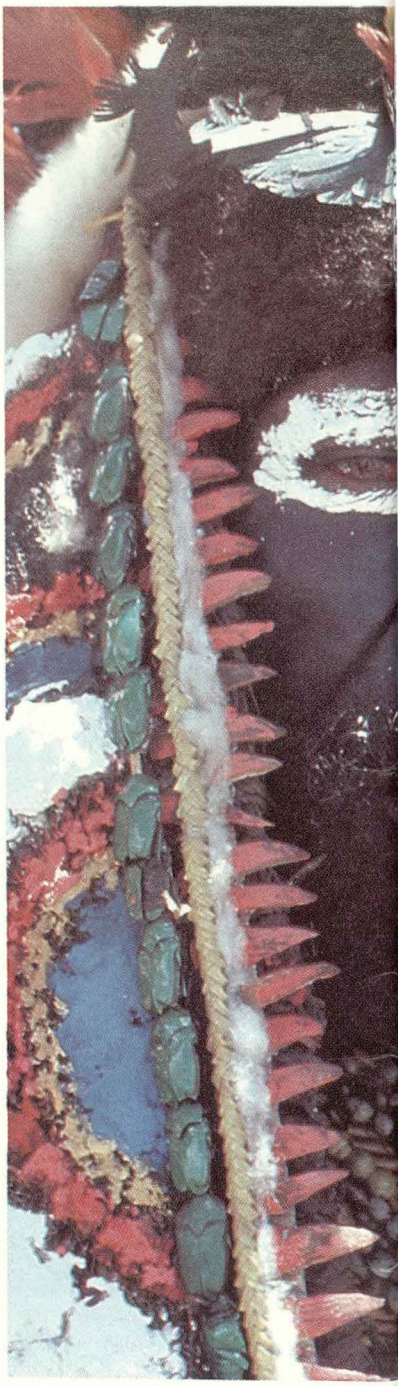
The striking use of colour in the decoration of face and body, particularly among the people of the Southern Highlands Province, has been developed to a degree of sophistication matched only by the coastal Mekeo people in Central Province to the northwest of Port Moresby, the national capital.

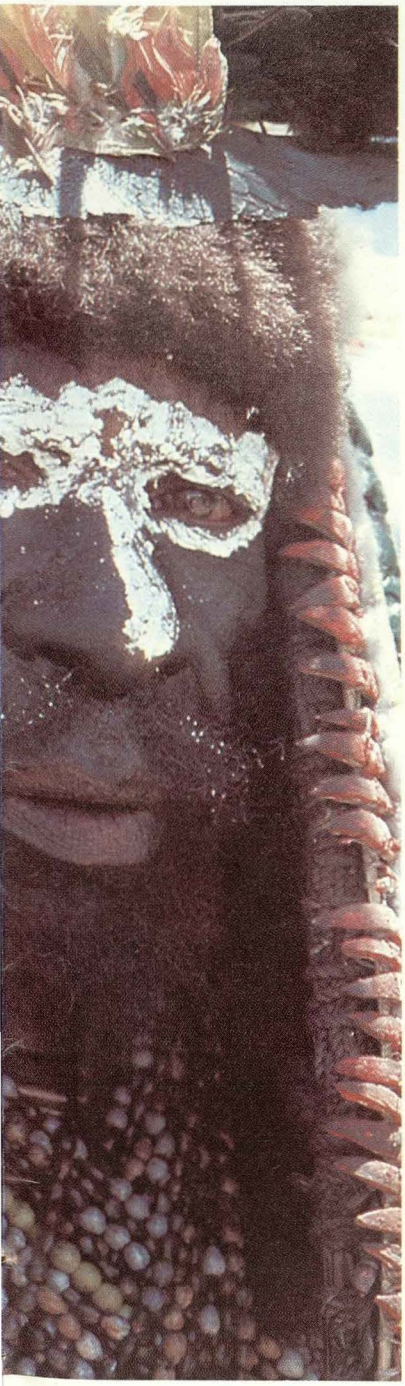
Some Highlanders, like the Huli wigmen from the Tari Basin in the Southern Highlands, completely mask their faces with a mixture of pig-grease and powdered lime, natural ochres and clay pigments – or with crude strong powdered pigments from tradestores. This latter method is rapidly replacing traditional processes. Intricate polka-dot patterns are delicately painted around their eyes, and on the nose and forehead. No man can copy another's design without permission.

In other areas, particularly in the Eastern Highlands, the people decorate only parts of their faces, the extent depending on clan identity. These designs do not have the finesse of the Southern and Western Highlands face painting. Whereas in the Western Highlands colours are painted with a beaten reed brush, in the Eastern Highlands they are applied with fingers.

Cosmetics and costumes once made it easy to identify a person as being from a particular tribe. The combination of paint, feathers, headdresses, shells and bones helped symbolise and express a common







Above: *A wigman from Mamunga makes the most of the contrast between light and dark elements;* **right:** *through a curtain of Job's tears, this man from Henganofi mourns for ancestors lost in battle*

tradition and served to bind one man to another, to his tribe and to his ancestors. Today, personal creativity and ingenuity are accelerating and over-riding traditional constraints to some degree.

The act of putting on finery for a singsing is a manifestation of the Highlanders' close links with nature. Traditionally they used only natural objects – plumage, shell, marsupial fur, shards of luminous green beetles and the bones and teeth of domestic and wild animals.

Their headdresses include brilliant feathers from a variety of birds – the plumes of the paradise species (*kumul*), the yellow and white feathers of the white cockatoo (*koki*), the red, green, pink and yellow parrot plumage and the long, black quills of the cassowary (*muruk*).

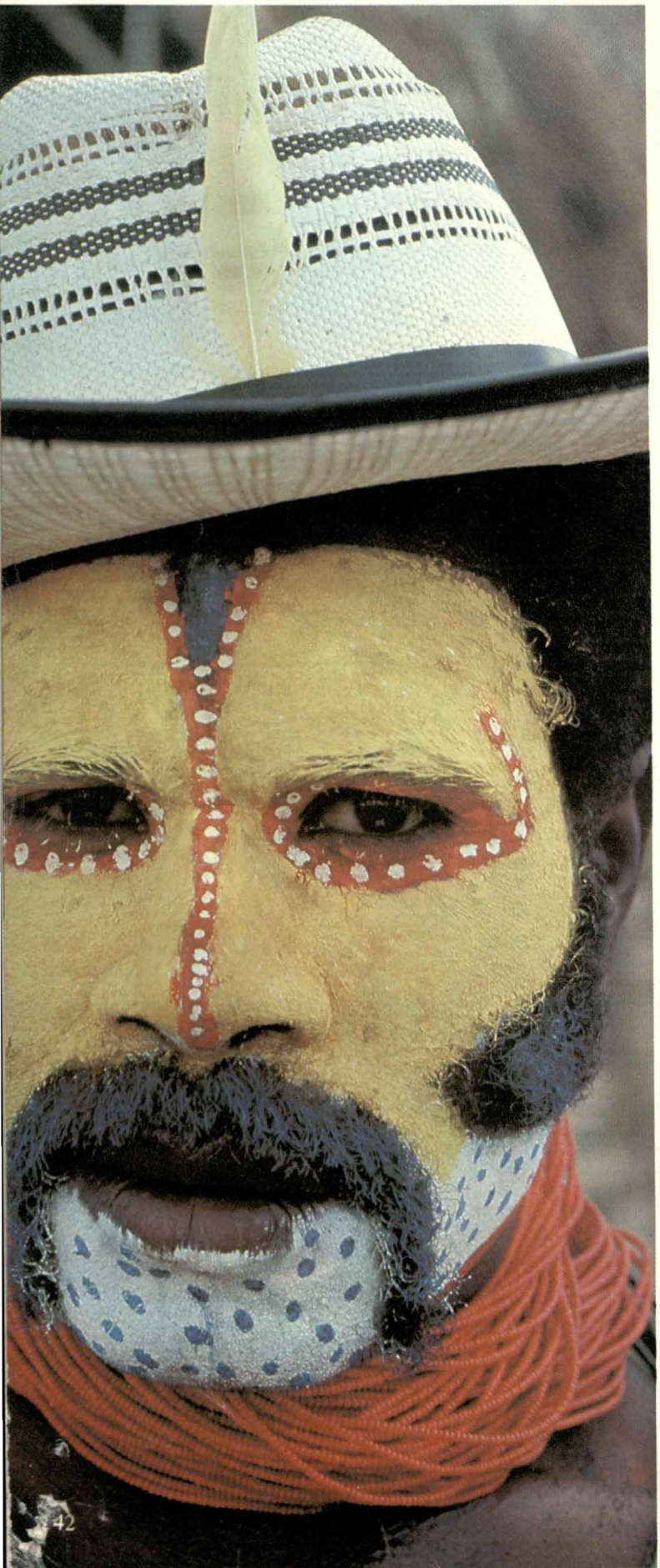
Shells, including cowries both large (*koma koma*) and small (*giri giri*), the tiny studded *tambu* and mother of pearl form an important part of body *bilas*. Though they had no knowledge of the sea, Highlanders have for thousands of years been able to obtain shells as a result of highly-developed trading routes.

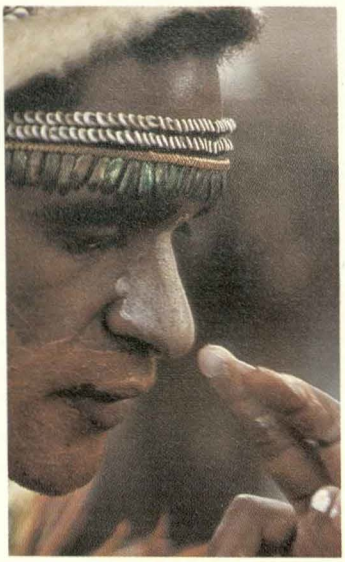
Pelts from wild mountain possums (*kapul*) are available in a rich variety of shades from pale silver through creams and whites to the richest of chestnut and black. They are meticulously bound and sewn together with natural bush string which is twisted and rolled from fibres.

Wigs are a strong feature of Southern and Western Highlands dress. The Huli bowmen are allowed to wear their characteristic ceremonial crescent-shaped wigs (made from compacted human hair) only after they have been initiated into tribal manhood. When the wig is worn the face must always be decorated.

The Huli everyday wig, of triangular design is usually decorated with brilliant everlasting daisies which are specially cultivated.

The mid-Wahgi and Mam-





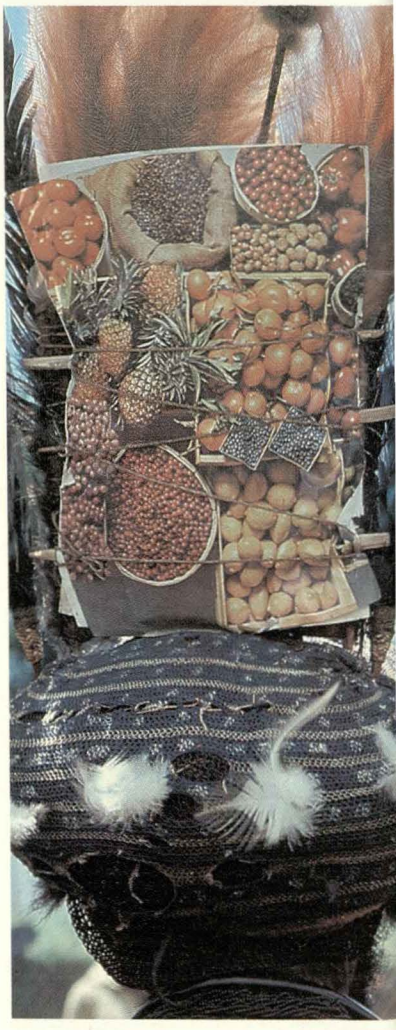
unga warriors of the Western Highlands wear large wigs built on a frame of pliant cane strips, bound with lianas. Human hair is attached to this with bark thread and then set hard with resin. They are finally painted in bright colours in chevron, streaky and triangular markings. The front of the wig may be fringed with scarab beetles, light-coloured marsupial pelts and bright blue breast plumes of the superb bird of paradise.

The *bilas* of a Highlander never serves as a disguise or to represent another person, or spirit, as masks and costumes do in many other cultures. Specific occasions call for a certain type of dance and the body decoration, type of wig and facial design will be varied accordingly.

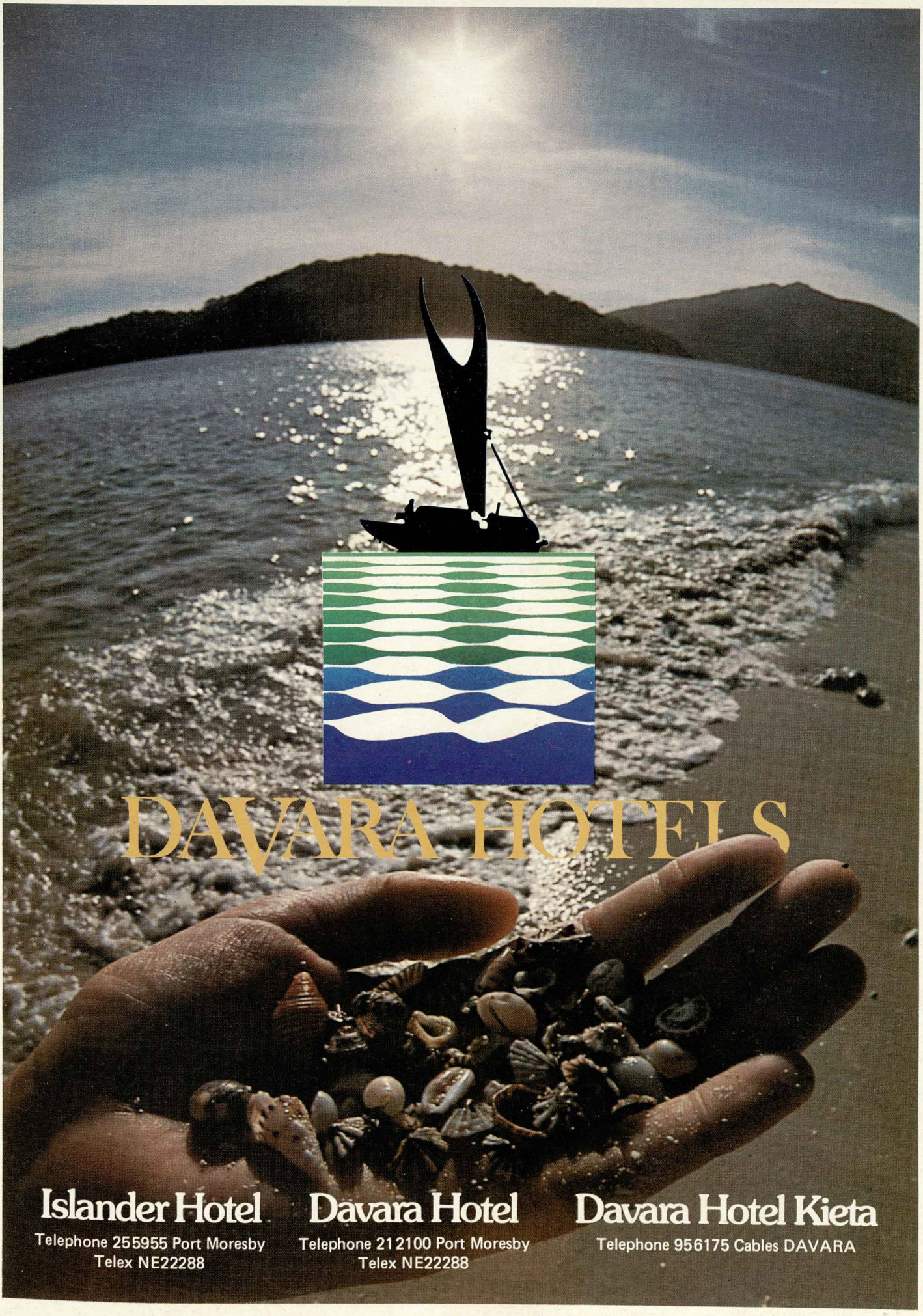
Although women do indulge in face painting, it is primarily a male art. The meanings behind traditional designs are handed down to the male youth of a tribe during their pre-initiation training.

Treasured items of *bilas* are handed down through the generations but, with many young men now leaving village life in response to the lure of city lights, the thread of tradition, if not the art of decoration, is being lost. It is to encourage the survival of the rich culture of body decoration that regular Highlands shows are staged.

– Maureen Mackenzie is lecturer in graphics at the National Arts School in Port Moresby.



Left: *Western straw hat substitute for traditional wig on the head of a man from Tari;* **above left:** *in the process of making up, a young Eastern Highlander crudely applies natural ochre;* **above:** *a glossy magazine contributes to the magnificence of this Hagen man's headnet*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