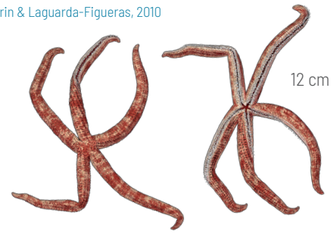
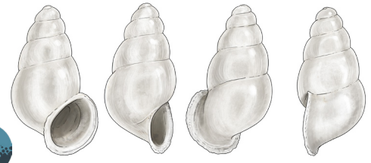
Copidaster cavernicola Solís-Marín & Laguarda-Figueras, 2010
Cave Starfish

The only stygobiont starfish in the world, it exists only in a flooded cave in Cozumel.



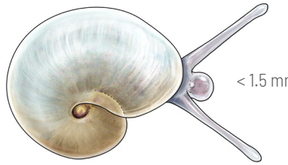
Mexicenotica xochii Grego, Angyal & Beltrán, 2019
Blind Snail

Tiny, conical snail. Named after the cenote where the species was discovered.



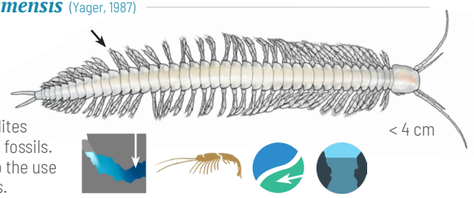
Teinostoma brankovitsi Rubio, Rolán, Worsaae, Martínez & Gonzalez, 2016
Cave Snail

Snail with a tiny, depressed shell. Associated with bacterial mats of sediment in coastal caves.



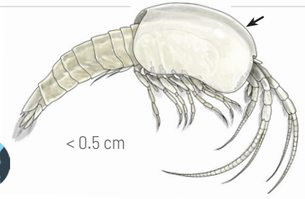
Xibalbanus tulumensis (Yager, 1987)
Remipede

The remipedes are the only poisonous crustaceans. They are hermaphrodites and considered living fossils. Their name alludes to the use of the legs as paddles.



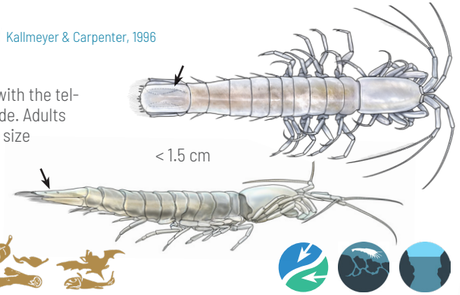
Tulumella unidens Bowman & Iliffe, 1988
Helmet Cave-Shrimp

A tiny crustacean that lives around the halocline in flooded caves. Their young develop in a dorsal pouch on the mother.



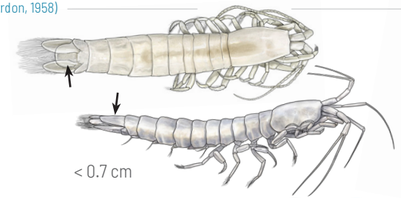
Stygiomysis cokei Kallmeyer & Carpenter, 1996
Greater Stygiomisid

Elongated crustacean with the telson twice as long as wide. Adults are almost twice of the size of *S. holthuisi*.



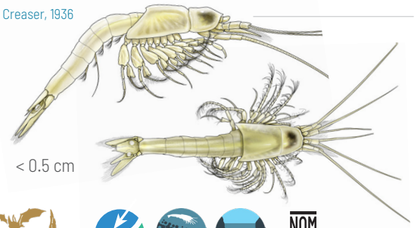
Stygiomysis holthuisi (Gordon, 1958)
Lesser Stygiomisid

Elongated crustacean with the telson almost as wide as long. Adults are about half of the size of *S. cokei*.



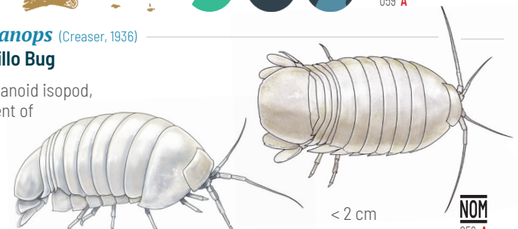
Antromysis cenotensis Creaser, 1936
Cenote Mysid

Tiny mysid crustacean. It is the most frequent and abundant species in the freshwater cenotes. Their young develop in the mother's abdominal pouch.



Creaseriella anops (Creaser, 1936)
Cenote Armadillo Bug

Omnivorous cirolanoid isopod, a frequent element of the cenotes. It protects itself by rolling into a ball.

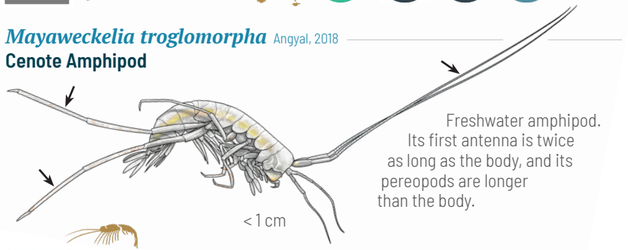


Mayaweckelia cenoticola Holsinger, 1977
Cenote Amphipod

Freshwater amphipod. Its first antenna is as long as the body and its pereopods are shorter than the body.

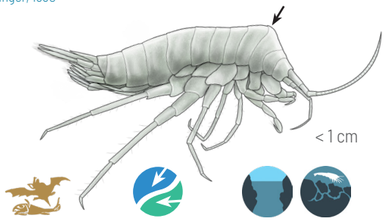
Mayaweckelia troglomorpha Angyal, 2018
Cenote Amphipod

Freshwater amphipod. Its first antenna is twice as long as the body, and its pereopods are longer than the body.



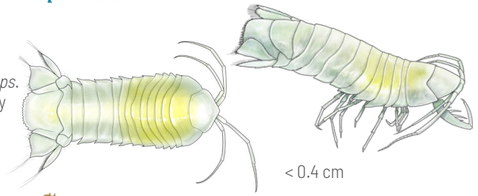
Tuluweckelia cernua Holsinger, 1990
Humpback Amphipod

Fresh and salt water amphipod. The front portion of its body bends down like a hump.



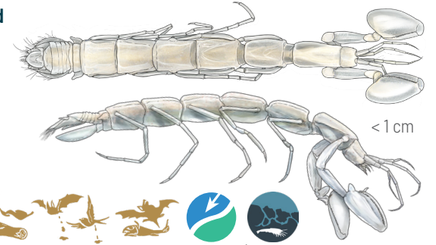
Yucatalana robustispina Botosaneanu & Iliffe, 1999
Cenote Isopod

Cirolanoid isopod, smaller than *C. anops*. It has a slender body and cannot roll into a ball.



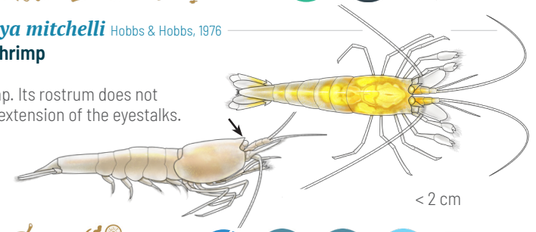
Curassanthura yucatanensis Álvarez, Benítez, Iliffe & Villalobos, 2019
Mantis Cenote Isopod

Cylindrical, elongated isopod, whose shape generally indicates that it lives in tubes or between rocks.



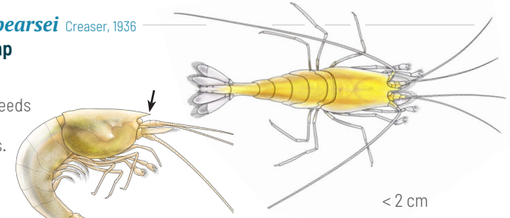
Typhlatya mitchelli Hobbs & Hobbs, 1976
Cenote Shrimp

Atyd shrimp. Its rostrum does not reach the extension of the eyestalks.



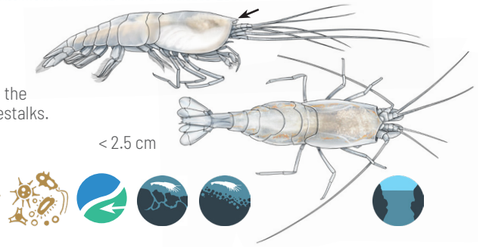
Typhlatya pearsei Creaser, 1936
Cenote Shrimp

Atyd shrimp. Its rostrum exceeds the extension of the eyestalks.



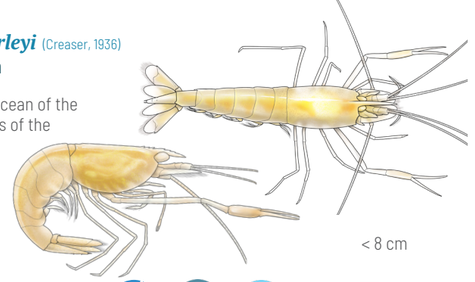
Typhlatya dzilamensis Álvarez, Iliffe & Villalobos, 2005
Cenote Shrimp

Atyd shrimp. Its rostrum reaches the extension of the eyestalks.



Creaseria morleyi (Creaser, 1936)
Cenote Crayfish

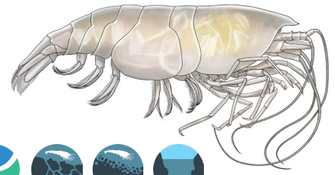
The largest crustacean of the anchialine systems of the peninsula.
It is a predator by choice and an omnivore by necessity.



NOM 059 A · LC

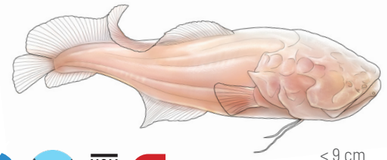
Yagerocaris cozumel Kensley, 1988
Snapping Shrimp

The only species of its genus, with very few records. They are hermaphrodites and can only inhabit the saltwater portions of caves.



Typhlias pearsei (Hubbs, 1938)
Mexican Blind Brotula

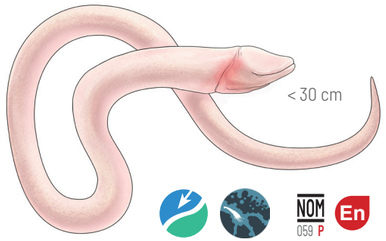
Freshwater fish of the viviparous sprout family. Along with the Blind Swamp Eel, it is the top predator of cenote ecosystems.



NOM 059 P · NT

Ophisternon infernale (Hubbs, 1938)
Blind Swamp Eel

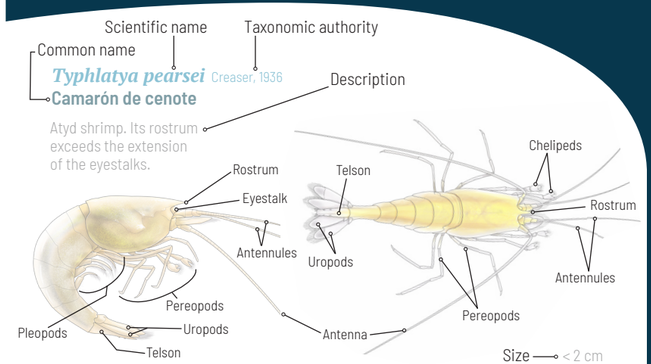
Endangered and delicate slender eel. It lives in galleries in the sediment and is known only from a few cenotes.



NOM 059 P · En

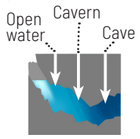
How to use this guide

The species presented in this guide belong to different classes of invertebrates and vertebrates, which are adapted to subterranean aquatic habitats. For each species, scientific names and common names, information on life habits, distribution and microhabitats, protection status and morphological identification data are presented. Below is an example of how to use this guide.



Iconographic key

Hydroregion



Habitat

- Under the rocks
- On the rocks
- In sediment galleries
- On the sediment
- In the water column

Feeding

- Microalgae and bacteria
- Algae and phytoplankton
- Superficial organic material
- Bat and bird guano
- Carcasses
- Crustaceans

Water type

- Freshwater
- Saltwater

Protection categories

SEMARNAT
Secretaría del Medio Ambiente y Recursos Naturales

NOM 059 A · NOM 059 P

RED LIST
- LC Least Concern
- NT Near Threatened
- En Endangered

The "stygobiont" species (the name comes from *Styx*,, Greek river of the underworld and *bios*, life) are those that inhabit subterranean aquatic environments, such as the flooded caves of the Yucatan Peninsula. The vast majority of the stygobionts are endemic, some even microendemic (exclusively from a single cave), and currently 15% of the inhabitants of the Yucatan Peninsula are at risk of extinction.

The stygobionts show troglomorphisms, which are adaptations that are common among cave organisms that have evolved in subterranean environments, and that distinguish them from surface species. The morphological modifications are the most obvious. Some examples are the loss or reduction of eyes, lengthening of limbs, and depigmentation. However, they also present physiological adaptations that influence their ecology and allow them to complete their life cycles in total darkness.

The stygofauna provides ecosystem services such as bioturbation, which consists of recycling accumulated organic matter, eliminating pathogens, and removing pollutants from the sediments. Therefore, it is a fundamental component for the maintenance and proper functioning of the aquifer ecosystem.

In Cenoteando, we believe that the education is the proper way towards the responsible and sustainable use of the cenotes and the aquifer. Therefore, this quick identification guide of the stygofauna is an effort to raise awareness regarding life in the underground ecosystems. It is not intended to be an exhaustive guide and only the most common species that are easy to observe were included, with the exception of a few rare species.

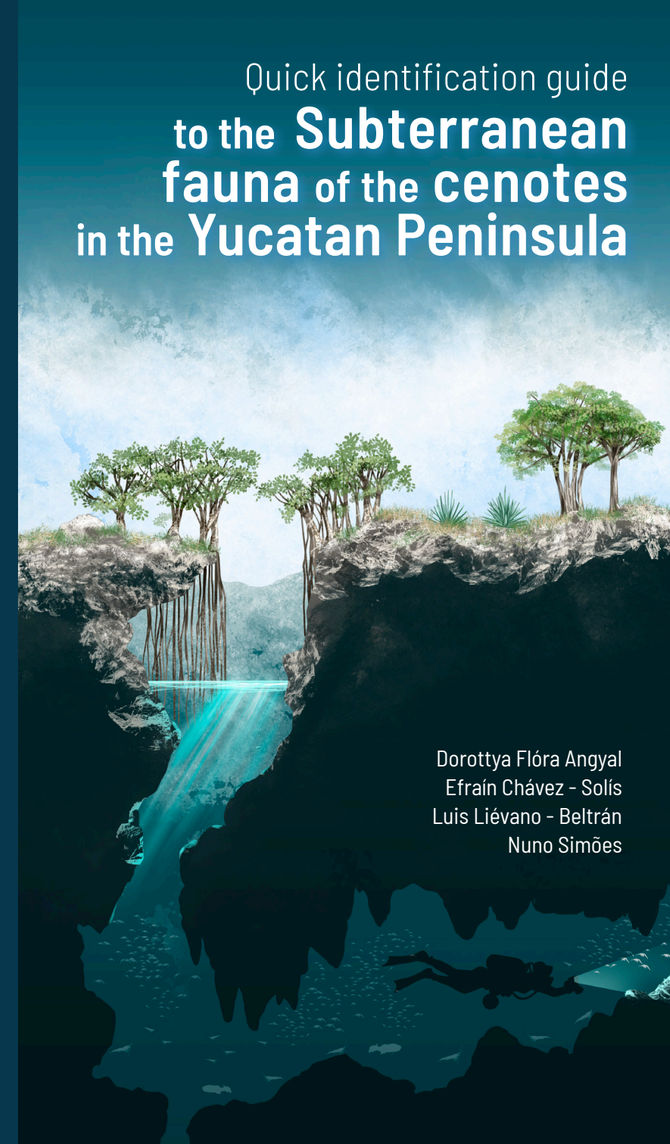
This publication was possible through the funding of PAPIIT IN222716 "Biodiversidad y Ecología de la fauna de cenotes de Yucatán" and PAPIIT 2019 – IN228319 "Hacia un mapa de biodiversidad acuática de cenotes de la península de Yucatán" led by N.S. D.F.A. is grateful for the scholarship received from the "DGAPA-UNAM Programa de Becas Posdoctorales en la UNAM 2020".

Design: Alberto Guerra. Illustrations: Eduardo Velázquez y Alberto Guerra.
The illustrations are adaptations of photographic material, courtesy of Benjamín Magaña, Efraín Chávez-Solís, Dorottya Flóra Angyal, Luis Liévano-Beltrán, Brett González, Francisco Solís-Marín, Jozef Grego and Fernando Álvarez.

Website of the research group "Cenoteando" of the UNAM UMDI-Sisal:
www.cenoteando.mx

CENOTEANDO

Quick identification guide to the Subterranean fauna of the cenotes in the Yucatan Peninsula



Dorottya Flóra Angyal
Efraín Chávez - Solís
Luis Liévano - Beltrán
Nuno Simões