

5. On the Caves containing Edible Birds'-nests in British North Borneo. By D. D. DALY, Assistant Resident, British North Borneo¹.

[Received February 2, 1888.]

The increasing attention to valuable products of trade in new countries has led me to prepare the following notes on the Birds'-nest Caves of Northern Borneo gathered during a residence of nearly five years in that country. The number of caves that are known to be in existence up to date are referred to in the order of their size, wealth, value, and importance both as regards the quantity and quality of the nests. Many of these mountain-caves have been visited by Europeans since the establishment of British North Borneo as a Colony under Royal Charter in November, 1881; but there are a few that are so inaccessible amid inland mountains and among semi-hostile tribes that they have not yet been explored, and are only alluded to from native information.

The edible nests of the Swift (*Collocalia fuciphaga*) are valued in China only; to the European palate birds'-nest soup has an insipid taste.

Many theories, some of them absurd, have been propounded with respect to the mode of formation of the nests; it may, however, be laid down as indisputably proved by experts that the nests are made by the Swifts of their own inspissated saliva². The nests have been carefully analyzed by chemical experts, and no traces of vegetable matter have been discovered. The thready mucus is worked up by the Swift from the salivary glands in its neck.

The strings of mucus are plainly visible in the nests which I have the pleasure of exhibiting at this meeting, and which were brought

¹ In the discussion which followed the reading of this paper, Mr. W. H. Treacher (late Governor of British North Borneo) pointed out, in reference to Mr. Daly's explanation of the differences in the colour and value of the nests, that Sir Hugh Low, writing on Sarawak about 40 years ago, maintained that two distinct varieties of birds formed the white and the black nests respectively, the latter being a smaller dull-coloured bird, generally found in the inland caves, and the former a large bird, of livelier colour, with a white belly, and found in the caves near the sea-shore; and that the natives of whom he had inquired, corroborated Sir Hugh's statement; he also pointed out that the Sigalong caves yielded almost entirely white nests, while those of Madai, close by, were almost all black ones. In the Gomanton series some of the caves always yielded black nests, and others always white ones, although the nests in all were collected with equal regularity. The Hon. Ralph Abercromby said that when he visited the Gomanton caves the natives showed him three different-sized eggs, and said the largest was the egg always found in the white nests; he added that a German naturalist, who had resided in Palawan, had, however, given him an explanation similar to Mr. Daly's.

Mr. Selater said that only one kind of Swift had been sent to him from Borneo for identification, and that that, as determined by Mr. Sharpe (see P. Z. S. 1886, p. 54), was *Collocalia fuciphaga*; he suggested that the Company's officers might easily settle the question by procuring specimens and sending them home for determination, and urged them to adopt this plan.

² See Mr. H. Pryer's paper on this subject, P. Z. S. 1884, p. 532 and the accompanying footnote.

by me last July from North Borneo. They were taken from the Tatalahan Caves on the west coast.

The later geological formation of British North Borneo, superincumbent on the granitic and older rocks is a slate composed of sandy and muddy sediments with occasional intercalated zones of limestone. In the caves found in these limestone deposits the Swifts make their homes, and build the nests so much coveted by the Chinese. The demand for these ingredients of gelatinous soup is constant among the wealthier Chinese, and the supply is extremely limited; the product is consequently of increasing value as a luxury. There are three qualities of these nests:—

1. The white nests, which are gathered before the bird has commenced to lay any eggs, and which are composed of a clear transparent mucilaginous matter, with very few feathers mixed with them.

2. The *red* or *grey* nests¹ which are partly mixed with feathers, in which eggs are sometimes found, and which have to be cleared of much extraneous matter. The part of the nest adhering to the limestone is sometimes tinged with pink.

3. The *black* nests, which are much mixed with feathers. Sometimes fledglings may be found therein. These nests have been overlooked at the previous gathering, and have darkened or deteriorated from exposure to water and to the atmosphere of the caves. The partial decomposition of the mucous matter renders them the least valuable.

The following market-quotations of the birds'-nests are taken from the 'British North Borneo Herald,' of 1st December, 1887.

<i>White</i> birds'-nests, best,	per catty	\$16	to	\$12
„ „ 2nd quality	„	9	„	7
„ „ red	„	7	„	5
„ „ common	„	1·80cts.	„	2
<i>Black</i> birds'-nests, best,	per picul	\$80		
„ „ 2nd quality	„	50		
„ „ 3rd quality	„	40		

The following are the names of the principal mountains containing caves to which the Edible Swift resorts for the purpose of breeding, so far as they are yet known:—

No. 1. Gomanton.	No. 10. Butong.
„ 2. Madai.	„ 11. Bukit Malingai.
„ 3. Sigalong.	„ 12. Pigton.
„ 4. Baturong.	„ 13. Bahalla.
„ 5. Batu Timbang.	„ 14. Ulu Sembakong.
„ 6. Senobang.	„ 15. Waleigh-waleigh, Kin- oram River.
„ 7. Obang Obang.	„ 16. Mantanani.
„ 8. Tatalahan.	
„ 9. Bod Narkiw.	

¹ When the nests are left untaken for too long a period after they have been built, the part or hinge adhering to the limestone first turns red, then black, and finally the nest drops to the ground, oftentimes with young

No. 1. THE GOMANTON CAVES, near Sandakan, East Coast, are by far the most extensive and rich in quantity and quality of birds'-nests. These limestone caves are reached from Sandakan, the capital of British North Borneo, by ascending the Sapagaya River, which flows into the vast harbour of Sandakan, and from the head of the navigation of the Sapagaya by a jungle-track, $7\frac{1}{4}$ miles in length, to the Gomanton caves. These caves can therefore easily be reached in half a day from Sandakan. Marching along the narrow track, between green walls of tropical jungle, the traveller at times takes breath to notice ferns, lycopodiums, pitcher-plants, and orchids that love the shade of valuable hard-wood forest trees. The crow of the Argus Pheasant frequently breaks the stillness, and the monster ape, the "Orang utan" (in Malay "Mias") looks down with surprise at the passing wayfarer from lofty branches overhead. As the caves are approached, half a mile off, the air is strongly impregnated with the odour of guano, of which there are valuable deposits; then slippery, moss-grown limestone boulders are scaled until the entrance, "Simud Putech" (Malay for "white entrance"), is reached. This porch is situated at an altitude of 570 feet, by aneroid, above the sea, and being 30 feet high by 50 feet wide, presents a noble entrance. Leaving this, a further climb of 500 feet brings the traveller to the summit of the Gomanton Caves. Peering down a small aperture, a magnificent cavern variously estimated at 850 to 900 feet in depth, or upwards of twice the height of St. Paul's, London, is disclosed. The native climbers descend from this hole, holding on to a network of rattan ladders that spread over the limestone roof of the vaults; as seen from the floor of the cave, the collectors appear like flies as they clamber about in their perilous work. Here, on the summit, there are some cocoa-nut trees, lime trees, and a plateau of grass. A grand panoramic view is unfolded, Sandakan harbour and distant cloud-capped ranges being prominent. Looking down from the plateau, there is a precipitous cliff inviting the weary mind with suicidal intent. Let us descend again to the Simud Putech entrance. It is very steep and slippery work; suddenly a vast dome-shaped chamber is entered. This dome is honeycombed with other domes, all of which have their native names, as precise as the nomenclature of the leading thoroughfares into Trafalgar Square. The vaulted corridors leading to this dome are about 150 feet high. Let no man enter these caves without torch or candle, as there are dangerous fissures. In this, the Simud Putech cave, looking to the left, a dark abyss, known as the Simud Itam (Malay for "black entrance") Cave, is pointed out by the guide; its depth is estimated at 400 feet. The Simud Putech Cave is coated with a layer of Swifts' guano from 5 to 15 feet in depth; it is less valuable than the Bats' guano in the Simud Itam and other caves.

Swiftlets in them. These nests having been overlooked or being inaccessible to the inexpert climber, are used by the birds for laying their eggs and rearing young ones year after year, until they turn black and worthless.

No. 2. THE MADAI CAVES, Darvel Bay, East Coast.

In July 1884 I visited these caves in company with Governor Treacher. The approach to the shore in a steam-launch was intricate work, as many coral patches obstructed the entrance. Having anchored at the mouth of the Tugabuah River, we paddled up for about an hour and landed. A three-mile jungle-track, much broken up by Elephants, Rhinoceroses, wild Cattle, and wild Pigs, brought us to the entrance of the caves, which is on a level with the surrounding country. The limestone walls rose rugged and precipitous, and glittered in the light of the morning sun. As we entered, there were flights of Swifts whizzing and flitting past our heads, and we found many of the young birds, tied together by the wings, lying on the floor ready to be carried away for food by the collectors. These men belong to the Erahan tribe, and we found some twenty of them living on stages inside the caves. They handed to us torches and bees'-wax tapers, which were most welcome as we clambered in the murky darkness over the slippery limestone boulders. In the hollows of the floor there were thick layers of guano, which was saturated with the rain-water that percolated through the limestone ceiling; the result was that we were frequently immersed up to our middle in these offensive deposits.

Unlike Gomanton, which boasts one monster cave, Madai presents a series of chambers, about 150 feet in height, connected with each other by narrow passages. There are very few Bats, the Swifts having taken possession of the most advantageous nest-building sites and being evidently too numerous for the unremunerative mammalia to lead a peaceable existence.

As we walked through the six caves, the collectors pointed out to us 23 "lobangs," as they are called by the natives. These are domes or vaults, each one of which is owned by a separate proprietor. The natives say that 20 of these vaults contain black nests only, and that three vaults only hold white nests.

This would denote, as native information frequently asserts, that there are two kinds of Swifts, viz., one that builds black nests and the other white nests. In fact some natives maintain that there are as many as four different kinds of Swifts. Further investigation is required to clear up this question.

There are three collecting-seasons in one year; the last season yields nests of an inferior quality to the other two. The total harvests of both black and white nests are valued at \$15,000 per annum.

No. 3. THE SIGALONG CAVES, Darvel Bay, East Coast, are situated about 21 miles S.E. from the Madai Caves, and are approached through coral reefs. The chambers are low, and the openings are small and difficult to enter for Europeans.

The native collectors enter some of these limestone caves by loop-holes from the summit, which is about 250 feet above the surrounding country. There is a preponderance of Bats over Swifts, but the deposit of guano is not so large as in the Gomanton and Madai Caves. I

was only able, owing to darkness coming on, to visit a few of these caves; the Erahan collectors said that there were 14 of them, and gave us the names of the proprietors and the yield of nests of each cave.

The Sigalong caves have all white nests, and the harvest is valued at \$12,500 per annum.

No. 4. THE BATURONG CAVES, near the Madai Caves, Darvel Bay, East Coast, were first visited by Mr. F. G. Callaghan, the Assistant Resident of Darvel Bay, in July 1887, and the following extract from his official report will be of interest:—

“The next morning we started for Madai, but, only being able to get four Ehrens as baggage-carriers, the greater portion of our stores was left in the boats.

“Reaching Madai at about 10 o'clock, I obtained a party of fifteen Ehrens, and started for Baturong at 12. The track lies at the back of Madai and passes close underneath the high hill called Pigtong, and also near another range of the name of Gelass. This latter hill used to produce birds'-nests, but for some reason has not been worked for thirty seasons (?). The nests were of both kinds, black and white. The track lay through flat and rather swampy ground with outcropping of limestone in several places. We halted for the night at the Kiten River. Sri Rajah, who accompanied us, followed as a guide.

“Leaving the next morning at daybreak, we ascended a gradual slope for nearly an hour, the jungle full of durians, langssats, and other fruit-trees. For about another hour we continued along this range, called Bukit Telang, of about 400 to 500 feet high, direction E. by S.

“On leaving the hill, we met the following tributaries of the Tinkayu River—the Bitaspalino, Natunde-Batas, Segas, and Binnan rivers, all of which are of fair size. The Tinkayu is a fine river, but is not navigable to this point, owing to large rapids and falls. The natives say it is about six days' paddle up from the mouth to the first rapids, the noise of which we heard.

“The country is very flat between these rivers, and, owing to the heavy rains, a good deal inundated, making travelling very difficult.

“We reached the Baturong Caves at 2.30 and found the Tedong people had all left, probably four or five days before. Baturong is a hill about 2000 feet high, nearly perpendicular; it appears to be all of white glistening limestone. It contains fifteen 'lobangs' or holes, out of which Suggin and Selagas appear to be the most valuable, producing seven and four catties of white nests yearly respectively. These two holes are worked three times a year, but the remainder only once. The estimate in the 'Herald,' of September 1884, gives the out-turn at one picul yearly, but I do not believe that more than twenty catties or so are gathered. The entrance to the cave is about 40 feet from the ground, a large tree growing up alongside the rock affording a kind of ladder, and from the branches of the tree a kind of suspension-bridge to the cave has been made. I did not attempt therefore to enter the caves, which, I

was informed, are nearly twice as high as Madai. A stream of good water flows just below the cave.

No. 5. THE BATU TIMBANG CAVES are situated at the head of the Quarmote River, a branch of the Kinabatangan River, East Coast, and are almost inaccessible when the Quarmote River is in flood, on account of dangerous rapids. During other seasons the journey from the Kinabatangan to the caves can be accomplished there and back in a fortnight. When I visited the Quarmote in September 1884 it was impossible to stem the flood. The chief, Rajah Tuah Dorkas, concurred that a road would be a great advantage, inasmuch as three seasons for gathering the nests would then be available, and the nests would all be in good order and of higher value. At present there are two seasons—one dry, when the nests are picked and in fair order; the other when the rains are on, which, percolating the limestone vaults, trickle into and damage the nests. When the rainy season lasts an unusually long time and the caves cannot be reached, the nests are left on the walls for too long a period and become black and nearly worthless. Men are frequently drowned over the cataracts. There are many vaults in these caves, and the chief told me that he had gathered 15 catties (= 20 lbs. avoirdupois) of white nests, and one picul (= 133½ lbs.) of black nests from one vault alone during the last season. The expenses of collecting are considerable. When the collecting-season has arrived, a fleet of flat-bottomed boats start from the Kinabatangan River; sometimes there are as many as 90 boats, and allowing five men to each boat, the force would number 450 men. As there is no currency in silver or copper, all these people are paid in birds'-nests, which come into the traders' hands and find their way to Sandakan.

The Batu Timbang Caves had been abandoned for some years until the British North-Borneo Company proclaimed the Royal Charter in 1881. There are powerful tribes in the interior, the principal one being the Tingallans, who are head-hunters, and the collectors were decimated year after year. Since the advent of the British North-Borneo Company, the people have been able to work the caves without molestation.

No. 6. THE SENOBANG CAVES are situated on the Upper Penungah River, a tributary of the Kinabatangan River, East Coast. The late much-lamented Mr. Frank Hatton, in 1882, made a gallant attempt, in the face of hostility from the 'Tungara tribe, to visit them. The savages were conciliated, chiefly by his pluck and tact; but the floods swept away and destroyed some of his boats over the rapids, and he was most unwillingly compelled to do that which explorers are so loath to do, viz., turn back.

In October 1884 I made two attempts to reach these caves, but was overpowered by the heavy rains which swelled the river, and over a cataract I lost part of my provisions, a rifle, and all my cooking-utensils. The time will come when roads laid out by the

British North-Borneo Company will give access to the Batu Timbang, Senobang, Ulu Sembakong, and Obang Obang Caves, which are all situated to the south of the Kinabatangan River, and then the real output of the caves will be ascertained, and the harvests of birds'-nests, collected, as in Java, under European supervision in proper seasons, will be enhanced in value.

No. 7. THE OBANG OBANG CAVES are situated on the Melikop River, a tributary of the Kinabatangan River, East Coast, about the centre of British North Borneo, and connecting the east and west coasts by the palæozoic zone of insular limestone mountains.

The aneroid, at the mouths of the caves, gave a reading of one thousand eight hundred and ten feet above sea-level. The last half-hour's walk was over limestone boulders, and the air was strongly impregnated with the odour of Bats' guano.

The first cave is the most valuable, but it can only be entered by experts in climbing.

The entrance is a small hole, about four feet by four, which is closed with a wooden grating, for the purpose of attracting attention to the spot.

Every two months this doorway is opened, and the climbers let themselves down into the caves by means of rattans, and gather all nests, both large and small.

The "take" or collection varies much in different seasons, this principal cave yielding from eighty to two hundred and fifty white nests, worth \$16 a catty, per season.

One season lasts only two months, making six seasons in the year, the same periods of seasons are also observed at the Senobang cavern, Ulu Penungah. This is quite different from the duration of the seasons at Gomanton, Batu Timbang (river Quarmote), Madai, and Sigalong Caves, where there are only two or, at most, three seasons in the twelve months. The Tungaras agree that by collecting frequently they procure white nests in first-rate order, though some of the nests fetch a higher price from the Sulu traders than those of Batu Timbang.

I noticed a great scarcity of Swifts; this may be attributed to these frequent takings of nests, which prevent the birds from breeding, whereas in the other caves of North Borneo where the collections are less frequent, an immense number of birds are found.

On the other hand, where there are only two collections per annum, and especially during the rainy season, many of the nests are found to be half rotten, particularly that part of the nests that adheres to the wall, and full of feathers and containing eggs, from having been left too long on the walls before collection.

The "Obang Obang" range, which contains the caves of that name, runs about north and south and is half a mile in length.

There are seven entrances ("lobang") from the top of the hill, and they are all close together. Five of the caves do not contain any nests, no Swifts, but only Bats, inhabiting them.

The first I have already alluded to, and the last was the only one

that could be entered. 'This is a small cave, the chamber itself only about fifty feet high, and containing both Bats' and Swifts' nests.

I visited these caves in October 1884 and found that only ten Swifts' nests had been gathered that season.

The Bats' nests are similar in form to those of the Swifts, but are made of moss only, which the Bats pick off the limestone boulders outside.

I had Malini with me, the man who had successfully scaled the interior of the Gomanton Caves; he went down to No. 1 of these Obang caves, but unfortunately could only find a few young nests just being formed in the crannies and cracks of the vault, the season's nests having already been gathered.

The tribes who inhabit this part of Borneo have a certain specified law of succession as to the gatherers of the nests, and the honour is taken in turn by the chiefs and their several relatives.

It is probable that, with a little rest and freedom from intrusion, the Obang Caves might become very valuable to the colony. I was, I must own, somewhat disappointed with these caves after what I had heard about them. I proposed to the people that, inasmuch as the Government afforded them protection on the Kinabatangan River, which enabled them to trade and live in security, they should in return pay a tribute of one third of all birds'-nests taken out of the caves. This was cheerfully assented to.

I found the yield of the month previous to my visiting the district had been 150 nests, and of these 50 were at once handed over to me.

No. 8. THE TATALAHAN CAVES, on the Padas River, West Coast, are as yet unvisited by Europeans; but I have seen white birds'-nests of the best quality brought to Mempakol, the capital of Province Dent.

No. 9. BOD NARKIOW CAVES. This paper, relating, as it does, chiefly to the edible birds'-nest caves on the Kinabatangan River, will show that that river is very rich in caves. Amongst others I may briefly allude to those reported at Bod Narkiw. Though I did not visit them, there is every reason to suppose they exist. The formation of the country is favourable to the supposition, and the folklore of the natives alludes to the fact that at Narkiw such caves are found.

No. 10. BUTONG CAVES. Much the same kind of obscurity hangs over the history of the Butong Hill Caves. Time would not allow me to explore the district in their neighbourhood. So I contented myself with offering \$100 to anyone who would bring me reliable information about them.

No. 11. BUKIT MALINGAI, a sandstone mountain, holds birds'-nest caves, but an entrance to them has not yet been discovered. There is a strong smell of guano near the summit.

No. 12. PIGTON, a limestone hill, Darvel Bay, is as yet unvisited.

No. 13. BAHALLA ISLAND, off Sandakan Harbour, contains both black and white nests, the collection of them being farmed out by Government. The apertures are in the face of a precipitous sandstone cliff, some 600 feet high, and are entered from the summit, the climbers being lowered down from the top by ropes.

No. 14. ULU SEMBAKONG CAVES. Natives informed me of some valuable caves on the Sembakong River, which empties itself into Sebuco Bay, East Coast; these could only be visited by going through the country with an armed force, as some of the head-hunting tribes are hostile.

No. 15. Some caves at WALEIGH-WALEIGH, Kinoram River, a tributary of the Bongon River, a part of the northern Kinabalu watershed; these were visited some years ago by the late Mr. Frank Hatton.

No. 16. MANTANANI. These caves are situated in a group of uninhabited islands of that name, about 20 miles off the north-west coast of Borneo. Both white and black nests are taken, the collection being in the hands of two Borneo tribes who collect in alternate seasons.

I have now enumerated all those caves that are known at present. Doubtless this vast territory contains others perhaps richer than these, and in the course of time, when the country is more fully explored, we shall be able to fix their position definitely on the map of British North Borneo.

6. A Note on *Ornithoptera victoriæ*, Gray.

By OSBERT SALVIN, M.A., F.R.S.

[Received February 7, 1888.]

(Plate IV.)

At the meeting of the Society held on the 1st of March last I had the pleasure of exhibiting a male specimen of an *Ornithoptera*, from the island of Maleita, one of the Solomon group. This specimen Mr. Godman and I considered to belong to the male of the long-known *O. victoriæ*, the description of which was based upon a female example obtained by J. Macgillivray, but of which the locality was not recorded. The females, of which specimens were also exhibited, from Maleita Island agree with the type, hence our determination of the male. The male and the underside of the female have since been figured by Mr. Henley G. Smith, on the first plate of his new work '*Rhopalocera Exotica*,' the male having been described in the June number of the '*Annals and Magazine of Nat. Hist.*' of last year (1887).

Mr. Woodford, the enterprising naturalist who captured these specimens, has since returned to England, bringing with him a large



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