

AN INTRODUCTION TO CAVE EXPLORATION IN BELIZE

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Systematic speleological exploration has been taking place in Belize since about 1960. Such exploration tends to be characterized by long term involvement by a small number of individuals, principally from the USA, but with significant contributions from other countries, especially the UK. An estimated total of 250 km of passage have now been mapped, ranging from low dry grovels to large, active river passage, and two of the largest underground chambers in the world. The author assigns caves to eight geographical areas and describes the history of recent exploration in each. Future exploration problems and priorities are also discussed.

Belize is located in the southeastern section of the Yucatan Peninsula in Central America (see location map, page 68), bordered to the south and west by Guatemala, to the north by Mexico, and to the east by the Caribbean Sea. While the social geography and modern history of the country are very distinct from those of its neighbor countries, the physical geography is less of a contrast. The northern part of the country is flat and contains no known caves of significance, but the southern half of Belize has caves in great profusion throughout the limestone foothills and outliers of the Maya Mountain range.

CAVE EXPLORATION BEFORE MODERN TIMES

Caves are inextricably bound up with the history of Belize, having been fundamental to the religion of the Maya. Few do not already have some signs of human visitation. It rapidly becomes apparent to the modern cave explorer in Belize that, while virgin cave can still be discovered, evidence of the activities of the ancient Maya can be found almost everywhere, and often substantial distances inside the caves. Relics, principally in the form of smashed shards of pottery, are very common.

In more recent times, however, the caves have held little significance for the average Belizean, except as a source of income for a few unscrupulous individuals who loot the artifacts to sell them abroad. Only in the last few years, with the development of Belize as a major tourist destination, have the caves started to be valued as potential sources of income in their own right, and it is now common for local landowners and international travel companies to mention caves in their promotional information about the country and to provide cave tours as part of the "Belize experience" (Hollings, pers. comm., 1994; O'Regan, 1991; McNatt, pers. comm., 1993).

As a result of the looting problem, the Government of Belize has scheduled all caves as sites of archaeological interest and it is necessary for all visitors, be they explorers or tourists, to apply to the Department of Archaeology in Belmopan for a permit before going underground. Also, much of the cave-bearing land of Belize is located on private land

and owners, understandably, will not take kindly to trespassers. The importance of requesting permission cannot be over stressed since failure to observe this simple courtesy can not only land the visitor in jail, but will also eventually hasten the destruction of many of these beautiful and exciting caves.

In deference to the achievements of the Maya it has become standard practice among modern cavers in Belize to give the caves names taken from the Mayan language. Actun is the Mayan word for "cave" (ac- hollow, tun- stone). The choice of a noun to describe the cave is one of the more enjoyable aspects of the trip, and usually results in several interesting hours in the Department of Archaeology library in Belmopan leafing through their Mayan/Spanish dictionary. In common with cave culture everywhere in the world, names relating to life after death, sorcery, bats, and religious matters tend to pre-dominate.

MODERN CAVE EXPLORATION

Modern caving in Belize can be traced back to about 1959 when W. Ford Young (who had been sent there by Gulf Oil to manage their oil explorations) visited caves in several areas (Young, 1961). Young was accompanied by Frank Norris, another American, with a ranch in the Cayo District. Explorations prior to the work of Young included A.H. Anderson, who was the Archaeological Commissioner (Pendergast, 1970), and others making archaeological investigations at specific sites, but systematic exploration and mapping for speleological purposes was pretty much unknown and as a result there is little relevant to be found in the speleological literature prior to 1960.

After Young, cave exploration grew mainly out of the work of archaeologists in Belize. A number of American workers were invited to participate in archaeological programs and because of the link between caves and the Maya civilization that the archaeologists were studying, it was inevitable that sooner or later cavers wishing to concentrate on cave exploration and mapping would visit the country. Among these,

workers such as Tom Miller, Logan McNatt, and more latterly Philip Reeder have all made considerable and long term commitments to exploration in Belize. Anyone researching cave exploration in the country rapidly comes to realize that the vast majority of work has been done by only a few dedicated individuals and the same names crop up again and again in the literature.

MAJOR CAVING REGIONS

For the purposes of description, the caves of Belize can be assigned to eight regions which correlate to karst areas or sub-areas shown on the location map on page 68 and Miller's figure 4 in this issue. The boundaries of these regions are inevitably blurred since the geology dictates that they are nearly all based on essentially the same limestone. The differences between the areas are significant, however, and probably the single most important factor is their position in relation to the main massif of the Maya Mountains because of the effect that this has on rainfall. The massif itself is of igneous origin and the sedimentary rocks comprising most of the other portions of the Maya Mountains are non-carbonates (Bateson & Hall, 1977) and contain no caves of significance. As a summary of significant caves in Belize, Table 1 lists the country's five longest and deepest.

CAVES BRANCH

By virtue of convenient location and long-term exploration, Caves Branch stands out as a distinct caving region, while actually a geological subregion of the Boundary Fault Karst Area. Caves Branch River rises in the northern foothills of the Maya Mountains and flows northeast to join the Sibun River about halfway between Belmopan and Belize City. The river gives its name to an area of land which is situated about 20 km

almost due south of Belmopan. Where the Hummingbird Highway crosses the river, a farm has existed for many years and access to the caves is relatively simple. In speleological terms this is certainly the most intensely studied area of the country.

The area was first explored by Young and Norris who visited St. Herman's Cave in the late 1950s. They were also aware of the Caves Branch River Cave and other caves in the area. Among the visitors to Belize they played host to were Americans Barbara MacLeod and Dave Albert (Albert & MacLeod, 1971) and probably the surveyor, Charles Wright (Wright et al., 1959). In an article for the National Geographic magazine in 1972, Louis de la Haba mentions visiting a cave somewhere on the Hummingbird Highway in the presence of Young, Norris, and Dan Bellini (de la Haba, 1972). Dan Bellini worked on the Caves Branch farm, and Department of Archaeology records indicate that the site visited was known as Pothunter's Cave.

Barbara MacLeod returned to Belize to work for the Department of Archaeology on a Smithsonian Institution/Peace Corps program (Bartholomew, 1973; Rushin-Bell, 1991). She was joined by Carol Jo Rushin, and between 1971 and 1974 they explored several caves in the Caves Branch area including Petroglyph Cave, a major river conduit linked to St. Herman's Cave. In 1978, she and other archaeologists engaged in an extensive study of Petroglyph, the results of which are still unpublished (MacLeod & Reents-Budet, 1995). This period could be considered the second phase of speleological exploration in Belize, involving a number of United States cavers, principally from the Sligo Grotto and Texas chapters of the National Speleological Society (NSS). Amongst these visitors was Tom Miller. He later centered the field work for his PhD thesis (Miller, 1981a) at Caves Branch where he was assisted by Mike Shawcross, Jerry Davis,

Table 1.

LONGEST CAVES IN BELIZE

CAVE NAME	KARST AREA	LENGTH
Cebada Cave	Chiquibul	17.2 km
Petroglyph-St Herman's Cave	Boundary Fault (Caves Branch subregion)	17.0 km
Actun Tun Kul	Chiquibul	12.2 km
Actun Chek	Boundary Fault (Caves Branch subregion)	8.1 km
Actun Tunichil Muknal	Boundary Fault	5.3 km

DEEPEST CAVES IN BELIZE

CAVE NAME	KARST AREA	DEPTH
Actun Box Ch'ii'ch	Boundary Fault	-183 m
Cebada Cave	Chiquibul	-155 m
Actun Zotziha	Boundary Fault	-152 m
Actun Tunichil Muknal	Boundary Fault	-127 m
Actun Lubul Ha	Boundary Fault	-120 m

and Logan McNatt, a speleo-archaeologist.

In his thesis, Miller concludes that all the caves in the Caves Branch area are hydrologically linked in some way or another. What is commonly referred to as the Caves Branch River system is found a few kilometers downstream from the Hummingbird Highway bridge. This system consists of sections of deep canal, where flotation aids are required, which occasionally break out into open jungle. A vehicle-negotiable track from the Western Highway to Frank's Eddy, about a kilometer downstream of the Caves Branch's confluence with the Sibun River, permits a party to be collected after a trip through the cave making this a perfect introduction to Belizean caving.

Another important segment of the system, St. Herman's Cave, is only five minutes' walk from the Hummingbird Highway. The cave consists of an active river passage and downstream from the entrance can be followed through several stretches of wading and swimming in deep water to a sump which eventually discharges into the Caves Branch River system. Upstream also leads to a sump eventually, but before this is reached it is possible to climb out of the water into a high level series leading to a second entrance. This whole area has been designated a nature reserve, and a nature trail leads from the second entrance back to the Hummingbird Highway at the Caves Branch Blue Hole. This is a popular public spot for swimming and is not to be confused with the Blue Hole at Lighthouse Reef off the coast.

McNatt also stayed in Belize on a more or less permanent basis until 1993, first attached to the Department of Archaeology through the Peace Corps and then latterly as an independent speleological consultant and researcher. He provided considerable assistance to the first serious British expedition to the country, undertaken by 18 members of Queen Mary College (QMC) (part of the University of London) from January to May 1988. The expedition spent three months based at Caves Branch and mapped caves throughout the area bound by the triangle formed between the Western Highway, the Hummingbird Highway and the Caribbean coast (Marochov & Williams, 1992). Many had not been explored or mapped before, but some had been the subject of work by previous expeditions (Miller, 1989a). Discoveries continue to be made at Caves Branch—in 1988 Miller re-discovered 1,600 meters of streamway which had been lost since 1977 (Miller, 1989b), and in 1993 he added a further 5 km to the system (Miller, pers. comm., 1994)

Caves Branch has also been the only focus of inland cave diving activity. The Petroglyph/St. Herman's connection was attempted by Miller in 1987, but he had to abandon the attempt because of regulator failure (Miller, 1987). The connection was finally proved, at the second attempt, by Jim Bowden with assistance from the QMC team in 1988 (Bowden, 1988). It is interesting to note that, despite considerable potential, relatively little cave diving has been attempted in Belize. This probably reflects the realities of lugging the necessary equipment to the most interesting (but most remote) sites.

INDIAN CREEK

The Indian Creek and Dry Creek basins lie in the area to the north of the Hummingbird Highway, northeast of Caves Branch. This area is not really part of the Maya Mountain range, being separated from it by the Caves Branch and Sibun Rivers, and is a subregion of the Sibun-Manatee Karst Area where the limestone hills are less pronounced than on the fringe of the mountains proper. Caves here tend to be short fragments, those at the water table being mostly river passage while above they are usually completely dry. The terrain is rugged and it is necessary to traverse considerable distances on foot through the bush in order to reach the caves, although the recent designation of Five Blues Lake as a National Park may assist somewhat in this regard (McNatt, pers. comm., 1991)

Ford Young mentions several caves in this area in his account (Young, 1961) including Ben Lomond (near the Northern Lagoon), Manatee Cave, and "a group of some forty caves in an area of limestone hills south of the Sibun River between Gracy Rock and Indian Creek." The disappearance of Indian Creek into a number of caves is noted on most maps of the country. This is probably accounted for by the work of a British Colonial Office survey team since Charles Wright recalled being taken through Indian Creek Cave in a canoe while working on a land use survey in the late 1950s (Wright, pers. comm., 1988).

Rushin and MacLeod visited caves in this area in 1972 during their work for the Department of Archaeology (Rushin-Bell, 1982). In 1979, Miller, in the company of Mark Gutchen, surveyed Darknight Cave which is marked on the 1:50,000 topographic maps (Miller, 1979). Miller was also aware of other caves close by, including Green Howards Cave which had first been investigated by British soldiers, but it was to be eleven years before he was able to return to map them (Miller, 1991). In the intervening years he investigated other caves in the area, notably K'op Kimen Cab, explored with Linda Gough in 1987 and 1988 (Miller, 1987), although a survey of this cave does not appear to have been published.

Surveys of other caves on Indian Creek were published by the 1988 QMC expedition (Marochov & Williams, 1992) which also investigated an area to the north which the team named "Gracy Rock." In terms of exploration this is a distinct area in its own right, being accessible via the Western Highway rather than from the Hummingbird, and having little previous record of exploration. However, the caves found were minor and the area is geologically a continuation of the Sibun-Manatee karst so it does not merit distinct status for this treatment.

WHITE RIDGE

White Ridge is the name of a farm company which cultivates a considerable amount of land on the flat coastal plain near Gales Point, about halfway along the coast from Belize City to Dangriga. Like the Indian Creek area to the northwest, White Ridge is a subregion of the Sibun-Manatee karst, but

contrasts as a caving area because its cave-bearing limestone is relatively easy to reach. The terrain is less rugged than further to the north and the farm's citrus plantations provide cleared land and tracks which give easy access to the edges of the low conical hills where the caves are found.

The biggest system is that of Darby Pat and White Ridge caves: basically a river passage with an abandoned top level which closely follows the line of the edge of a couple of the cones. The cave was first discovered by MacLeod and Rushin in 1973 and partly surveyed by Miller and colleagues in 1984 (Miller, 1989a). Miller also assisted the QMC team which extended the cave and produced the first published survey (Marochov & Williams, 1989). QMC explored a few other small caves in the area, including one they christened the Mines of Moria; a single dry trunk passage passing right through a single cone with entrances at each end (Marochov & Williams, 1992). Other caves in the area tend to be very limited in length, and the potential for vertical development is strictly limited since the area is very close to sea level and the cones are a maximum of about 40 m high.

BOUNDARY FAULT AREA

The Boundary Fault Area is the least distinct of all the Belizean caving areas, in the sense that where it ends and the adjacent Caves Branch subregion and Vaca Plateau karst area begin is not readily apparent in the field. For the purposes of this article, the Boundary Fault Area excludes the Caves Branch subregion and adjoining karst further east, and can be considered to include the ground extending west from the Caves Branch watershed up to and including the Barton Creek watershed. The principle rivers are Barton Creek and Roaring Creek.

The limestone of the Boundary Fault Area is some of the highest in Belize. Access to the most interesting caves is only possible by several hours of jungle bashing on steep, heavily vegetated slopes. However, the effort is well rewarded. Situated on the northern edge of the Mountain Pine Ridge, an area of non-carbonate rock, streams that drain onto the karst are chemically and hydrologically suited to form significant caves. The Boundary Fault Area is probably second only to the Chiquibul in its speleological potential and contains some of the most interesting caves in Belize.

Actun Zotziha is fairly typical and consists of a steeply descending entrance series which changes to a wide, high stream passage as the level of the resurgence is approached (Marochov & Williams, 1989). Actun Tunichil Muknal has a similar profile and is one of three through trips in this part of Belize, Actun Box Ch'ii'ch and Sunken Forest caves being the other two (Miller, 1990a; Marochov & Williams, 1992). There are several other caves in dolines along the top of the limestone, and resurgences can also be explored by following the tributaries to the major rivers in the valley bottoms.

Zotziha was originally discovered by Miller in 1985. In 1988, Miller gave directions to the area to the QMC team

which had, like himself, already noted the potential of the area obvious from the 1:50,000 survey. The QMC team explored and mapped the cave to a terminal sump in 1988, and a large Anglo-Canadian team continued the exploration of the area the following year (Frew, 1989; Marochov & Williams, 1992). Among other achievements, the expedition successfully completed a traverse of the Actun Tunichil Muknal system, but was the cause of some international tension (Miller, 1990a).

CHIQUIBUL

Undoubtedly the most spectacular caving area is the Chiquibul, on the western side of the Maya Mountains in close proximity to the Guatemalan border. The Chiquibul itself is one of the largest vanishing rivers in the Americas and explorations in this area have revealed many kilometers of enormous passage, some wet, some dry, much of it fabulously decorated, and all of it difficult to get to. Probably the most significant single cave is Cebada, but this is only part of a major system which extends across the border into Guatemala (Ganter, 1990).

The area had been known to be cavernous since early in the 20th century when it was important for mahogany and log-wood production. Ford Young notes the "Puente Natural" (natural bridge) spanning the Chiquibul River (Young, 1961). Wright also notes this feature and also that the average annual rainfall of the area is up to 4.1 m (Wright et al., 1959). The area is directly to the windward side of the Maya Mountains and this, combined with the proximity of the impermeable massif to concentrate rainwater runoff, and the ample, structurally strong but soluble Cretaceous limestone, leads to the formation of underground passages of considerable dimensions.

Mike Boon briefly visited the area in 1971 (Boon, 1971), but proper exploration did not take place for a decade. While completing work for his PhD, Miller realized that this was the main area of promise and so he spent eight days exploring it solo in 1982 (Miller, 1990b). This resulted in the organization of a major, inter-disciplinary expedition in 1984, funded by the National Geographic Society and the NSS. The cave system created by the sinking of the Chiquibul River was found to be divided by massive collapse and sumps into four main caves: Actun Kabal, Actun Tun Kul, Cebada Cave, and Xibalba. In 1984, exploration focused on Kabal and Tun Kul, the upper half of the system. The Chiquibul River no longer flows through these caves having been diverted to an impassable route beneath. Twenty-three kilometers of large passage were surveyed, including two of the largest rooms in the world: Belize Chamber and Chiquibul Chamber. Exploration ended at a deep sump at the downstream end of Tun Kul (Miller, 1984; Weintraub, 1984).

Miller returned with another expedition in 1986, regaining the Chiquibul River in Cebada and Xibalba (the downstream half of the system) and added a further 27 km to the system. Xibalba was followed right through into Guatemala to the

Chiquibul River's resurgence, an entrance measuring 200 m wide by 80 m high (Miller, 1986). In May 1988 Miller returned again to try to complete the work in the Chiquibul by joining Cebada to Tun Kul. Due to a number of problems this was not achieved (Miller, 1988). Cebada Cave still retains the title as the longest in Belize at 17.2 km. A comprehensive survey was published by Steve Grundy and Olivia Whitwell in 1990.

VACA PLATEAU

The Vaca Plateau is immediately north of the Chiquibul and forms the western boundary of the Mountain Pine Ridge. For this paper the Plateau is considered to include the Pine Ridge's isolated erosional remnants of limestone located atop some hills and ridges. Certainly the earliest properly recorded cave in this area is Rio Frio Cave, a site of significance in the development of archaeological study in Belize (Pendergast, 1970), and visited frequently by cavers (Young, 1961; Albert & MacLeod, 1971). Caves in this area are mentioned by Ford Young (Young, 1961) but apparently were not investigated in detail. The 1988 QMC expedition looked briefly at this area but concluded that easier rewards were available elsewhere, so it was not until 1990 that systematic exploration commenced with the first of a series of expeditions led by Philip Reeder.

Reeder's interest followed from a long series of investigations into aspects of the human and physical geography of Belize by members of the Department of Geography at the University of Wisconsin-Milwaukee. Prior to 1990, Dr. Mick Day from the University had often visited Belize and, on occasions, engaged in karst research (e.g. Day, 1983), but Reeder's painstaking investigation of a large number of small caves, many with important archaeological remains, was the first large scale effort at serious speleological work by cavers from the Department. Reeder, now affiliated to the University of Nebraska at Omaha, and his team returned again in the six following years and to the end of the 1995 field season had explored about 100 caves ranging from short horizontal stoops to caves with vertical shafts of over 100 m depth (Reeder, 1993, 1995).

During the preparatory phase of an expedition to the Little Quartz Ridge in 1991, British cavers David Arveschoug and Ern Hardy mapped two caves to the southwest of the village of San Antonio (not to be confused with the village of the same name in Toledo District) (Williams, 1992a). Then, in April 1994, Pete Hollings and three other members of the UK's Mendip Caving Group discovered a total of 20 caves, up to 800 m in length (Hollings, 1994 and this issue). Being very close to the area studied by Reeder, it comes as no surprise that the caves are similar.

TOLEDO DISTRICT

South of the Maya Mountains, there are two major areas of interest. The first of these is centered on the village of Blue Creek, about 25 km northwest of Punta Gorda, in the K-T Fault

Ridges Karst Area in the southern portion of the Toledo district. Here Blue Creek Cave is an exhilarating, wet trip and other caves in the area have long been known for their archaeological significance. The second area is the Little Quartz Ridge, 15 km north of Blue Creek and considerably more difficult to get to.

Ford Young mentions the explorations of Donald Owen-Lewis in the Toledo district, who stated that most of the caves in the area were quite wet and had active streams in the lower reaches (Young, 1961). Unfortunately, neither Ford Young nor Owen-Lewis documented discoveries in this area. This had to wait until the second phase of exploration in Belize, pioneered by MacLeod and Rushin in 1971-74.

With work in the Caves Branch area essentially completed by 1979, Miller turned his attention south and, with a group from McMaster University, explored and mapped about 4 km of cave in the Toledo District, including Blue Creek Cave (Miller, 1981b). On another occasion he and McNatt nearly drowned during a flash flood (McNatt, 1982). In the company of John Wyeth and others, Miller completed a traverse of Blue Creek Cave to the Rio Blanco in 1984.

Miller found himself back in Blue Creek Cave ten years later. As part of the multi-disciplinary Jason Project, led by deep-sea explorer Robert Ballard, Miller lectured live via satellite from within the cave to school children at receiving sites in England and the USA (Musgrave, 1993). During the project, Miller, Wyeth and others were also able to map further into the cave, bringing the total surveyed length to 9 km (Miller, 1995).

British Forces stationed in Belize have had a somewhat mixed relationship with the caves. As a result of the protectorate status of Belize which pertained until the beginning of 1994, the Royal Engineers were responsible for mapping in the country. Undoubtedly some of the caves appearing on the 1:50,000 survey of the country were initially reported by military patrols (Miller, 1991), and caves at Caves Branch were used for "adventurous training" if an officer with caving experience was stationed in Belize at the time (e.g. Sims, 1988). However, few British Soldiers stationed in the country undertook any systematic exploration and very little speleological mapping was ever done. About the only soldier who has produced any records of original research in the caves is Sgt. Chris Jackson, who was stationed at Salamanca Camp in 1987 and made notes on a series of trips into Blue Creek Cave (Jackson, pers. comm., 1991). In early 1994, having been diverted from his original intention to visit the Chiapas area of Mexico by impending civil war, Jackson returned to Blue Creek and was able to complete a traverse from sink to resurgence, unaware that this had already been completed by Miller ten years previously (Jackson, 1994).

Fifteen kilometers north of San Antonio is the Little Quartz Ridge, an igneous intrusion pushed up through the surrounding limestone. In mid-1985 Percy Dougherty and crew from Kutztown University explored the Rio Grande on the north-eastern end of the ridge (Dougherty, 1985), working in large

passages with lots of water. The main finds were Tiger and Mucbe caves which had already been discovered and partially explored by MacLeod, Rushin, and Harriot Topsey. Dougherty returned subsequently (Turner, 1991) but has published little on the results of his research.

Work at the southwestern end of the ridge has been decidedly less successful, and it would appear that most of the drainage is deeply subterranean. The first officially sanctioned British Forces caving expedition to the country was part of a joint civilian/military trip led by Nick Williams (a veteran of the 1988 QMC expedition). It attempted to explore the caves at the southwestern end of the ridge. Despite some serious logistical problems (Frew, 1991), the expedition managed to reach the target sinks marked on the map, but was disappointed to discover only a few hundred meters of enterable cave passage throughout the area (Williams, 1992b). Some small caves do exist, particularly to the south of the ridge, and some of these contain archaeological artifacts (Matola, 1990).

OFFSHORE

None of the cayes which form Belize's barrier reef rise more than a few meters above sea level so caves out on the reef are inevitably totally submerged. Many large, submerged sinkholes also occur in the reef and are known as "blue holes." The most famous is the Blue Hole at Lighthouse Reef, which is some 300 m in diameter by 120 m deep. The first recorded exploration was made by Jacques Cousteau in 1967. Observations of the shaft were made visually and by using a miniature submarine, and various specimens, including a large detached stalagmite, were recovered to the surface (Cousteau, 1973; Mathews, 1991). In subsequent years this Blue Hole became a popular destination for tourist divers.

Underwater caves have been explored under the cayes closer to the mainland. The most significant discovery was Giant Cave at Caye Caulker. Descriptions of the cave differ. Mapping led by Sheck Exley in 1982 shows the cave as a group of 5- to 20-m-wide conduits radiating from a 50-m-diameter room. While not completely explored, the cave's 3116 m surveyed length ranks it as the world's longest underwater saltwater cave (Exley, 1994). However, between 1985 and 1988, survey and exploration by Jim Coke and his colleagues found problems with the original survey and describe the cave as a large chamber, possibly as large as 600 m in diameter (Coke, 1986, 1987, 1988). If these dimensions prove to be accurate, the room would be the largest known in the world by a significant margin.

Later explorations at other sites of interest on the reef have revealed Double Hole Cave off Caye Chapel, and Rio Hondo off Ambergris Caye (Coke, pers. comm., 1989). In 1989, an expedition led by Tom Iliffe examined the biology of the blue holes, and mapped caves under Caye Chapel and Columbus Caye (Sarbu, pers. comm., 1990). Iliffe reported a new species of *calanoid*, a type of *copepod*, from Giant Cave (Fosshagen & Iliffe, 1991).

SUMMARY

In conclusion it may be said that there are few areas of Belize likely to contain underground development which have not been subject to at least cursory examination, and in some areas work of considerable detail has been performed. The obvious major leads are taken but there is much detailed systematic investigation still required. There is also a great need for diligent publication by cavers visiting Belize for while an increasing number of cavers are returning to places which have been previously explored and mapped, even minor discoveries should be documented properly. Even now in Belize there are some significant known systems whose surveys have yet to appear in the literature.

This, of course, poses particular problems for persons wishing to undertake new research in Belize. Much of the work which has been published on cave exploration has appeared in relatively obscure caving journals, and the poor cross fertilization between academic researchers (especially archaeologists) and amateur speleologists has exacerbated the problem. It is notable that the most successful explorers to date have been those who are able to straddle this divide.

New explorers wishing to start projects in Belize are advised to take great care in their background research. While the Department of Archaeology in Belmopan maintains a library with as much material on caving as it can obtain, the record is far from complete. Information about the detail of what has been done in the country is often only available by directly contacting the researchers responsible. It is hoped that this paper may provide some assistance in that regard.

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