



Caves in the historical record of Sarawak, prior to the formation of Malaysia in 1963

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Abstract: This paper presents a comprehensive miscellany of, inherently non-native, accounts of visits to caves in the Malaysian State of Sarawak, derived from many books, journals, and archives, expanding upon the work of G E Wilford. The first known cave survey from the State is reproduced, along with a selection of early drawings and photographs.

A biographical appendix follows the References to describe, briefly, the often interesting, sometimes distinguished, lives of the European cave visitors, amongst whom W M Crocker can now be identified as the first person to write about the Great Cave of Niah.

Keywords: Birds' nest caves; Borneo; exploration; history; karst; limestone; swiftlets.

Received: 20 June 2025; **Accepted:** 15 September 2025.

Introduction

For what was initially a country only one tenth the size of Wales, with a tiny population, Sarawak (Fig.1) has collected many references to cave use. G E Wilford distilled accounts of many earlier visitors in *The Geology of Sarawak and Sabah Caves* (1964), but much relevant material, not readily available to him, is revived below. The visitors to the caves were administrators, tourists, miners, archaeologists, and naturalists, who left a variety of descriptions, from the poetic to the prosaic, moving towards muted. A reliance on native guides, to whom caves were a valuable resource, is commonly only implicit, but there are occasional vivid descriptions of their lighting and bird nesting activities, showing that the most knowledgeable and prolific cave visitors went unnamed.

There can be no written records of early exploration Sarawak caves but, through analysis of the evidence preserved in cave sediments, archaeologists have now described human use of the Niah Cave complex in northern Sarawak going back possibly 65 millenia (Curnoe *et al.*, 2016) or, more certainly, up to 53 millenia (Barker *et al.*, 2013, 2016; Hunt *et al.*, 2012). Cultivation, perhaps of rice, might go back to around 6000 years B.P. near Niah Cave (Hunt and Rushworth, 2005) and to around 4000 years B.P. in Sireh Cave (Doherty *et al.*, 2000). Both these caves exhibit largely anthropomorphic parietal art, as do some Sarang caves (Harrisson and Reavis, 1966). Anecdotal evidence of interest in caves persists as folk tales of the petrification of people into stalagmites (Howes, 1952) or of villages into hills containing caves, e.g. Selabor (Grant, 1864b) and Niah (Harrisson, 1952).

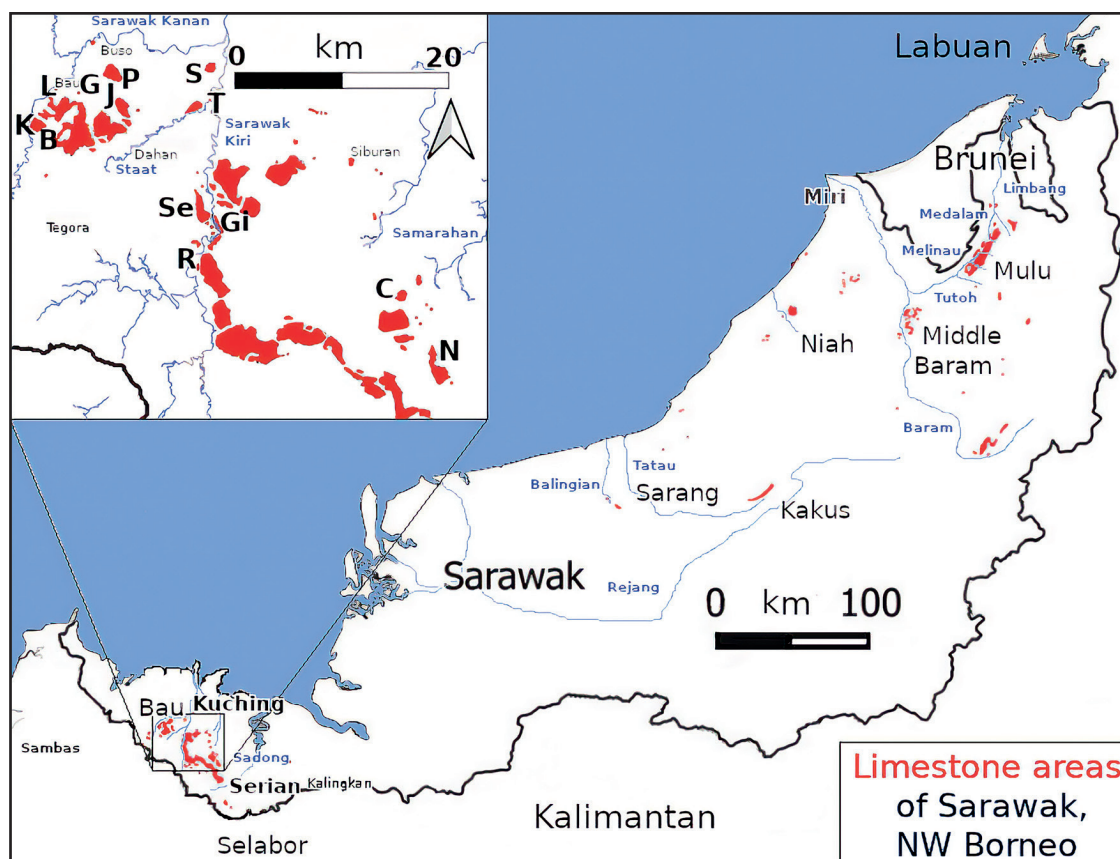


Figure 1: Map of Sarawak (showing the current boundaries after expansion from Samarahan into – and beyond – Brunei, between 1842 and 1904). Limestone hills are shaded in red. Rivers, historically the main arteries of communication, are shown as blue lines. Outside Kuching there were significant overland routes (other than local paths) from Busu to gold and antimony mines at Bidi and Jambusan (and, thence, to the mercury mine at Tegora).

Key to historic karst localities:

- B — Bidi
- C — Chupak
- G — Ghost Cave
- Gi — Gigi
- J — Jambusan
- K — Kapoh
- L — Lobang Angin
- N — Nambi
- P — Paku
- R — Rumbang
- S — Skunyit
- Se — Sebayat
- T — Tubbang

Besides being places of refuge, caves yielded edible birds' nests. The related trade with China, more than a thousand years old in some places, appears to date from not long before the nineteenth century in most parts of Sarawak (Lim and Cranbrook, 2014). This external interest might even be reflected in the word for cave, which approximates to *tang* in southern Sarawak. Pronunciation of the Chinese character, 洞, shifts from *dong* (Han) in going to coastal dialects as *tong* (MinYin) and *tung* (Hakka). [See Note 1.]

Significant British influence began in 1840, when James Brooke arrived in his armed schooner, helped put down a rebellion against the Malay governor from Brunei, and was ultimately rewarded with that same governorship, becoming known as the White Rajah: a British subject who went on to claim absolute charge of his own, expanding, realm. Caves were important to government for the wealth that birds' nests could bring to communities; wealth that had sometimes been extorted, could now be taxed.

Upper Sarawak was a source of mineral wealth: antimony was dug from veins in limestone plains; gold was washed from alluvium, and also sought in cave deposits. The native population was broadly classed as pagan Dyak, or muslim Malay, and different Chinese groups were engaged in mining, agriculture, and business.

Rajah James is recorded as visiting at least one cave and, in a letter to William Pengelly, he engaged to “*enter heartily into the project mentioned by Sir Charles Lyell for exploring the limestone caverns of Sarawak*” (Brooke, 1864; Harrison, 1966). James' heir, Charles, had enjoyed visits to tourist caves in his native Somerset (Brooke, 1862) and was certainly well aware of (if not recorded as visiting) Sarawak's caves (e.g. Brooke, 1887) and funded excavations, albeit with an eye on associated mineral investigations (Everett, 1878). As the administrative system became more established some degree of oversight of the birds' nest caves that paid the taxes was seen as desirable, with ownership rights defined in 1940, followed by rules on collection and sale in 1948.

The coverage below is broadly by river catchment, because transport and administration in Sarawak was predominantly by river until, after WW2, as a British colony, road building began to change the country profoundly. This geographical arrangement is also near chronological, reflecting the growth of Sarawak and shrinking of Brunei. The island of Labuan, in Brunei Bay, a British colony from 1846, was also a base for early exploration.

Caves are commonly not distinguished by names or precise locations, so names of hills (historically *gunong* in Malay rather than current *gunung*) must then serve for direction. Names used here are as published, frequently differing from later spelling(s). Transcriptions might also retain incorrect spelling.

Coverage is roughly up to the publication of *The Geology of Sarawak and Sabah Caves* (Wilford, 1964), the culmination of the interest he had set-out a decade earlier (Wilford, 1954); it complements the recent compendiums by D W Gill on Middle Baram (2020), Mulu (2023), and Bau-Serian (2025). Another account of Sarawak caves, in an archaeological and historical context, is given by Drawhorn (2022).

Southern Sarawak

Sarawak Kiri

This comprises the catchment of the left-hand (Malay: *kiri*), southern, branch of the Sarawak River, as it heads towards Penrissen, southern Sarawak's highest mountain, lying on the watershed boundary with Kalimantan, the Indonesian part of the island of Borneo. Direct connection to Kuching led to early exploration here.

The first recorded European cave visit, early in 1842, was in Gunong Tubbang, a small limestone hill. James Brooke noted ‘*a roof groined like Gothic*’, ‘*fantastic stalactites*’, and local folklore interpreted a petrified pillow, bed, and furniture as ‘*the residence of a fairy queen*’ (Keppel, 1846). In 1845 Hiram Williams was excited when “*At Gunong Tabong we discovered the existence of*

some immense caves, and the effect on entering them was most remarkable from their extraordinary dimensions and the magnificent appearance of the stalactites forming, as it were, pillars for the support of the roof, indeed giving the beholder the idea of a most exquisite work of art. We could not learn to what purpose these caves had been appropriated; but they appear to have served for habitation or temples, and they are still frequented by the natives; yet the only means of access is by climbing over immense blocks of stone, by the aid of the branches of the trees which grow here in great luxuriance”. More soberly, he noted, its walls were “*smooth, bearing every appearance of being water-worn*” (Williams, 1848). More than a hundred years later, the headman of nearby Segubang retold the petrification story, now in the context of greed and lack of charity dooming an entire village (Jimo, 1955).

Farther up the river, early in 1843, Brooke noted a cave that passed right through a mountain (presumably Gunong Rumbang) to ‘*a gothic window, which might suit Tintern itself*’ (Mundy, 1848), and Hugh Low, in 1845, traversed a ‘*lofty cavern*’, torch-lit through a ‘*magnificent apartment...with decaying stalactites*’ using ‘*a gravelly stream of pure and cold water...a regular road of the Dyaks*’ who used it to reach birds' nest caves entered via precarious wooden ladders that he dare not attempt (Low, 1848). From his boat, on his circuitous return to Kuching from Simunjan coal mine late in 1855, Alfred Russel Wallace was enjoying the view of “*limestone mountains with their fantastic forms, white precipices and fantastic vegetation*” when he came upon, and visited, “*a cave, which...passes completely through the spur of a lofty mountain [but] offers nothing remarkable*” (Wallace, 1856). Charles Grant was more impressed in 1858, and ‘*walked right throu*’ this ‘*by no means unimpressive*’ cave, ‘*perhaps 3 or 4 hundred yards*’ which ‘*reminded me of the great Mammoth cave in Kentucky*’ (Grant, 1864a). Spenser St John (1862a) probably describes the same large cave near the Sarawak Kiri, as does Cuthbert Collingwood who, with Alfred Houghton in 1867, “*recalled the entrance to the Peak in Derbyshire*” at the “*grandly arched*” portal and “*with flambeaux of bamboos... explored these chambers, disturbing a number of large bats*” while “*From the roof of the cave, in many places, depended enormous stalactites many feet long, and of a diameter sometimes exceeding that of a man's body*” attributed to “*roots of which had penetrated the soil above and sent down fibres through the roof; the water percolating...carried down calcareous particles...so that each enormous stalactite was a network of rootlets entangling...masses of lime*.” On return “*beautiful precipitous limestone rocks towered around us of which those called Gunong Gigi (Fig.2) and Retti were perhaps the most striking*” (Collingwood, 1868). A fossilized rhinoceros tooth, found by Ludvig Helms and later sent to the British Museum, came from a cave bordering the river near Gunong Gigi (Brooke, 1869). Helms did not elaborate on his extensive explorations of the area beyond writing that he had “*ascended most of the mountains, which, as they are chiefly of the limestone formation, are, as a rule, difficult to ascend, but very picturesque*”, adding that “*nearly all the limestone mountains in Upper Sarawak have [caves], and some are miles in extent, and are sometimes difficult to reach*.” and recalling when he “*was accompanied by two young missionaries; we had explored some caves, passing entirely through a mountain, and the Dyaks then informed me that there were other caves above. We determined to explore these also, and climbed the steep sides of the rock for this purpose; when at a height of several hundred feet, we found that a cave could only be entered by climbing over a rocky ledge which overhung the precipice below, so that our safety would depend solely on the slender shrubs by which we were to raise ourselves over the protruding ledge. One of our companions, rather full-blooded, was already much exhausted by the climb. We advised him not to enter the cave, to which he agreed. We got safely in, and were resting at the entrance of the cavern, when, to our dismay, we saw our friend's face, pale and nervous, appear over the ledge... Poor fellow! A few years later he [See Note 2.] was murdered...*” (Helms, 1882).

[Note 1]: Going south, Vietnamese might have adapted *dong* to *hang* (and *Thai* as *tham*?) and further mutations could lead to *lobang* (and *tang*, if not directly from Chinese trade) and *liang* in the Indonesian archipelago.

[Note 2]: The nature of his demise identifies the ‘missionary’ as C J Fox.

Of the west bank, Hugh Low says: “*The mountain before us is pierced with innumerable fissures and caves, the residence of the pretty little mouse-coloured swallow (Hirundo esculenta), which is now flying over our heads, catching its insect food. The nests of this bird form a source of considerable profit to the Sempu Dyaks of Sebayet and to all those tribes inhabiting the limestone districts, in which alone this species of bird builds, caves being most abundant in this formation.*” (Low, 1848).

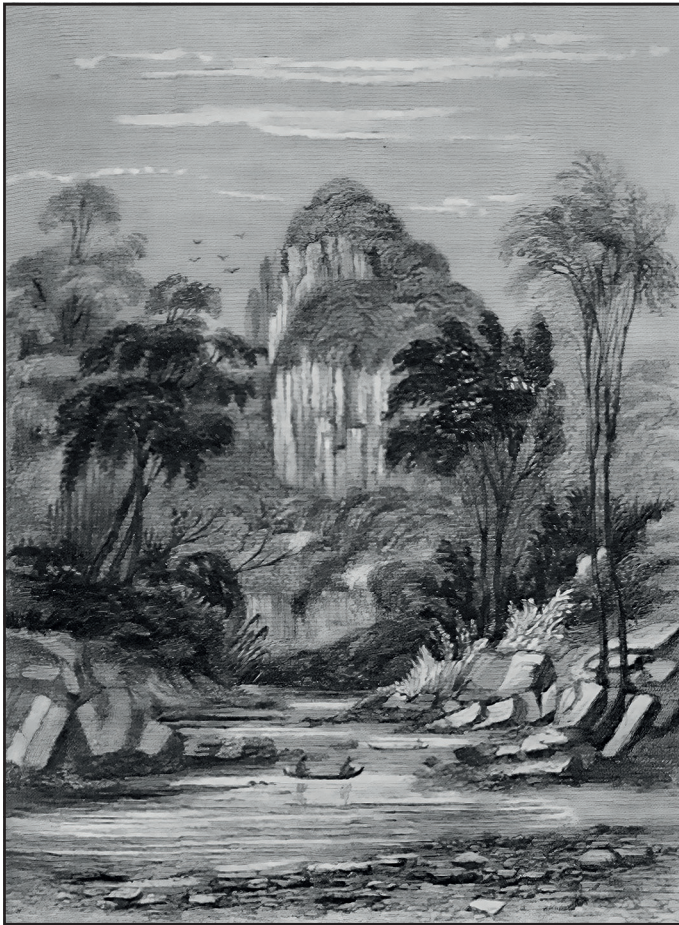


Figure 2: First picture of limestone karst in Sarawak: Gunong Gigi by H Williams in 1845, in Low (1848). [Public domain.]

Sarawak Kanan

This comprises the catchment of the right hand (Malay: *kanan*), westerly, branch of the Sarawak River, heading towards Jagoi, and then southwards to the Kalimantan watershed. Its direct connection to Kuching made it important for early exploration and governance of Upper Sarawak from Paku. This was also the main early source of valuable minerals and the Borneo Company had its riverine base at Buso. From there, tracks led southwards via Paku, to the antimony-mining area around Jambusan and thence to the cinnabar mine at Tegora, or southwest to the Chinese gold-mining town of Bau and the Borneo Company's other antimony-mining area at Bidi. The Chinese mainly found their gold by washing the surface alluvial deposits, but also trialled some cave sediments. Borneo Company miners were perhaps sent to the caves south of Bau and east of Bidi to look for evidence of mineral veins or to test for gold-bearing sediment. It is evident from their diaries and letters home that they also took some pleasure in admiring the mighty cave passages, and respected the pluck of the locals, who had not only found, but regularly risked their lives in search of, birds' nests. This is also one of the places where the use of echo-location by (some) swiftlets was first confirmed (Medway, 1959).

The first record of **Lobang Angin** is by Carl Hupe in 1844. On his way to Kuching from Sambas he entered the ‘*Höhle des Aeolus*’ [See Note 3.] “at noon on the third of December.

[Note 3]: “Aeolus in a high-vaulted cavern keeps control o’er warring winds” – from Virgil, 19 BCE, *The Aeneid*.]

The front chambers were about twenty feet high, and the entire cave is approximately one hour long, as I believed I could deduce from the four torches of two Dayaks just about to pass through the cave to their kampong in the forest. They told me they couldn't spare any of their torches for a closer examination of the cave, as they would use them up themselves. Since I had gone in with them for a short distance and now had to grope back in the dark, I fell from the elevated ground, loosened by the droppings of countless bats living there, into the stream flowing through the cave. Besides other bruises, I suffered a gaping wound on my left foot.” (Hupe, 1846, Kelling, 2022). Low followed in November 1845, trimming his lamp “to prepare for entrance to the ‘Wind Cave’”. He had been “told that a stream of water ran through it and the wind never ceased to blow in it and also that to walk from one end to the other would take three hours...the faint light of my lamp enabled me to see that one part of the cave was deeper than the other...I ascended to the highest part which appeared to be composed of broken and rotten stalagmites [sic] though there was no appearance of them ever having been attached to the roof which was water worn, arched and marked as if water had flown through it when it was in a soft state... I found that the stream did not rise far in the interior but was formed by water dripping from the roof.” He climbed up “a little dome like the steeple of a church...not difficult to climb with the assistance of the broken Stalactites” and another to the surface “with some difficulty on acct. of my feet being naked and the excessive sharpness of the tops of some stalagmites piled at the opening.” He noted “immense heaps of what the natives told me was the Bats' excrement: it had a nasty smell at least” and that “the sound of the wind which gives name to the place comes from the fluttering of the wings of the innumerable Bats” (Reece, 2002). Grant followed in 1857 when he ‘stopped at a cave by the rivers side & went into it – there were some Dyaks far in it getting birds nests for the China market’, then Boyle in 1863/4 (Boyle, 1865a), and Odoardo Beccari, around 1867, “excavated bones” (Beccari, 1904) while, for Noel Denison in 1874, it ‘bore out all that had been written about it’ (Denison, 1879). The first photos of a Sarawak cave appear to be of Lobang Angin's riverside entrance: “We sometimes went pic-nicing to these limestone caves” noted Archibald Allison under a photo of ‘A Cave in a hill between Bow and Bidi’ in an unpublished album from around 1890; Margaret Brooke's photo (Fig.3), from 1887 or 1895, is almost identical.

Marshall Cresswell was based at the Bidi antimony works in 1858 when told by geologist James Russell to “get a lamp and cutlass” – the latter “for fear we meet any beasties, snakes, and boa-constrictors, which are very numerous in those caves” –

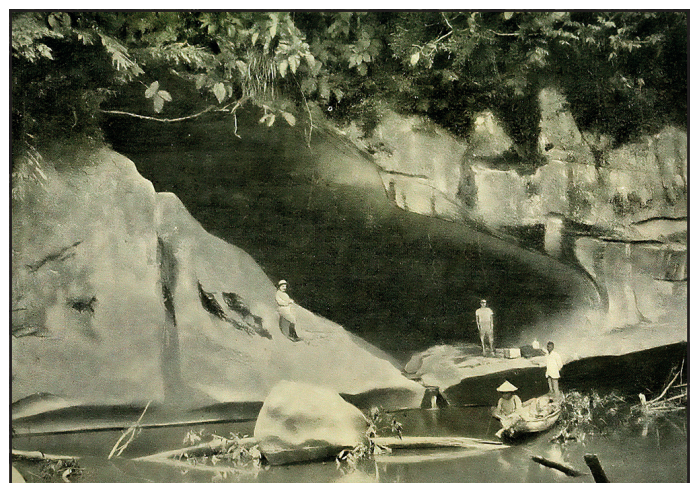


Figure 3: One of the first photos of a cave entrance in Sarawak: Lobang Angin (1887 or 1895) by Margaret Brooke in Beccari (1904). [Public domain.]

A closely similar photo of: “A cave in a hill between Bow and Bidi – we sometimes went pic-nicing to these limestone caves”, taken c.1890 by Archibald Allison, is in the Denver Archives, CO, USA.

and join him in one of the four or five nearby hills which were “nearly hollow, there being several caves in every one of them, where you might enter and walk for hours without coming back to the same place”. They had to stoop in places where “it was with difficulty we kept our lamps from going out, owing to the current of air” but usually they could just walk and after three-quarters of an hour they “came to an extensive open space. On looking at it we might suppose it had been made expressly for a circus company to perform in. It was 50 ft. or 60 ft. in height, and in circular form of 100 ft. or 80 ft. diameter. There were scores of birds flying about in all directions, which I afterwards learned were a species of swallow, and built the edible nests I had previously bought of the Dyaks. The rock was limestone, and there were several pillars standing here and there that looked as if they had been finished by an experienced sculptor. As we took a seat to rest ourselves we heard what sounded like the heavy fall of water. Mr Russell asked if either of us “had ever seen sick a braw place” as that. I replied that I had. He said he would like to know where it was. I told him the interior of Newcastle Theatre Royal was “a lang way bonnier place than that.” He thought it “was’na fit to be compared tilt;” and so the matter rested” (Cresswell, 1876). Russell himself wrote “I have measured columns of stalactite rising 105 feet 7 inches from the floor to the roof, and 12 feet in circumference. Some of the cave chambers are 80 feet wide by 325 feet long, narrowing at each end, and so lofty that I was unable to measure their height. There are some considerable lakes in the caves, with rivulets flowing from them.” (Russell, 1864).

Frederick Boyle explored caves under Gunong Kapoh (sic) with his brother in 1863. They were told that: “[edible birds’] nests of Bidi are yellow and dirty...not very valuable [and] the supply ...almost exhausted” but (wrongly) “The bird itself we did not see, as it is migratory” (Boyle, 1865). He later wrote a story, *The Rajah’s Diamond*, with a realistic description of a cave used to hide a valuable stone (Boyle, 1876); unusually, its caving protagonist was the local chief’s daughter: “From the box of bamboo slung at her waist the girl produced a taper, a bit of broken crockery and a touchwood fungus. Striking the bamboo with her chip of earthenware, she soon got ...Her taper lit, the girl went on through gallery after gallery, sometimes in twilight, sometimes in dark. Now and again she paused, and in a narrow part of the cavern stooped to arrange something under foot. After such stoppages ...she refixed the sort of trap behind them, the feeble light just outlining her perfect figure. ... There were two or three crevices in the rock. The rajah’s daughter raked them well out with her knife, “For fear of scorpions,” she whispered ; then began to climb like a kitten with hands and toes. ... she vanished in the obscurity above. He only heard her laboured breath, and saw the slender outline of her limbs...” The traps referred to had been “Dyak deer traps. The spear strike you through the stomach. They all of Inggri steel and never rust, you see! Inggri steel and Inggri men true and stout Holland men false and murderers!” (Boyle, 1876).

Denison thought Gunong Kapor well repaid a visit, ‘to its summit full of caves, in which are found the valuable edible bird’s nests’ and at its foot ‘caves extending deep into the bowels of the mountain, the nightly resort of numbers of deer’, and, in one, ‘it was said was an immense cat protected some jars of fabulous age and value.’ (Denison, 1879).

‘Bidi Caves’ is the Type Locality for two species found in caves: a crab, *Potamon (Thelphusa) bidiense*, collected by Cecil Brooks in 1899 [See Note 4.], and a millipede, *Plusioglyphiulus cavernicolus* (Silvestri, 1923). The latter may have been collected when Sarawak Museum curator, Eric Mjöberg, “asked by a specialist to secure material of some cave-dwelling animals”, set up camp with three collectors in June 1922:

“The permanently dark parts of the caves were properly explored by means of strong lanterns. A very fine and comprehensive collection of cave-dwelling species was collected and preserved” (Mjöberg, 1923). The next curator at the Sarawak Museum, Edward Banks, concentrated on the monitoring of the birds’ nest caves, including a cave at Bidi “where a climb of a hundred feet or so reaches a very large entrance hall, leading to chambers which now contain scarcely any nests.” (Banks, 1949).

The Sarawak Gazette reports several visiting dignitaries, including the plant-collecting Clemens missionary couple “living in the Bidi Caves” (Anon, 1929) and Chinese palaeontologist Bien Mei Nien [See Note 5.] “visited many of the caves in the [Bau] district in search of fossils, but without much success” (Anon, 1936). Post-war, Tom Harrisson chose Gua Bungoh as a location to learn about cave archaeology (Harrisson and Tweedie 1951).

Edward Banks also noted another cave “in Jawang hill between Bau and **Dahan**. After ascending the hill several hundred feet a circular depression perhaps a hundred yards wide is encountered, narrowing funnel-wise to a shaft no bigger than a man-hole, down which is made a crazy scaffolding of sticks tied with rotan. Two hundred and fifty feet lower one walks on the level cave floor, in galleries a hundred feet high.” (Banks, 1949).

Thérèse Yelverton, some 13 years after the Chinese insurrection of 1857, noted that “In the limestone caves are found the edible “birds’ nests” so much esteemed by the Chinese for soups and ragouts” and goes on, possibly in relation to what is now known as Ghost Cave at Bau, that “These natural tunnels, excavated by the action of the rivers served in many instances for the hiding places of the then wretched, hunted epicures, who, notwithstanding the tempting fare around them, died of hunger, and their whitened bones now attest their miserable end.” (Yelverton, 1874). Later, Reginald Pawle gave the Sarawak Museum “a portion of a molar of the Indian Elephant from a small limestone cave; the fragment which appears to be completely fossilised was found in a small limestone cave” (Shelford, 1901).

Beccari stayed at Paku, venturing over limestone (as he described at Skunyet) ‘full of holes, erosions, fissures, and caves; and the configuration often most fantastic, and so sharply pointed and jagged that climbing was a painful business’. This, he thought “must be a consequence of their origin” because “In a coral rock in process of formation, the polyps at work very rarely grow in a uniform manner, and never form compact masses — interspaces and hollows frequently occurring between one colony and another... fissures or caverns necessarily result, which are not less marked in the rock when it has emerged from the sea than in its former submarine condition” although “atmospheric agency” was no doubt involved in subsequent erosion. However, his attempt to explore “The cave at Paku...very difficult to get at...where in addition to gold, edible nests of *Collocalia nidifica* were to be got” was abandoned as “the wooden props and steps by which access to the cave was rendered possible were in a rotten condition and quite useless”. He had wanted to go because “a large quantity of human bones, especially skulls” had been found there but broken up by Dyaks. In another cave not far away he had also heard of bones being found “very friable, and reduced to semi-fossil fragments”.

Alfred Everett soon followed to examine many caves in his sponsored quests for fossils and traces of early man: first in 1870–1871, then between 1876–1878. From his house at Paku, amidst a limestone formation “absolutely honeycombed with caverns”, he settled on Jambusan as his main focus.

[Note 4]: Sent to Singapore for identification, with a note from curator Shelford as to its location: “Caves at Bidi in pools; the caves were absolutely dark” (Lanchester, 1900).

[Note 5]: For his work in Yunnan, see Bien (1938).

Figure 4: First known survey of a cave in Sarawak: 'Rough Plan of Cave No. V, Jambusan Hill' by A H Everett in 1878. Originally drawn at a scale of 1/16" to 1", the 'Entrance' is at top right leading to 'Great Talus dipping inward at 30° to a 'Bank of stalagmite' and two areas of 'Steep Clay Bank' in the 'Low Level Chamber' to the right, where excavations 'D', 'A', 'B', 'C' and 'F' are marked. Excavation 'E' is in the 'High Level Chamber' to the left, which also has a 'Steep Clay Bank'.

[Royal Society Archives, Licence AP/60/9 p.15.]

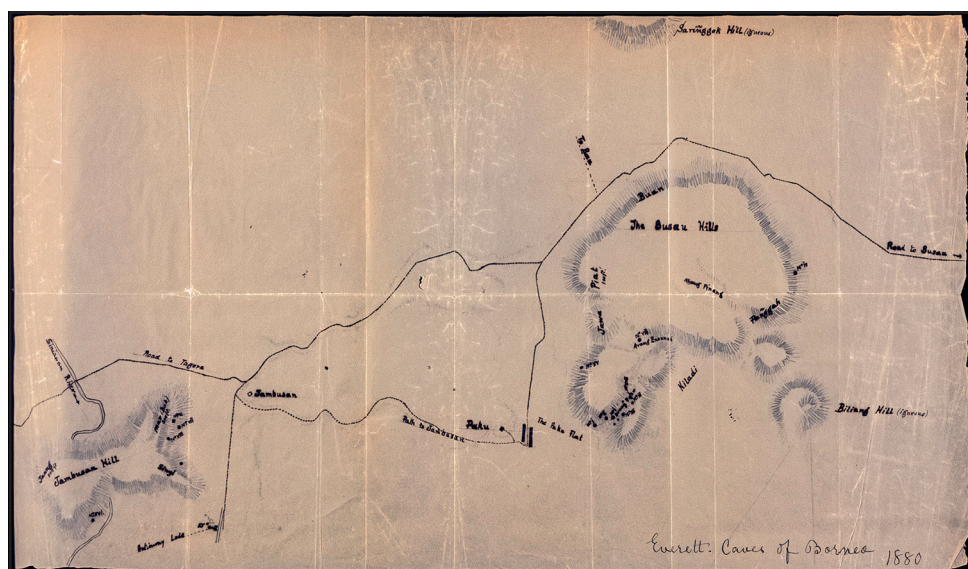
Of 30 caves in Upper Sarawak Proper, he excavated 12, using Roman numerals rather than names for the caves; only one plan (Fig.4) and a map (Fig.5) marking the locations of the Paku caves (in Gunong Pangga, between Buso and Paku) seem to have survived. It is clear that the main site, Cave No.V, was Tupak, selected because "it was easily accessible and spacious, – the contents could be examined in full daylight in the entrance hall, – it had never been touched by gold-workers, its deposits appeared to be thick and there was only a slight local drip..." (Everett, 1878). One of his finds, from a fossilized orangutan, might have become notorious as Piltdown Man's jaw (Harrisson, 1966; Sherratt, 2002). The Museum collected "numerous fossil bones, mainly Chelonian" around 1900 (Shelford, 1901). Serious and detailed examination of the original finds had to wait for well over a century (Cranbrook, 2013).

During December 1878 William Hornaday, an American taxidermist collecting specimens, was taken by Oliver St John to visit Ensunah cave in a rocky gorge half a mile east of Paku [See Note 6.]: He "was surprised at seeing long, slender, rope-like roots of a dark red color coming down from the trees far above" and "limestone floor ... quite honeycombed with small round holes which the "little drops of water" had drilled" From the cave they: "went on higher up the gorge to some of the remarkable well-like crevices which exist in the hills. They are simply holes running down through the limestone, with ragged, uneven sides, very often of no greater diameter than a common well, three or four feet, and sometimes sixty to seventy feet deep.

[Note 6]: Arung Ensunah, with Cave No.VIII, is located half a mile west of Paku on Fig 5, a map in Everett (1878).

Figure 5: First known map of cave locations in Sarawak: 'Jambusan Hill and The Busau Hills' by A H Everett in 1878. Neither scale nor orientation are noted, but the drawing represents about 5km left (S) to right (N), with the "top" being West.

[Royal Society Archives, Licence AP/60/9 p.13.]



Sometimes gold is found in the loose dirt at the bottom, and when this is the case they are worked by the Malays. In order to get down one of these holes and up again, the prospector puts sticks across the opening, jamming the ends firmly into the cracks in the sides, thus forming a ladder reaching to the bottom. There is usually a cavern at the bottom of each crevice..." (Hornaday, 1886).

In the same area, around 1890, Baden Baden-Powell noted that "Near **Buso** are some extraordinary rocky hills. The formation is suggestive of a huge sponge, for on all sides one sees large holes and caves, mostly round, and apparently water-worn." and "Chinamen make use of some of the holes in the rocks as natural gold-mines. They scrape up the deposit from the bottom, and in that find small quantities of gold. They are also able by means of the natural shafts to follow up the quartz veins, which, by the way, often enclose a lode of antimony ore like a sandwich." He was taken by the government's Resident, Awdry, with some policemen on a trip into a birds' nest cave: "...varying from a narrow tunnel to huge caverns [with] lots of nasty holes and crevices to cross, bridged by rotten-looking poles and rattans; awkward ridges of rock, with deep black chasms on either side, with frail rattan railings to guide us. High up in the cracks overhead poles are jammed across in such a way as to enable an agile native to scale these dizzy heights and collect the nests [which] form little brackets, attached to the rock, and are composed of a substance like glue or size, often intermixed with feathers. There were only a very few stalactites, and but little beauty in the cave itself until we presently got into a huge hall lit by two 'windows' high up, through which the green ferns and trees which surrounded them looked marvellously fairy-like and beautiful, reminding one of some pantomime transformation-scene..." (Baden-Powell, 1892).

In 1894 John MacGregor, veteran of America's Mammoth and Australia's Jenolan caves describes a trip into a cave that the Dyaks called New Cave (suggesting that exploration for caves was still active). They used "torches...strips of resinous wood, held together in conical bundles by means of thongs made of bark [where] the Dyaks regulate the amount of light by these strings of bark..." As for the trip itself: "We groped and groped ...through many a devious and tedious passage ... and sometimes waded considerably more than knee-deep [until] we reached a narrow, irregular, up-and-down passage, with a deep pool of water at the bottom of it, and how to get through it became the question of the day." They watched the collection of birds' nests, wondered why the deep guano had little value "and then rose the unpleasant question of how we were to return, and how to get through that horrible passage again. It was a tight enough fit to get up through it, but to get down through it was far worse.... Observing our dilemma...the Dyaks... brought us through a looped passage, [to] avoid the narrow straits [but it] was a longer way, and required a good deal of creeping and horizontal squeezing, but was not altogether such a tight fit as the previous one." (MacGregor, 1896).

Samarahan

This comprises the catchment of the river leading through swampy forest at the eastern side of the limestone area.

A 1-inch to the mile geological map made for the Admiralty in 1846 marks limestone at Penkallan Buntang (Williams, 1846). The version published in 1848 omits it but an accompanying chapter says: "Caverns ...exist in Gunong Mungu Nanbi, one of the mountains on the South side of the Nanbi valley; and it is said that they have been explored by the Dyaks for a considerable distance under the mountain: large stalactites are visible from the mouth... and the beautiful appearance of the perspective is very striking." (Williams, 1848). Spenser St John recorded the Sireh cave, in Gunong Nambi, in 1855, his visit lit by "sticks of a resinous wood [prepared] by splitting one end until it had the appearance

of a brush...as far as the chamber in which the edible birds' nests were collected... by Dayaks who climb long poles fastened together to the height of eighty or ninety feet...taking them five days [but] the nests ... [compare] to those of Baram [as] dirty glue [to] finest isinglass... It is the finest [cave] I have ever seen..." (St John, 1862b). Much later he wrote of villagers taking refuge in the cave during oppression by a Malay chief and of a government party traversing the cave from its remote second entrance to drive off their oppressors: a swashbuckling story which might have a kernel of truth (St John, 1906).

A graffito (perhaps "Jack Do", certainly "1866") in Sireh has been tentatively ascribed to Giacomo Doria (personal communication, Jerry Drawhorn and James Handfield-Jones 2020): whereas evidence is lacking for such a visit, or for him adapting his name, it is not impossible. Doria had discovered a new species of blind cave beetle in Italy in 1858.

Harrison excavated Sireh in 1959 (Solheim, 1963) and it was only then that extensive black drawings in an alcove by the entrance were recorded (Leslie Wall, unpublished): they appear to date from between 1670 and 1830 (Huntley *et al.*, 2023).

Denison (1879) also noted that the Land Dayaks of this, Bukar, area were the most wealthy, because of the birds' nests in their caves: Siri, Tambaco, Sambayan, and Panji in Gunong Nambi-Myap, also in Gunong Pyang; Banks (1933) names Gua Payau and Chupak as small birds' nest caves above Pangkalan Bentang on the [Bukar tributary of the] Samarahan.

Sadong

This comprises the catchment of the River Sadong, leading through swampy forest to the southern parts of the limestone.

Grant recalls a camp-fire tale of the formation and discovery of "the Si-Lebor caves...said to be the richest [in birds' nests] and the tribe possessing them...the wealthiest and most prosperous in the Sadong" (Grant, 1864b).

Banks recorded large-scale bird nesting activity in Lobang Batu (also the name of the village "about a day beyond Tebakang" and the cave at Silabor) which "is large enough to shelter [a] roofless village under its overhanging edge. The cave goes right through the limestone hill and the Land Dayak owners, of a tribe that excel above all others as crazy climbers, have erected some truly fearsome bamboo and stick ladders; in spite of all this and the suitability of the cave, they seem to glean no more than two or three hundred pounds of nests a year." (Banks, 1933, 1949).

Birds' nest caves were also known in the Kelingkan mountain range on the Sarawak border (Brooke, 1888) but these are not in limestone. A 1959 visit found that birds' nests had first been collected there in 1852; the caves (rock shelters and fissures in sandstone) were hard to get to, small, and of no archaeological interest. (Medway, 1960).

Northern Sarawak

Tatau, Balingian

This comprises the catchments of the Tatau and Balingian rivers, lying between the major Rejang and Baram catchments. The small limestone hills of Sarang and Kakus are significant sources of birds' nests.

Robert Burns travelled up the Rejang, down the Baram, and up several intervening rivers in 1847. He noted that some tribes collected birds' nests (Burns, 1849) but does not specify which caves they came from: perhaps Middle Baram (Banks, 1931), but two other areas have been significant sources. Edward Peregrine Gueritz (1876) noted his efforts to reach a cave in Gunung Ga Buan being thwarted by the locals refusing to guide him "even for \$100" because the cave was protected by an invisible man-eating tiger. The Kakus caves had to wait until 1965 for more than a cursory mention (Reavis, 1966), as did the Sarang caves (Harrison and Reavis, 1966).

Niah

This river leads to just one isolated limestone outcrop, Gunong Subis.

In 1862, Robert Coulson went exploring for antimony in (what is now) northern Sarawak (Low, 1862). Wallace had spent 8 months in 1855 at the coal mine that Coulson managed and evidently the two kept in touch because: “Robert Coulson has been in England and reported finding bones in a cave ‘inland from the coast’ between Brunei and Sarawak while prospecting for tin” (Wallace, 1864). The cave might well have been at Niah because it is one of the few “mountains...near Meri” (although the plan had been to go as far south as Tatau). Wallace continues: “we may expect that the caves of Borneo would reward a persevering explorer, not only with fossil tapirs, Malay bears, and scaly ant-eaters, but also with the precursors of the extraordinary lemuroid forms now inhabiting the country – *Galeopithecus*, *Nycticebus*, and *Tarsius* – and with fossil proboscis-monkeys, gibbons, and oranges, more or less resembling those which now abound in its vast and luxuriant forests. It is not improbable that some human remains may also be found to throw light upon the question of the origin of the Malayan races” and “Should the naturalists of this country be willing to make an effort to carry out this most promising work, I can inform them that Mr. Coulson, who is now on his way to Singapore, is willing to undertake it” (he didn’t).

When Everett first went to Sarawak he met Coulson in Singapore and asked about this cave: Coulson could (or would?) not recall anything at all. ‘The Caves in Gunong Sobis’ was published anonymously in June 1873, describing the journey of the writer with 5 natives up the Neah River, through swamps until: “I saw rising straight up to an enormous height (1000 feet is mentioned as its height in the Chart) a perpendicular limestone wall with vegetation clinging to its sides in the most impracticable looking places” [See Note 7.]. They climbed “up a ravine of jagged limestone... to an immense opening under the mountain about 200 feet broad by 600 feet long: the perfect semi circular shape, smooth ceiling and props or pillars gave it an artificial appearance. Here we found the temporary huts of the nest collectors.” Continuing “we found ourselves standing at the mouth of a large arched cavern, several hundred feet broad, and over two hundred high, huge stalactites were pending from the ceiling, and a fringe of vegetation drooping from its outer edge: across a beautifully wooded valley rose a small limestone hill, its white and rugged sides glistening in the sun, capped with vegetation it resembled a large iceberg decorated with evergreens. We commenced our exploration of the cave by walking up a gentle incline, a soft flooring of dry scentless guano under foot. We were met by thousands of bats and swallows, the latter are the manufacturers of the edible nest: they resemble the common swallow in appearance, but are only half as large. Now descending a gentle declivity, we found ourselves in an immense amphitheatre; the roof of the cave assuming a circular shape, high in the centre resembling the interior of a dome; our guide assured us the roof was one hundred and twenty fathoms high. Thousands of nests were clinging on to the pillar like sides and roof. The most flimsy looking stages of bamboo tied together by rattans, shewed us the simple means employed by the natives in collecting them from their seemingly unconquerable position. Through rifts in the mountain side stole many coloured rays of light, throwing a dim religious light over the scene. Through this ghastly dimness, the black mouths of branch caverns could be seen. I broke the dead silence which seemed naturally to steal over us by a loud shout, which re-echoed through the vaulted chambers. We now had to light candles to proceed; after another stiff climb we saw light, and going down a steep declivity we emerged on one side of the same opening by which we entered.

The caves are remarkable for their vastness; they are dry and free of stalactites, bar those mentioned as existing at the mouth, several large boulders of limestone were scattered over the floor, stepping out of the bed of guano. I found a part of a human skull at the mouth of the cavern, and was told by my guide that in a cave higher up the mountain, there were several heads and old jars. The former, he said were considerably larger than the heads of the present generation. They were, however, afraid to remove them, as a trial was once made, and one head brought as far as the lower cave, when the outraged spirits of the departed brought about a severe hurricane which destroyed their homes. On our descent, I found the head in question. It was in good preservation and was evidently the head of a native. After a great deal of persuasion, I prevailed on him to allow me to carry it off, he was however, quite aghast at my temerity: as he felt convinced that I should bring down vengeance dire on my head by offending the evil spirits. We got back to the village (minus my canvas boots, which were left in shreds by the way) without any mishap or hurricane. I was glad of this, as I had to carry the head myself, all my followers being afraid to touch it, and the slightest accident would have only tended to confirm their superstitious belief. I was sorry that I could not devote the time necessary to thoroughly explore the neighbourhood, as I was told several smaller caves existed in different parts of the mountain. Some idea of the extent of these caves may be formed from the fact that they yield over 30 pikuls or nearly 2 tons of edible nests at one gathering; unfortunately for the owners, the nests are black, and of an inferior quality, worth only \$100 per pikul: whereas the white nests of finest quality realize \$2,000 per pikul.

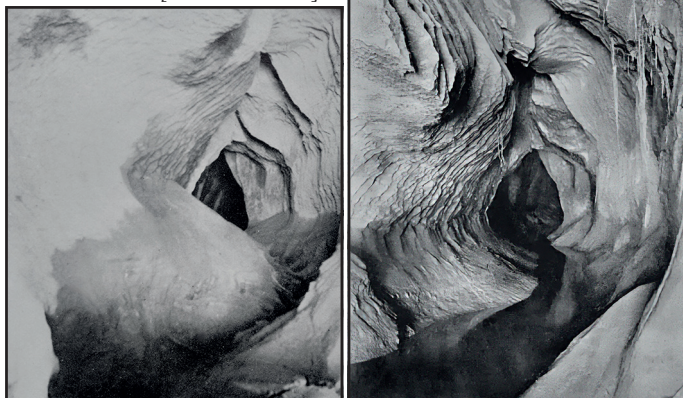
The story of the existence of the heads and jars was confirmed by all whom I questioned on the subject: and although native reports are not to be relied on, doubtless the caves would repay exploration, and prove highly interesting to a scientific traveler.” This account has been attributed to Everett but he wrote, in a report that has long been thought lost (Everett 1878), that although he had visited 2 caves in Mount Sobis, he had been preceded by William Maunder Crocker in 1873 so the above account can now properly be accredited as ([Crocker], 1873). Everett was reminded that to “Mirih from Kudurong is about 75 miles containing high mountains of lime stone with caves” when his Central Borneo Company was set up, hoping to acquire mineral rights there from Sarawak (Brooke, 1887). The Rajah might have had Niah in mind from reports by Charles Hose in 1886, [See Note 8.], when he discovered a new species of fern, *Matonia sarmentosa*, there and sent it to Kew (Hose, 1912). Hose facilitated a photographic trip to Niah by William Henry Furness (Hiller, 1895) and was later involved with an application by a European to work the guano at Niah, but the Rajah was not inclined to approve because “I look on the caves as the hereditary property of the Natives who have been accustomed to work them for generations” (Brooke, 1913). In retirement, Hose took his family to Niah, concluding the trip with an excavation in which his son found “the massive lower jaw of a man together with some teeth, [and] bones of pig, deer, and other animals” echoing earlier sentiments that “such places...need thorough investigation...by competent persons fully equipped” (Hose, 1927). Wilfred Edward Le Gros Clark “discovered the remains of a human head and fossilized ribs of a child, embedded in stalactite” at Niah (Anon, 1921).

Edward Banks was interested in birds' nest swifts and their efficient management at Niah with its “tall, cathedral-like, rather gloomy entrance hall, several hundred feet high, festooned with ladders made of substantial lengths of iron-wood, pegged together and suspended from the ceiling or with temporary lengths of bamboo guyed with rotans into a not so temporary stability.

[Note 7]: A more recent visitor described it as “200 feet to a jutting lip...a fantastic variation of the High Tor at Matlock Bath” (Anon, 1953).

[Note 8]: Harrison (1947) says that official reports on Niah's nest harvests go back to 1882, with guano worked from 1930.

Figure 6, left (below) and right:
Two of the first photos taken inside a cave in Sarawak [see notes below]:



'Entrance to the cave at Gading' (left), was probably taken in 1890 (Hose, 1927). A sediment bank appears to have been washed out by a flood that also left debris hanging from the roof before **'Inside a cave with edible birds nests'** (right) was taken in 1894 (Kukenthal, 1896). [Both images Public Domain.]

Up these contrivances go the collectors, vanishing through the roof to follow narrow passages, crossing temporary bridges into the farthest recesses far beyond anything I should care to attempt. Further within the cave, where it is not so high, stick-like ladders are built up the wall side, with little platforms here and there, whereon sits the Milano nest collector, wielding a long pole of three or more bamboo joints fitted fishing-rod fashion, with a large iron spoon on the end for dislodging the nests to be collected on the floor below by his assistant. The light is supplied by a thin, narrow, bees-wax candle tied on to the end of the pole near the spoon, so frequently extinguished by puffs of wind that a piece of smouldering tinder made from palm-matting is carried to relight the candle from time to time. One's impressions on entering the caves are first the soft mass of guano some ten feet thick under foot, over which run countless cockroaches, then the apparently perilous position of the climber suspended in semi-darkness so little altered by his firefly-like light, and lastly the rising and falling twittering of the disturbed swiftlets as they seek safety in fluttering flight from darkness towards the daylight." He only noted that: "The ramifications of the cave would take days to explore..." (Banks, 1975).

Harrison, hooked by a quick visit to Niah in 1947, returned in 1951 to this "place of man, and all believe was made of man – by the petrification of the village of an extinct race who disobeyed divine instructions and slept with women during religious ceremonies" (Harrison, 1952), and started his archaeological digs in 1954. His wife, Barbara, 'discovered' the Painted Cave in 1958 (Harrison, 2016). He wrote numerous articles on the archaeological finds in the Sarawak Museum Journal and elsewhere (e.g. Harrison, 1961, 1964, 1972), and also discovered a new species of cave gecko, *Cyrtodactylus cavernicolus* Inger and King, 1961 (Harrison, 1961). He recruited many talented assistants, not least Gathorne Gathorne-Hardy to study the faunal remains (e.g. Harrison *et al.*, 1961) and swiftlets. He was also instrumental in making two films for TV at Niah (Harrison and Gibb 1957; Harrison and Harrison, 1964). Wilford mapped the (accessible, lower) cave in 1951 and later summarized what he knew of its history (Wilford, 1964).

Middle Baram

This is an atypical area of subdued limestone hills by the major river of northern Sarawak.

In 1851 St John visited Baram and wrote of 'fissures in the rock extending some 100 or more yards in, entering through a narrow opening, it gradually enlarged into a large chamber; there were numerous branches, and dangerous apertures, through which you might tumble many dozen fathoms into the darkness below, never to return', a description he later expanded on (St John, 1851, 1862c).

Hose located a number of limestone areas [See Note 9], 'Limestone Caves' on the Sepayang river and Maran Cave nearby, on a map (Hose, 1900), and included a photo (Fig.6: left), but no description, of a cave at [Batu] Gading in his autobiography (Hose, 1927). The cave is thought to have been Lobang Tuking (Gill, 2020), and Hose made several visits. In 1894 he took a German zoologist and photographer (Fig.6: right) to: 'a narrow crack that descended into the depths... Our guide, the owner of the cave, who was afraid that the birds might be angry with the foreign intruders, gave them a long speech in which he assured the swallows that we were very honorable people who wanted to take a look at the cave and had no evil intentions. We found the floor to be fairly flat and covered to a foot's height with fine dust, which turned out to be a mixture of bird guano and the wings of small beetles, of which the place was teeming. The nests were glued in long rows to protruding strips on the walls and were bowl-shaped, similar to our swallows' nests. We took some down and found them to consist of a white, slimy but elastic mesh which, as is well known, is produced by the animal itself through vomiting. The white nests are much more expensive than the darker ones, which contain impurities. I calculated that the owner gets about 50 pfennigs for each from the Chinese negotiator in Baram; so by the time they get to China they will have risen to several times the price. The harvesting of bird nests takes place three times a year, but now and then longer breaks are taken to give the birds, "debili" in the Kayan language, a rest. — I was interested in Mr. Hose's statement that the white and black nests do not occur mixed together, so that it is not likely that the latter are originally white nests that have only been accidentally contaminated, and my informant has been trying hard for some time to collect material for his view that the various nests come from two different types of Collocalia.' (Kukenthal 1896). Furness (1897) describes in some detail his trip with two Americans, including being chased out by a flood pulse and finding another entrance. 'Cub' Hartley, a member of the Oxford University Expedition to Borneo in 1932, caved around Long Laput where, mostly, 'The cave entrances were usually narrow muddy fissures in the side of some low limestone mound' and were 'strictly utilitarian'. Tuking was an exception where 'a small river came cascading out' and 'having fought your way up against the current, clinging to slippery niches in the side wall' you emerged into larger, quieter passage where you could survey the beetles, scorpions, centipedes, snakes and allegedly venomous lizards, together with traces of the nest-gatherer's activities (Hartley, 1938). The expedition's co-leader knew of Salai Cave, and Lobangs Bruang "a pleasant sort of cave rather overshadowed by the nearby more famous Lobang Tocking", Sepayang, and Maloi in the context of conserving the swifts (Banks, 1931).

Medalam

This river is a tributary of the Limbang, which debouches into Brunei Bay.

St John is famed for his travels in northern Borneo, especially those with Low, and they were the first Europeans to visit the Mulu area when, in 1857, they penetrated into the headwaters of the Limbang and the northern part of Gunong Benarat, which they thought was Gunong Mulu itself and not a distinct (and still unclimbed) mountain. They attempted to climb the mountain but, having camped a night on poles thrown across the rocks and heaped with leaves, the surface, described as "sharp axes below and pointed needles above", became too much for them at "only 3500 feet above the sea". Nevertheless, they "noticed during our ascent a cave in the limestone rock about forty feet high, and the roots of the trees growing on the rock above came down perpendicularly and passed into the fissures in the stones that formed the floor.

[Note 9]: However, some of Hose's 'limestone' was misidentified: most notably, Mount Mulu and Batu Lawei: both sandstone.]

Their upper parts were encrusted with carbonate of lime in the form of stalactites. Water was continually dripping from the roof of the cave...the only time we saw any pure water on the mountain". After a good dinner, they attempted to explore the Terikan River Cave, but had to be content with drawing its resurgence at Batu Rican (Fig.7), (St John, 1862d).

Melinau

This is a tributary of the Tutoh and Baram rivers which runs off the western slopes of Sarawak's second highest mountain, Gunong Mulu. It then runs to the west of Malaysia's highest limestone mountain, Gunong Api, and takes additional input from its caves.

In 1951, Harrison slept well on "a soft bed of guano" in the entrance to a "superb cave": Gua Payau (Deer Cave), Mulu. He had been preceded by Hose around 1911 (photos of the Melinau Gorge and Batu Bungan appear in his autobiography), and his guide, who "had been making our mouths water with descriptions of how previous visitors (Messrs Banks, Pollard, Griffin, Blacklock, etc.) had shot one or sometimes two deer here": this time he and his party bagged three. He thought he might have found a new species of mossy nest swiftlet and an old burial site but also mused that "Niah cave is not so magical – perhaps I should say so musical – as Mulu. Mulu's cave is to Niah as Wagner to Mozart – for these caves are symphonies of sound, inseparable the eye from ear, multitude notes from great flat bars of view. Or in more visual terms, Mulu is to Niah as William Blake's pictures to Constable's. That is to say (or see or hear) Mulu is pale and cathedral, Niah clear and carved." (Harrison, 1952).

Conclusion

Through being integrated into the economic life of Sarawak caves were of value to government and people. It seems that the locals knew of many caves but managed to keep the locations of most secret (and, in some cases, guarded or booby-trapped) while guiding visitors through just a few of the more obvious ones. Most visitors seem to have at least enjoyed their experience and left unexaggerated descriptions of the cave passages and their progress through them; a few have waxed notably lyrical. A profusion of life, animal and vegetable, has often made itself known (and sometimes been recorded scientifically for the first time) through sight, sound, and smell but has not proved any more dangerous than outside. Less obvious hazards are the fungal spores that can cause histoplasmosis (Harrison, 1965) and other microbes that undoubtedly teem in fresh bat and swiftlet guano: did Doria almost die from one of those?

Flaming torches (of a variety of woods and resins) were the usual mean of lighting but Europeans also used oil lamps or candles; from the early twentieth century carbide lamps designed for use by rubber tappers, or, perhaps, used in the coal mines, might also have come into use. Bamboo or belian, with rattan for lashing, was the material of choice for facilitating upward climbs and descents.

Those visitors who thought about the origin of the caves, produced a spectrum of ideas ranging from various supernatural fables of petrification – the story of Majag, for instance [See Note 10.] – through speculating inception as voids in coral reefs, to recognizing natural erosion through the action of water through dissolution, possibly of softer rock, by fresh, or perhaps sea, water. As to the form of the limestone hills, Everett (1880) thought marine erosion was responsible for the 'old sea-' cliffs and the flats and stacks, noting similarities with features in the Philippines. Earlier, he had also remarked on the frequency of fires on limestone hills and suggested that these were a significant factor in their denudation (Everett, 1874).

There have been flickers of interest in biospeleology but little systematic apart from that leading to the confirmation of echolocation in some species of swiftlets (Medway, 1959). The need for conservation of the caves and their contents was first highlighted by Edward Banks and brought about the Edible Birds' Nests Ordinance, 1940, defining ownership rights and meaning well for both ecology and the local economy. This was revised and incorporated into the colonial Laws of Sarawak as the Edible Birds' Nests Title (Collection and Auction) Rules, 1948. However, enforcement has been lax and, with increasing road transport and urbanization, quarrying threatens the hills themselves, and all they contain: the Paku caves are gone.

Acknowledgements

The author thanks the Earl of Cranbrook, Dr G M Drawhorn, Professor C O Hunt and Dr D J Lowe for comments on earlier versions of this paper, and Jutta Kelling for her translation of Hupe's letter.

[Note 10]: Majag was a lady from Siburan who went in search of freshwater prawns, and then on to rest in a cave. One prawn, caught up in her clothing, then crawled onto her breast. She admonished it for being so familiar; furious, the prawn turned her to stone and she stands inside the cave at 14th Mile to this day. [Précis of the Biatah-language version given by Howes in 1952.]

Figure 7:
The first known drawing of a cave entrance in Sarawak: "The Trunan issuing from the Batu Barit Mountain", drawn in 1857.

From St John (1862).
[Public Domain.]

(Identified by G E Wilford as the entrance to the underground Terikan River [issuing from Mount Benarat].)



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Biographical Appendix

Further information on most of these cave visitors can be found through the Brooke Trust Digital Archive at:

<http://archive.brooketrust.org/DA/>

and commonly in other online sources. The entries are in order of birth, which roughly matches their appearance in the history of Sarawak.

James Brooke (1803–1868) born near Calcutta, India, had spent less than half his life in England, had a military career ended by a wound received during the first Burma War, and been an unsuccessful trader to China, when he set out for the Far East (and a possible circumnavigation) in 1839. By 1842 he had begun what became a century of absolute rule of a country that grew from about the size of Yorkshire to be bigger than England. Knighted for his (short-lived) governorship of the Colony of Labuan, several species of flora and fauna bear his name.

Hiram Williams (1816–1871) land surveyor and geologist from Swansea, Wales, drew the tithe map for Upper Tawe (including Pwll Byfre, Ffynnon Ddu, and Dan-yr-Ogof). He was sent to Borneo in 1845–6 by the British Admiralty to assess the possibility of finding a supply of coal for the Royal Navy. He compiled and drew the first geological map of Sarawak, much of which was also used on Admiralty Charts for many years. He was granted some land near Kuching in 1848 and toyed with starting a company there, but went into the administration and management of a number of mines in England until ending up as a gentleman farmer.

James Russell (1817–1873) Scottish mineral surveyor, worked on mineral exploration for the Borneo Company for about four years from 1856. On returning home he discovered a fossilized forerunner of the reptiles that bears his name: *Anthracosaurus russelli*.

Robert Coulson (1818–1882) Northumbrian coal miner who was recruited to the Labuan colliery in 1852 (losing an arm in a dynamite explosion a year after). He spent most of the next 25 years in northwest Borneo (notably hosting A R Wallace at the Borneo Company's Sadong coal mine in 1855) and Singapore. After a brief return home in 1877, he emigrated to try his hand in New Zealand.

Johann Michael Carl Hupe (1818–1861) was a German missionary from Halle who came to Sarawak overland from Sambas (Dutch Borneo) in 1844. He left in 1847 to return to Germany.

Robert Burns ([1820]–1851), allegedly a grandson of the Scottish bard, arrived in Singapore in 1846 and went, in 1847, to explore the hinterland of Bintulu for minerals. He then took to trading until he was murdered to the north of Labuan in 1851 while engaged as supercargo on the trading ship, Dolphin.

Alfred Russel Wallace (1823–1913) from the Anglo-Welsh border county of Monmouthshire had been a teacher in England before returning to Wales as a land surveyor increasingly interested in natural history, whence he took long walks from Neath towards the Brecon Beacons and even spent an uncomfortable night sleeping in the entrance to Porth yr Ogof. After a 4-year collecting expedition in Brazil he set out on what became an 8-year trip in the Malay Archipelago, with 18 months from 1854–1856 in Sarawak. At his death he had become one of Britain's best known scientists, recognized by award of the royal Order of Merit. Many species of flora and fauna bear his name.

Hugh Low (1824–1905), son of a horticulturalist from London, sent by his father in 1844 to search for plants, such as orchids and ferns, for the family's nursery business. His book on Sarawak was published in 1847, after having returned to England with the Rajah, who then took him, as Colonial Secretary, to Labuan. From there, he explored Mt.Kinabalu and Limbang. After many quiet years in Labuan he went on to the Governorship of Perak, and knighthood (KCMG 1889). Several species of flora and fauna bear his name.

Spenser Buckingham St John (1825–1910) born in London, son of journalist and writer James Augustus St John (born James John in Laugharne, Wales). He appears to have become very interested in Sarawak when his father was involved in editing James Brooke's journals, and this interest led to James Brooke taking him on as his Private Secretary for Labuan in 1847. He was a prominent explorer (with Low) of Kinabalu and of the Limbang river up to just north of Mulu. After 16 years of Bornean life – adventure, domesticity, government and diplomacy – his diplomatic career continued in Haiti, Peru, Mexico, and Sweden. Knighted (KCMG) in 1881, raised to GCMG in 1894.

Ludvig Verner Helms (1825–1918) a Dane who first went to Sarawak to work for the what became the Borneo Company in 1852 and left 22 years later. He explored the interior of Sarawak intensively for minerals (a pursuit he repeated for a few years during his later life) while managing the company.

Cuthbert Collingwood (1826–1908) was a doctor and naturalist who visited Labuan and Sarawak in 1867 while he was surgeon on a Royal Navy ship.

Thérèse Yelverton ([1830]–1881) a Mancunian, nee Longworth, a.k.a. Viscountess Avonmore, plunged into travel after a notorious divorce case in Ireland. She had been a nurse with some French nuns in the Crimea, and went via America in 1870 to the Far East in 1871–1872.

Charles Thomas Constantine Grant (1830–1891), who was the younger son of an aristocratic Scottish family, joined the Royal Navy as a midshipman, was befriended by James Brooke, and then induced to take a role in James Brooke's government in 1847. After 15 years in government he returned to work in England, before inheriting his Scottish Estate.

Charles James Fox ([1832]–1859) arrived in Sarawak from India in 1851 and worked as a catechist with the Anglican Mission until becoming a Government officer in 1855. He was killed in a, probably politically motivated, incident.

Marshall Cresswell (1833–1889) Northumbrian coal miner recruited for 2 years in 1857 to sink shafts for the Borneo Company in Sarawak. On returning to Northumberland he continued as a collier but also became known as a writer of witty poems and songs.

Alfred Robert Houghton (1838–1881) who had trained as a lawyer and a physician, was wounded while fighting for Garibaldi in Italy. He then wrote newspaper articles before being recruited into service in Sarawak at the age of 24. Barring one furlough, he spent the rest of his life in Borneo, until illness decreed that he leave, but he died during the homeward voyage.

Noel Denison (1838–1893) born and raised in Java, but of a well-connected English family. He spent much of his 8 years as an officer in Sarawak, among the Land Dayaks. He followed his time in Sarawak with diplomatic posts in Perak.

Giacomo Doria (1840–1913) Italian Marquis who facilitated Beccari's Sarawak visit, accompanying him for a year until he became very unwell. The cave beetle *Duvalius doriae*, which he had found in Italy in 1858, is named after him.

Frederick Boyle (1841–1914) from the Potteries area of England, visited Sarawak with his brother in 1863–1864, not long after graduating from Oxford and being called to the Bar as a lawyer. Continued to travel widely, spending most of his life as a journalist and writer, specializing latterly in orchid growing.

Odoardo Beccari (1843–1920), Italian naturalist, in Sarawak 1868–1870. Many species of flora and fauna bear his name.

William Maunder Crocker (1843–1899) joined the Sarawak Government in 1864, worked as a trader in his own right at Muka for four years from 1870, rejoined the government, and then moved to North Borneo, where he acted as Governor for a year from 1887 and had a mountain range named after him. He wrote the first account of a visit to the Great Cave at Niah.

Oliver Cromwell St John (1845–1898), a nephew of Spenser, went to Sarawak in 1862. He resided in Upper Sarawak for 12 years until retirement in 1884.

John MacGregor (1848–1936) Scottish surgeon in the Indian Medical Service, later to be appointed first bard of the clan MacGregor. He visited Sarawak for a few weeks early in 1894.

Alfred Hart Everett (1848–1898) was born on Norfolk Island, an Australian penal colony, but grew up near Southampton. Reportedly too ill to go to university, he went to Sarawak to collect natural history specimens in 1869 and stayed on in northern Borneo, independently or, sometimes, in government jobs, for most of his life. Many species of flora and fauna bear his name.

Margaret Brooke (1849–1932), married the 2nd Rajah in 1869, and then spent a total of around 10 years in Sarawak before making her final visit in 1895. Later, from her home in Italy, she supplied photographs for Beccari's book.

William Temple Hornaday (1854–1937) was an American zoologist who visited Sarawak for 5 months in 1878 and advocated establishing a museum in Sarawak.

Archibald Allison (1855–1926) was a Scottish miner, who was based at Tegora mercury mine from 1881–1893, then at Labuan coal mines (1894–1896). He became a prolific pamphleteer, which led to libel actions in Singapore in 1898, consequent bankruptcy, and return to the UK. He emigrated to the United States in 1903 where Denver Public Library, Colorado, holds his archive.

Edward Peregrine Gueritz (1855–1938), who acted as a Sarawak Government official from 1874–1877, subsequently served in North Borneo and Labuan, rising to Governor of North Borneo for 7 years from 1904.

Reginald Victor Awdry (1856–1944) was a Sarawak Government official for 25 years from 1876. While based at Paku, his monthly Sarawak Gazette reports show that he took visitors though several caves.

Baden Fletcher Smyth Baden-Powell (1860–1937) was a soldier in India when he visited Sarawak. He went on to fight in Africa (including relieving his elder brother, Robert, at Mafeking), and to champion the uses of balloons, and then aviation, by the army.

Charles Hose (1863–1929) was a Sarawak Government official for 25 years from 1884, mainly in Baram, and he gained familiarity with birds' nest caves. In retirement, he took his wife and family to visit Niah. Several species of flora and fauna bear his name.

William Henry Furness III (1866–1920) was an American doctor who undertook an ethnographic expedition to Baram in 1896, during which he took some of the first photos inside Niah Cave (published in 1906 in *The Home-life of Borneo Head-hunters – its Festivals and Folk-lore*). Among other research, he spent several years trying to teach an orang utan to talk.

Reginald Pawle (1870–1958) was manager at Tegora mercury mine from 1894, and then of gold works at Bau.

Robert Walter Campbell Shelford (1872–1912), a biology graduate of Emmanuel College, Cambridge, was curator of Sarawak Museum from 1897–1904. Several species of flora and fauna bear his name.

Cecil Joslin Brooks (1875–1953) was a chemist, managing the cyanide gold extraction works at the Bau for 10 years from the turn of the century. A keen naturalist, he collected the type specimen of the Bidi cave crab; many ferns (from Sarawak) and several reptiles (from Sumatra) bear his name.

Eric Georg Mjöberg (1882–1938), Swedish curator of Sarawak Museum for two years from 1922. The English translation of a book published in Sweden in 1928 (*Forest Life and Adventure in the Malay Archipelago* [London, George Allen & Unwin]1930) contains two pictures of Niah Cave, but he only reports visiting “*the enormous Kemanis caves*” in Beran, East Borneo (= Berau, N Kalimantan?).

Wilfred Edward Le Gros Clark (1895–1971), who was Principal Medical Officer in Sarawak from 1920–1923, was a distinguished anatomist, later involved in uncovering the Piltdown Man hoax.

Edward Banks (1903–1988) was born in Newport, Monmouthshire, the son of the owner of a colliery. He went to Sarawak as an Oxford zoology graduate and was Curator of the Sarawak Museum from 1925 until interned as a POW by the Japanese. He took a particular interest in the birds' nest caves of Bau, Niah and Baram.

Tom Harnett Harrison (1911–1976) was born in Argentina but educated in England, becoming a keen ornithologist. After an expedition to the Arctic he led the Oxford University Exploration Club's 6 month expedition to northern Sarawak in 1932, followed by 2 years from 1934 in the New Hebrides, returning to start documenting the natives of Bolton and adjacent parts of Lancashire through Mass Observation. In 1945 he parachuted into northern Borneo to recruit and lead resistance against the Japanese. He was Curator of the Sarawak Museum (1947–1966), during which time he initiated archaeological excavations in several karst areas, most notably at Niah. In 1959, he was awarded an OBE for his work as curator and, in 1960, the Certificate of Merit by the (USA) National Speleological Society for his archaeological work in the caves of Borneo. Several species of fauna bear his name.

Christopher Harold Hartley (1913–1998), the son of an Oxford chemistry don, was a zoology student when he joined the 1932 OUEC expedition. After two expeditions to the Arctic and a spell teaching at Eton, he became an RAF pilot in 1938. In his subsequent career he rose to the rank of Air Marshal, and received a knighthood.

Barbara Harrison (1922–2015) was a German (nee Güttler, from Silesia, now Poland) who went to Sarawak in 1953 with her husband, E F Brünig; she divorced in order to marry Tom in 1956. She had an integral role in the archaeological work at Niah, found the Painted Cave. and went on to specialize in ceramics.

Gerald Edward Wilford (1928–2019) was an English geologist and caver who, in 1948, “*whetted by Derbyshire caves, Yorkshire potholes, and Mendip sumps*”, was one of the first geologists assigned to the Geological Survey, British Territories in Borneo. Among his early tasks he investigated phosphate deposits (mainly guano in caves), as well as carrying out the first detailed geological mapping of SW Sarawak, for which London University awarded him a PhD in 1957. Later he wrote the definitive book on the caves of what had been British Borneo, gave his name to a genus of foraminifera (*Wilfordia* Adams, 1965), and was awarded an OBE, before leaving for Australia in 1967.

Gathorne Gathorne-Hardy (b.1933) known as Lord Medway to 1978, subsequently Earl of Cranbrook, became expert on the mammals and birds of Borneo, and its birds' nesting industry; honoured by Sarawak as a *datuk*.