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A possible high-altitude roost of Seychelles sheath-tailed bats *Coleura seychellensis*

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As one of the most endangered mammals in the world, the Seychelles sheath-tailed bat *Coleura seychellensis* PETERS, 1868 is, as far as is known, struggling in terms of numbers. To date there have been only 32 individuals recorded. This figure has been collated by visual observations at a single cave on the granitic island of Silhouette, Seychelles. Within the order Chiroptera (bats) the family Emballonuridae, includes sac-winged bats, sheath-tailed bats and ghost bats. Sheath-tailed bats can be further divided into two genera with *Coleura* being African and Arabian sheath-tailed bats, and *Emballonura* being Old World sheath-tailed bats. Until relatively recently, *Coleura seychellensis* had not been researched and very little was known. The bats are small, only 55–65mm in length with a wingspan of 45–56mm in length and weighing of 10.2 grams in adult males and 11.1 grams in females (NICOLL & SUTTIE 1982). Vocalisation is in both ultrasonic frequencies and frequencies audible to human ears. The ultrasonic sounds are between the ranges of about 20kHz and to a max of 50kHz but usually around 30kHz when flying within the roost.

With a large area to cover, the best possible and most systematic technique to use to search for a new roost is that of transects. Initialialy an overgrown and disused path was used as a transect line. This was covered with a bat detector (Pettersson D-100) every night at around 6.30 for 6 nights for around 40 minutes.

The main path from Grand Barbe to La Passe was used as a second transect line. It was suitable as it was longer and went through many boulder fields with changing habitats. This second transect line was covered with a bat detector extensively during the day, during dusk and nightfall for 5 days and 3 nights. The bat detector was be switched on regularly at points along the path that looked suitable for bat roosts. Large granite boulders forming caves would determine these 'suitable points'. These caves were extremely regular along the transect line, which meant the bat detector was on cumulatively for a long time. Each point would receive between 5 and 10 minutes of 'detector time' daily, usually differing in the time of day. As well as detecting from the path, transect lines at 45° from the path were used when cave systems were extensive and went back away from the path, or if a likely boulder formation was spotted from the path. These were usually at a distance of between 30 and 50 metres.

Upon detection of a frequency between 20kHz and 50kHz, the area was extensively explored and mapped. Droppings, if any, were to be collected along with recordings of temperatures and percentage humidity from both inside and outside the cave. Canopy coverage, a map of cave and vocalisation periods were also to be recorded from

the assumed roost site. Deciding upon the area the sounds were coming from was fairly straightforward as the range of the detector was limited, to no more than 10 or 15 metres. Not only is range of the detector limited, the directional range is around 120° (DOWNES 1982).

Vocalisations were recorded on the second transect line on several occasions. These vocalisations were almost certainly coming from a cave close by within a substantial cave system. To the human ear they were audibly identical to those recorded at the bat roost at La Passe. For example, the frequency detected by the detector was the same as that at the La Passe roost almost to within 1kHz, the pulsing was the same, and the timings in which they were heard were very similar.

The first vocalisations were first detected during the day at around 1.00pm. These were very clear and lasted for about 5 minutes. A return visit was made again that evening and, as expected, there was vocalisation around 6.30, which was the time in which the La Passe bats vocalised before emerging. This vocalisation, differing in both lengths and clarity, continued to around 7.05pm. At this time, vocalisation ended very abruptly and was not heard for the following hours spent outside the cave that evening.

Recordings were made for the next three days and evenings and showed very similar findings to that of the first day. There were vocalisations from the cave on days two and four but these were very minimal compared to those recorded on the first day. On day three there were no vocalisations heard during the day. Recordings were heard every evening around the same time of 6.30pm and ended abruptly at around 7.00pm, the same as the recordings on the first night. At around 6.45pm on night two the detector picked up some vocalisations that sounded like several bats squabbling. This lasted for between 5 and 10 seconds and was at the frequency of just over 30kHz.

Fig. 1 Entrance of the possible new roost

The cave was situated at a considerable height compared to the cave at La Passe. The cave was situated in a large granite boulder field near Gratte Fesse (515m) and was a 1.5-hour walk with equipment from Grande Barbe. The cave was surrounded by foliage of medium to high density with a canopy cover in the region of 80%. Foliage noted around the cave was typical to that of the whole island, with a few invasive species similar to that of the La Passe roost. There were many endemic palms such as *Nephroseprma vanhouetteanum,* which grew in front of the cave, plus ferns such as the 'bird nest fern' *Asplenium nidus* that grew over the top of one of the cave entrances. A large majority of the foliage was that of the introduced cinnamon tree, *Cinnamomum verum*. A plant covering the area in front of the entrance was *Clidemia hirta,* another introduced. This is a very invasive plant that spreads easily on the rainforest floor (GERLACH 1993). To the left and right of the cave grew *Angiopteris evecta*, an indigenous fern to the Seychelles. Growing to a fair height on top of the cave was *Dracaena reflexa*, which, like the palms, is endemic.

The cave was reasonably dark inside, with one main opening about 1×2m, plus several smaller openings positioned high towards the back of the cave, no larger than

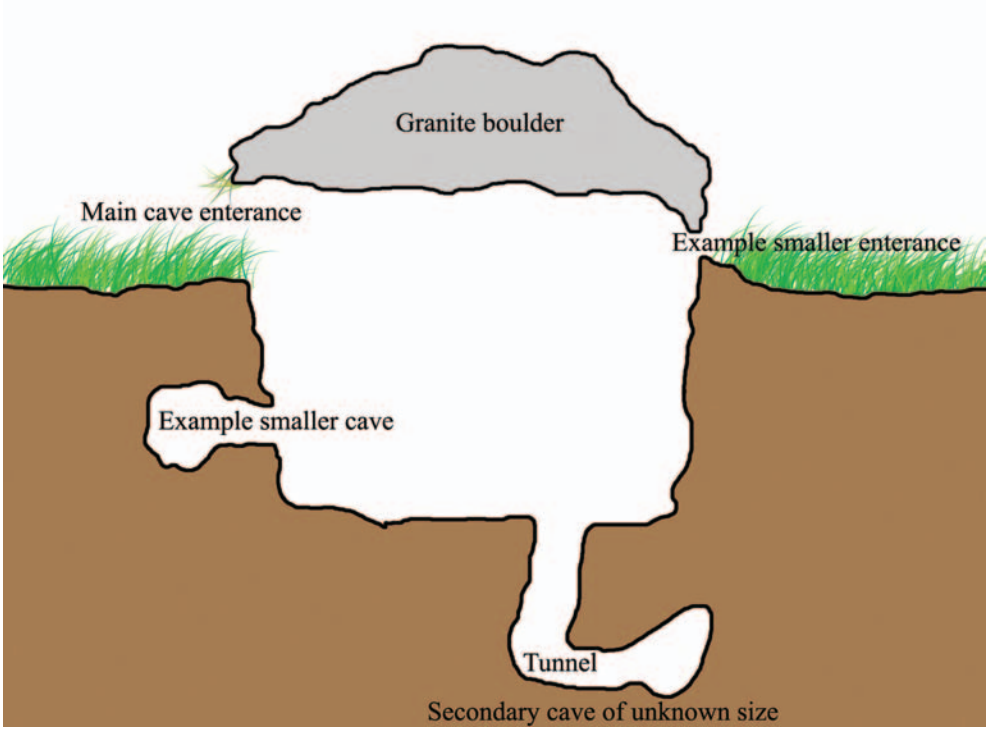

Fig. 2 Sketch of the possible roost

0.6×0.6m. Around the lower part of the cave were narrow passages leading to smaller caves, which were no larger than about 2×2m. The main part of the cave was around 5×6m with a ceiling height of about 4m. There were no bats visible in this part. On the floor of the cave was a vertical tunnel of about 2.5m deep with a diameter of around 1 metre. Upon illumination, the tunnel revealed a second chamber with an estimated ceiling height of over 1m. Size is unknown as access was not possible. As this second cave was underground, it felt substantially cooler although measurements were not taken. Table 1. summarises climatic data recorded at the roost described above and that of the roost at La Passe. As described by BURGESS & LEE (2004), the La Passe roost was in a field of eroded granite boulders situated in a forest of native and introduced flora. This description

	Possible new Roost	***La Passe Roost (two adjoining caves)**
Temperature outside roost during the day (oC)	26-27	26-34
Temperature inside roost during the day (oC)	26-27	A: 27-31& B: 26-30
Average humidity outside cave during the day (%)	92.00	-
Average humidity inside cave during the day (%)	92.67	-
Approximate altitude from sea level (m)	450-515	40
Direction of most prominent cave entrance	South south-east	North north-west

Table 1. Climatic data at bat roosts on Silhouette (*La Passe data from BURGESS & LEE, 2004)

matches that of the possible roost at Gratte Fesse, which also has neighbouring cinnamon trees and palms.

While insects communicate using ultrasonic frequencies picked up by the bat detector, it is highly unlikely that these frequencies would match the complexity of the bats or those recorded at the cave site. Not only is similar complexity unlikely, but based on observations from the La Passe roost, vocalisation timings are as expected for bats. A climax of vocalisation starting around 6.30pm leading to an abrupt ending of vocalisation at around 7.00pm suggests that the bat may have been getting ready to leave the cave followed by a group emergence.

Fig. 3. *Coleura seychellensis* in the La Passe roost (photo by N. BALL)

JOUBERT (1996) states that roosting bats are non-vocal unless disturbed. This statement can be challenged as recordings have been made at the La Passe roost during the day when the bats were undisturbed and in their roost. These vocalisations are thought to be 'squabbling' for roost positions and stated to be 'a common theme amongst the bats' (BURGESS & LEE 2004).

Even though there were no bats observed visually, recordings of vocalisation do indicate that this is indeed an area where bats roost and further work should be carried out in order to determine the exact location of the roost and the number of bats in there. The vertical tunnel within the cave was delicate and not suitable for access without climbing equipment. However a remote camera could be very useful to determine the size of the secondary cave and if there were bats present. The secondary cave could also have another exit as well as the tunnel. Factors such position, remoteness, cave complexity, terrain and

climate all contribute to making it a difficult area to survey. A camp outside or near the cave would be possible and would almost certainly produce good results as recordings could be made throughout the night and day plus increasing the chance of a visible observation.

These bats are undeniably rare and need protection but there are almost certainly more roosts on Silhouette as the island is full of boulder fields with caves ideal and remote enough for roosts similar to that of the La Passe.

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