

Speleological Exploration to Sthreepura Lena Cave at Kuruwita, Sri Lanka

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Abstract

*Sthreepura Lena Cave (06°49' 54.6" N and 08°22' 27.8" E) in Rathnapura District located 322.78m msl was speleologically investigated in November 2009. The cave is in the steep slope of eastern escarpment of Soodagala mountain range of the Peak Wildernes tropical rain forest and belongs to crystalline terrain of highland complex. Basic ground maps, several cross sections and longitudinal sections were drawn and cave fauna and formations were observed. The cave bedrock comprises hornblende-biotite gneiss which is 20 m high and showing many signs of rock falls. The entrance is 12m wide with an average height of 1.5m, aligned along the north south and facing the east. The cave extends over an area of 90m x 40m and the interior is divided into two main spaces as outer and inner chambers which are connected by a 15m long passage on the south wall which has a bearing of 145°. The outer and the inner chambers are separated by a massive load of rock falls. Outer and inner chambers extend in an area of 30m x 15m and 10m x 5m respectively. Inner chamber extends towards east with a bearing of 140° making the eastern passage and northwest with a bearing of 210° making north-west passage. Micro-chiropteran bats, geckos, two species of frogs (*Adenomus kelaarti* and *Phillautus sarasinorum*), cave crickets, two species of spiders (family *Philodromidae* and *Nemesiidae*), pupae and egg cases of insects were found in the cave. Stalactites, Stalagmites and flowstones were found in the cave although not exceeding more than 5cm in length. A pool was found inside the cave connecting both chambers at ground level of the cave. Sediment deposits in the cave would provide waste opportunity for much archeological investigation.*

Keywords: cave cricket cave fauna, cave formations, stalactites, stalagmites

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INTRODUCTION

Speleology is the scientific study of a cave with a multidisciplinary approach. Geology, Hydrology, Biology, Ecology and Archaeology are some of the important subjects needed for proper speleological studies. Caves have been extensively studied for many reasons in global context (White, 2007) and for decades (Goldberg and Nathan, 1975; Fliermans and Schimids, 1977). Cave deposits known as speleothems (stalagmites, stalactites, and flowstones) are archives for paleo-environmental changes and very early studies about those were done by (Hendy and Wilson, 1968; Hendy, 1971). Speleothems provide detailed information on climate variations on annual to millennial time scales (Burns et al., 1998; 2001; 2002; Fleitmann et al., 2004). It has found that speleothem calcite mainly reflect three parameters such as amount of precipitation, the source of moisture, and evaporation (Fleitmann et al., 2004). Caves are attracted by adventure lovers, guano and treasure hunters, also Buddhist monks in South Asian region and low breakers. Since caves are stores of geology, hydrology, biology and ecology and their past relics, cave protection is an important aspect. Most of the caves are archaeologically importance for the academics and researchers while others are historically and religiously important for general public. Although cave exploration is being done since a long time by adventurous youth proper scientific explorations started recently. Deraniyagala (1965) reported about importance of Speleological research and draw backs. During the last 70 years only very few publications were done about scientific cave studies. Among them many are dedicated for cave fauna (Bringoli, 1972; Silhavy, 1974; Mauries, 1981; Weliange, 2009; Weliange & Namalagamuwa, 2009; Jayasingha et al., 2009). Caves have become an interesting topic for Sri Lankan researchers recently (Jayasinghe et al., 2010., Weliange et al., 2010., Dandeniya et al., 2010., Premarathna et al., 2010). As such Sthreepura Lena cave was investigated in order to find out what is inside the space beneath that particular rocky landscape. This is a preliminary investigation and only during the day time investigations were carried out.

STUDY AREA

The cave is located at the edge of the peak wilderness tropical rain forest in wet zone of the country. The cave is located in the escarpment slope of the Sudagala mountain range and found at a steep slope of a Gneissic rock. The entire area is distinguished by hills and narrow valleys. The area is characterized by disturbed natural forest lands, shrubs, mixed crop

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cultivated home gardens. The area gains rainfall from southwest monsoon and northeast monsoon.

METHODOLOGY

Cave study is a team work. This particular study was led by Dr. Wasantha Weliange and his team that included a Geologist; Mr. Pathmakumara Jayasingha, an Architect; Mr. R.S Dandeniya and Archaeologis; Mr. Prageeth Elgiriya. For the Ground support two other were involved. Initially cave was visited with ample lights using battery operated torches and head lamps. Each person had two torches, one to be used in an emergency. Afterwards cave mapping was done. The Longitudinal section of the Cave mouth was done. GPS location was obtained. Later cross sections and longitudinal sections were drawn using a Digital Range Finder and a Compass. Cave chambers were visited and observed carefully for cave formations, fauna and special structures. Cave formations, special structures and fauna were photographed extensively. Location of the special structures and formations also were recorded in order to find them conveniently in a later stage. In the laboratory sections and maps were drawn on papers. Fauna were identified using available taxonomy literature.

RESULTS

According to GPS reader Sthreepura Lena Cave is located in coordination N - 06°49' 54.6" and E - 08°22' 27.8". According to the political maps Sthreepura Lena Cave is belongs to the Endiriyawala Grama Sewa Division of the Kuruwita Pradeshiya Lekam Area. Cave is located 1059 feet above the mean sea level and geographically located about 400 meters north of the famous Divaguhawa Lena Cave or Batatota Lena cave (N - 06°49' 50.1" / E - 08°22' 23.8" / 835 ft above mean sea level). This particular area is also connected to various legends that involved King Rawana, God Sumana Saman, elder sister of Sumana Saman; Mahaloku Menike, Emperor Alexender, Great Walagamba, King Keerthi Sri Nissanka Malla and Rajasinghe I. Therefore it can be believed that this particular area had been with human interference since a long time ago.

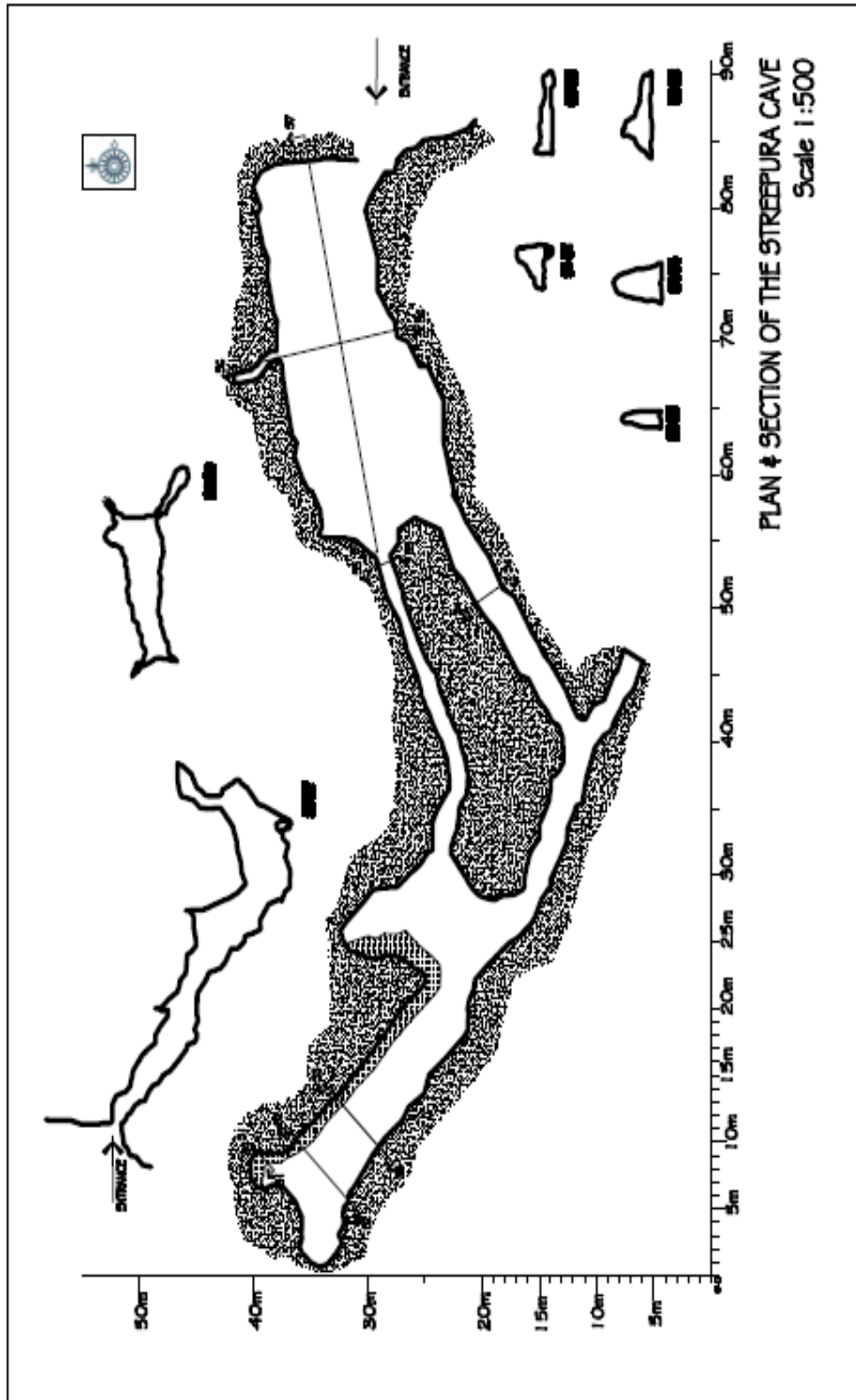


Figure 1. Spleomorphology of Sthreepura Lena Cave

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Plate 1. Entrance to the Sthreepura Lena Cave is very small

Plate 2. Drip point in the northern wall of the Welcome Chamber, also showing tiny cupola shape structures.



Plate 3. Hydraulically drilled hole and abraded sharp edges of a rock in the Guano Chamber of the Sthreepura Lena Cave.

Plate 4. Researchers taking notes about the Crescent Tube near the dead end of the Passage of Bats in Sthreepura Lena Cave.



Plate 5. A view into the Crescent Tube located at the dead end of the Passage of Bats in Sthreepura Lena Cave in Sri Lanka.

Plate 6. Drip point in the Passage of Bats in the Sthreepura Lena Cave,.



Plate 7. Michro-chiropteran Batsin the Sthreepura Lena Cave.

Plate 8. Bat guano on the ground of Sthreepura Lena Cave.

Cave mouth

Sthreepura Cave has a very wide opening, 12 meters in length along the North –south axis and facing the East (Figure 1). The bed rock of the Sthreepura Lena Cave is about 20 meters tall and shows various signs remaining from the rock falls. Rock falls of about 3-4 meters large has blocked about 1/3 of the cave entrance. Only southern part of the cave entrance is free for entering into the cave. Cave floor is not flat but about 50 degree slope towards the inner part. Up to about 15 meters a dim light penetrates into the cave.

Welcome Chamber

The very first Chamber of the Sthreepura Lena Cave is about 30 meters long and 15 meters wide at the widest place. It is named as Welcome Chamber by the exploring team. The longitudinal section properly indicates about the slope of the Welcome Chamber. Two passages are extending from the Welcome Chamber towards the southwest direction (Figure 1).

Connecting passage

The Connecting Passage is about 2.46 meters in average width at the base and about 20 m in length. The ground of the Connecting Passage is made of rock falls. The Connecting Passage bends 90° at its mid point. At this point a tube can be seen which is oriented towards south-east direction. This particular passage is named as Connecting Passage as it connects two chambers. The inner chamber is named as Guano chamber as it has layers of bat guano sediments.

Guano Chamber

Guano Chamber is the second largest chamber in the Sthreepura Cave. According to our maps it can be seen that first and guano chamber are separated by a massive load of rock falls. The guano chamber is infested with large number of microchiropteran bats. Also found larger species of spiders and cave crickets. At the base of the First Chamber and the Guano Chamber water pools were found. Guano Chamber is hydrologically active and it can be seen that the

roof has many drip points. Water dripping has created several hydraulically abraded potholes on the rocks beneath and also small stalagmites not taller than 5 inches.

Passage of bats

The Guano Chamber extends towards north and north-west direction to form two passages. At 140° axis a passage extend from the Guano Chamber for about 16 meters. This long passage is names as Passage of Bats because we found highest density of bats in the passage. This passage had a triangular roof which had occurred along a main joint. Also found rock falls on the floor of the cave which has fallen from the particular joint. Eastern margin of the Passage of Bats had a pool which also extends from the beginning of the passage till the dead-end. This Passage of Bats had a wider opening but is partially closed due to a large rock fall.

Northern passage

Guano Chamber extends towards north and makes Northern Passage. It is about 10 m in length and 4-5 meters in height. The roof of the Northern Passage shows a joint line along the 45° axis. This passage has large rock fall which measures about 3-4 m in length and width. The Northern Passage ends up with a dead-end. Western margin of the Northern Passage has a water pool. This pool extend further deep down. At the dead-end many different formations could be seen including a black flowstone taller than 5 feet. Also the dead end was infested with michrochiropteran bats. This passage was not completely mapped due to time constraints.

Westward tunnel

At the dead-end Passage of Bats a tunnel extends towards the west at an angle of 210°. This is names as Westward Tunnel. It is not horizontal but rising upwards by an angle of about 45°. This Westward Tunnel was also infested with bats and also found few cave crickets. The floor of this Westward Tunnel was filled with rock falls but was able to crawl along for about 5 meters. Also found on the floor was bat guano and soil developed over the bat guano. The roof of this Westward Tunnel was made of a single rock. The walls of the Westward Tunnel had many different mineral types and also very tiny stalactites. The roof has drip points where

dripping was regular and along the drip lines tiny cave formations were found. This small passage is becoming a bottle neck after 4 meters and further extends for another 4 meters and reach the dead-end. The mouth of the westward tunnel had the following dimensions; height 1.48m and width 1.46 m.

Crescent tube

At the dead end of the Passage of Bats a crescent shape tube was found in the north-eastern wall. It is located about 1.3 m high from the cave floor, towards 165°. It was named as Crescent Tube. The Crescent Tube is extending into about 4 meters. The dimensions of the mouth of the Crescent Tube is; 0.79 m high and 0.5 m wide. This Crescent Tube is tapering towards the end and not horizontal but about 45° from the horizontal plain.

Dead-end Chamber

Dead-end chamber is found at the end of the Passage of Bats. It is oriented towards 10° and looks like a cupola and had a dome shape space. This particular space is named as Dead-end Chamber. The ground of the Dead-end Chamber is steep and ends at the water pool. The depth of the pool is not known.

Cave formations

Cave formations are not a characteristic feature but stalactites, stalagmites and flowstones were found. Stalactites are small and limited only to the places where drip points or drip lines were visible. None of the stalactites were taller than 5 cm but found in as patches distributed unevenly in the cave interior. Stalagmites in the other hand are less abundant than stalagmites. Two flowstones were found during our exploration from which one is about 5 feet tall and had a black color.

Cave fauna

Cave fauna in the dark interior areas included spiders, cave cricket, and microchiropteran bats and Daddy long legged spiders. At the cave mouth pupal cases, egg sacs and mud houses of Vespids were found (Table 1).

Table 1. Some fauna found in the Sthreepura Lena Cave

Family	Zoological name	Common name
Aranea	-	Spider
Bufo	<i>Adenomus kelaarti</i>	Kelaart's dwarf frog
Racophoridae	<i>Phyllautus sarasinorum</i>	Frankenberg's shrub frog
Rhaphidophoridae	<i>Tachycines asynamorus</i>	Cave cricket
Vespidae	-	Mud dauber
Arachnida	-	Amblypygi
Scutigera	<i>Scutigera</i>	

DISCUSSION

Cave science is a new discipline in Sri Lanka although some foreign researchers have worked on several caves (Bringoli, 1972; Silhavy, 1974; Mauries, 1981). Cave science is basically a very different subject which has to be done with multidisciplinary approach. Caving is a tedious work in unpleasant environment, which is filled with bat guano. Also caving needs lots of endurance and bravery to be in complete darkness. A proper team that will be able to overcome lots of difficulties is also an important requirement in caving. Entering to an unknown ecosystem which is entirely dark is also a risk. Therefore caving needs special equipment such as proper head lamps, helmets, field kit, gloves, a compass, range finder and GPS machines too.

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Sthreepura Lena Cave although looks dark and known to be inhabited by bats is a home for many other animals such as spiders, cave crickets, amphibians and other insects. Other than cave fauna there are very interesting things to be seen in Sthreepura Lena Cave such as Cave formations, special structures such as tunnels and pot holes. Mapping is an important aspect in caves as it gives the information about how does it looks like if illuminations are done. Also mapping tells us about how the space is distributed in the cave. Cross sections and longitudinal sections are important to understand about the area and size of the chambers. Special structures such as pot holes and tunnels are important to understand about the geological features and weathering patterns. Cave formations such as stalactites and stalagmites are important in understanding about the hydrological events and the nature of the bed rocks and the allochthonous environment of the cave.

The stream which runs during the rainy time indicates that somewhere up in the cave rain water makes a stream, this also indicate that this water could have a source of organic matter into the cave. Streams and runoff waters that bring water into the cave is stored in the pools in the cave which perhaps flows outside from another outlet.

In biological view point Sthreepura Lena Cave is an important place in the area as it accommodates large number of bats. Microchiropteran bats are important elements in population control of insects and pollination.

Finally it can be concluded with the following remarks; further exploration of Sthreepura Lena cave would provide vast amount of additional information that we could not gather during the initial exploration.

This is the first ever study done in this scale in a Sri Lankan Cave. There are more to be exploring in the Sthreepura Lena Cave. More working hours are needed for mapping and investigating about the geology, hydrology, cave formations and cave fauna.

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