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New records of cave-dwelling mysids from the Bahamas and Mexico with description of *Palaumysis bahamensis* n. sp. (Crustacea: Mysidacea)

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New localities in the Bahamas and Mexico are reported for six species of stygobitic and stygophilic mysids from the genera *Spelaeomysis*, *Stygiomysis*, *Antromysis* and *Heteromysis*. In addition, a new species, *Palaumysis bahamensis*, is described from a marine cave in the Bahamas. This genus had previously contained only a single species from anchialine caves in Palau, Indo-West Pacific. The biogeography and evolutionary origins of stygobitic mysids are discussed. An up-to-date key to the species of the genus *Spelaeomysis* is presented.

KEYWORDS: Mysidacea, *Spelaeomysis*, *Stygiomysis*, *Antromysis*, *Heteromysis*, *Palaumysis*, Bahamas, Mexico, cave, taxonomy, biogeography.

Introduction

Mysids are common inhabitants of both fresh and salt water (anchialine) caves and groundwaters in widely diverse locations (Bowman, 1984; Pesce *et al.*, 1994). At least 38 species in 19 genera of subterranean mysids have been reported. In addition to clusters of stygobitic mysid species in Mexico and the Caribbean and in the Mediterranean, two species (*Spelaeomysis longipes* and *Spelaeomysis cochiensis*) are known from India and a third (*Spelaeomysis servatus*) from Zanzibar, Kenya and Aldabra. As is the case with a number of stygobitic taxa including remipedes, speleophriid, misophrioid copepods, epacteriscid calanoid copepods, hadziid and pardaliscid amphipods, thaumatocyprid ostracods and thermosbaenaceans (Boxshall and Jaume, 1999), these distributions suggest a Tethyan origin involving stranding, whereby the caves and groundwaters inhabited by their marine ancestors were uplifted during regressions of the Tethys and the Mediterranean. Most freshwater subterranean mysids occur in localities not far from the coast, indicating a relatively recent origin from marine ancestors. Although many stygobitic species are endemic to specific cave and/or groundwater systems on a single island or landmass, some

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such as *Stygiomysis holthuisi* (from cave waters in the Bahamas, Anguilla, St. Martin and Puerto Rico) and *Spelaeomysis servatus* (from cave waters in Kenya, Zanzibar and Aldabra) have remarkably wide distributions. An up-to-date key to the species of the genus *Spelaeomysis* is presented.

Taxonomic account

Order MYSIDACEA
Suborder MYSIDA
Family LEPIDOMYSIDAE Clarke, 1961
Spelaeomysis quinterensis (Villalobos, 1951)
(figures 1–4)

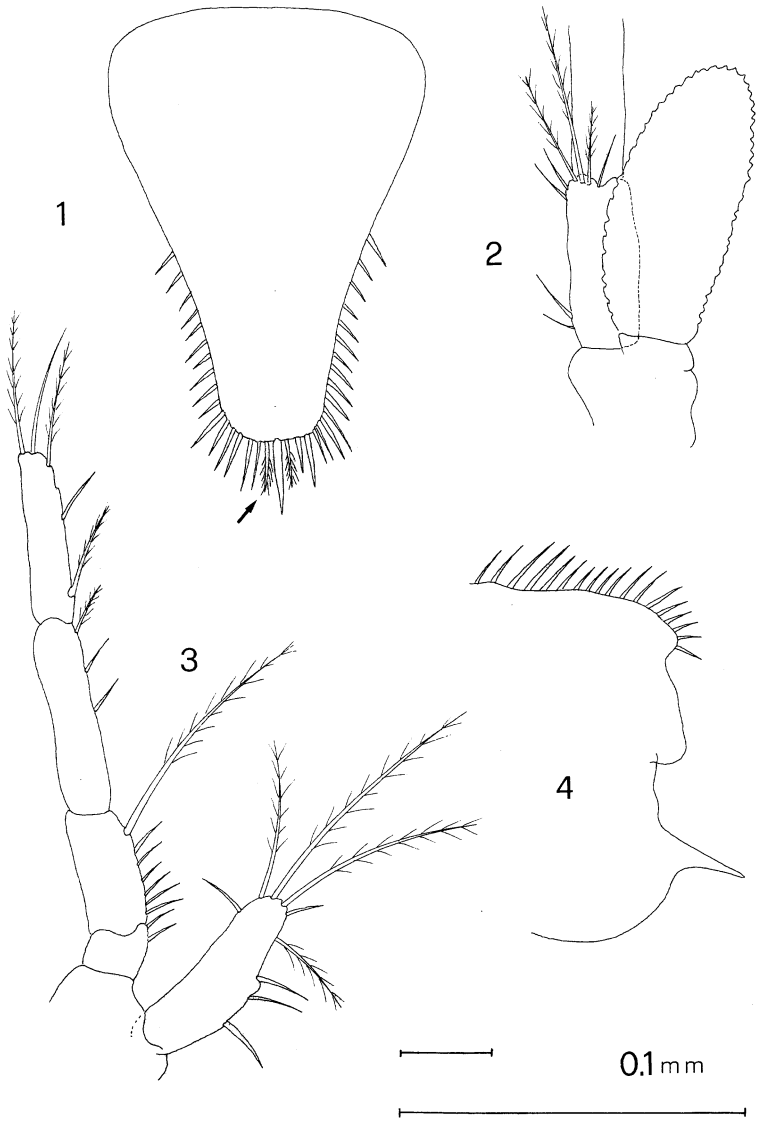
Material examined. Tamaulipas, Mexico: cave spring on the Rio Guayalejo near Juamave; 15 March 1998; one mature female (length 7.5 mm) collected with vial from water column in 10 m depth by T. M. Iliffe.

Taxonomic notes. The single specimen we examined from a cave spring on the Rio Guayalejo is identical to *S. quinterensis* described and illustrated by Villalobos (1951) from the type-locality (Quintero cave, Tamaulipas, Mexico), as well as by Bowman (1973, 1982) and Reddell (1981), also from Mexico, differing only by the following minor characteristics:

(1) Antennal scale more rounded and slightly wider as compared to Villalobos' description and figures; antennal flagellum with more and longer segments (figure 2).
(2) Sixteen to 18 long spines on the medial lobe of uropod (figure 4) (vs 20 or more, and shorter spines both in Villalobos' and Bowman's figures).
(3) Telson armed with 33 spines (figure 1) (vs 25 and 27 spines in Villalobos' and Bowman's figures, respectively); moreover in the specimen from Guayalejo spring, the medial apical spine is flanked by two slender plumose setae (vs the same spines figured as naked in the original and following descriptions and figures). However, in this last regard, we suppose that the re-examination of typical material could reveal the presence of the same plumose setae also in *S. quinterensis*, since these setae have been reported and figured in other species of the genus (*S. bottazzi*, *S. longipes*) and probably they could be present, but overlooked, also in the remaining ones.
(4) Pleopod 2 (figure 3) slightly shorter and less setulose as compared to Villalobos' figures.

The peculiar telson armature could justify recognition of the Guayalejo spring specimen as a distinct species or subspecies, but until enough material from this locality, as well as from the type-locality, becomes available to assess adequately the variability of *S. quinterensis*, we consider the Guayalejo spring and the Villalobos' material to be conspecific.

Habitat. This spring is located on the south bank of the Rio Guayalejo as it passes through a large canyon crossing the Sierra Madre Oriental. The spring pool is located about 50 m inland from the river bank and consists of a shallow basin about 5 m in diameter, beneath a rock ledge. Underwater, a cave trends away from the river for about 100 m before coming back to the surface in a small air-filled chamber with possible dry cave passages leading off. Maximum depth in the underwater cave was 15 m. The stygobitic cirolanid *Speocirolana disparicornis* Botosaneanu



FIGS 1–4. *Spelaeomysis quinterensis*. (1) Telson; (2) antennal scale; (3) pleopod 2; (4) uropod, medial lobe.

and Iliffe, 1999 and the amphipod *Seborgia* near *hershleri* (det. J. R. Holsinger, 13 April 1999) were also collected from the cave.

Remarks. The genus *Spelaeomysis* presently includes nine named species, seven from various groundwater habitats (anchialine caves, springs and wells) in south Italy, Zanzibar, Mexico and Cuba, one from prawn culture fields in India, and another one from crab burrows in Colombia. Recently, García-Garza *et al.* (1996) presented a key to the known species in the genus, including only seven species and omitting *S. bottazzii* Caroli, 1924 and *S. cochinensis* Panampunnayil and Viswakumar, 1991. Moreover, in the same paper, the authors misspelled the name of *S. servatus* with *S. serratus*.

Three species are presently known from subterranean waters in Mexico:
Spelaeomysis quinterensis (Villalobos, 1951) [cave waters, Tamaulipas]
Spelaeomysis olivae Bowman, 1973 [cave waters, Oaxaca]
Spelaeomysis villalobosi García-Garza, Rodriguez-Almaraz and Bowman, 1996 [phreatic and cave waters, Nuevo León]

The remaining species come from the following localities:
Spelaeomysis bottazzii Caroli, 1924 [anchialine cave and phreatic waters; south Italy]
Spelaeomysis servatus (Fage, 1924) [cave waters; Kenya, Zanzibar, Aldabra]
Spelaeomysis longipes (Pillai and Mariamma, 1963) [phreatic waters, India]
Spelaeomysis nuniezi Bacescu and Orghidan, 1971 [cave waters, Cuba]
Spelaeomysis cardisomae Bowman, 1973 [cave waters, crab burrows; Columbia, San Andres]
Spelaeomysis cochinensis Panampunnayil and Viswakumar, 1991 [prawn culture field; India]

Key to the species of the genus *Spelaeomysis*

1 Eyestalks with few disto-lateral ommatidia 2
– Eyestalks without ommatidia 4

2 Telson more than twice longer than wide . . . . . *S. cochinensis*
– Telson less than 1.5 longer than wide 3

3 Apical spine of telson about twice length of two flanking spines . . . *S. servatus*
– Apical spine of telson more than six times length of two flanking spines . *S. cardisomae*

4 Eyestalks medially fused forming a single plate . . . . . *S. longipes*
– Eyestalks separate 5

5 Eyestalks produced anterolaterally into subtriangular lobes 6
– Eyestalks subquadrangular, not produced anterolaterally 7

6 Pleopod 4 with four-segmented exopod; telson slightly longer than wide; lateral margin slightly concave near midlength . . . . . *S. quinterensis*
– Pleopod 4 with two-segmented exopod; telson about as long as wide, lateral margin convex . . . . . *S. villalobosi*

7 Telson, margin of distal half armed with spines 8
– Telson, margin completely armed with spines . . . . . *S. bottazzii*

8 Telson L/W 1.5, with about 20 marginal spines . . . . . *S. nuniezi*
– Telson L/W 1.1–1.2, with about 40 marginal spines . . . . . *S. olivae*

Family STYGIOMYSIDAE Caroli, 1937

Stygiomysis cokei Kallmeyer and Carpenter, 1996

Material examined. Yucatan, Mexico: Cenote Pabakal, Eknakan; 25 June 1998; one female (8.5 mm) and one male (7.7 mm), collected with vials from the water column in 20–33 m depths. Cenote San Eduardo, Tecoh; 26 June 1998; two females (7.9, 8.1 mm) and one male (7.7 mm) collected with vials from the water column in 15–27 m depths. Cenote Kankirixche, Mucuyché; 1 July 1998; one female (9.1 mm) and one juvenile collected with vials from the water column in 30–50 m depths. Cenote Kankirixche, Mucuyché; 19 November 1998; one female (9.0 mm) collected with vials from the water column in 30–50 m depths. Cenote Pabakal, Eknakan; 26 June 1999; two females (8.3, 8.5 mm) collected with vials from the water column in 20–26 m depths. Cenote Dzonot-ila, Abalà; 30 October 1999, two juv. collected with vials from water column in 30-40 m depths. Cenote Pabakal, Eknakan;

31 October 1999; three females (7.9–8.6 mm) and one male (7.9 mm), collected with vials from water column in 20–33 m depths. Quintana Roo, Mexico: Actun Ko, Akumal; 28 June 1999; one female (8.8 mm) and one juvenile collected with vials from the water column in 8–13 m depths.

Remarks. Caroli (1937) created the family Stygiomysidae and the genus *Stygiomysis* to accommodate material from anchialine cave waters of the Salentine Peninsula (south Italy). The genus *Stygiomysis* at present includes six described species:

Stygiomysis hydruntina Caroli, 1937 [anchialine and phreatic waters; south Italy]
Stygiomysis holthuisi (Gordon, 1958) [cave waters; Bahamas, Anguilla, St. Martin, Puerto Rico]
Stygiomysis major Bowman, 1976 [cave waters; Jamaica]
Stygiomysis clarkei Bowman, Iliffe and Yager, 1984 [cave waters; Bahamas]
Stygiomysis aemete Wagner, 1992 [phreatic waters; Dominican Republic]
Stygiomysis cokei Kallmeyer and Carpenter, 1996 [cave waters; Yucatan, Mexico].

Three other undescribed species are known from the Salentine Peninsula (south Italy) (Pesce, 1975), Quintana Roo, Mexico and Florida, USA (Bowman, in litt.).

The remarkable distribution of *Stygiomysis* undoubtedly points to a Tethyan origin, all the species of the genus being actually known from the Caribbean and surrounding areas, and south Italy.

Stygiomysis cokei is a large species, well characterized by the unusually long telson and very narrow uropodal protopods. This species was previously known only from caves near Tulum, Quintana Roo, Mexico. Our collections, therefore, considerably extend the range of *S. cokei* to include four cenotes in the state of Yucatan, located approximately 200 km west of Tulum on the opposite side of the Yucatan Peninsula.

Only minor morphological differences were found in the present material as compared to the original description and illustrations of the species (body length, number of setae on mediodistal margin of the lamella of pleopods 3–5, armature of the uropodal protopod). However, so far little is known about the variability of the species of this genus, and the entire family appears to be remarkably uniform in many features (Kallmeyer and Carpenter, 1996).

Habitat. Cenote Pabakal ('Mud Stains') is located about 45 km south-east of Merida, near the village of Eknakan, Yucatan. From the 30-m wide, cave-like entrance to this cenote, a breakdown slope descends to a 30 m wide by 20 m long lake containing large, stalagmitic columns. The eastern passage splits and reaches a maximum depth of 23 m at 140 m penetration. The western passage descends to 30 m depth at 190 m penetration. Also collected from this cave were the cirolanid isopod *Yucatalana robustispina* Botosaneanu and Iliffe, 1999, copepods, amphipods and thermosbaenaceans.

Cenote San Eduardo is located near the village of Tecoh, 41 km south-east of Merida. This cenote is entered through a dry cave and contains two different and unconnected underwater caves. The largest of these begins from the main pool on the north side of the cave. From this 15 m wide by 5 m long pool, a breakdown slope ends at a depth of 24 m and penetration of 57 m. On the right side of the pool, a small tunnel continues past several sharp turns to a 30 m diameter, circular room, containing a large air bell at the top. A second pool lies to the south of the entrance. The underwater passage on this side of the cenote is shallower and less extensive.

Cenote Kankirixche ('Yellow Fruit Tree') is located 49 km south of Merida, near

the town of Mucuyché, Yucatan. A steep, 15 m entrance slope leads to a large underground lake. Water depths in the entrance area range from 5 to nearly 50 m, while the room is almost circular with a diameter of approximately 90 m. In the south-west corner of the cavern, a low but wide tunnel at 50–53 m water depths passes through a bedding plane that opens onto a chamber, about 90 m long and 45 m wide with a floor to ceiling height of approximately 18 m. Two passages lead out of this room, one of which has been explored to a maximum penetration of 313 m and depth of 53 m. A halocline is present at 50 m depth.

Cenote Dzonot-ila is located 52 km south of Merida, near the town of Abalá, Yucatan. The cenote entrance consists of a rectangular, 12 m deep well shaft, providing access to an underground lake. The largest section of the cave is a 40 m wide by 30 m high passage with a ridge of large breakdown blocks running down the centre and deepest depths along the walls. At the far end of this passage, a small restriction leads to a 30 m wide by 2 m high room containing numerous stalactites and stalagmites. Maximum water depth in the cave is 39 m.

Actun Ko is a large underwater cave system located between Playa del Carmen and Tulum, along the Caribbean coast of the Yucatan Peninsula. The entrance consists of a collapsed sinkhole with a pool running in a semicircle along the margins. This cave has several entrances and several kilometres of explored submerged passages. The halocline in this cave is at about 12–14 m depth.

Stygiomysis clarkei Bowman, Iliffe and Yager, 1984

Material examined. Grand Bahama Island, Bahamas: Lucayan Caverns, Freeport; 6 August 1998, one aberrant (female?) specimen collected with vial from the water column in 5–10 m depths. Lucayan Caverns, Freeport; 18 August 1998, one immature specimen (female?) collected with vial from the water column in 5–10 m depths. Lucayan Caverns, Freeport; 20 August 1998; one female (5.5 mm) collected with vials from the water column in 5–10 m depths. Lucayan Caverns, Freeport; 22 August 1998; two females (5.9, 6.1 mm) collected with vials from the water column in 5–10 m depths.

Remarks. The three adult specimens from Lucayan Caverns, Grand Bahama fit the original description of the species, except for the following minor differences, which, in our opinion, could better characterize the Lucayan population rather than justify the proposition of a new species or subspecies.

(1) Distal armature of telson: 3+4+3+4+3, or 3+3+3+3+3 (vs 3+3+3+3+3 in the original description).
(2) Protopodal process of uropods with one lateral apical seta and five apical spines, followed by two short spines, one longer spine and eight short setules (vs one lateral apical seta, five apical spines followed by four short spines, one long spine and six to eight spinules, in the original description).
(3) Antenna 1, outer flagellum 14- or 15-segmented (vs 17–19 in the original description), inner flagellum nine-segmented (vs ten-segmented in the original description).

Stygiomysis clarkei is presently known only from anchialine caves in Middle Caicos, Providenciales and Grand Bahama islands (present data).

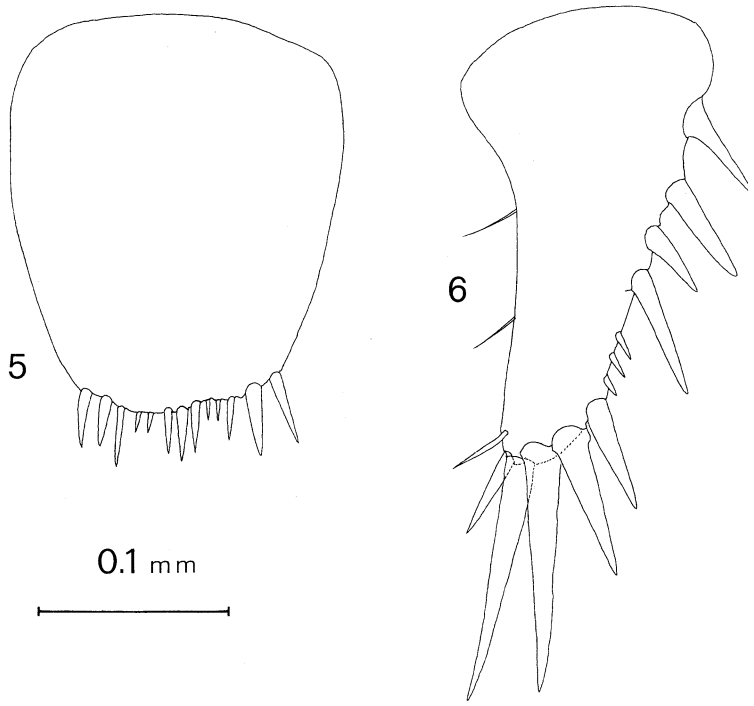
Habitat. Lucayan Caverns is located about 20 km east of Freeport on Grand Bahama Island. It is the longest explored cave in the Bahamas with more than

10 km of surveyed underwater passages. The surface waters in the cave are fresh, with a halocline at 16 m depth and full strength sea water beneath. Most passages were formed at the same depth as the halocline by mixing corrosion between fresh and salt waters. An unusual feature of this cave is the presence of large amounts of flocculent organic sediments, probably of bacterial origin, that occur below the halocline.

Stygiomysis holthuisi (Gordon, 1958)
(figures 5, 6)

Material examined. Quintana Roo, Mexico: Cenote Maya Blue, Tulum; 13 March 1994, one immature specimen (female?) collected with vial from the water column in 15–20 m depths. Casa Cenote, Tulum; 14 January 1996; one female (7.1 mm) collected with plankton net from 6–8 m depths (halocline at 7 m). Yucatan, Mexico: Cenote Mucuyché, Mucuyché; 4 July 1999; eight females (5.5–6.7 mm), three males (4.5–5.9 mm) and three juveniles collected with plankton net from water column in 20–37 m depths.

Remarks. Described by Gordon (1958) to accommodate material from groundwaters of Devil's Hole (St. Martin, Lesser Antilles), *Stygiomysis holthusi* has been successively collected from several localities in the Caribbean, namely Puerto Rico (Bowman, 1976), Anguilla (Botosaneanu, 1980) and Grand Bahama Island (Bowman *et al.*, 1984). The present discovery in Yucatan (Mexico) greatly extends the known distribution range of the species. Two of the Yucatan collection sites are located along the Caribbean coast, while another is from near the opposite side of the Peninsula in the state of Yucatan.



FIGS 5, 6. *Stygiomysis holthuisi.* (5) Telson; (6) uropod protopod, backward prolongation.

The material from Yucatan shows good agreement with Gordon's description and illustrations, as well as with the other descriptions from Puerto Rico, Anguilla, and Grand Bahama, with respects to the main characters that distinguish *S. holthuisi* from the other congeners.

In the following description only the main differences as compared to the original and the subsequent descriptions are reported. Telson slightly longer than wide (figure 5) (vs nearly as wide as long in Gordon's description; slightly longer than wide in specimens from Anguilla, Grand Bahama and Puerto Rico); two to four short spines fill the gaps between lateral and median apical spine groups (vs four to five spines in Gordon's description; three in specimens from Anguilla, Grand Bahama and Puerto Rico).

Antennal flagellum 13- or 14-segmented (vs 16–18 in Gordon's description; no information is available for material from other localities); antennular flagella subequal in length, both inner and outer flagella 17- or 18-segmented (vs inner flagellum 28-segmented, outer flagellum 16/18-segmented).

Male second pleopod less setulose than in the original and following descriptions and figures.

Backward prolongation of the uropod protopod (figure 6) with five strong apical and subapical spines and two to three thin setules on the outer margin; inner margin armed with two to three spinules and four strong spines (vs the same margin armed with row of spinules interrupted by one or two stouter spines in Gordon's description and figures; more spines on the same margin and lacking the outer subapical setula in specimens from Grand Bahamas).

The propod of uropod armature and the construction and spinulation of the telson could justify recognition of the specimens from Yucatan as a distinct species or subspecies. However, until enough material is available to determine the variability of *S. holthuisi*, we consider the Yucatan, Anguilla, Grand Bahama, Puerto Rico and St. Martin specimens to be conspecific. Planned DNA work on these populations could better determine their effective reproductive and genetic separation.

Habitat. Cenote Mayan Blue is located about 5 km inland from the Caribbean coast, about 3 km south of Tulum Pueblo, Yucatan. Primary orientation of this 15.5 km long cave is perpendicular to the coast suggesting that it serves as a major freshwater drainage conduit to the sea. Cave passages are predominantly developed at the halocline in 15 m water depths where mixing corrosion between fresh and salt water occurs. Water above the halocline averages less than 2 g/l salinity, while below the abrupt halocline at 18 m depth, salinity is 35 g/l. Shrimp [*Typhlatya* spp. and *Creaseria morleyi* (Creaser, 1936)], remipedes (*Speleonectes tulumensis* Yager, 1987), ostracods (*Danielopolina mexicana* Kornicker and Iliffe, 1989 and *Spelaeoecia mayan* Kornicker and Iliffe, 1989), thermosbaenaceans (*Tulumella unidens* Bowman and Iliffe, 1988), mysids (*Antromysis cenotensis* Creaser, 1936), amphipods (*Tuluweckelia cernua* Holsinger, 1990), isopods [*Bahalana mayana* Bowman, 1987 and *Creaseriella anops* (Creaser, 1936)] and fish [*Ogilbia pearsei* (Hubbs, 1938)] inhabit the cave (Iliffe, 1993).

Casa Cenote is located about 10 km north of Tulum Pueblo, Yucatan. It connects directly to the Caribbean Sea and is the resurgence for Systema Nohoch Nah Chich, one of the longest underwater caves in the world. Haloclines in this cave are at about 8–10 m depth.

Cenote Mucuyché is located within the ruins of a hacienda in the village of Mucuyché, Yucatan. The crescent-shaped sinkhole entrance is approximately 30 m

long by 15 m across. A breakdown slope with a flight of steps descends to a 30 m long by 10 m wide, gravel and rock floored pool. Against the far bedrock wall, a narrow hole at 5 m depth opens into a 50 m long, 10 m wide breakdown chamber that angles diagonally down to 30 m depth. At this point, a vertical breakdown shaft ascends to 15 m depth before choking off. Also collected from the cave were copepods, mysids (*Antromysis cenotensis*), thermosbaenaceans, amphipods and isopods [*Creaseriella anops* (Creaser, 1936)].

Family MYSIDAE Dana, 1850

Palaumysis bahamensis n. sp.

(figures 7–13)

Material examined. South Andros Island, Bahamas: Atlantis Blue Hole, 2 October 1999; one female (holotype), three females and one male (paratypes) collected with 93 μm mesh plankton net from the water column in 60–70 m depths. Material dissected and preserved on cover slips in the 'Crustaceans collection' at the Dipartimento di Scienze Ambientali, University of L'Aquila, Italy (My-Pa/01–My-Pa/05).

Description. Body size 1.9–2.5 mm. Alcohol decolourized the specimens which appear white transparent. Live specimens were noted as being bright red. Cephalothorax larger than abdomen. Integument translucent. Anterior part of carapace forming a large triangular area.

Antennule (figure 13): peduncle short and thick; a prominence (rudiment of male lobe) bears four to five aesthetascs (male) and a very reduced, apomorphic, two-segmented flagellum. The main flagellum very long, exceeding the length of the body.

Antenna (figure 9) with a short peduncle and a rudimentary scale.

Eyes large, suboval.

Labrum slightly protruding anteriorly.

Mouthparts not well visible since specimens partially damaged, but seemingly without distinguishing characteristics.

Peraeopods all alike, both in males and females; dactylus as in figure 7. Very rudimentary oostegites.

Pleopods (figures 10, 12) tiny, all alike except the fourth male pleopod which is armed with a very long distal seta (figure 10). 'Pentagonal zones' on the ventral side of each pleonite, reported in *P. simonae* Bacescu and Iliffe, 1986, apparently absent.

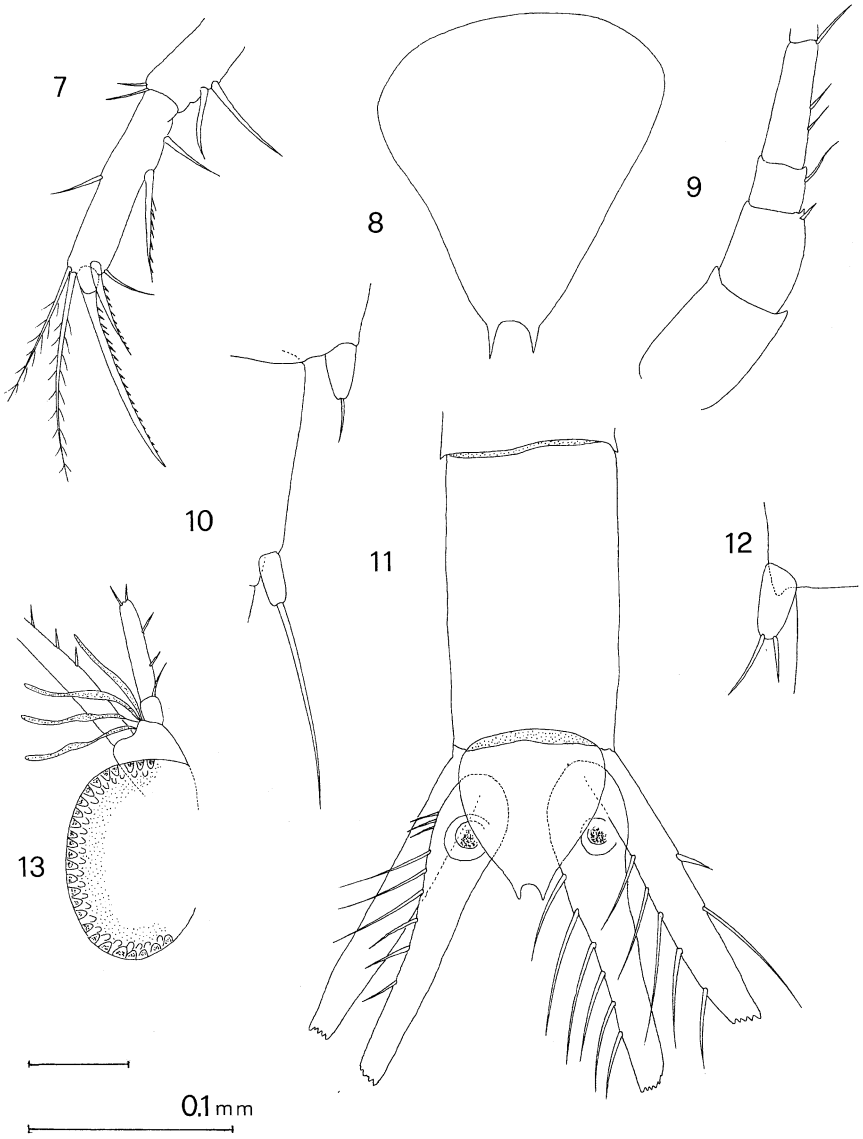
Telson (figures 8, 11) slender, subtriangular, about twice shorter than the last pleonite (figure 11), and bearing two apical spines, small and not articulated.

Uropods (figure 11): exopod slightly shorter than endopod. Endopod provided with a large statolith and completely devoid of spines on the inner margin; other setation as in figure 11, distal setae not figured.

Remaining characteristics as in *P. simonae*.

Remarks. Palaumysis bahamensis n. sp. is similar in most respects to *P. simonae*, described by Bacescu and Iliffe (1986) from cave waters of Palau (Micronesia), but differs in some important characteristics such as: telson distinctly longer than wide, only half as long the last pleonite (vs one third as long), and bearing two un-articulated spines distally (vs these spines are figured as articulated); antennular flagellum apomorphic, two-segmented (vs four-segmented); slightly shorter male pleopod IV.

The highly anomalous distribution of this genus, with species occurring in cave



FIGS 7–13. *Palaumysis bahamensis:* (7–9, 11–13) holotype, (10) male paratype. (7) Peraeopod 2 dactylus; (8) telson; (9) antenna, peduncle; (10) male pleopods 3 and 4; (11) abdomen (last pleonite), telson and uropods; (12) pleopod 2; (13) antennula, flagellum and eye.

waters of Palau (134°E) in the western Pacific and Andros (78°W) in the western Atlantic, is remarkable, but not necessarily unique. The anchialine cave-limited, misophrioid copepod genus *Expansophria* includes species from Palau and the Galapagos Islands, on opposite sides of the Pacific, from the Canary Islands in the Eastern Atlantic and from Sardinia in the Mediterranean (Boxshall and Iliffe, 1987, 1990; Jaume and Boxshall, 1996b). Likewise, another anchialine misophrioid, *Speleophriopsis*, includes species from the Canary Islands, Balearic Islands, Bermuda and Palau (Boxshall and Iliffe, 1990; Jaume and Boxshall, 1996a, 1996b). Such

distribution patterns suggest that these fauna are relicts of the once widespread, warm water fauna of the Tethys Sea that colonized anchialine habitats from shallow water/hyperbenthic environments prior to the closure of the Tethys Sea (Boxshall and Jaume, 1999).

Habitat. Atlantis Blue Hole is an ocean blue hole, or submarine cave, located near Grassy Cay, South Andros Island. The cave entrance consists of a 15 m long by 5 m wide vertical fissure, surrounded by living coral heads in 3–4 m water depth. This shaft descends to about 40 m depth, where a vertically orientated fissure extends for more than 350 m, reaching depths in excess of 85 m. Such fracture caves parallel the submerged escarpment that marks the edge of the shallow water platform. They are believed to have formed by slumping of the exposed bank margin during glacial periods of lowered sea level in the Pleistocene. Such caves have strong, tidally reversing currents that allow divers to enter only at slack tide when the currents are in the process of changing direction. A thermocline is typically encountered at about 60 m depths with colder water below. This colder water does not flow out of the cave entrance, suggesting that water circulation occurs primarily at shallower depths within the cave system. Other fauna collected from the cave included copepods, cumaceans and amphipods.

Palaumysis Bacescu and Iliffe, 1986

Revised diagnosis. Length 1.6–2.5 mm. Antennal scale rudimentary. Apomorphic inner antennal flagellum (two, four segments). Strong peraeopods with carpopropodus not divided. Two pairs of oostegites, rudimentary. Telson subtriangular, armed with two distal, articulated or not articulated spines.

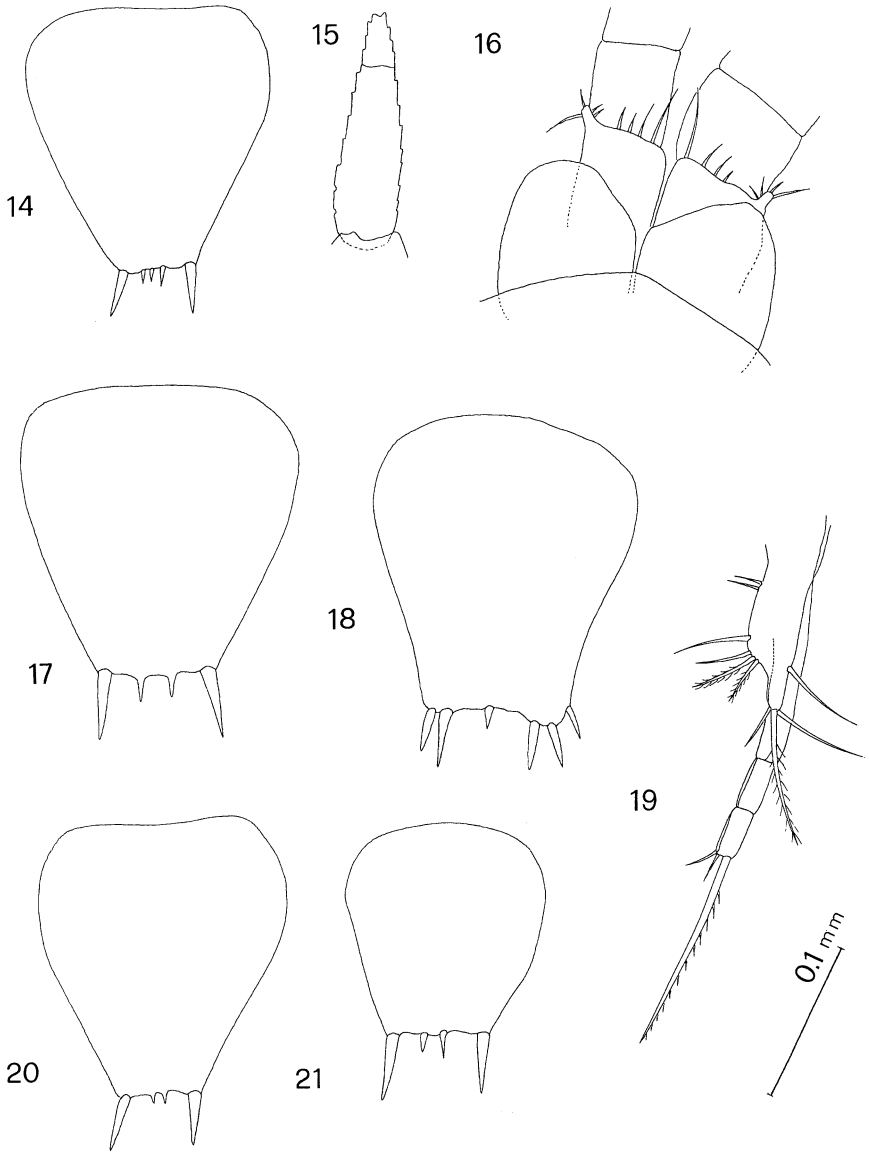
Type species: *P. simonae* Bacescu and Iliffe, 1986 from cave waters of Palau (Micronesia).

Antromysis (Antromysis) cenotensis Creaser, 1936
(figures 14–21)

Material examined. Yucatan, Mexico: Cenote Ucil, Cenotillo; 15 December 1991, two females (3.5, 3.8 mm) collected with 93 μm plankton net from water column in 0–10 m depths. Cenote Mucuyché, Mucuyché, Yucatan, Mexico; 4 July 1999; eight females (3.4–4.1 mm), three males (3.1–3.3 mm) and two juveniles collected with plankton net from water column in 20–37 m depths.

Remarks. The species is widespread in groundwaters of the northern Yucatan Peninsula. Bowman (1977) did not find 'obvious differences among specimens from the various localities'. On the contrary, in our specimens we pointed out relevant variation, also in the same sample, regarding the shape and the armature of the telson, which is slightly longer than wide [vs nearly as long as wide, both in Creaser's (1936) and Bowman's (1977) description and figures] and bears four to six (2+2; 2+3; 3+1+2) apical spines, in some specimens the medial fused with the telson [vs always four apical articulated spines (2+2) in the original and subsequent descriptions and illustrations] (figures 14, 17, 18, 20, 21). Another minor difference is the presence on our specimens of two (vs one) setae on the basal inner margin of the male pleopod 4 (figure 19), and the eye stalks (figure 16) closer to each other than in previous descriptions.

In our opinion, the above differences, however, could fit the wide variability of this species, which is widespread in groundwaters of the Yucatan karst system.



FIGS 14–21. *Antromysis cenotensis.* (14, 17, 18) Telson (female); (20, 21) telson (male); (15) antenna 2 scale (female); (16) anterior end, dorsal (female); (19) male pleopod 4.

In Cenote Mucuyché, Mucuyché, Yucatan, Mexico, *Antromysis (Antromysis) cenotensis* lives in association with *Stygiomysis holthuisi.*

Heteromysis (Heteromysis) cf. ***odontops*** Walker, 1898
sensu Tattersall, 1951
Syn. *Heteromysis spinosus* Holmes, 1900

Material examined. Exuma Islands, Bahamas: Angelfish Blue Hole, Stocking Island; 18 July 1998; three females (3.1–3.3 mm) collected with suction bottle approximately 360 m inside the cave at a depth of 29 m. South Andros Island,

Bahamas: South Bight #2 Blue Hole, 4 October 1999; three females (3.0–3.5 mm), two males (3.0, 3.2 mm) and three juveniles collected with plankton net and suction bottle from surface of silty sediments in 40 m depths. Exley's Boiling Hole; 5 October 1999; three females (3.6–3.8 mm) collected with plankton net and suction bottle from water column and surface of silty sediment in 60–70 m depths.

Remarks. This stygophilic species was described by Walker (1898) based on material from Puget Sound. Successively, Holmes (1900) described a very similar species, *Heteromysis spinosus*, from California; W. M. Tattersall (1951) describing material from West Coast of Panama synonymized the latter with *H. odontops*, pointing out as well some negligible differences between the two taxa. Later, O. S. Tattersall (1967) transferred *H. odontops* described by W. M. Tattersall from Panama to a new species, *H. panamensis*.

Our material from Bahamas is very close to the species *odontops* Walker, 1898 and Tattersall (1951), differing only by minor characteristics, which could well fit the wide variability of this species. The lack of sufficient number of specimens, especially males, causes us to ascribe provisionally our material to *H. odontops*.

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