

## Caves in Myanmar

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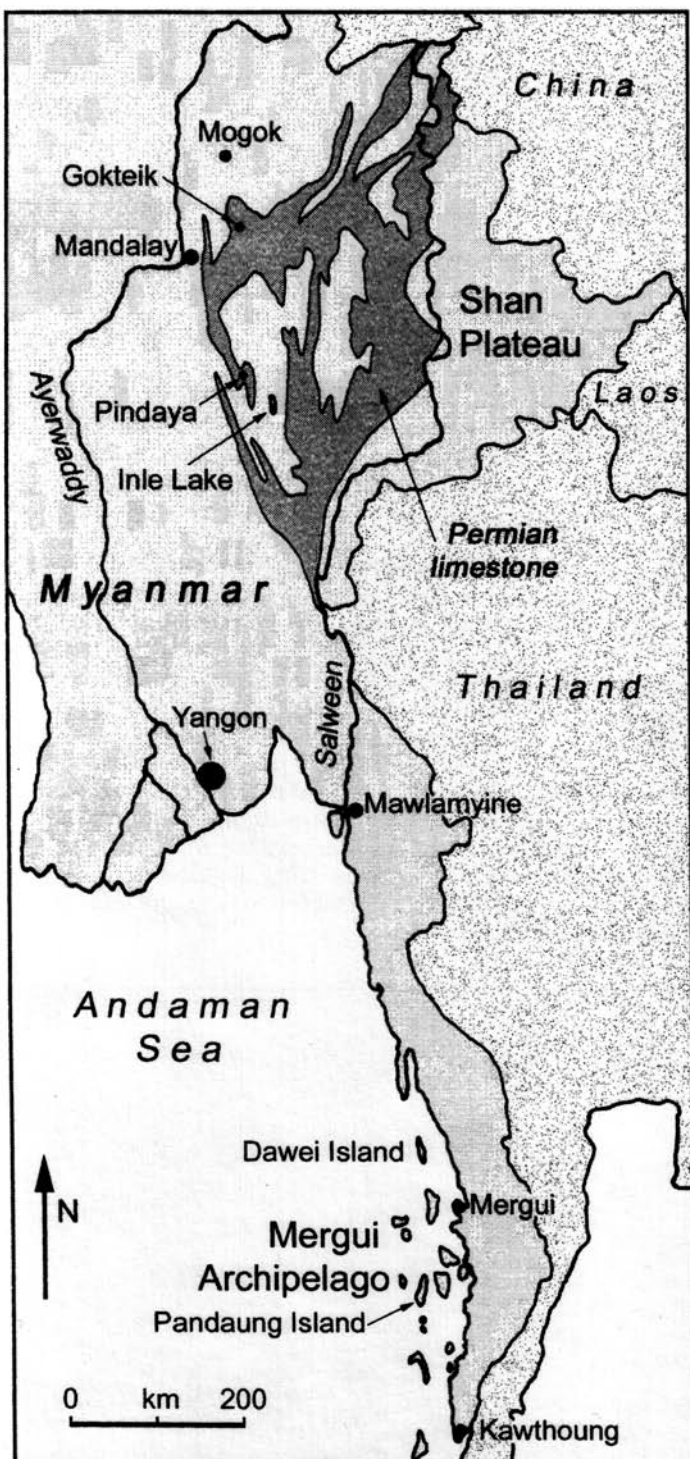


Figure 1. Locations of sites in southern Myanmar.

## INTRODUCTION

Due to long-standing travel restrictions, the karst and caves have not been widely investigated in Myanmar (the country once known as Burma). Access is now easier to some parts of the country, though others remain virtually closed to foreigners. A useful overview of Myanmar caves was presented by Dunkley *et al.* (1989). More has been revealed since the Harrison Institute (based in England) has pursued its biodiversity research into the bats that occupy a critical site between the Indian sub-continent and the peninsulas of Southeast Asia.

## CAVES OF THE ANDAMAN COAST

The southern part of Myanmar is a narrow strip between the Andaman Sea and the watershed frontier with Thailand (Fig.1). Its geology is complex, with major faults isolating scattered and

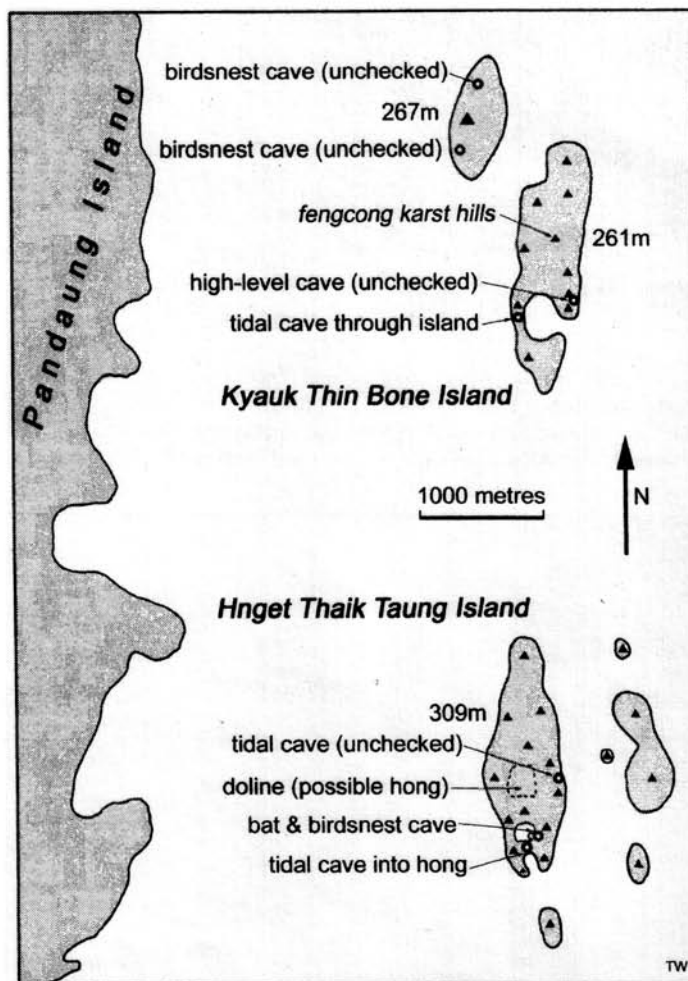
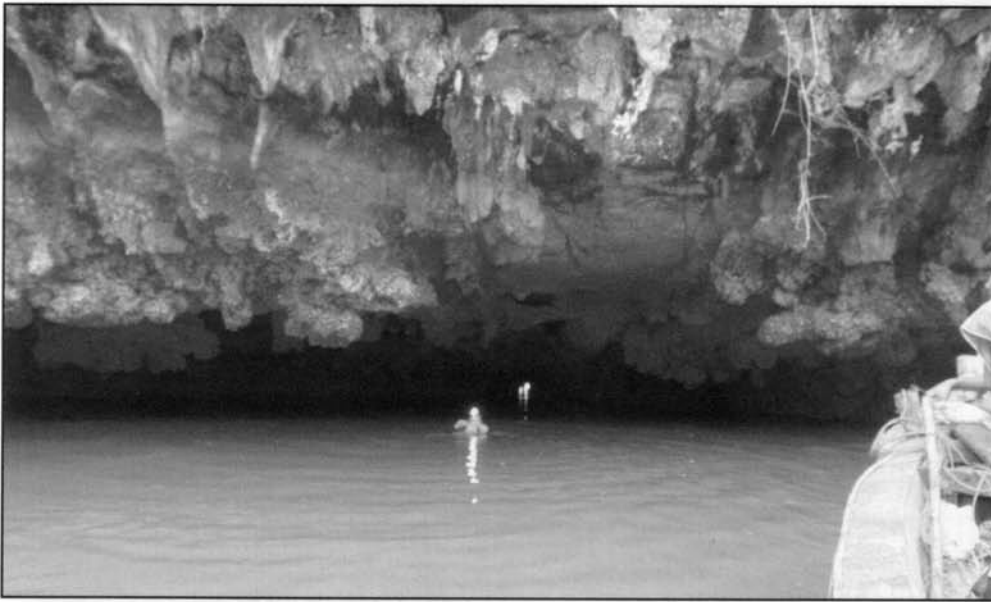
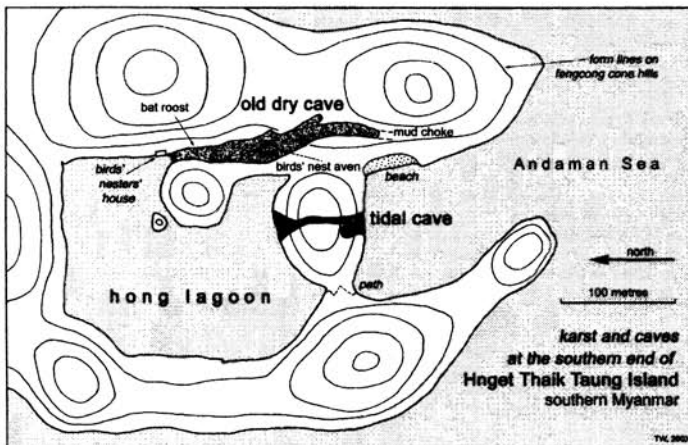


Figure 2. The limestone islands east of Pandaung in the southern Mergui Archipelago.



**Figure 3.** The tidal cave through to the hong in Hnget Thaik Taung Island (all photos by Andy Eavis except Figure 8).

unrelated outcrops of Permian limestones and Mesozoic granites within the dominant slates, shales and sandstones that are also mainly of Permian age. Karst and caves are therefore restricted to isolated patches, and access to most of the area is restricted because of almost continuous activity by uncontrolled rebel groups.



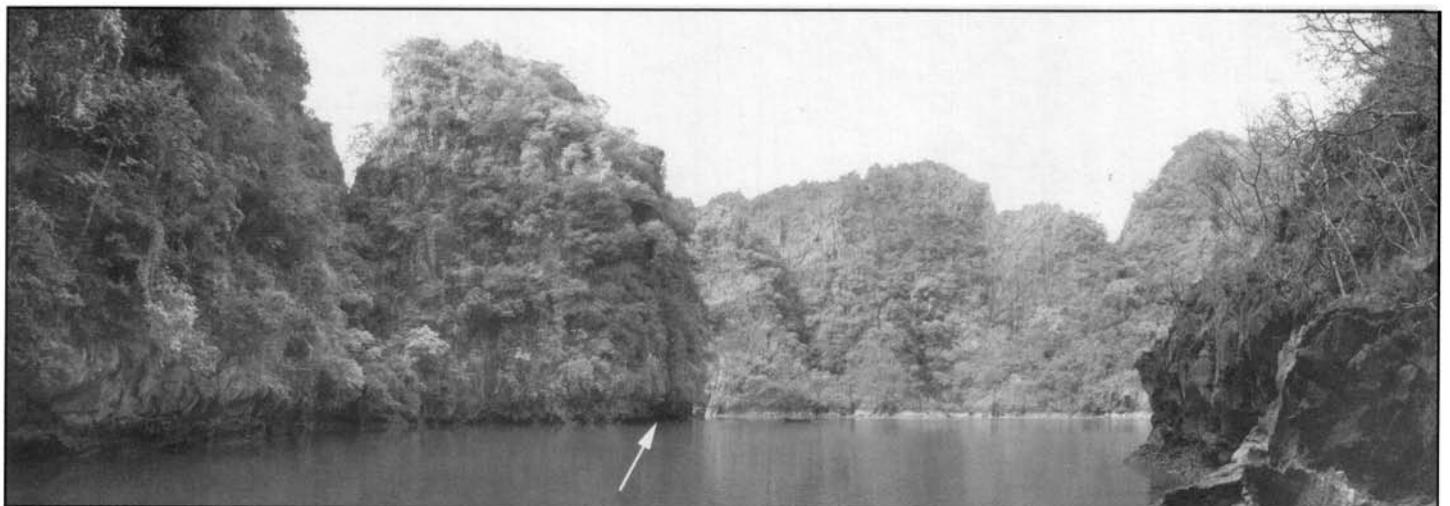
**Figure 4.** Sketch survey of the caves and hong at the south end of Hnget Thaik Taung Island.

The area around Mawlamyine (also known as Moulmien) is reported to contain fine tower karst, with high limestone hills rising from the alluviated coastal plains and along the valley of the Salween River. There are many caves, most with the large passage

sizes and no great length that typify isolated karst towers (Dunkley *et al.*, 1989). Further inland and further south, there are other caves known in the scattered blocks of limestone.

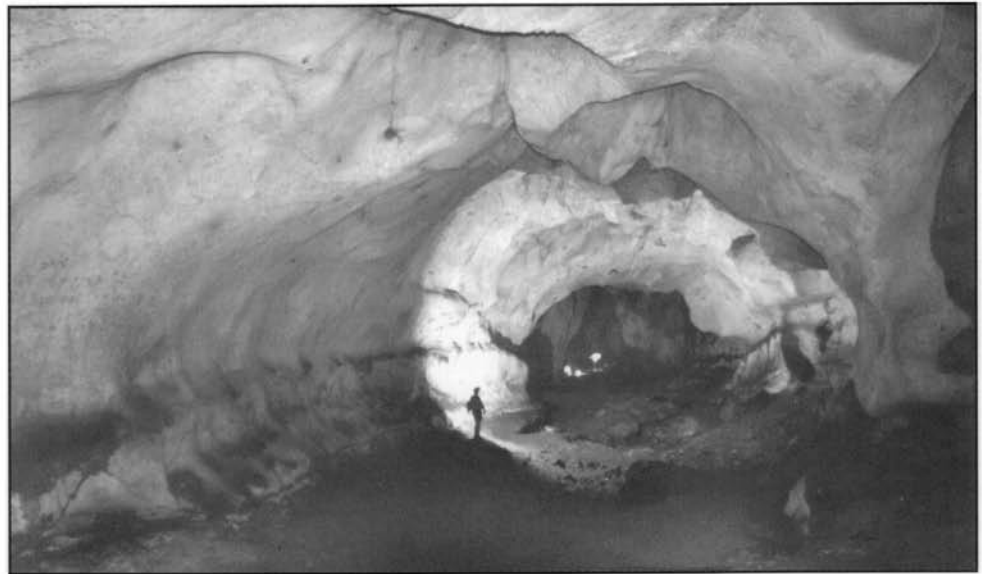
The Mergui Archipelago (also known as Myeik Archipelago) is a cluster of islands off the southern coast of Myanmar (Fig.1). Sadly, it is not a chain of karst islands to rival Vietnam's Halong Bay, as it has only two small patches of limestone. At its northern end, Dawei Island (also known as Tavoy Island or Mali Island) is a long thin strip of limestone bounded by very steep and vertical cliffs that rise 200m or more from the Andaman Sea. Access is next to impossible, as it is guarded jealously by birds'-nest collectors. This implies that the island has a number of caves containing the saliva nests of the cave swifts (an incredibly valuable resource for supply to Eastern gourmets), but it is likely that these will be large, old, abandoned chambers, whereas extensive cave systems are unlikely to exist in the small limestone outcrop.

The only other limestone in the Mergui Archipelago forms a small group of islands on the eastern side of Pandaung Island (also known as Letsok-aw Island or Domel Island)). These are formed of steeply folded Permian Moulmein Limestone, whereas Pandaung is a Mesozoic granite. The limestone islands are the hills of a fengcong karst whose plains and doline floors were submerged by the end-Pleistocene rise in sea level; water depths indicate that the remains of the karst plain are now about 5 to 15m below sea level. Flooded dolines form two large bays in the islands and also at least one internal lagoon, known as a hong, that is reached through a cave (Fig.2). A second deep doline has been seen only from a boat, as a deep depression between steep cones. If the drowned karst was a mature fengcong, this could be expected now to be another hong, but this remains unconfirmed.



**Figure 5.** View westwards across the Hnget Thaik Taung hong; the arrow points to the entrance to its tidal cave outlet.

**Figure 6.** The large old phreatic tube in the cave behind the Hnget Thaik Taung hong.



All these limestone islands are scored by deep notches at the level of the tidal range, and at least two caves extend from the back of the notches. One cave passes right through Kyauk Thin Bone Island into the back of the flooded doline that now opens to the sea as a large bay. Of the other cave entrances seen but not checked, two on the unnamed northern island are also high-level remnants of old passages. Bamboo ladders and ropes up to their entrances suggest that these caves are, or have been, exploited for birds' nests.

The second tidal cave is at the south end of Hnget Thaik Taung Island. It is entered through a notch at the back of a flooded doline that is open to the sea as a bay. The 80m-long cave is submerged at high tide, carries strong flows at mid-tide, is an easy swim through around low tide, and is navigable by small boat at spring low tides (Fig.3). It passes directly beneath the crest of a conical hill, through to the hong lagoon that is another flooded doline (Fig.4). This is the hong previously described as giving "the impression of the crater of a volcano" (Chhibber, 1934). It is a typical depression within fengcong karst, ringed by conical hills, except that the sea now occupies its floor, and tidal notches have steepened the margins by undercutting the cones (Fig.5).

Accessible from the Hnget Thaik Taung hong, a remnant of old phreatic trunk cave that was formed along the limestone strike is now dry and floored with mud and clay. Its inner part is a splendid phreatic tube about 10m in diameter (Fig.6). The size of this passage suggests that it was probably a major conduit carrying a river that sank on meeting the limestone, before rising on the far side of the outcrop. This was when the area of the archipelago was continuous and hilly land, long before its dissection into fengcong karst. The first 50m of the cave houses many bats. Above the central chamber, a 30m-tall aven has birds' nests on its upper walls. These are harvested by a group of local people who have built a bamboo tower up the aven (Fig.7) and also a small longhouse at the cave entrance. For access when their boat route through the tidal cave is sealed off, the nest collectors have made a rocky path over the saddle that has been undercut and steepened into an arete between the hong and the bay in their adjacent drowned dolines.

The conical island hills, the old caves, the notches, the tidal caves and the hong are typical features of the marine-drowned fengcong karsts that characterise Southeast Asia (Mouret, 2004). Halong Bay, in Vietnam, is the type example, but the karst south of Phuket, in Thailand, and some other islands in the western Pacific also have a number of these beautiful hong with their dramatic entries through tidal caves. This small part of the Mergui Archipelago is a comparable hong site.

### CAVES OF THE SHAN PLATEAU

East of the Ayerwaddy Valley and Myanmar's central lowlands, large areas of dissected uplands are known collectively as the Shan Plateau. On the western rim, limestones form some of the hills and ridges between Inle Lake and the central lowlands (Fig.1). The northern sector of these contains the caves at Pindaya, famed for their thousands of Buddha statues (White, 1988). Bat researchers

have been taken to many caves in the area, including some with large old chambers and others with passages that continue beyond the interests of bat collectors. Correlations are difficult in a country distinguished by numerous name changes of its geographical features, but it appears that there are many more caves of significant size than those listed by Dunkley *et al.* (1989). Further east on the Shan, outcrops of Permian limestones are known (Oo *et al.*, 2002), but await further investigation.

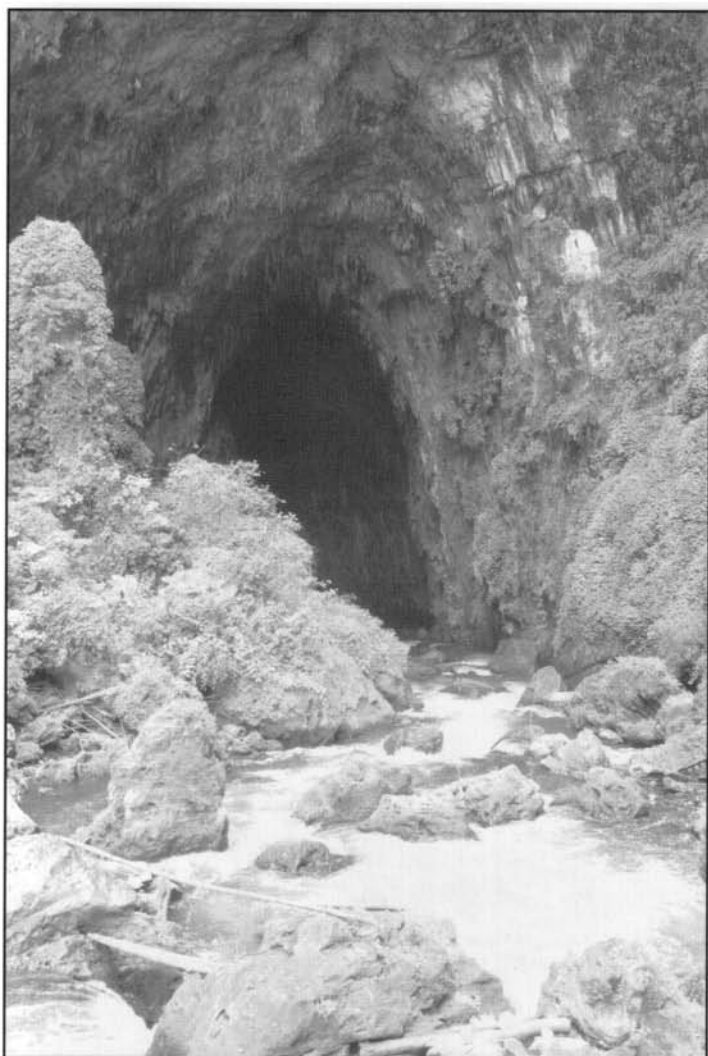


**Figure 7.** The bird's-nesters' tower in the Hnget Thaik Taung cave.



**Figure 8.** Pinnacled rockhead exposed in an opencast ruby mine at Mogok.

Further north, the main potential for karst development appears to be on scattered outcrops of the marbles and limestones of the Mogok Series. These lie in among much larger areas on Precambrian metamorphic rocks and granites. At Mogok itself, marbles are host to the famous ruby deposits, while sapphires occur in the adjacent granitic rocks. Both gems are worked mainly from extensive placer deposits in the valley alluvium (Waltham, 1999). Open pits have exposed pinnacled rockheads on the marble karst (Fig.8), and some of the mines have intersected cave passages, both open and sediment-filled, though no extensive cave systems have yet been found.



**Figure 9.** The upstream entrance to Gokteik Cave.

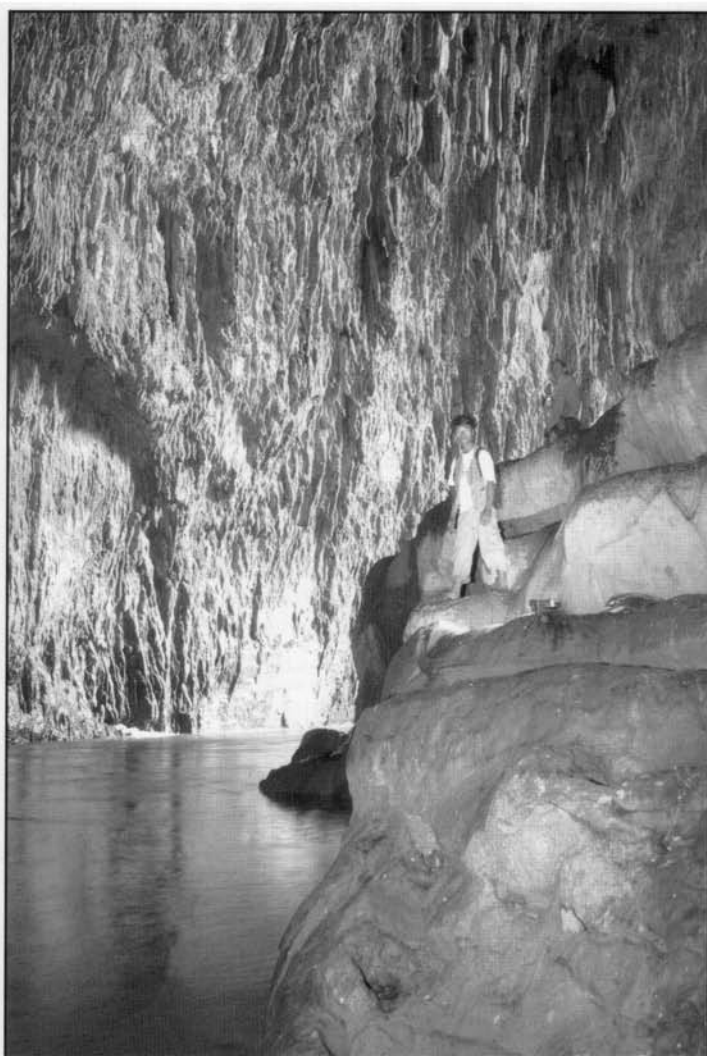
A cave directly beneath the high railway viaduct at Gokteik has a large river passage that is the best part of 300m long from sink to resurgence (Fig.9). The passage is well over 25m high and wide, except where it lowers over a deep lake, just beyond a huge flowstone bank that descends from the stalagmite-choked remains of an old high-level (Fig.10). The lake requires a swim that is only possible downstream in normal conditions. Gokteik Cave has looming rock walls, and a roof draped with stalactites. Rumours that is formed in travertine (reported by Dunkley *et al.*, 1989) are erroneous – it is cut in the Permian limestone. There do not appear to be any other large caves in the vicinity, but there are clearly many more caves to be found in the highlands of Myanmar.

## ACKNOWLEDGEMENTS

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**Figure 10.** Inside Gokteik Cave, with flowstone banks from the high-level descending to deep water.