



# Cavernicolous species of phlebotomine sand flies from Kanchanaburi Province with a note on anthropophilic species

**Chamnarn Apiwathnasorn**  
**Chotechuang Panasopolkul**  
**Yudthana Samung**  
**Samrerng Prummongkol**  
**Anon Phayakaphon**

Department of Medical Entomology,  
Faculty of Tropical Medicine



A close-up, high-magnification photograph of insect legs and body segments. The image shows the intricate structure of the legs, including the tibiae and tarsi, which are covered in fine hairs and spines. The lighting is dramatic, highlighting the textures and colors of the biological structures against a dark background.

# The objectives of this study are to

- conduct a biological inventory of cave adapted arthropod species;
- identify potential harmful arthropods of the caves sampled in;
- discover new species or additional species
- Perform knowledge management on exploratory type of entomological survey

# Cave fauna types

- **Troglobites** (cave-limited species)
- **Troglophiles** (species that can live in caves, but also occur in other environments)
- **Trogloxenes** (species that use caves, but cannot complete their life cycle in caves)
- **Accidentals** (animals not in one of the previous categories).

based on their degree of cave adaptation





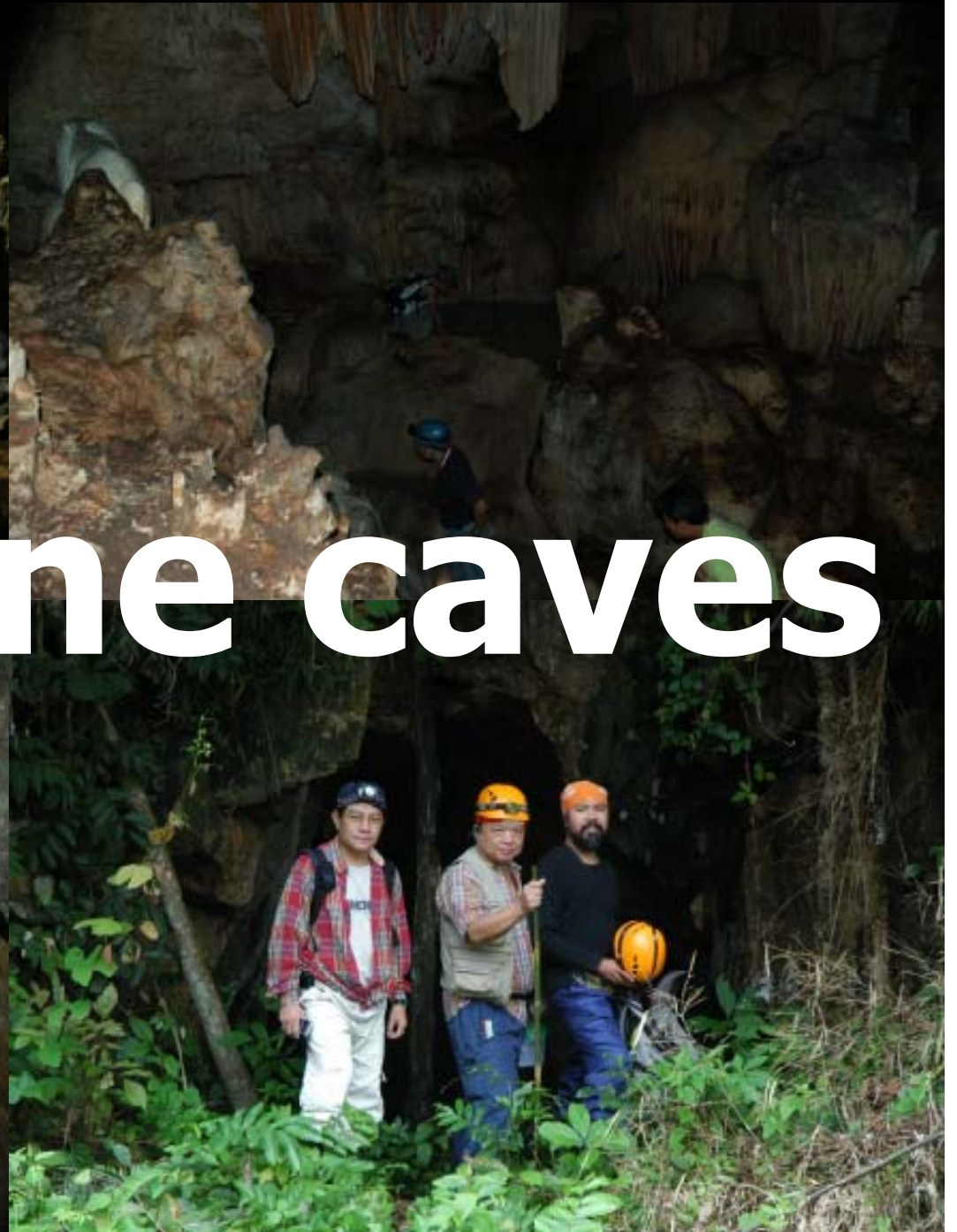
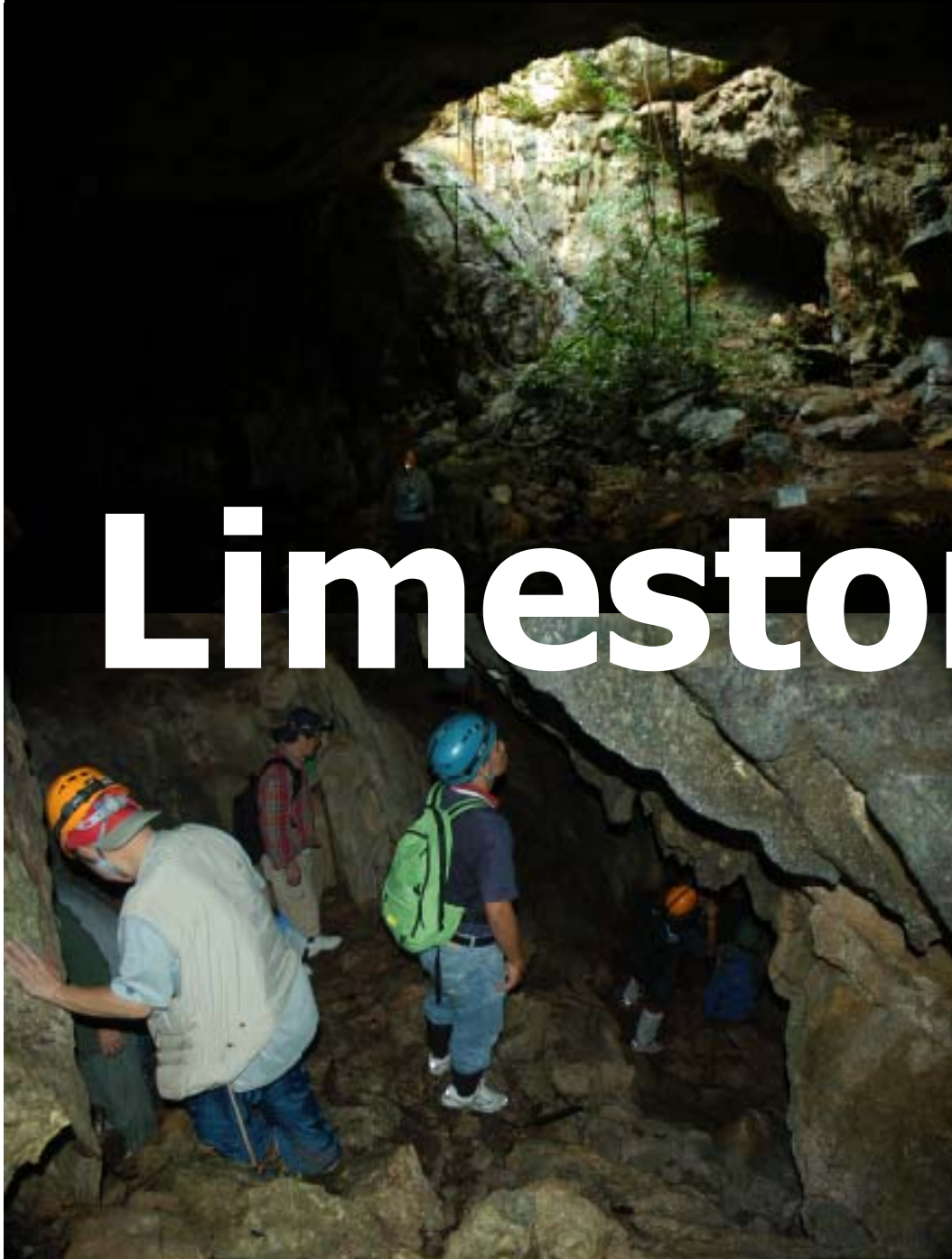
# Caves explored

1. Ma Ha Mongkon, Hed Kon Cave
  2. Thep Pa Tan Porn Cave
  3. Kuan Im Goddess Cave
  4. Ma Ha Mong Kon Cave
  5. Wat Phrom Lok Cave
  6. Da-Wa-Dung Cave
  7. Wat Benjarat Cave
  8. Nam Thip Cave
  9. Prong Fa Cave
  10. Wanon Cave
  11. Pu Toei Cave
  12. Chaloei Cave
  13. Badan Cave
  14. Klang Cave
  15. Lava Cave
  16. Nam Cave
- 

Thep Pratan Porn

Wanon Cave

# Limestone caves

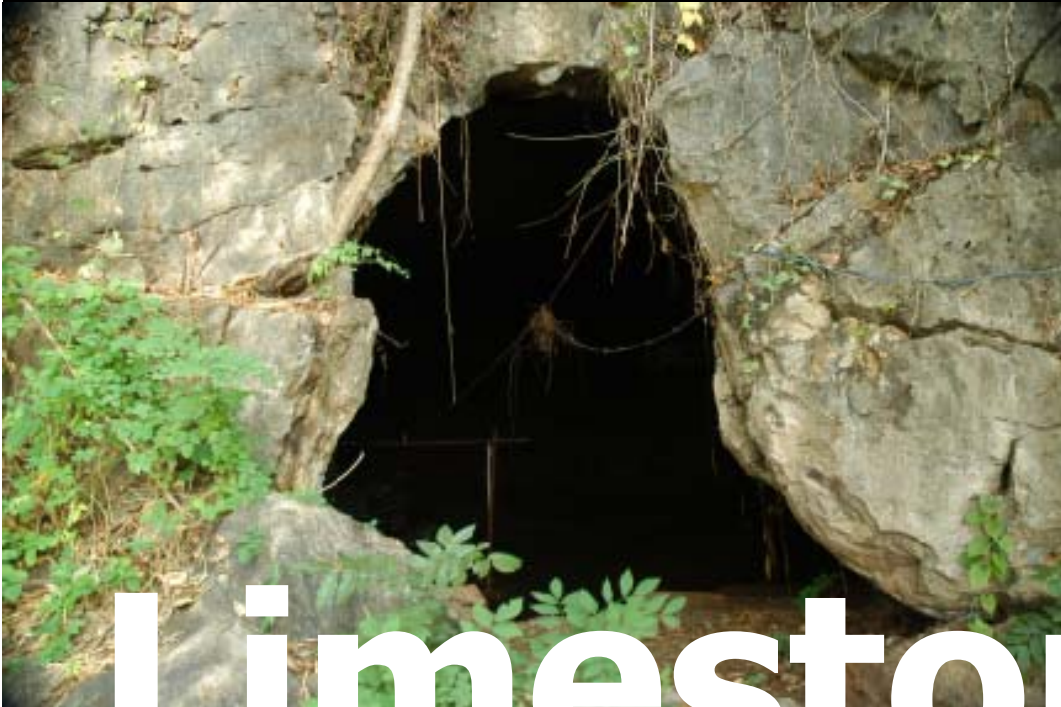


Maha Mongkon Hed Kon

Maha Mongkon

Wat Phrom Lok Cave

Kuan Im Goddess Cave



# Limestone caves



Da-Wa-Dung Cave

Lava Cave

Pu Toei Cave: ถ้ำพุเตย



Nam Cave: ถ้ำน้ำ



Chaloei Cave: ถ้ำเขลย



Wat Benjarat Cave: ถ้ำวัดเบญจรัตน์

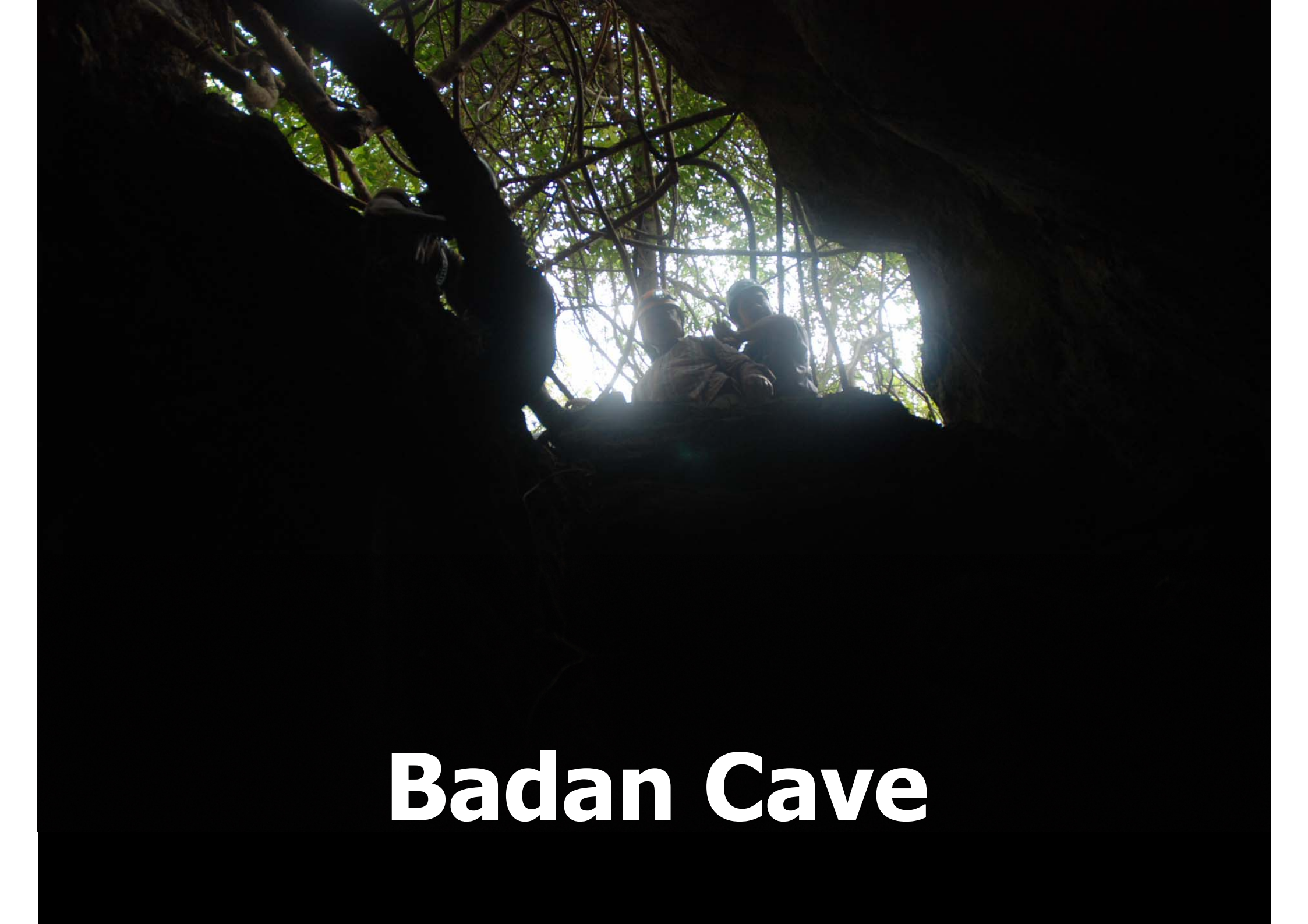
A photograph showing the entrance to a cave. The scene is dominated by a dense, intricate network of thick, light-colored tree roots that hang down from the top of the frame, creating a natural staircase or path. A person wearing a blue shirt and dark pants is seen climbing one of these roots. In the background, another person is visible, standing on a higher ledge and holding a long pole or stick. The cave interior is dark, while the area above the roots is brightly lit by sunlight filtering through the green foliage of the surrounding forest. The overall atmosphere is one of a wild, natural environment.

# Prong Fa Cave



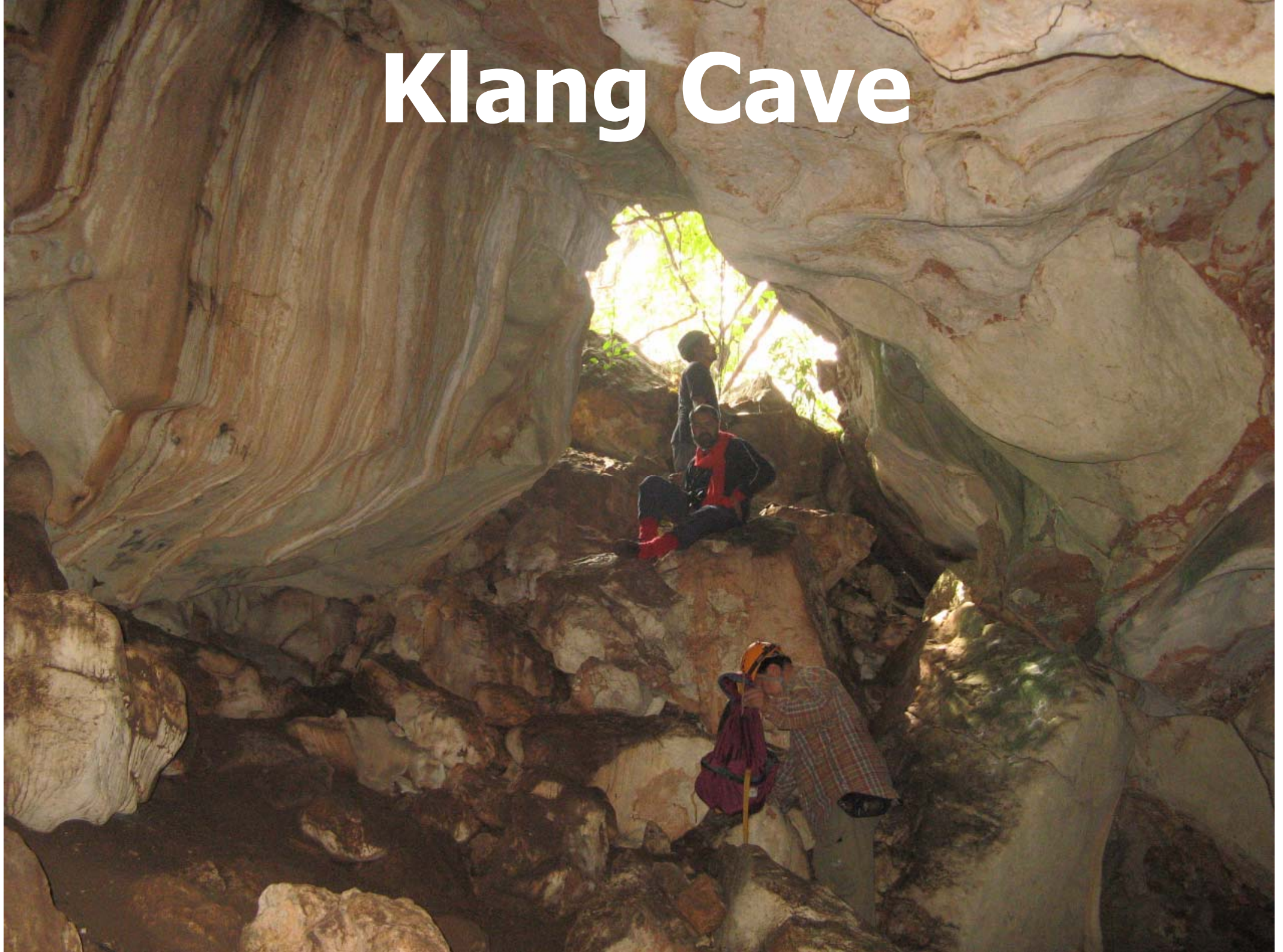
# Nam Thip Cave

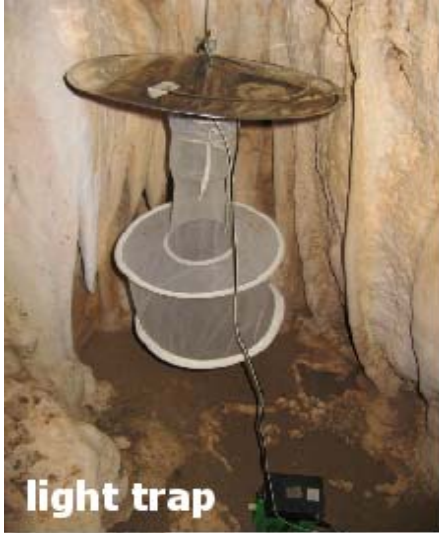




# Badan Cave

# Klang Cave

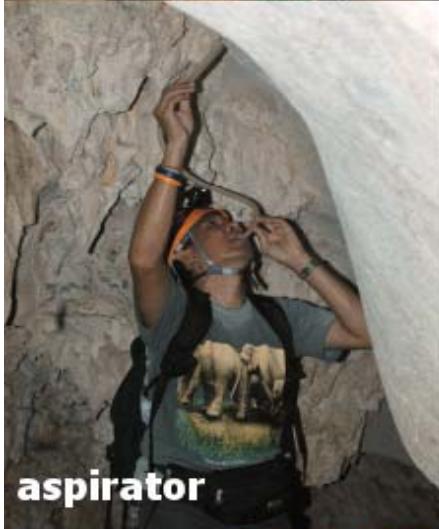




light trap



direct search



aspirator



pipetting



pit fall trap



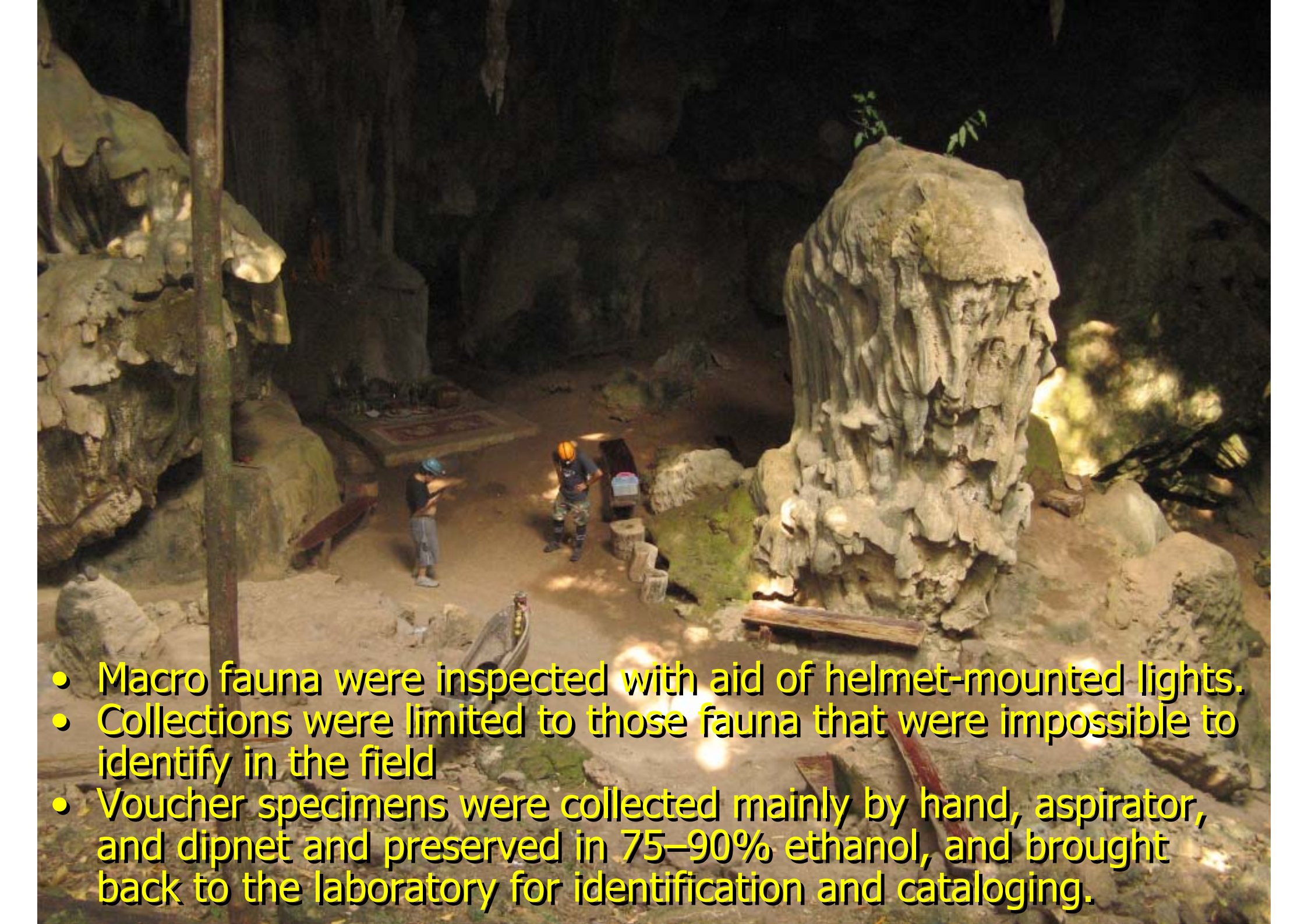
Disney trap

# Methodology

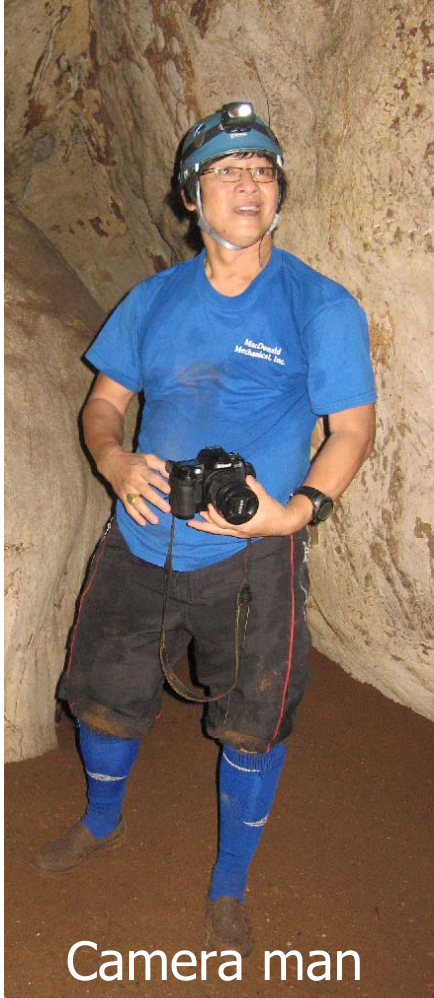
- Direct search by hand or aspirators, pipette
- Baiting: Disney traps
- Light traps
- Pitfall traps

Macrofauna were counted visually with helmet-mounted lights.



- 
- A photograph of a cave interior. A large, textured rock formation is the central focus, illuminated by several bright, circular spotlights. In the background, two people wearing helmets and work clothes are visible, one standing and one crouching. The cave walls are dark and rocky, with some green moss or vegetation. The overall scene suggests a field research or collection site in a cave environment.
- Macro fauna were inspected with aid of helmet-mounted lights.
  - Collections were limited to those fauna that were impossible to identify in the field
  - Voucher specimens were collected mainly by hand, aspirator, and dipnet and preserved in 75–90% ethanol, and brought back to the laboratory for identification and cataloging.

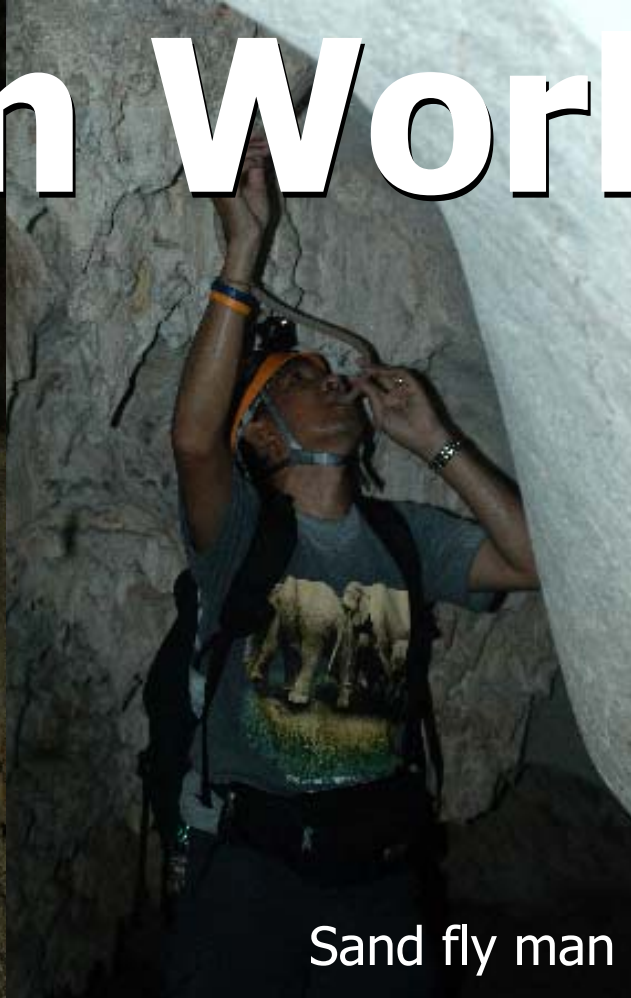
# Team Work



Camera man



Spider man



Sand fly man



Bug man



Roach man



Support man

A group of people are gathered in a dark, rocky cave. They are wearing helmets and headlamps, suggesting a spelunking or field research activity. The scene is dimly lit, with the primary light source being the headlamps. In the foreground, a person in a blue helmet and dark shirt is looking towards the camera. Other individuals are positioned further back, some holding tools or equipment. The ground is uneven and appears to be covered in dirt or rock. A large, bright yellow text overlay with a black outline reads "Results" across the center of the image.

# Results

A dark, dimly lit cave interior. In the background on the left, a person wearing a headlamp and a light-colored jacket is crouching. The cave walls and floor are dark and textured, with some rocks visible in the foreground on the right.

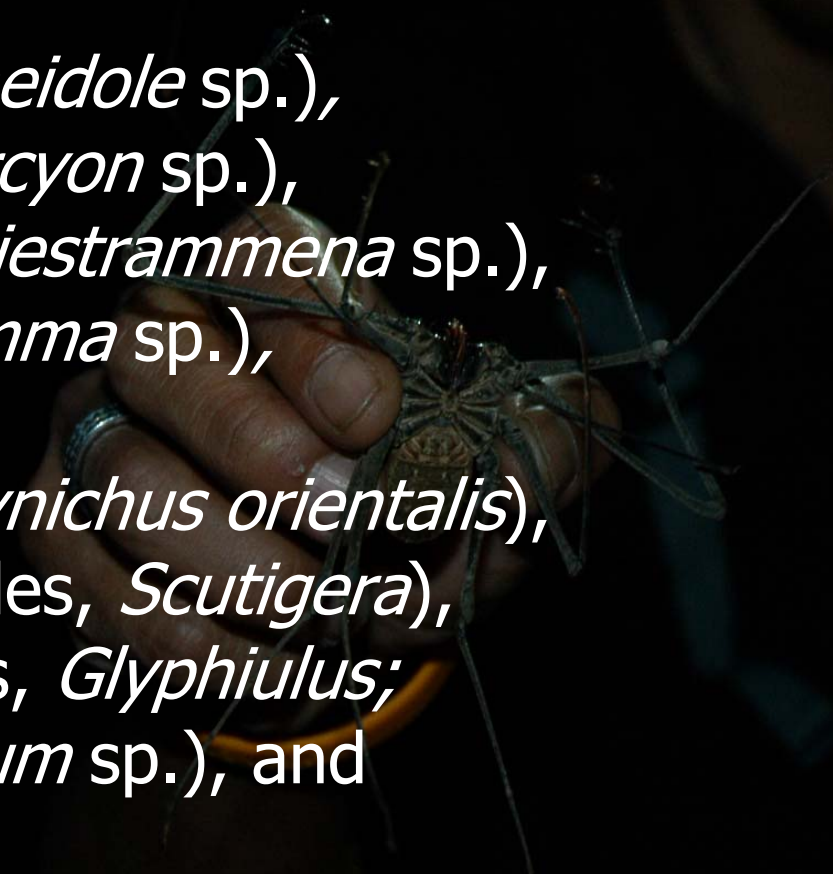
**Insects and Arthropods**  
dominated the cave habitats,  
especially crickets, sand flies,  
cockroaches and spiders.

**> 30 species**



# A total of >500 specimens representing

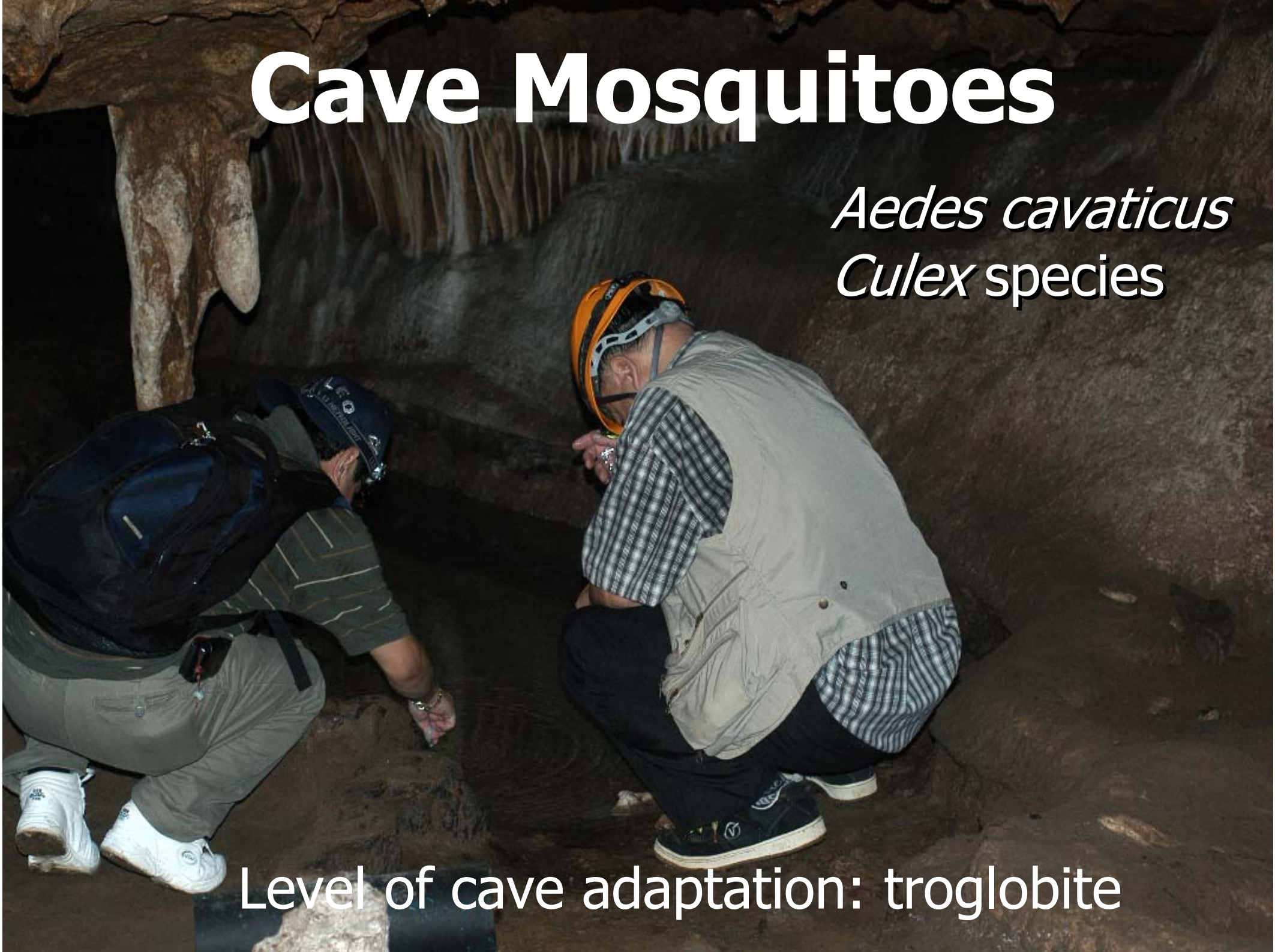
- Mosquitoes (*Aedes cavaticus*, *Tripteroides* sp.),
- Cockroaches,
- Phlebotomine sand flies,
- Bat flies,
- Bat bugs,
- Ants (*Camponotus* sp., *Pheidole* sp.),
- Beetles (cave beetles, *Cercyon* sp.),
- Crickets (Camel cricket, *Diestrammena* sp.),
- Ticks (reptile tick, *Aponomma* sp.),
- Mites,
- Spiders (whip spider, *Phrynichus orientalis*),
- Centipedes (cave centipedes, *Scutigera*),
- Millipedes (cave millipedes, *Glyphiulus*;  
Pill millipedes, *Armadillidium* sp.), and
- Springtails



# Cave Mosquitoes

*Aedes cavaticus*  
*Culex* species

Level of cave adaptation: troglobite



*An. dirus sl*

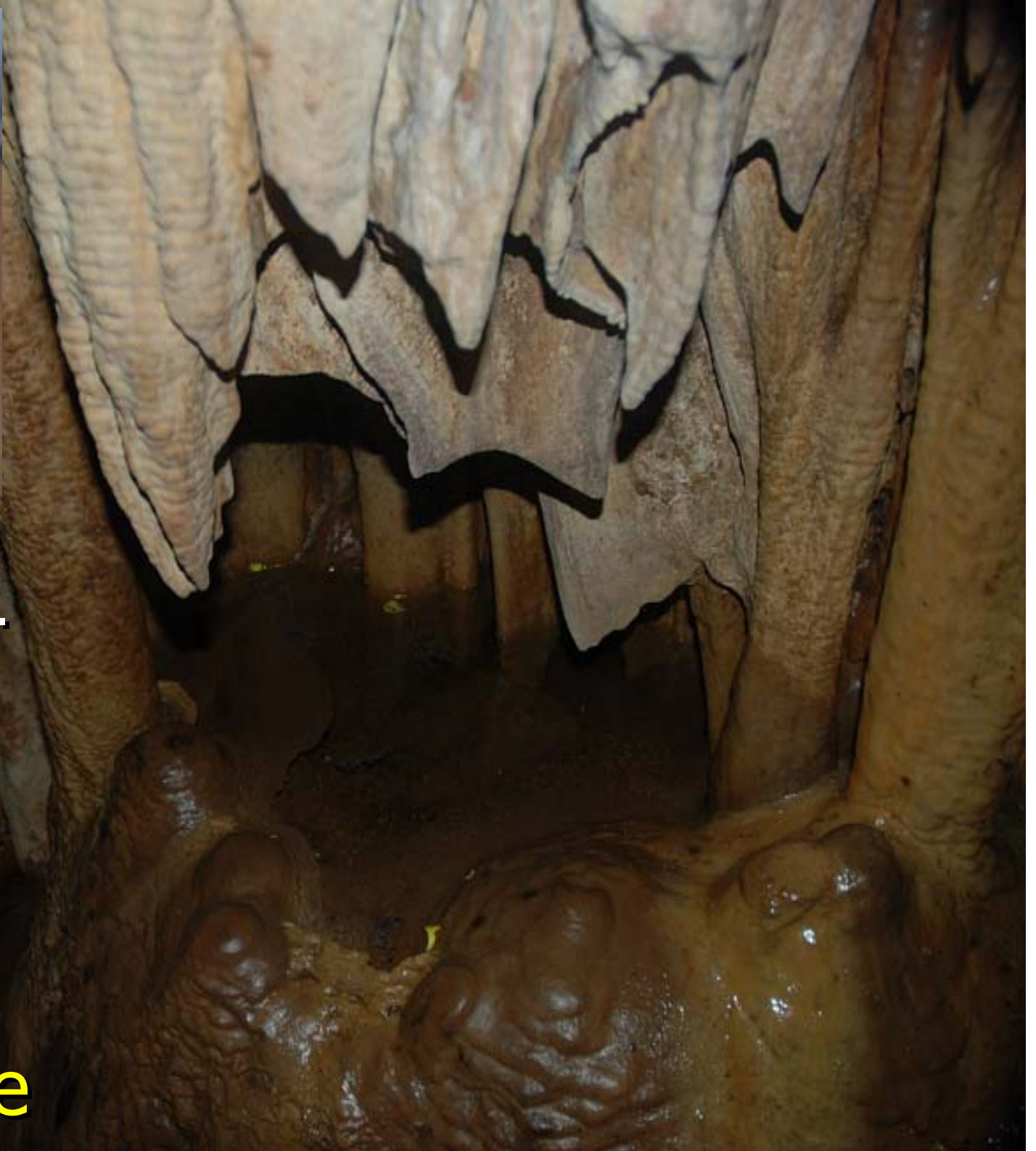
Level of cave adaptation: troglobite





*Aedes cavaticus*  
*Anopheles dirus* sl.  
*Culex* species

Lava Cave  
Wanon Cave  
Chaloei Cave  
Benjarat Cave



*Armigeres subalbatus*



Nam Cave

Level of cave adaptation: accidental

Level of cave adaptation: troglaxene



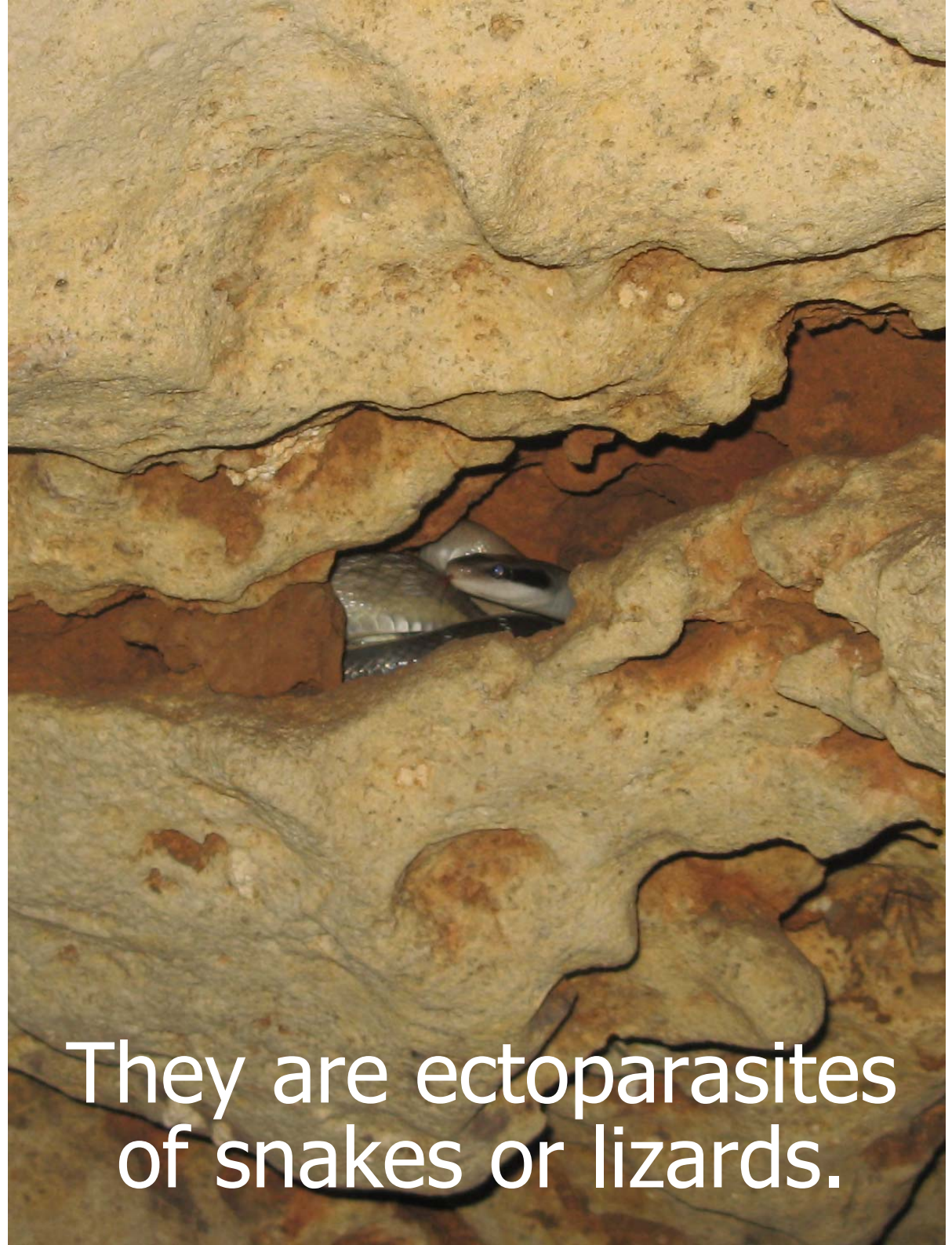
**Hard tick**

Nam Cave  
Pu Toei Cave

# Reptile tick

## *Aponomma* sp.

The tick *A. hydrosauri* is associated with reptiles and is the arthropod reservoir for *Rickettsia honei* on Flinders Island (Australia).



They are ectoparasites of snakes or lizards.







**Bat flies**

*Leptocimex* sp.  
New/additional species



**Bat bug**  
Wat Phrom Lok Cave

A close-up photograph of a cave cockroach (Blattella cavernicola) on a dark, textured rock surface. The insect is dark brown and appears to be crawling. The background is a rough, brownish rock with some lighter-colored mineral deposits.

**Cave cockroach**

***Blattella cavernicola***

**all caves**



# Spiders

Level of cave adaptation: troglophile





**Whip spider** (แมงมุมแส้) are member of Arachnids group which are strongly flattened animals, with strong raptorial pedipalps, armed with large spines and very long front legs.

*Phrynichus orientalis*



Level of cave adaptation:  
**Troglobite**

Lava Cave  
Wanon Cave  
Benjarat Cave  
Chaloei Cave  
Da-Wa-Dung Cave  
Wat Phrom Lok Cave  
Ma Ha Mong Kon Cave





# Tarantula

Level of cave adaptation: troglobite

Phrom Lok Cave  
Pu Toei Cave



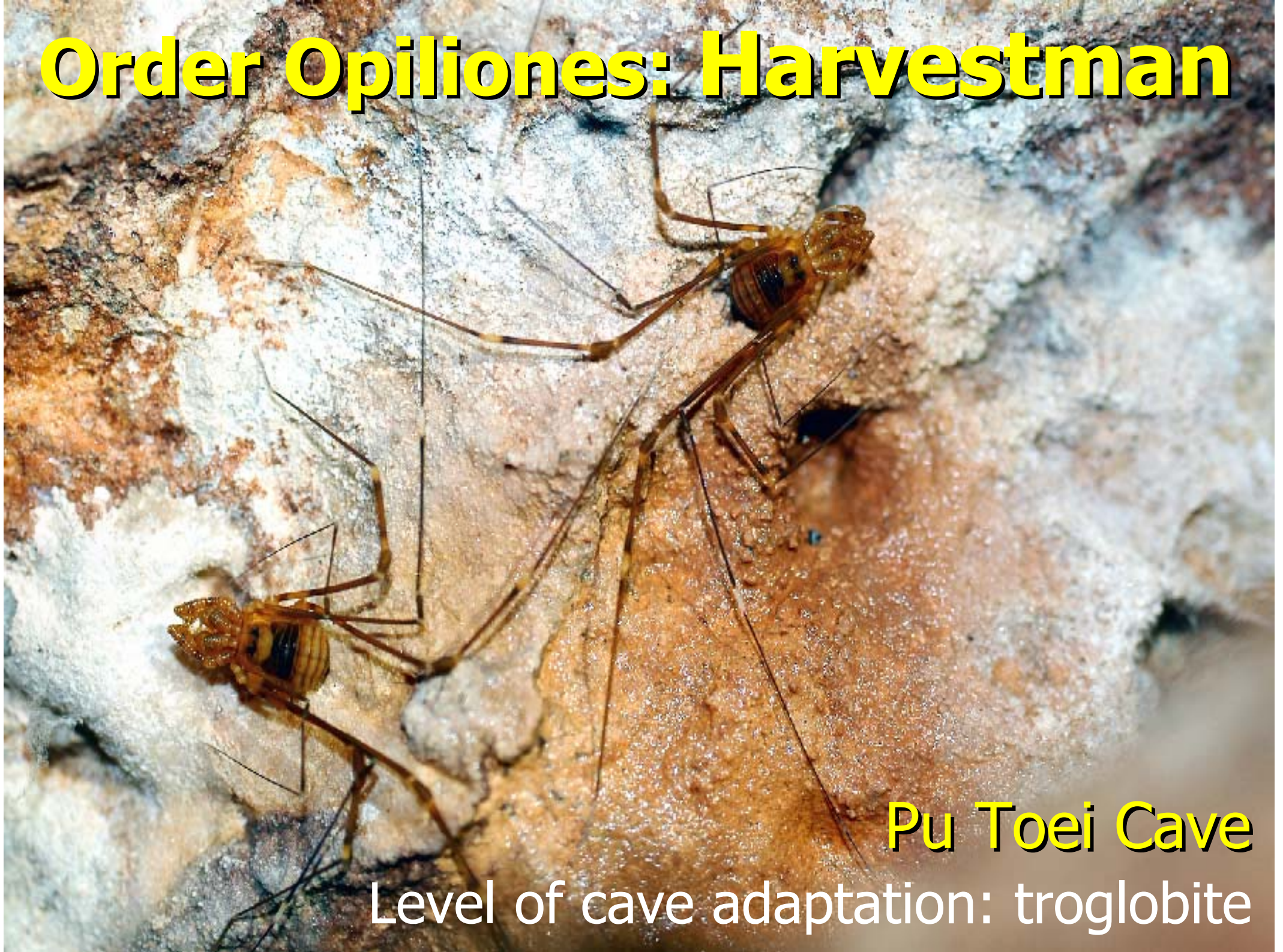


# Harvestman

A close-up photograph of a harvestman, a member of the class Arachnida. The creature has a small, segmented body and several long, thin, jointed legs. The legs are brownish and have small spines or hairs along their length. The background is a soft, out-of-focus light color.

Harvestman are not real spiders, but resembles the spiders very much. They belong to the class Arachnida. 3,500 known species are known. Most species feed on other invertebrates although some consume plant matter. Others are scavengers and feed on the bird carcasses or mammals.

# Order Opiliones: Harvestman



**Pu Toei Cave**

Level of cave adaptation: troglobite

Brown Huntsman spiders  
(Araneae: Sparassidae)  
***Heteropoda* sp.**

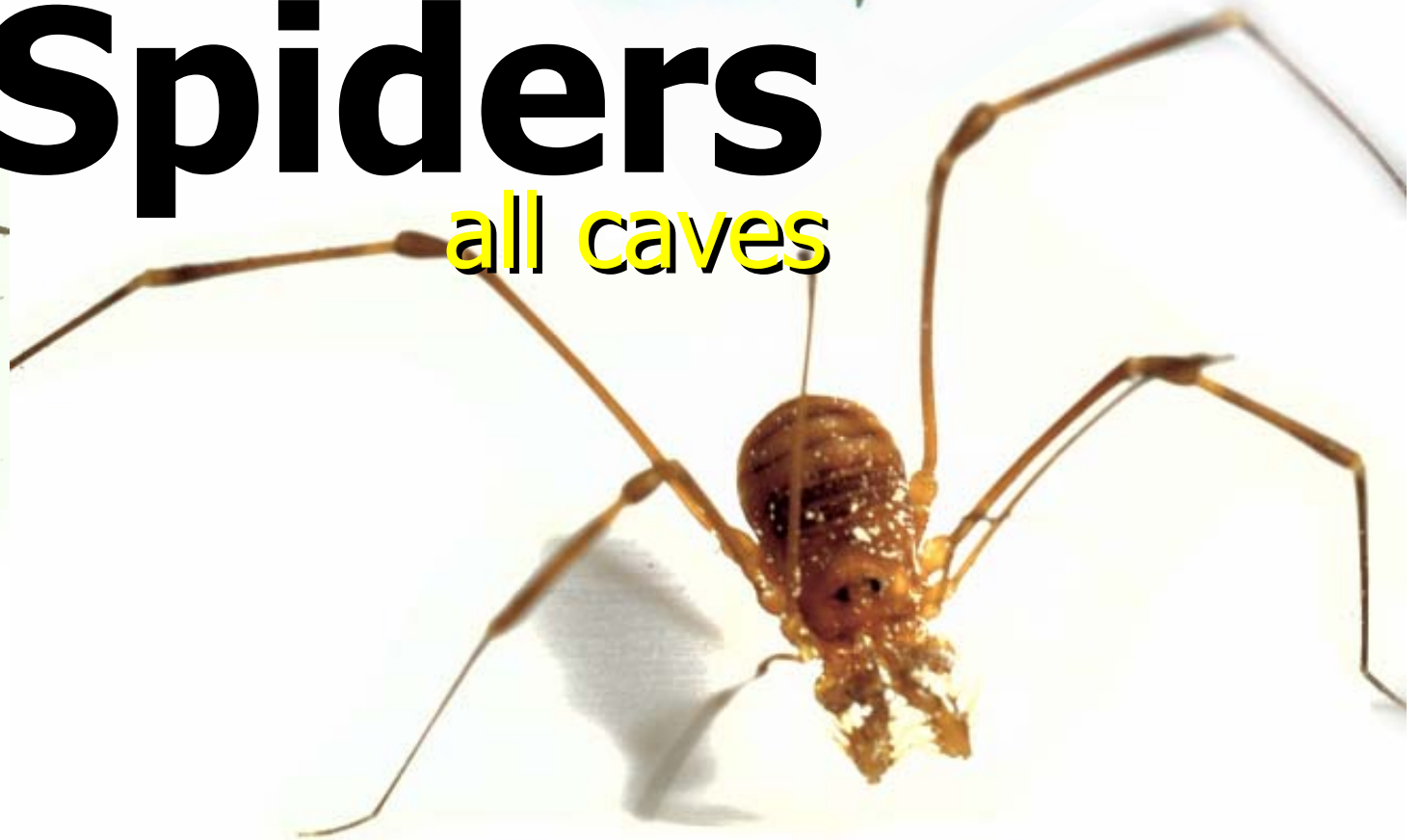


In general, Huntsman spiders are not regarded as dangerous, and can be considered beneficial because they feed on insects.



# Unidentified Spiders

all caves





มด  
ants

Ma Ha Mong Kon Cave



*Camponotus* sp.



# ตะขาบขายาว Cave centipedes (*Scutigera* sp.)



Level of cave adaptation: troglophile

**Cave centipede**, which is generally carnivorous, feed upon cockroaches, mites, ants, etc. that sustain themselves on the guano.



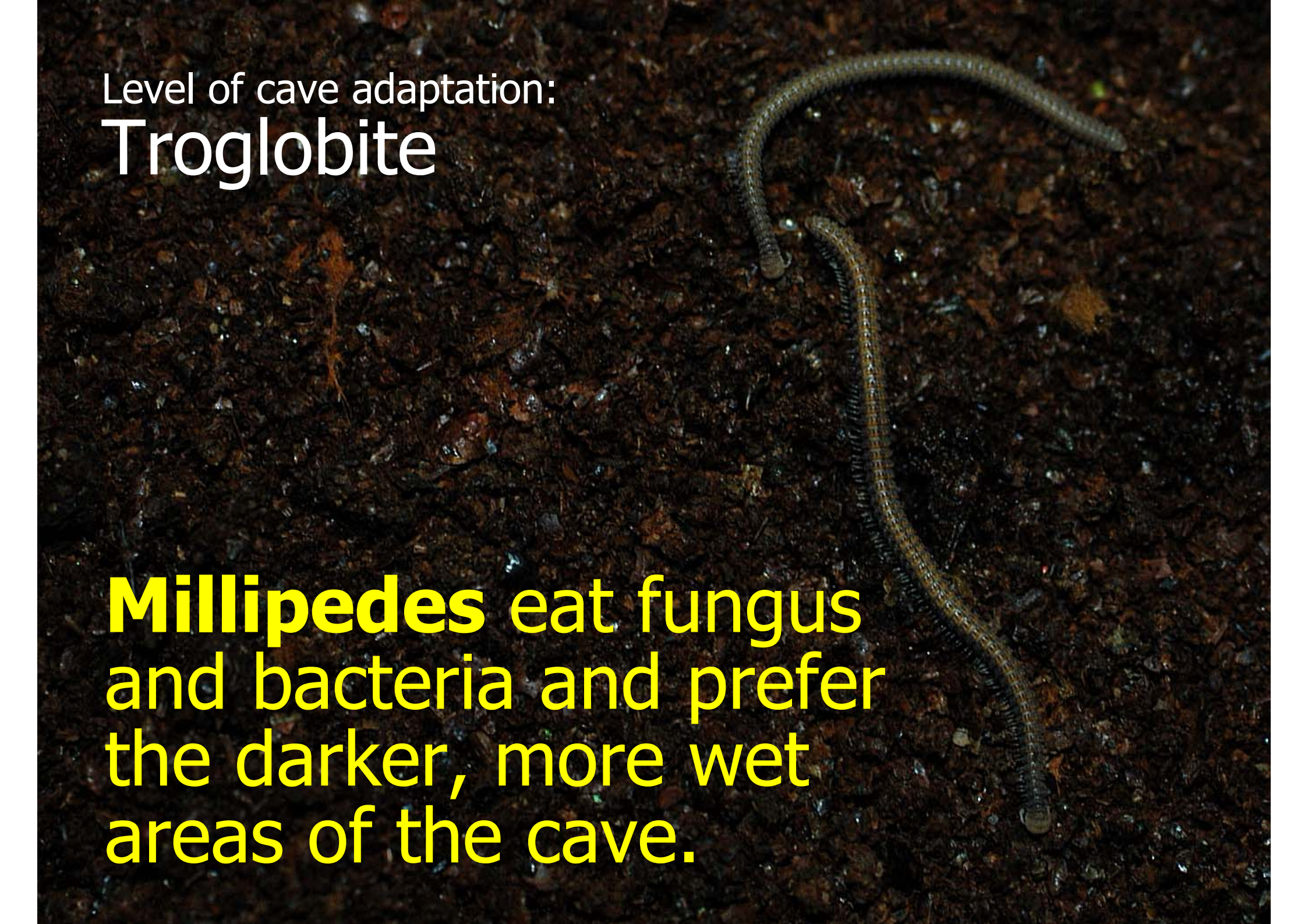
**Wat Phrom Lok Cave**  
**Da-Wa-Dung Cave**  
**Pu Toei Cave**  
**Wanon Cave**  
**Lava Cave**



Level of cave adaptation:

**Troglobite**

**Millipedes** eat fungus and bacteria and prefer the darker, more wet areas of the cave.

A photograph of a millipede, a segmented invertebrate with many pairs of legs, crawling on dark, moist soil. The millipede is positioned on the right side of the frame, curving slightly. The soil is dark brown and appears damp, with some small white particles visible. The background is a uniform dark brown color, suggesting a cave environment.

Lava Cave



Nam Cave

Pill millipedes  
(*Armadillidium* sp.)

Level of cave adaptation: troglobite





Pill millipedes  
(*Armadillidium* sp.)

A close-up photograph of a cave cricket (Diestrammena sp.) on a light-colored, textured rock surface. The cricket is dark brown with long, thin antennae and legs. It is positioned on the left side of the frame, facing right. The background is a blurred, light-colored rock surface.

Cave cricket or  
Camel cricket  
(*Diestrammena* sp.)

all caves

Level of cave adaptation: troglaxene





Cave beetles live in the dry, loose, disturbed dirt and limestone floor of the cave, where it often finds cricket eggs to eat.





# Triatomine bug

Pu Toei Cave





Bats are archaic mammals  
that originated in the  
Eocene period (50 mya)



**Predominant mammal species**

# Phlebotomine Sand flies



*Phlebotomus*  
*Chinius*  
*Sergentomyia*

Level of cave adaptation: troglophile

**all caves**

## **CHINIUS BARBAZANI N. SP. DE THAILANDE (DIPTERA : PSYCHODIDAE)**

DEPAQUIT J.\*, LÉGER N.\*\* & BEALES P.\*\*\*

**Summary:** *CHINIUS BARBAZANI* N. SP. FROM THAILAND (DIPTERA: PSYCHODIDAE)

A new species of sandfly is described from limestone caves in Thailand. The inclusion of this species in the genus *Chinius*, which up until now was monospecific, is discussed. It is justified on the basis of characteristics of the head (eyes, pharynx, cibarium, complete interocular suture and length of the mouth pieces), thorax (rounded wings), abdomen (presence of trumpet glands on the tergites 4 and 5 of the male) and genitalia (morphology of the male genitalia and of the spermathecae in the female). Detailed

## ***Phlebotomus (Euphlebotomus) barguesae* n. sp. from Thailand (Diptera – Psychodidae)**

Jérôme Depaquit\*, Frédérique Muller and Nicole Léger

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### **Abstract**

**Background:** A few studies have been carried out on the Phlebotomine sandflies from Thailand. Within the Phlebotomine sandflies, the genus *Phlebotomus* Rondani & Berté, 1840 contains the vectors of leishmaniasis in Europe, Africa and Asia. It includes several subgenera. Among them the subgenus *Euphlebotomus* Theodor, 1948 contains at the present time 12 taxa. The type-species of this subgenus is *P. argentipes* Annandale & Brunetti, 1908, the vector of *Leishmania donovani* (Laveran & Mesnil, 1903) in India.

**Results:** A new species of sandfly, *P. barguesae* n. sp. is described from limestone caves in Thailand. The male-female gathering in the same species is based on ecological, morphological and molecular criteria (homology of mtDNA cytochrome c oxidase I sequences). The inclusion of *P. barguesae* n. sp. in the subgenus *Euphlebotomus* is justified on the basis of characters of the male genitalia (five spines on the style, bifurcated paramere, and no basal lobe on the coxite) and of female pharyngeal armature (two kinds of teeth). It well differentiated from another sympatric species: *P. mascomai*.

**Conclusion:** The new species described in the present study has smooth spermathecae. This original morphology opens a discussion on the heterogeneity of this subgenus.

## ***Phlebotomus (Euphlebotomus) mascomai* n.sp. (Diptera-Psychodidae)**

Frédérique Muller • Jérôme Depaquit • Nicole Léger

**Abstract** A new species of sandfly is described from limestone caves in Thailand. The inclusion of this species in the subgenus *Euphlebotomus* is justified on the basis of characters of the male genitalia (paramere, basal lobe). The male–female gathering in the same taxon is based on ecological (cavernicolous species), morphological (length of male genital filaments and female spermathecal ducts) and

**Khao  
Tham  
Khun  
Chon  
Ratchaburi**

**2006  
2007  
2009**



# A Species List of Phlebotomine Sand Flies in Caves

*Chinius barbazani*

recent new species

*Phlebotomus argentipes*

*barguesae*

recent new species

*major major*

man biting species

*stantoni*

*teshi*

*Sergentomyia anodontis*

*bailyi*

*barraudi*

*brevicaulis*

additional species

*dentata*

additional species

*hodgsoni*

*iyengari*

*sylvatica*

species A

new species

**25**  
species  
of Thailand

A photograph of a lizard on a rock. A sand fly is feeding on the lizard's neck. A red arrow points to the sand fly.

**Sand fly feeding on a lizard  
at Wat Phrom Lok Cave**

Man biting species: *P. major major*

Biting place: Entrance of a cave

Biting time: 1900-2100 h

Biting density: 2-3 bites/person/hour

Seasonal prevalence: absence during winter





**Thank You**