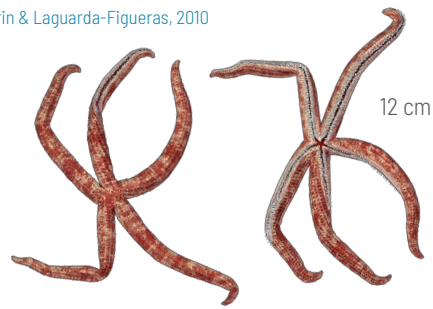


Copidaster cavernicola Solis-Marín & Laguarda-Figueras, 2010

Eek'il áaktun

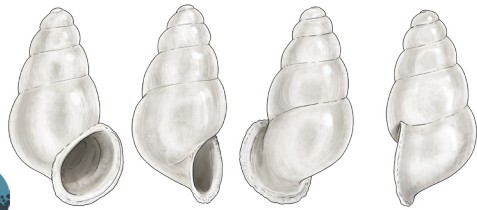
Chéen jump'eel eek'il K'áak'náab *estigobionte* yaan yóok'olkab, chéen kuxa'an t'i' jump'eel áaktun tu lu'umil Cozumel.



Mexicenotica xochii Grego, Angyal & Beltrán, 2019

Ch'óop jub

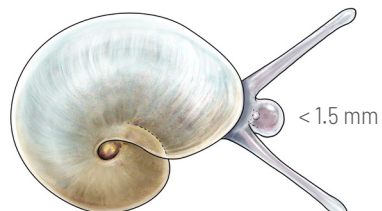
Mejen jub, ts'aab u K'aaba' je'el bix u ts'ono'otil tu'ux kaxta'abij.



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

U jubil áaktun

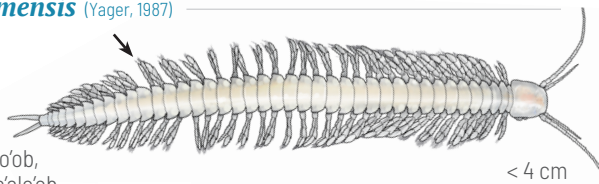
Chan jub yaan u sóol chichan, yaan u k'oomk'omil. Lelo' ku ya'alale' tumeen yaan t'i' u xiixel ba'alóob yaan ichil u áaktunilóob tu jáal K'áak'náab.



Xibalbanus tulumensis (Yager, 1987)

Báab ookil

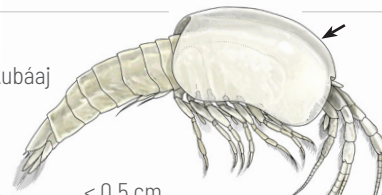
Le báab ookilóob' u yik'elóob ja' jach yaan u k'i'nam. Leti'obe' kajam koobolóob, ku ya'alale' úuchben ba'alóob kuxa'ano'ob. U k'aaba'e' u k'áat u ya'ale' ku báabo'ob yéetel u yook'ob.



Tulumella unidens Bowman & Iliffe, 1988

Xexkay p'óokil áaktun

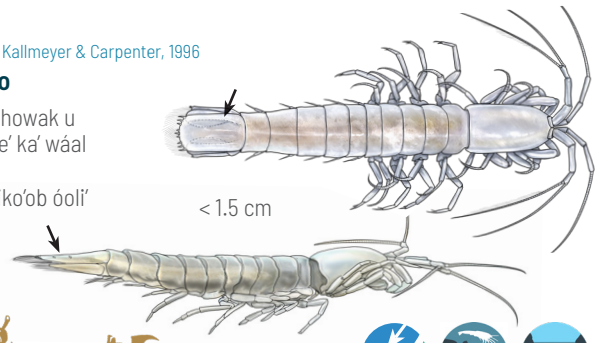
Chan iik'el yaan u sóol, ku kuxtal tu'ux ku nupikubáaj ch'óoch' ja' yéetel ch'ujuk ja' ich áaktuno'ob. U mejenile' ku kuxtalóob ichil jump'eel mukuk yaan tu paaach u na'ssil.



Stygiomysis cokei Kallmeyer & Carpenter, 1996

Nojoch Estigiomísido

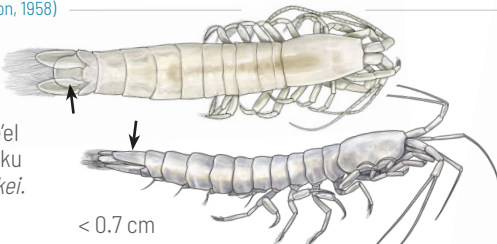
Chan iik'el yaan u sóol, chowak u wiinkilil u xuul u wiinkilile' ka' wáal u chowakil t'i' u kóochil. U nuuktakilóobe' ku p'isik'ob óoli' ka' wáal *S. holthuysi*.



Stygiomysis holthuysi (Gordon, 1958)

Chan Estigiomísido

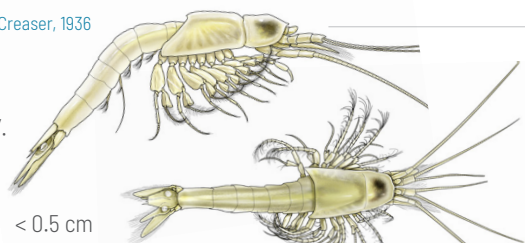
Chan iik'el yaan u sóol, chowak u wiinkilil u xuul u wiinkilile' kóoch je'el bix u chowakile'. U nuuktakilóobe' ku p'isik'ob táan ch'uumukil of *S. cokei*.



Antromysis cenotensis Creaser, 1936

Mejen xexkayil ts'ono'ot

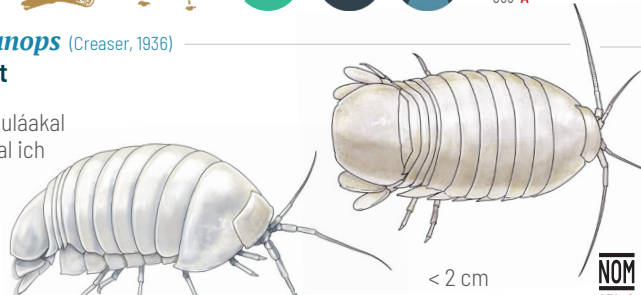
Mejen xexkay. Lelo'oba' jach yaan tu ts'ono'otilóob ch'ujuk ja'. U mejenile' ku kuxtalóob t'i' jump'eel mukuk yaan tu chuun u nak u na'ssil.



Creaseriella anops (Creaser, 1936)

Mukayil ts'ono'ot

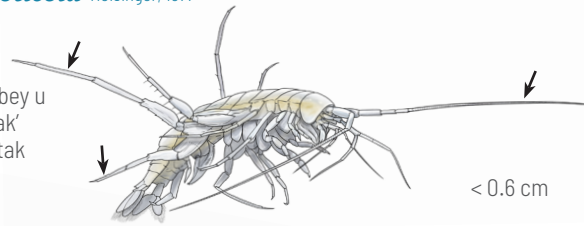
Mukay ku jaantik tuláakal ba'al, jach ku yantal ich ts'ono'oto'ob. Utia'al u ta'akikubáae' ku wolkubáaj.



Mayaweckelia cenoticola Holsinger, 1977

Xexkayil ts'ono'ot

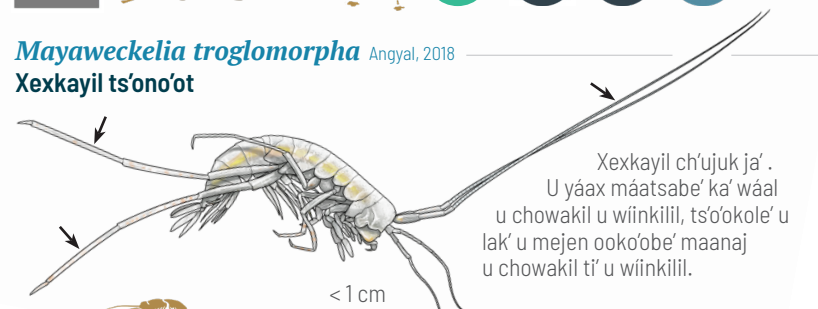
Xexkayil ch'ujuk ja'. U yáax máatsabe' láayli' bey u chowakil u wiinkilile', u lak' u mejen ook'óobe' kóomtak ma' bey u wiinkilile'.



Mayaweckelia troglomorpha Angyal, 2018

Xexkayil ts'ono'ot

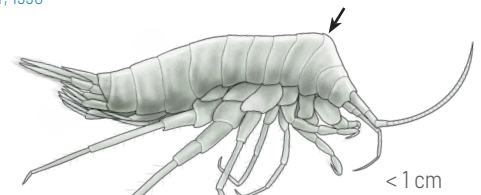
Xexkayil ch'ujuk ja'. U yáax máatsabe' ka' wáal u chowakil u wiinkilil, ts'óokole' u lak' u mejen ook'óobe' maanaj u chowakil t'i' u wiinkilil.



Tuluweckelia cernua Holsinger, 1990

Xexkay yaan u p'uuse

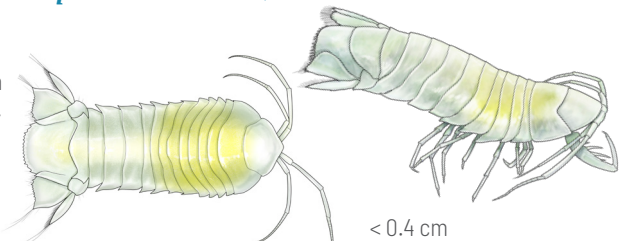
Xexkayil ch'ujuk ja' yéetel ch'óoch' ja'. U táaniil u wiinkilile' ku p'uunul kaabal bey wa yaan u p'uuse'.



Yucatalana robustispina Botosaneanu & Iliffe, 1999

Mukayil ts'ono'ot

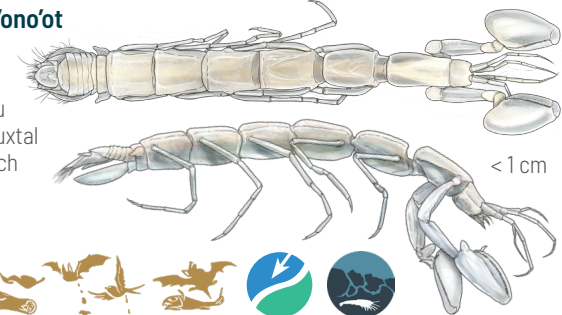
Mukayil jach chichan ma' je'el bix *C. anops*. U wiinkilile' chowak ts'óokole' ma' tu páajtal u wolkubáaj.



Curassanthura yucatanensis Álvarez, Benítez, Iliffe & Villalobos, 2019

Mukay ts'awayak'il ts'ono'ot

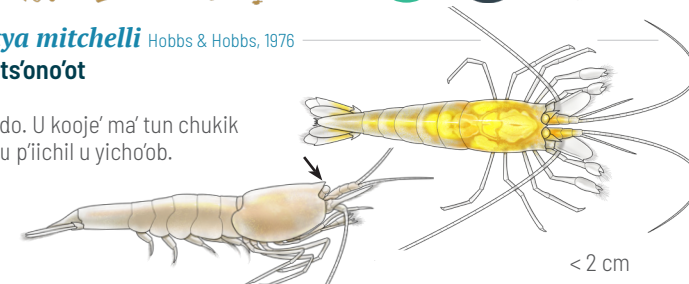
Mukay túuts' u wiinkilil yéetel chowak, je'el bix u wiinkilile' ku ye'esik ku kuxtal ich joolóob chowak wa ich tuunichóob.



Typhlatya mitchelli Hobbs & Hobbs, 1976

Xexkayil ts'ono'ot

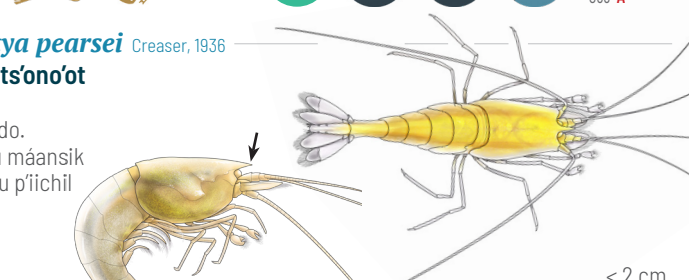
Xexkay átido. U kooje' ma' tun chukik u nojochil u p'iichil u yichóob.



Typhlatya pearsei Creaser, 1936

Xexkayil ts'ono'ot

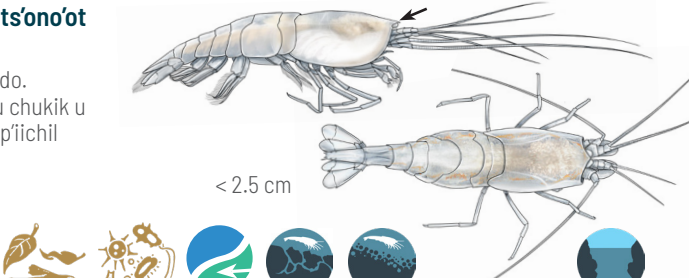
Xexkay átido. U kooje' ku máansik u nojochil u p'iichil u yichóob.



Typhlatya dzilamensis Álvarez, Iliffe & Villalobos, 2005

Xexkayil ts'ono'ot

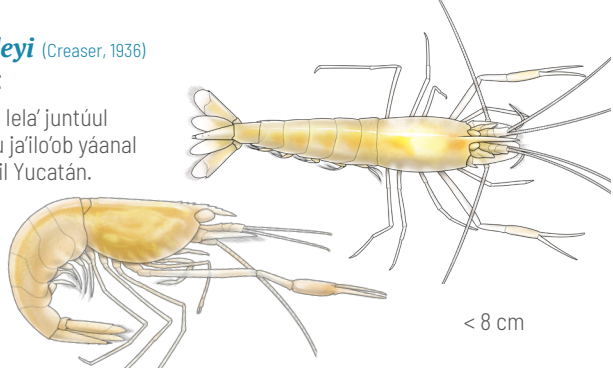
Xexkay átido. U kooje' ku chukik u nojochil u p'iichil u yichóob.



Creaseria morleyi (Creaser, 1936)

Chakayil ts'ono'ot

Yik'el ja' yaan u sool, lela' juntúul u nojochil kuxa'an tu ja'ilo'ob yaanal lu'um yaan tu Petenil Yucatán. Ku jaantik ulak' ba'alche'ob, chéen wa jach minaan ba'al u jaante' ku jaantik tulakal ba'al yaan ichil le ja'ó.



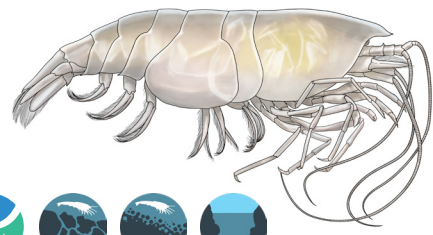
< 8 cm



Yagerocaris cozumel Kensley, 1988

Xexkay ku juum

Lela' chéen juntúulili', óoli' ma' k'ajóola'ani'. Kajam kobol chéen tu ja'il yaanal lu'um ku kuxtal.



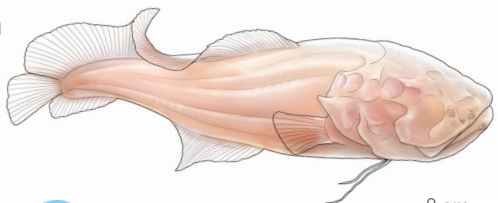
< 2 cm



Typhlias pearsei (Hubbs, 1938)

Sak xunaan ch'oop

U kayil ch'ujuk ja' u ch'i'ibale' ku kuxtal tu taamil ja'ob. Yéetel u kan kayil ch'oop yaan tu lu'umil Yucatáne', ku jaantik ulak' ba'alche'ob ku kuxtal'ob ich ts'ono'oto'ob.



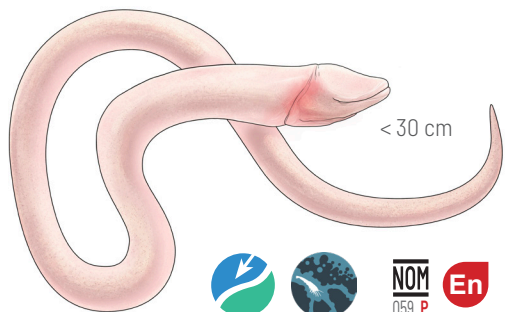
< 9 cm



Ophisternon infernale (Hubbs, 1938)

Kan kay ch'oop yucatanil

Jats'uts u wiinkilil le kan kaya', ta'aytak u xu'ulul u kuxtal. Ku beetik u joolo'ob ichil u xiixel ba'alo'ob yéetel ku yila'al chéen ti' wáa jayp'eeel ts'ono'oto'ob.

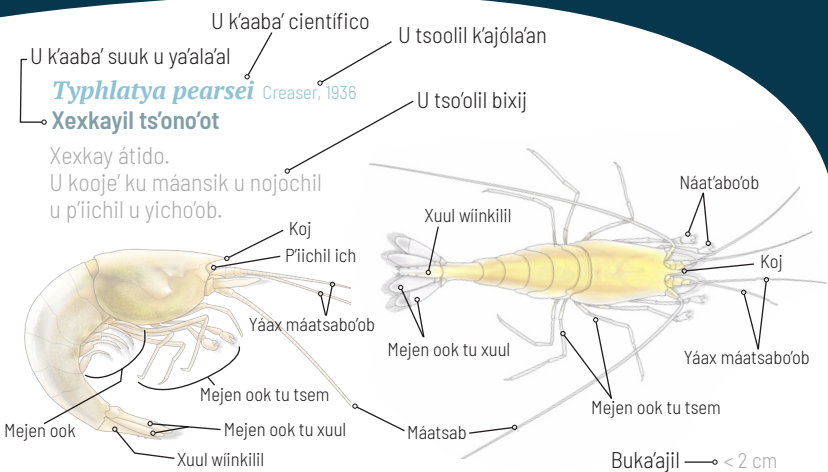


< 30 cm



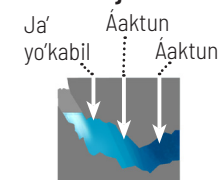
Bix je'el u meyajta'al le tsol ts'íiba'

Ch'i'ibalilo'ob ku yila'al te'ela' tiano'ob ichil u jejeláasil ba'alche'ob *estigobiontes*, yane' minaan u baakelo'ob yéetel u jeelo'obe' yaan u baakelo'ob. Ti' junjuntúulil u ch'i'ibalilo'obe', ku ts'aabal u K'aaba' científico yéetel u K'aaba' suuk u ya'ala'al ti'ob, bix u kuxtal'ob, tu'ux yano'ob yéetel mejen kúuchilo'ob tu'ux kaja'ano'ob, bix u kaláanta'al ti' le K'i'ino'oba' yéetel bix u yila'al u wiinkilal. Ti' le súutukila', ku ye'espajal bix je'el u meyajta'al le tsol ts'íiba'.



U chiikulil

U kúuchil ja'



Tu'ux ku yantal

- Yáanal tuunich'ob
- Yóok'ol tuunich'ob
- Joolo'ob ich u xiixel sojol
- Yóok'ol u xiixel sojol
- Tu bel ja'

Ba'ax ku jaantiko'ob

- Mejen xiwo'ob yéetel ikelo'ob
- Xiwo'ob yéetel kuuxum
- Ba'alo'ob yaan yóok'olkab
- U ta' soots'ob yéetel ch'i'ich'o' ob
- Kimen ba'alche'ob
- Ik'elo'ob yaan u sool

Ti' ba'ax ja'il

- Ch'ujuk ja'
- Ch'óoch' ja'

U tsoolil bix u kaláanta'al

- SEMARNAT
- NOM 059 A
- NOM 059 P
- Ma' jach tukultbiil'
- Táan u taal u xu'ulul
- Péek óol u xu'ulul

Ch'i'ibalilo'ob *estigobiontes* (u K'aaba'e' ku taal ti' Styx, jump'eeel bel ja' griego ti' Xibalba yéetel bios, kuxtalil) leti'obe' ku kajtal'ob tu ja'il yaanal lu'um, je'el bix u áaktunilo'ob beeyxan ts'ono'oto'ob tu Petenil Yucatán. U ya'abi'lo'ob estigobiontese' wayilo'obe', yaan jach chichan tu'ux kaja'ano'ob chéen ti' jump'eeel áaktun kuxa'ano'ob, ti' le K'i'ino'oba' 15% ti' le yano'ob tu Petenil Yucatán ta'aytak u xu'ulsalo'ob.

Estigobiontese' ku k'éexpajal u kuxtal'ob ku ya'ala'ale' *trogloformismo*, lelo'ó, u k'áat u ya'ale' ba'alo'ob yaan ti'ob ikil k'éexpaj u kuxtal'ob yanaal lu'um, lelo' ku yila'al u jela'anil yéetel le yano'ob yóok'olkabo'. U k'éepajal u wiinkililo'obe' jach séebak u yila'al. Yano'obe' ku p'áatal minaan u yichó'ob, u chowaktal u k'abo'ob yéetel u yook'ob beeyxan u saktal u wiinkilalo'ob. Chéen ba'ale' yaan K'iin xane' ku k'éexpajal u kuxtal'ob lelo' ku k'exbesik u baak'pachil tu'ux kaja'ano'ob lelo' ku beetik u páajtal u kuxtal'ob ich éek'joch'éenil, tu'ux minaan saásilil.

U ba'alche'ilo'ob estigobiontese' ku beetiko'ob meyajo'ob yéetel u ba'alilo'ob yo'kabil, je'el bix u beeta'al u la'abal, lelo' u k'áat u ya'ale' ku sutk'esiko'ob sojol tukukbal ichil le kúuchilo', u xu'ulsiko'ob ik'elo'ob ku taasiko'ob k'ojáanilo'ob beeyxan u péeksiko'ob ba'alo'ob ku kaskúuntiko'ob yóok'olkab. Le beetike', jach k'ána'an utia'al u yantal yéetel u meyaj ma'alob le kúuchil ja'ó. Tu kúuchil Cenoteando, táan k tuklike' ka'ansajile' u bejil utia'al u meyajta'al yéetel u kaláanta'al ts'ono'oto'ob beeyxan u ja'ail yóok'olkab.

Le beetikee', le tsol tsikbala' séebak utia'al u k'ajóolta'al estigobiontes jump'eeel muk' meyajil utia'al u ts'aabal na'atbil le kuxtal yaan yaanal lu'umo'. Ma' tukulta'ab u beeta'al chéen bey jump'eeel péeksaj óole' yéetel ku ye'esik chéen u ba'alche'ilo'ob séebak je'el u páajtal u k'ajóolta'ale', beeyxan chéen wáa jaytúul jach jela'antako'ob.

Le ts'ib ju'unila' beeta'ab yéetel u áantaj taak'inil 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" liderado por N.S. D.F.A. está agradecida por la beca recibida de "DGAPA-UNAM Programa de Becas Posdoctorales en la UNAM 2020".

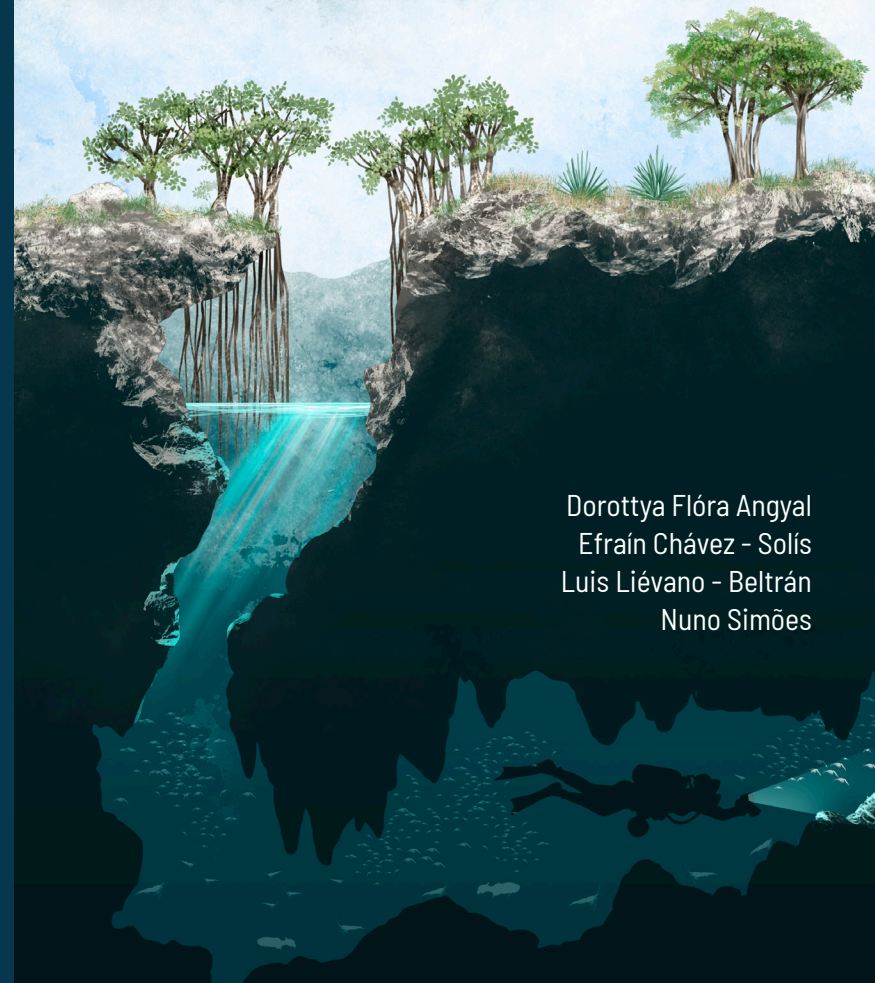
Boonilo'ob: Eduardo Velázquez yéetel Alberto Guerra. U boonilo'obe' beeta'ab yéetel u meyaj oochelilo'ob, K'u'ub tumeen, Benjamín Magaña, Efraín Chávez-Solis, Dorottya Flóra Angyal, Luis Liévano-Beltrán, Brett González, Francisco Solis-Marín, Jozef Grego y Fernando Álvarez.

Ts'iita'ab ich maaya tumeen José Manuel Tec Tun.

U wáal ju'unil tu'ux ku yila'al u Molay Xak'almeyaj "Cenoteando" of the UNAM UMDI-Sisal: www.cenoteando.mx



Tsol ts'íib seebak utia'al u k'ajóolta'al: Ba'alche'ob yano'ob yaanal lu'um tu ts'ono'otilo'ob u Petenil Yucatán



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