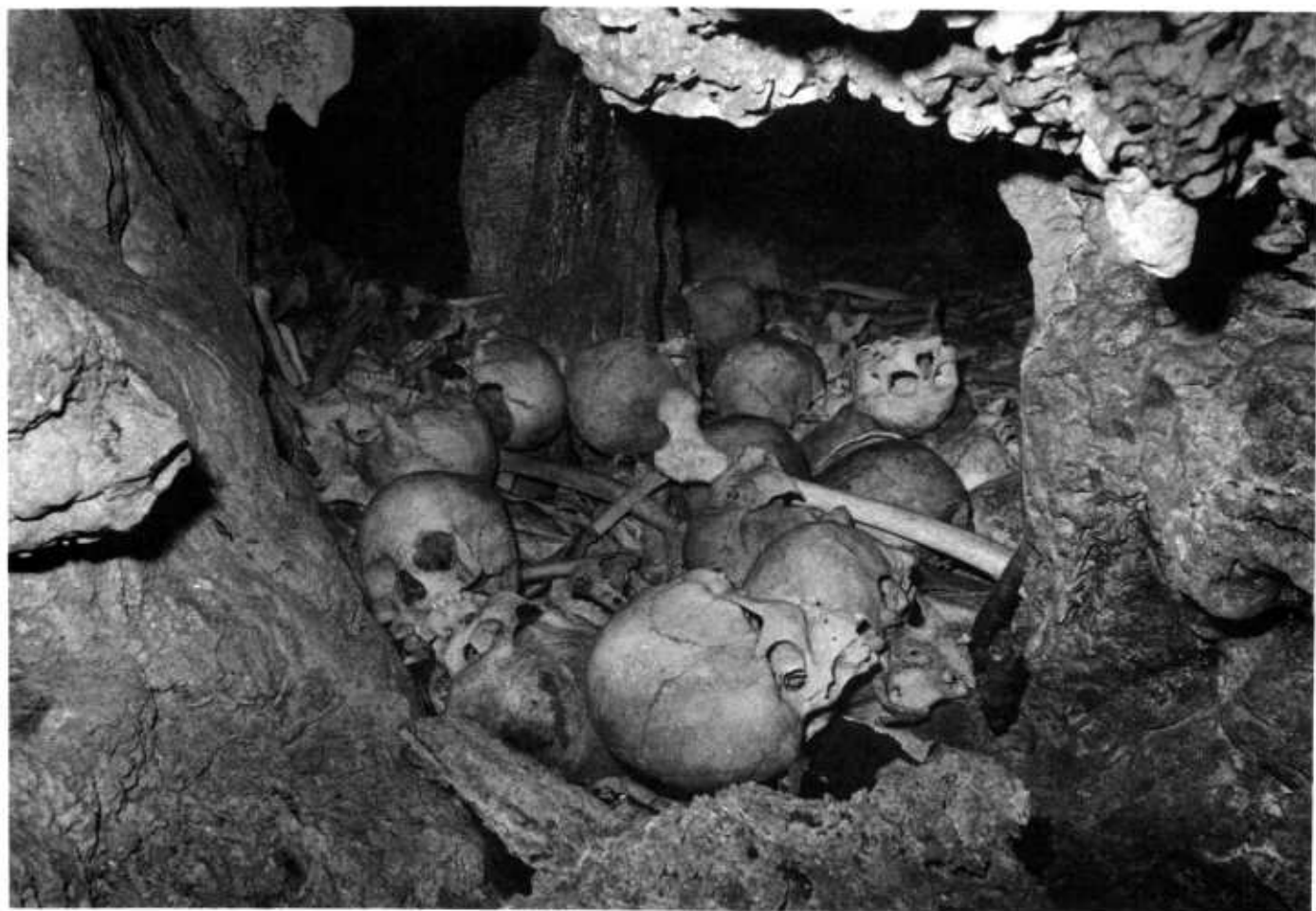


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JOURNAL OF AUSTRALASIAN CAVE RESEARCH



Skulls in Tuma 3 Cave, Trobriand Islands.

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## ABSTRACTS AND REVIEWS

BONE DEPOSITS IN CHILLAGOE-MUNGANA CAVES. By Jo Trezise. Nth. Q'ld Nat., 37 (152), 1970 : 2 - 4.

The palaeontological potential of deposits in the Chillagoe Caves, Northern Queensland, has only been recognised recently. Bones have been removed from loose floor deposits and travertine-bone breccia. No dating has been attempted, but the species list suggests excavation of relatively young sediments. None of those listed is extinct, but the author mentions that bones of extinct marsupials have been discovered recently. The remains include those of Macropus robustus, Petrogale penicillata, Thylogale stigmatica, Satanellus hallucatus, Isodon macrourus, Petaurus breviceps, Phascogale tapoatafa, Sminthopsis sp., Canis dingo, Uromys sherrini and Rattus sp. P. tapoatafa has not been previously recorded in the district.

Bat remains identified are those of Ladarrida australis, Macroderma gigas, Nyctophilus bitax, Miniopterus australis, Rhinolophus philippinensis, and Saccolaimus sp. Bird and reptile species are also listed. Numerous nests of the grey swiftlet (Collacalia francina) were noted high on cave walls. - G.S. Hunt.

STYLONISCIDAE (ISOPODA, ONISCOIDEA) FROM TASMANIA AND NEW ZEALAND. By Alison J.A. Green. Pap. Proc. R. Soc. Tas., 105, 1970 : 59 - 74.

An earlier discussion of genus Styloniscus Dana is revised and three new species are described. A new species of Notoniscus Chilton is also described. The Tasmanian species St. sylvestris, St. hirsutus, Notoniscus chiltoni and N. tasmanicus all inhabit litter on the ground in damp forests. St. nichollsi is also present in such forests, but it has been found in other situations as well. It is the only species of Styloniscidae to be recorded from caves in Tasmania. It has been collected in King George V Cave, Hastings; Old Tourist Cave, Loongana; and Georgie's Hall, Scott's Cave, Baldock's Cave, Herbert's Pot and Mersey Hill Cave, Mole Creek, and is usually associated with dead wood or with debris near underground streams.

In New Zealand, St. thomsoni, St. phormianus and St. otakensis came from damp forest litter, but St. phormianus is also known from caves in the North Island. - A.M.R.

ALBINISM IN THE BENT-WINGED BAT MINIOPTERUS SCHREIBERSII (KUHLE). By E. Hamilton-Smith. Vict. Nat., 85, 1968 : 358 - 359.

The first case of albinism in the bent-winged bat is reported in this note. The animal, a female, was captured at Pannure Cave near Warrnambool, Victoria, in 1967, but it later escaped. A good colour photograph of the animal is included. White-spotted or partially white bats of this species are not uncommon in south-eastern Australia. - A.M.R.

CAVES OF KAILEUNA AND TUMA, TROBRIAND ISLANDS

C.D. OLLIER, D.K. HOLDSWORTH and G. HEERS

Introduction

The Trobriand group of coral islands is situated a hundred miles off the northeast coast of Papua and north of the D'Entrecasteaux Islands. In previous papers we have described caves on Kiriwina (the main island), Vakuta and Kitava (see References). We now describe caves of Kaileuna and Tuma (see Figures 1 and 2). In August 1970, we spent one week of intensive search for caves on these two islands, making our headquarters in the copra store in the village of Kadawaga.

Kaileuna island is six miles long and almost four miles wide, and supports a population of 1,079 (1969 Census). It is separated from the large island of Kiriwina by a channel two miles wide between Mamamada Point and Boll Point, though the main village of Kadawaga on the west coast of Kaileuna is 18 miles from Losuia and 14 miles from Kaibola. The island is generally swampy in the centre with a rim of uplifted coral around the edge. We were assured that the correct name of the island is Laileula, but since Kaileuna is used on all previous maps it is retained here. However, we prefer Kadawaga to the Kudawaga or Kaduwaga that appear on some maps.

The inhabitants are of mixed Melanesian-Polynesian stock, who are almost totally self-supporting, being in the main farmers and fishermen. The yam (taitu) constitutes the staple crop and the harvest is still gathered in with ceremonies unchanged for centuries. There is great competition among families for the quantity and quality of the crop, which is displayed firstly in garden arbours (kalimonio), later in the village outside the houses; traditionally styled yam huts (bwaima) are then constructed to display the harvest until the next season. The transfer of yams from the garden to the village is occasion for a long procession of gatherers to parade through the village blowing conch shells and chanting traditional airs (sawili) to attract the attention of villagers to the harvesting party. After storage of the harvest, a period of dancing and feasting (milamala) continues for a month or more.

Traditional clothing is the rule. Women and girls wear fibre skirts (doba), most of the men, especially the older ones, wear a pubic leaf (vivia) made from the sepal of the betel nut palm flower (Areca catechu Linn.).

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Tuma, the northernmost of the main islands in the Trobriand group, is six miles long and less than a mile wide. It is a low ridge of coral with swamps in the centre and along much of the western side. The island has been uninhabited since 1963 when the last few residents abandoned it and moved to Kiriwina, but it is still visited from time to time by other islanders who collect copra and fish.

Tuma is believed by all Trobriand Islanders to be inhabited now by the spirits of the dead. It is also generally believed that Tuma is the original home of the Trobriand ancestors; these ancestors are also said to have emerged at Labai Cave on Kiriwina Island, and from many other places of emergence or "bwala". Lack of consistency in the legends does not appear to concern the Trobrianders very much.

The cave maps in this paper are sketches based mainly on estimated dimensions, with a few actual measurements and compass bearings. Bwabwatu was surveyed more accurately, using a 100 ft steel reinforced tape and prismatic compass throughout.

#### CAVES OF KAILLEUNA

##### Okunukunu (Figure 3)

This cave is in limestone cliffs on the shore, and our first intimation of its presence was a skull and a few other bones placed at eye level looking at the beach. It appears that the natives place any bones that fall from above on little ledges, though without any feelings of reverence or association with the bones. The limestone cliff is about 18 ft high and the shelf leading to the cave is visible from the beach and is about 10 ft high. The coral here is riddled with sink-holes, often only separated by very narrow and sharp walls; the topography might be termed "razor and sink-hole karst". It is very rough and sharp, and the easiest route to the cave is not directly up the cliff but through a small arch into a sink-hole, up the far side of the sink-hole and around the rim to the shelf. Close to the cave there are two sink-holes about 10 ft diameter and 18 ft deep, and one like a cylindrical well 3 ft in diameter and 12 ft deep.

The cave is a low crawl with a ceiling rising to 4 ft in a few places, and divided into several sections by stalactites and columns up to 2 ft wide (Plate 1). Our local guides knew the cave but had never been in with lights and were unaware of the contents. Local stories maintain that the caves contain the treasure of their ancestors; they were expecting to find hoards of stone axes and shells and were possibly disappointed when we failed to find any.

There are many human bones of various kinds on the floor of the cave, but not too many skulls. The cave contains many pottery fragments, some quite large, one intact pot containing bones but no skull, and an almost intact pot has a skull inside (Plate 2). One clam shell is present.



Plate 1. Okunukunu, showing phreatic spongework on ceiling.



Plate 2. Almost intact get containing skull, Okunukunu.



Plate 3. Globular speleothem, or "heap of yams," Bwabwatu.

The natives account for the bones as the remains of the victims of the legendary giant Dokonikani, who ate people. He apparently dwelt in every bone cave in the islands for the legend is found everywhere. When we asked about the pots we were told that he also ate visitors to the islands, including those from the Amphletts where our guides presumed the pots came from since present-day Trobrianders get their pottery from the Amphletts. However, the pots are not in fact of Amphlett type.

#### Yavala (Figure 4)

This cave is the remains of a tunnel, much modified by collapse and opening to the sky at three collapse openings, of which the centre one provides easiest entrance on to a large heap of rubble. Pools of water are present, up to about 6 ft deep, and the water surface is 15 ft below ground surface. Some of the collapse debris is covered by stalagmite, but the largest fallen block is crude coral without any flowstone, and therefore is indicative of a recent fall.

The southern chamber has eight large bulbous stalactites growing to within 6 inches of the water surface. Our guides say this cave is tidal and that the tide was high when we were there. This cave contained many bats, a crayfish or yabby, and a large snake (seen by the guides but not by ourselves) said to be 6 ft long and thick as a man's arm.

#### Okeledagula (Figure 5)

The name literally means "on putting in the feathers". This refers to the Trobriand custom of putting white feathers into the hair for a dance or "sing sing".

This cave is located inside the rim of the island where the rough coral (leibwaga) begins, at the base of an 8 ft high bluff. It is a fairly small cave descending from a small entrance, but because of difficult access it was not measured accurately. It is about 25 - 30 ft wide and perhaps 20 ft deep. The roof is up to 4 ft above the floor and covered by stalactites, some of which are active. This cave is absolutely littered with human bones, several bones deep, which cover about 80% of the floor. A few knobs of rock and stalagmite enabled one of us (C.D.O.) to explore the cave, with great difficulty, without smashing the bones. There are many skulls, and some parallel bundles of limb bones could be detected in the confused heaps.

Two pots are present. A slightly broken one near the entrance was photographed. The other is intact, about 14 inches in diameter and 8 inches deep, with a distinctive pattern around the rim. Clam shells are also present.

The custom of cave burial existed until recent times in this cave. Yu-waigiri was the name of the village before the present Tawema, and this cave was the burial ground for people of that village. There are said to be two

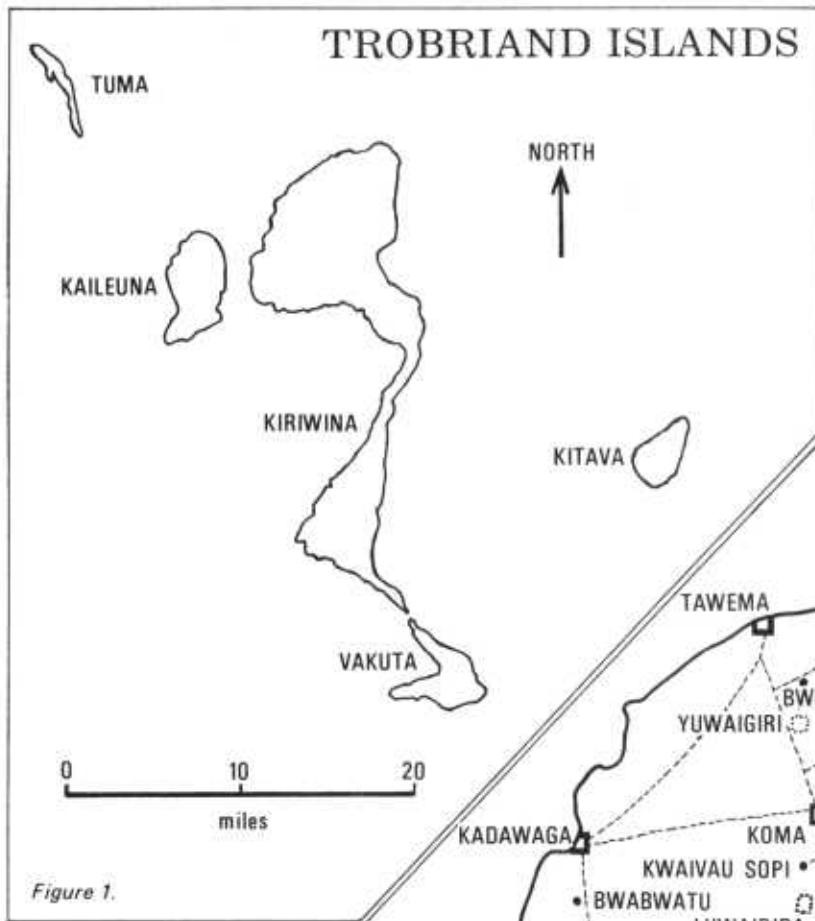


Figure 1.

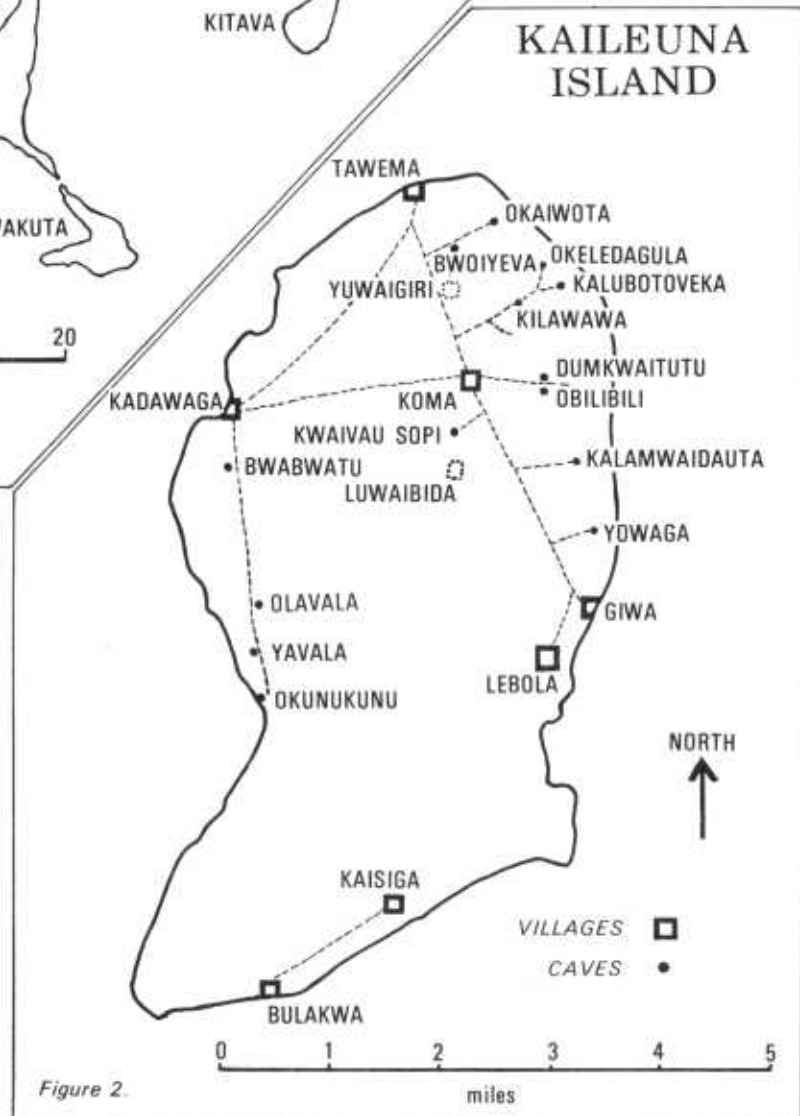
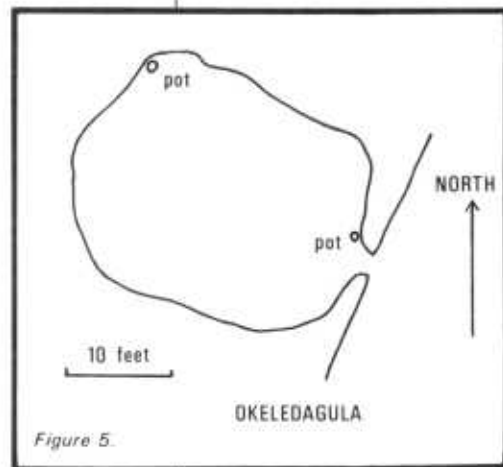
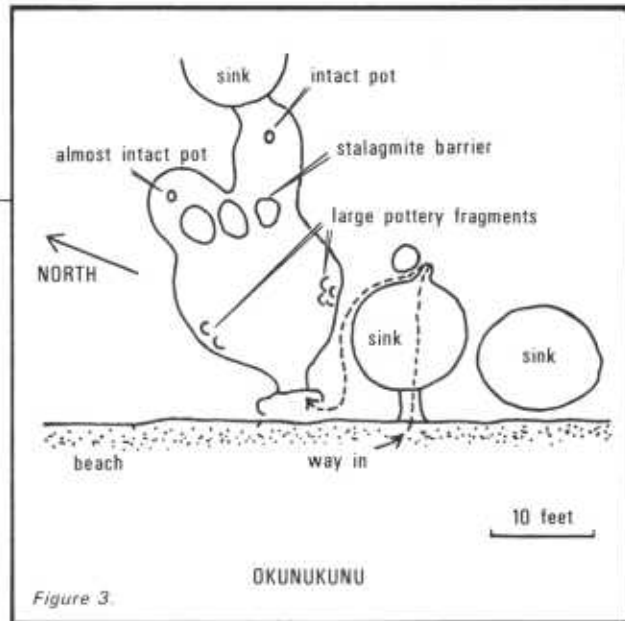
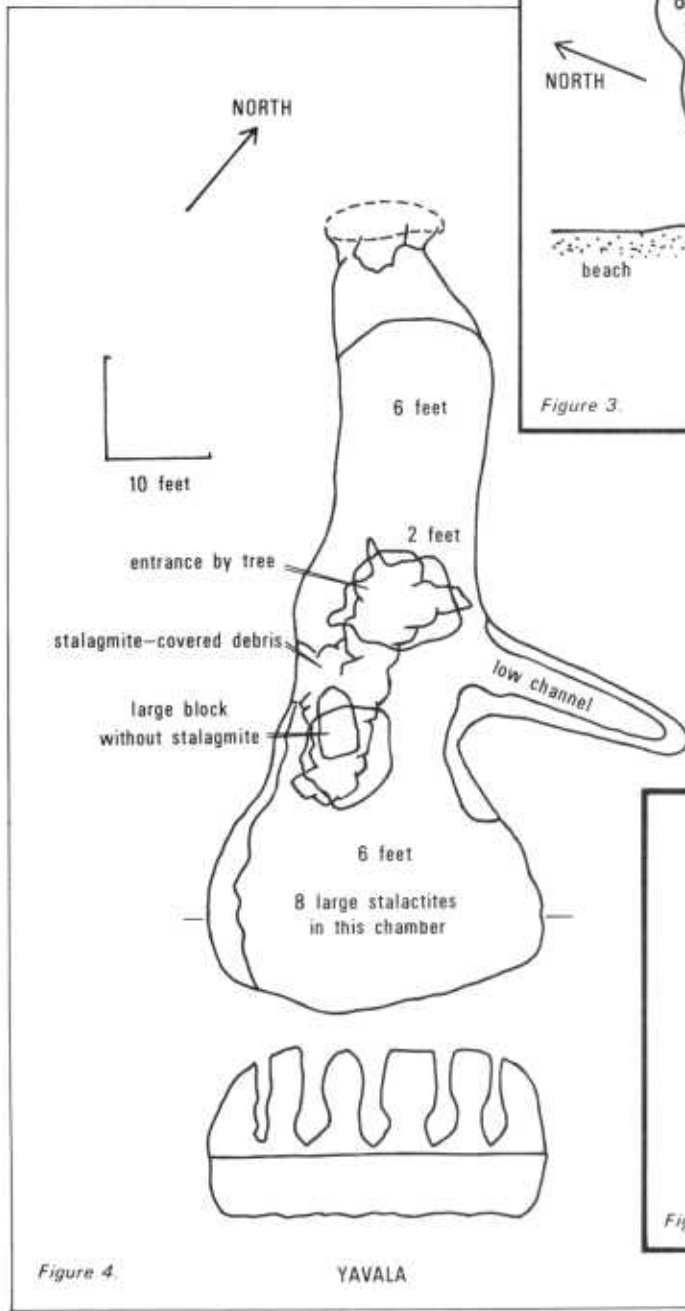


Figure 2.





men still alive at Tawema who witnessed cave burials in Okeledagula when they were children, but we were unable to meet them.

Okaiwota (Figure 6)

This cave is in extreme razor-sink-hole karst where the coral is not only sharp and "nasty", but is very overgrown and has also managed to become muddy and slippery. The roof of the cave is a small plateau a few feet above the surrounding country.

From the two cave entrances, one blocked by an artificial barrier, the cave descends to the south, and is divided by pillars and barriers into a number of chambers. Scattered bones occur, and there are two pots, one 18 inches diameter and one 12 inches, both containing bones.

To the east there is an extension of the cave in the form of a steep mud slope, with ceiling about 3 ft above the floor, leading down to water. A few bones have fallen down this cave, but do not appear to have been deliberately placed there.

Bwabwatu (Figure 7)

Bwabwatu Cave is the best and simplest stream passage cave so far discovered in the Trobriands. It is complicated by a collapse near the western end which divides the cave into two, almost three, portions. There are three cave entrances.

The southernmost cave is a single chamber, containing a lake of fresh water several feet deep. The floor of the lake is of rough coral blocks and there are no stalagmites, although the ceiling is completely encrusted with stalactites. The chamber is connected with what might be called the central chamber, which contains an isolated pool but is largely full of rockfall debris. The central chamber is notable for numerous well-formed helictites. The rest of the cave consists of a 180 ft long passage, full of water except near the entrance, and trending consistently at 60° as if joint controlled. The floor is very irregular, and the water reaches a maximum depth of 12 ft. Many fallen blocks of jagged coral lie beneath the water. The roof of the cave is almost entirely covered by speleothems.

Floating calcite was found in all parts of the cave on our first visit. When we returned after two days it did not seem so abundant in places where we had disturbed the water, but was plentiful in those parts of the cave that we visited for the first time. It seems probable therefore that our disturbance caused it to sink. Parts of the long passage contain soft mud under the water, in which an explorer sinks well above the ankles. This mud is in discontinuous patches, and could possibly result from accumulation of fallen "floating" calcite. There was no detectable water flow in the cave, and the still conditions could be conducive to the formation of floating calcite.

Many tree roots grow in the cave water, and above it. Some masses appear to grow through large thicknesses of stalagmite, but it is probably an accreted extra cast around the roots.

Stalactites are often stumpy, though still tapered at the bottom, and they do not reach water level. One very peculiar form of speleothem occurs in this cave, which we have called "globular speleothem". This consists of very spongy carbonate, in the form of globular or elliptical masses on the cave walls for perhaps 2 ft above the water level. The globules are so oriented that they look rather like a heap of yams or potatoes (Plate 3). It seems fairly evident that this growth is controlled in some way by fluctuating water levels, and probably marks the range of variation in water surface.

At the time of our visit the lowest parts were actually submerged about 2 inches under water, and below the bottom edge of the globular speleothem there was rough coral rock with no deposition whatsoever. The band of globular speleothem has grown out so that it projects into the water; it would seem that the lowest water level is maintained longest, and that maximum deposition takes place just above the water level.

One vertical pipe was seen in the roof of the long chamber. It was about 4 ft high and 12 inches in diameter, and partly filled with curved stalactites resembling inch-thick tree roots.

One black fish was seen in the water, and a few small flying things were seen deep in the long passage. They looked more like swifts than bats, but they could even have been large insects. There is no guano in the cave.

#### Bwoiyeva (Figure 8)

This is a small fresh water pool beneath an overhang, with the water surface only about 6 ft below the ground surface. The approach has been modified to facilitate water collecting, and a square stone wall 3 ft high presumably is to keep pigs away from the water.

#### OLAVALA(Figure 9)

This cave is merely an overhang under a cliff, leading to pools of brackish water.

#### Kalubotoveka (Figure 10)

The name means cave or house of the great man. The entrance to this cave is a small overhang about 12 ft across, from which several routes descend to lower chambers. An artificial barrier is present on the western side of the entrance chamber and on the eastern side is a small, blind chamber about 12 ft long containing the remains of a single burial. Several large clam shells occur in the cave and one large bailer shell about 15 inches long.

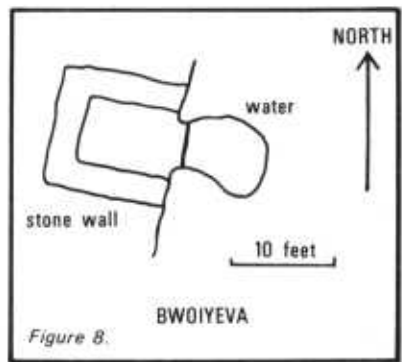
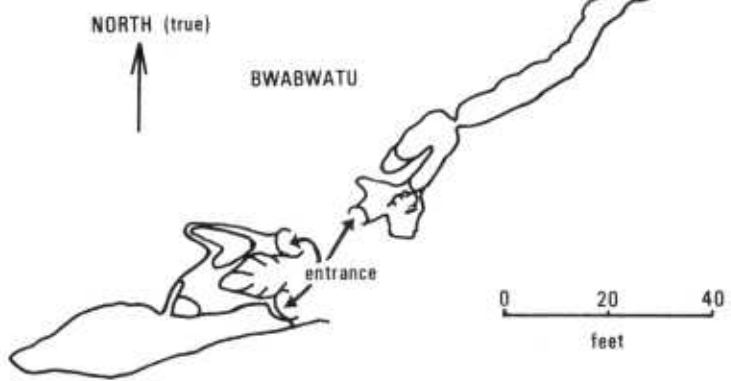
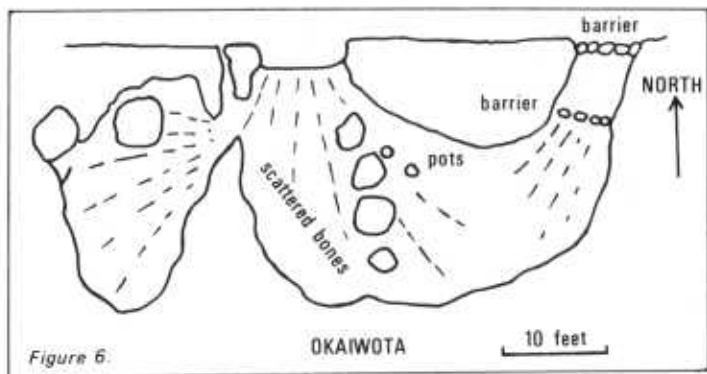
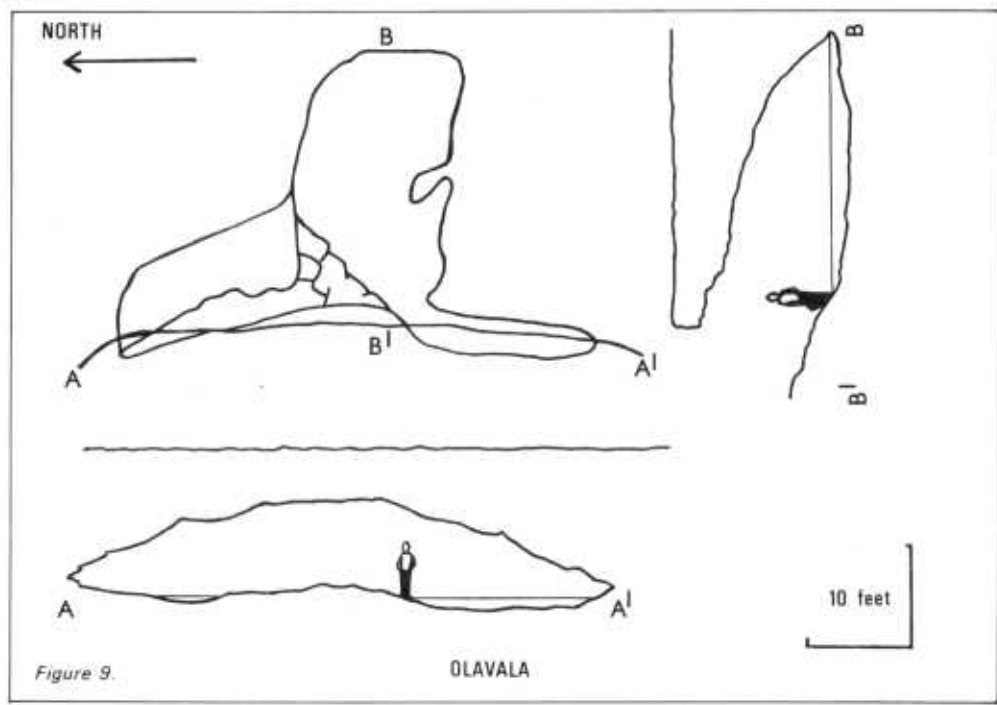


Figure 7.



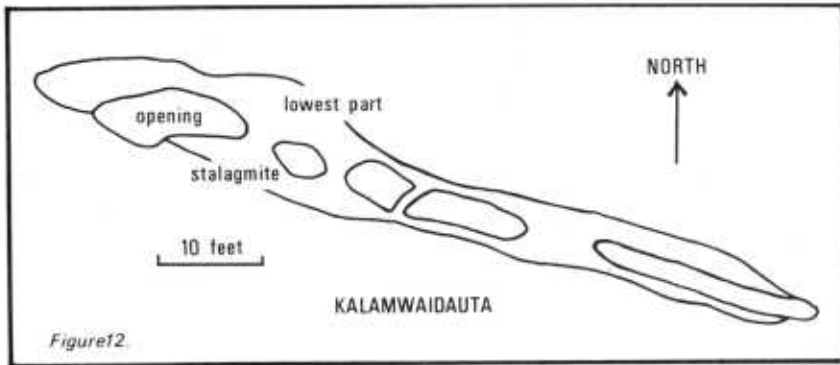


Figure 12.

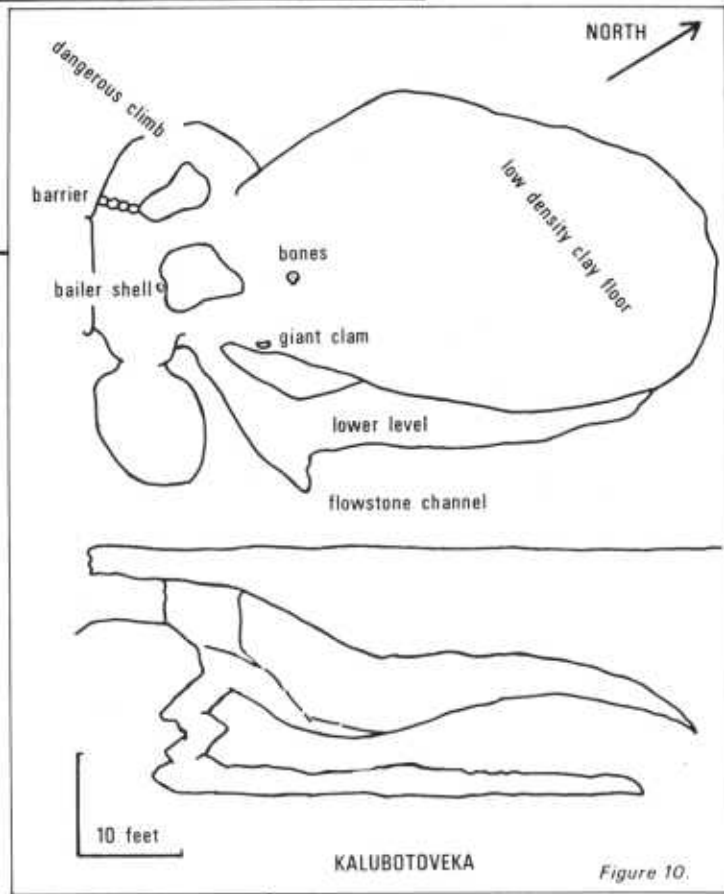


Figure 10.

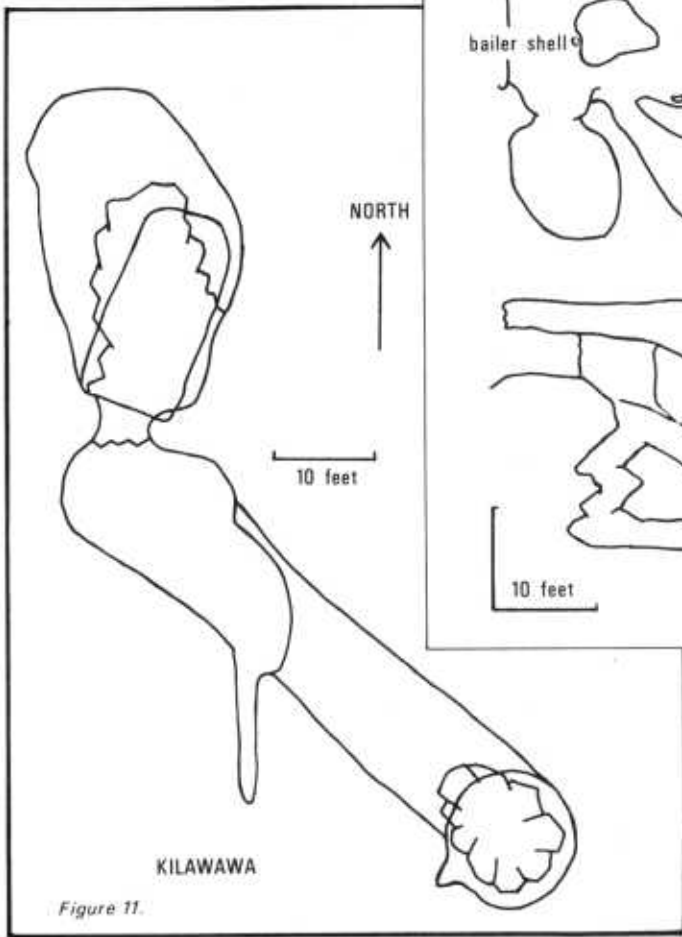


Figure 11.

At the lowest part of the main chamber there are many bones including 12 skulls, and many limb bones in parallel bundles indicating that they had been carefully placed in position and not merely thrown in or fallen from above. More bundles of bones and a few skulls occur on a small shelf on the west.

Beyond this lowest part of the chamber the floor rises again and is in fact a heap of low-density clay with a crust of banded clay about  $\frac{1}{2}$  inch thick and about  $\frac{1}{2}$  inch below the surface. The clay sinks several inches under the weight of an explorer crawling over it. There are some magnificent helictites in this part of the caves, and the cave is littered with bits of decoration, fragments of roof and occasional stalagmites.

A lower level of the cave is a crawl beneath heaps of rubble cemented by flowstone. It seems probable that the base of the rubble pile was washed out by streams, but the water is now at a lower level. There are bits of flowstone and channels testifying to the former flow of water at this level.

The cave is remarkable in that it has provided three more examples of the skulls with holes drilled in them, referred to in our earlier paper (Ollier and Holdsworth, 1968). We can offer no further explanation of how they came about beyond the statement in our earlier paper that the holes were made after death to remove the brains, thus speeding up the preparation for burial. This further instance shows that the custom is not confined to Kiriwina Island. The holes in the skulls here did not appear to be quite so neatly made as those we have seen earlier (Plate 4).

#### Kilawawa (Figure 11)

Wawa means heap of rubbish and might refer to the collapse material in the cave.

This cave is the remains of a stream chamber after extensive collapse. At the southern end is a roughly circular collapse, which leads north through a water-filled chamber about 15 ft wide with water 5 ft deep, to another heap of rubble beneath an oblong opening, beyond which is an overhang with some water.

The cave is said to be tidal, and the opening between the two sections is closed at high tide. The water is fresh. A black fish 3 inches long was seen.

#### Kalamwaidauta (Figure 12)

This is an east-west rift about 130 ft long and 25 ft deep made of a lot of coalescing sink-holes, with a few bridges across the top. There are many barriers to crevices and small holes, and there have evidently been many burials here. A few scattered bones remain, but no pots, and no skulls.

Probably this cave is too wet and exposed for preservation. The lowest part of the cave is soil covered, but elsewhere there is much collapse material. Many columns run from roof to floor. Many surface trees send thick roots down into the cave, and some trees that started growing on the cave floor have kinks in their trunks where they have grown around projecting parts of the cave walls.

#### Kwaivau Sopi (Figure 14)

The name of the cave means new water. It is a simple collapse cave of recent origin.

A man called Kwaiyoba was out cutting sticks for his yam garden, sometime between 1960 and 1963 (the date can be fixed because it was while a certain missionary was in residence). He was thirsty and asked the Gods for water. He fell over the edge and found water. This hole did not exist before, and the collapse must have occurred a fairly short time before its discovery, certainly not more than a couple of years. The rock is crumbly, coarse coral without joints or bedding planes. No trace of a lower cave was noticed. Only young scrub is growing on the debris heap. A clam shell appears to have been inserted upside down near the water.

#### Dumkwaitutu (Figure 15)

Kwaitutu means knee cap. It was explained by our guides that people hit their knee caps on the rocks here.

The cave consists of a main central passage connecting two sink-holes, a number of chambers connected by narrow and low crawls, and an extension to the west. The central passage has a soil and rock covered floor with few bones, and the chamber to the right of the entrance has scattered bones and broken skulls. The northernmost chamber is about 20 ft by 10 ft, but reaches a maximum height of only 3 ft 5 in. The floor is covered by rock fall, and there is no stalagmite. A large clam shell, ten skulls, bone bundles and scattered, half-buried bones occur in this chamber. The western chamber is separated from the central chamber by the remains of a barrier, and there are smaller barriers inside, as well as bone bundles and skulls.

#### Obilibili

This is a small chamber across the track from Dumkwaitutu, with the remains of a barrier across its entrance. Inside is a large clam shell containing bones, and other bones are scattered over the floor. An inner chamber 8 ft by 5 ft and 2 ft 6 in. high is separated by another barrier.

#### Yowaga

This cave was the burial ground for a former village called Luwaibida.

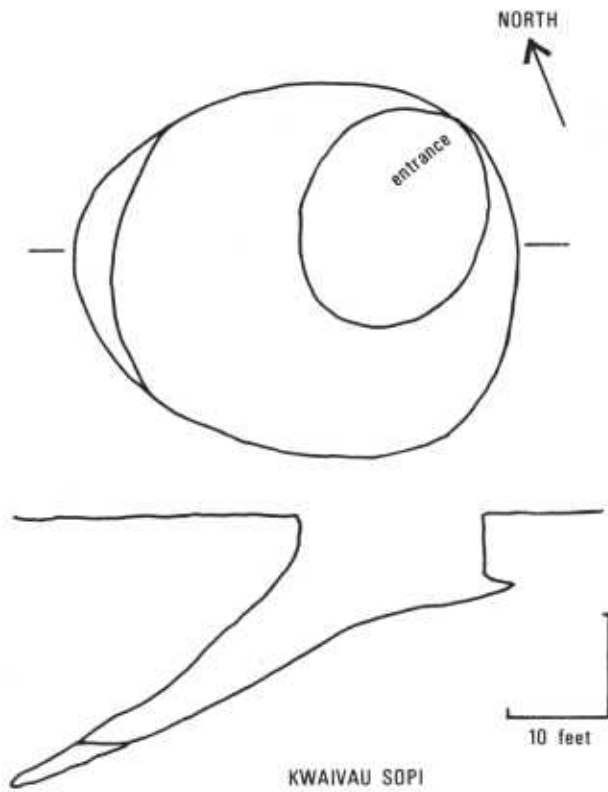


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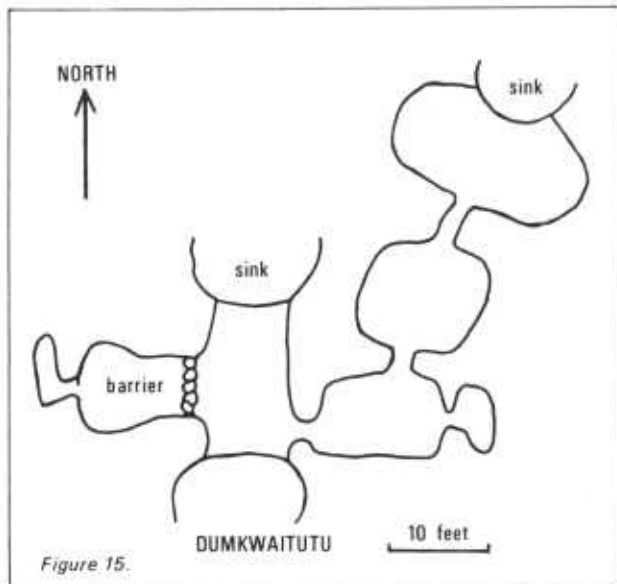


Figure 15.

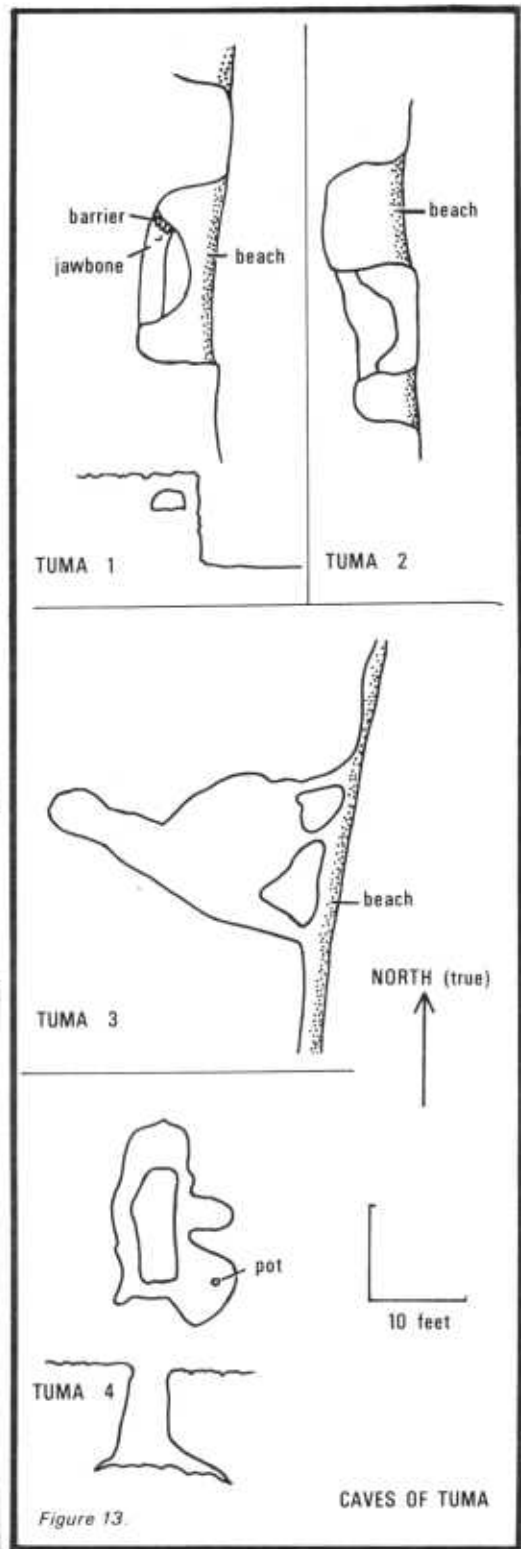


Figure 13.



now non-existent. The cave is a rift oriented NE-SW made up of a series of sink-holes joined together and open to the sky, with a few bridges. The cave is about 16 ft deep.

The cave walls are full of holes, pits and crevices. There is no stalactite or stalagmite whatsoever. This is a cave of consistently aggressive solutional action and no deposition. The lowest metre of the cave walls is much smoother than the higher walls, possibly indicating stream action or standing water at some stage in the development of the cave.

A few skulls, bone bundles and scattered bones are present, but as in Kalamwaidauta the environment does not seem suitable for the preservation of bones.

#### Namsasaila

This is the name of a place, thought to be a cave, and the name of a woman. She came from Misima and lived in a place on the coast near Tawema called Kadaka. One time she made herself invisible and the size of a child and lay down in the water. A woman named Namkilawawa came from Yuwaigiri to get water. As she bent over the water, Namsasaila entered her vagina. Namkilawawa later gave birth to Namsasaila, who grew up to become a cannibal who ate all the people. Her brother took her to Bwemwaga Island (which is close by). Afterwards she walked back to Tawema through the water, and went to live at the present spot which is named after her, and where she ate all intruders.

Some sicknesses, deaths and deformities are still blamed on this woman, and she still inspires fear such that no one would take us near the place.

The clan name of Namsasaila is Lukuba, her family or dala name Tobiyuwa. Her closest living relative in Tawema is a man named Tokwebola, and he is the only one who has been anywhere near the place.

#### CAVES OF TUMA

Since no people live on the island of Tuma, we were not able to find guides to lead us to caves as on our other Trobriand expeditions. All we could aim to achieve was a quick look around on our own, and hope to find caves to see if they held cave burials like those found elsewhere, to confirm that similar customs prevailed on Tuma in the past. We arrived on the Administration boat, the "Pearl", on the west side of the island, which is the low side, and walked across the island to the east shore where there is a somewhat higher rim, though the maximum height of the island appears to be only about 20 ft. The track across the island leads to a long beach. We elected to explore a likely-looking mass of coral about half a mile to the south, where we found the following four caves (Figure 13).

Tuma 1. The northern end of the coral cliffs is undercut by a coastal visor in many places. Just beyond the first visor is a small cave only about 10 ft long, opening at both ends to embayments in the cliff, and being about 8 ft above the beach. This cave had the remains of a barrier at one end, and a few human bones, including a jaw bone inside.

Tuma 2. This is about half a mile south of Tuma 1. It is about 30 ft long, running in from the beach in a north-westerly direction, and having several entrances leading to a chamber about 15 ft across. The cave contained numerous bones and shells.

Tuma 3. This is a small tunnel about 10 ft long, linking two small embayments in the cliff on a ledge about 10 ft above the beach. It cannot be seen from the beach and is easiest approached from above. This cave has a lot of bones and is particularly interesting because of the large number of skulls it contains. Fragments of a carved wooden bowl were also present.

Tuma 4. This is a slot-like rift about 12 ft long and 10 ft deep with flaring sides overhanging various recesses. Bones are again present, including a skull, and there is also a very unusual pot, 15 inches in diameter, and many pottery fragments, some partially buried.

Thus we see in the Tuma caves the bones, barriers, pots and shells indicating very similar customs of cave burial that we found elsewhere.

In addition to these caves, we examined two features important in legend that sounded as if they might be caves and which the crew of the "Pearl" were able to show us. The first was a sacred well called Gilewa, which turned out to be a chunk of coral with a small cylindrical hole about eight inches in diameter and full of water, together with some associated stones. Briefly, this is where newly-arrived spirits of the dead wash themselves.

The second feature was a hole called Ogegela where offerings were made. This turned out to be a small blowhole on the southern tip of the island. Offerings of food, betel nut or cigarettes are made to ensure good fishing, good weather, etc. The offerings are removed eventually by the sea. These two features and their legends are described more fully elsewhere (Ollier, Holdsworth and Heers, in press).

#### GEOMORPHOLOGY

Like the other islands in the Trobriand group, Tuma and Kaileuna were once coral atolls and have been uplifted. The rims of the islands are the old reef, and the lagoon is represented by the low, swampy parts of the islands. Like Kiriwina and Vakuta, but unlike Kitava, there was only one uplift in Tuma and Kaileuna.

The Tuma caves are very small and provide little information of geo-

morphic value, but some of the Kaileuna caves are of considerable interest. When coral islands are of sufficient size they hold a lens of fresh water, and solution tends to be concentrated at the surface of the watertable, where primary caves are formed. Subsequently these may be modified by collapse and the growth of speleothems. Such appears to be the origin of the Laileuna caves.

The lens of fresh water is evident in many of the caves, and also at the shore, where springs of fresh water emerge at many points along the beach. At Kadawaga a small pool has been walled off from the sea by coral blocks, here it is possible to bathe in fresh water at low tide, in the presence of many tropical fish which swim equally happily in either fresh or salt water and often make their way into the caves. At high tide the pool becomes salty, and we are told that water level rises in some of the caves though we have not seen this ourselves. Some of the cave waters very close to the sea are slightly brackish.

That the caves initiated near the watertable seems clear from their present position and the fact that many still contain water. Roof collapse and much flowstone deposition has effectively hidden the early form of most caves, but some clues remain. Phreatic spongework, probably formed in the early stages of cave development, has been seen in several caves, especially Okunukunu. No initial cavities retained from the time when the island was still a reef have been detected, and the caves appear to be normal karst caves.

Bwabwatu is a superb example of a first generation cave, oriented along a line, presumably a joint. Such linear caves are rare in the Trobriands, the only other example being Tunwalau on Kiriwina, apart from the open rift type of cave. The roof and walls are almost completely covered with flowstone deposits, mostly active, but these stop abruptly at water level. Below the water the rock is very sharp and jagged, and is probably still being corroded for most of the time. The "globular speleothem" described earlier indicated fluctuating water levels, with deposition entirely above the water. One strange feature, if the cave waters are still aggressive, is the presence of floating calcite and the deep ooze in some parts of the cave which may be derived from floating calcite. We do not have enough observations to speculate usefully any further on this point.

Kwaivau Sopi is an interesting collapse mainly because it took place so recently. It is not water filled, but in size and plan shape it is very like the examples of cenotes recorded from Kiriwina and Vakuta, and supports the earlier speculation that these were formed by collapse.

None of the caves are old sea caves, but the abundance of caves near the sea, especially small ones, suggests some connection between near-shore location and the formation of small caves. Possibly flow of groundwater to the sea is better organised near the edge of the island, with a less canalised



Plate 4. Skulls with holes, thought to be made for removal of brains. Kalubotoveka.



Plate 5. Typical clam shell burial. Kalubotoveka.



Plate 6. Typical crypt burial, with skull and bone bundle partly concealed behind coral block barrier. Dunkwaitutu.

and more general flow in the inland coral. It is also possible that repeated changes in salinity when the caves were being formed, just as some caves experience at the present-day, could have increased solution rates. No precise mechanism is known for this, but we suggested previously that changes in salinity may be in some way responsible for the formation of Vakuta caves.

Several Kaileuna caves are open rifts, that is, long narrow slots, open to the sky in many places. Like Bwabwatu, these are probably located along vertical joints. They are generally wet, and Yowaga is notable for the complete dominance of solution; no speleothem deposits are present at all, and much of the cave walls are careous suggesting much corrosive solution. Why the waters around this cave should be especially aggressive is not clear. This cave is also notable for having a smoother surface on the bottom three feet of the cave walls, suggesting a different water regime here, presumably standing water or a stream, the change from smooth to careous surface marking a former watertable.

Cave fill of clay and other washed-in debris is not usually extensive, but there are considerable deposits in Kalubotoveka and Okaiwota. Collapse material is very common and may include rubbly material as at Kwaivau Sopi, or large blocks. Speleothem deposits are plentiful and varied; helictites are common, but not straight straws; stalactites are abundant and very varied in form, but roughly encrusted ones are more common than smooth ones, and many are rather broad for their length. A number of bulbous stalactites are found, especially over water. Stalagmites are not especially plentiful; some stalactites form over water so cannot have a matching stalagmite, but in other places it appears that trickling water deposits all its lime before dripping or evaporating. Floating calcite was seen in Bwabwatu. In suitable places quite large columns can form. Gourds and flowstone dams are rare; a few were seen in the flowstone channel in the lower part of Kalubotoveka. Shawls are very rare and poorly developed. An unusual kind of deposit is the "globular speleothem" of Bwabwatu, which is in some way related to changes in water level.

The caves are evidently all young and of one generation. They have been formed close to the present watertable, and modified by collapse, speleothem formation and cave fill.

#### BONES AND POTS

The caves have been used extensively for interment of bones, as on the other islands in the group. Roughly, the custom was to bury the dead in the ground until the flesh decomposed, and then dig up the bones and inter them in a cave, sometimes in a pot or a clam shell (Plate 5). This accounts for the presence of bone "bundles", and also for the scarcity of small bones such as finger bones and ribs, which presumably decay faster or get lost during the transfer. Individual interments were often walled off to make a

small "crypt", and the "barriers" can still often be recognised, though many have collapsed by now (Plate 6).

The only exceptional burials appear to relate to those with holes in the top of the skull found in Kalubotoveka. Briefly, these are thought to originate as follows. If a very great man dies the funeral honours would be too expensive if protracted for the entire period of burial in the ground, so the process is speeded up. Instead of removing flesh by the slow decomposition following burial, the mourners stripped it off with knives or axes and the bones were boiled or smoked ready for interment. The brains present an obstacle to this otherwise efficient process, and holes were drilled in the skull to let out the brains.

The custom of cave burial persisted on Kaileuna longer than any other island in the group, so far as we can tell. Two old men in Tawema can remember seeing cave burials when they were children; unfortunately we were not able to interview them. The bones were placed in Okeledagula Cave, which was the burial ground for the people of Yuwaigiri, a village now replaced by the present Tawema. Similarly, Yowaga was the burial cave for a former village called Luwaibida, but we could not find out when it was last used.

Since the custom of cave burial was maintained until very recent times, it is a surprise that all the pottery is old. Peter Lauer and Brian Eggloff, two research scholars in the Department of Prehistory, Australian National University, Canberra, who have made extensive studies of the pottery of the Trobriand region, have examined the photographs of the pottery and are sure that it is all old, probably originating in the vicinity of Goodenough or Wanigela, and it is quite different from present-day Amphlett pottery (used at present in the Trobriands) and from pre-contact Amphlett pottery.

The old pottery is similar in general character to that found in other Trobriand caves, though there are several forms present and some fragments, particularly the pot in Tuma 4, with rather unusual features. It seems probable therefore, that on Kaileuna and Tuma, as elsewhere in the Trobriands, many of the cave burials are the relics of earlier inhabitants who were displaced by the present Trobrianders who, despite sharing the general habit of cave burial, had different contacts; they obtained their pottery from a different source, and did not use pottery in cave burial. The age of the old pots has not yet been determined; informed guesses seem to range from 500 to 1,500 years, so perhaps 1,000 years is a reasonable rough estimate. Eventually the discovery of pottery in stratified and dateable deposits should enable firm dates to be derived.

#### MEGALITHS

Elsewhere in the Trobriands we have found a close association between caves and megaliths (see references), but this was not so on Kaileuna. Some stone structures were found (Ollier, Holdsworth and Heers, 1971) and two of

them have associated legends of people emerging from holes in the ground, but not from caves.

According to legend, at Bwadiyagemu, a girl of the same name and her brother were going to emerge from a hole, but the brother came out first and blocked the hole with a large slab of rock, and the girl is inside still. We raised this slab, but there was no cave underneath.

Owaigiri is another "bwala" or place of emergence, and is marked by a roughly cubic block of coral over three feet high. We could not move this, but it is most unlikely that there is any cave entrance beneath. Nearby are some other, smaller, standing stones called Okabunuvateta. According to legend, these were used to lean on by the first people who came out of Owaigiri. When they were newly emerged they could not open their mouths, and when wild animals came they could only shake their heads vigorously. Finally one of the group made a knife out of pearlshell and cut the lips of his companions, enabling them to speak. The name of the family that originated in this way is Kapatu, which means closed lips, and the present members live on the island of Nuwata.

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