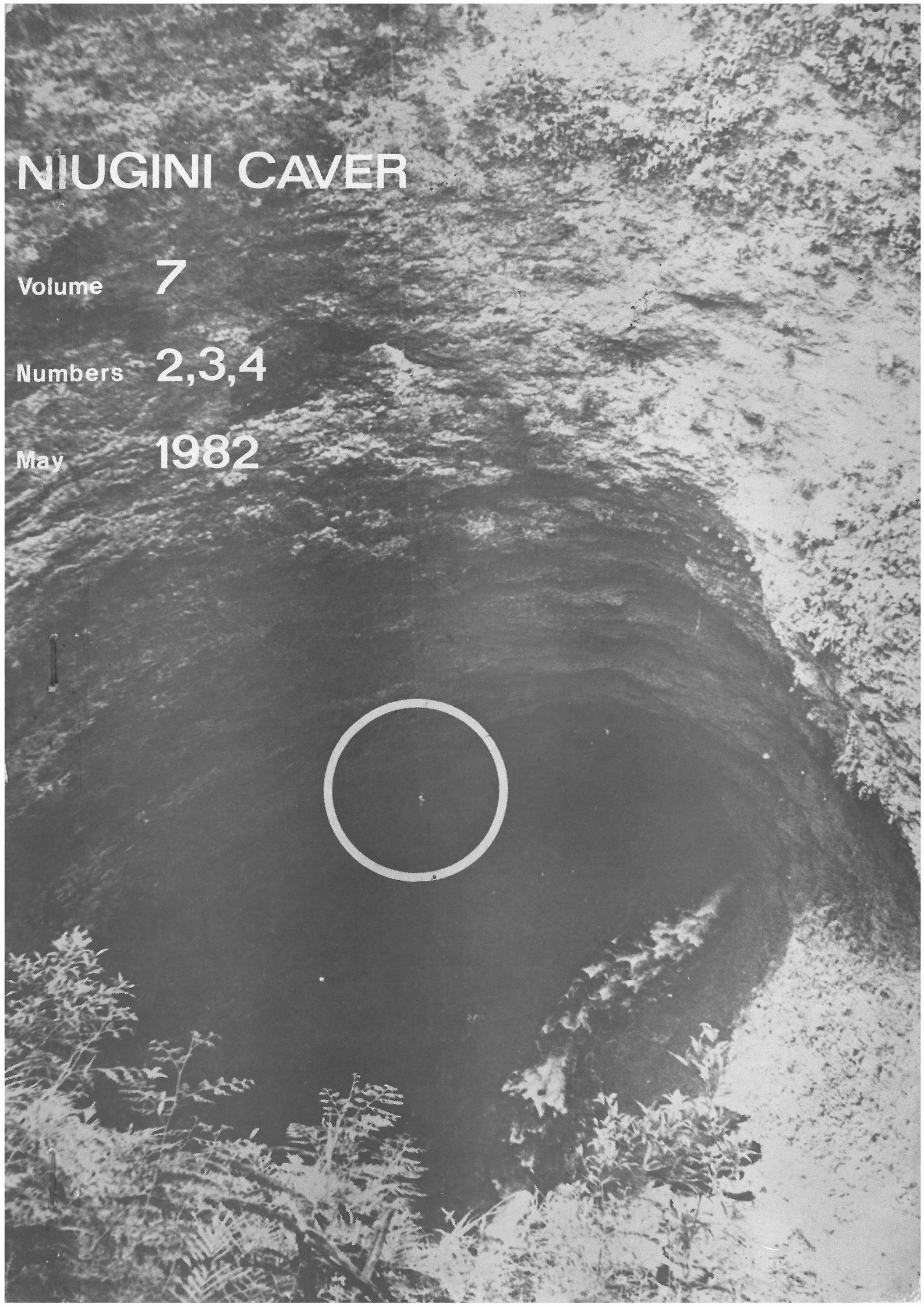
NIUGINI CAVER

Volume 7

Numbers 2,3,4

May 1982



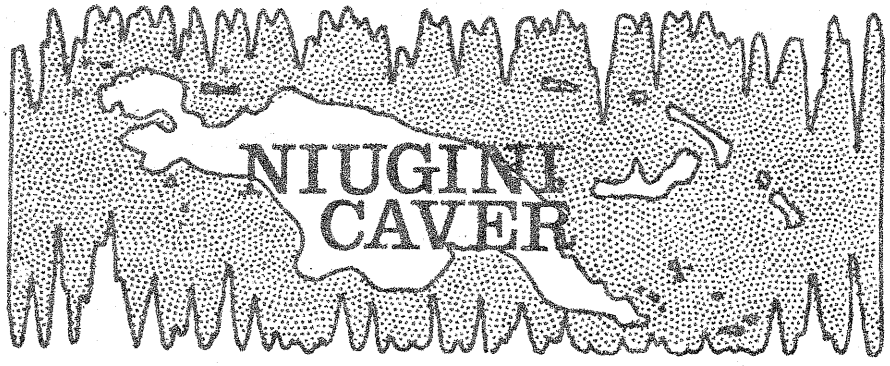
Volume 7

Numbers 2,3,4

May,1982

Quarterly

K5.00 per volume
K1.25 for number 1
K3.75 for numbers 2, 3,4 (together)



Niugini Caver is the publication of the Papua New Guinea Cave Exploration Group, an informal association of persons engaged in speleology in Papua New Guinea.

Editor: Malcolm Pound,
P.O. Box 1824,
Port Moresby,
Papua New Guinea.

P.O. Box 102,
Kainantu,
Papua New Guinea.

For new editor, see page 27.

Maps: Dave Pease

Typing: Alison Pound, Ian Wood

Electronic Stencils: Geoff Francis,
P. N. G. Printing

Printing: S. I. L. Print Shop,
P. N. G. Printing

niugini caver — contents

* * *

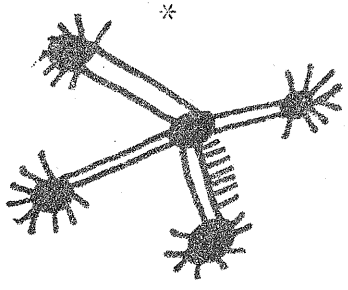
Cover Photographs

Front Cover - Nare Doline
This spectacular photograph of Nare Doline in the Nakanai Mountains of East New Britain shows a member of the 1980 French Expedition abseiling the 300 m deep entrance.
Photograph: FSS/J.F. Pernette.

Back Cover - Atea Kananda
This photograph shows Malcolm Handel in Deep Throat, far into the Atea Kananda. This photograph also appeared on the back cover of Niugini Caver Volume 7 Number 1, March 1979.
Photograph: Randell King.

Five more photographs of Papua New Guinea caves are to be found on pages 83 and 84.

* * *



niugini caver — editorial

This will be the last issue of Niugini Caver to be produced by Malcolm Pound. On the 21st May, 1982, I will be leaving Kainantu and returning to Port Moresby for a short period of up to six months and then off to Australia.

Due to many problems, mainly the relocation of the Editor from Port Moresby to Kainantu in 1980/81, this is the first issue since March, 1979. This issue covers the period since March, 1979 and is covered by the 1979 subscriptions. This issue is equivalent in size and content to three normal issues. I apologize profusely to those subscribers who have waited patiently since 1979 to receive the results of their subscription. I certainly feel that this number is worth waiting for.

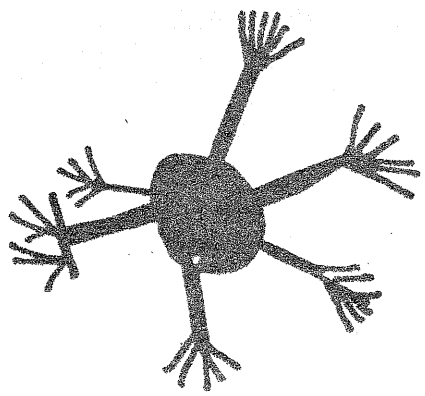
The new Editor will be Geoff Francis who works for the Geological Survey Division of the Department of Minerals and Energy in Port Moresby. Geoff will be assisted by John Wyeth who is at the Institute of Applied Social and Economic Research and Bernard Pawick who is at the University of Papua New Guinea. I will also assist while in Port Moresby. Due to a rearrangement at the Port Moresby Post Office, the address of the Papua New Guinea Cave Exploration Group has become:-

Papua New Guinea Cave Exploration Group,
P. O. Box 1824,
Port Moresby,
Papua New Guinea.

The new editor plans to produce two issues a year for which the subscription will be K8.00 per year. This will be due in January,1983 for Volume 8. An extra number of Volume 7 will be published in October, 1982 and will be sent to all current subscribers.

The new editor requests suitable material for future editions of Niugini Caver from all Papua New Guinea and overseas cavers. Good quality photographs of Papua New Guinea caves and karst are also requested.

Cavers will notice from this number that Papua New Guinea no longer holds the record for the deepest cave in the Southern Hemisphere. This record has just been taken by New Zealand. The editor urges all local cavers to attempt to regain this record.



M D Pound

THE GREATEST CAVES OF PAPUA NEW GUINEA (DECEMBER 1980)

R. M. Bourke*

Four years ago I published lists of Papua New Guinea's greatest caves as then known (Bourke, 1977). This information has now been condensed and revised to incorporate recent discoveries and surveys. The lists given are up to date at the end of 1980.

All figures quoted are surveyed ones, except for some river flows and doline dimensions. Generally figures given by the explorers have been accepted, although the depth and pitch length of Tina Bu Tem has been reduced to conform to the convention of recording depth from the lower side of the doline lip rather than the higher side. The length of Irukunguai has been reduced following measurements off the survey.

Deepest Caves

There are now 46 caves which have been surveyed at 100m deep or more (Table 2). There were 24 caves in this category 4 years ago. Bibima (494m) is still the deepest, as it has been since 1972. Courbon (1979) lists 69 caves as 600m deep or greater in the world, so Bibima does not feature at all prominently on a global scale.

Longest caves

There are 22 caves with a surveyed passage length of 1000m or more, compared with 11 caves 4 years ago (Table 3). Courbon's (1979) list indicates that Atea Kananda (30.5km) was the 23rd longest in the world then and the longest cave outside of the U.S.A. or Europe.

Longest pitches

There is no shortage of long pitches. The minimum length for inclusion has been increased from 50m to 60m because of the large number of long pitches. Twenty-six pitches of 60m or more have been surveyed compared with 19 in 1979 (Table 4). The entrance pitch of Minye (270m) would be the 12th longest in the world based on Courbon's data.

Largest surface karst features

Large surface karst features have been variously described as dolines, doline-avens, uvalas and pits. Fourteen of these have been recorded with volumes of a million cubic metres or more (Table 5). Measurements used to derive the volumes of the giant karst features are at times approximate because of the nature of the features. Hence the volumes quoted are sometimes approximate. The volumes of Luse, Ora and Minye in the Nakanai Mountains of New Britain considerably exceed that of any other reported giant karst feature in the world (Courbon, 1979). Only the giant pits of Venezuela and Mexico are of the same order of magnitude as Papua New Guinea's biggest.

Large underground chambers

There are four underground chambers in Papua New Guinea with a volume of 0.7 million cubic metres or more (Table 6). The chamber in the cave near Koripobi village on Bougainville with a volume of 3.5×10^6 cubic metres is the equal second largest in the world (Courbon, 1979).

* P. O. Box 384, Kainantu, E. H. P., Papua new Guinea.

Highest caves

Six caves with entrances at 3500m a. s. l. or higher have now been recorded (Table 7). Other caves between 3000m and 3500m have been explored in the Saruwaged and Muller Ranges. In 1976, the highest explored entrance was only 2990m. Of the six caves, only Kege Mur is a significant one. It is 182m deep and has an entrance shaft of 168m. On a global scale higher caves than in Papua New Guinea have only been recorded in Kashmir (one cave) and in Peru (Courbon, 1979).

Large Underground Rivers

The limited available data is given in Table 8. That some of the greatest underground rivers in the world are in Papua New Guinea is obvious from the Table. Howevere, until more flow measurements rather than estimates are made, this cannot be more properly documented. It should be noted that the figures in Table 5 refer to cave rivers rather than springs or resurgences that cannot be explored.

Discussion

The number of significant caves in Papua New Guinea has increased greatly over the last four years, mainly as a result of exploration and surveying done by expeditions from overseas. In fact the number of caves over 100m deep and caves over 1km long has doubled. Papua New Guinea retains the cave record for all categories in the Southern Hemisphere, except for the highest cave entrance. On a global scale, many of our caves are very significant. Papua New Guinea has the largest doline in the world; some of the longest pitches, highest caves, largest underground chambers and largest underground rivers; and the longest cave outside the U.S.A. or Europe.

Despite the effort directed at finding really deep caves, none have been explored which are significant on a world wide basis. The deepest was explored by Papua New Guinea based cavers rather than by expeditions from overseas with massive resources who came with the specific objective of exploring very deep caves. Still it is worth remembering that the deep caves of Europe and Mexico were explored only after prolonged effort.

In my previous article (Bourke, 1977) I suggested that the highlands was where most of the big systems appeared to be and would be found. This has been the thinking of most commentators on Papua New Guinea caves, although this was a reversal of my earlier position that lower altitude areas (500 - 1500m) on New Britain, New Ireland and Bougainville had much potential. The 1980 French expedition has proven that the lower altitude areas do have great potential. Five of the six deepest surveyed caves in Papua New Guinea are to be found in the Nakanai Mountains of New Britain, as are five of the nine caves over 2km long, the two longest cave pitches, the four largest measured dolines or uvalas, three of the four largest underground chambers, and five of the seven largest underground rivers. It depends on where you look and how hard, it seems.

Recording

Problems are arising because various groups are using different systems to record cave dimensions. For example, the British tend to take cave depth from the very top of the doline; the French and Queensland/Papua New Guinea cavers take it from where vertical gear is needed in the doline; Sydney based cavers do not include any of the doline in recording cave depth. The French record total cave length as including

slope length of shafts and inclined passages whereas other groups seem to use length as projected on to a horizontal plan. To illustrate with an example: The French expedition recorded Minye as 366m deep, 3400m long and with a pitch of 270m (Fantoli et al., 1979). The British may have recorded it as 506m deep (a new Papua New Guinea record), 2700m long and with a 410m pitch (an equal world record).

It is suggested that the recording system recommended by the International Union of Speleology Commission on Large Caves be used by all speleologists in Papua New Guinea (I.U.S.,1979).

Acknowledgements
I am grateful to the following who provided unpublished data: Dave Brook, Jim Farnworth, Gerald Favre, Allan Goulbourne, Julia James, Richard Maire, Daniel Martinez, Hans Meier, Jean Pernette, Noel Plumley and Kevan Wilde.

References

Bourke, R. M. (1977). The greatest caves of Papua New Guinea as at December, 1976. Niugini Caver 5(1): 3 - 17.

Courbon, P. (1979). Atlas des grands gouffres du monde. Editions Jeanne Laffitte, Marseille. 202pp.

Fantoli, J. L., Goyet, X., Maire, R., Martinez, D., Poggia, F. and Savournin, G. (1979). Nouvelle Guinee 78. Federation Francaise de Speleologie, Paris. 130pp.

International Union of Speleology (1979). Report of the commission on large caves. Caving International Magazine 3: 33-36.

* * *

Table 1. Abbreviations used in the Tables

GCC	Goroka Caving Club (mostly F. Parker's exploration)
NSCEG	North Solomons Cave Exploration Group
PNGCEG	Papua New Guinea Cave Exploration Group
PMSS	Port Moresby Speleological Society
PNGCEG 75	Last significant exploration in cave was by PNGCEG members in 1975
E.H.P.	Eastern Highlands Province
N. B.	New Britain
N. I.	New Ireland
S. H. P.	Southern Highlands Province
W. S. P.	West Sepik Province
W. P.	Western Province
1965 Stars	1965 Australian Star Mountains Expedition

New Britain 72-73	1972 - 73 University of Queensland Speleological Society New Britain expedition
1973 NSRE	1973 Niugini Speleological Research Expedition to the Muller Range (Australian/New Zealand/Papua New Guinea)
NG 75	1975 British Speleological Expedition to Papua New Guinea
1975 NISE	1975 New Ireland Speleological Expedition (Australia/Papua New Guinea)
1976 NISE	1976 New Ireland Speleological Expedition (Australia/Papua New Guinea)
Muller 76	1976 Muller Range Expedition (Australian/Papua New Guinea)
Atea 78	1978 Australasian Muller Range Expedition (Australian/New Zealand/ Papua New Guinea)
NG 78	1978 British Speleological Expedition to Papua New Guinea
FFS 78	Federation Francaise de Speleologie Nouvelle Guinee 78
Spanish 78	Expedicion Espeleologica Papua-Nueva Guinea 1978
Swiss 79	Expedition Speleologique Suisse Papouasie Nouvelle-Guinee ete 1979
FFS 80	Federation Francaise de Speleologie Nouvelle Guinee 80

* * *

EDITOR'S NOTES ON NEW CAVE RECORDS

According to the Papua New Guinea Post Courier newspaper of 5th January, 1982, the deepest cave in the Southern Hemisphere is now Nettlebed Cave at Mount Arthur near Nelson in the South Island of New Zealand. A team of cavers recently pushed this cave upwards from the efflux to a height of 616m, which is 122m greater than Bibima Cave in PNG.

The British Speleological Expedition to Sarawak, Mulu 80, is described in Caving International Magazine No. 12, July 1981 as having discovered a new world largest underground chamber. This is described as 700m long by 300m wide and never less than 70m high. The volume is at least 12 million cubic metres!

* * *

Table 2. Deepest caves in Papua New Guinea

	Cave	Locality	Explorers	Depth(m)
1.	Bibima	Porol Escarpment, Simbu Province	PNGCEG 72	494
2.	KA II	Nakanai Mountains, N.B.	Swiss 79/ FFS 80	459
3.	Bikpela Vuvu	Nakanai Mountains, N. B.	FFS 80	414
4.	Nare	Nakanai Mountains, N.B.	FFS 78/ FFS 80	400*
5.	Kavakuna	Nakanai Mountains, N.B.	FFS 80	392
6.	Minye	Nakanai Mountains, N.B.	PMSS 68/ FFS 78	366*
7.	Terbil Tem	Fault Valley, W.P.	NG 75	354
8.	Arem Tem	Olsobip, W.P.	NG 78	334
9.	Camp III Hole	Fault Valley, W.P.	NG 75	330
10.	Kanada Heiowa Heia	Muller Range, S.H.P.	1973 NSRE	314
11.	Uli Guria	Muller Range, S.H.P.	1973 NSRE	314
12.	Atea Kananda	Muller Range, S.H.P.	Atea 78	300
13.	Liklik Vuvu	Nakanai Mountains, N.B.	FFS 80	288
14.	Darua Muru	Porol Escarpment, Simbu Province	PNGCEG 75/ Spanish 78	230*
15.	Luse	Nakanai Mountains, N.B.	FFS 80	224
16.	KA VI	Nakanai Mountains, N.B.	FFS 80	204
17.	Lemerigamas	Lelet Plateau, N.I.	1976 NISE/ Swiss 79	203
18.	Langlang Tem	Fault Valley, W.P.	NG 75	200*
19.	Uli Eta Riya	Muller Range, S.H.P.	Atea 78	200*
20.	Tina Bu Tem	Nong Valley, W.P.	NG 75	198
21.	Hadia Yanea-bogairi	Muller Range, S.H.P.	Atea 78	195*
22.	Oravunana	Obura, E.H.P.	FFS 78	190
23.	Gebemi Tem	Kaban Range, W.P.	NG 78	183
24.	Owillfore Tem	Feramin, W.S.P.	NG 75	183*
25.	Kege Mur	Mt. Kege, Simbu Province	Spanish 78	182

	Cave	Locality	Explorers	Depth(m)
26.	Uli Ui	Muller Range, S.H.P.	1973 NSRE	182
27.	Agim Tem	South of Tifalmin, W.S.P.	NG 75	167
28.	The Sting	Hindenburg Range, W.P.	NG 75	158
29.	Girtoil	Hindenburg Range W. P.	NG 75	156
30.	Yunamare	Obura, E.H.P.	PNGCEG 78/ FFS 78	156
31.	Fungi Tem	Mt. Wamtakin, W.S.P.	NG 75	142
32.	La Buum Tem	Hindenburg Range, W.P.	NG 75	138
33.	Selminum Tem	Hindenburg Range, W.P.	NG 75	137
34.	Barananomba	Yonki, E.H.P.	GCC 74/ PNGCEG 78/ FFS 78	134
35.	Maig Mur (Mebile)	Duglpagl Simbu Province	PNGCEG 73/ Spanish 78	132
36.	Uli Mulmulum	Muller Range,S.H.P.	1973 NSRE	130
37.	Uli Eya Kolo	Muller Range,S.H.P.	Atea 78	124
38.	Ariyorba Tem	Mt. Wamtakin, W.S.P.	NG 75	122
39.	Askenbu Tem	Olsobip, W.P.	NG 78	120*
40.	Kukuwa	Kuraro Valley, Bougainville	NSCEG 78	119
41.	KA V	Nakanai Mountains, N.B.	FFS 80	113
42.	Poypun	Nakanai Mountains, N.B.	FFS 80	110
43.	Vuvu II	Nakanai Mountains, N.B.	FFS 80	110
44.	Lowatkusmeri Lemet Silot	Lelet Plateau, N.I.	1975 NISE	102
45.	Obungeram	Baining Mountains, N.B.	PNGCEG 75	102
46.	Toroku Nantaut	Manetai area, Bougainville	NSCEG	100

* Exploration incomplete.

It is interesting to know that the deepest cave in the world is currently Jean Bernard (reseau) at Samoens, Haute-Savoie, France with a depth of 1455 metres.

Table 3. Longest caves in Papua New Guinea

	Cave	Locality	Explorers	Length(m)
1.	Atea Kananda	Muller Range, S.H.P.	1973 NSRE/ Muller 76/ Atea 78	30 500
2.	Selminum Tem	Hindenberg Range,W.P.	NG 75	20 500
3.	Hadia Yaneabogairi	Muller Range, S.H.P.	Atea 78	8 500*
4.	Liklik Vuvu	Nakanai Mountains, N.B.	FFS 80	6 200
5.	Nare	Nakanai Mountains, N.B.	FFS 80	4 500*
6.	KA II	Nakanai Mountains, N.B.	Swiss 79/ FFS 80	3 500
7.	Minye	Nakanai Mountains, N.B.	FFS 80	3 400*
8.	Bikpela Vuvu	Nakanai Mountains N.B.	FFS 80	3 000
9.	Irukunguai (Irapui)	Porol Escarpment, Simbu Province	GCC 64 PNGCEG 72	2 120
10.	Toroku Nantaut	Manetai area, Bougainville	NSCEG 79	1 904
11.	Kavakuna	Nakanai Mountains, N.B.	FFS 80	1 800
12.	Tuweiwu (Ikenar/ Kipuari)	Obura area E.H.P.	GCC 64 PNGCEG 78	1 525
13.	Barananomba	Yonki area, E.H.P.	GCC 74/FSS 78 PNGCEG 78	1 500
14.	Kanada Heiowa Heia	Muller Range, S.H.P.	1973 NSRE	1 500
15.	Kopunei	Central Manus Is.	PNGCEG 74	1 500
16.	Nenduma	Bougainville Is.	NSCEG 75	1 500
17.	Oravunana	Obura area, E.H.P.	FFS 78	1 500
18.	Lemerigamas	Lelet Plateau, N.I.	1976 NISE Swiss 79	1 300
19.	Pumpulyun	Central Manus Is.	PNGCEG 74	1 250
20.	Bibima	Porol Escarpment, Simbu Province	PNGCEG 72	1 222
21.	Dalum	North-east coast, N.I.	1976 NISE/ Swiss 79	1 200
22.	Ok Tem (Ok Kaakil Tem Uneibo)	Hindenburg Range, W.P.	NG 75	1 040

* Exploration incomplete

Table 4. Longest cave pitches in Papua New Guinea

	Cave	Location	Explorers	Length of pitch (m)
1.	Minye	Nakanai Mountains, N.B.	PMSS 68/ FFS 78	270
2.	Nare	Nakanai Mountains, N.B.	FFS 78	217
3.	Kege Mur	Mt. Kege, Simbu Province	Spanish 78	168
4.	Tina Bu Tem	Nong Valley, W.P.	NG 75	153
5.	Uli Guria (The Shot Tower)	Muller Range, S.H.P.	1973 NSRE	123
6.	The Sting	Hindenburg Range,W.P.	NG 75	119
7.	Girtoil	Hindenburg Range,W.P.	NG 75	113
8.	Vuvu II	Nakanai Mountains. N.B.	FFS 80	100
9.	Uli Mindu	Muller Range, S.H.P.	Atea 78	85(1)
10.	Gebemi Tem	Kaban Range, W.P.	NG 78	84
11.	Lambelubung	Lelet Plateau, N.I.	1975 NISE	81
12.	Uli Ui (Pendulum Shaft)	Muller Range, S.H.P.	1973 NSRE	81
13.	MR260	Muller Range, S.H.P.	Muller 76	80
14.	Uli Ug Wa Gitu	Muller Range, S.H.P.	Atea 78	79
15.	Anawol Tem	Fault Valley, W.P.	NG 75	76
16.	La Buum Tem	Hindenburg Range, W.P.	NG 75	73
17.	The "240 feet" pot	Hindenburg Range, W.P.	NG 75	73
18.	Uli Mulmulum	Muller Range, S.H.P.	1973 NSRE	73
19.	MR116	Muller Range, S.H.P.	1973 NSRE	71
20.	Darua Muru	Porol Escarpment, Simbu Province	PNGCEG 75	70
21.	Fungi Tem	Mt. Wamtakin, W.S.P.	NG 75	68
22.	Kansua	Duglpagl area, Simbu Province	Spanish 78	68
23.	Obi Tum Tem	Tifalmin Valley, W.S.P.	NG 75	68
24.	Owillfore Tem	Feramin area, W.S.P.	NG 75	61
25.	Uli Eta Riya	Muller Range, S.H.P.	Atea 78	60
26.	Uli Oogua	Muller Range, S.H.P.	1973 NSRE	60

(1) Exploration incomplete. Estimated as 160m.

Table 5. Volumes of some large karst features in Papua New Guinea

	Feature	Location	Explorers	Volume ($\times 10^6 m^3$)
1.	Luse (doline)	Nakanai Mountains, N.B.	FFS 80	60
2.	Ora (uvala)	Nakanai Mountains, N.B.	New Britain 72 - 73	29
3.	Minye (doline - aven)	Nakanai Mountains, N.B.	FFS 78	26
4.	Kavakuna (doline)	Nakanai Mountains, N.B.	Swiss 79/ FFS 80	15
5.	Doline near Koripobi village	Keriaka Plateau Bougainville Is.	F. Parker, 1963	14.6
6.	Doline 1)	Dokfuma Plateau)	1965 Stars	7.5*
7.	Doline 3)	Star Mountains)	NG 75	7.5*
8.	MR201 (doline)	Muller Range, S.H.P.	1973 NSRE	5.2*
9.	Nare doline (doline - aven)	Nakanai Mountains, N.B.	FFS 78	3.3
10.	Bikpela Vuvu (doline)	Nakanai Mountains, N.B.	FFS 80	2.5
11.	Poypun (doline)	Nakanai Mountains, N.B.	FFS 80	2.0
12.	Tina Bu Tem (pit)	Nong Valley, W.P.	NG75	1.8
13.	Gebemi Tem (pit)	Kaban Range, W.P.	NG 78	1.0
14.	The Sting (pit)	Hindenburg Range, W.P.	NG 75	1.0

* Not surveyed, estimated only.

Table 6. Volumes of some large cave chambers in Papua New Guinea

	Chamber/Cave	Location	Explorers	Volume ($\times 10^6 m^3$)
1.	Cave near Koripobi village	Keriaka Plateau, Bougainville Is.	F. Parker 1963	3.5
2.	Olaipun chamber KA II cave	Nakanai Mountains, N.B.	FFS 80	2.5
3.	Chamber in Minye cave	Nakanai Mountains, N.B.	FFS 80	1.5
4.	Sump chamber KA II cave	Nakanai Mountains, N.B.	FFS 80	0.7

Table 7. Highest caves in Papua New Guinea

	Cave	Location	Explorers	Altitude of entrance(m)
1.	Cave No. 3	Mt.Saruwaget, Huon Peninsula	FFS 78	3800
2.	Cave No. 2	Mt.Saruwaget	FFS 78	3700
3.	Sikau	Mt.Saruwaget	FFS 78	3700
4.	Arnold Mur	Mt. Kege, Simbu Prov.	Spanish 78	3620
5.	Kege Mur	Mt. Kege	Spanish 78	3530
6.	Kege cave	Mt. Kege	Spanish 78	3500

Table 8. Largest underground rivers in Papua New Guinea

	Cave	Location	Recorder	Flow (m^3/sec)
1.	Tobio	Kagua area, S.H.P.	H.Beck 74	85-113*
2.	Matali efflux	Nakanai Mountains, N.B.	FFS 80	20-25 *
3.	Minye	Nakanai Mountains, N.B.	FFS 78	15-20 *
4.	KA II	Nakanai Mountains, N.B.	Swiss 79/ FFS 80	15 *
5.	Nare	Nakanai Mountains, N.B.	FFS 78/ FFS 80	15 *
6.	Atea Kananda	Muller Range, S.H.P.	Atea 78	2-20 **
7.	Ora	Nakanai Mountains, N.B.	New Britain 72-73	4-6 **

* Estimates only

** Flow measured

* * *

ESTIMATION OF SHAFT DEPTHS

Did you know that the depth of a shaft can be roughly calculated from the time taken for a stone to reach the bottom when dropped from the top? The formula is:

$$\text{Depth} = 4.8 \times \text{time}^2$$

For example, if it takes 3 seconds from when you drop the stone until when you hear it hit the bottom, then the depth is $4.8 \times 3^2 = 43$m.

* * *

SOME CAVES OF THE MANETAI AREA, BOUGAINVILLE ISLAND, NORTH SOLOMONS PROVINCE, PAPUA NEW GUINEA.

H. Meier*

Karst Areas of the North Solomons

Two types of limestone are generally recognised in the North Solomons Province. They are the Keriaka limestone and the Sohano limestone.

The Sohano limestone extends over most of Buka Island and much of the northern extremity of Bougainville Island. It may be possibly overlaying Keriaka limestone. Sohano limestone is of Pleistocene age.

The Keriaka Plateau, an area of approximately 250 km^2 in the north western part of Bougainville Island, consists of Keriaka limestone of the lower Miocene. Relief in this area is up to 1300m. Other outcrops of Keriaka limestone occur in other areas, mainly central Bougainville. These take the form of small, isolated lenses, but three larger areas are known. These are at Karato and Mainoki on the western side of the Crown Prince Range and Manetai on the eastern side. Latest aerial interpretation suggests that these three areas may be linked with each other.(Blake and Miezitis, 1967).

Manetai Limestone Area

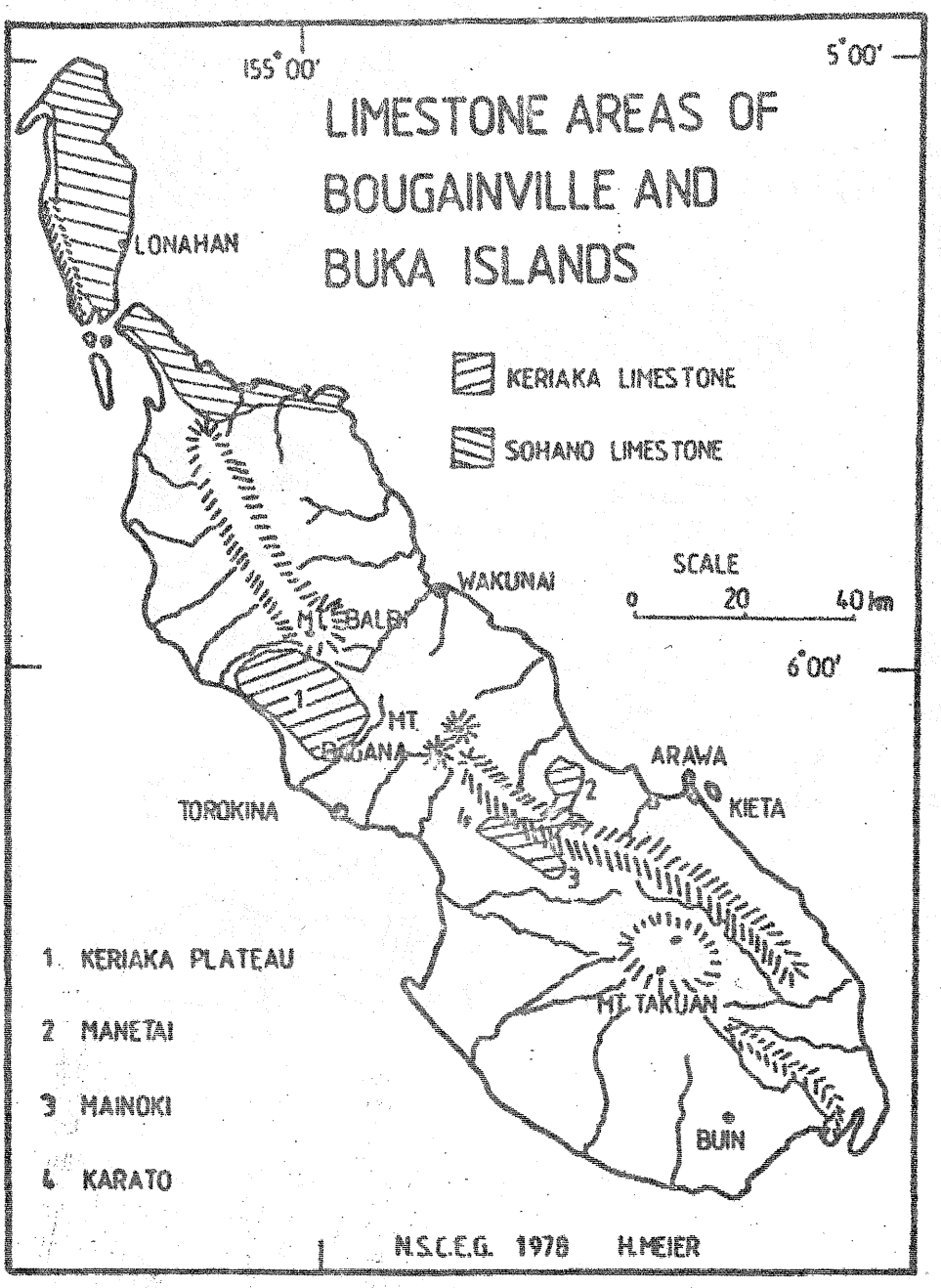
The area covered in this report is south west of Manetai Mission. Manetai Mission is 26km north of Arawa by road. The limestone extends over at least 15km^2 with a relief of approximately 300m. The limestone is covered by soil and volcanic tuff. Numerous steep sided dry valleys slope predominantly towards the north west. Dolines, some containing sink holes, are found on the valley floors. Drainage is mainly underground. Cover is dense tropical rain forest. Parts of the area are cleared and utilised for food gardens and cash crops. Near the southern extremity, a fault with a SE trend extends practically across the full width of the limestone. Most caves found so far seem to be related to this fault. The much eroded cone of the extinct Bakanovi volcano adjoins the area on the NW side and may overlay the limestone.

Exploration of the Caves

The North Solomons Cave Exploration Group started exploring the area in August, 1976 at the Taroku efflux. Exploration was at the rate of 6 - 7 trips per year and is still continuing. Work has generally been limited to mapping of the caves. A number of surface traverses were surveyed to fix the relative position of the caves.

The following equipment was used for the surveys: Suunto KB14 compass, Suunto PM5 clinometer, 100 ft fiberglass tape. Data reduction was initially done manually but is now carried out using a simple computer program. Standard is usually to ASF Grade 52. Many of the original maps were drawn by Ian Wood.

* P. O. Box 73, Panguna, North Solomons Province, P. N. G.



Description of Caves

Anaviato Nantaut, M1, M1A (see map page 42)

Location: 2km south west of Urumovi village on the eastern side of Emevovi River.
Total surveyed length is 77m.

Two entrances approximately 6m apart connect to a sandy passage 2m wide and 1.5 - 2m high. A small chamber is reached 23m from the entrance. A steep side passage on the right leads to a dead end after a few metres. A further 28m of passage connects to a second chamber. Roof height is up to 10m.

A. MANETAI MISSION
B. URUMOVI VILLAGE

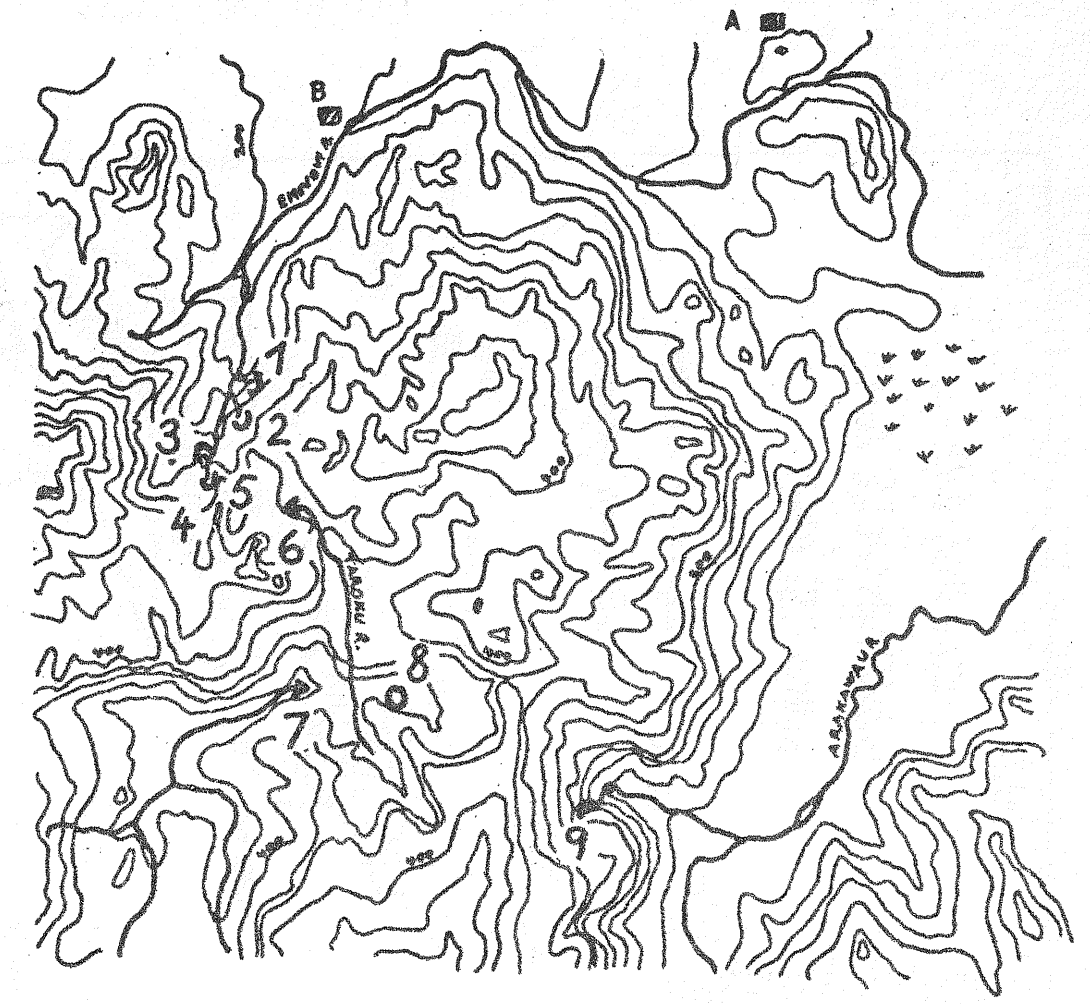
1. ANAVIATO NANTAUT M1, 1A
2. TAROKU NANTAUT EFFLUX M2
3. SMALL RIVER CAVE M3
4. EMEVOVI RESURGENCE M4
5. DOLINE WITH CAVE M5
6. TAROKU NANTAUT INFLOW M6, 6A
7. PUNUA NANTAUT INFLOW M7
8. DOLINE WITH LAKE M8
9. PUNUA NANTAUT EFFLUX M9
(POSN. APPROX.)

PERMANENT SURFACE STREAM
SWAMP

1000 500 0 1000 METRES

CONTOUR INTERVAL 40 METRES

COMPILED FROM 1:50 000
SCHWARZE POINT AND
MOUNT SUGARLOAF SHEETS



GN MN

MANETAI AREA
CAVE LOCATIONS

NSCEG 1978 H. MEIER

Flowstone covers the western wall. The floor consists of rock from roof collapse. A short steep side passage on the right again leads to a dead end. From here, the passage contains water to its full width except for a small sandy island. Water depth is about 1m. The roof dips close to the water level in places. The passage ends in a sump.

The floor of the horizontal passage is mainly sand. There are indications of the occasional small flow of water. The passage roof is heavily scalloped. The occasional cluster of stalactites is found. There are numerous bats in the second chamber. A crab, spiders and cave crickets were noted.

It is likely that the passage continues beyond the sump. Diving might be possible, but would be hazardous due to the low roof (1m) and the presence of much sand which, when stirred up, reduces visibility to nil.

Taroku Nantaut (Efflux), M2 (see maps pages 44 - 51)

Location: 2.5km south west of Urumovi

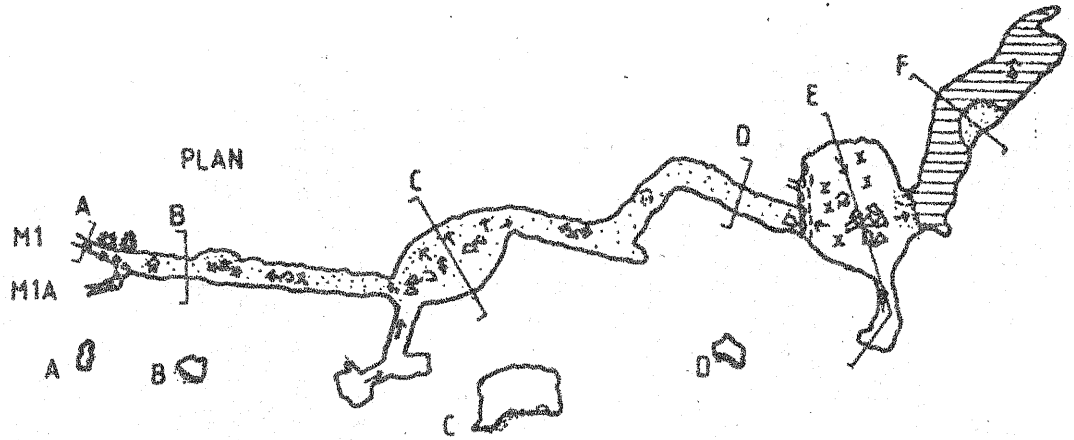
This was the first cave to be visited in this area. To date, it is also the longest at 1904m and the deepest at 100m. It is impressive not only by its huge chambers and canyons, but also by the abundant and magnificent decorations.

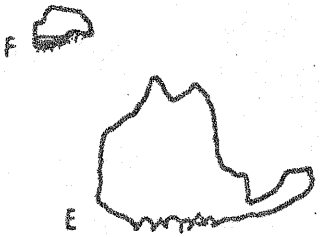
The cave is an active river cave. The only entrance known so far is via the efflux, a hole approximately 1.3m high and 2m wide. The water level reaches the roof during heavy rain. The passage opens up immediately inside the entrance. The walls are covered with flowstone. Colour varies from predominantly dark brown red to grey and white. The glassy texture of the decorations would indicate that this entrance has been sealed as a rule. Droughts and low humidity, the result of an open entrance, generally result in formations being knobly and opaque.

Twenty metres inside the entrance, a flowstone covered 5m pitch can easily be free climbed. A low, wet passage (The Mouth of the Lion) can be followed for about 10m under the pitch. This passage is beautifully decorated with red brown flowstone and stalactites.

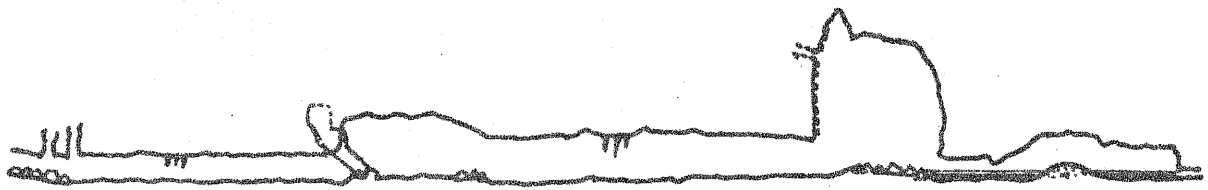
After negotiating a somewhat narrow passage, one emerges on a ledge 5m above the floor of a large chamber. The river can be seen another 7m down through holes in the floor. This chamber (Castle Chamber) extends for 130m although this is not noticeable at first. A cluster of white stalagmites adorn the tip of a rock projecting from the wall of the chamber. This formation resembles a mediaeval castle. High ground consisting of earth is followed along the right hand side for most of the length of the chamber.

The main stream enters the Castle Chamber from a narrow passage at its southern extremity. The Castle Chamber continues to the west where Batchamber "1" is reached after climbing a 6m pitch. Two possible leads continue from this bat chamber. One is a wet, narrow chimney with walls covered in bat guano. The other is a low crawl into the rock pile. They have not been explored.





FLOWSTONE
SAND
ROCKS
STALACTITE
DIRECTION OF SLOPE
WATER
GUANO
CURRENT SCALLOPS, ROOF



DEVELOPED LONG SECTION

ANAVIATO NANTAUT M1,1A

1:500

5 0 10 20 m

MN

ASF GRADE 42

NSCEG 1978 H. MEIER

The main stream passage is often narrow, but high and zig zags, probably following the jointing. Several short rockfalls and waterfalls are climbed. The passage leads up through another rockfall into a large chamber containing bats (Batchamber "2"). Most of the chamber is at a high level reached by climbing up a 7m slippery slope. The floor is level at first, rises towards the far end as one climbs up an old roof collapse and then drops off steeply to a fairly flat area at the far wall. Bat guano covers the floor. Some formations of stalagmites and stalactites, columns and some flowstone are found mainly near the walls. Rows of stalagtites occur along roof joint lines.

Upstream of the chamber, the passage is again narrow (2 - 4m) but very high. Water depth is up to 1.5m. Noticeable features are a flowstone extending halfway across the passage and two columns resembling pieces of bamboo.

Two hundred and sixty metres from the bat chamber the stream emerges from a rockfall which can be climbed through and the stream regained. High level passages have been found above this area extending for over 100m along the direction of the stream passage.

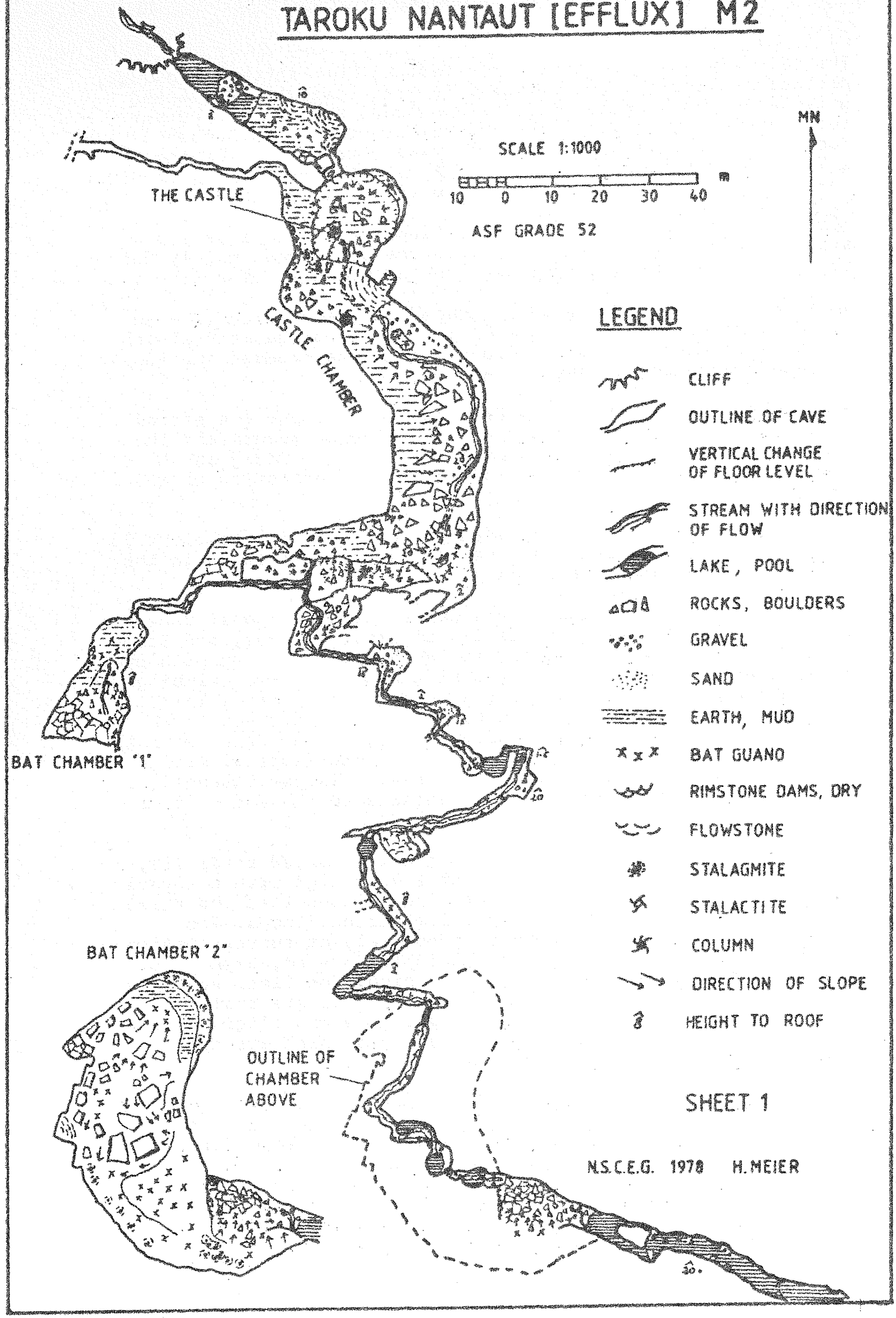
The passage divides a short distance upstream. To the right is Paradise Staircase. The continuation to the left leads to the Hall of the Chocolate Soldiers.

To reach Paradise Staircase, one wades through a chest deep pool. This is followed by a series of short pitches, one being a slight overhang. Passage height is usually 10 - 20m with what appears to be a maze of passages at a higher level. Climbing up through Hanging Rock passage, one passes underneath a large boulder suspended over a passage. The boulder appears to be held on one side only. From here, a small stream flows down a narrow passage in a westerly direction. After approximately 50m, this passage emerges in the roof of a larger passage. There is a 5m vertical drop with overhang to the Upper River Passage.

Downstream in this passage is a lake which sumped after 20m. The upstream passage is narrow, but 2 - 6m high with a keyhole cross-section in places. There are indications that the first 100m of this passage fills with water during floods. The character of the passage changes completely at survey station 74/55. Width is now up to 6m and height 1.5 - 6m, except for a short wet crawl which is only 0.4m high. The floor consists of many small rocks and some boulders. It appears that this section is above flood level. The passage sumps after 185m. There are a number of narrow side passages which are not explored. They generally head north and up.

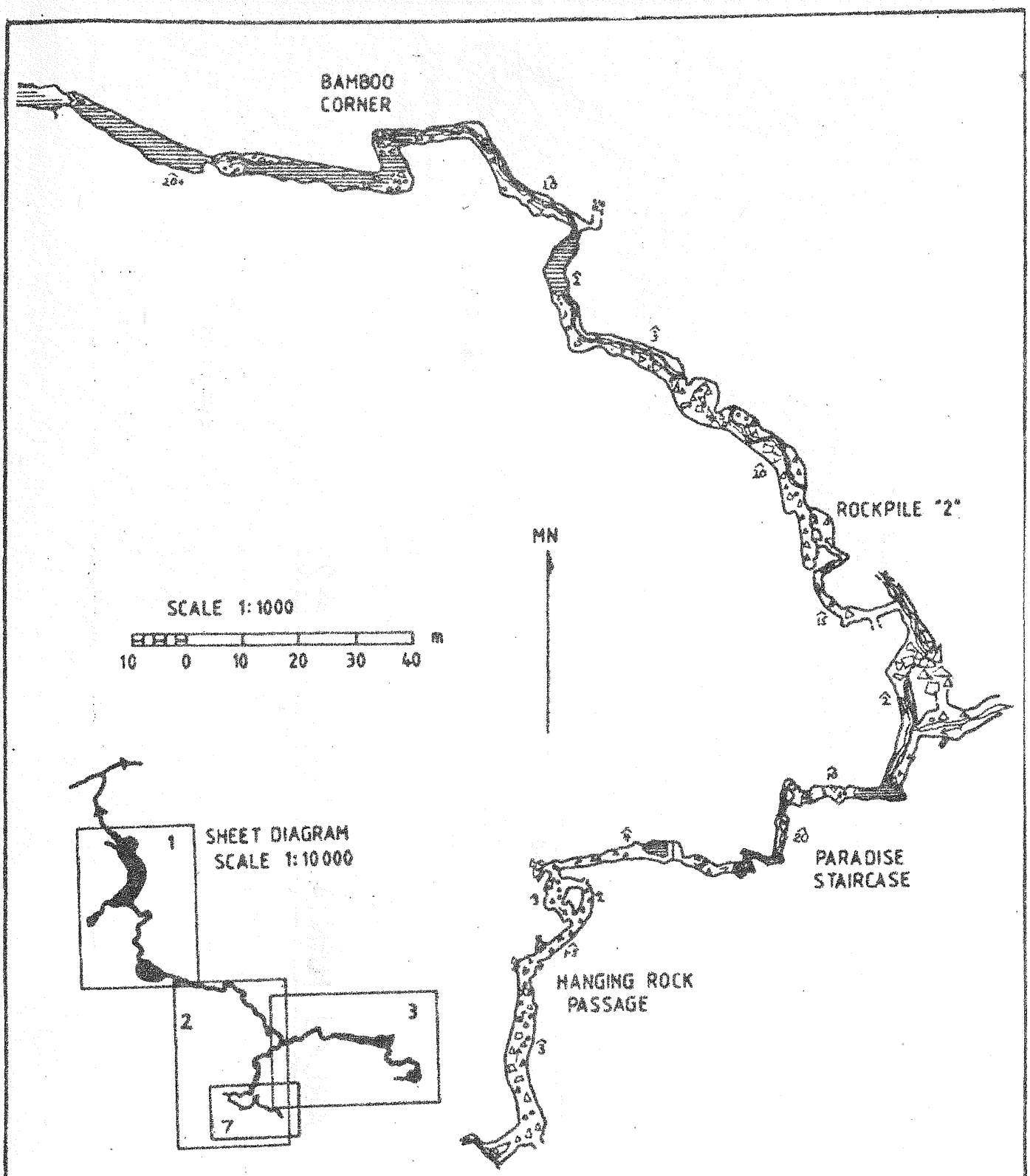
The passage to the Hall of the Chocolate Soldiers is canyon like with a short low stretch. The passage then widens but roof height reduces to 5m. The wide section extends for 100m. A small stream flows in a 2m deep floor canyon. Some decorations are present. The most prominent are a large column and numerous small stalagmites. The stalagmites are partly covered with a brown crust (Chocolate Soldiers). A rockfall blocks the upper end of this section.

TAROKU NANTAUT [EFFLUX] M2



SHEET 1

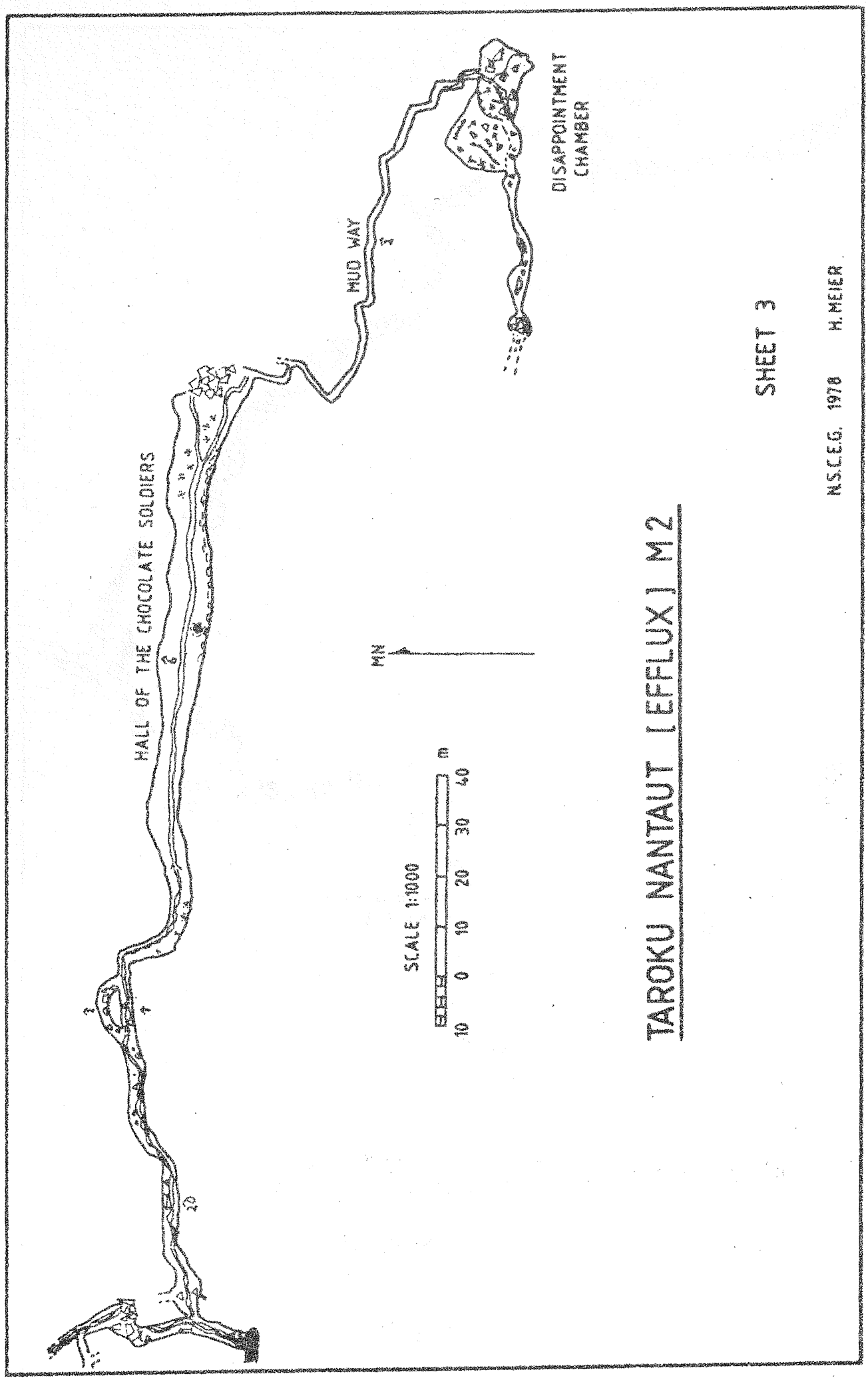
N.S.C.E.G. 1978 H. MEIER

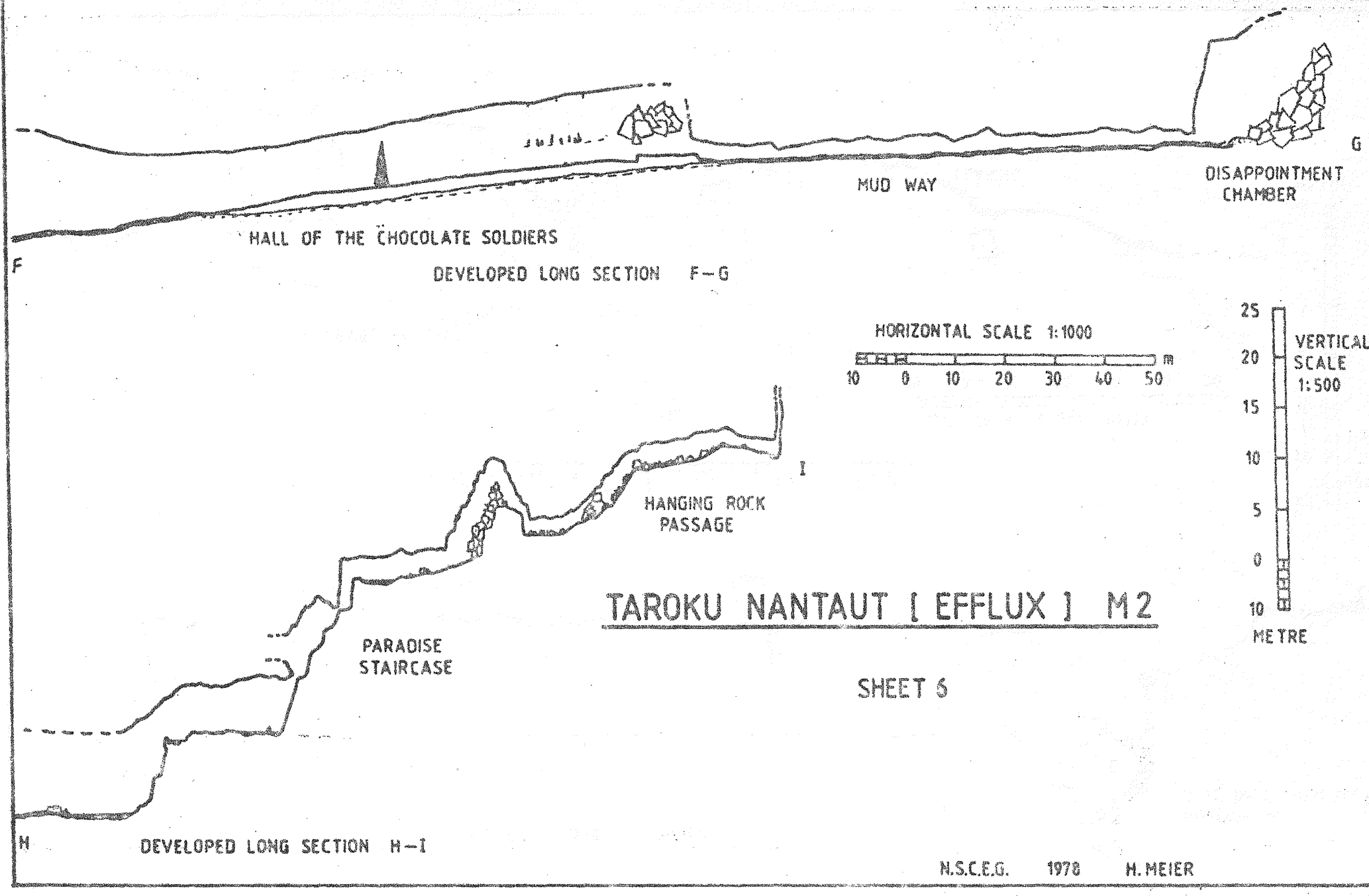


TAROKU NANTAUT [EFFLUX] M 2

SHEET 2

N.S.C.E.G. 1978 H.MEIER


HALL OF THE CHOCOLATE SOLDIERS
MUD WAY
DISAPPOINTMENT CHAMBER
MN
SCALE 1:1000
m
10 0 10 20 30 40
TAROKU NANTAUT [EFFLUX] M2
SHEET 3
N.S.C.E.G. 1978 H. MEIER

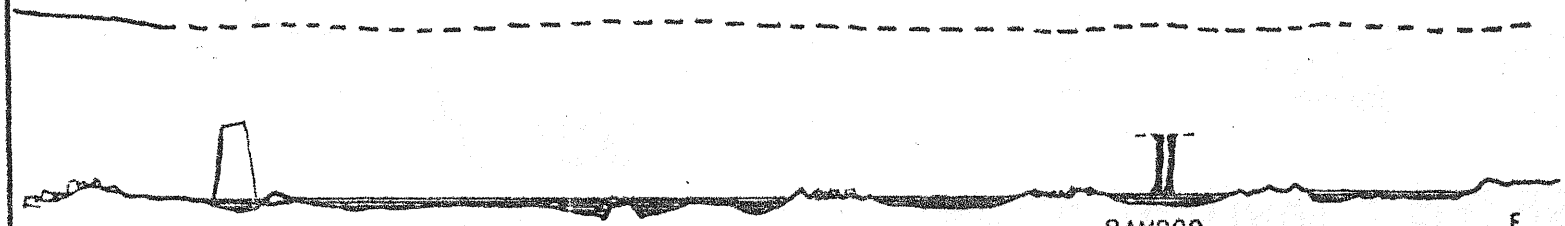


TAROKU NANTAUT [EFFLUX] M2

SHEET 6

N.S.C.E.G. 1978 H. MEIER

N.S.C.E.G. 1978 H.MEIER



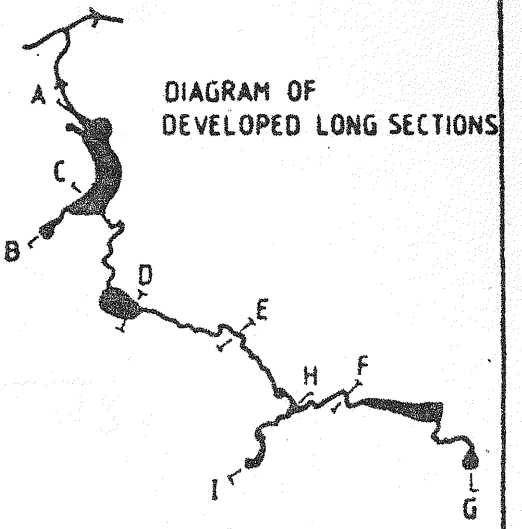
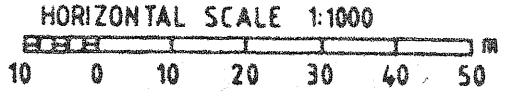
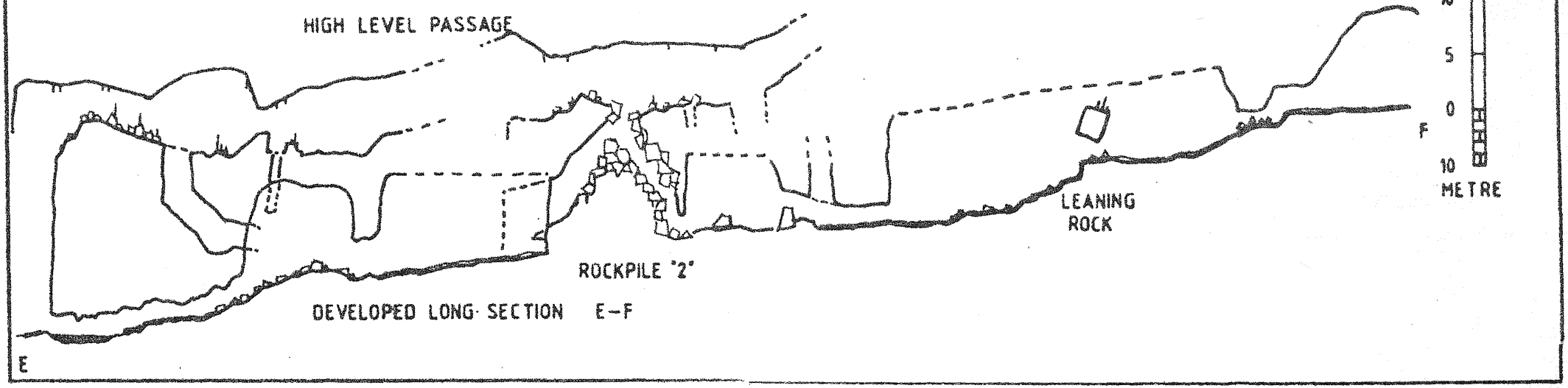


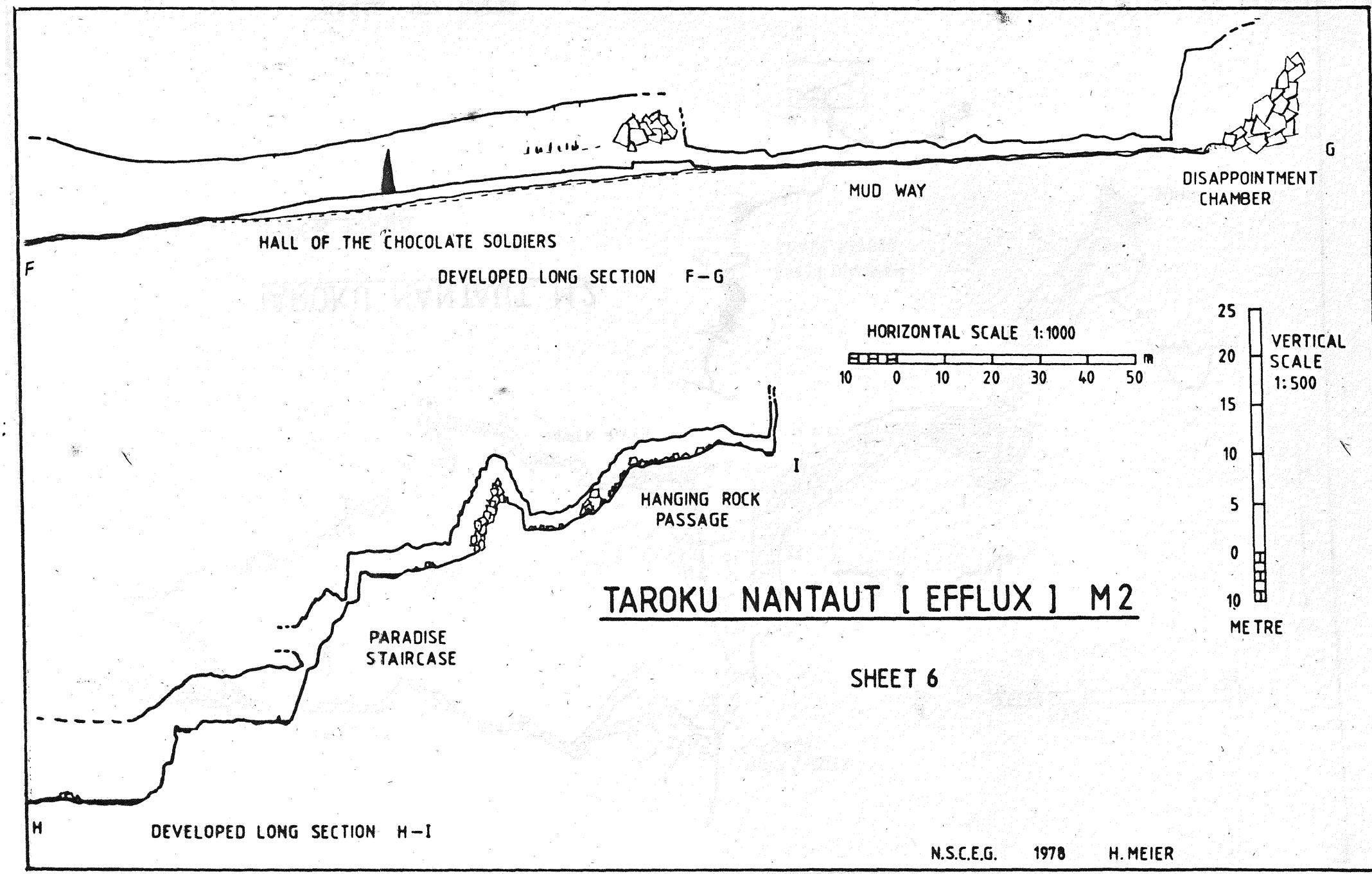
DIAGRAM OF DEVELOPED LONG SECTIONS

TAROKU NANTAUT [EFFLUX] M2

SHEET 5



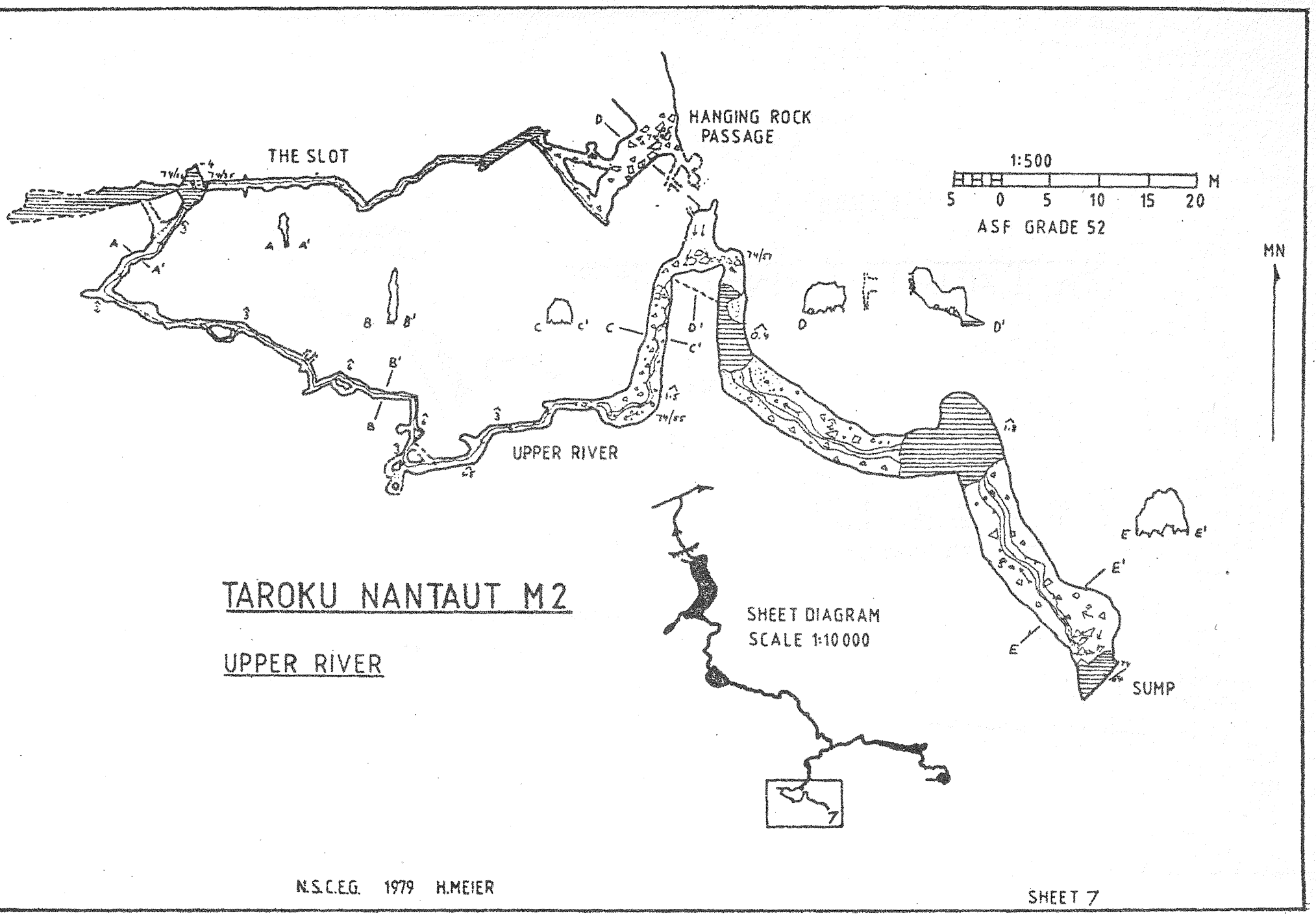


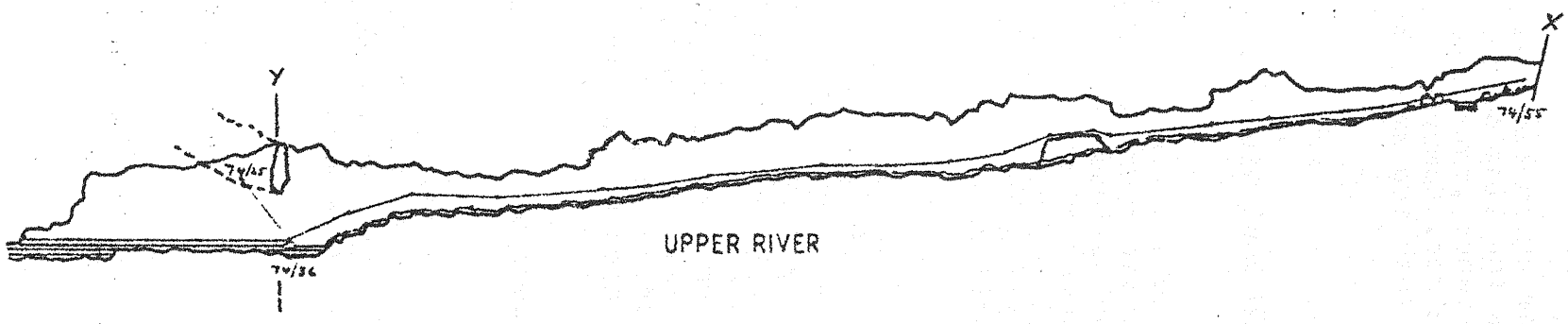


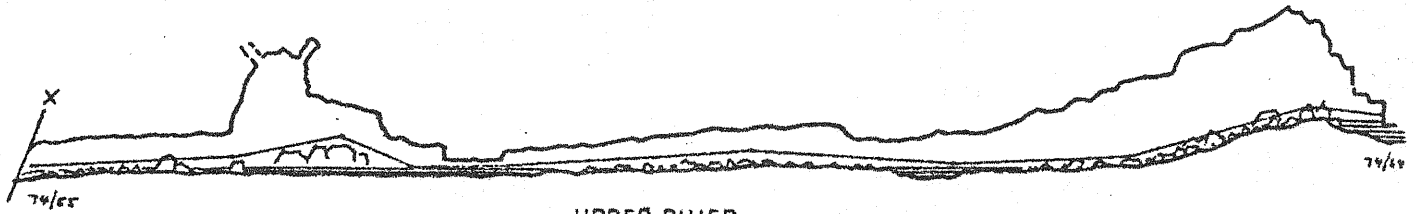
TAROKU NANTAUT [EFFLUX] M2

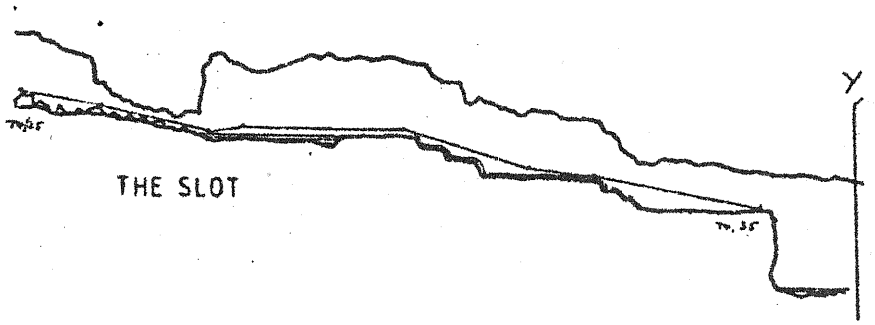
SHEET 6

N.S.C.E.G. 1978 H. MEIER


HANGING ROCK PASSAGE
THE SLOT
1:500
5 0 5 10 15 20 M
ASF GRADE 52
MN
UPPER RIVER
SHEET DIAGRAM
SCALE 1:10000
SUMP
TAROKU NANTAUT M2
UPPER RIVER
N.S.C.E.G. 1979 H.MEIER
SHEET 7







TAROKU NANTAUT M 2

DEVELOPED LONG SECTION

SCALE 1:500

N.S.C.E.G. 1979 H.MEIER

A narrow passage, with knee deep mud in places, zig zags for 90m to where it emerges abruptly into Disappointment Chamber. This chamber is large but the far end has not yet been reached. A huge rockpile fills most of the chamber. The pile has not been climbed. A small stream emerges from the rockpile along the left wall.

It is somewhat surprising that no other entrances have been found so far. The cave closely follows the line of the trench on the surface. For a considerable distance ,the floor of the cave is no more than 50m below the surface. Numerous sinkholes are found on the surface but they are much too small to give access.

Small River Cave, M3 (see map page 53)

Location: 150m upstream of the upper Emevovi River crossing. Surveyed passage length is 50m.

The entrance is at the foot of a cliff where a small river emerges. Access is gained along this water course. The entrance is 0.5m wide and 1.5m high. The passage divides 3m inside the entrance. The water course can be followed by crawling along a narrow low passage. This widens after a few metres but remains low. The floor is river gravel. There are numerous short stalactites. The passage appears to continue but has not been explored.

A small hole on top of a short steep mud slope leads to a higher level passage. This passage is 2 - 3m wide and 3m high. The floor is earth. There are a number of tree roots. An ants nest was found in a small pile of rotting vegetation. The passage rises slightly at first and then continues practically horizontal to a collapse chamber. For the next 20m, the passage is narrow, low and muddy. It then turns right and enlarges. A steep slope leads into a small low chamber. Stalagtites and stalagmites are numerous. Progress is barred by the prolific decorations, but there does not appear to be a continuation.

This cave is not fully explored. The river passage appears to continue.

It was unexpected to find limestone on the western side of the Emevovi River. It was assumed that volcanics from the Bakanovi Volcano extend to the river. It would be interesting to explore along the contact zone of limestone and volcanics.

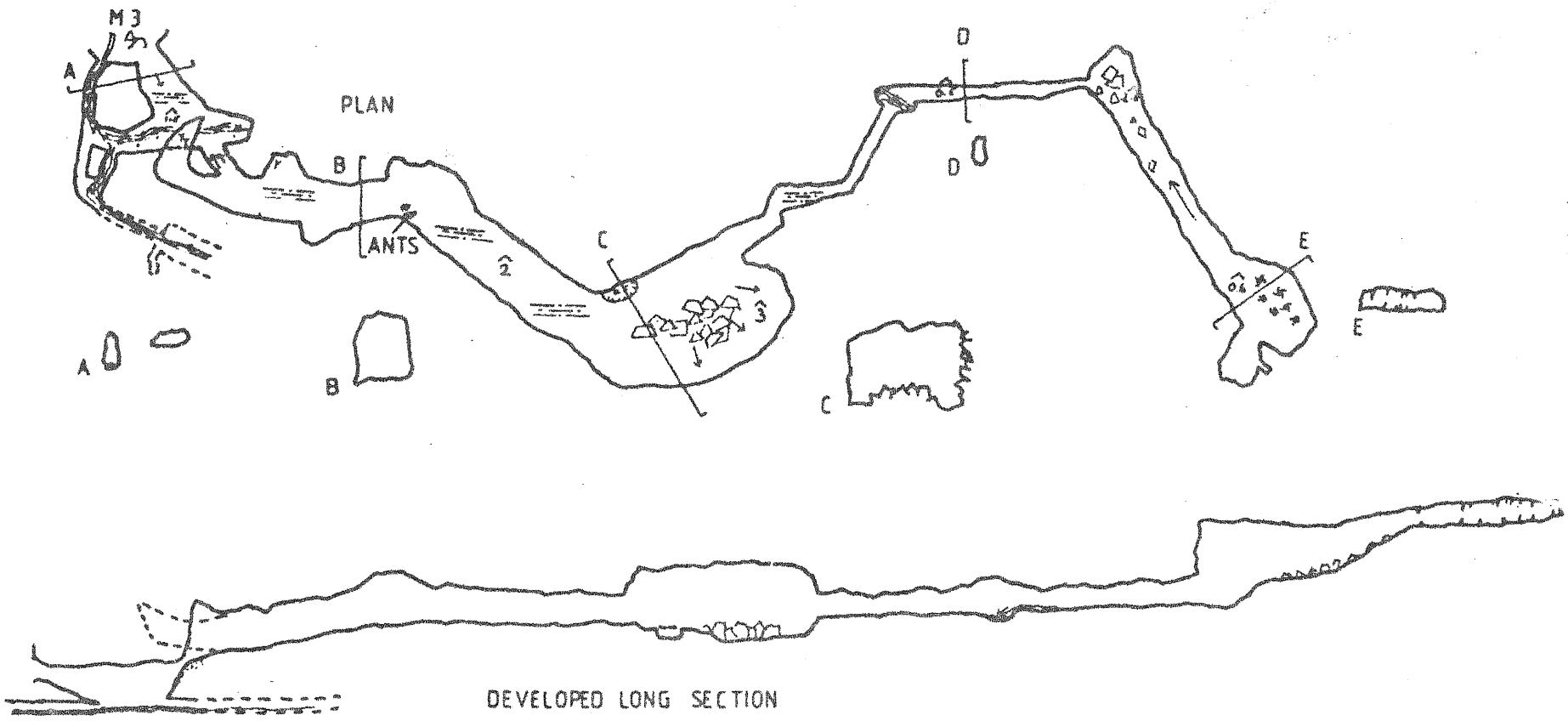
Resurgence, M4

Location: 280m upstream from the upper Emevovi River crossing.

The Emevovi River emerges from rocks on the left of the valley. No entrance is apparent. The creek bed in the gully upstream from the resurgence is usually dry.

The Doline, M5 (see map page 54)

Location: In a dry gully 50m to the east of the Urumovi to Nasivavi track and 250m past the upper Emevovi River crossing.



SMALL RIVER CAVE M3

1 : 200

2 1 0 2 4 6 8 10 m

ASF Grade 42

MN

Rocks

Earth

Flowing Water

Direction of Slope

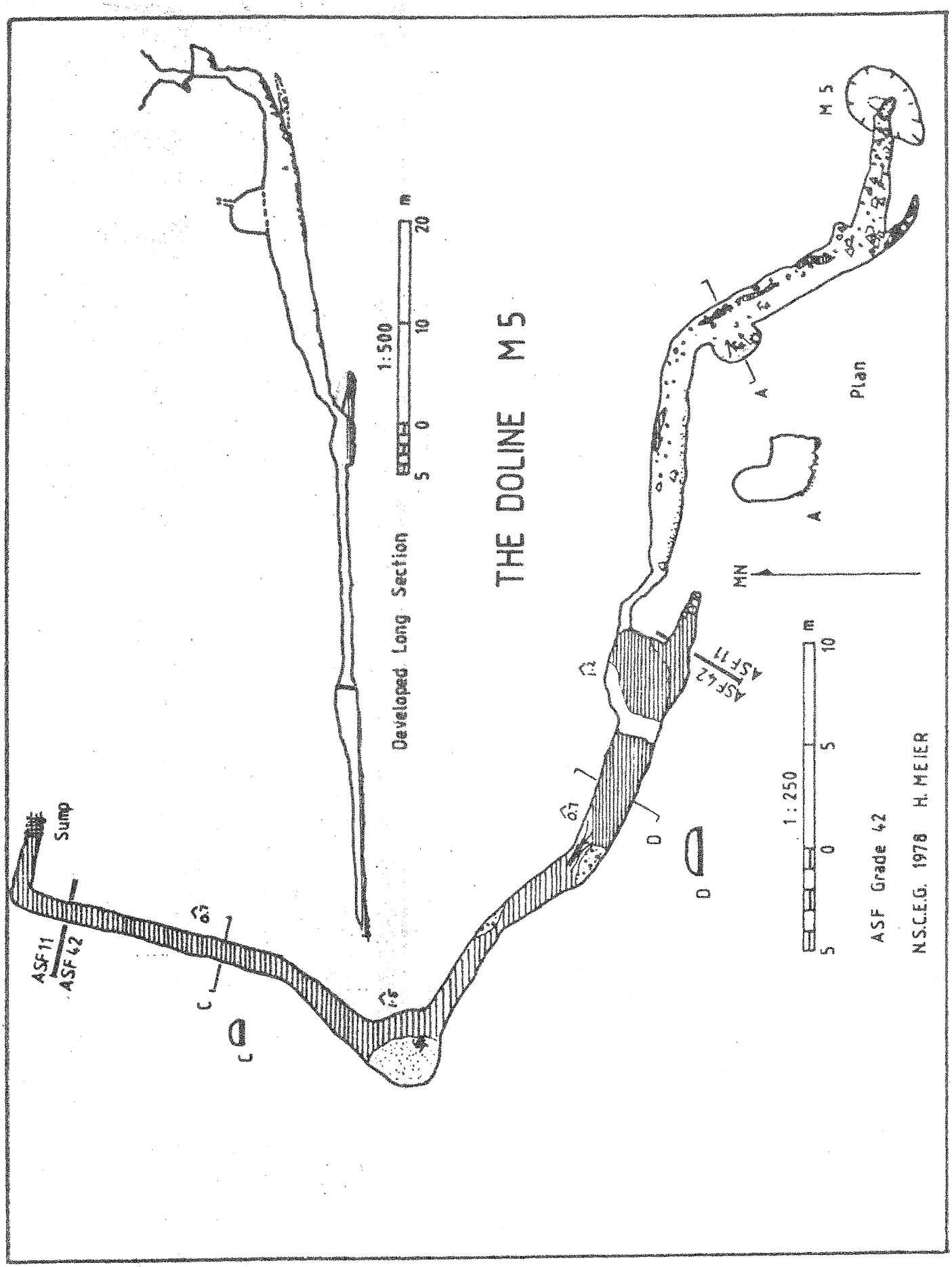
Roots (in situ)

Vegetable debris

Stalagmite

Stalactite

N.S.C.E.G. 1978 H. MEIER


THE DOLINE M5
Developed Long Section
1:500
m
20
10
0
5
Plan
M5
A
A
MN
1:250
m
10
5
0
5
ASF Grade 42
N.S.C.E.G. 1978 H. MEIER
Sump
ASF 11
ASF 42
C
C
D
D
ASF 42
ASF 11

Surveyed passage length is 81m with a vertical depth of 19m.

A 10m vertical shaft is situated in a small shallow doline. This shaft was originally completely hidden by tall grass and creepers. A good reminder of the danger of carelessly walking into a doline.

The shaft leads into a well developed passage 3m wide and up to 5m high. The floor consists mainly of rocks with some mud and sand. Ten metres along the passage, there is a dome like enlargement on the left. At times, water enters through a hole in the top of the dome.

A low squeeze, 15m past the dome, was enlarged to give access to a low wet passage. Height is generally less than 1m and width 2 - 5m. The passage ends in a sump. Stalagmites in the water indicate that the water level has been lower at times.

The general trend of the cave is towards the resurgence M4. The resurgence is 100m west of the sump but only one metre lower. If there is a connection between the two, then it is likely to be flooded.

Taroku Nantaut (Inflow), M6, M6A (see maps pages 56 - 57)

Location: Approximately 1km ESE of Taroku efflux M2, situated in the trench about 400m a.s.l.
Surveyed passage length is 171m. Vertical depth 10m.

There are two entrances. The surface stream sinks between the entrances. M6 also takes water during floods. M6A is at a higher level and dry.

The entrance M6A is low. The passage opens out after 8m. Climbing down over boulders, one reaches a chamber 25m long, 5m wide and 6m high. The stream enters at floor level from the left. The floor consists of rocks and river gravel. More and more sand is encountered as one continues along the passage. A small lake is reached after 40m. Roof height is only 1m in places. A narrow passage continues 10m past the lake. The stream passes into a sump on the right.

Entering from M6, one climbs over boulders for 15m to where a very small stream emerges at the top of a small but magnificent flowstone. From here, a canyon type passage continues for 35m to a chamber with numerous bats. A low, narrow, wet passage is then followed to the main stream.

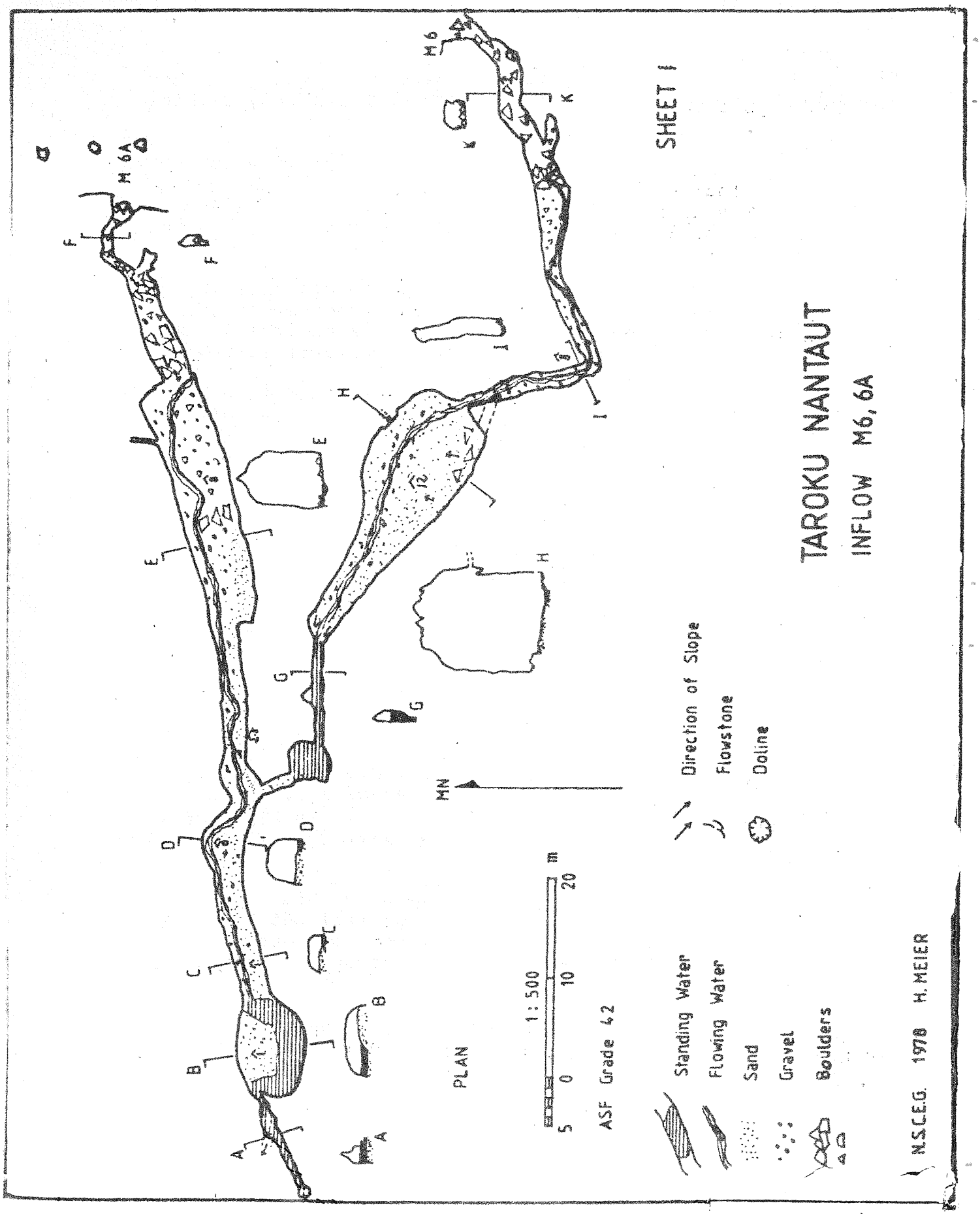
Not a spectacular cave. Thought to be fully explored. It is subject to serious flooding. The water level is likely to seal M6. The water recedes very slowly.

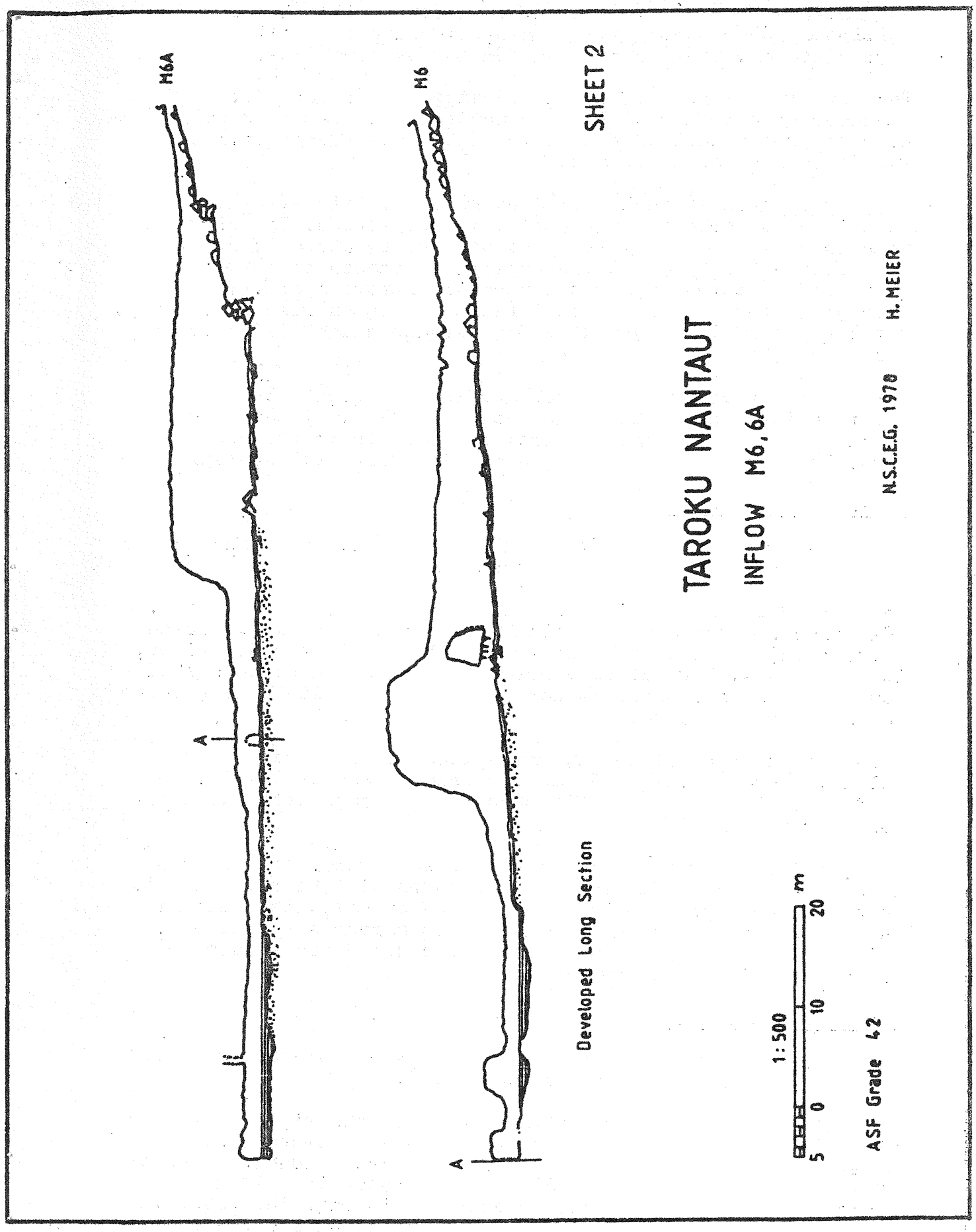
According to the local villagers, this cave connects to Taroku Efflux M2.

Punua Inflow Cave, M7

Location: 4km due south of Urumovi, in a blind valley.

The entrance is at the foot of a 100m cliff. A huge log jam is in front of the entrance. The river passes through the log jam


TAROKU NANTAUT
INFLOW M6, 6A
SHEET 1
PLAN
1:500
0 10 20 m
5
ASF Grade 4.2
MN
Direction of Slope
Flowstone
Doline
Standing Water
Flowing Water
Sand
Gravel
Boulders
N.S.C.E.G. 1978 H. MEIER


M6A
M6
A
A
SHEET 2
TAROKU NANTAUT
INFLOW M6,6A
Developed Long Section
N.S.C.E.G. 1978 H. MEIER
1:500
5 0 10 20 m
ASF Grade 4.2

appears in the passage 5m lower. Normal flows have been estimated at 4 cumecs. Apparently a lake with a large whirlpool forms during heavy rain, flooding the valley for some distance. Logs are jammed 10m up the rock face.

The cave is entered via a side passage. The river emerges from a number of points, mainly from underneath rock faces but also through a wall of timber 4m high. This timber wall is said to be of recent origin.

The river flows through a 2m wide passage. This passage cannot be followed as the current is too strong. The river can be crossed and a side passage negotiated to where it rejoins the river after about 60m. Progress is stopped a short distance downstream where the passage narrows again. The current is too strong for exploration to be carried out safely. Water depth is in excess of 1.5m. Passage height is frequently more than 10m.

A promising cave but dangerous due to the large volume of water during floods. Catchment area is 34km^2! Distance to the presumed efflux is 2km. Vertical distance is in the order of 100m. This would appear to be a mainly horizontal system.

Doline with Lake, M8

Location: Approximately 4km south of Urumovi. In a side valley to the north of the trench.

The doline is on the right side of the valley. It is approx. 30m across. A track passes along the rim on one side. During heavy rain, the lake is said to overflow, but at other times, it may be dry. The bottom appears to be mud and earth washed down from the hillside. It was partly filled with a lake which appears to be shallow.

According to the villagers, there used to be a shaft in the doline. A connection to Punua was assumed and is likely. The shaft was blocked about 1975 when a large sago tree was swept down the hole.

It is possible that the shaft will clear again. Trees, even large ones, take about three years to rot in the rain forest. Depending on where the blockage is and on what other material is in the shaft, a break through could happen any time now. This could result in a flash flood through Punua should the doline be filled with water at that time.

Punua Efflux Cave, M9 (see maps pages 60 - 61)

Location: Arakawau Valley. Approximately 5km along the Atamo road. (dry weather road only).

A substantial river flows down a gully on the right. This river is followed up for an hour to where it emerges at the base of cliffs at least 50m high. There are a number of minor effluxes in addition to a main one. Entrance is gained through a side passage which requires swimming. The river is then crossed. Looking upstream, one can see daylight ahead and 20m further on one emerges into a huge chamber. There are

two large daylight holes in the roof. Lights can almost be dispensed with. Two streams, one from each side wall, join here and rush down the river passage. This is the lowest point in the chamber. The smaller river emerges from a rockpile 40m along the south wall. A rock and mud pile in the centre of the chamber is 20m high. Height to the roof is a further 33m (established by triangulation). The two daylight holes go a further 15 - 20m to the surface.

The slope on the far side of the mud pile leads down 10m to a flat area. This area consists of gravel banks and a lake. From this lake, the main stream follows around the north slope of the mud pile. The stream bed contains large rocks and is steep in places. Also, from the lake a small stream flows into the rock pile on the south side.

The lake extends into a lower chamber to the southwest. There is a large flat gravel island. The water seems to emerge from a sump or sumps along the south wall.

A steep slope leads up from the western side of the lake. The slope consists of slippery mud, bat guano and boulders. A small passage leading off near the top is not fully explored due to many bats.

The large chamber is 80 x 55m. Max. height is 53m not including the shafts. The second chamber is 70 x 45m. A rough estimate of the flow of the combined streams is 2 cumecs.

There are practically no decorations besides some flowstone on the north wall of the lake.

Some green vegetation including a banana tree grows on the mud pile where a snake was also seen.

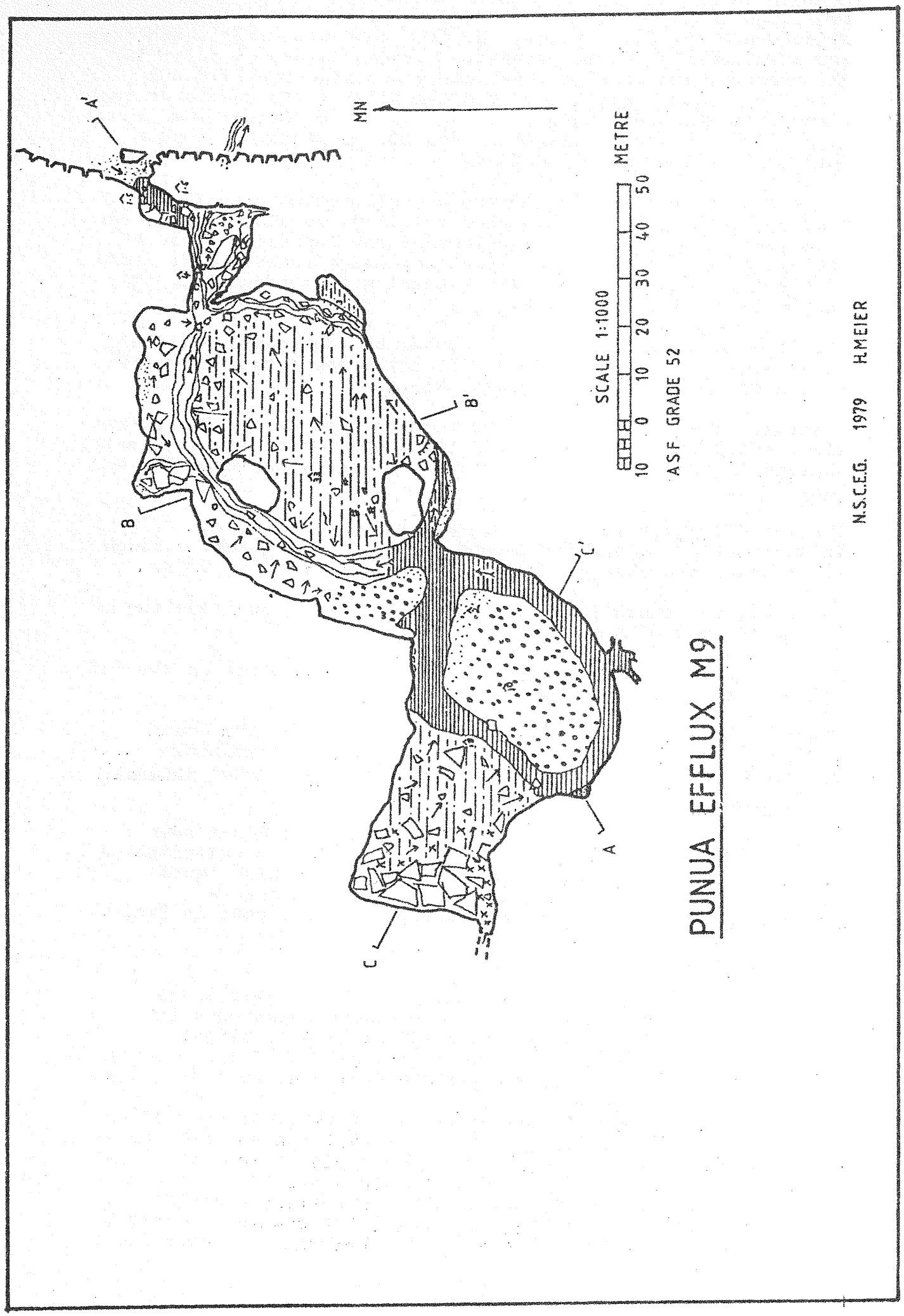
There were numerous bats in the higher level of the small chamber. Two bats were collected. Both have a distinctly trilobed noseleaf. They probably belong to the genus Asellia or Aselliscus.

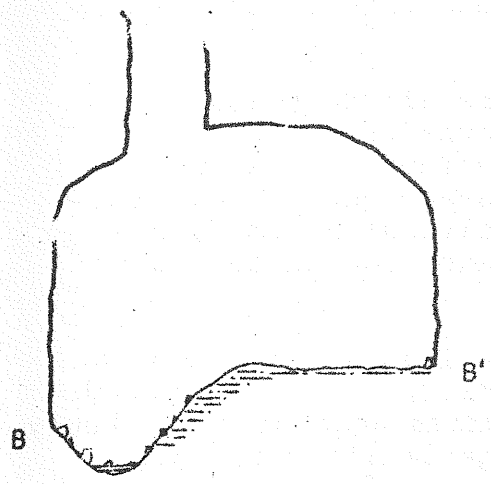
Some passages leading off near the entrance have not been investigated. The cave has possibilities, but is definitely a dry weather cave. Progress may be possible by high level passages. Further shafts from the surface are also a possibility. The distance to the likely inflow cave is 2km.

Discussion

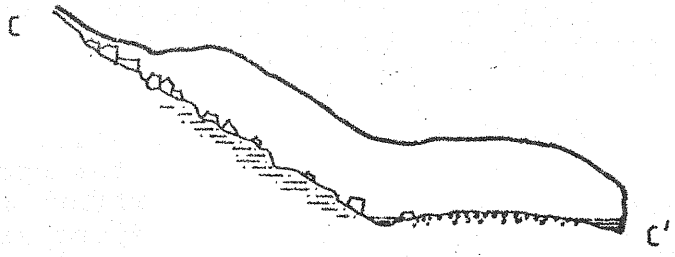
Caves found so far in the Manetai limestone appear to be closely associated with the fault (trench) which runs in a south easterly direction. Taroku efflux cave M2 almost exactly follows the line of the fault. Relief of the area is 300m. The possible depth of Taroku efflux cave is about 200m.

Both Taroku efflux cave and Punua are likely to be extensive systems. The statement by villagers that the two Taroku caves are connected may be correct. But the river flowing into the inflow cave is unlikely to be the same as emerges at the efflux cave. Dye tracing has not been carried out as the river is used for domestic purposes. The quantity of water at the inflow has been consistently larger than that appearing at

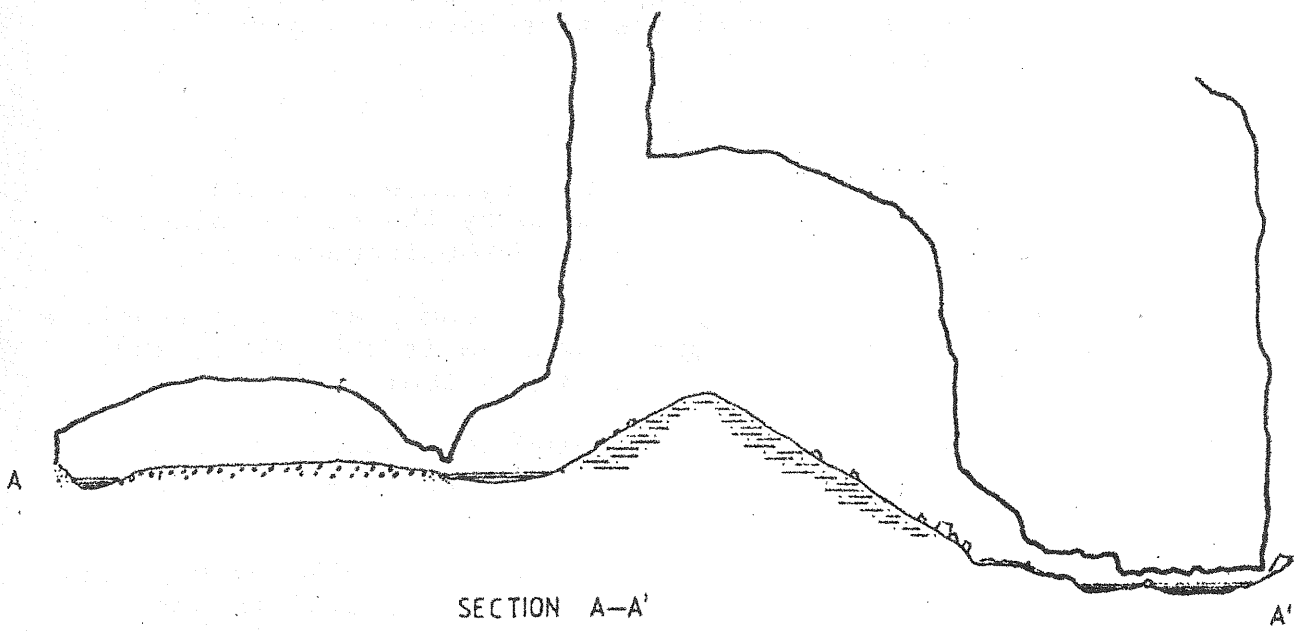

A'
MN
B'
B
C'
A
C
SCALE 1:1000
METRE
10 0 10 20 30 40 50
ASF GRADE 52
PUNUA EFFLUX M9
N.S.C.E.G. 1979 H.MEIER



SECTION B–B'



SECTION C–C'



SECTION A–A'

PUNUA EFFLUX M9

SCALE: 1 1000

N.S.C.E.G. 1979 H.MEIER

the efflux. In addition, the efflux stream is made up from a number of small tributaries along the full length of the cave. The inflow volume more closely resembles the flow at the resurgence M4.

A connection between the two Tarokus may be via some abandoned passages. It may be that the inflow cave overflows into the efflux system during big floods. There are indications of large flows at the top of Hanging Rock passage due to overflow from the Upper River Passage. It is unlikelythat a complete penetration can be made between the two caves due to the sump in the inflow cave.

It was expected that the Upper River would lead to the sump in Taroku Inflow cave. Therefore, the Upper River would in fact be the Taroku River. There are a number of points against this theory. The sump reached in the Upper River passage is 116m from the inflow sump and 17m higher. The difference in elevation could be due to survey errors (more than 200 stations). More important there was no active flow in this passage in August 1978. The Taroku River has a fair catchment and to my knowledge, never dries up. Therefore, the Upper River is unlikely to be the same as the Taroku River. Therefore the flood water must be coming up the Upper River passage.

I feel that the Taroku River flows through a system to the south west to emerge at the resurgence in Emevovi River. This system must be constricted somewhere downstream. During floods, the water level rises to flood part of the Upper River passage and the Slot until it overflows into Paradise Staircase.

The other caves in the area appear to be separate systems, although the Doline M5 may at one time have connected to Taroku efflux cave.

Acknowledgements

Permission granted by the Provincial Government and the villagers for the exploration of caves by the North Solomons Cave Exploration Group is gratefully acknowledged.

The assistance given by the people of Urumovi and Father Woeste of Manetai Mission is much appreciated as is the effort and dedication shown by the members of the NSCEG.

The NSCEG survey parties wish to thank the people of Urumovi who assisted them, mainly Andrew Apatoman, Francis, John, Philip, Hepatoi and many others.

Efforts must be continued to retain the good relationship with the local population. The interest shown, hospitality and assistance given by the people has been a gratifying experience. Tenkyu tru!

Reference

Blake, D. H., and Miezitis, Y. 1967. Geology of Bougainville and Buka Islands, New Guinea. Bur. Miner. Resour. Aust. Bull. 93 (P.N.G. 1).

* * *

IDENTIFICATION OF BATS IN NEW GUINEA CAVES

Thane K. Pratt*

For more than fifty million years bats have been seeking out and occupying caves as sanctuaries in which to sleep and rear their young. Caves offer a sheltered environment safe from disturbance by the many predators, such as hawks, owls and snakes, which patrol the skies and forest, the nocturnal feeding grounds of these winged mammals. In Papua New Guinea, man is the only outside visitor to the subterranean realm of bats. For generations, local people have hunted bats in caves. More recently local and international interest in cave exploration has lead to increased discovery of bat colonies in caves. Cavers must indoubtedly wonder what types of bats they encounter and thus this article is meant to serve as a guide to the bats most frequently seen in caves on the main island of New Guinea.

Between 65 and 70 species of bats will eventually be recognised to inhabit New Guinea; surprisingly only about one third of these species have been found in caves - the remainder roost in foliage or hollow trees. The cave dwelling species are not really that easy to tell apart and except in a few cases the animal in question must be captured and examined in the hand. Coloration of the fur and wing membranes in virtually useless for identification purpses, so special attention must be given to certain structural features, particularly of the face and tail. Size of the bat can be a helpful indication and the forearm and wing span of different bats is given in the discussion following. The wing measurement taken by scientific workers is that of the forearm (FA), the length of the bone between the elbow and the wrist; wing span (WS) is calculated, approximately, by multiplting the FA length by six.

New Guinea bats are divided into two easily recognized groups: the Megachiroptera ("megabats" or fruit-eating bats) and Microchiroptera ("microbats" or insect-eating bats). Megachiroptera include all of the large New Guinea bats, those species with a wingspan of more than 600mm, as well as some smaller species. Megabats navigate by eyesight and consequently possess normal, well developed eyes. Their nocturnal vision is truely impressive; they seem to experience no trouble finding their way about on moonless, overcast nights and can also travel some distance into caves. Megabats feed exclusively on fruit and flowers which they probably detect by scent, requiring vision to get from one place to the next. Microbats on the other hand have exchanged acute vision for a more sensitive means of finding their small insect prey - echo location. Bats echo locate by emitting sound pulses and listening for the echoes of these pulses which bounce off objects in the bat's flight path. The principle is much the same as radar or sonar. The evolution of echolocation has meant the development of special adaptions in microbats: (1) the eyes have degenerated to a small size, only 1-2mm, if that, and all species have evolved either (2) a nose leaf - a flap of skin encircling the nostrils and projecting above them, or (3) a tragus - a little

* Rutgers University, Dept. of Biological Science, P.O.Box 1059 Piscataway, New Jersey, 08854 U.S.A.
formerly Wau Ecology Institute, P.O. Box 77, Wau, P.N.G.

finger of skin inside the ear. The nose leaf is thought to help in the transmission of the sound pulse and the tragus may fascilitate reception of the echo; in any case all microbats have one or the other or both of these characteristics, lacking in megabats.

Megabats all belong to a single family, the Pteropodidae or Fruit-eating Bats. About 20 species occur in New Guinea; these species are classified into eight groups called genera (plural of the word, genus). Individual bat species are quite often difficult to recognise, so this discussion will be mostly at the genus level. True Flying Foxes (genus Pteropus) avoid caves and instead roost in trees, singly or in colonies, such as the "camp" at Madang. Equally large bats of the genus Dobsonia do frequent caves. Dobsonia moluccensis are the unnerving monsters (FA 150mm, WS 900mm) which flee their cavern with such commotion, just as one enters the cave and is adjusting to the dim light and confined surroundings. Several smaller species (FA greater than 70mm, WS more than 420mm) also inhabit PNG. Dobsonia bats are recognized by the complete absence of fur on the back and by the way the wing membranes attach to the spine rather than from the central area of the back or the sides, hence the names Naked-backed Bats or Spinal-winged Bats. Dobsonia are dull blackish brown, lacking the pale collar of many Pteropus species.

Another very large cave-dwelling fruit bat, Aproteles, is known in the scientific literature only from fossil specimens ten thousand years old found in a cave in the Simbu Province. The author who studied these specimens speculated, from the prehistoric use of that cave by hunters, that Aproteles may have become extinct in the area due to over-kill when the cave was first discovered. Aproteles may well turn up in caves remote from human settlement. As yet Aproteles can only be distinguished from Dobsonia by skeletal characteristics.

Besides Dobsonia only one other Megachiropteran bat, Rousettus, is regularly seen in PNG caves. The two very similar species of Rousettus have FA 70 - 100mm and WS 400 - 600mm. The wings attach to the side of the body about 10mm from the spine and a narrow track of fur runs down the back. Unlike all other megabats, Rousettus has evolved a primitive type of echo location which enables them to penetrate further into caves than other fruit bats. This echo locating ability is evident when one puts a Rousettus in a bag or box - finding itself in total darkness the bat "switches on" its echo locating instruments and begins making a rapid clicking sound which is a series of sound pulses it uses to generate echoes. These clicks sound very much like the clicks made by certain swiftlets which also echo locate in their nesting caves.

Both Dobsonia and Rousettus feed on fruit and Rousettus, at least, sometimes brings fruit into the cave as a last meal before retiring for the day. These bats are the ones responsible for all the seeds and seedlings growing on the floor of roosting caves. Bats also disperse seeds through the forest and grasslands and are extremely important to forest regeneration in this country. Conservation of fruit bats is actually a two sided problem for some species of Pteropus are very destructive to cultivated fruit crops. Incidentally, many

of the tropical fruits which are so good for eating originally evolved to appeal to fruit bats and in their natural state are fed upon almost exclusively by bats. Among these fruits are bananas, pawpaws, mangoes and breadfruit.

The Microchiroptera include four families of small insectvorous bats, Emballonuridae, Rhinolophidae, Vespertilionidae, and Molossidae.

The Sheath-tailed Bats (Emballonuridae) are distinguished by the peculiar position of the tail. In all insectivorous bats a sheet of skin stretches between the bat's two hind legs and helps support the animal while it is flying. In all other microbat families the tail lies completely within this membrane and extends to the margin of the skin. The tail of Sheath-tailed Bats differs in that it follows the membrane for only part of its length and then it projects out of the top surface of the membrane. One genus of this family, Taphozous, has been recorded a few times from New Guinea. In Australia, these relatively large bats (FA 60 - 80mm; WS 360 - 480mm) are found roosting in caves bordering the sea or lakes.

Leaf-nosed (or Horseshoe) Bats (Rhinolophidae) derive their name from the leaf-like structure arising from the skin around the nostrils. Also, this is the only microbat family lacking an ear tragus. The thirteen species belong to three genera Rhinolophus, Aselliscus and Hipposideros which differ externally on the shape of the nose leaf. Most species are cave-dwellers and are among the bats regularly encountered by cavers. Twelve of the species look much alike - brownish to blackish with FA 40 - 55mm, WS 240 - 330mm - and can be identified only by laboratory examination. However, one species is very distinctive; Hipposideros diadema, largest member of the family in New Guinea (FA 70 - 80mm; WS 420 - 480mm), differs from all other PNG bats by its dark brown fur spotted with patches of white.

The Vespertilionid Bats (Vespertilionidae) are characterized by possession of an ear tragus, and, usually, the absence of a nose leaf. Those genera which do have a nose leaf also have a tragus, which separates them from the regular Leaf-nosed Bats (Rhinolophidae); however, Vespertilionids with nose leaves rarely enter caves. The Vespertilionidae in PNG contain about 19 species in 11 genera. Despite such variety only a few species habitually roost in caves. Myotis adverus is a species which prefers to hunt insects over lakes and rivers. Caves near its favourite habitat are a likely place to find this bat (FA 40mm; WS 240mm). The members of this family most frequently encountered in caves, where they may outnumber other species, are the Bent-winged Bats (Miniopterus), FA 35 - 55mm, WS 210 - 330mm. The unique characteristic of this genus is in the dimensions of the third forefinger: the innermost bone of this finger is about 1/3 the length of the second bone (in other Verspertilionid bats the two bones are about equal in length). Three species of Miniopterus occur in PNG; these bats are blackish, slightly more grey below.

The last family of Microchiroptera recorded from Papua New Guinea are the Free-tailed Bats (Molossidae) recognised by their long tail which extends more than one centimetre beyond the margin of the tail membrane. Of the two genera found in

PNG, only one, Tadarida (FA 35 - 60, WS 210 - 360), has been recorded from caves. Members of this genus usually roost in tree hollows.

One more family should also be mentioned, the False Vampires (Megadermatidae) which range from Asia east to the Celebes Is. (Megaderma) and also occur in Australia (represented by the Ghost Bat, Macroderma gigas). The absence of this family from Papua New Guinea is puzzling and perhaps these cave dwelling bats will eventually turn up in PNG. As their name implies there is no relation between these bats and the Southern American vampire bats; nor do they feed on blood. They do, though, prey on small birds and other bats. The Megadermatidae resemble the Leaf-nosed Bats in that they too possess a nose leaf; in contrast to the Rhinolophidae they have a large ear tragus. Unlike all other microbats the tail is absent.

Cavers wishing to know more about PNG bats are encouraged to obtain a copy of "Guide to Native Land Mammals of Northeast New Guinea" by A. C. Zeigler. Copies are available from the Wau Ecology Institute, P. O. Box 77, Wau, Morobe Province, Papua New Guinea for K1.00 plus postage.

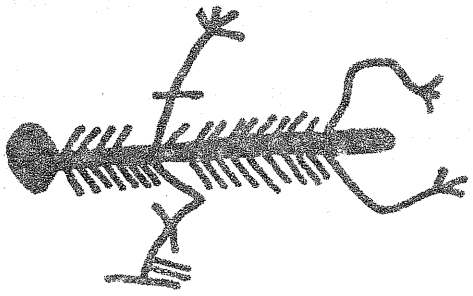
Studying Bats

Cave exploration reports rarely give bats much notice although so little is known about the New Guinea species that even a short description of the size of the colony and identification of the member species would help improve our knowledge of these secretive animals. For instance, most New Guinea bats have been recorded from the island only a few times, due to lack of scientific exploration. Combined with the usual information on geological structure of particular caves and their environs, data on the size and composition of bat colonies will provide information on the distribution of bat species in PNG and their requirements as to cave types. Consultation with local people on their methods and frequency of hunting bats should give some indication of the effects of human predation on bat populations. With a little effort cavers can contribute relevant information on PNG bats.

Part of the problem of studying bats is identifying them properly. Determination of bats to species requires detailed examination and measurement of various external and internal characters and is a job best left for the specialist.

Bats in this country are the property ot the Papua New Guinea government and its people. They should not be captured etc. without the permission of the Wildlife Division, Department of Environment and Conservation and most importantly the owners of the cave.

* * *

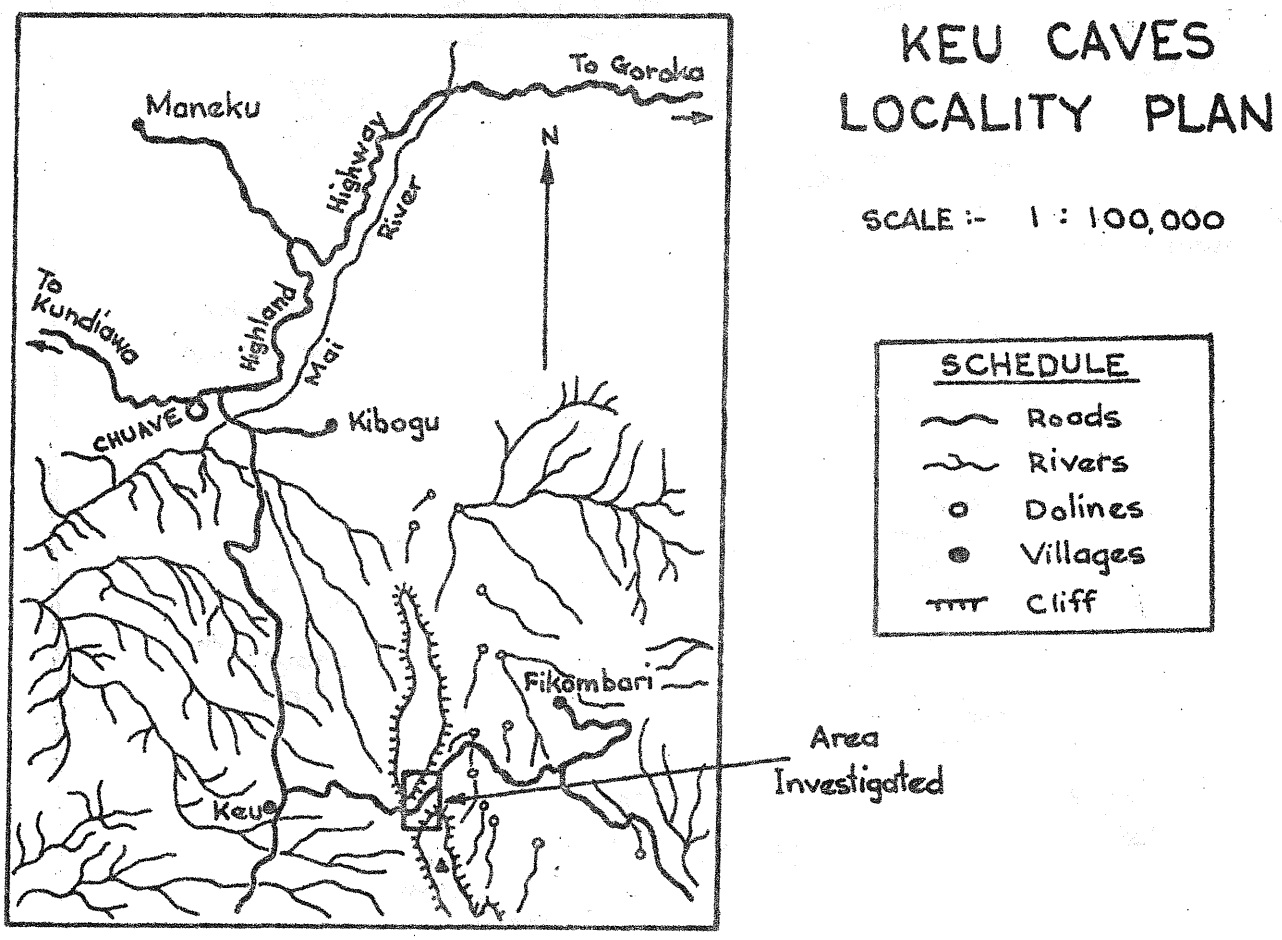


1978 MINI FRENCH SPELEOLOGICAL EXPEDITION TO PAPUA NEW GUINEA

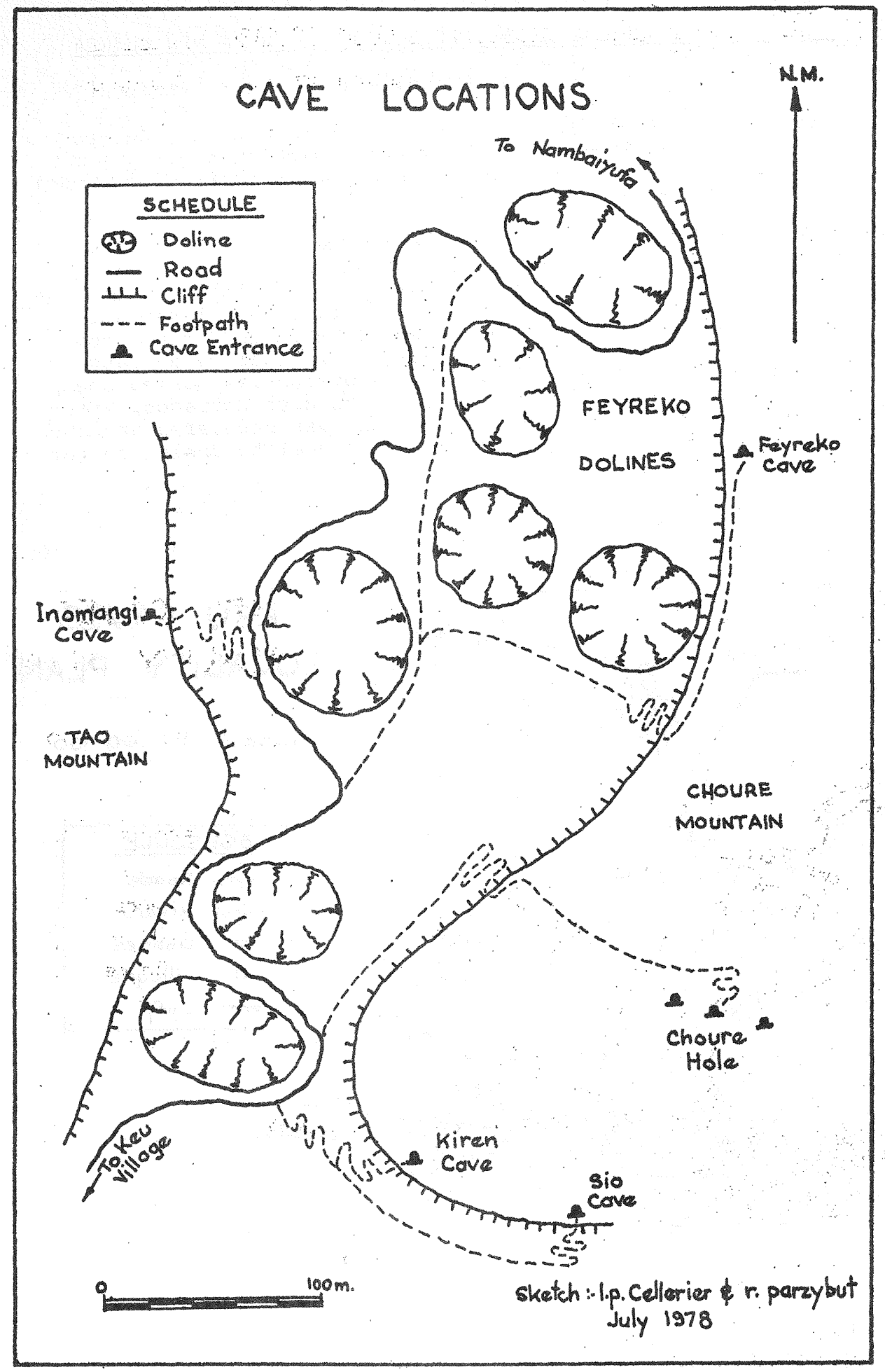
I. P. Cellerier* and R. Parzybut**

The first French speleological expedition to Papua New Guinea took place in July 1978 when two French speleologists, I. P. Cellerier and R. Parzybut accompanied by their wives spent three weeks in Papua New Guinea.

As an initial introduction, Mr. Malcolm Pound in Port Moresby introduced us to coastal Papua New Guinea caving conditions by taking us to the Old Cave in the Javarere area. The walk through the tropical rain forest to the cave was extremely interesting though very hot and tiring. The cave, although suffering from many visits was interesting as a coastal tropical river cave with large numbers of wildlife. This excursion was marred when a villager stole gear that was left at the cave entrance. After enquiries at Doe village most of the gear was recovered and the village councillor laid on a native style meal to apologise for the inconvenience.



* 18 Rue Janssen, 75019 Paris, France.
** Rue aux Chiens, Avricourt, 60310 Lassigny, France.


CAVE LOCATIONS
N.M.
To Nambaiyufa
SCHEDULE
Doline
Road
Cliff
Footpath
Cave Entrance
FEYREKO
DOLINES
Feyreko Cave
Inomangi Cave
TAO MOUNTAIN
CHOURE MOUNTAIN
Choure Hole
Kiren Cave
Sio Cave
To Keu Village
0
100m.
Sketch :- l.p. Cellerier & r. parzybut
July 1978

Two weeks were spent in the Simbu Province, staying at Keu village about 5 kilometres south of Chauve. We are indebted to Mr. Mike Bourke from Kainantu who took us to Keu village and introduced us to the village people. Our visit to the Simbu Province would have been much more difficult without his help. Many caves, possibly previously unrecorded by speleologists were investigated in an area about 2 kilometres east of Keu Village on the Nambaiyufa road (see location plans). The various caves investigated are described below:-

Feyreko Dolines (see cave locations map)

Three of the eight dolines we visited contained caves:-

(a) At the entry of the first doline we found a small shaft about 7 metres deep leading to a narrow passage. It was impossible to go any further than 15 metres because of vertical limestone fluting in the passage which formed a barrier. Vegetal remains show that the cave is an active sink in the wet season.

(b) It's the same with the second doline where the cave quickly blocks off in spite of starting as a dome of about 15m in depth open at the top.

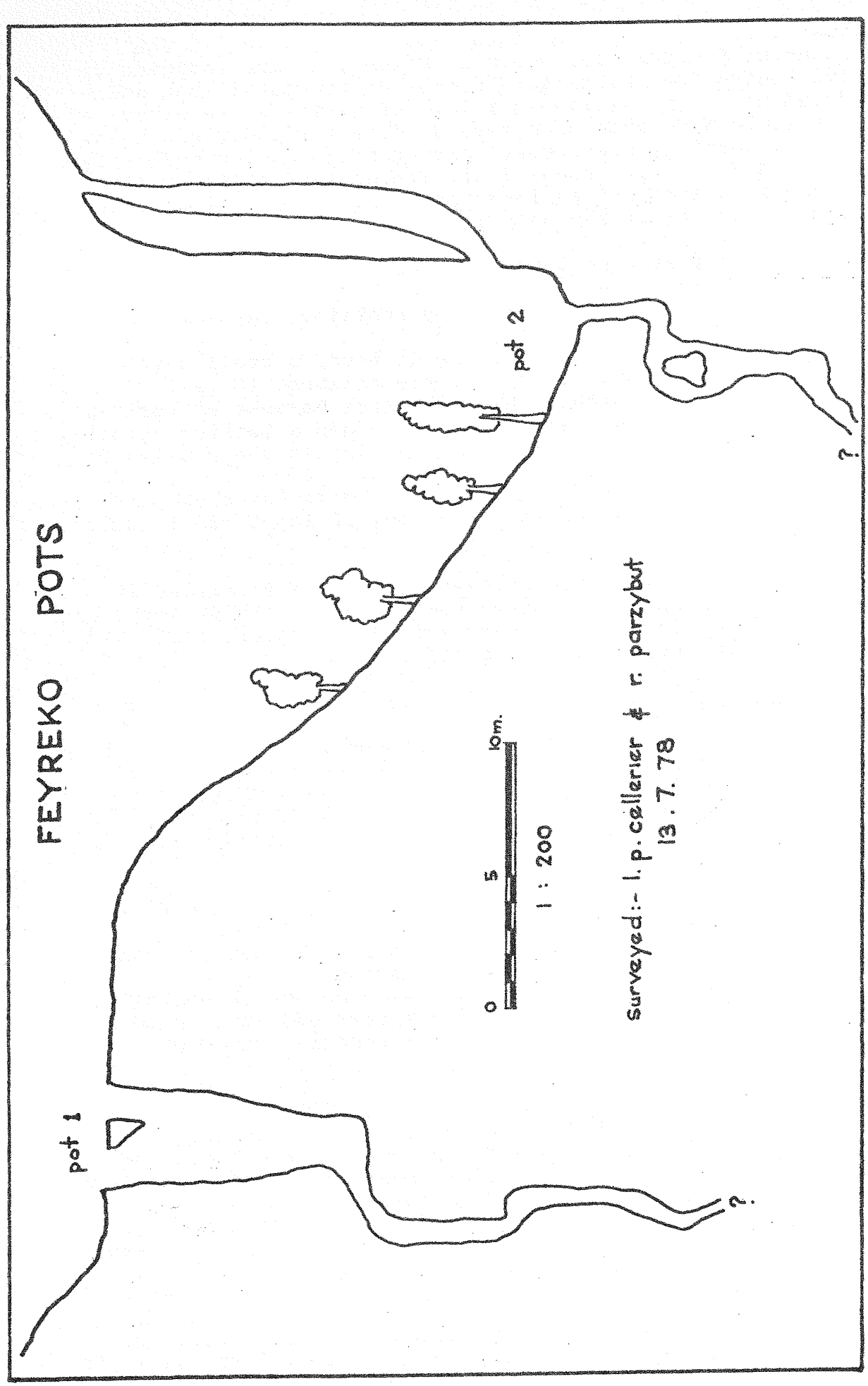
(c) The third doline revealed a shaft which was estimated at 20m deep. The echoes from dropped stones make us think there are possible continuations. It was impossible to explore that shaft as it wasn't on the guide's territory.

Choure Mountain (see cave locations map)

Mike Bourke had told us that the local people knew of several holes on Choure mountain which can be reached via a path leaving the road after the first doline has been passed. The track leads through the forest to an altitude of 2400 - 2450m where the caves occur. They appear to be located along a series of joints.

(a) The first cave has a small entrance about 1m in diameter. By dropping stones we estimated the entrance shaft as 70 to 80m deep and there may be continuations at depth. We noticed that there was a small draught. We were shown this shaft on our first exploration and as there were some problems to equip it, we decided to explore later but we soon realised this would be impossible as this might have created a conflict between villages.

(b) The second cave (Choure Hole) is about 100m from the first and its entrance is 2m wide. An entrance shaft, 40m deep, with deeply scoured sides leads to a floor covered with humus and vegetal remains in which worms 150mm long and 5mm thick can be seen moving. In the humus we found a human remain: a piece of a skull and a radius or a cubitus. A 3m high climb leads to a second shaft, 20m deep which leads to an impenetrable squeeze. The bottom of this pit is blocked with blocks of limestone. Through the impenetrable passage, a small chamber (5m diameter) can be seen which seems to be choked. There is no draught. This cave was not surveyed. We had planned a second visit but our guide refused to take us back a second time. There seems to be land conflict between the two local villages and these caves are situated in the territory of the second village.

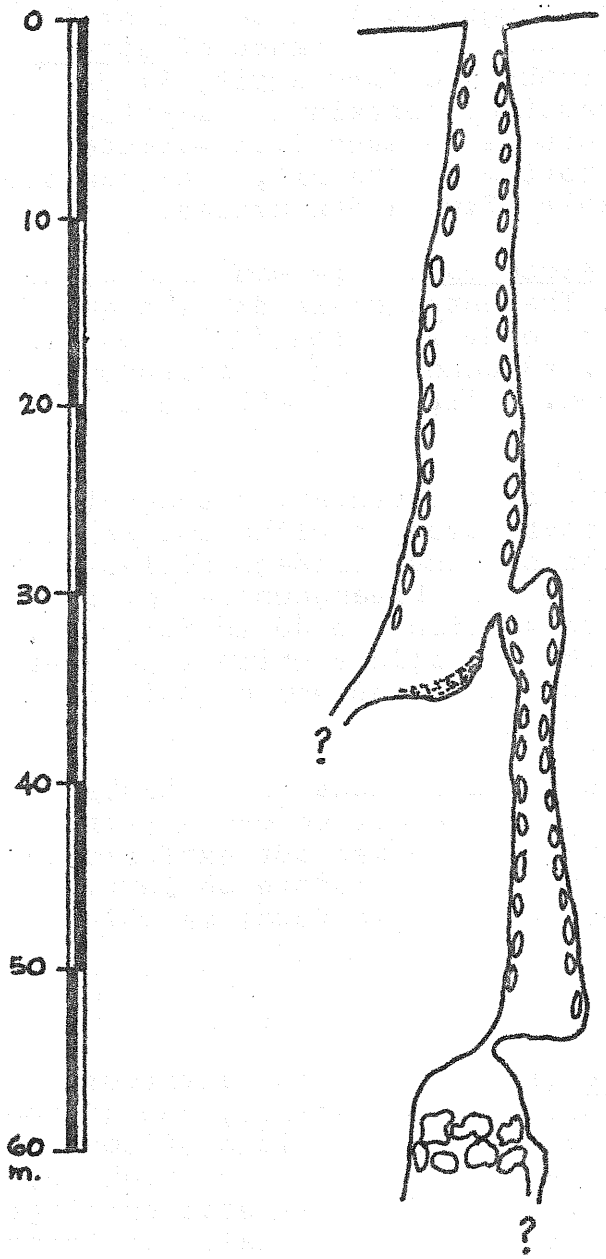

FEYREKO POTS
pot 1
pot 2
?
?
0
5
10m.
1 : 200
Surveyed:- I. P. Cellerier & r. parzybut
13. 7. 78

CHOURE HOLE

DEVELOPED LONGITUDINAL SECTION

Surveyed:- l.p. cellerier & r. parzybut

12.7.78



(c) A third cave was shown to us. It is in the same line as the two others. But for the same reasons as above, we couldn't explore this shaft.

Feyreko Cave (see map)

This cave is situated at the top of a vertical lapiaz (karst area), east of the dolines at the altitude of 2300m. A small entrance, 1m diameter, leads to a chamber whose walls are covered with calcite. The next chamber is of the same type. Both small chambers are obstructed by calcite.

Southern Cliff of Choure Mountain

(a) A walk along the cliff brings you to a wall 5 or 6m high which you have to climb to reach the entrance of Sio cave (see map). Not far from the entrance you find a pit, 8m deep, which is blocked with calcite. A beautiful curtain of calcite is to be noticed. Above this pit there is an aven (10m diameter) which is at least 50m high. At the bottom of the pit, a narrow passage on the left becomes impenetrable after a few metres.

(b) Also in this cliff is Kiren cave (see map) whose entrance can be seen from the road. The entrance is 8m high and 4m wide. A large passage 60m long, 5 to 8m wide and 30 to 40m high, leads to an overhang of 8m. Adjacent to the entrance, a shaft was observed but not entered. A further shaft occurs 15m in from the entrance.

Adjacent to the second shaft is a secondary passage (which we did not enter). After the sharp drop, a climb brings you to a passage perpendicular to the entrance passage filled with slab breakdown. Following down the slab breakdown on the right, we entered a side passage 3m to 4m wide and 30 to 50m high. In the passage we had to walk on sharp scallops which show there was a large stream in this place once. At the end of this is a shaft 30 to 40m deep with a dome above.

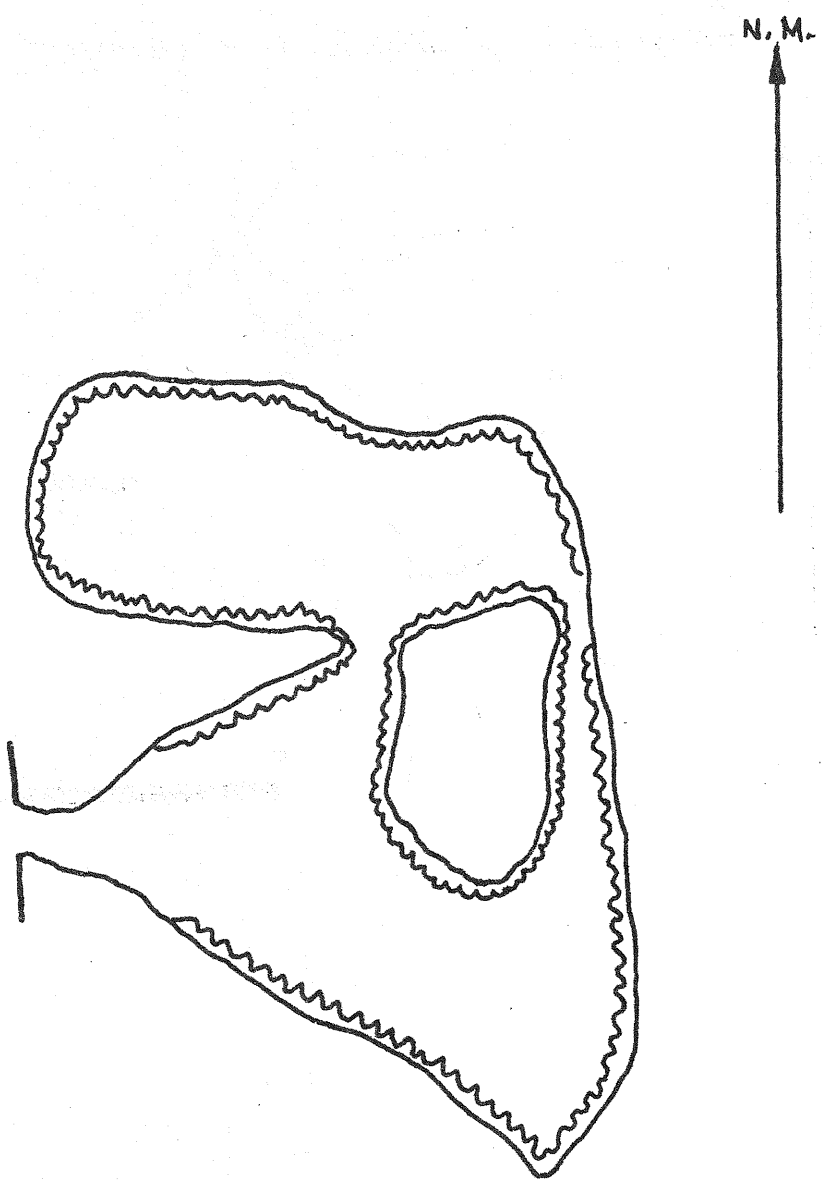
Walking around the pit, the passage leads to a chamber which soon becomes a passage. In this chamber we saw a great number of flying foxes (100 to 200). We stopped our exploration in this chamber for we found the cave the day before we left. Considering the size of the passages we found we think it is an important cave system.

Tao Mountain

Here we found Inomangi cave (see map) at the altitude of 2280m. The entrance is characterised by two openings, one of them being oval, 2m wide and 3m high. A small pitch of three metres leading to a chamber with slab breakdown on the right occurs 30 metres from the entrance. On the left several openings lead to small chambers covered with calcite crystals but these chambers are blocked by calcite.

Climbing the slab breakdown, we reach the ceiling where a small passage leads to a 3m pitch which gives way to a network of big chambers. The first chamber is in the same line as the entrance and is formed by a big slab breakdown. It is 60m long, 15 to 20m wide and 30 to 40m high. Some stalactites decorate this chamber where grey swiftlets live.

FEYREKO CAVE

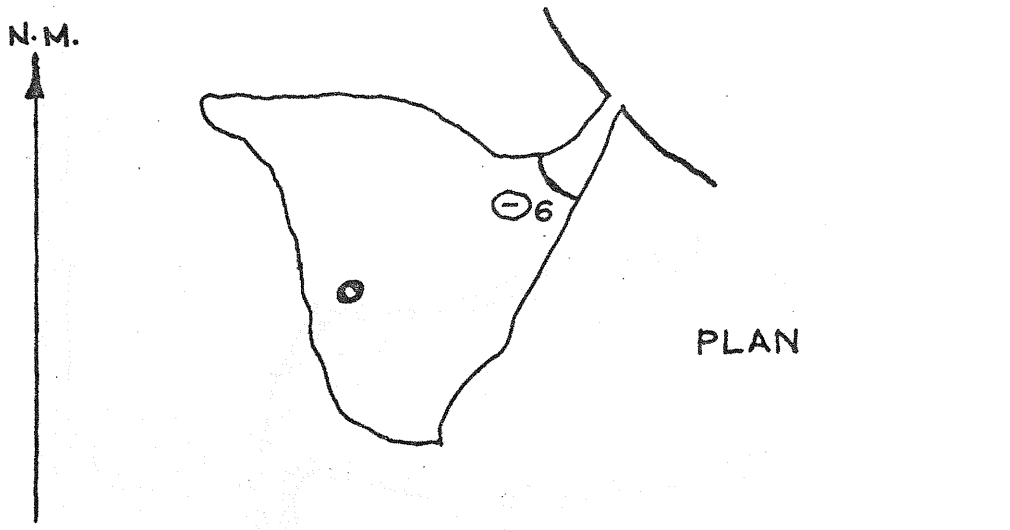


PLAN

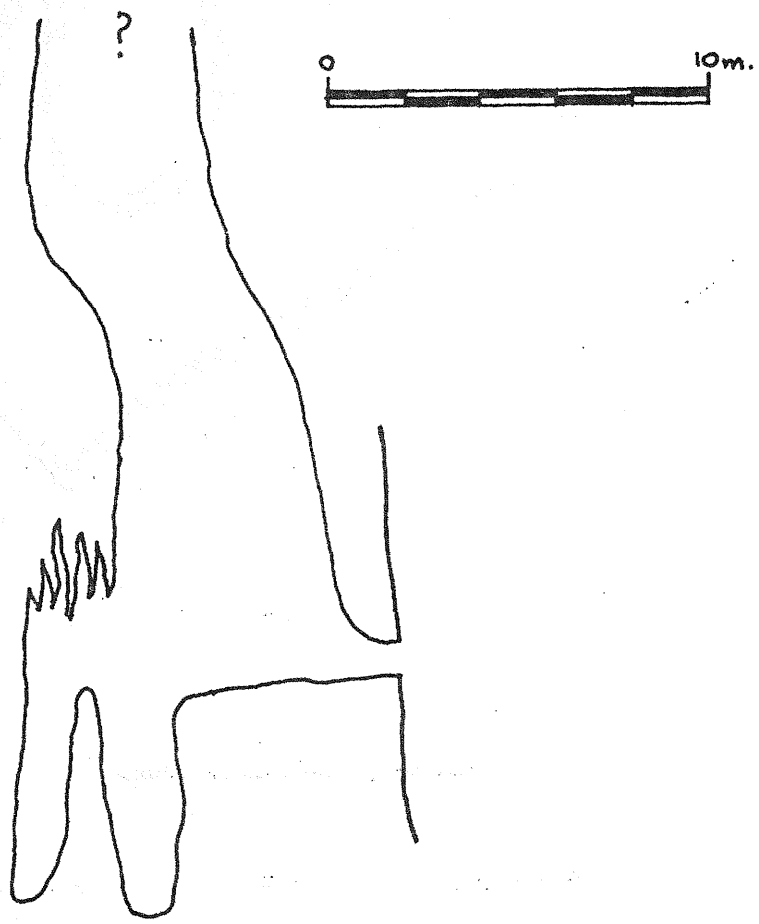
Surveyed:- l. p. cellerier & r. parzybut
13.7.78
A.S.F. Grade 1

SIO CAVE

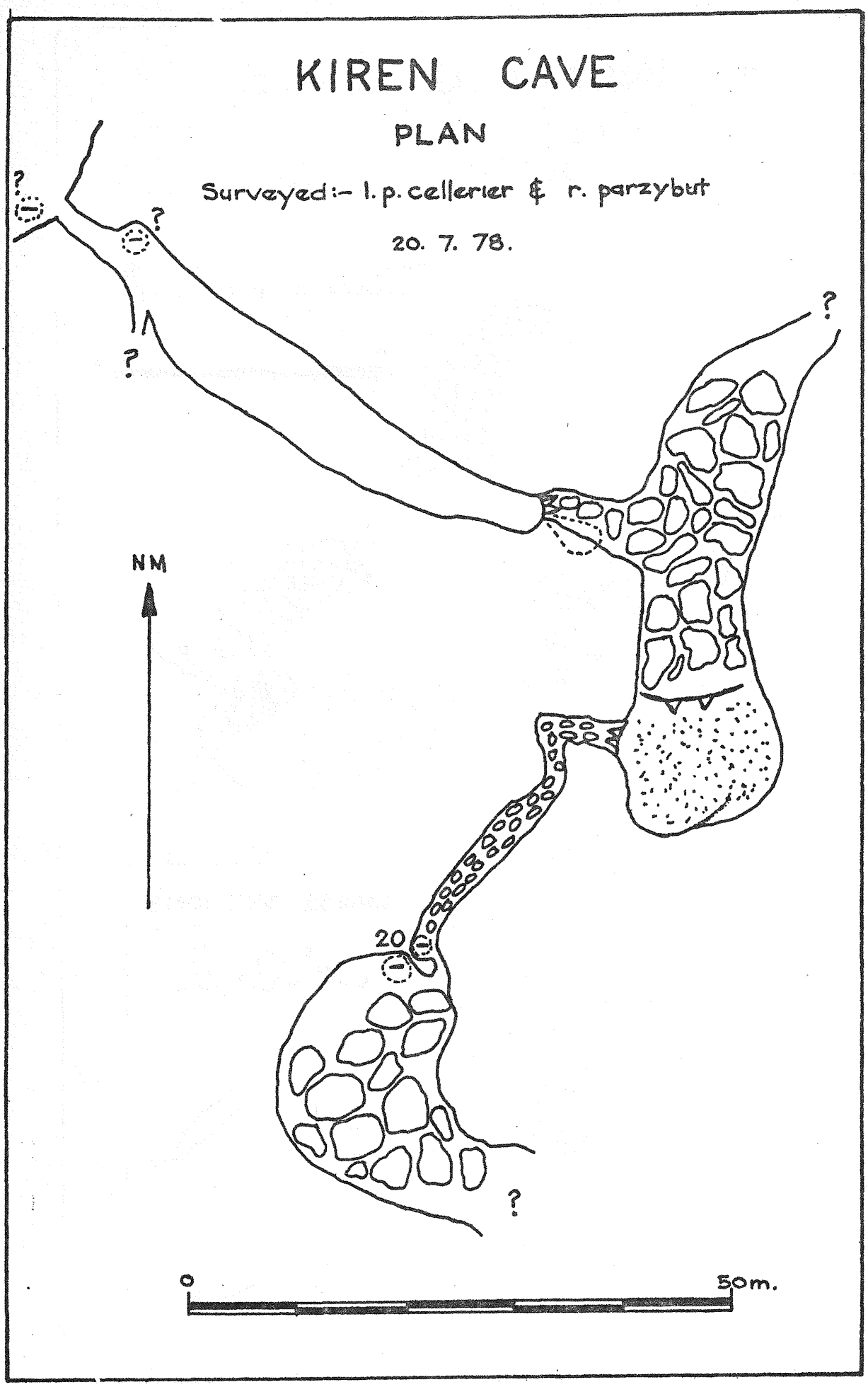
Surveyed:- l. p. cellerier & r. parzybut 19.7.78

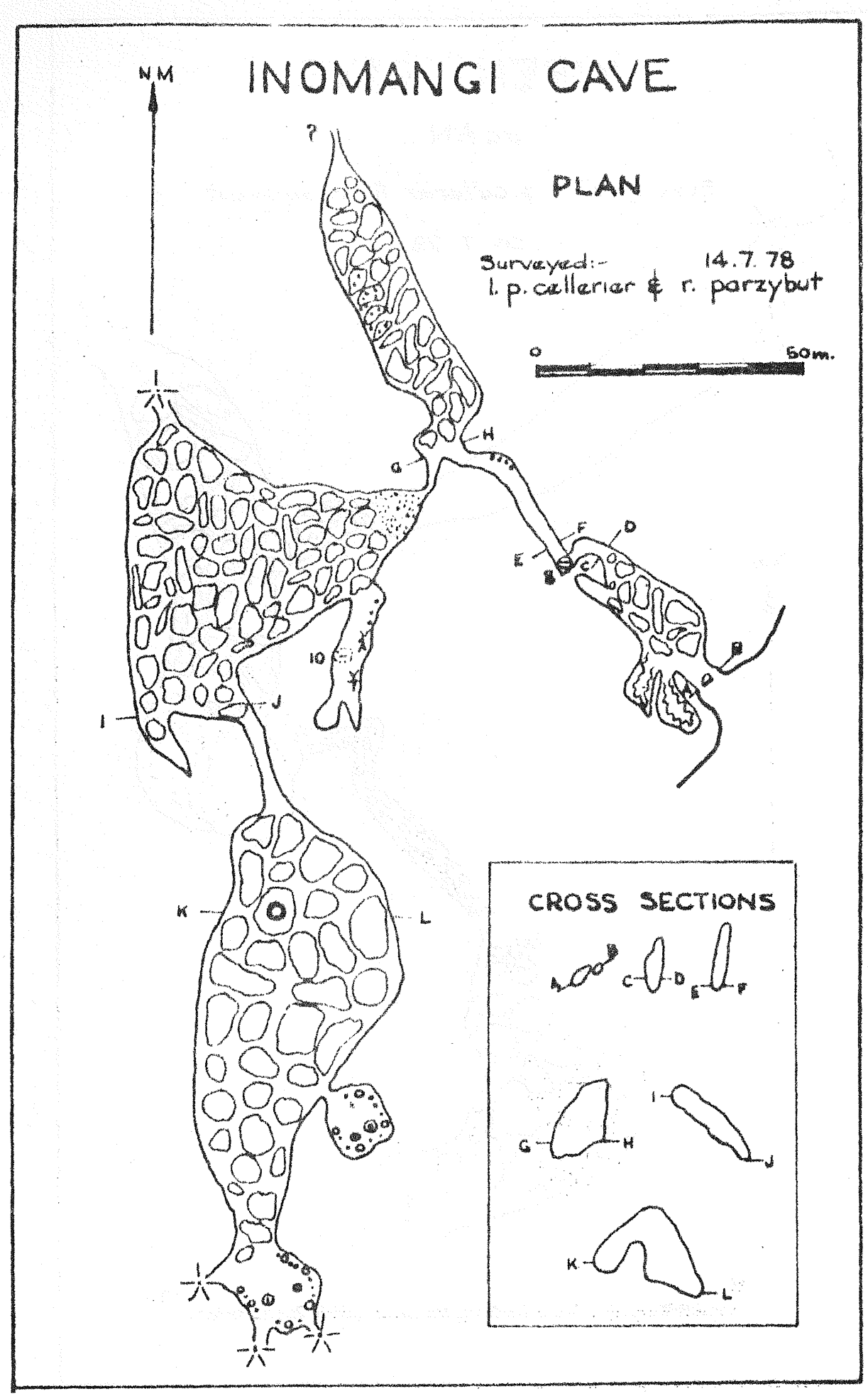


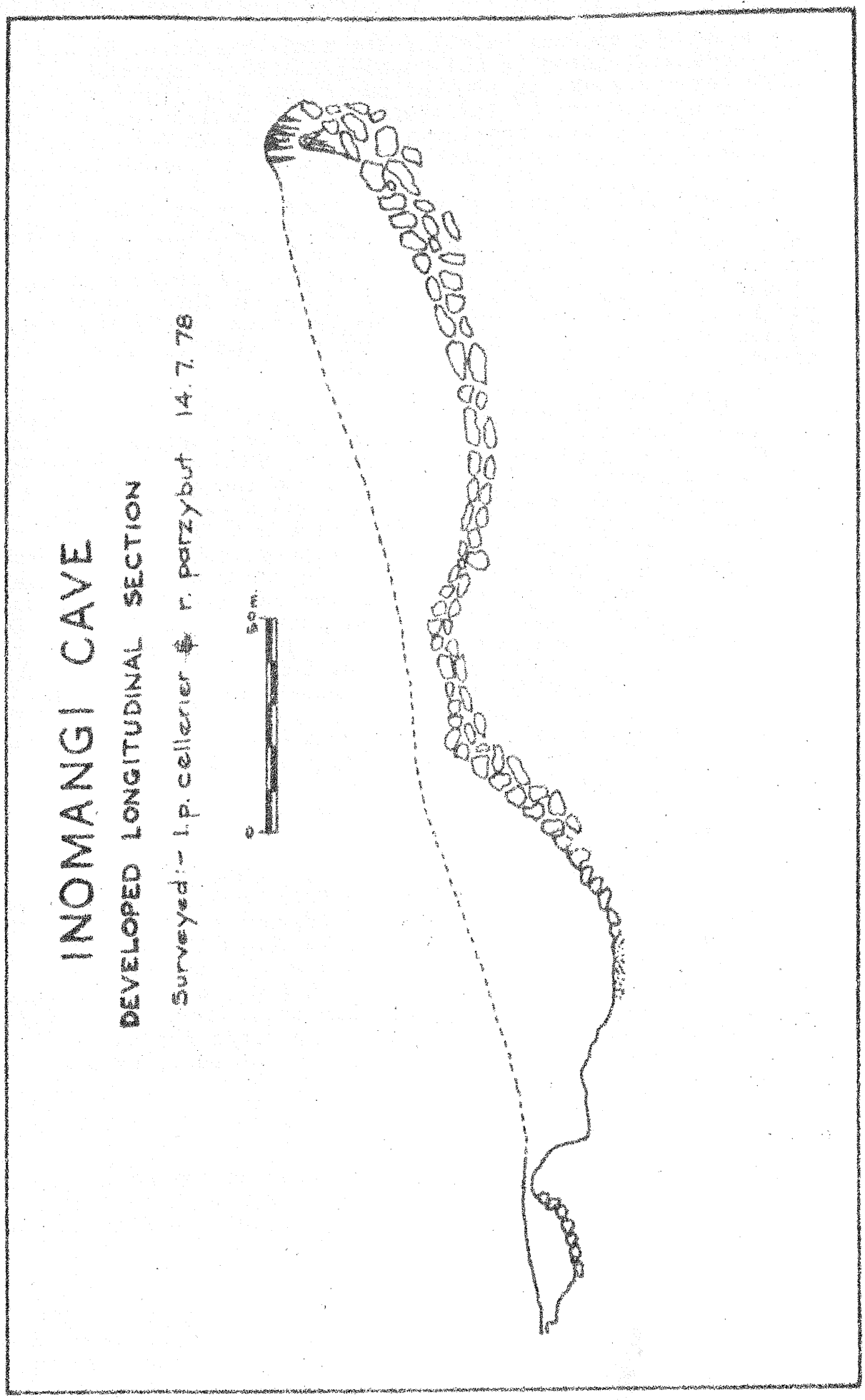
PLAN



CROSS SECTION


KIREN CAVE
PLAN
Surveyed:- l. p. cellerier & r. parzybut
20. 7. 78.
?
?
?
?
NM
20
?
0
50m.


INOMANGI CAVE
NM
PLAN
Surveyed:- 14.7.78
l. p. callerier & r. parzybut
0
50m.
?
A
B
C
D
E
F
G
H
I
J
K
L
10
CROSS SECTIONS


INOMANGI CAVE
DEVELOPED LONGITUDINAL SECTION
Surveyed:- L.P. cellier & P. parzybut 14.7.78
50m.
0

A narrow passage at the entrance of this chamber gives access to another chamber which is formed by an immense slab breakdown. We can reach the roof by climbing the slab breakdown. On the right a dome obstructed by clay appears to have been the entrance for a stream. At the bottom of the slab breakdown, a vault with a angle of 45^{0} is decorated with stalactites and some helictites. In the slab breakdown occurs a pit 2m in diameter and 10m deep. Because of a lack of time we did not explore it.

Walking along the ceilings we reach a huge chamber 100m long and 50m wide. At the entrance, on the right rises a big stalagmite 10m high and 8m diameter. On the left we can see a small chamber full of cave formations. In the roof we noticed three openings through which some water was running. This cave is certainly more important than it looks at first sight but time is needed to search the slab breakdown to locate further passages.

To conclude the Simbu part of the expedition, Mr. Malcolm Pound from Port Moresby and Mr. Allan Goulbourne from Lae came up and took Roger Parzybut on an exploratory trip down Berema cave in the Porol Escarpment above Masul village on the Highlands Highway. Patrick Cellerier was not well and stayed in Masul Police Station during this trip. This cave had first been recorded by Fred Parker and had been briefly looked at several times in 1978. This was the first trip to the bottom. The cave was pushed down the active stream passage over five pitches to a lake at a depth of about 100 metres. The final pitch ended in the deep lake and a swim was required to get a toehold on the adjacent wall. No way on could be seen. Our guide also pointed out several adjacent holes to us but these were not entered.

The final week of our trip was spent on a cultural visit to the Trobriand Islands but no caves were investigated during this period.

Cave formation

During our exploration we noticed that cave formation isn't important because most of the caves in this area are still active, apart from Inomangi cave, Sio cave and Feyreko cave. Most of the cave walls were covered with moonmilk. We found the same type of cave formation as we are used to in Europe only in Inomangi cave. We noticed some stalactites, stalagmites, a very few pool deposits, small draperies and some helictites. Running water is very important in these caves but the conditions for cave formation do not appear to be prevailing at present, except for Berema cave.

Cave Fauna

The following were observed:- (a) shell fish in the water
(b) flying foxes in Kiren Cave
(c) grey swiftlets in Inomangi cave

Conclusions

Tao mountain has only a middle sized cave (Inomangi cave) with a fossil network - walking in this cave can be dangerous because of moving slab breakdown. Several times we heard rocks falling down. Another exploration of this cave should consist of

searching through the slab breakdown to find other possible passages.

Choure mountain is certainly more important, more interesting as far as caving is concerned. Kiren cave seems to be a complicated network and we can suppose that communications with shafts (Choure Hole, etc.) will be found. The principal network which we explored is full of shafts which certainly lead to a lower system, maybe the active section of this cave.

We can also suppose that the lower system functions in connection with the swallets of Feyreko.

During our explorations we were struck by the important size of the caves. We can conclude that this area in Papua New Guinea is certainly very important as far as caving is concerned.

* * *

REVIEW

A. Pound*

Preliminary Notes on Bats from the Bismark Archipelago (Mammalia: Chiroptera). J. D. Smith and C. S. Hood.
Science in New Guinea 8 (2) : 81 - 122. 1981.

The main emphasis of this paper is on the zoogeographic relationships of PNG island bats. To do this work extensive collections of bats had to be made and so of interest to speleologists is the long list of collection sites, many of which are caves. All of the sites are identified both by name and a latitude and longitude. This is followed by a long section which lists each bat with information on where both in terms of geography and habitat the bats were found along with information on taxonomy, breeding and physical characters. This information is sufficient for speleologists to identify bats from island regions. I must remind cavers that it is illegal for non nationals to collect bats without permission. If in any doubt about a bat's identity this paper gives references to other material which could help to resolve the problem. A valuable resource as work on bats in PNG (as it is for most biological work in PNG) is widely scattered in the literature. This expedition also found a new species of bat Hipposideros maggietaylorae (Smith and Hall,1981). The zoogeographic relationship proposed for the bats of the Bismark Islands is that they have much in common with the bats of the Solomon Is., then the islands of the Banda Sea and then mainland New Guinea.The authors propose that this distribution is not just the result of chance (bats flying from one island to the next) but is a result (for most species) of the positions that the islands have held in past geological time.

Reference

Smith, J. D., and Hill, J. E. (1981). A new species and subspecies of bat of the Hipposideros bicolor group from Papua New Guinea, and the systematic status of Hipposideros calcaratus and Hipposideros cupidus (Mammalia : Chiroptera : Hipposideridae) Contrib. Sci. Nat. Hist. Mus. Los Angles Co.

* P.O. Box 102, Kainantu, E.H.P., Papua New Guinea.

* * *

PRELIMINARY REPORT OF THE 1978 FRENCH RECONNAISSANCE EXPEDITION

D. Martinez*, R. Maire** and R. M. Bourke***

Over the period 2nd November to 31st December, 1978, a six man French expedition visited New Britain, the Huon Peninsula and the Kainantu area of the Eastern Highlands. The trip was to prepare for the 1979 French expedition. The team was composed of six cavers: J. L. Fantoli, X. Goyet, R. Maire, D. Martinez, F. Poggia and G. Savournin (Doctor). R. M. Bourke (PNGCEG) participated in the New Britain section of the trip.

New Britain

We spent three weeks in East New Britain investigating some of the gigantic vertically sided dolines and river systems in the karst north of Pomio.

Nare. The first of the giant dolines explored, Nare, was near Nutuve Mission. It was first reported by Lex Brown of the 1972-73 UQSS New Britain expedition (Bourke, 1973). The elliptic entrance was 200m by 100m. Depth to the stream which flowed across the bottom of the doline was 260m. The rope pitch to descend was 217m, a new Papua New Guinea record for length of pitch. The highest side of the pitch measured 310m.

The river cut a passage NE - SW and flowed at an estimated 8-10 m^3/sec. It was not possible to follow the left bank of the river downstream, but we crossed the river on a rope. At the crossing, a beautiful efflux emerges in a waterfall (50 l/sec) 70m high. After a bank of 70m, we were prevented from going further because the flow is too strong. The passage (20m x 15m) continued.

In the downstream direction the passage (25m x 30m high) can be followed for 100m, after which the river fills the entire passage. We could see for 250m.....

At the top of the pitch there is a dry river. After 6 hours of rain it was in flood (1-2 m^3/sec). This water goes underground after 700m.

Minye. The second doline explored, Minye, was between Kapgena and Tuke villages. It was first looked at by Chris Borough and Kevan Read in 1968 (Borough, 1973). (See cover photograph of Niugini Caver 5(1)).

The diameter of the doline is about 450m at the top and 250m at the bottom. The rope pitch was 270m, again a new P.N.G. record for pitch length. Length including the scree slope at the bottom was about 355m. The highest side of the doline is 410m high. On the last stage of the pitch, a 75m free hang, Mike discovered that French Petzl descenders are much faster than the Australian whaletail. The result: two burnt hands, one badly so. The volume of the doline-aven is 26 000 000m^3 (Fantoli, et al., 1979), thus making it the largest karst cavern in the

* AV. A. Briand C4, 83160 La Valette de Var, France.
** 16, rue du Bosquet, 74240 Gaillard, France.
*** P. O. Box 384, Kainantu, E.H.P., Papua New Guinea.

world (Courbon, 1979 p20).

The river at the bottom was flowing at an estimated 15-20 m^3/sec, making it one of the largest river caves in P.N.G.. The river comes out of a sump, flows for 400m across the bottom of the doline and goes into the west wall under a 90m high overhang.

It was possible to follow the river downstream for only 80m. Cave depth here was 366m. Upstream, we crossed the river at the edge of the sump and got into an upper passage. This was 10m high x 8m wide. Stream flow here was 100l/sec. A sloping room of 240m long, 130m high and 200m wide followed. A beautiful efflux (50l/sec) goes down 100m in the chamber. On the NW side, the passage (30m x 30m) continued with many concretions in the stream (40l/sec). After 1000m the ceiling came down to a pool 15m long. The passage opens up again (15m x 15m). Finally after 2350m of passage, the water emerges from a sump. Total development of the system was 3000m. Truly an impressive cave!

The final objective of the New Britain part of the expedition was to Matali River resurgence near Pomio and an associated giant doline 800m above the resurgence. Because of access difficulties, this objective was not reached.

Huon Peninsula

After New Britain, The team spent two weeks in the Sarawaget Range. Although the potential is very good with limestone thickness of over 1000m, results were disappointing as all of the shafts were closed by soil and glacial deposits. The party explored 25 caves around Mt. Sarawaget, only 5 of which were 10m or more deep. The deepest was a mere 19m deep and was at 3800m a.s.l.. The only consolation was that the caves explored were higher than any others previously explored in P.N.G..

Eastern Highlands

Barananomba. At Yonki near Kainantu, Michael Bourke, Norman Flux and Noel Plumley looked at caves near the Swiss Mission in December. These were first reported by Parker (1975) and by Wainwright (1975). They descended two previously unexplored pitches in the river cave, but were stopped by a third pitch. Norman returned with the French expedition and over three days the party joined up the "wet" and "dry" caves and pushed the system to a sump which is just above the resurgence of the river. It was not possible to penetrate this. The cave is 134m deep and 1050m long.

Oravanana. The team also spent several days pushing the Oravanana system near the Obura Swiss Mission. This was first reported by Parker (1975) under the heading "Obura area". The top entrance of the system (Yunamare) was pushed to a depth of 156m and a length of 350m before it became too low. The middle section was explored to a depth of 190m and a length of 1100m before it closed off. The resurgence of the system was surveyed at 330m long. It was not possible to join up the three sections of the system. Daniel Martinez slipped and badly bruised his knee in here. The injury put him out of action for the rest of the trip. Finally three of the team and Norman Flux spent a day in Hell's Gates at Henganofi as a finale for their P.N.G. explorations.

Conclusion

The karst of New Britain (around Nutuve and Pomio) seems to be the most interesting region of the explored parts. However it is critical to come to New Britain in the "dry season" because the subterranean rivers are very big and very dangerous. The next French expedition (and others) will have to find new techniques to explore these rivers if they want to have a successful trip.

A full report of the 1978 expedition has now been published (Fantoli et al., 1978).

Acknowledgements

The assistance of the following is acknowledged with thanks: the French Federation of Speleology; the French Ambassador in P.N.G.; Alison and Malcolm Pound; Paul Courbon and the Australian Ambassador in France.

References

Borough, C. J. (1973). A large cave and doline near Tuke village, Pomio Sub-District, New Britain. Niugini Caver 1 (2) : 25 - 26.

Bourke, R. M. (1973). The 1972 - 73 UQSS New Britain Expedition. Niugini Caver 1 (2) : 27 - 43.

Courbon, P. (1979). Atlas des Grands Gouffres du Monde. Jeanne Laffitte, Marseille. 202pp.

Fantoli, J. L., Goyet, X., Maire, R., Martinez, D., Poggia, F. and Savournin, G. (1979). Nouvelle Guinee 78. Federation Francaise de Speleologie, Paris. 130pp.

Parker, F. (1975). Some caves and rock shelters in the Kainantu area of the Eastern Highlands. Niugini Caver 3 (2) : 35 - 44.

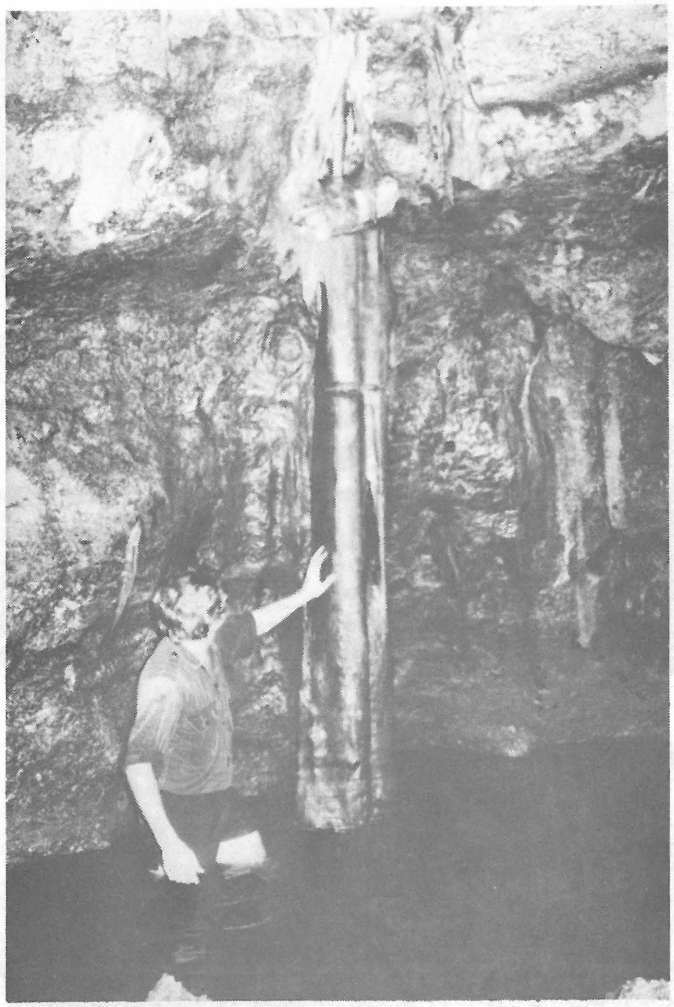
Wainwright, M. (1975). Three caves in the Yonki area, Eastern Highlands District. Niugini Caver 3 (2) : 48 - 50.

* * *

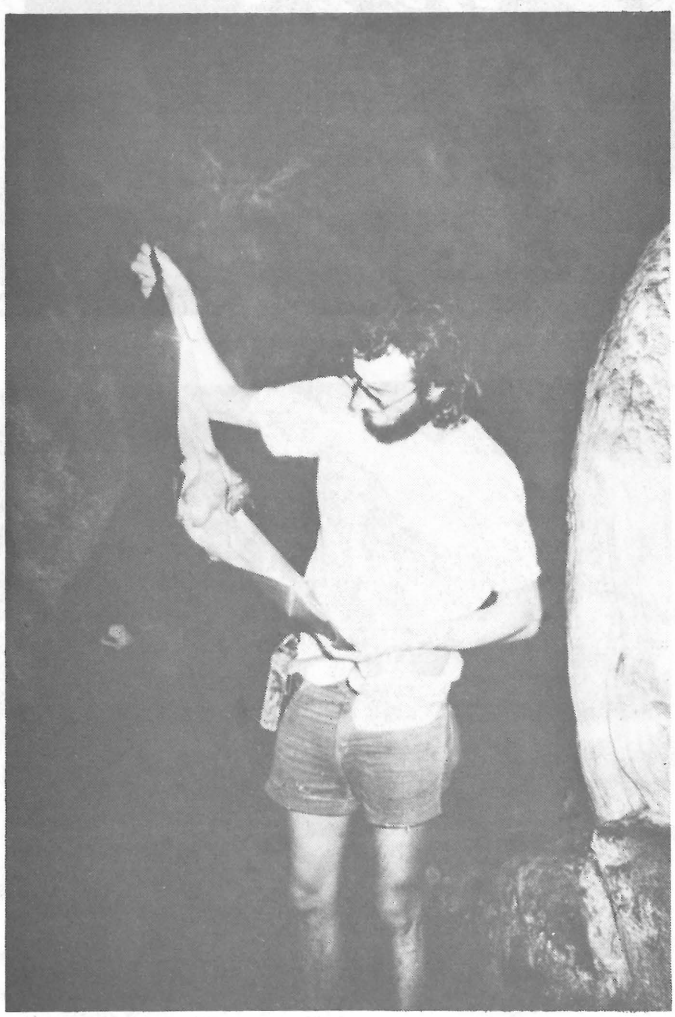
FOUR CORNERS PROJECT

Malcolm Pound had a request for information from an unusual project. It is known as the "Four Corners Project". The director of the project is one David Barr who resides in Michigan, USA. He writes "The Four Corners Project is the construction of the world's largest sculpture using the least amont of material. It consists of an invisible tetrahedron spanning the inside of the earth with the outer four courners just protruding from the crust of the earth. These visible corners are to be located in Easter Is., South Africa, New Guinea and Greenland, with the imaginary planes extending through the earth from each corner to the other three. This corner will be a buried pinnacle of marble barely protruding from the ground like a plant sprouting through the earth's crust. This briefly described project has laminations of data and concepts which give it endurance beyond its temporal physical character".

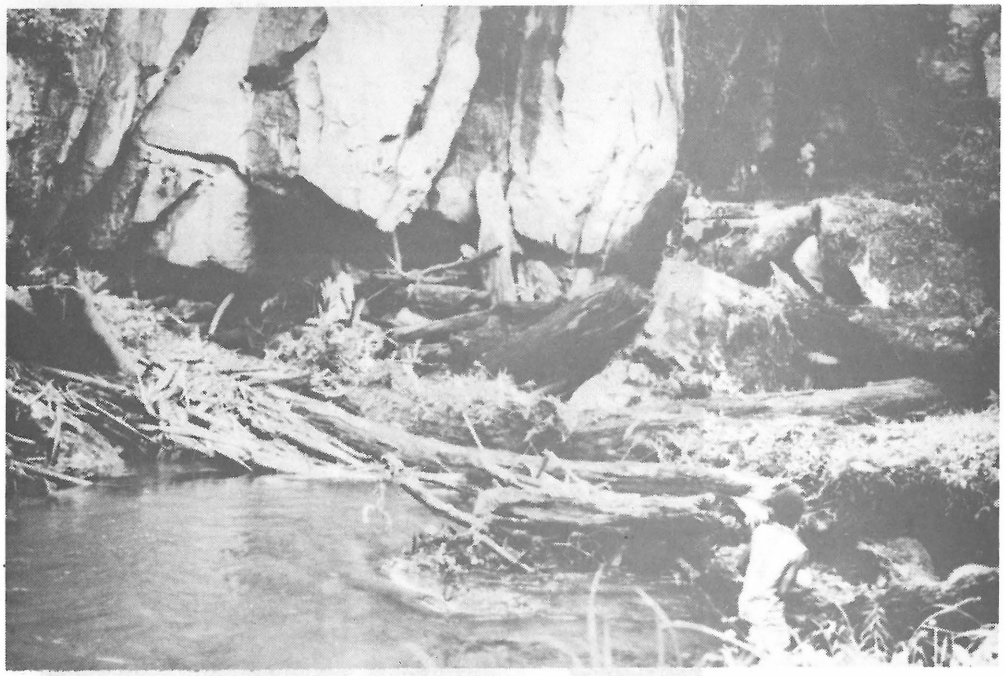
* * *



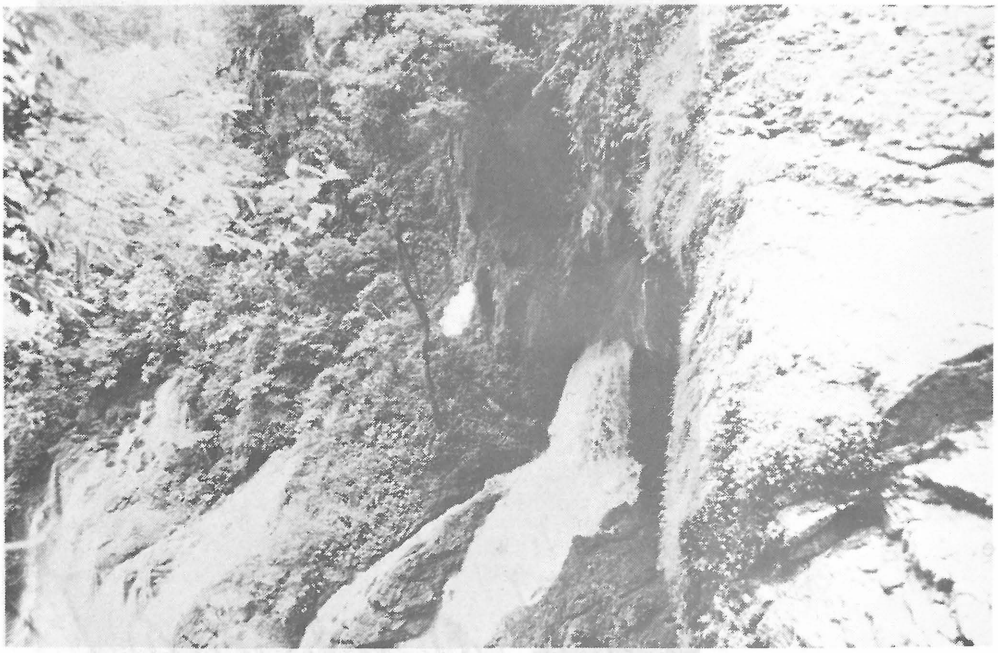
The bamboo formation in Taroku Nantaut Efflux M2 North Solomons Province.
(see page 43)
Photograph: M.D. Pound



Leigh Gleeson examining a Dobsonia moluccensis (a fruit eating bat) in Art Gallery Cave near Doe Village, Central Province.
(see page 64)
Photograph: M.D. Pound



The log choked entrance to the Punua Inflow Cave, M7 North Solomons Prov.
(see page 55)
Photograph: M.D. Pound



The Atea Resurgence above the Atea Gorge.
(see page 141)
Photograph: J.M. James

Panoramic view of the E Mama stream sink at the base of 400 m cliffs.
(see page 127)
Photograph: B. Unger

A PNG OVERLOOK OF THE 1980 FRENCH SPELEOLOGICAL EXPEDITION TO PAPUA NEW GUINEA

R. M. Bourke*

The first speleological investigation of the Nakanai Range took place in 1968 when Papua New Guinea based Australian cavers, Chris Borough and Kevan Read, looked at the system now called Minye. They attempted to explore upstream in the huge efflux of the system, but were quickly flushed out. They then explored the top 60m of the Minye doline-aven but estimated they were still 300m from the bottom (Borough, 1973). Their estimate was accurate to within 10m.

From a helicopter, a geological assistant had reported seeing a huge river effluxing out of a cave entrance high up a cliff near Ora village, so in April 1972 I made a solo reconnaissance trip to investigate. I was able to explore only part of the huge Ora uvala (double doline), but I had seen enough to organize an expedition (Bourke, 1972). At the end of that year six cavers returned to explore Ora uvala and the associated river cave. The river proved too large for our limited resources, and we were able to explore only 600m of river passage before being finally stopped by the force of the water. Aerial reconnaissance by expedition members had located four giant dolines and uvalas in the range. These are now known as Ora, Minye, Nare and Kavakuna (Bourke, 1973).

It was another six years before speleologists were to return. At the International Speleological Congress in Sheffield, England in 1977 I spoke with French cavers who were interested in coming to Papua New Guinea and recommended the Nakanai Range in New Britain as a difficult and challenging region that was likely to yield large river caves, but not really deep systems. A reconnaissance expedition was made by the French in 1978 (see previous article); Swiss cavers explored the Kavakuna system in late 1979; and the main French expedition returned in early 1980 (see next article).

In Europe, Papua New Guinea is exotic and largely unknown. Cave explorers who have come here are assumed to have encountered similar conditions. But Papua New Guinea is an extremely diverse country. In the densely populated parts of the Highland valleys, such as in the Simbu Province, cave exploration is relatively easy. The climate is mild and invigorating; the country is open; the explorer can see where he is going; and the scenery is often spectacular. There are good tracks, albeit steep ones, and a well developed road system allows cavers and goods to move relatively easily; it is possible to buy fresh temperate climate vegetables cheaply; local guides and porters can usually be obtained easily and they have a good knowledge of the local cave systems.

By contrast, New Britain is much more difficult. Temperatures and humidity are high, particularly below 500m, and the climate is debilitating; the rainfall is excessive; tracks are often muddy; the forest is dense and visibility is restricted to 20m or so; there are no vehicular roads and only a few airstrips;

* P. O. Box 384, Kainantu, E. H. P., Papua New Guinea.

all transport arrangements are consequently unreliable and expensive; little local food is available for purchase; porters are often difficult to obtain; and it is more difficult to draw on local knowledge because of lower population densities.

The first cave explorer in the region wrote, "The big problem.... is the lack of access... The limestone areas can only be described as extremely rugged. It is so difficult to walk into these areas that even many experienced Papua New Guinea cavers would not have encountered the severe karst topography that is so typical." (Borough, 1973). This is the environment in which the French cavers worked and their achievements have to be seen against this background.

How do the results of the French exploration compare with other Papua New Guinea caves? Kavakuna II at -459m deep is second only to Bibima (-494m) which is the deepest cave in the Southern Hemisphere. In fact five of the six deepest caves in Papua New Guinea were explored by the 1978 and 1980 French expeditions in the Nakanai Mountains. Liklik Vuvu has a surveyed passage length of 6200m, thus making it the fourth longest cave in Papua New Guinea. The rope pitches in Minye (270m) and Nare (217m) are the two longest rope pitches in the country. The doline of Lusa (60 million m^3) and the doline-aven of Minye (26 million m^3) are the largest in Papua New Guinea, and indeed the world. River flows in Minye (15 - 20 m^3/sec), Nare (15 m^3/sec) and Kavakuna II (15 m^3/sec) are exceeded only by Tobio cave (85 m^3/sec) in Papua New Guinea or, for that matter, in the world.

Prior to the French expeditions, most of the significant caves in Papua New Guinea were known from higher altitude areas in the highlands (over 2000m altitude). The giant dolines and river systems of New Britain were known, but none had been proven to contain deep or long systems. The recent results indicate that other karst areas on New Britain, New Ireland and Bougainville at an altitude of 500 to 1500m are likely to contain significant systems.

A vast amount of exploration is yet to be done in the Nakanai Mountains. Nare could be pushed further, but it would be extremely difficult and hazardous. Ora cave could be explored more easily, and the efflux of Minye should be investigated. Apart from these obvious and spectacular river systems, there are many thousands of dolines to be looked at in these karsts.

French cavers coming to Papua New Guinea have always been ready to listen to advice about new areas and situations. They paid special attention to formal and informal requirements of people in Papua New Guinea, be they government departments, local cavers or village people and they have always been ready to pay their way. Personally I have enjoyed the company of the French cavers from both expeditions and learnt much about equipment and good caving techniques. We hope to see French cavers back in Papua New Guinea, and especially in New Britain, before long.

* * *

PRELIMINARY REPORT OF THE 1980 FRENCH SPELEOLOGICAL EXPEDITION TO PAPUA NEW GUINEA

Jean Francois Pernette*

This very first expedition nationally organised by the French Federation of Speleology was under the patronage of the then President of the French Republic, Mr V. Giscard d'Estaing. It took place from 10th January to 10th May, 1980 in the southern part of East New Britain, near Pomio.

Apart from the discovery of unique karst features such as the doline-aven of Luse (the largest known in the world - 60 million cubic metres), the KA II and Nare systems (respectively the second and third deepest in P.N.G. and indeed the southern hemisphere), the expedition had the opportunity to cope with many unusual difficulties. The exploration of the largest underground rivers in the world has required innovations in caving techniques as well as the continual challenge to overcome obstacles never before encountered underground.

Altogether more than 22km of unknown caves have been explored. Each member of the team has spent at an average, 200 hours underground and walked over 1500km in the jungle....!

These are, in chronological order, the main discoveries:

Kavakuna System (3 entrances)

- The Doline-Aven : Depth = 394m. Diameter = 300m. Sump downstream, 1km of river passage upstream. River flow = 5 - 6 m^3/sec.

- KA II : narrow, alpine type system of pitches. At -300m a large river (15 m^3/sec) flows inside a huge chamber (150m x 100m x 200m). Total length = 3500m. Total depth = -459m (2nd deepest in the southern hemisphere).

- The Matali efflux : A 400m cliff was abseiled down in order to reach the entrance. The river (20 - 25 m^3/sec) was explored for 350m but the force of the water precluded further exploration.

Doline-Aven of Luse

A giant sinkhole 225m deep and 750m wide. It is the largest doline-aven known in the world (60 million cubic metres).

Camp Vuvu

- Big Vuvu Sinkhole : A dry canyon disappears underground after a surface course 900m long and 190m deep. Underground, 600m of rope were necessary to rig a way through numerous pools. Total length = 3000m. Total depth = -414m. (third deepest in the southern hemisphere).

- Little Vuvu : A small dry sinkhole with beautiful calcite formations. Total length = 6200m. Total depth = -288m. (4th longest in Papua New Guinea.)

* 33760 Escoussans, France.

Nare Sinkhole

A giant shaft 300m deep and 150m wide. A large river (15-20 m^3/s) flows at the bottom. Two kilometres have been explored downstream and 1.4km upstream in a large river passage (30m x 40m). Exploration was very difficult and hazardous. One kilometre of rope was necessary. Total depth = 400m. Total length = 4400m. Exploration is incomplete.

Minye Sinkhole

A 350m deep and 400m wide shaft with a large river. At 26 million cubic metres in volume, it is the second largest doline-aven in the world. Total depth = 366m. Total length = 3400m. Exploration is incomplete.

Summary:

Cave	Depth	Length
KA II	-459m	3500m
Big Vuvu	-414m	3000m
Nare	-400m	4500m
Kavakuna	-392m	1800m
Minye	-366m	3400m
Liklik Vuvu	-288m	6200m
Luse	-224m	500m
KA VI	-204m	350m
Oravanana	-190m	1500m
Yunamare	-156m	350m
Barananomba	-134m	1500m
KA V	-113m	150m
Poypun	-110m	200m
Vuvu II	-110m	250m
Sundry other caves		1300m

Complete reports including maps, surveys and photographs have been published both in French and English. A special issue of "Spelunca" (the quarterly bulletin of the French Federation of Speleology) has been published - supplement au No 3, Juil - Sept. 1981. A book (in French) - L'Abime sous la Jungle, Expedition Nationale Francaise - Nouvelle Guinee - 1980 - by J. F. Pernette (collection "aventures extraordinaires", 25, rue Montesquies - 38100 Grenoble, France) has also been published. This book contains many magnificent colour photographs of the caves and the country.

* * *

CAVE LOCATIONS

The editor suggests that the locations of all PNG caves should be fixed using a Universal Grid Reference based on the PNG 1:100 000 Topographic Survey. A Universal Grid Reference consists of two letters followed by 6 numbers (e.g. CQ066652) and gives the location to the nearest 100m. The two letters give the 100 000 metre square in which the point lies. The first and second three numbers give the distance in 100m from the west side and the south side respectively. The title of the 1:100 000 map on which the reference is based should also be given for ease of reference. The maps making up the 1:100 000 topographic survey are easily obtained from the National Mapping Bureau who have an efficient mail order service.

ACCIDENT REPORT

On 1st July 1979, nine members of the Swiss Speleological Expedition arrived in Port Moresby. Two other members of the party had arrived earlier. They then left for Pomio in East New Britain. When exploring in Kavakuna Doline tragedy struck and Rene Marthaler was drowned while crossing the river in the cave. The following article is taken from the statement by Franc Maleckar, a Yugoslavian caver who joined the expedition later. This statement was made to the Coroner and explains the circumstances around the accident.

I was part of a Swiss expedition that visited Papua New Guinea in July - September, 1979. I am a geology student at the University of Ljubljana, the capital of Slovenia in Yugoslavia. I have been caving for 8 years and have also done some mountain climbing. Caving and climbing have techniques in common.

On Sunday, 2nd September,1979, at about midnight one of our party, Rene Marthaler, was killed in a caving accident at Kavakuna Cave about 5 hours walk north of Pomio in the East New Britain Province of Papua New Guinea.

I joined the speleologists at their camp at Kavakuna on Wednesday 29th August. The party then consisted of : Gerald Favre - leader, Rosemary Emery, Christian Rufi, Rene Marthaler, Self, Julius and Martin - two guides from Olaipun Village.

On Thursday, 30th August, I climbed into a gallery at IV on sketch 1 using pitons which the others had placed there before I had arrived. After 40 metres, it came to a dead end.

On Friday, 31st August, I descended into the cave again and removed the ropes, ladders and pitons from IV. We could not follow the river downstream because it went into a sump, so we decided to follow it upstream.

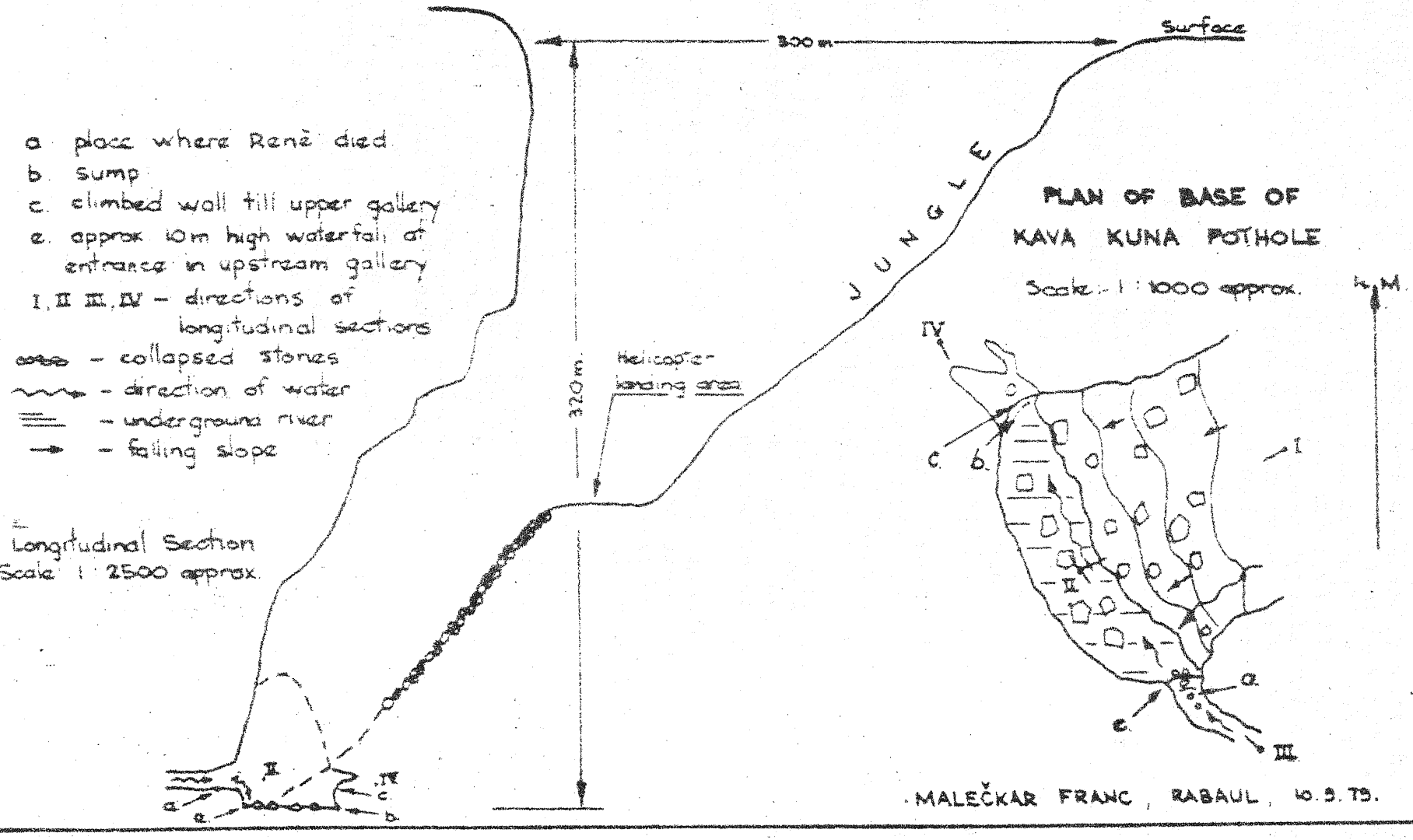
We climbed up a waterfall about 8 metres high (see 'e' on sketch 1) and walked along the stones on the left hand side of the gallery (i.e. the left hand side as we were facing it. The right hand side if you were facing downstream.). We walked 30m along this side to a point 'a' on sketch 1 and point 'A' on sketch 2. It is important to explain what we did here as this is the point where Rene later died. At point 'A' there were no more stones on the left hand side but we saw stones on the right hand side, so, to explore the gallery further we decided to cross the stream. It was about 7 metres wide with a flow of approximately 8 cubic metres a second. We did not measure its depth. It was a sunny day, rare in this area, and some sunlight penetrated this area.

I tied the rope around a rock 'A' in sketch 2. I tied it very tightly. After many unsuccessful attempts I managed to lasso a rock 'B'. I then untied the knot on rock 'A' and tied with the special knot shown in sketch 2. It was then pulled tight (not shown in the sketch). I attached my harness to the rope and using my hands and feet crossed the suspended rope to 'B'. I then walked upstream and saw that the gallery continued. I returned to 'B'. I tried to remove the rope from 'B' to tie it more securely. This could not be done, so I asked Gerald to untie it at 'A'. He did this. I was then able to remove the rope from 'B' and retie it at 'C'. When this was done, I asked Gerald to retie the rope securely at 'A'. I then crossed on it from 'C' to 'A'. The rope sagged a little as I crossed, so Gerald and I

KAVA KUNA POTHOLE

POMIO DISTRICT E.N.B.

a place where René died
b sump
c. climbed wall till upper gallery
e. approx 10m high waterfall at entrance in upstream gallery
I, II III, IV – directions of longitudinal sections
– collapsed stones
– direction of water
– underground river
– falling slope

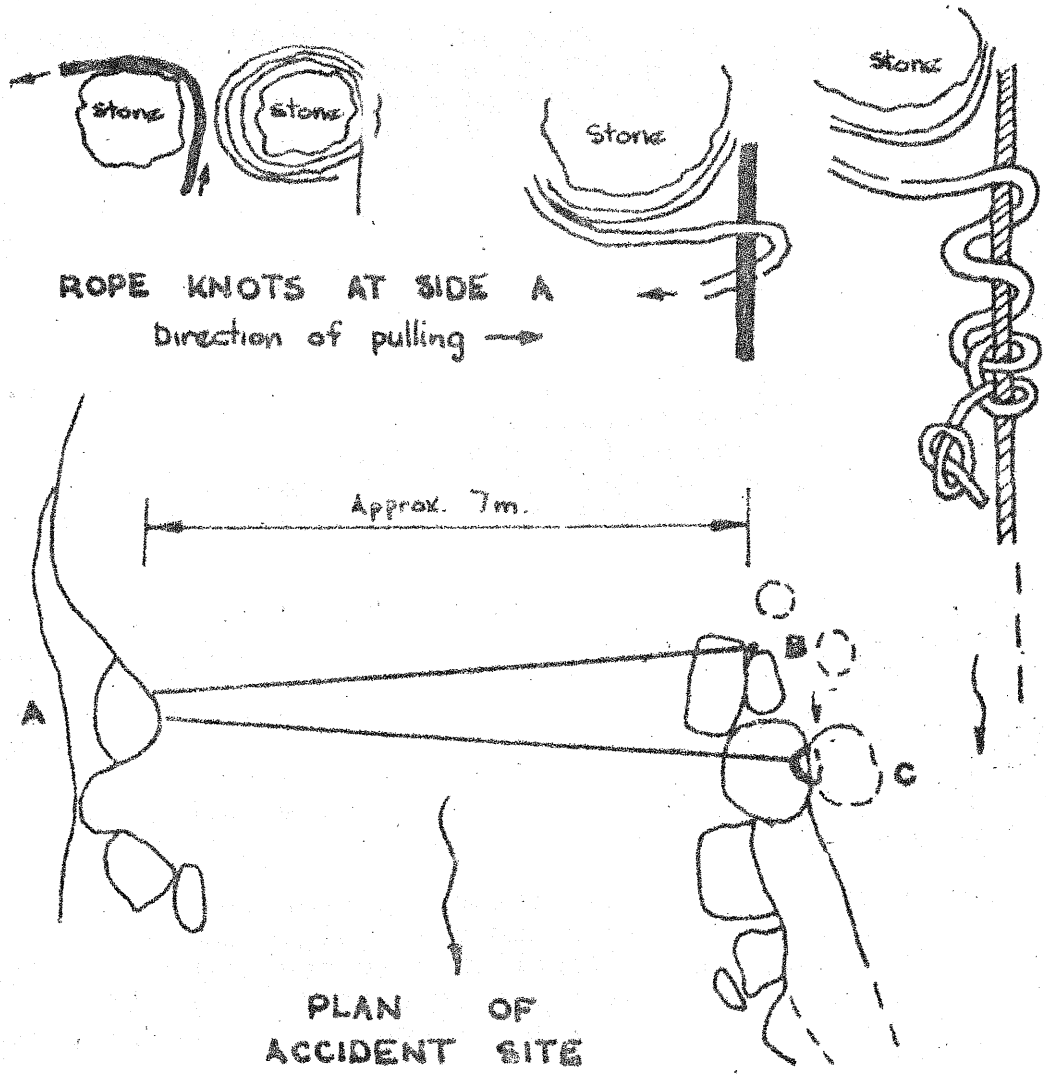


Longitudinal Section
Scale 1 : 2500 approx.

PLAN OF BASE OF
KAVA KUNA POTHOLE

Scale : 1 : 1000 approx.

MALEČKAR FRANC, RABAUL, 10.9.73.



MALEČKAR FRANC, RABAUL, 10.9.79

pulled it tight again and retied it at 'A' using the knot shown in sketch 2. We left the rope in place and went back to the camp.

The next day, 1st September, Gerald and I returned with some more equipment. We both crossed on the rope from 'A' to 'C' and explored the right hand side of the gallery, going upstream for about 100 metres. We passed a waterfall 3m high. We put in a number of pitons and a bolt and used ropes to assist one another in case we lost our footing and fell into into the water.

Eventually we came to a place where water covered the width of the cave and we decided to return. We crossed from 'C' to 'A' on our return journey.

On Sunday 2nd September, Gerald said he would have a rest day. So Rene, Christian and I went in again. We took a lot of ropes, pitons, bolts and food as we intended staying in the cave for up to 30 or 40 hours. We decided to try and finish the exploration of the cave and to map it. I also took my camera. I was the trip leader.

I went first. We all crossed again from 'A' to 'C'. We went up the right hand side of the cave. Rene and Christian carried rucksacks. We came to the point Gerald and I reached the day before. We climbed above that point and came to where the gallery and stream divided into two. The two streams filled each gallery entirely and we could not go beyond that point. We ended our exploration there and decided to return. We had explored and mapped about 300 metres of gallery and were well pleased.

On our return journey we derigged the cave. Rene assisted me and I, him. We noticed that the river had risen since our journey upstream. For instance, three stones that we had walked on before were now submerged. Although we had a rope there, I decided not to try crossing using the stones. I noticed a shelf a metre higher and we were able to crawl along it.

Eventually we reached point'C'. Christian crossed first with a transport sack. In order to recover the rope after we had crossed to 'A', we decided to use a double rope through a loop made at 'C'. Then after we had all crossed we could untie the rope at 'A' and simply pull it through the loop 'C'. This technique had been used earlier to recover rope from the pitons. We untied the rope at 'C'. Christian pulled it across and threw us a longer rope. Rene used nylon tape to make a loop at 'C'. We passed the rope through the loop and threw it back to Christian who tied it around 'A'. I attached myself to the rope with my harness and tested it. I saw that it was not tight enough. Christian had not used the knot that I had used (see sketch 2). Christian does not speak English and I speak very little French, so I explained to Rene in English to tell Christian in French to make the same knot as I had made. It is a knot that can be pulled very tight. Rene tried to do this - he shouted out across the river. There was however at lot of noise both from the river and the waterfall. Also it was very hard to see Christian because of the mist and the water dripping from the roof. It was also very dark - there was no natural light as it was now night time. My carbide lamp was very low at this time as well. I too shouted to Christian to tie the rope properly. I thought it was about time to change my

carbide lamp. I was doing this on a flat rock, when Rene attached his harness to the rope and gripping the rope with his feet and hands started to cross.

I said,'Rene, the rope is not tight enough. You will get wet.'
He said, 'PFFT.'

He had a rucksack on his back full of ropes etc. He began normally but about 1½ metres from side 'A' his feet and hands fell off the rope. He was in the water and the current was strong. He got his hands back on the rope. I called out 'Leave the transport sack' but that was hard to remove as it was held onto his body by a diagonal strap over one shoulder.

He fell into the water again. His harness still held him onto the rope.Christian tried to pull the blockaire but could not do so. Rene was hanging on two ropes: 1. attached with carabiners to both ropes.

2. attached with the blockaire to one rope (the blockaire is made to attach to one rope)

I got in the water and tried to lift the ropes out of the water but with little success.

Christian decided to untie the rope so that Rene would be washed to side 'A' of the cave downstream. There were stones there and he would be above water level. Either too much rope was untied or else the current was too strong as Rene ended up at point 3 on sketch 3. Rene had now lost the transport sack. I changed my position and pulled on the rope and got the upper part of the body out of the water. That was 5 or 10 minutes after he fell in the water. He had no pulse when I felt it. I also saw that he wasn't breathing. I then tried mouth to mouth resuscitation and heart massage. At this stage my carbide lamp did not work any more. I had only a battery lamp.

Christian asked me if he could go and get Gerald and the two native carriers. I said 'Yes.' I was told he ascended the cave with problems but then got lost and could not fine the camp until dawn.

I continued massage and mouth to mouth resuscitation for a hour or more with no result. I noticed the water level rising. I attached Rene to my harness and lifted him to another stone.

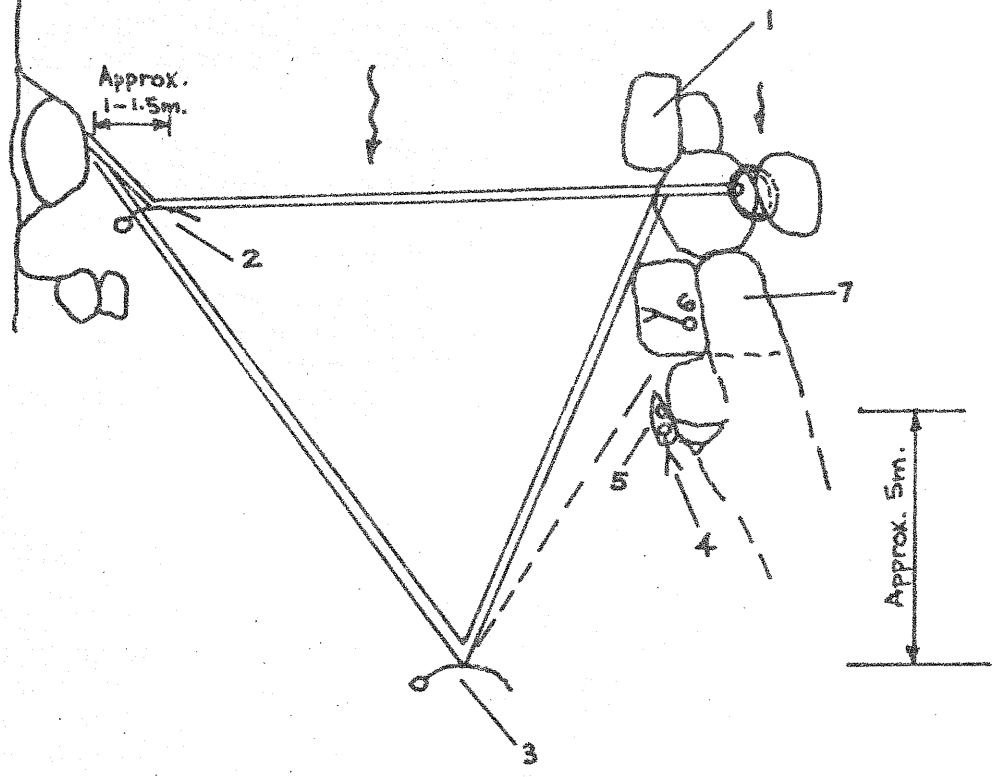
My back was aching. I was exhausted. I fell asleep on top of him. I thought he gurgled. I woke up and continued heart massage and mouth to mouth resuscitation. I shouted at him to breathe. Then the sun came up and I could see what was wrong with my carbide and I changed it.

About 9 or 9.30am on 3rd September, Gerald and a carrier, Julius reached us. Gerald and Julius retied the knot at 'A'.

In my opinion the causes of the accident were as follows:

1. Christian did not tie the rope tight enough because he did not use the knot shown in sketch 2. With the noise level and in the dark, Rene and I could not explain it to him properly.

COURSE OF ACCIDENT



double rope
direction of stream
nylon tape

1. Stone on which I was standing when accident occured. Here I replaced carbide in lamp.
2. Approximate position of body at accident.
3. Position of body after untying rope.
4. – First position of body after pulling of rope 1. Posthon on giving first aid.
5. 2nd. position of body.
6. 3rd. " " "
7. Waited here for help.

MALEČKAR FRANC, RABAUL, 10.9.79

Also I did not speak French and Christian did not speak English.

2. Rene should not have crossed with the rope like that and a strong river that had risen. The fact that he was tired, frozen and happy may have affected his judgment.

3. The fact that Rene was tired, cold and wet would have reduced his strength to pull himself across on the rope.

4. The rucksack on his back contributed to his death.

5. As mentioned above: tired. Although I did not have a watch, I estimate that we began work at 8am and this accident happened about 12 midnight. We were all tired by then.
wet and cold. We were wet through and frozen from walking in the stream or falling in it and the constant dripping from the roof.
happy. We were happy and confident. We were happy that we had fully explored the cave. This was our last passage out of the cave. We were anxious to cross the stream and get out of the cave.

Post Accident Events

1. Tuesday 4th September at 12 noon the helicopter arrived. We had cleared a landing place with the aid of one axe and a small bush knife. This was hard work as the trees were big. Although we had cleared the landing place, we had not got the body up to it. Our strength and man-power was limited.

2. Wednesday 5th September. The helicopter came again and took the body to Pomio. The helicopter returned and picked up Gerald and Christian. Gerald wanted to go to Rabaul and explain what had happened to Rene's girlfriend, Marianne. Helicopter picked up the body from Pomio.En route to Rabaul the helicopter had an engine failure and crashed into a river. No one was injured but the helicopter was badly damaged. Assistant District Commissioner took the pilot, Gerald and Christian to Pomio by speedboat. The body was left in the river with the helicopter.

3. Thursday 6th September. We packed our gear and with 20 carriers walked to Ulapun village six hours away. I walked onto Pomio and saw the body which had been brought out of the river by another helicopter. The doctor in Pomio and the Health Inspector wanted to bury the body because it smelt. I said, 'No, it must go to the morgue in Rabaul and then for transport to Switzerland.'

4. Friday 7th September. I was in the Assistant District Commissioner's office when he phoned on the radio phone for a helicopter. The helicopter came and transported the body to Jacquinot Bay. It was put in a coffin there. I went to Jacquinot Bay. We then flew in a Catholic Mission aeroplane to Rabaul. I helped put the body in the police vehicle where it was taken to the morgue.

* * *

A BRIEF RECONNAISSANCE OF THE KANDRIAN AREA

J. Specht*

In May 1975, a small group of anthropologists visited the Kandrian area to see if any major archaeological sites could be located. As this area has not been visited by speleologists, these brief notes on the area were prepared as a preliminary guide to the area. They may be of some use to future speleologists. As anthropologists are seeking archaeological sites, which are frequently situated in the mouths of large caves or rock overhangs, both anthropologists and speleologists are frequently looking for the same features that indicate caves. Unfortunately anthropologists avoid water as they have no interest in active river caves.

Kandrian is a district headquarters in West New Britain located on the south coast of the island of New Britain. The surrounding country is mainly composed of polygonal karst covering an area of approximately 3000 km^2 developed on Miocene limestone. The limestone forms the Whiteman Range inland from the coast. The extensive limestone and the heavy rainfall have resulted in extensive underground drainage and the possibility exists for very large river caves. The 1:100 000 Papua New Guinea Topographic maps of the area shows numerous large sinkholes in the Whiteman Range. Unfortunately, the maximum depth potential of the area is about 800 metres.

The visitors did not do any cave exploration but noted many sinkholes and caves with passages going some distance. It was the wet season at the time of the visit and this was a serious problem. The rain made travelling inland very difficult and some surface rivers such as the Palicks may be impassable. Flooding underground would be a serious problem.

The following areas are listed where caves were observed:-

(a) A large sinkhole with passage occurs $4\frac{1}{2}$ hours easy walk out of Arihi/Ahi village towards Umbi. The Arihi to Umbi stretch is about $5\frac{1}{2}$ hours fast walk, 7 hours easy walk with no settlements between and very little water.

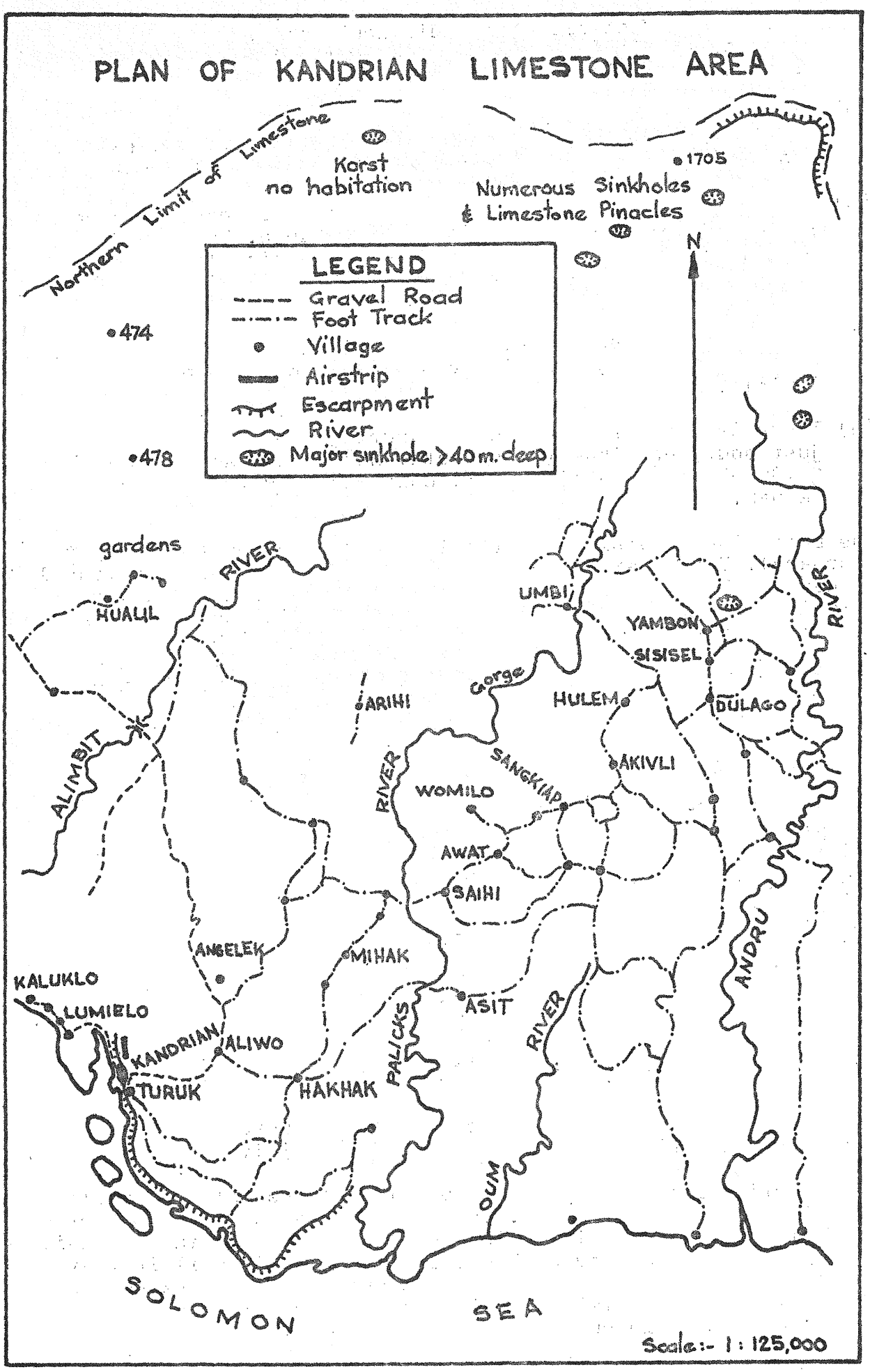
(b) There are no caves of interest in the Umbi - Yambon - Dulego areas, east of the Palicks River though unvisited sinkholes were reported.

(c) The Miocene limestones are very hard and seem to have mainly sinkholes which were of little interest to anthropologists, though the local people say few if any are known to have large passages.

(d) There is very little further south in the Sangkiap - Awat - Saihi areas.

(e) A cave was reported in the Moiya area but was not visited.

* Curator of Anthropology, The Australian Museum, 6 - 8 College Street, Sydney, New South Wales, 2000 Australia.


PLAN OF KANDRIAN LIMESTONE AREA
Northern Limit of Limestone
Karst
no habitation
Numerous Sinkholes
& Limestone Pinacles
1705
474
478
N
LEGEND
Gravel Road
Foot Track
Village
Airstrip
Escarpment
River
Major sinkhole >40 m. deep
gardens
HUALIL
RIVER
ALIMBIT
ARIHI
Gorge
UMBI
YAMBON
SISISEL
HULEM
DULAGO
RIVER
SANGKIAP
AKIVLI
WOMILO
AWAT
SAIHI
ANGELEK
MIHAK
KALUKLO
LUMIELO
KANDRIAN
ALIWO
TURUK
HAKHAK
PALICKS
ASIT
RIVER
ANDRU
OUM
SOLOMON
SEA
Scale:- 1 : 125,000

(f) A limestone pinnacle with a difficult to get to tunnel high up is near Asit (marked as Mihak on the 1:100 000 topographic map).

(g) The most promising area seems to be nearer the coast in particular from Aliwo southwards. At Aliwo is a system of tunnels known as the Ale which may be worth following up.

(h) Over a dozen caves were sighted around the coast, and one in particular seems to go in some distance. This is Yimilo near Iumielo Village. The area is the peninsula running south from the village and is controlled by Kigin of Iumielo.

(i) Several caves near Angelek were visited and clearly contain water in the wet, especially one cave near the haus kiap at Iumielo.

(j) There is a major tunnel near Sanuring the unnamed village just south of Mihak (incorrectly named Lapalam on the 1:100 000 topographic sheet) which is said to extend to Hakhak.

The best time to visit the area is the dry season (December to February). The remainder of the year is too wet for easy travel or caving. The Angelek - Aliwo - Hakhak - Sanuring areas are relatively easy to reach with Angelek and Aliwo being on the vehicle road to Eseli. Accomodation is patchy with haus kiaps at Mihak, Angelek and further inland at Awat, Hulem, Yambon, Asiaun and Moiya. A catechist's house is at Tomugu. The houses are small except at Angelek, being big enough for 3 or 4 people with a bit of a squeeze.

The 1:100 000 topographic map contains many errors. Some correct names are:-

Map	Correct
Sangkiap	Womilo
Akiuli	Sangkiap
unnamed village between Akiuli and Hulem	Akiuli
Iombon	Dulago
Dulago	Sisisel
Seiagit	Yambon (Iombon)
abandoned	Seagit
Lapalam	Mihak
Ahi	Arihi
Mihak	Asit
Alimbit	Kaluklo

There are no hamlets to the north of Arihi. Between Arihi and Umbi there is only one garden area and certainly no habitations.

The Kandrian Local Government Council includes only the village of Asit outside of Kandrian. The other villages operate under the luluai system. It is advisable that anyone wishing to visit the area to look at caves should write to the Council if they wish to work in the Council area. However, with the exception of small caves immediately on the coast, the main caves mentioned above lie outside the Council area.

The area of most interest to speleologists would appear to be the area to the north and north west of Yambon. This area would appear to be three days walk from the road to the last habitations and hence would require a fair sized expedition for worthwhile results to be obtained.

A corrected 1:100 000 scale topographic map showing the karst area of most interest to speleologists is attached.

Editor's note: The above article has been extensively modified by the Editor. Any errors are due to the Editor.

* * *

BOOK REVIEW

In the Spirit of Enterprise. (From the Rolex Awards). Edited by Gregory B. Stone. W. H. Freeman and Company, San Francisco. 1978. 360 pages. ISBN 0-7167-1034-X

In 1976, Rolex (watches) decided to commemorate the 50th anniversary of what they say was the first waterproof watch (the Rolex Oyster case) by giving awards to projects of several types: saving endangered species, adventure seeking, civil engineering, medical projects for the third world and others too numerous to mention here. Rolex gave five Laureate awards worth 50,000 Swiss francs and a Rolex watch, and 26 Honorable Mentions (a Rolex watch). The book contains descriptions of 131 projects culled from 3,000 applications. There are six projects related to caving. One of the five Laureate awards went to Luc Jean-Francois Debecker of Belgium for documenting and mapping all European caves with Paleolithic cave art (at least 156 caves). An Honorable mention went to Jean-Francois Pernette, who led the 1980 French Expedition to PNG, for an expedition to the St. Georges system under the Pierre St. Martin Plateau. He thinks that the St. Georges might connect with the P.S.M.. Rexford D. Lord, a U.S. public health advisor in Venezuela is compiling a field guide to South American bats (about 200 species described with photos of about 150 species). A Frenchman, Jean-Pierre Faray, proposes an expedition to dive the sump in Ghar Parau, Iran. Pierre Lecomte, U.S.A., has a device (or just an idea?) for a miniature dive computer that continuously gives decompression requirements. John Cook, U.S.A., uses "monocycle radar", apparently to detect underground spaces in coal mines. Perhaps it would have some application to cave locating. Each person's address is given in case you wish to contact them.

A second Rolex Awards for Enterprise was conducted and another book published: Spirit of Enterprise The 1981 Rolex Awards. Edited by Gregory B. Stone. Harrap, London. 1981. 460pp.

Of the 169 projects in this book 2 relate to caving. Both received Honorable Mentions. One relates directly to Papua New Guinea. Jean-Francois Pernette proposes a second expedition to the giant potholes of New Britain to follow work already done in that area. Claude Touloumdjian from Marseilles, France proposes an extensive investigation of the submarine river at Cassis near Marseilles.

The other projects in these books make fascinating reading and they are well worth looking out for.

* * *

THE CAVING SCENE

compiled by R. M. Bourke *

This "scene" will cover the period since the previous one was published in Niugini Caver. It thus includes all of 1979, 1980, 1981 and January to March, 1982.

Central Province

The Javavere caves have been the object of numerous trips over the past three years. The PNG Bushwalkers Association have made a number of trips there. Malcolm Pound and Neil Hickson visited the Art Gallery cave in 1981. John Wyeth also got out to Javavere in January, 1982.

The Pounds together with Jill Cheetham and Brian Finch made a trip to the Kupiano area in late 1980 to search for reported caves, but nothing was found.

Eastern Highlands

Over the past few years, there has been a concentration of active cavers in the Kainantu - Goroka area of the Eastern Highlands. Here's a summary of trips since 1979:

(1) Kamasi village area south of Goroka. Michael Bourke, Rod Kerr and Malcolm Pound got down a vertical cave 70m deep in this area in April, 1980. Other caves are reported.

(2) Henganofi. Rod Kerr organised two trips to "Hell's Gates" during 1981. On the second trip a party of 8 cavers from Kainantu and Goroka explored all of the cave. For some novices, the 50m entrance pitch abseil was a dramatic introduction to the art!

(3) Aibura cave, Upper Lamari River. This small cave has been visited by at least three parties of cavers since 1980. In mid 1980 Rod Kerr and Ian Priestley visited the cave. Alison Pound and the Goulbourne family went there in early 1981; and the Bourke family took a party there in February, 1982.

(4) Sonofi area. Michael Bourke and Allan Goulbourne plus kids visited two caves near Sonofi in June 1981. Omuntianele is a 120m long stream cave. Of greater interest is the 300m long Okafunka cave which is an enjoyable system to explore. Part of the cave is very well decorated with drawings (see Niugini Caver 6 (1) : 3-26). Michael returned a few months later with Dave Pease and Malcolm Pound.

(5) Omaura/Arau area. Michael Bourke and Malcolm Pound had a look at a small cave near Waaiammu hamlet in February, 1979. Allan Goulbourne and Michael Bourke explored two caves in September 1980 in this area. They were noted for their long miserable crawls.

(6) Obura area. In October 1979 Michael Bourke, Allan Goulbourne, and Rod Kerr descended Oravanana cave in a bid to make a connection with the higher Yunamare system. After descending five pitches, the party pushed upstream. Rod pushed some tight passages but had to admit defeat in the end.

* P. O. Box 384, Kainantu, E.H.P., Papua New Guinea.

In March, 1980 Michael and Allan returned to the area to look at the reported caves beyond Himarata Village. The caves were 550m lower in altitude than the village - good exercise. Matali cave (Batari cave to J. Peter White, the "Himarata Bridge" to Fred Parker) turned out to sport an impressive underground river and some attractive cave art done in red pigment.

Tuweiwu cave, which is 1500m in length, on the Lamari River was the object of a tourist trip by Michael and Edward Bourke, Carol Clayton, Neil Hickson and Dave Pease in January, 1982.

(7) Yonki. The attractive river cave Barananomba has been visited on five occasions over the period 1979 to early 1982 by the Eastern Highlands cavers. Geoff Francis from Port Moresby, Allan Goulbourne from Lae and Neil Hickson from Hagen have also participated in these trips. The efflux cave of the system which is situated on the eastern side of the ridge and above the Ramu River has also been visited twice by Michael Bourke, Allan Goulbourne, Rod Kerr and Malcolm Pound. Allan planned to dive the sump at the end of this 40m cave until he discovered that the walk into the cave was over some steep country!

Enga

In Easter 1981, Allan Goulbourne, Graham Lash, Martin Richardson and Neil Ryan did a trip to the top of the very rugged Mt. Kaijende. It is believed to be the first ascent of the mountain. One cave was looked at on the trip. In November that year Neil returned with Roey Berger to look for caves, but nothing of significance was found.

Madang

In late 1981 Neil Hickson, Geoff Nicol, Dave Pease and Malcolm Pound visited three caves in the Omaru area near Madang. Our spies report that their memories of the weekend were unfortunately erased by excessive imbibing.

Milne Bay

In July 1980, Cliff Ollier (University of New England) and Colin Pain (University of New South Wales) did some caving near Gurney. The cave, known as Damawewe, was surveyed except for a narrow passage complete with stream and a resident snake.

Morobe

In March 1982, Michael Bourke made a quick visit to the well known "Mapos caves" in the Snake River area of this province. There is a K1 entrance fee for which the visitor receives a printed receipt.

New Britain

In July - August 1979 a Swiss expedition visited the Pomio area. Kavakuna sinkhole was descended to a depth of 320m. The stream passage was explored upstream for 300m. Another pothole (Kava Martel) was explored to a depth of 100m. The cave continues. The expedition ended in a tragedy when one of the cavers, Rene Marthaler, was drowned. A series of bad scenes followed for the Swiss including a helicopter accident, problems with the police in Papua New Guinea and the dead caver's family (see report in this issue).

Between January and May 1980, the French cavers mounted a major expedition to the Nakanai Range of New Britain. The team achieved excellent results which are printed in summary elsewhere in this newsletter. A book on the 1980 expedition by Jean Francois Pernette entitled "L'Abime sous la Jungle" has just been published. All of the French work in PNG is described in a special English edition of Spelunca.

New Ireland

The 1979 Swiss expediton also visited the east coast of New Ireland and the Lelet Plateau. Lemerigamas cave on the Plateau was pushed to a depth of 203m and a length of 1300m. The Dalum efflux was extended to a length of 1200m. A previously unreported cave 120m long was explored near Namatanai.

North Solomons (Bougainville)

The cavers on Bougainville under the leadership of Hans Meier remain active. The December 1979 issue of the North Solomons Cave Exploration Group Newsletter (Vol. 2 number 7) summarizes the activities of 1979 as follows: Seven trips were made in 1979. These went to Nenduma cave, Taroku efflux, Siwema area (3 days), Panua efflux, Buka Island (2 days) and Arakawau. Ten new caves were described, some with surveys. As well the cave surveys of Taroku Efflux and Panua Efflux were extended. In addition to the usual exploration and surveying, cave water was collected for testing from Buka Island and bats, swiftlets and insects were collected.

In 1980 trips went to Arakawau, Taroku Nantaut M2, Kaviropaia-Keriak, Arakawau and Keriaka Benua. The last trip was to the "Big Hole" on the Plateau - a very impressive cave. The 1981 trips went to Taroku Efflux, Kopani, Urumovi and Paika.

An indication of the level of activity is that the first three trips for 1981 had 10 cavers per trip on average. The North Solomons Cave Exploration Group Newsletter has been appearing fairly regularly and contains some well produced cave maps. Hans reports that a monthly barbecue for cavers at his house is even more popular than the caving trips.

Simbu

In 1979 Dave Gillieson (University of Queensland) visited the Nombe rockshelter near Chuave to assist archaeologist Mary-Jane Mountain with geomorphological and sedimentological studies. A paper on the work has just appeared in Helictite (Vol 19 no.2).

On the second day of 1981, Michael Bourke, Lex Brown (from Brisbane) and Tony Stearns (from California) headed up to Berema cave in the Porol Escarpment for three days. The trip took place 21 years after the first caving trip by speleologists in Papua New Guinea (3rd January, 1960). Berema was first reported by Fred Parker and has been visited by PNGCEG cavers twice since 1978. On the second trip the party was stopped by a lake. On the 1981 trip, the lake was no longer there and the cave was pushed to a sump at 120m. It was surveyed. The cave has 7 rope pitches and is pleasure to explore.

Early in 1980, Rod Kerr did a trip to the Kaimomo cave near Chuave with a party from the Goroka Teacher's College. Neil Hickson and John McCarthy got out to Irukungai Cave in the Porol Range in August 1981 for a look-see.

Southern Highlands

After the conclusion of the French expedition to New Britain in 1980, Richard Maire, Jean-Francois Pernette and Jean-Paul Sounier accompained Michael Bourke on a trip to the Southern Highlands. Here the karst areas of the Nembi Plateau (west of Mendi) and Erave-Kagua were visited. Richard, who is a professional karst geomorphologist, had a field day photographing the varied karst landscapes seen. On the Nembi, Jean-Francois and Jean-Paul explored two caves previously looked at by Mike. Orabel turned out to be a complex system some 250m long. Pemnekpus was pushed down a series of pitches to a depth of 75m that terminated in a tight muddy squeeze. There is no truth in the rumour that all 5000 members of the Federation Francaise de Speleologie will be visiting Erave next year.

Dave Gillieson, Jill Landsberg and Neil Ryan got down 4 or 5 caves in the Erave area during 1979. Euclid D'Souza has made a number of trips since mid 1979 to some caves in the Kagua area. Robin Field got down to the very impressive Iaro River cave near Kagua in late 1981 with some students from Ialibu High School. He returned with Neil Hickson and Carol Clayton in March, 1982.

West Sepik

In 1979, Dave Gillieson and Jill Landsberg from the University of Queensland returned to Selminum Tem and the Finim Tem area west of Telefomin. They also visited the Oksapmin area where they did some caving with Nicky Cape (based in Oksapmin) and Rod Edwards from Port Moresby. Dave and Jill are continuing research work started in 1978 on cave mud and botany respectively.

Western Highlands

Neil Hickson and Neil Ryan visited a small cave near Mount Hagen in the Waghi Valley in late 1981.

Expeditions

Another ambitious expedition will return to the Muller Range in June 1982 under the leadership of Julia James. There will be fifty cavers and scientists in the field for up to three months. If the results of the previous expeditions to the area are a guide, we can look forward to a lot of good caves being explored.

Mt. Kaijende near Porgera in Enga Province boasts the most rugged karst in Papua New Guinea. Reconnaisance caving trips have been made there in the past by Kevan Wilde, the 1978 Spanish expedition members, Allan Goulbourne and Neil Ryan. No caves of any significance have been found. From June to August an expedition will be sent to the area under the joint leadership of Neil Montgomery (a USA based Australian caver), Donna Mroczkowski (USA) and Neil Ryan (Mt Hagen). Expedition members will come from the USA, Switzerland, the United Kingdom, Australia and Papua New Guinea. It is anticipated that there will be 20 to 30 cavers on the trip.

An expedition to Papua New Guinea was planned for July to September 1981 by ten cavers from the Gruppo Speleologico C.A.I. Roma in Italy. After initial correspondence, nothing more has been heard from the group. Another proposed expedition from Europe which seems to have faded away was from a group of Polish cavers based in Crakow. Yet another proposed expedition that did not eventuate was one to the Whiteman Range of New Britain planned by some Sydney based cavers for December, 1981. There has been no news of a proposed English trip to the Lavani Valley in the Southern Highlands scheduled for 1982. Vague plans for French and Spanish expeditions for 1983 have been mentioned in correspondence with cavers from these countries.

People

Merle Busenitzand and Tim Husk are two residents of Ukarumpa (near Kainantu) who have been doing a bit of caving in recent years. Both returned to the USA in April, 1982.

Louis Deharveng is a French biologist and caver who visited Papua New Guinea in 1978. During his visit here he contacted the "cavers' disease", histoplasmosis. He thinks this may have been in a Chuave cave.

Euclid D'Souza, Robin Field and Colin Thomas are three cavers who are based in the Southern Highlands. Euclid is originally from India and is now based in Tari; Robin is an Australian and is at Ialibu; whilst Colin is a Kiwi and is in Mendi "stret". Euclid has been living "in the bush" for the past two years on a karst plateau (Nembi Plateau). Robin transfered up to Ialibu from Passam National High School near Wewak.

Geoff Francis who was based on Manus for two years before returning to Australia to do his Ph.D. has now returned to Moresby. He is with the Geological Survey and should be in Moresby for several years at least. Extended periods of field work in 1982 will take him to the Muller Range and the Kainantu area.

Chris and Allan Goulbourne will be going finish back to the UK in June 1982. Allan does not plan to continue his diving activities in the English Channel.

Rod Kerr moved up to Goroka from Australia in late 1979. He has been doing some climbing and caving in parts of the Eastern Highlands and Simbu Provinces. Rod was married in 1981. He plans to go finish later in 1982.

Geoff Nicol is another Kainantu caver to join the "gone finish" ranks. He returned to Australia in late 1981.

Dave Pease is another caver who knows where the good climate is to be found. Dave transferred from the Markham up to cool Kainantu in late 1980. Under pressure, he also admits to involvement in the Highlands Highway sealing.

Malcolm and Alison Pound moved up to Kainantu in February 1981 where Malcolm has been working on the Highlands Highway. They produced a son, Timon,in January 1982. In May this year they will be returning to Australia to live on the Gold Coast.

John Wyeth is a fairly new arrival in Moresby. He came in September 1981, to work with the Institute of Applied Social and Economic Research.

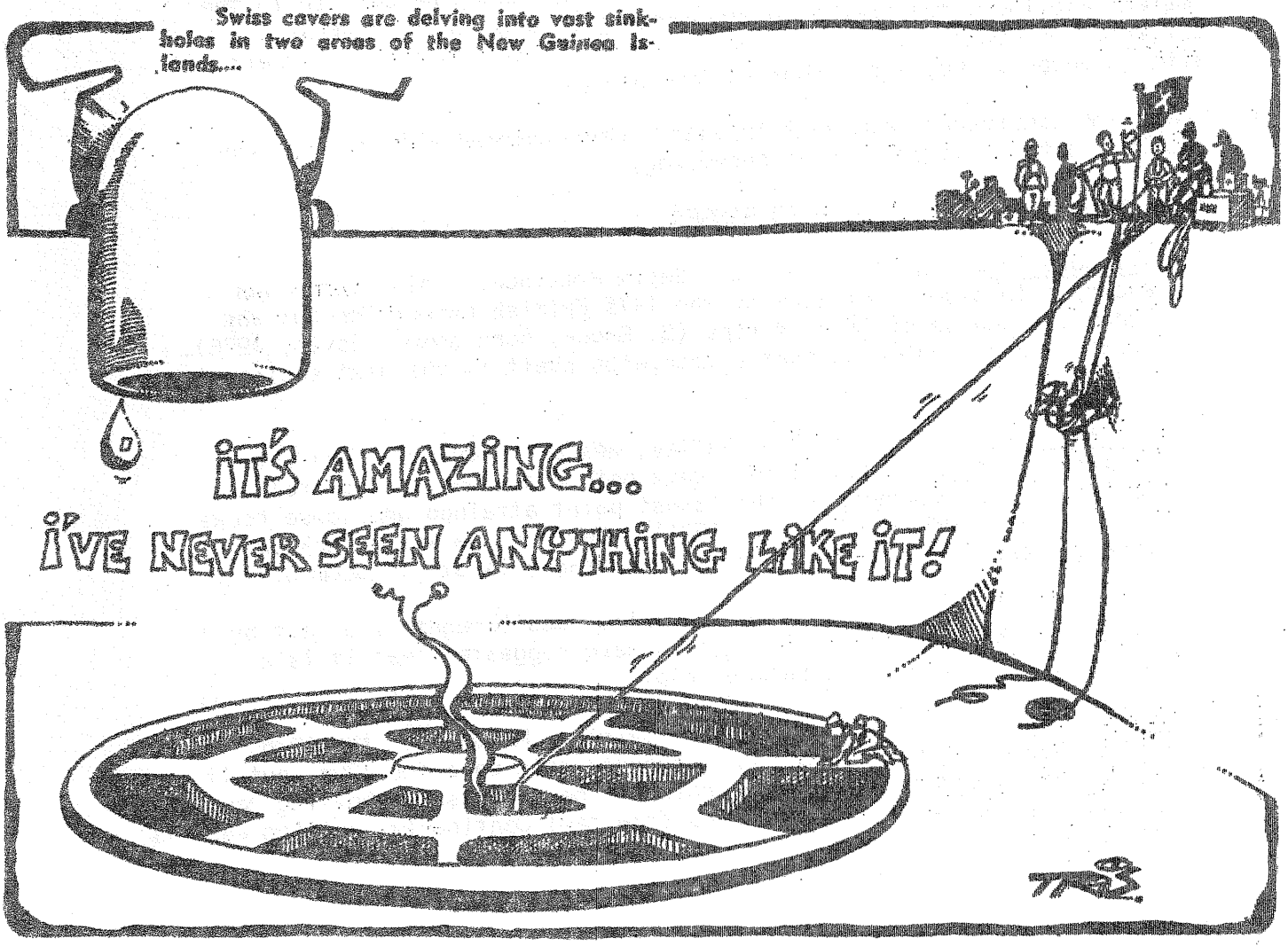
.....

And that's the caving scene for the past three years and three months. We've seen a very significant French expedition to New Britain; a Swiss expedition to New Ireland and New Britain that had a tragic ending; plenty of "tourist" caving all over the country; and centres of activity on Bougainville and in the Eastern Highlands where the cavers are exploring new systems.

Don't forget to drop the editor of Niugini Caver a note with your caving news.

* * *

During the 1979 Swiss Expedition the Post Courier newspaper published this cartoon. It is reprinted with their permission.



Post Courier 26th July, 1979.

PARTIALLY EXPLORED AND SURVEYED MAJOR CAVES IN PAPUA NEW GUINEA

R.M. Bourke*

In an article on the greatest caves of Papua New Guinea published four years ago, I gave a list of fourteen major caves that required further surveying or exploration (Bourke, 1977). Great progress has been made since then with exploration and surveying, particularly in 1978 when many discoveries were made. The previous list has now been updated to focus attention on what needs to be done to finish off partially explored caves and where quick progress can be expected. No major cave can ever be considered 'finished'. There is always a possibility of new finds, and these can be expected in the future. But here we are concerned with passages, rivers and pitches that have been left unexplored in major caves for want of time, equipment or people.

It is not the intention to discourage anyone from going into a 'new' area, but following up on previous exploration does seem to give better results. The overseas expeditions and local cavers which have had the greatest success in recent years have been following earlier work. Those that have had least gain for their efforts have been pioneering new ground. For example, the Australasian trip to the Atea Kananda, the French on New Britain and around Kainantu, the Spanish in the Upper Simbu, PNGCEG members in the Simbu and Kainantu areas, and NSCEG members at Matanai on Bougainville have achieved a lot. On the other hand the British in the Western Province, the French in the Saruwaged Range and Parzybut-Cellerier on Mount Elimbari did not achieve to much relative to their efforts because they were breaking new ground.

Areas are considered from west to east. Caves marked with an asterisk require further exploration or surveying.

HINDENBURG RANGE AND ASSOCIATED RANGES

* Owillfore Tem, near Feramin, West Sepik Province. This system was descended to a depth of 183m by the 1975 British expedition but was abandoned because of lack of rope (D. Brook, pers.comm., Eavis, 1976). Eavis's sketch indicates that a deep,wide shaft is the next section to be explored.

* Langlang Tem, Fault Controlled Valley, Western Province. The same expedition got down 200m in this cave before abandoning exploration because of the tightness at the lowest point attained and loose rocks of a 50m shaft (Wilde et. al., 1976). Kevan Wilde was struck by falling rocks in this cave. The cave entrance is at c. 2600m a.s.l.

Exploration in the Fault Controlled Valley was brought to a halt by the end of the expedition and members have suggested that it is a very promising area for a return trip.

* Askenbu Tem, Olsobip area, Western Province. Members of the 1978 British Speleological Expedition descended this cave for 120m, but it was abandoned after 8 pitches because of the slowness of bolting down wet pitches (White, 1979). Perhaps some fast Continental bolting experts are needed?

. P.O. Box 384, Kainantu, E.H.P., Papua New Guinea

MULLER RANGE, SOUTHERN HIGHLANDS

Atea Kananda. This system was first entered by the 1973 Australasian expedition to the Muller Range, pushed to almost 4km by the 1976 expedition and extended to 30.5 km length and 300m depth by the 1978 expedition (Atea 78). There are still leads in parts of the cave, but they are very inaccessible (James, 1979). For all purposes, the cave can be considered finished for the moment.

* Hadia Yaneabogairi. The 1978 expedition surveyed this cave for 8.5km length and 195m depth (James, pers. comm.). There are many leads in the cave not explored and it is anticipated it is much longer. Another Australasian group plans to return in 1982 specifically to continue exploration. Let's hope they can finish off the other question marks on the Muller.

* Uli Eta Riya, Okafungu area. A vertical cave descended for 200m by Atea 78 members. The cave was abandoned 60m down a huge shaft. From this point a shelf could just be distinguished with a large pitch below (James, pers. comm.).

* Uli Mindu, Legari. This cave is at about 3200m a.s.l. near the top of the Muller Range. Two members of Atea 78 descended the entrance pitch for 85m and estimated the depth as 160m (James, pers. comm.).

OTHER SOUTHERN HIGHLANDS

* Omai, near Mendi. John Van Amstel (1973) reported that this was a large cave that had not been fully explored. In my earlier article, it was suggested that further exploration was required. Dave Gillieson, Jill Landsberg and Neil Ryan attempted that in 1978 with near disastrous results. A ledge collapsed and nearly collected the cavers. They beat a hasty retreat (Gillieson, 1979). I still think a return visit is warranted.

* Tobio, Pulupare village, Kagua District. This impressive system was first reported by Neil Ryan (1974) and later surveyed by Howard Beck (1975). Beck estimated river flow as 85-113m^3/sec. If this was accurate, it is by far the greatest underground river in the world. This river flow should be documented as a matter of priority.

SIMBU PROVINCE

Maig Mur (Mebile), Duglpagl area, Upper Simbu. Sanders (1973) reported this cave was still going at 160m depth. Members of the 1978 Spanish expedition bottomed the cave and surveyed it to a depth of 132m (Montserrat and Chavarria, 1978). Another question mark answered.

* Darua Muru, near Puri village, Upper Simbu. This was pushed to a depth of 187m in 1975 where exploration was abandoned because of lack of rope at the top of a pitch estimated at 7m high (Bourke, 1976). Members of the Spanish expedition reached a depth of 230m without reaching the end (Montserrat and Chavarria, 1978). I am not certain that the Spanish went 43m deeper than our 1975 trip, or whether the difference in depth reflects differences in the surveys.

* Irukunguai (Irapui), Porol Escarpment. Wilde (1973) reported the length of this cave to be 3,000m, and as 4,000m to me in a personal communication. However scaling off the map done by Julia James Van Watson and Kevan Wilde shows surveyed passage to be 2,120m. There appears to be some unsurveyed passage and this needs to be sorted out.

* Berema, Porol Escarpment. This was first reported by Fred Parker (1967); and it was explored to about 60m depth at Easter 1978 (Goulbourne, 1978). Allan Goulbourne, Malcolm Pound and Roger Parzybut (France) descended to a lake at about 120m depth in July, 1978, but the cave was not bottomed (A. Goulbourne, pers. comm.).

* Inomangi, Tao Mountain, Mt Elimbari area. Parzybut and Cellerier explored this cave in July 1978 for some 400m without finishing it (Anon., n.d.).

* Lombila, Nola Village, Chauve District. This impressive river cave was first explored in 1975 (Wilde and White, 1976) and later over Easter, 1978 (Bourke, 1978). About 1,000m of passage has been explored with an estimated depth of 60m. According to villagers, the river resurges in Kirove cave which is some 200m lower and several kilometres away. This is a dangerous cave to explore under wet conditions, but a potentially long and deep system in a very accessible location is waiting to be pushed.

There is a lot of work to be done in the Chuave-Elimbari area. Much exploration has been done by members of the Port Moresby Speleological Society and the Goroka Caving Club, but the reports are not clear. Numerous unexplored smaller caves are referred to in reports by Bain, Read and Wilde. It would be an excellent project, albeit a demanding one, to sort out what is known and what needs to be pushed in this area.

KAINANTU DISTRICT, EASTERN HIGHLANDS

Tuweiwu (Ikenar and Kirbari), Obura area. Fred Parker (1975) referred to this system as the Lamari caves (Ikenar and Kibuari). His estimates of chamber and passage length suggested the system was about 2,200m long. During 1978 Allan Goulbourne and I visited the system several times. It was surveyed in December 1978 by Norman Flux and Noel Plumley and found to have a passage length of 1,525m.

A number of question marks in Oravanana (near Obura) and Barananomba (near Yonki) merited inclusion of these two caves in a first draft of this article. Recent exploration has resolved these unknowns, and these two caves have been dropped.

NAKANAI MOUNTAINS, NEW BRITAIN

* Minye, Kapgena village. This enormous doline and the associated efflux near Tuke village were first investigated in 1968 by P.M.S.S. members (Borough, 1973). The 1978 French expedition explored the doline and part of the cave at the base, making it one of the great caves of Papua New Guinea (Maire, 1979). The French expedition did not visit the efflux which Borough indicated was flowing at some 75m^3/sec. The French estimated river flow as 15-20m^3/sec at the bottom of the doline, but did not explore the active river passages because of the force of the water.

The flow in the efflux cave needs to be measured. There is a huge system awaiting exploration, but it is doubtful whether present technology is adequate to do so. (That's what was said of the Atea Kananda in 1973 after 108m of passage was surveyed!).

* Nare, Nutuve Mission. This was first reported in 1973 by Lex Brown (Bourke, 1973) and the doline was likewise explored by the 1978 French group. In early 1980 the second French expedition explored the river cave for over 2,000m downstream and 1,000m upstream. Total cave development is 4,400m and depth is 400m. Further exploration was prevented because of the extreme length of trips (15-20 hours) needed simply to add a few hundred metres to the system. The river passage continues in both upstream and downstream directions, but further exploration will be extremely difficult and hazardous.

* Ora. This dramatic river cave and the associated giant uvala (compound doline) were explored in 1972-73 by the University of Queensland Speleological Society New Britain expedition (Bourke, 1973). Only 600m of passage were explored before exploration was stopped by the force of the river (4-5m^3/sec) in the downstream passage and a sump upstream. Chances of pushing the river passage, particularly downstream, are good.

NEW IRELAND

Lemerigamas, Lelet Plateau was explored to just under 100m depth by members of the 1976 New Ireland Speleological Expedition (Gillieson, 1977). Exploration stopped at the top of a pitch estimated as 15m high. The 1979 Swiss expedition bottomed the cave at a depth of 203m and a length of 1,300m (G. Favre, pers. comm.).

Dalum. This complex system is located on the New Ireland north-east coast and drains part of the adjacent Lelet Plateau. Several hundred metres of passage were explored by the 1976 expedition, but their map contained some 13 question marks (Gillieson, 1977). The 1979 Swiss expedition pushed it to a length of 1,200m and the only possibility for further exploration is by diving (G. Favre, pers. comm.).

* Kabase, Namatanai area. Gallasch (1974) estimated this cave to be 400m long and 100m deep. A survey needs to be done to establish the actual length and depth.

BUKA ISLAND

Teama cave, Lonahan village. Parker (1973) reported that Teama cave is said to be at least three miles long, and I suggested this needed to be checked out (Bourke, 1977). Gallasch (1977) visited and mapped the cave using the name Tioma. Members of the North Solomons Cave Exploration Group visited the cave in 1978 and surveyed it as 397m long. They used the name Teama (Meier, 1978).

* Malasang system. Parker (1973) followed the cave for an estimated 1,200m in a narrow passage, but did not reach the end. It has not been explored by cavers since then.

DISCUSSION

In the previous list of caves needing further exploration or surveying, 14 caves were given. Of these, five have been finished off, progress has been made in another four, and five have not been revisited. The present list includes 24 caves. Six do not require further work (Atea Kananda, Maig Mur, Tuweiwu, Lemeragamas, Dalum and Teama). This still leaves 18 caves from one end of Papua New Guinea to the other that need more work to be done in them. Progress in the giant river caves of the Nakanai Mountains will be very slow and may be impossible. However, over the next few years it is reasonable to expect that the going caves in the Southern Highlands, Simbu, Buka Island and Muller Range will be completed.

REFERENCES

Anon. (n.d.). Premiere expedition speleologique Francaise en Papouasie Nouvelle-Guinee, Juillet, 1978. Rapport preliminaire. Typescript.

Beck, H.M. (1975). Iaro River Cave, Southern Highlands District. Niugini Caver 3 (1): 4-5.

Borough, C.J. (1973). A large cave and doline near Tuke village, Pomio Sub-District, New Britain. Niugini Caver 1 (2): 25-26.

Bourke, R.M. (1973). The 1972-73 U.Q.S.S. New Britain Expedition. Niugini Caver 1 (2): 27-43.

Bourke, R.M. (1976). Darua Muru, Chimbu Province: 194m deep and still going. Niugini Caver 4 (1): 20-22.

Bourke, R.M. (1977). The greatest caves of Papua New Guinea as at December, 1976. Niugini Caver 5 (1): 3-17.

Bourke, R.M. (1978). The PNGCEG Easter 78 Simbu trip. Niugini Caver 6 (2): 63-64.

Eavis, A.J. (1976). The Eastern Wamtakin Plateau and the Upper Sepik. In D. Brook (compiler). The British New Guinea Speleological Expedition, 1975. Trans. Brit. Cave Resear. Assoc. 3 (3, 4): 137-141.

Gallasch, H. (1974). Caves of the Namatanai area of New Ireland. Niugini Caver 2 (3): 222-228.

Gallasch, H. (1977). Notes on some caves on Buka Island. Niugini Caver 5 (1): 25-26.

Gillieson, D.S. (1977). Lelet: Report of the 1976 New Ireland Speleological Expedition. Niugini Caver 5 (3):62-101.

Gillieson, D.S. (1979). Notes on a very, very brief trip to Omai Cave, Southern Highlands, Niugini Caver 1 (1): 11-12.

Goulbourne, A. (1978). Berema - Porol Escarpment. Niugini Caver 6 (2): 65-66.

James, J.M. (1979). An Australasian speleological expedition to Papua New Guinea. A preliminary report. Niugini Caver 1 (1): 2-10.

Maire, R. (1979). The preliminary report of the 1978 French expedition. Niugini Caver 7 (1):14.

Meier, H. (1978). North Solomon Cave Exploration Group (Newsletter) 15/16th April, 1978

Monteserrat, A. and Chavarria, F. (1978). The advance report of the Spanish speleological expedition 'Papua New Guinea 1978'. Niugini Caver 6 (3): 86-88.

Parker, F. (1967). The caves of the Porol Ranges between the Chimbu River and Chuave, in the Chimbu District of the Eastern Central Highlands of Papua New Guinea. Communications Occas. Paper 2. Sydney Speleo. Soc: 20-27.

Parker, F. (1973). Caves on Bougainville and Buka Islands. J. Sydney Speleo. Soc. 17 (1): 7-8.

Parker, F. (1975). Some caves and rock shelters in the Kainantu area of the Eastern Highlands. Niugini Caver 3 (2): 35-44.

Ryan, N. (1974). Some caves in the Erave, Kagua and Lake Kutubu areas of the Southern Highlands and Gulf Districts. Niugini Caver 2 (1): 142-146.

Sanders, B. (1973). Mebile cave, Chimbu District. Niugini Caver 1 (2): 50-52.

Van Amstel, J. (1973). Caves in the Mendi area, Southern Highlands District. Niugini Caver 1 (3): 56-58.

White, T. (1979). The Hole-in-the-Wall Expedition - Papua New Guinea. Caving International Magazine 3: 11-14.

Wilde, K.A. (1973). Irapui cave, Porol Escarpment, Chimbu District. Niugini Caver 1 (3): 70-74.

Wilde, K., Gray, P., Goulbourne, A. and Buchan, J. (1976). The Fault Controlled Valley. In D. Brook (compiler). The British New Guinea Speleological Expedition, 1975. Trans. Brit. Cave Research Assoc. 3 (3, 4): 147-152.

Wilde, K.A. and White, T. (1976). Angunga sink, Chimbu Province. Niugini Caver 4 (1): 23-24.

* * *

THE BARANANOMBA ANUNTIMPA CAVE SYSTEM

R. Maire* and D. Martinez**

To the east of Kainantu near the Ramu River Hydroelectric Scheme and 300m to the north of the Swiss Evangelical Mission at Yonki, an outcrop of Miocene white marble of 1.5 square km and 100m thick occurs. The karst topography takes the form of two large dolines like funnels with a diameter of 100m; Barananomba and Anuntimpa.

History

Wainwright (1975) was the first European who reported the existance of these two dolines. Later, Parker described the entrances under the names of upper sinkhole and lower sinkhole. The inactive part (Anuntimpa) is well known by the missionaries who say that they have entered as far as the river. On 17th December 1978, R.M. Bourke and two English speleologists (N. Flux and N. Plumley) explored the active sink hole of Barananomba, but stopped at a waterfall overhanging a lake. On 21st and 22nd December, after advice from R. M. Bourke, we carried on and finished the exploration of the system.

Barananomba

A 4m by 4m opening is the entrance of a 20 litres per second stream running on the marble/metamorphics contact. A first section of small waterfalls and basins full of shining tree

* 16, Rue du Bosquet, 74140 Gaillard, France.
** Av. A. Briand Cy, 83760 La Vazette Du Var, France.

trunks carried in by floods, leads to two waterfalls which need equipment (P10, P12). The gallery, 3 to 4 metres wide and 8 to 10 metres high, in entirely cut in white marble whereas dark boulders up to 1 metre in diameter show the flood power of the river. One hundred and fifty metres from the entrance, a low vault siphoning during floods, can be passed through by swimming. It's called The Crocodile's Way if you believe F. Poggia's fright on encountering a black log floating in the water!

Then the passage returns to 2 - 3 metre width floored with a lot of deep pools. At -63m, the junction with the Anuntimpa branch is made on the right bank. After a few small drops and wide pools a 6m waterfall (R. M. Bourke's stop) dashes down into a 25m high room occupied by a lake at -75m. At this level, the cavity changes in appearence. Previously, the low level galleries were often doubled by an upper, inactive passge 4m to 5m wide. From -75m the main passage gets very wide (10m by 15m). After a chaotic trip passing down three waterfalls, we reached the final siphon (Floating Woods) situated about 1km from the entrance.

Anuntimpa

A wide doline located in grassland and occupied by a thick forest. The doline is about 30m deep. A 45° scree slope leads to a 6m by 10m entrance. A gallery congested with blocks and boulders leads to a 10m diameter and 20m high chamber. A 1m wide channel of a ½ litre per second stream slots the far end of this room and drops rapidly down a 13m pitch. At the base of this pitch another 20m by 20m chamber occurs. In the roof of these chambers a maze of small tubes occurs and shelter some amazing fungus growths (the fungus Histoplasma capsulatum occurs in this cave). Going downstream through a 50m semi-aquatic passage, the river in Barananomba is encountered.

Depth 134m. Length 1500m.

Rigging

P10, P12, P6, E3 E2 (Barananomba) P13 (Anuntimpa). The system doesn't cause any problems during low water. Care of floods must be taken during the wet season as shown by the logs stuck everywhere in the roof and across the gallery.

Rererence

Wainwright, M. 1975. Three caves in the Yonki area, Eastern Highlands District. Niugini Caver 3 (2): 48-49.

Editor's Note

This description of Barananomba and Anuntimpa caves in the Yonki area of the Eastern Highlands Province is taken from the special edition of Spelunca (the publication of the French Federation of Speleology) published after the French Expeditions to Papua New Guinea.

* * *

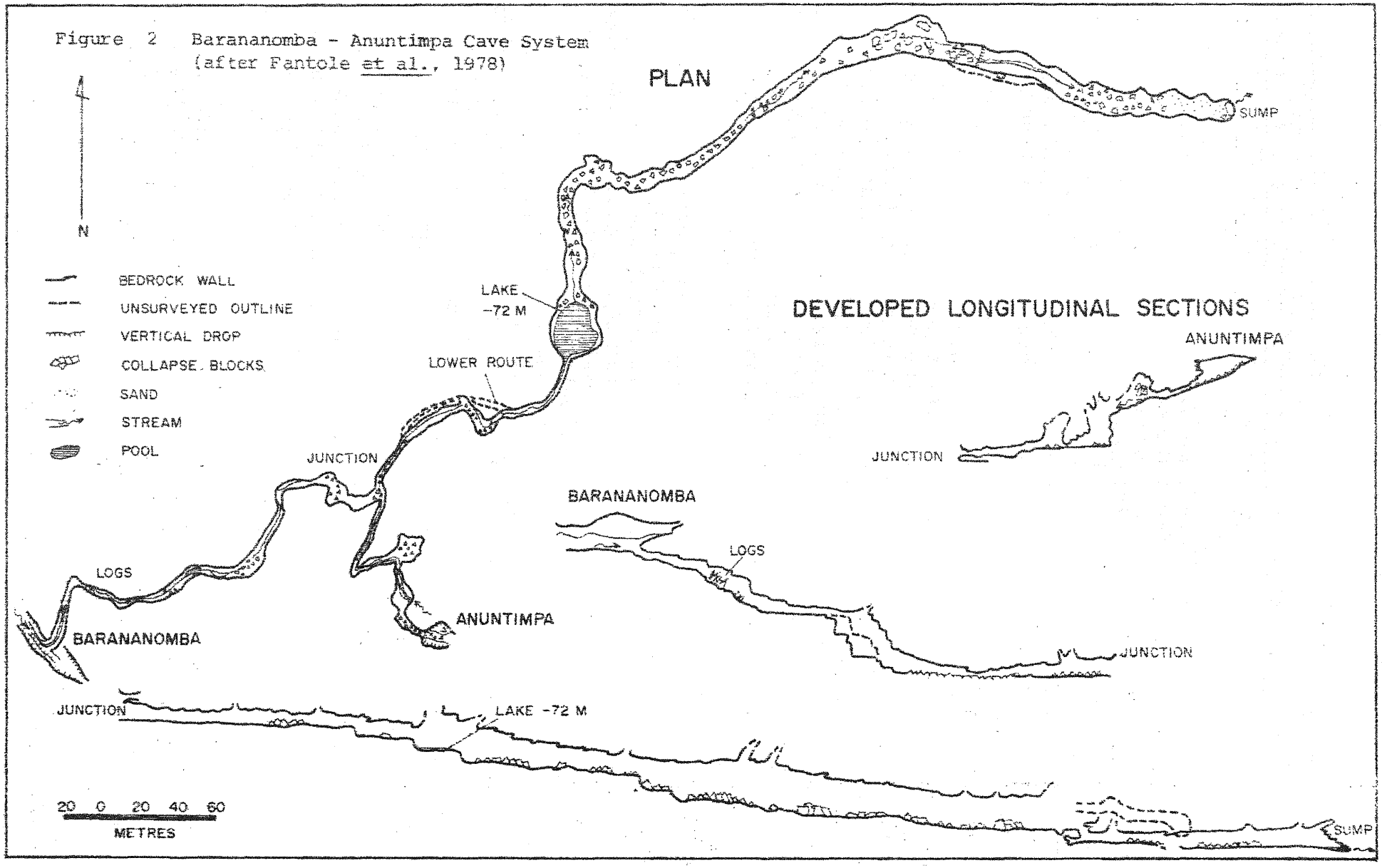


Figure 2 Barananomba - Anuntimpa Cave System (after Fantole et al., 1978)

A GEOLOGICAL RECONNAISSANCE OF ANUNTIMPA PASSAGE, BARANANOMBA - ANUNTIMPA SYSTEM, EASTERN HIGHLANDS PROVINCE.

G. Francis*

The Barananomba - Anuntimpa Cave System is situated three hundred metres north of Yonki Mission, which lies 11km northeast of Kainantu (Figure 1). The system has two entrances, Barananomba and Anuntimpa (Figure 2), which are located in an easterly trending glade formed along the contact between a mafic pluton and metamorphosed limestone. The southern wall of this glade has developed on microdolerite, which is the chilled contact-margin phase of the pluton, whereas the northern wall has developed on limestone.

The limestone unit is part of the Omaura Greywacke. Micropalaeontological dating indicates that limestone units in this formation a few kilometres to the north and to the southwest of Yonki Mission are of Early to Middle Miocene (upper Te to lower Tf) age (Tingey and Grainger, 1976). The Abuna Intrusive Complex is composed of doleritic and dioritic rocks with some ultramafic differentiates and some coarse gabbro (Dow and Plane, 1964; Tingey and Grainger, 1976). Isotopic ages of 16.7my $\pm$ 0.7 to 9.6my $\pm$ 0.5 have been determined for rocks from this pluton, with most of the reliable ages falling into the 16 - 14 my range (Page, 1976).

The limestone in Anuntimpa Passage has been recrystallised to a grey marble with a foliation that dips at 30^{0} to the northwest. In thin section the foliated rock has a granoblastic-elongate texture with a preferred orientation of elongate calcite grains and some dark laminae containing finely disseminated opaque oxides. A few samples are porphyroblastic with 0.2 - 0.5mm porphyroblasts and ribbon-like aggregates of calcite in a groundmass with a preferred orientation. The calcite often has small inclusions of sphene and opaque oxides and there are a few interstitial quartz grains. At the base of the 12m pitch white marble with a granoblastic-polygonal texture occurs as an iden (Logan and Semeniuk, 1976) within a shear zone.

Between the Anuntimpa entrance and the 12m pitch the limestone is intruded by small dykes and sills of basalt from the adjacent pluton. The basalt is a fine grained holocrystalline rock with a sub-ophitic texture. It consists mainly of labradorite and clinopyroxene which is largely altered to uralite. There is some basaltic hornblende and accessory oxides.

Structures in the limestone have greatly influenced cave development. Much of Anuntimfa passage consists of vertical fissures developed along dip (ac) joints and in places the floors have formed on foliation planes or on small sills which were emplaced along them.

* c/- Geological Survey, P. O. Box 778, Port Moresby, P.N.G.

References

Fantole, J. L., Goyet, X., Maire, R., Martinez, D., Poggia, F., and Savournin, G., (1978) : Nouvelle Guinee 78, Federation Francaise de Speleologie, Paris.

Logan, B. W., and Semeniuk, V., (1976) : Dynamic metamorphism; processes and products in Devonian carbonate rocks, Canning Basin, Western Australia. Spec. Publ. geol. Soc. Aust. 6.

Page, R. W., (1976) : Geochronology of igneous and metamorphic rocks in the New Guinea Highlands. Bur. Min. Res. Aust. Bull. 162 : 117p.

Tingey, R. J. amd Grainger, D. J., (1976) : Explanatory notes on the Markham 1 : 250,000 geological sheet SB/55-10. Geol. Surv. Papua New Guinea, 49p.

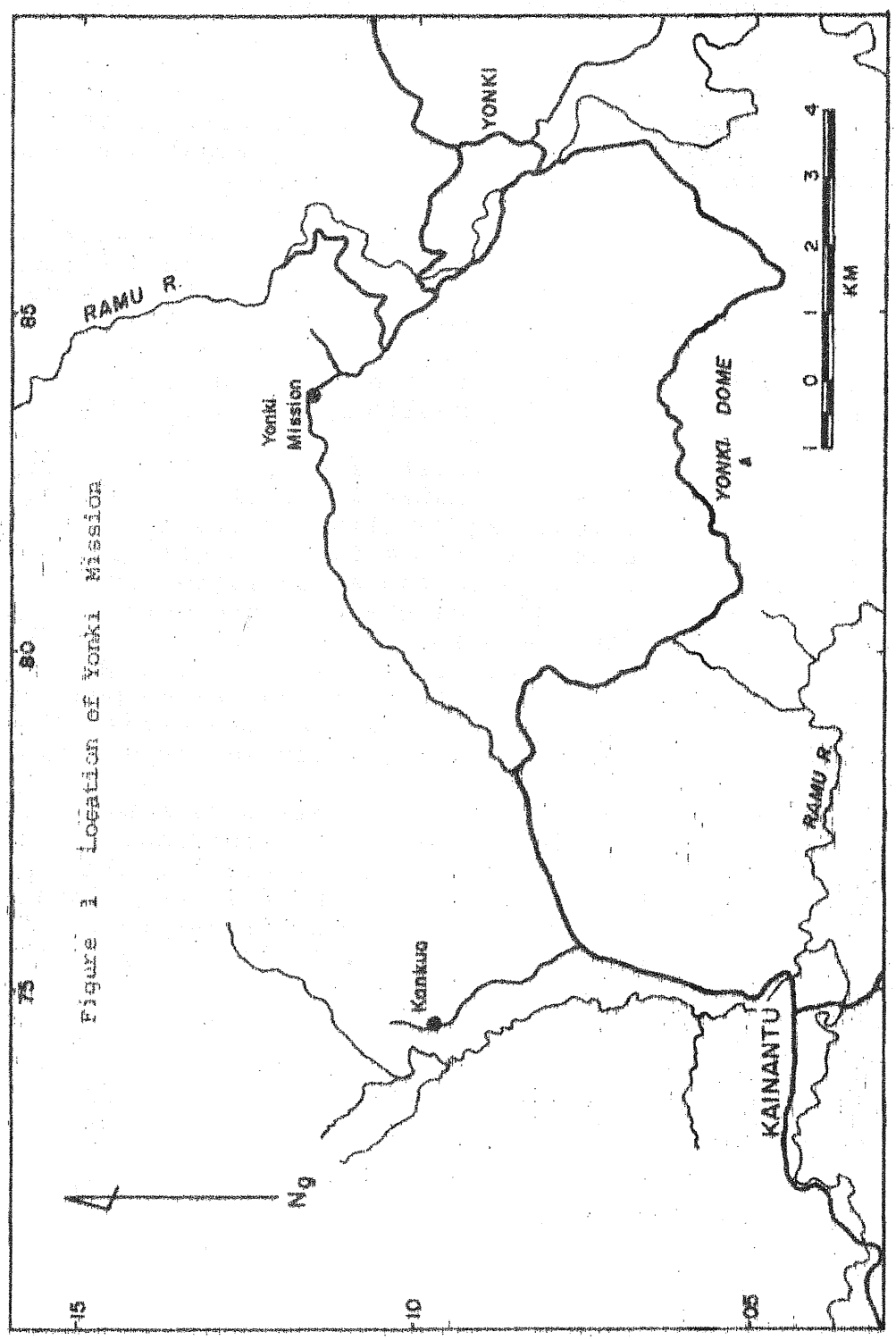


Figure 1 Location of Yonki Mission

A RECONNAISSANCE OF CAVES AND KARST IN THE ERAVE AREA, SOUTHERN HIGHLANDS.

Dave Gillieson* and Jill Landsberg*

The recent opening of a good, all weather road between Ialibu and Erave prompted a one day recce by the authors and Neil Ryan. We left Mt. Hagen early - too early for some - and rapidly reached Kagua. Carrying on through to Erave, we picked up a guide, one Stephen Yenki of Tiribi Village. He was able to show us a number of cave entrances, locations of which are given with reference to the Erave 1:100 000 sheet 7684 (prelim. ed.). After picking up Stephen we headed into a region of strike controlled limestone ridges up to 150m high. Between the steep sided anticlinal ridges were abundant small solutional dolines, many with enterable shafts. Truly a caver's paradise .... or nightmare. We selected a number on the reasonable basis of proximity to the road, which wanders in and out of dolines between crossing ridges. In all cases the shafts were blocked with vegetable detritus and sediment at depths not greater than 10m.

Neil remembered a large entrance he'd seen while walking from Kagua to Erave in the good old days. After some difficulty we located the track at 149720, just before the final road descent to the Erave River Bridge. A half hour's walk along a joint controlled glade to ref. 150725, we climbed steeply up a tributary gully to a large entrance at the base of a bluff. The entrance drop of 6m was rigged with a handline and we entered.

The cave, called Mubi, is basically a single strike controlled cavern, not long but of impressive internal dimensions. The steeply dipping limestone has facilitated stoping of the chamber resulting in a large cavity with a rockpile floor. This is of some antiquity as evidenced by the accumulation of massive stalagmites on the breakdown blocks. No enterable leads were found. At some time in the past, a local person had taken a nose dive over the entrance drop, as his/her skeleton graced the entrance rockpile. Did he/she fall or was he/she pushed? The stalagmites at the lower end of the cave had marked fluctuations in the width of the growth layers, which may be a seasonal effect.

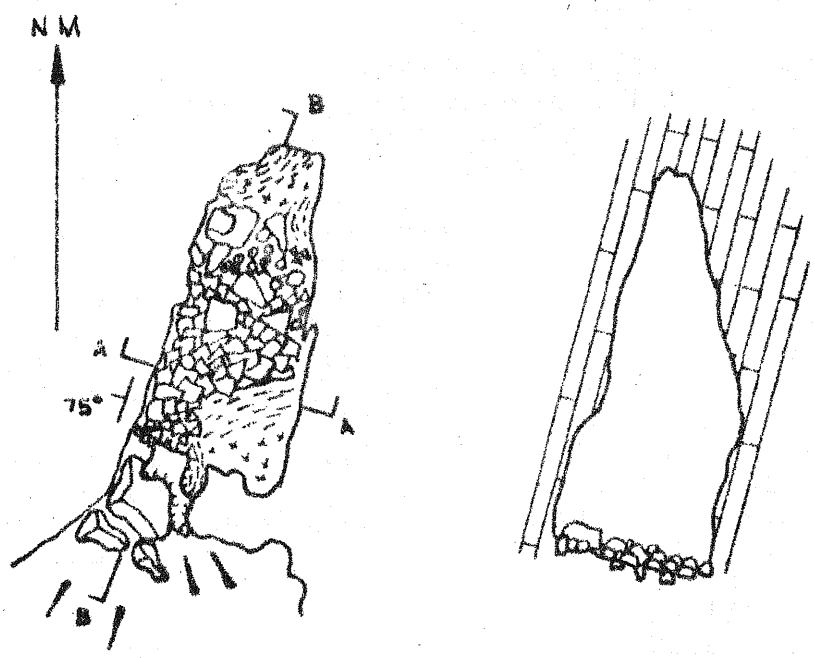
After photography and surveying, we walked back to a resurgence that crosses the track lower down. The resurgence is perched on a terrace at 1200m, above the Erave River. The cave was duly entered by all, with some coercion, and followed along about 100m of rocky crawl to a low muddy chamber. At this point running water could be heard but not gained. It is likely that resurgences in the area are graded to this base level, giving a local depth potential of not more than 200m.

Cave entrances in the area are frequently located at the exposed ends of strike ridges. Many are former outflow caves fed by rainfall on the ridge above and are now choked with fine

* Department of Geography, University of Queensland, St. Lucia, Brisbane, Australia. 4067

MUBI CAVE

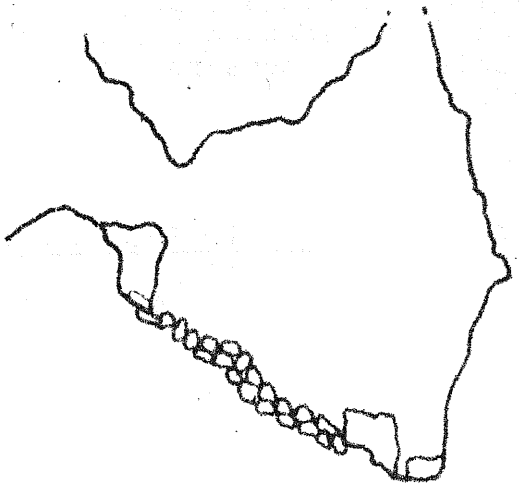
ERAVE S.H.P.



PLAN SECTION AA

0 5 10 15 20m.

1:500



SECTION BB

Surveyed 8.7.79 by
D. Gillieson, J. Landsberg
N. Ryan.
A.S.F. Grade 5.2

sediment and collapse material. The caves themselves are elongated along the strike and this is probably the result of greater fissility at that orientation.

We next proceeded to Erave, to a cave called Ambli. This has three small entrances located at 173690. The entrances are located in a deep karsted gully above a garden area, again at the end of a strike ridge.

The shortest drop was rigged as an 18m pitch into the large chamber visible below. The descent down a steep mud and rock wall was impeded by a large tree trunk used as a ladder by the local people after flying foxes.

At the base of the pitch a very steep descent over the large blocks of an unstable rockpile led to an estimated 20m drop. Below a large stream could be heard. The upper chamber has at this point intersected a vadose canyon about 2m wide. An attempt was made by Dave to descend this next drop. A short climb to a wedged boulder permitted the gibber test of depth. Unfortunately this released a mega avalanche of rocks which confirmed the presence of a large body of water below. The inherent instability of the drop precluded further attempts and an indecently rapid exit was made despite attempts at surveying and photography. The cave is similar to Mubi, in that a chamber has stoped up dip producing a large collapse chamber. The thin bedding and banded impurities in the limestone aid this process. The underground stream is most probably the continuation of a large river which sinks at 190680, at the base of the same ridge. This in itself would be worth of a visit.

By the time we reached the surface it was raining and dark, we ended up in Mendi at midnight.

One day we are going to find a cave in that part which is not inherently unstable! The Erave region seems to have limited depth potential in the area traversed, but this potential increases to the south. A vast number of karst features are present for evaluation, if the problems of loose rock and sediment fills can be circumvented.

* * *

OMAI CAVE, SOUTHERN HIGHLANDS PROVINCE - A NOTE TO THE EDITOR.

Neil Ryan*

Re Gillieson, D. S. 1979
"Notes on a very, very brief trip to Omai Cave, Southern Highlands"
Niugini Caver 7 (1) : 11 - 12.

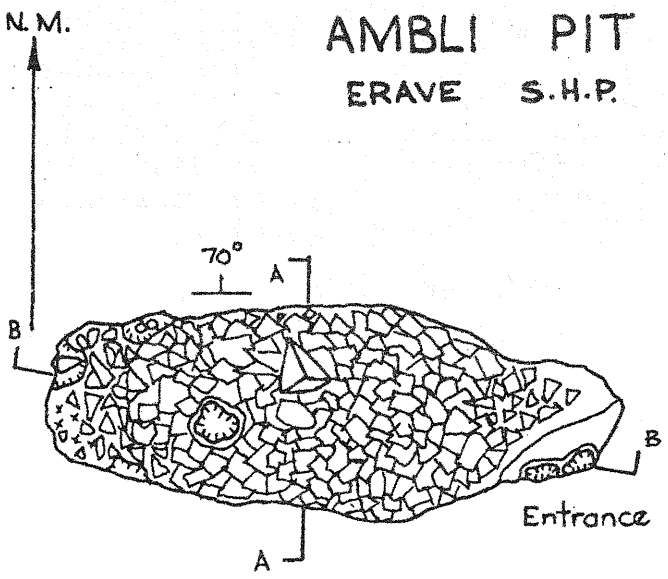
This article could be misinterpreted that the change in the streamflow, cave entrance, etc was due to earthquake disturbance - not so.

This cave at Omai lies in fairly close proximity to the Mendi - Hagen highway, which runs through an orange coloured siltstone at the ridgecrest. This particular section was constructed in 1970 and a large quantity of this siltstone has been washed down the stream which flows into the cave.

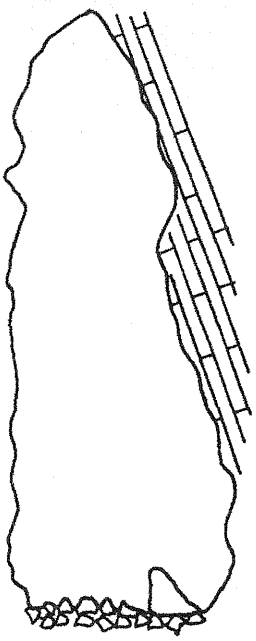
* P. O. Box 525, Mt. Hagen, W.H.P., P.N.G.

AMBLI PIT

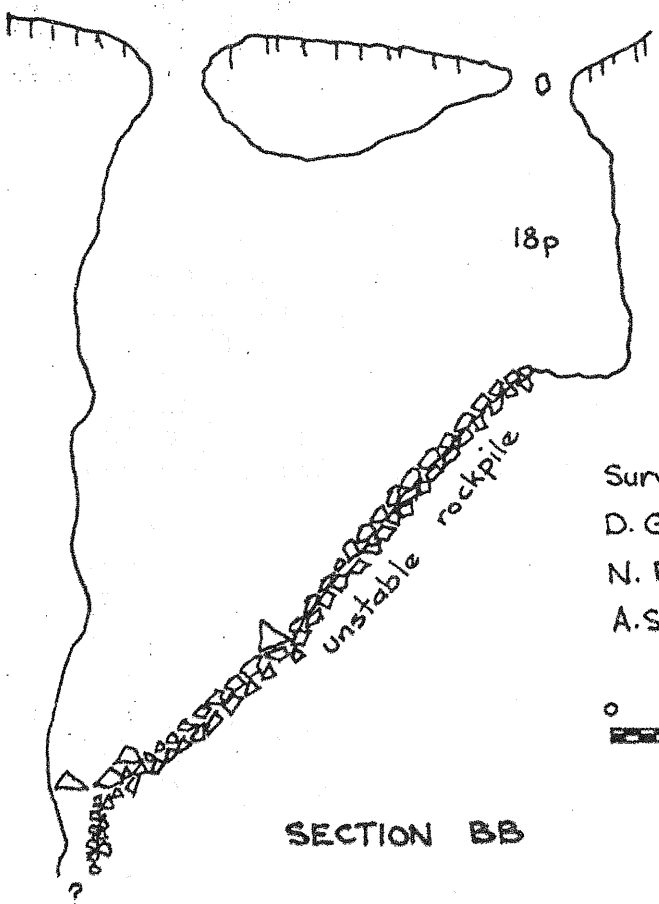
ERAVE S.H.P.



PLAN



SECTION AA



SECTION BB

Surveyed 8.7.79 by
D. Gillieson J. Landsberg
N. Ryan P.N.G.C.E.G.
A.S.F. Grade 5.2

0 10 20m.

1 : 500

The stream formerly flowed down two shafts situated side by side, but these have now been completely covered by siltstone and the stream has cut a new channel and now flows in what was formerly a dry entrance in a doline. Due to the effect of the water, part of the entrance has collapsed and what used to be the normal way to the lower sections of the cave down a short shaft has completely silted up and a rockfall has collapsed opening up the shafts described in Dave's article.

This is the second cave that I know of in the Southern Highlands which has been affected by road construction. The entrance to a small cave near Erave has been completely filled in during the construction of the Kagua - Erave road. Unfortunately these are probably only the first of many.

* * *

CAVE SWIFTLETS

A. Pound*

Most cavers in Papua New Guinea have at some time or other seen small black and white birds flying from the caves. Other common views of these birds are on their nests in the cave or in the hand of your guide as they are a popular food item. These are Swiftlets of the genus Collacalia from the Family Apodidae. There are five swiftlets that can be encountered in mainland Papua New Guinea caves: Collacalia esculenta (Glossy Swiftlet), C. vanikorensis (Uniform Swiftlet), C. hirundinacea (Mountain Swiftlet), C. brevirostris (Whitehead's Swiftlet) and C. papuensis (Three-toed Swiftlet).

All of these birds live and nest in caves, rock shelters and cliffs. They feed outside of the caves on the wing catching insects. Unlike swallows with whom they can be confused, swifts and swiftlets do not usually perch away from their roosting places. Their nests are made of vegetable material that is cemented to the walls of the caves with saliva. The nests of similar species in South East Asia are used in soup. Swiftlets find their way about caves by echo location in a similar manner to bats. This is the metallic clicking sound that they make while flying around inside. Outside the cave their calls resemble a soft twittering.

Identification of these birds on the wing is difficult but it is often possible to see the bird in the hand as they are caught as a food item. You can then with permission examine them to see what the species is. Even if you do not get the bird in the hand it is worth noting if swiftlets are present in a cave and if and where they are nesting and roosting. If the nests can be examined without disturbing the birds, some idea of the stage of development of the young in the nests would be useful.

The easiest bird to sort out is C. papuensis, the Three-toed Swiftlet. It has three toes unlike the other swiftlets.

C. esculenta the Glossy Swiftlet is aptly named. The smallest of the swiftlets at 85 mm, its upperparts are black with a

(continued on page 138)

* P. O. Box 102, Kainantu, E.H.P., Papua New Guinea.

A REPORT OF THE SPELEOLOGICAL RECONNAISSANCE OF THE LEVANI VALLEY AND ADJACENT AREA. 9.8.1978 - 24.8.1978.

Bruce Unger* and Robert Kay"

Introduction

The Levani Valley, a large closed valley in the Southern Highlands Province of Papua New Guinea, was considered as a possible location for the 1973 Niugini Speleological Research Expedition. However, discussions with local geologists and a helicopter reconnaissance led to the transfer of the expedition to the Muller Plateau.

During the 1978 expedition to the Atea Sink on the Muller Plateau, two cavers, Bruce Unger and Robert Kay, decided the time had come for a ground based investigation of the Levani area. During the 16 days of their investigation, they probed a large amount of heretofore unexplored territory, discovered 15 significant speleological features including a cave surveyed to a length of 1km with several going leads and developed friendly relations with the local people of the Duna and Huli tribes.

Acknowledgments

This work would not have been possible without the help of the many local people who bore up bravely under heavy loads, communication difficulties, floods and other hardships to guide the often clumsy cavers to their goals. Special thanks go to Liaba, Paiya, Koromonga and Kenewa.

Daily Log

9.8.78
The cavers depart from Atea-gana-anda with porters as far as the junction of the Harage and Levani tracks near Geroro. Here they shoulder their 30kg packs with 10 days' supply of food and set off on their own. The night is spent in a hastily prepared rainy bivouac near Dengera-anda.

10.8.78
Slowed by an overgrown trail, they stop for the night at a partly roofed hut a few hours beyond Dengera-anda.

11.8.78
They meet a party of expedition porters returning from the Levani, led by Paiya. Bruce does a quick check of Ma Waru

* deceased.
" 14 Albert Rd., Cheltenham, Glos., England.

Valley, returing just before dusk. Paiya tells Rob about Kewane Kananda, Yagamega Kananda, Emama Ekanda. Rob contracts dysentery.

12.8.78
Rob recovers dysentery. Bruce recovers from an infected ankle.

13.8.78
They investigate Ma Waru Valley.

14.8.78
Searching for Yagamega Kananda, they find instead the Dindi Mondo Col on the edge of the Levani Valley. Investigating a line of filled-in dolines, they become hopelessly bushed and escape at great cost in blood loss.

15.8.78
Spent waiting for Paiya's return. He does not arrive.

16.8.78
Another search for Yagamega leads to a hopeless maze of faint tracks. Neil Ryan arrives in the late afternoon, accompanied by Parauwi and Kenewa.

17.8.78
Neil and Parauwi set off for the Levani. Kewane guides Bruce and Rob to Kewane and shows them several caves, including Kewane Kete Kananda. (This later proves not to be the Kewane Kananda referred to by Paiya).

18.8.78
Exploration and surveying of 1km of walking passage in Kewane Kete Kananda.

19.8.78
With food running out, the group retreats to Karibu in the Levani Valley. Here they spend the night with Neil Montgomery's party and meet Liaba, a quadralingual Duna of age about 15. Liaba wants to see the world and so joins the group.

20.8.78
Exploration of Yaga Kananda and walking to Gwali. The group is now on Huli land.

21.8.78
Bruce recovers from recent weakness. Rob and three guides cut track to Emama Ekanda, build a hut and explore the cave.

22.8.78
Bruce, Liaba, Liaba's brother and a guide explore Kerene Eto. Rob is trapped on the wrong side of the Emama River by a flood.

23.8.78
Rob returns to Gwali at 1.00pm to find Bruce and a rescue party ready to depart. Dave Gillieson and Jill Landsberg, who have arrived the previous day explore Huli Ekanda with Liaba.

24.8.78
The four Europeans with Liaba and assorted porters walk to Koroba.Along the way they hear what sounds like a large resurgence and are told this is the source of the Yogora R.

Track Descriptions

Gororo to Yakoma 12 hours
From Gororo the Harage track is followed over the Atea River for about an hour. At the fork, turn right, through bush, and find your way through a small garden by turning left around the hut and continuing over the fence. Another track to the left goes back to the Harage track. About two hours from Gororo the Atea is again crossed by a slippery log bridge and the track climbs steeply up a ridge. A small stream is met, and the track goes up it to the ridge. There is a good hut about four hours out, with water nearby, which could sleep four at a pinch and from here the track continues along the ridge.

About four hours from the hut, Dengera Anda, along a slightly difficult track with many awkward logs and some tricky route finding, is an old hut with a hole in the roof, which can be covered with polythene. An hour after it there is a small grassy knoll, and another hour after a wide grassy saddle is gained, revealing the Ma Waru doline on the right. The doline is skirted, passing the Kewane turnoff on the left, up a grassy slope and through an occassional spinney of bush, to reach Yakoma, a good hut just in the bush.

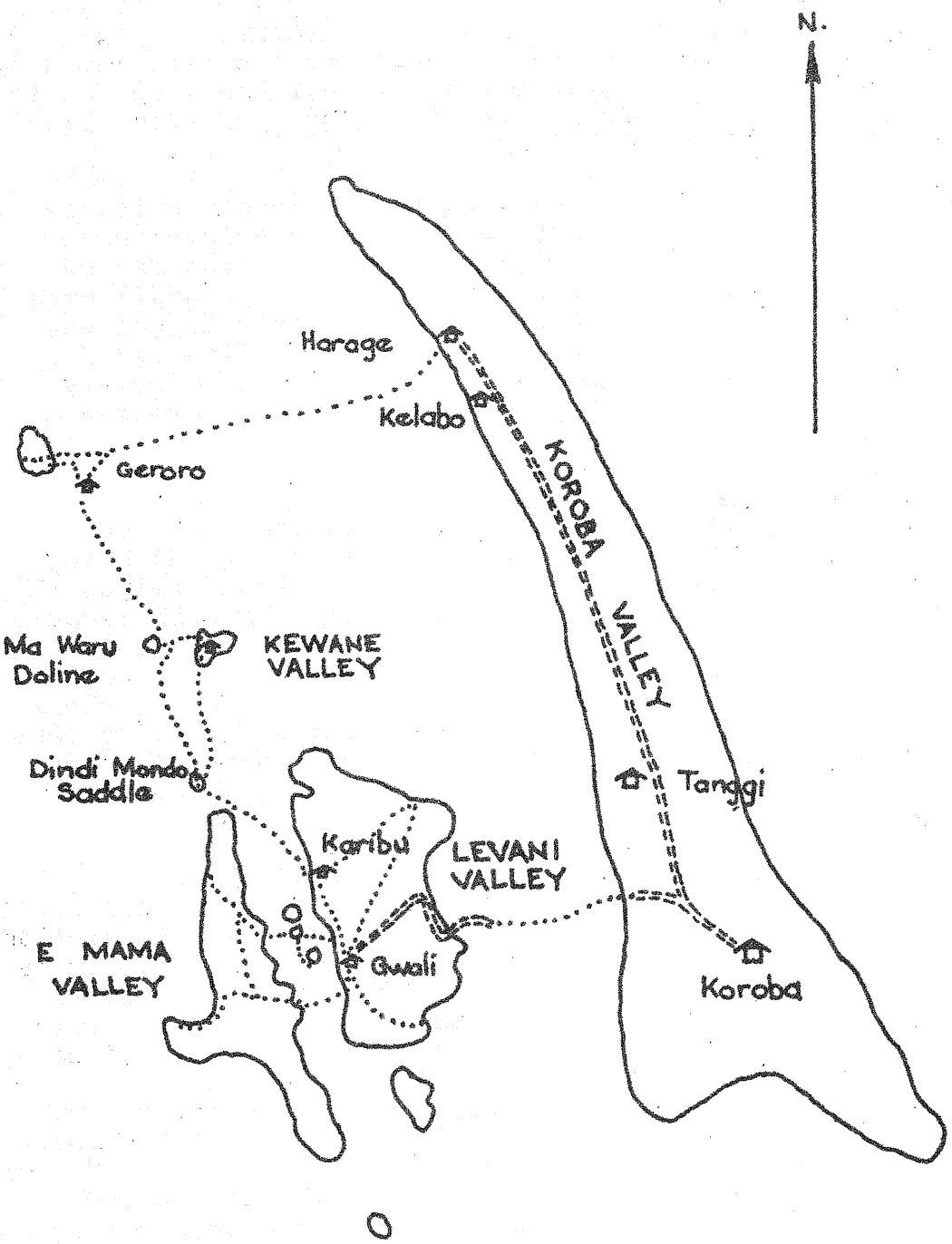
Yakoma - Ma Waru - Kewane - Dindi Mondo - Ma Waru
There are two tracks into the Ma Waru Doline. One goes down directly from the saddle half an hour or so north of Ma Waru, down a steep scree into the Ma Waru stream. It then follows the stream bed. A small piece of old track marking tape was found tied to a tree by the stream. Expect to get wet to the waist in the deep pools. The stream is followed to the sink, in a cliff. Time: about 1½ hours. The other route goes down a grassy slope 20 mins south of Ya Koma and is more difficult to find. It goes through a patch of bush and joins the streamway opposite where the other track joins it. Time from Ya Koma to sink: about 1¼hrs.

Kewane
About ¾hour north east of Ya Koma the track forks. The right fork leads to Kewane, a large enclosed valley with a small hamlet (pop. about 7). The track is all easy, with the possible exception of the last steep grassy slope onto the valley floor. From Kewane the track continues to Kewane Kananda along the north east side of the valley, with one fork leading to a small hut on a terrace level. The track is mostly through high grass and bog, but does go through a small wooded ridge just before reaching the cave. Time: 2 hours, from Ya Koma to Kewane, ¾hr from Kewane to Kewane Kete Kananda. This track may continue to Tanggi, possibly through the "black Hole Country" as yet uninvestigated. From Kewane there is another track going to Dindi Mondo. It leaves the Ya Koma track about twenty minutes past Kewane house, and goes across an impressive sized stream, continuing up the left bank of it until it becomes a gorge. The track climbs about 800 metres to a ridge and shortly after drops down to Dindi Mondo Saddle. Time: Kewane - Dindi Mondo about 3 hours.

Ya Koma - Dindi Mondo
This track is a bit rough but is only 1½ hours of slippery logs and the view at Dindi Mondo is so superb that all is forgiven! There is a fork to the right, well trodden, just before the saddle, and this may lead to Yaga Mega Kananda as it is along a line of dolines on a siltstone/limestone contact. The col itself is overshadowed by an impressive peak to the south; Mt. Koroma or Bidubwa - the names seem interchangeable.

AREA MAP

SHOWING TRACK LOCATIONS



SCHEDULE

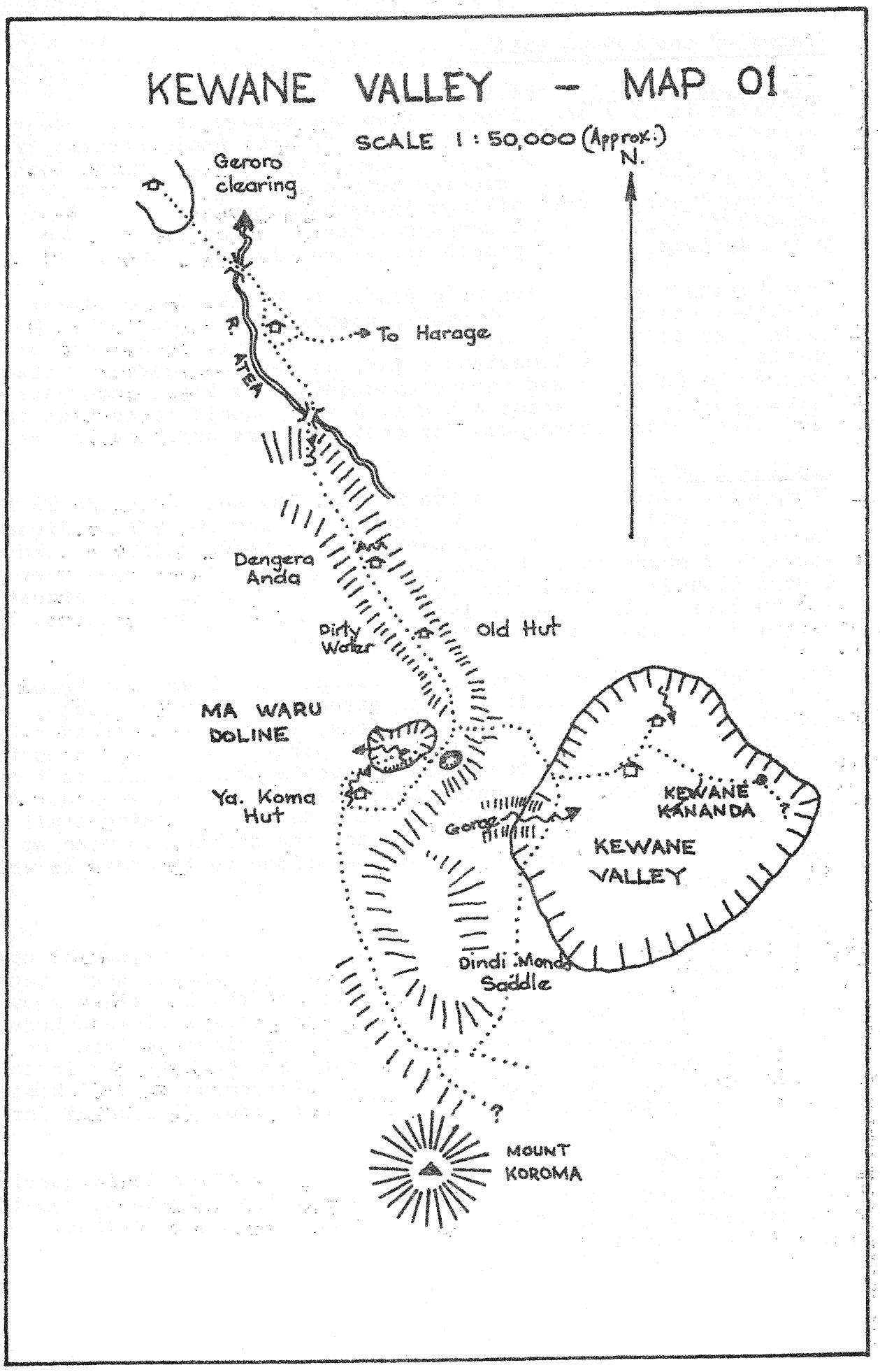
- Open country
- Village, Town
- ==== Road
- ..... Track

MAP 00

FROM MULTI SPECTRAL SATELITE IMAGE

LANDSAT SCENE 1028/00028 N.E. CORNER

Scale:- 1 : 250,000 (Approx.)


KEWANE VALLEY - MAP 01
SCALE 1 : 50,000 (Approx.)
N.
Geroro clearing
To Harage
ATEA
Dengera Anda
Dirty Water
Old Hut
MA WARU DOLINE
Ya. Koma Hut
Gorge
KEWANE KANANDA
KEWANE VALLEY
Dindi Monda Saddle
MOUNT KOROMA

Tracks of the Levani Valley

Dindi Mondo - Gwali about 5 hours
The track is wide and pleasant from the saddle,and fast progress can be made through tussock country. Several small streams cross the path, and there are two or three huts at occasional intervals. Some bush and swamp are crossed before Karibu, a pleasantly flea bitten and very scenic village is passed through. There is a small house used mainly for pandanus nut drying which can be used to stop at if desired, and the people are extremely hospitable. Time 2½-3hr.

From Karibu there are two main routes to Gwali. The shortest route is direct and takes 2½ - 3 hours, across bog and tussock. The other route goes to the left where a river sinks into Ya Ga Kananda at the base of a white limestone cliff, an obvious landmark, past several large lakes and marshes and joins the broad road just before Gwali. Time: about 4 hours. A more scenic route than the direct one, and recommended for photographers and bird lovers.

Gwali - E Mama
From Gwali two tracks go to the E Mama. The southerly one is less well used, and takes about two hours to reach the E Mama River. There is a ford which is impassable after heavy rain. It takes a about four hours through kunai, reeds and bog to go downriver to E Mama Eleanda, a huge sink in a 400metre high cliff of limestone and another trail of sorts leads to a temporary hut built by our party. Time: about an hour from the ford.

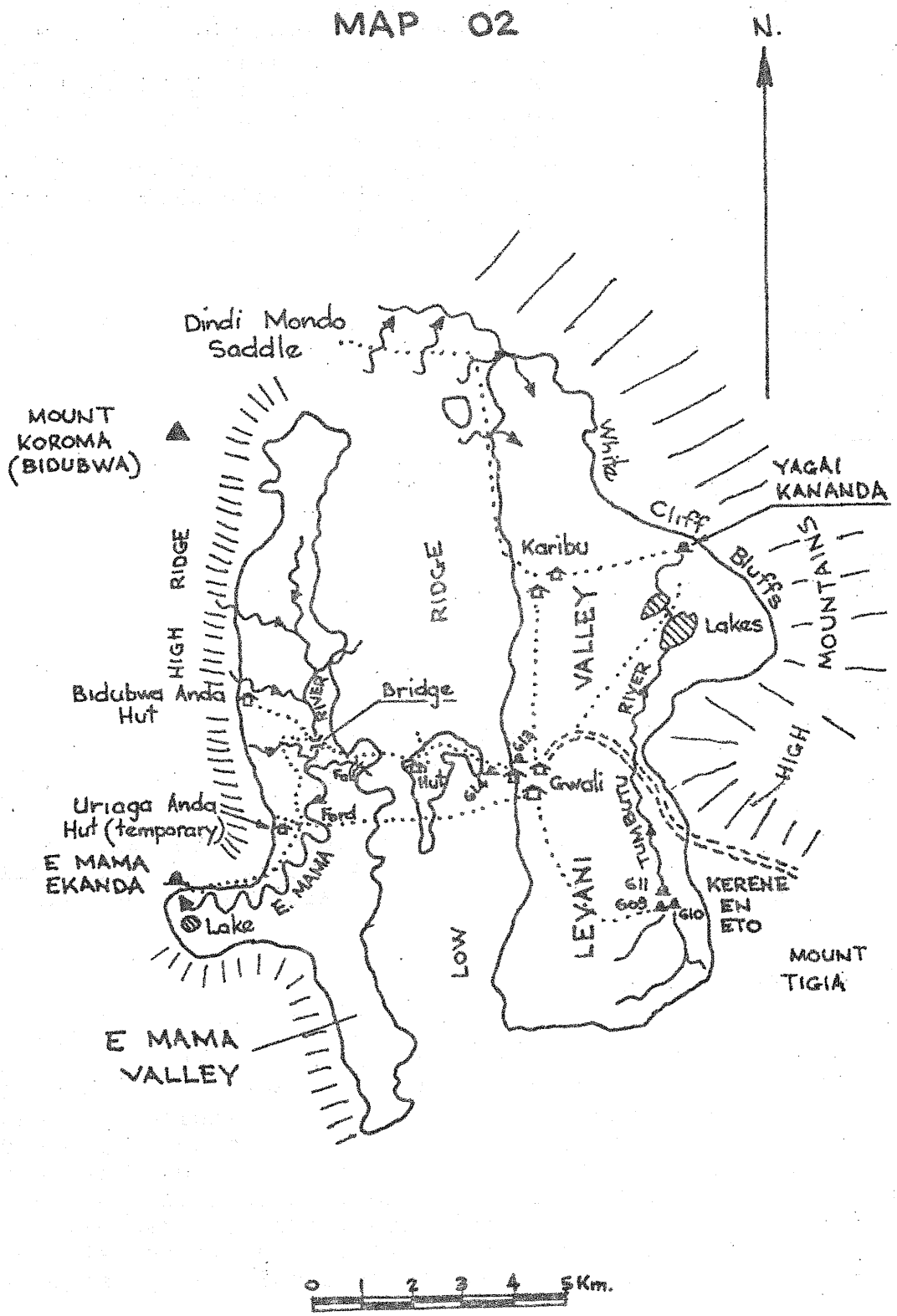
The other track leaves the Gwali road at the river just below Gwali to the north, and travels through gardens up over the ridge, recommended for strawberries and views, through some areas of swamp and tussock to a bridge, built by our party, which may stand for a year or two. It then continues through a wooded knoll to a hut about 1 hour from the bridge. Time: Gwali - Bidubwa Anda hut 4 hrs. It is possible to go anywhere in the E Mama by breaking trail over tussock and occassional reeds and the country is open so navigation is not a problem. From the bridge to the ford is about 1½ - 2 hours walk.

Gwali - Kerene En Eto
From Gwali the track goes south along the crests of several open ridges, past a few houses and over a few pig fences, then turns to the southeast and enters the broken bush of the low ridge where the two major rivers draining the southern Levani sink at Kerene en Eto, to resurge on the other side of the ridge to form the Tumbutu River. There are several gardens and bush tracks in the area, and a guide is recommended. The westernmost sink is best approached by track cutting from the east side. Time:about 2hrs.

Gwali - Koroba
Nothing much to say about this track. Over half of it is nearly proper road and there is only a short section left to be completed. A good days walk with pleasant views and more strawberries.
Time: 7 - 8 hours.

LEVANI & E MAMA VALLEYS

MAP 02



Cave Descriptions

MR 600, Ma Waru Doline
Location: bottom of Ma Waru Valley
Description: The east and west forks of the Ma Waru, each about 0.1 cumec, join in the muddy, kunai covered doline bottom then flow to the base of a 50m high limestone cliff, where the stream disappears through a number of small holes, none penetrable for more than a few metres. The surrounding cliffs were given a cursory check, this being all that was possible due to the extremely dense vegetation.
Comments: This appears to be a very young system and has probably had insufficient time to form a penetrable cave. The water may resurge into the Kewane River.

MR 601
Location: see map 03
Description: a 5m diameter and 20m deep shaft in a doline. The shaft has a muddy floor with no leads.

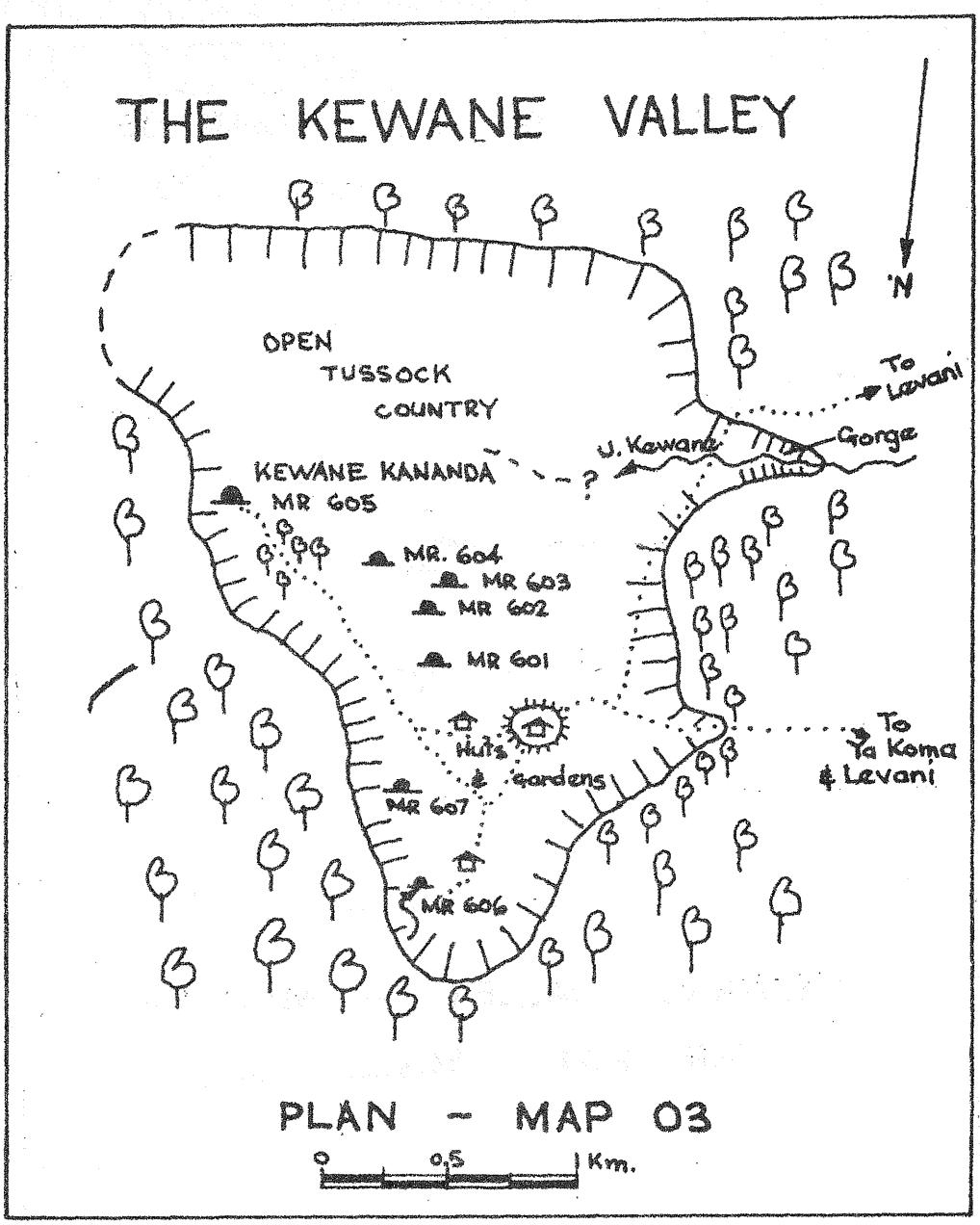
MR 602
Location: see map 03
Description: Two shafts drop into an extremely muddy streamway, 35m long tending NW - SE. See map 04.

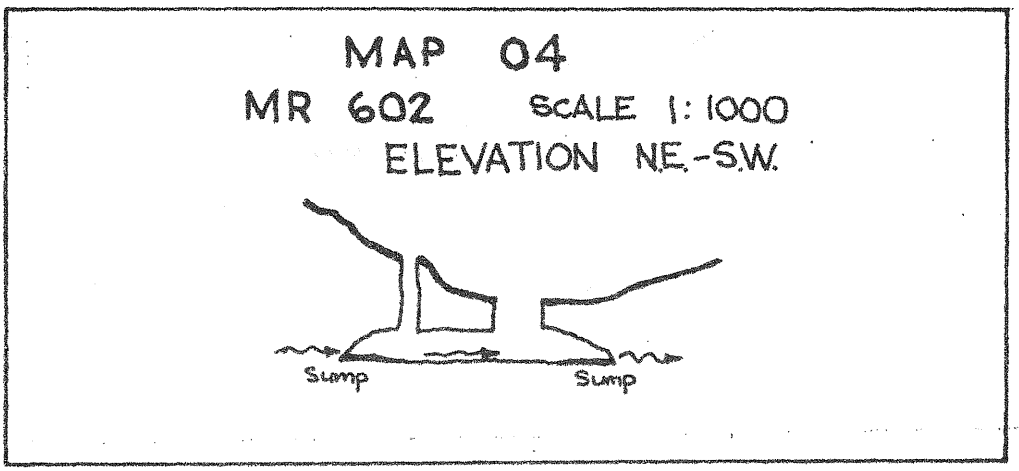
MR 603
Location: see map 03
Description: a 70m long free climbable fissure with a stream in its bottom. See map 05.

MR 604
Location: see map 03
Description: A very small hole in the side of a doline leads to an extremely muddy chimney. At the bottom of the chimney, a passage leads west with two short climbs to a chamber with a sump. See map 06.
Comments: The central Kewane Valley floor is liberally sprinkled with dolines and rifts. There seems to be extensive shallow subterranean development, but the passages are now all blocked by mud.

MR 605, Gewane Kananda
Location: NE side of Kewane Valley floor. See map 03.
Description: A gentle grassy slope leads to the two entrances, at opposite ends of a 35m long overhang at the base of a small cliff. The left hand entrance leads to a gravel floored stream passage 1m high by 1.3m wide, continuing upstream to the limit of exploration. The right hand entrance leads into a well decorated grotto with access to a streamway of walking height which goes 1km before breaking up into several low crawls in the streamway. There are several side leads. See map 07.
Comments: White flatworms were fairly common in the stream. This cave could easily prove to be considerably larger than is now known.

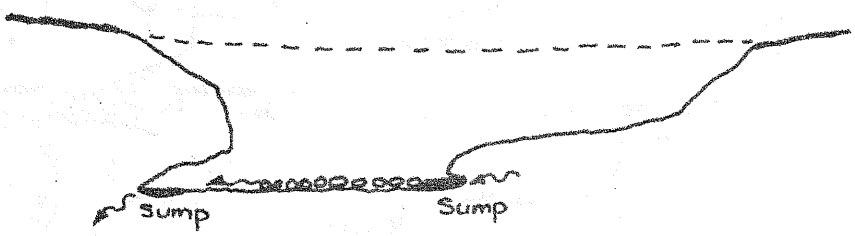
MR 606
Location: see map 03.
Description: The sink of a small stream in the valley floor. The stream was dry when visited. The cave was not entered as it begins in a pitch.


THE KEWANE VALLEY
N
OPEN
TUSSOCK
COUNTRY
To Levani
U. Kewane
Gorge
KEWANE KANANDA
?
MR 605
MR. 604
MR 603
MR 602
MR 601
Huts
& Gardens
To Ya Koma & Levani
MR 607
MR 606
PLAN - MAP 03
0
0.5
Km.


MAP 04
MR 602 SCALE 1:1000
ELEVATION N.E.-S.W.
Sump
Sump

KEWANE VALLEY – MAP 05

MR 603 SCALE 1:1000



ELEVATION

KEWANE VALLEY – MAP 06

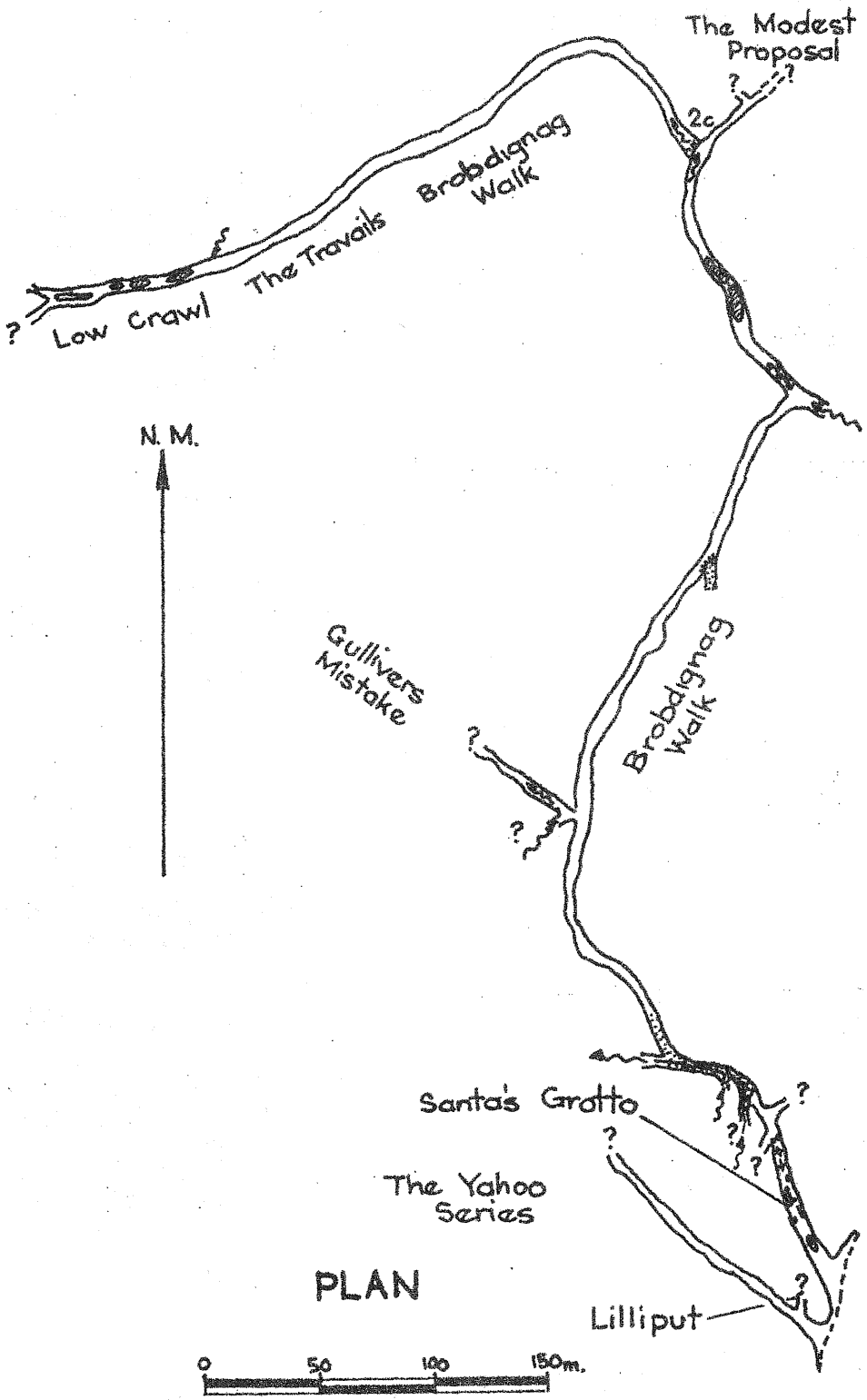
MR 604 SCALE 1:1000

ELEVATION

GEWANE KANANDA

MR 605 MAP 07

LENGTH 1145 m.



Surveyed by:- R. Kay
B. Unger
G.R.G Grade 3

MR 607
Location: see map 03
Description: An abandoned streamsink in the side of a cliff. The entrance is 4m high by 3m wide and is blocked by mud. It may be the upstream end of the left hand passage of Gewane Kananda.

MR 608, Yaga Kananda
Location: In the cliff at the eastern edge of the Levani Valley, East of Karibu. See map 02
Description: A river of about 0.5 cumecs meanders across the valley floor and enters the cave at the base of a large white cliff. A large muddy entrance chamber gives way to clean washed white limestone fissures with fast flowing water and unstable log jams. A very low duck and possible upper levels were not pushed. Total length is about 100m. Other entrances occur along the cliff and could provide alternate routes it into the system. Yaga Kananda is a very sporting cave. It would be expected that the water would move down dip through the white limestone and resurge near Viamu. Depending on the location of the resurgence, depth of the system could be up to 500m. See map 08

MR 609, Kerene en Eto I (western sink)
Location: SE end of the Levani Valley, about two hours walk from Gwali. See map 02.
Description: A river of roughly 2 cumecs flows into an entrance roughly 10 x 10m, with a chamber inside on the left containing two leads. The first of these was small and muddy, but had a slight draft and was inhabited by bats. The second was a narrow walking passage with plentiful decoration leading upward for about 50m to a sump in a deep pool, probably bailable. There is a high lead which would require bolting which leaves above the river near the end of this chamber. Slightly further down, a chamber on the right leads to a mud slope upward to a small entrance and a few alcoves which were inhabited by colonies of bats, probably Vespertilionids. The main streamway ends in a turbulent sump beyond this chamber, which may be passable in lower water. A high lead accessable by a slippery traverse was visible above the sump. See map 09.

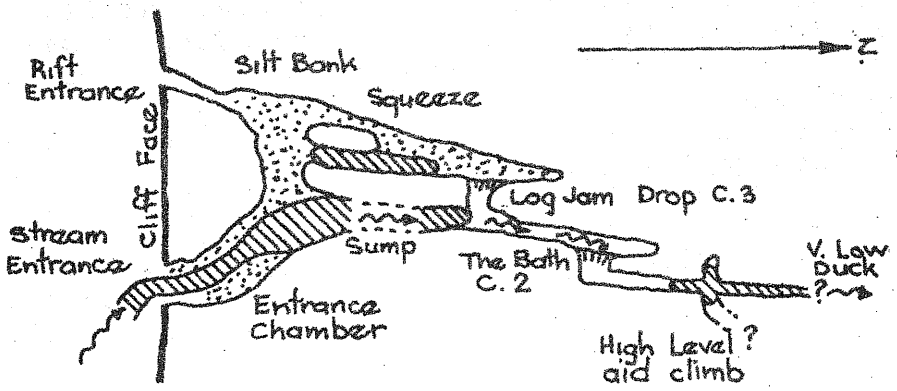
MR 609, Kerene en Eto II (eastern sink)
Location: about 500m SE of MR 610 I. Approach from the eastern side as the cliffs are gentler. See map 02.
Description: The river was in flood when this cave was visited, carrying nearly 3 cumec. It cascaded and churned steeply down into a cave entrance surrounded by overgrown cliffs, and immediatly sumps. The local people say that in lower water this cave is enterable. A small hole in the cliff directly above the sump may provide access. Across the river from the observation point, and reachable by roping over a small over hang, is a large dry entrance. Unfortunately, the party did not have a rope.

MR 611, Kereme en Eto III (Resurgence)
Location: about 1 - 2km north of MR 610. Not visited.
Description: The local people say it is not enterable. The waters from MR 609 and 610 rivers apparently meet somewhere

YAGA KANANDA - MAP 08

MR 608 SCALE 1 : 1000

PLAN

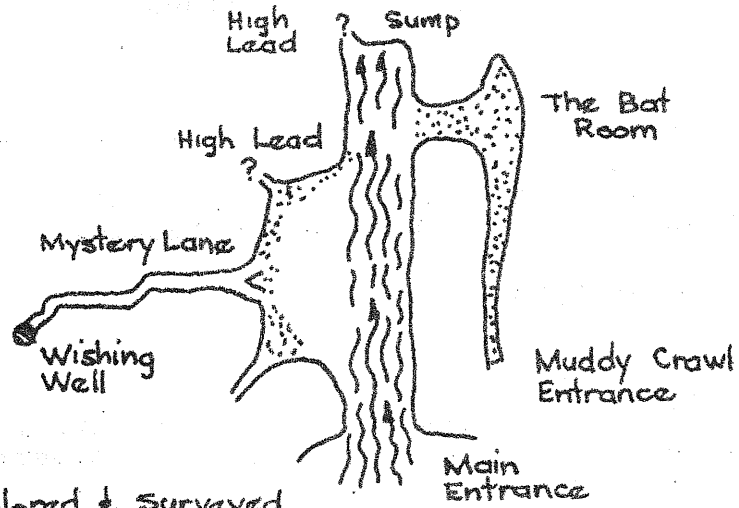


Explored & Surveyed
by:- R. Kay & B. Unger 20.8.78

KERENE EN ETO - MAP 09

MR 609 SCALE 1 : 1000

PLAN



Explored & Surveyed
by:- B. Unger 22.8.78

underneath the low limestone ridge and the combined flow resurges here to form the Tumbutu River. The Tumbutu flows across the Levani floor to sink in a shallow lake near Yaga Kananda, and, according to the local people resurges as the Tumbudu near Harage 20km away and 600m lower. The authors think it more likely that it resurges as the Yogona 10km away and 600m lower. A dye trace would be useful.

MR 612, Emama Ekanda
Location: The end of the Emama Valley, ringed by 400m high cliffs.
Description: The Emama River in normal flow carries about 2 cumec. The day after exploration, however, it was observed at about 8 cumec. In normal flow the water cascades down into an impenetrable fissure. Roping up to cross the rapids, an obvious entrance can be reached on the left of the sink. A short passage leads to a pool, then a couple of vertical chimneys of about 2m. The clean very white passage continues a further 15 to 20m with a dead end side passage, then encounters a pitch of 10m into a deep pool. Swimming for about 5m leads to a rock pile which could not be penetrated. Emama Ekanda is a very sporting cave for its length, with exciting potential, but the feeling is that it will not go as there is too much water. See map 10.

MR 613, Huri Ekanda
Location: 10 mins walk NW of Gwali, altitude 2100m.
Description (D. S. Gillieson): The entrance doline is located in a prominent gully amongst gardens, some 50m above the level of Gwali. The cave is a stream system with two crawl entrances. The downstream entrance leads down talus to a streamway 30m long, 2-3m wide and of a similar height. The flow of 10l/sec emerges from a low passage. The higher crawl gives access to a serpentinous stream passage, typically 0.5m wide and up to 4m high. This branches after 70m; the left branch ascends small tufa rapids to a flowstone blockage. A dry rift can be followed for 10m. The right branch can be followed for 300m with an easily passed flowstone blockage at 100m. See map 11.
Comments: The bedload in the stream is limestone and siltstone cobbles.

MR 614
Location: $\frac{3}{4}$ hour NW of Gwali in the Levani Valley along the Bidubwa-anda track.
Description: A shaft, at least 18m deep, at an angle of 70°. It was not descended and may require tackle.

Rumours - not investigated

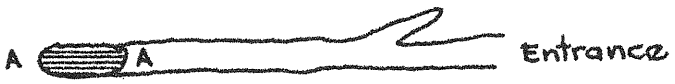
Hana - I - Uli
Location: somewhere in the Kewane Valley
Description: This is the sink of the Kewane River, which carries about 1 cumec of water. Paiya, Kenewa and others tell us there is a large cave entrance here.
Comments: This water may be the real source of the Tumbudu R. near Harage.

Yagamega Kananda
Location: Somewhere near Dindi Mondo.
Description: Almost everybody the authors talked with spoke of

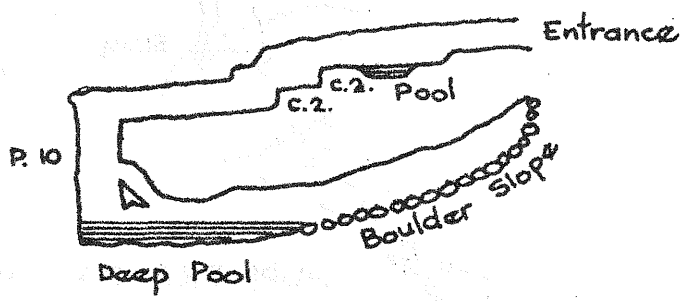
EMAMA EKANDA - MAP 10

MR 612 SCALE 1:1000

N



PLANS

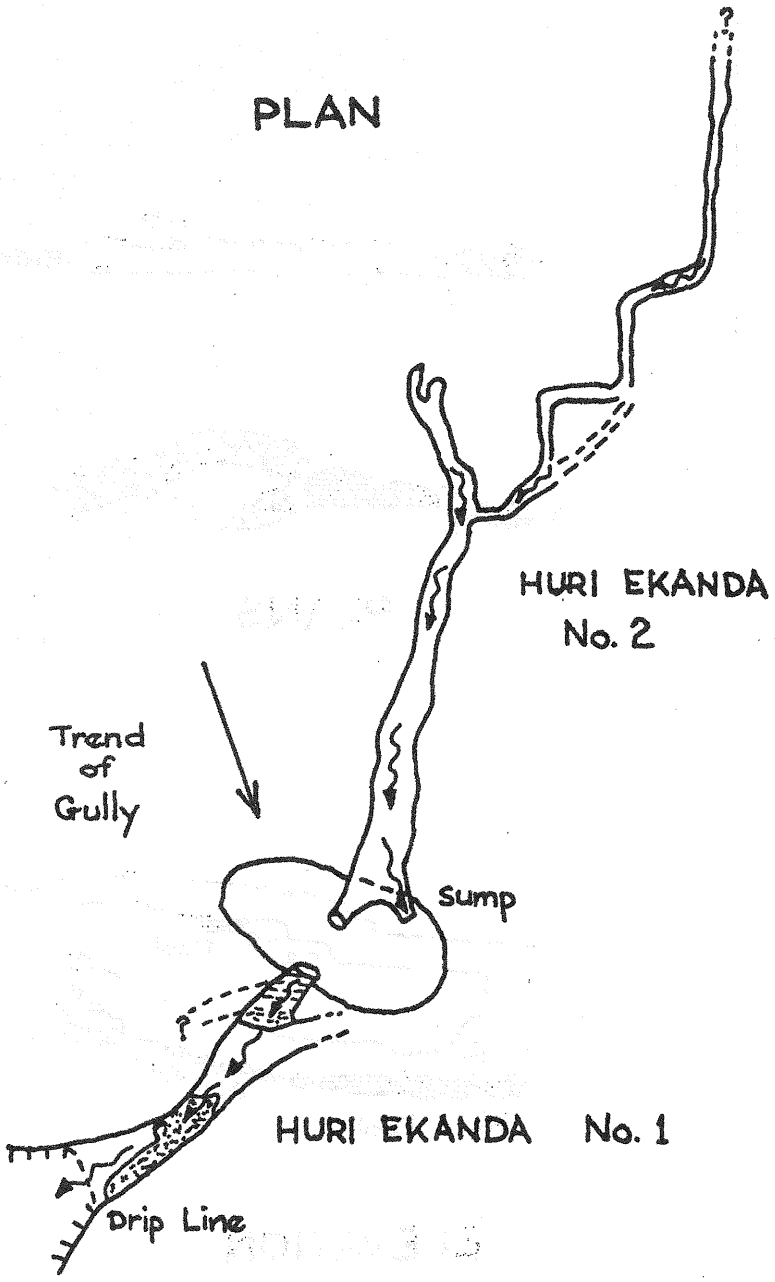


ELEVATION

Explored & Surveyed
by:- R. Kay 21. 8. 78

HURI EKANDA - MAP 11

MR 613 SCALE 1:1000



Surveyed by:-
D. Gillieson Aug, 1978

this cave. A stream about 1m wide reportedly flows into a hole (horizontal? vertical?) about 1½m by 1½m.

Black Hole Country
Location: South of Kewane, probably reachable by the Kewane - Tanggi track.
Description: This area was spotted from a helicopter by Neil Ryan. It shows on air photos as being full of black holes, not unlike The Cheese on the Muller Plateau. It may be capped with a layer of siltstone which would block the bottoms of the shafts. The area appears to be at the right stratigraphic level for siltstone. But you never know....

Yogona Ekanda
Location: In a gorge below the Levani track a few minutes from the junction with the Koroba - Harage road.
Description: A roar of swift water can be heard from the track. There appears to be a resurgence there, and one of the local people says that there is a large cave.

The People and their Languages

There is no permanent habitation along the Levani track between Geroro and Karibu, although there are a few scattered huts used by travellers, hunters and pandanus nut gatherers. The E Mama and Ma Waru valleys are also uninhabited. The Kewane Valley has a population of six, who are closely related to the people of Karibu. So when we speak of the people of the area, we are speaking of the 500 or so residents of the Levani Valley.

The Levani people consider themselves to be a mixture of the Huli and Duna people, and any given individual is somewhat hesitant to say which tribe he belongs to. Most, if not all, people speak both the Huli and Duna languages. There is, however, a rough dividing line. Duna is usually spoken in Karibu and the north, while Huli is the usual language of Gwali and the south.

In our spellings of place names we have tried to reflect the pronunciations we heard, rather than the sometimes inaccurate and/or inconsistent published spellings. Also, we have used Huli names for features in Huli territory and Duna names for features in Duna territory.

* * *

NEWS FROM NORTH AMERICA

The September,1980 issue of NSS News from the USA National Speleological Society contains some of the best cave related reading matter I've seen for some time. From Mexico comes a report by Bill Stone on the connection between Li Nita and San Agustin to make this the 3rd deepest cave in the world (1221m) and the first cave outside of western Europe to break the 1000m barrier.

The issue also contains an account of Bruce Unger's death in just over 1m of water 60m from the efflux entrance of a Granite cave in the Rocky Mountains. It appears that he drowned following head and neck injuries in an accident that is not fully understood. Bruce participated in the 1978 Muller Range Expedition . He had a close call on this expedition in the river cave. This issue of NSS News contains a poem he wrote whilst awaiting rescue and suffering from hypothermia on the Muller Expedition.

* * *

continued from page 120

highly glossed bluish tinge, its throat grey, the breast is grey with some feathers edged in white and the abdomen is white. Outside the cave this swiftlet hunts its food close to the ground and flies more slowly than the other species. The Glossy Swiftlet is the species which nests in the daylight zone of the cave. The other species nest further inside.

C. hirundinacea the Mountain Swiftlet is 125mm in length. Its common name comes from the fact that it is more common at altitudes of more than 1000m. The upperparts are black while the underparts are silvery grey. There is much concealed white in the bases of the feathers of the upper parts. The bill is very small. The tail is slightly forked and outside the Mountain Swiftlet flies high in the sky in flocks of 3 to 15 birds.

C. vanikorensis the Lowland Swiftlet is found below 1000m in altitude. It is the same size as the Mountain Swiftlet. The plumage on the upperparts is bronzy brown or greenish black, while the underparts are smoky or brownish grey. There is little concealed white on the feathers of the back. The bill is large.

C. brevirostris (=whiteheadi) Whitehead's Swiftlet flies very high. The bird is 140mm in length. The upper parts are black with a bluish or greenish gloss, the throat silvery grey which contrasts with the brownish abdomen. It is not as common as the other species.

On Bougainville, C. vanikorensis, C. esculenta and C. spodiopygia are present. C. spodiopygia White Rumped Swiftlet is a dark sooty colour, greyish below with a whitish bar across the rump with is distinctive. It is 100mm in length. These birds also fly quite high outside the caves.

References

Beehler, B. McP. 1978. Upland Birds of Northeastern New Guinea. Wau Ecology Institute Handbook No. 4. Wau. "

Hadden, D. 1981. Birds of the North Solomons. Wau Ecology Institute Handbook no 8. Wau. "

Peckover, W. S., and Filewood, L. W. C. 1976. Birds of New Guinea and Tropical Australia. A. H. and A. W. Reed, Sydney. *

Rand, A. L., and Gillard, E. T. 1967. Handbook of New Guinea Birds. Weindenfield and Nicolson, London. *

* out of print

" available from the Wau Ecology Institute, P.O.Box 77, Wau, Morobe Province, Papua New Guinea.

* * *

MULLER 82

AUSTRALASIAN EXPEDITION TO THE CAVES OF PAPUA NEW GUINEA

The Muller Range in the Southern Highlands of Papua New Guinea was the scene of the successful Australasian expediton, ATEA 78, which explored the now famous Atea Kananda cave system shown in the television film 'The Search for the World's Deepest Cave'.

Apart from many spectacular caves, ATEA 78 uncovered a wealth of scientific information which reveals that we have unlocked only a fraction of the secrets of the Muller Range.

.....MULLER 82 will be the key.

EXPLORATION

When ATEA 78 ended many inviting caves were left incompletely explored or untouched because of the onset of the wet season, so the emphasis of MULLER 82 is on underground exploration.

The ATEA KANANDA, already the longest cave in the southern hemisphere has the potential to be explored to double or triple its presently known length. Our studies in 1978 have shown where to concentrate exploration effort for maximum length and depth. The Atea Riverway is a prime objective, despite its being an extremely hazardous area, even in stable weather conditions.

The NALI GORGE sports two tantalising entrances high in its walls. Entry by abseiling or climbing could provide a back door to the Atea Kananda. Another intriguing prospect is a huge cave downstream of the Nali Gorge. The Duna tribe believes an evil spirit lives inside and that to enter the caves means certain death.

The MAMO PLATEAU covers 100 km^2 . Its karst features indicate that below its surface lies a cave system of unbelievable size. Hadia Yaneabogairi, the most beautiful cave in the Muller Range, was only discovered in the last weeks of ATEA 78 and maybe the doorway to this vast labyrinth.

The UNFATHOMED FISSURES lie at high altitude in cool moss forest. They were abandoned when the teams descending them ran out of rope. In one case the cavers dangled on the end of the rope with no cave floor in sight, and rocks fell for six seconds into the darkness. Hence, MULLER 82 will be taking several kilometres of rope.

The YU BALALO is an exciting prospect. It is a river with all the ferocity of YU ATEA, disappearing underground. Exploration of this cave is one of the greatest challenges of modern caving and will give Papua New Guinea another of the world's great river caves.

The BLACK HOLE, high on the Muller Range, was sighted on a helicopter reconnaissance. In this enormous void, 100 m in diameter, no bottom can be seen .....only blackness.

These are the most significant targets of MULLER 82. It is the most ambitious cave exploration program ever planned: the aim is to survey over 100km of new cave passage. A major objective, however, is to locate a cave of great depth.....All targets have been chosen with this in view, so that at any stage the expedition resources could be diverted to explore the world's deepest cave.

SCIENCE

The scientific program has attracted strong support. Research projects of many varieties were so successful in 1978 that the majority of the investigators will return in 1982 to continue existing projects and start new ones. Other scientists intend to join us, attracted by the opportunity provided by the expedition to do research work in a new and wild environment.

MEMBERS

The 50 participants form the most experienced team ever assembled to tackle a program of cave exploration and science in Papua New Guinea. It has 18 returning members from ATEA 78, the established international reputation of which has attracted representatives from Papua New Guinea, New Zealand, Great Britain, North America and Europe.

ORGANISATION

MULLER 82 will enter the field on 19 June 1982 for a period of 3 months. It is being organised in Sydney by Julia James, Alan Warild, Tony White and Steve Bunton and in Papua New Guinea by Neil Hickson.

Correspondence should be addressed to:

MULLER 82
41 Northwood St.,
Newtown, NSW 2042
Australia
Tel.02-519-1415

Neil Hickson
P.O.Box 987,
MT. Hagen,
Papua New Guinea

Additional information can be obtained from the following publications:

Papua New Guinea Speleological Expedition NSRE 1973. Julia M. James (ed). Speleological Research Council Ltd,1974

Caves and Karst of the Muller Range. Julia M. James and H. Jane Dyson (eds). Atea 78, in conjunction with the Speleological Research Council Ltd, 1980.

Muller '76. Julia M. James, Randall King and Neil Montgomery. Niugini Caver 5 (4): 103 - 128.

An Australasian Speleological Expedition to Papua New Guinea - A Preliminary Report. Julia M. James. Niugini Caver 7(1):2-10.

* * *

BOOK REVIEW

Paul W. Williams*

CAVES AND KARST OF THE MULLER RANGE, by J. M. James and H. J. Dyson. Atea 78, in conjunction with the Speleological Research Council, Sydney, 1980. pp.150. Price $A15.00.

This is one of the most impressive speleological expedition reports I have seen; impressive because of its professional standards and comprehensive coverage. It conveys the results of the 'Atea 78' expedition to the Muller Plateau in the Southern Highlands of Papua New Guinea. This was the third expedition to the area, others being in 1973 and 1976, and was launched with one major objective, the exploration of the Atea Kananda and with a strong commitment to scientific studies.

The expedition was ambitious and large. It had 49 members from 5 different countries, though the majority (34) were from Australia, and in addition engaged 13 local assistants. The sheer size perhaps explains why the text and tables don't agree in the numbers employed and involved. However, the fact that it received recognition from 5 official bodies in Papua New Guinea is a tribute to the quality of its leadership and to the useful results of previous expeditions. The value of the work done and the standard of its presentation in this report amply justifies that support.

The book is divided into 20 chapters and 9 appendices, involving 26 authors. The material presented covers every official aspect of the expedition - personal details that commonly colour caver's reports thankfully having been left out - and it is well supported by 40 maps, 29 figures, 25 tables and 60 plates. So there's a wealth of information. After a short introductory chapter by Julia James in which she outlines the purpose and organization of the expedition, and prospects for the future (Mamo 82), the next nine chapters - occupying well over a third of the book - provide a regional speleology of the expedition area. These contributions follow a similar pattern, outlining previous information and giving good accurate descriptions, aided by acceptable half-tone illustrations and well drawn maps of consistent style, of the major sites of interest. They conclude with a speleological assessment of each area, which is a useful guide for future expeditions. The chapter on the Atea Area, as might be expected, is the largest and concludes that the locality should still produce a considerable amount of new cave passage particularly in the vicinity of the Atea Gorge. The main cave, Atea Kananda, is also deemed worthy of a great deal of further exploration.

The following ten chapters present the results of the systematic scientific aspects of the expedition: geology, meteorology, hydrology, surface geomorphology, water chemistry, cave sediments, subterranean geomorphology, botany, vertebrate fauna, and biospeleology. The geology is well handled in an authorative manner and provides an invaluable basis for further work in the area. The meteorology is brief but useful, being particularly important from the safety point-of-view, as well

* University of Auckland, Auckland, New Zealand.

as complementing the hydrology. It was interesting to read in the latter chapter that the discharge of the river in the Atea Doline has been revised downwards from an enthusiatic visual estimate of 11 $m^3 s^{-1}$ made in 1973 to a measured estimate of 4 $m^3 s^{-1}$ on this expedition, but even with that 'loss' it's still a big river to contend with in a cave. The data presented on the relationship between rainfall, flood peaks, and ducks closing (Figure 13:3) is important for the safety of future expeditions. Some minor confusion shows up in the hydrology chapter over Rhodamine WT (or was it B?) and where it got to. Figure 13:1 shows the tracer route for Rhodamine WT, but the text and Table 13:1 state that it was Rhodamine B. Furthermore, on the figure both the Rhodamine and optical brightener converge at detector point 25 (Atea Resurgence), whereas the table indicates that only the optical brightener emerged there, the Rhodamine only being found (weakly) at site 26 (Yu Nali). In view of the admitted inconclusive nature of the Rhodamine B test, the conclusion endorsing the use of this dye in the tropics is hardly justified.

The chapter on Surface Geomorphology commences with outlines on structural geomorphology and soils and then deals in some detail with karst landforms, subdividing the latter into Small Scale Solution Sculpture, Closed Depressions, Karst Areas, and the Drainage System and Fluviokarst. The text on karst features is generally descriptive rather than explanatory and successfully avoids confusing the reader with difficult and often ambiguous karst terminology, although the distinction between uvalas and glades is rather arbitrary. There also appears to be some uncertainty over whether the Atea Doline is a collapse or solution feature. From its description it seems like a predominantly collapse doline, but the text (p. 94) suggests that it was developed by the removal of material through solution rather than collapse. The numerical and areal significance of the subjacent karst depressions developed in a siltstone caprock over limestone is a particularly important feature of the geomorphology. The origin of such depressions and their significance for the style of the polygonal karst relief which develops from them is something that requires further investigation. The chapter makes a valuable contribution to the discussion on the relative roles of climate and geology in determining karst landform distribution, and concludes that local geology is of greatest significance.

The Water Chemistry chapter is very brief and in fact concentrates on an assessment of limestone solution rates. The values calculated are not very helpful, as the data base is inadequate and a distinction needs to be made between autogenic and allogenic components.

The all-pervading cave mud was clearly quite a feature of the expedition, and David Gillieson's chapter on Clastic Sediments does it justice, being dealt with right down to scanning electron microscope level. Both this and the previous five chapters form a good background against which to interpret the Underground Geomorphology, which is handled well in Chapter 17. Some good points are made about the complications introduced by mixed sedimentary sequences on speleogensis, that are relevant beyond Papua New Guinea. Jenning's new term "nothephreatic" also gets an airing (soaking?), showing its

usefulness even if most of us have an aversion to yet more jargon.

The systematic section terminates with three short biological chapters on Botany, Vertebrate Fauna, and Biospeleology. The latter is the most detailed, and the most important because so little is known about the biology of caves in this part of the tropics. The chapter presents a preliminary list of cavernicolous fauna and useful comments for those wishing to collect specimens in the area.

The report concludes with nine appendices, in fact occupying almost a third of the volume. These mainly cover expedition logistic detail on food, medical, transport, equipment, finance and other topics. The information represents a valuable summary of experience of considerable importance for those planning future expeditions.

Atea 78 was clearly a successful expedition and although not gaining the glamour of an international depth record, it accomplished much more worthwhile science than most other speleological expeditions. The book is not balanced in the sense that equal weight is given to each topic - some chapters are very light - but the cumulative importance of its findings is considerable. The reference list alone is the best available source of literature on caves and karst in Papua New Guinea. Mamo 82 will have a high standard to match.

Reprinted from Helictite Journal of Australasian Cave Research 19 (2). 1981.

* * *

The Editor recommends this publication Caves and Karst of the Muller Range, as reviewed above to all speleologists interested in Papua New Guinea caves for their libraries.

title Caves and Karst of the Muller Range

subtitle "Exploration in Papua New Guinea"

editors J. M. James and H. J. Dyson

160 pages, with full colour cover, 71 plates, 69 figures and maps and three large loose leaf maps.

Published by Atea 78

Available from: Atea 78,
41 Northwood Street,
Newtown, N.S.W., 2042
Australia.

Price $A15, post free

ATEA 1978

* * *

ULUR PLAINS RECONNAISSANCE

D. Pease*

During Easter 1982 a reconnaissance group visited the Ulur Plains grassland (Mannasat) in order to determine the caving potential of the area.

The Ulur Plains are located about 60 km NE of Lae in the Cromwell Ranges of the Huon Peninsula. The most direct route to the Plains is to fly by third level airline (Talair, Morobe Air or Co-air) to the Indagen airstrip. Here guides and carriers can be hired for the walk to the plains. This is an arduous climb through the rainforest to 2600 m and then down to the grassland at 2400 m, taking about 7 hours overall to reach the campsite.

The Ulur Plains is an area of about 4 kilometres square with the northern boundary being the Cromwell Range and to the south the Mongi River flowing east. In general the grassland plain falls in a northerly direction towards the base of the Cromwell Range where the water disappears into sinkholes of various sizes.

At location number 17 (see map) an average sized stream was entering a submerged entrance creating small whirlpools on the surface.

Location 16 comprises a sinkhole with only a trickle of water. The base section of the hole comprised a five metre layer of pitted limestone. The direction of the flow at the outlet from the hole was northerly. A black silt layer 300 mm thick was evident at the base of the inlet where not eroded by the stream.

At location 15 is a sinkhole at the base of the western perimeter of the grassland. It revealed only a small seepage hole with no sign of the underlying limestone.

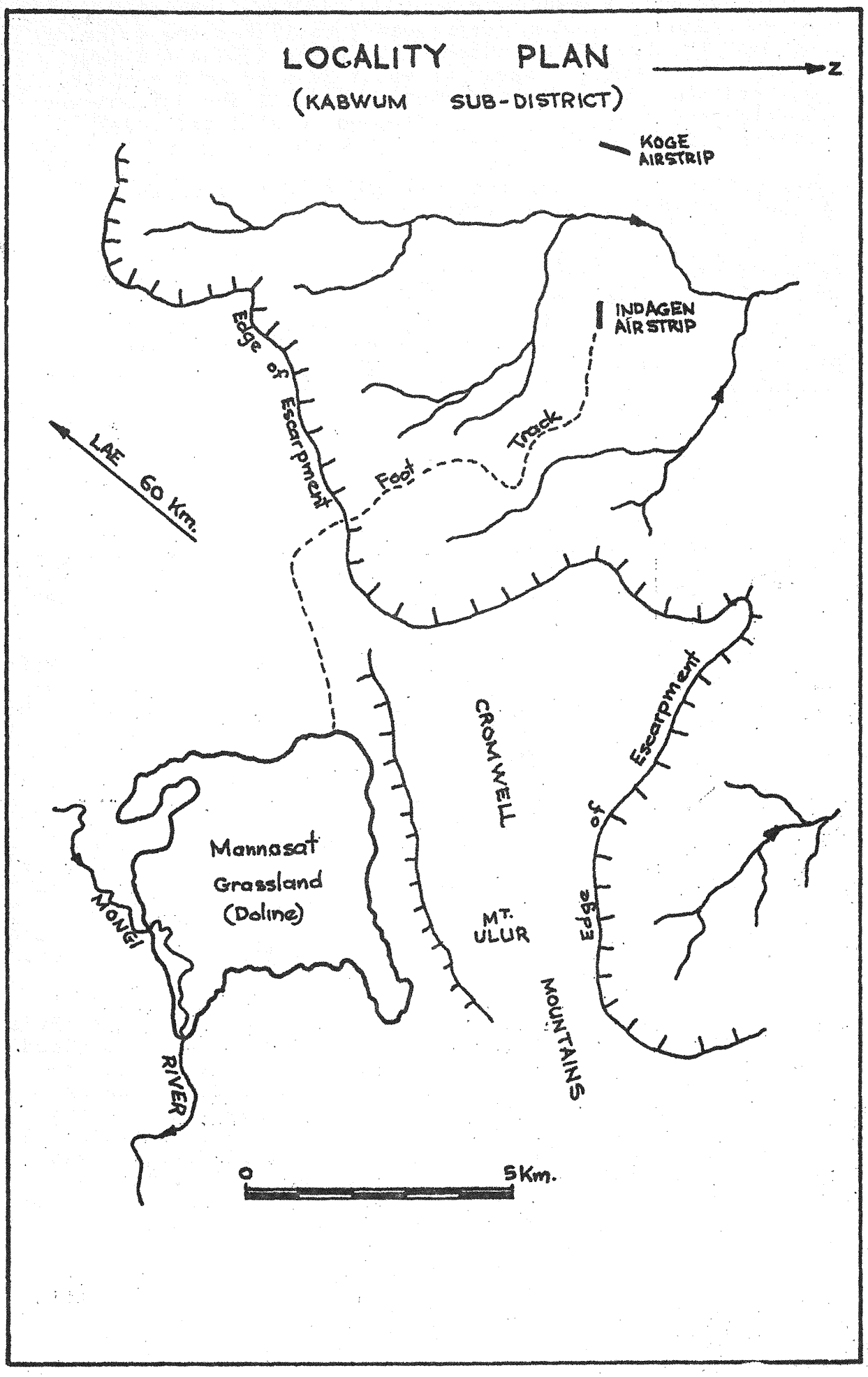
Location 14 has very little water entering at the time but the underlying limestone was exposed with tight squeezes evident.

At location 13, a small stream cascaded over a fifteen metre waterfall and had eroded the base limestone to a depth of over a metre. The water then flowed in a northerly direction into another tight squeeze.

Location 12 revealed an underground stream at the base of a collapsed cave section. There was a significant flow of water about 3 metres wide by 300 mm deep, which disappeared into a sump. The water which was flowing in a westerly direction may be from the stream draining the central section of the plain.

The water entering the sinkhole at location 11 was flowing in an easterly direction. The stream would measure 1.5 m wide by 200 mm deep. The stream drops into a 3 m deep hole in the limestone strata then levels out for another 6 m before ending in a sump. Another entrance was found and the stream traced a little further downstream.

* P. O. Box 344, Kainantu, E.H.P., Papua New Guinea.


LOCALITY PLAN
(KABWUM SUB-DISTRICT)
N
KOGE AIRSTRIP
INDAGEN AIR STRIP
Edge of Escarpment
Track
Foot
LAE 60 Km.
CROMWELL
MOUNTAINS
Edge of Escarpment
Mannasat Grassland (Doline)
MONGI
RIVER
MT. ULUR
0
5Km.

Lastly at reference point 10, a large cave entrance was found measuring about 6 m wide by 5 m high. The flow into the cave from the westerly flowing stream was larger than the adjacent stream and the two streams combined not far inside the cave entrance. The cave continued for about 30 m to an 8 m pitch. There were logs jammed between the cave walls and outside the cave which showed that the cave flooded to at least twenty metres in depth!

In all a very interesting reconnaissance to an area in which I feel more exploring is warranted.

At Indagen, the quality of the limestone is rather poor but excellent for road construction as this coronous material is located fairly close to the surface. Here, I investigated one cave which was fairly tight to enter. The overall depth was about 5 m. There was a side passage but due to a squeeze through loose boulders and the deterioration of the coronous material I declined to investigate further.

* * *

PAPUA NEW GUINEA FOR THE HOLIDAYING CAVER

As most readers are aware Papua New Guinea has experienced an influx of large expeditions over the past few years. I would like to present a new idea to those interested in caving here - the sightseeing/caving or caving/sightseeing holiday depending on your emphasis.

Large expeditions generally select fairly remote areas for their work and that when combined with the numbers of people and the need for at least some people to have research visas creates the impression that to come caving in PNG is a massive exercise. This need not be the case.

There are two groups of people that PNG has a lot to offer and they are firstly the single caver or at the most four cavers as a group. A small group like this could easily do some productive work in PNG during a month's stay as well as seeing quite a bit of the country in that time. The second group is what we could call the mini-expedition - 6 to 10 people whose main aim at least for several weeks of their stay is to go caving. There are a large number of areas in PNG suitable for this type of group.

Some areas that come to mind are the Highlands. This has an extensive road system with public transport in the form of PMV's available and can be reached by road from Lae which is serviced by frequent flights from Port Moresby. There are a number of resident cavers in the Highlands who could indicate areas of interest. New Ireland has much untapped potential both on the coast and in regions other than the Lelet Plateau. A similar story exists in New Britain where a number of limestone areas (e.g. near Kandrian) have received little attention. Although trips so far to the Cromwell Ranges have not produced very much only a small area has been examined and caves are known from the area around Kabwum.

It is considered that this type of holiday should prove very rewarding both from the caving point of view as well as getting to see the country and meet its people.

* * *


CAVE LOCATIONS
SCALE :- 1 : 34000 (Approx.)
N
CROMWELL MOUNTAINS
To Sialum
Edge of Grassland
To Indagen
10
11
12
13
14
Lake
15
16
17
MANN ASAT GRASSLAND
Foot Track
Edge of Grassland
RIVER
MONGI
To Avengu

NEW CONTRIBUTORS

Patrick Cellerier is a French caver based in Paris.

Maleckar Franc is a Yugoslavian speleologist from Ljubljana. A member of the Swiss expedition, he would be the first Yugoslavian caver to come to Papua New Guinea.

Robert Kay is an English caver who came to Papua New Guinea as part of the Atea 80 expedition.

Richard Maire came to Papua New Guinea on both the 1978 and the 1980 French expeditions. Richard is a professional geomorphologist from France.

Danielle Martinez was a member of the 1978 French Reconnaissance Expedition. Like all the members of both expeditions, he is a very experienced caver.

Roger Parzybut comes from Compigne in northwestern France. Roger's main area of interest in caves is photography.

Dave Pease is a surveyor with the Highlands Highway project. He has worked in Papua New Guinea on and off for many years.

Jean-Francois Pernette was the leader of the 1980 French expedition to Papua New Guinea. From Bordeaux in France, Jean-Francois has caved extensively in France, U.S.A. and Spain before widening his horizions to include PNG.

Jim Specht is the Curator of Anthropology at the Australian Museum in Sydney. The staff of the Australian Museum have a long standing interest in the South Pacific and PNG.

Bruce Unger was an American caver who came to Papua New Guinea to participate in Atea 80. Bruce was later killed in a caving accident in the United States.

Paul Williams is a researcher with the University of Auckland in New Zealand.

* * *

SAFETY HINT

It is suggested that all cavers should carry underground a small durable pack containing the following basic equipment for safety and convenience. (a) Three independant sources of light being a main light (carbide?), a reliable torch and a candle or chemical light. (b) Repair parts for the primary light source. This would include extra carbide or batteries. Any caver using carbide should carry and use a container for spent carbide. (c) A supply of drinking water and energy food. (d) A whistle for signaling. (e) a hypothermic barrier of a space blanket or garbage bag.

These light easily carried supplies may help save a life at some time. It may be yours.

* * *


NIUGINI CAVER