

Subterranean shrimps from Cuba (*Crustacea Decapoda Natantia*)*

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During the Biospeological Expedition 7 species of subterranean Decapoda Natantia were caught, this being the total number of subterranean shrimps so far known from Cuba. One of these species (*Typhlatya consobrina*) is new to science and fully described in this paper, while the known range of several others could be considerably extended. Some additional morphological and ecological information is also given.

A short account on the expedition as well as a description of all the localities where the underground water fauna was searched for, are to be found in Botoșăneanu 1970 (that is in the same volume as the present paper).

During this expedition subterranean shrimps were collected at 10 stations **. In the material 7 species are represented, being the total number of cavernicolous shrimps known so far from Cuba. One of these 7 species is new to science, while of several others the known range could be considerably extended. All species are endemic to Cuba, except *Barbouria cubensis* of which species here the first record from outside Cuba is published.

* Results of the Biospeological Expedition to Cuba (March-June 1969) organized by the Academies of Sciences of Cuba and Romania.

** They were noticed at st. 27 too, but no specimens could be caught there.

An almost complete bibliography of the species dealt with here has been given by Holthuis (1956, for *Typhlatya* and *Troglocubanus*) and Holthuis (1963, for *Barbouria*), therefore only the most important references for each species are given here and those not mentioned in the two just cited papers.

In order to obtain a better picture of the distribution of the species dealt with, all their known localities are given as accurately as possible.

In the text the abbreviation cl. is used for carapace length (inclusive of the rostrum).

The present material is kept in the Institute of Speleology "Emil Racoviță" in Bucharest, Romania, duplicates are in the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands, and in the Departamento de Espeleologia, Instituto de Geografía, La Habana, Cuba.

Atyidae

Typhlatya Creaser, 1936

Of this genus at present four species, all subterranean, are known. *Typhlatya pearsei* Creaser, 1936, the type species of the genus, is found in caves in Yucatan, Mexico. *Typhlatya monae* Chace, 1954, has been reported from the West Indian islands of Mona (near Puerto Rico) and Barbuda. The two other species, one of which is new, are endemic in Cuba and are treated below.

----- *Typhlatya garciai* Chace, 1942

Typhlatya garciai Chace, 1942, p. 99, pl. 29; Holthuis, 1956, p. 52 (references); Nicholas, 1962, p. 173; Vandel, 1964, p. 178; Vandel, 1965, p. 139; Chace & Hobbs, 1969, p. 80.

Material: One of the 4 caves, isolated nowadays but formerly forming the system "Las Cuatro Cientas Rosas", in the place bearing the same name, E. from the town Banes, near the place known as "Dolina de las Colmenas" (Prov. Oriente); 7 April 1969; leg. L. Botosaneanu st. 17 b.; about 200 specimens, cl. 3–6 mm.

It is quite possible that the very name of the cave be "Potrero del Molino" (on the cave's top a "bomba de agua con molino de viento" is mounted, whose pipe enters the underground "lakes", extracting to the surface a part of their water). This means that our locality is almost certainly the same as the cave whence Chace's material (a male and three females) was collected ("Potrero del Molino Cave, Las Cuatrocientas Rosas, Banes, Oriente Province, Cuba"). So far the species was only known from the original record.

Our specimens were taken by net in several "lagos freaticos" connected to each other (it is more correct to say that we are concerned with a single "lake" separated into several parts by fallen rocks); this is located

in the rather large room of the cave into which the pipe of the water pump penetrates; the darkness is rather accentuated, yet not complete; perfectly fresh water, depth 20–50 cm., temp. = 24.8°C. *Typhlatya garciai* occurs here in enormous numbers: many thousands of individuals are swarming in the lake's waters: they are gracefully swimming (somehow like *Troglocaris*) "entre deux eaux", but many of them were seen climbing on the submerged stones. The colour of the animals varied between dark pink and perfectly hyaline.

Our specimens perfectly agree with Chace's (1942) excellent description and figures. The posterior margin of the telson bears a pair of short outer spines, a pair of intermediate spines, which are about 3–4 times as long as the outer, and about 3 pairs of inner spines the outer of which are somewhat shorter than the intermediate spines. Of these three pairs of inner spines, the central pair is the shortest, the outer pair the longest.

Typhlatya consobrina new species

(Figs 1 & 2)

Material: Cueva del Agua, Sierra de Cubitas, at the foot of Cerro Tuabaquei, very near to "Finca la Entrada", (NE from the town Camagüey), prov. Camagüey; in a subterranean lake; 25 April 1969; leg. L. Botosaneanu, st. 30.—1 female paratype, cl. 4 mm; 1 male holotype, cl. 3.5 mm; one juvenile.

Cueva del Agua, Peninsula Guanahacabibes at "El Veral", prov. Pinar del Rio, near the westernmost point of Cuba; in a subterranean lake; 3 June 1969; leg. St. Negrea, st. 44.—1 specimen, cl. 3.5 mm (dried out).

Description:

The living animals had a very pale pink colour. The rostrum resembles that of *Typhlatya pearsei* Creaser and differs from that of *T. garciai* Chace and *T. monae* Chace in that it is longer than the eyes, reaching to the end of the basal segment of the antennular peduncle. It is unarmed and ends in a slender sharp point. Its lower basal part is somewhat swollen and carries some hairs. The lower orbital angle is broadly rounded. There are no spines at all on the carapace. The pterygostomial angle is broadly rounded, the anterior margin of the carapace gradually merges with the lateral.

The abdominal pleuras are broadly rounded. The posterolateral angles of the fourth and fifth are rectangularly rounded. The sixth somite is about 1.5 times as long as the fifth, both its pleuron and its posterolateral angle are rounded. The telson is slightly longer than the sixth abdominal somite. The dorsal surface of the telson carries two pairs of spines which are placed in its posterior third. The distance between the two pairs is about as great as that between the last pair and the posterior margin of the telson. This posterior margin is convex and bears three pairs of spines. The outer pair is the shortest, measuring about 1/3 of the length of the intermediate pair, which is the longest. The inner pair is somewhat shorter than the intermediate.

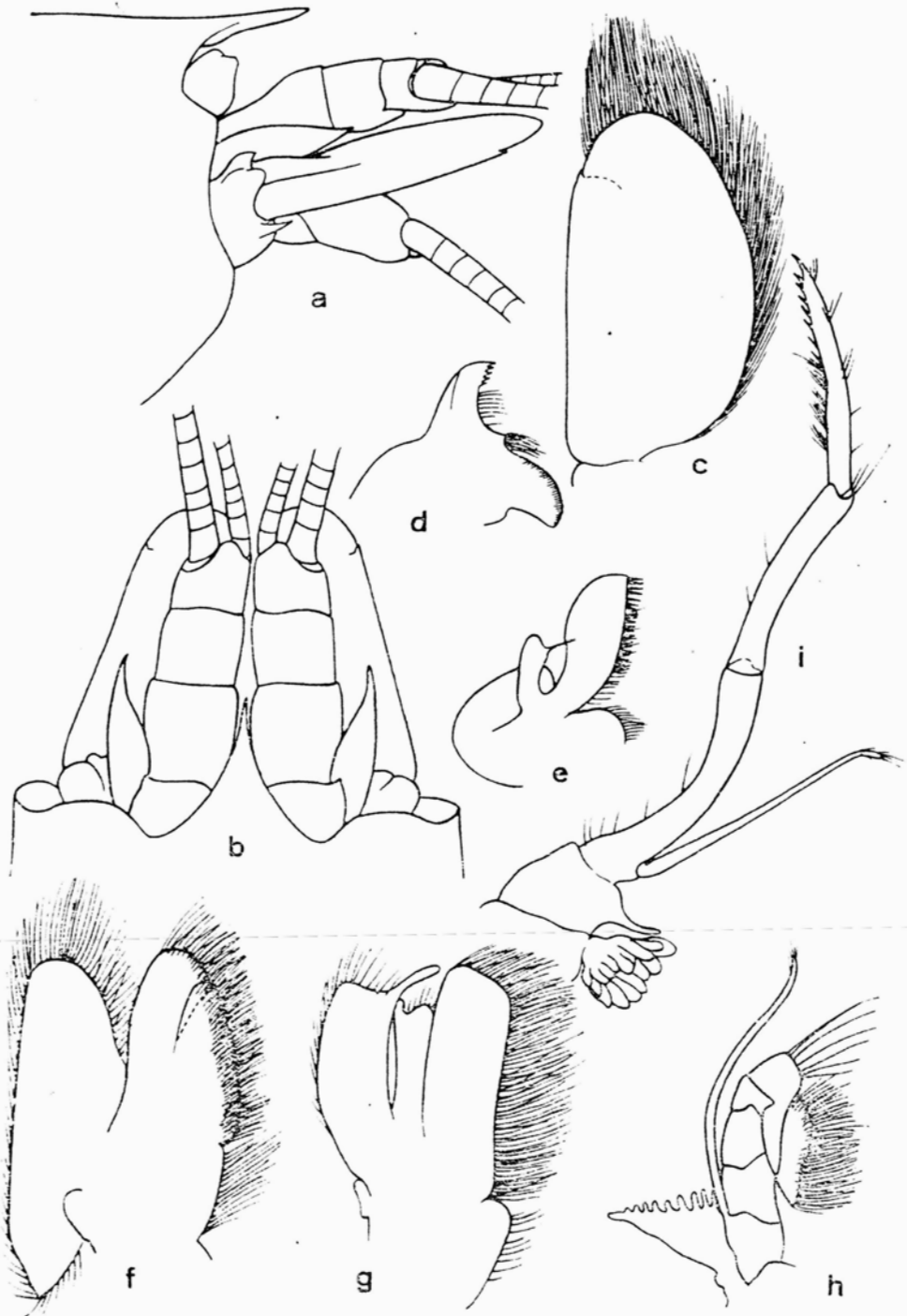


Fig. 1. — *Typhlatya consobrina* nov. spec.

a anterior part of body in lateral view; *b* anterior part of body in dorsal view; *c* scaphocerite; *d* mandible; *e* maxillula; *f* maxilla; *g* first maxilliped; *h* second maxilliped; *i* third maxilliped. *a* & *b* slightly less enlarged than the others.

The eyes show no trace of pigment. They are somewhat flattened. In dorsal view they show a quadrangular shape with a truncate or slightly emarginate anterior margin; the outer anterolateral angle bears a small tooth-like structure.

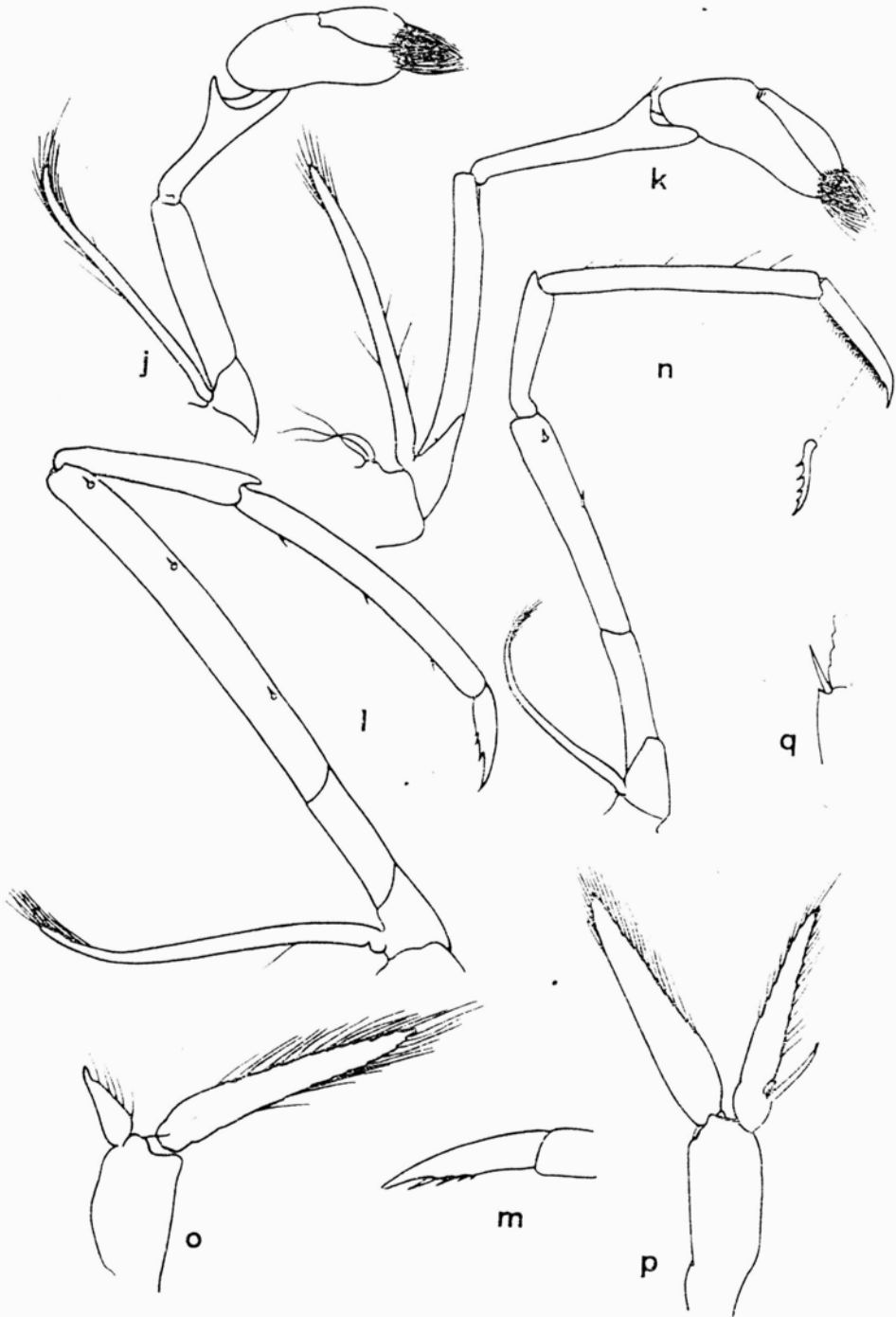


Fig. 2. — *Typhlatya consobrina* nov. spec.

j first pereopod; *k* second pereopod; *l* third pereopod; *m* dactylus of fourth pereopod; *n* fifth pereopod; *o* first pleopod of male; *p* second pleopod of male; *q* end of outer margin of uropodal exopod. *m* & *q* more enlarged than the others.

The antennular peduncle has the segments short and broad. The basal segment is longer than the two distal ones together. The stylocerite is well-developed and ends in a slender sharp point, which reaches beyond the end of the basal segment. The outer of the two flagella has the basal 10 or 11 segments broadened.

The scaphocerite is oval in shape being somewhat less than twice as long as broad; it reaches beyond the end of the antennular peduncle. The outer margin is rather straight and ends in a small, but distinct tooth, which is far overreached by the lamella. The antennal peduncle reaches slightly farther than the middle of the scaphocerite. A strong spine is placed in the basal part of the antennal peduncle near the outer basal angle of the scaphocerite.

The mandible has no palp. The incisor process bears some small teeth. The molar process is concave with a crenulated margin. A tuft of hairs is placed on the margin just above the molar process. The upper lacinia of the maxillula is elongate with numerous spinules and setae on the inner margin. The palp bears a single long seta. The maxilla has the scaphognathite large. The palp is broad and ends in a wide rounded tip, which merges with the anterior and inner margin of the endite. The first maxilliped has the upper endite elongate; the palp has the distal margin truncate with an elongate lobe at the outer anterior angle; the caridean lobe of the exopod is distinct, but the flagellum is reduced; the epipod is very small. The second maxilliped has the flagellum of the exopod long and well developed. A distinct podobranch is present. The third maxilliped reaches with half the distal segment beyond the scaphocerite. The inner margin of the distal segment bears a few distinct spinules in the distal part; the rest of the margin is beset with setae and spinules. The penultimate segment is slightly shorter than the ultimate. The exopod is well developed. A well-developed arthrobranch and a slender process, which may be a reduced arthrobranch, as well as a well-developed epipod are present.

All pereopods are provided with a pleurobranch and an exopod. An epipod is present on the first four legs only. The first pereopod reaches about to the end of the basal segment of the antennular peduncle. The fingers are blunt and almost as long as the palm. The carpus is about as long as the chela and more than twice as long as high; it is deeply excavate anteriorly. The merus is about as long as the carpus. The second leg is more slender than the first. It reaches about to the end of the antennular peduncle. The fingers are longer than the palm. The carpus is longer than the chela and about four times as long as high; the anterior end is deeply excavate. The merus is somewhat longer than the carpus. The third leg reaches with the dactylus and part of the propodus beyond the scaphocerite. The dactylus ends in a sharp point and bears three or four spinules on the posterior margin; the distal of these spinules is the largest, the others are very small. The propodus is about three times as long as the dactylus; it bears about 3 very minute spinules on the posterior margin. The carpus is about $\frac{3}{5}$ as long as the propodus and slightly less than half as long as the merus. The merus bears 3 spines on the outer surface, near the posterior margin; one of the spines is placed in the extreme distal part, one slightly distally of the middle of the merus, and the third in the basal third. The fourth leg resembles the third; it reaches almost to the end of the scaphocerite. The fifth leg attains about the end of the antennular peduncle. The dactylus is longer than those of the third and fourth legs, it is about half as long as the propodus. The posterior margin of the dactylus bears a row of about 30 closely set spinules,

which on their posterior margin are provided with some secondary teeth. The posterior margin of the propodus shows a single very minute spinule. The carpus is about half as long as the propodus, while the merus is slightly shorter than the latter segment. The outer surface of the merus shows two spinules near the posterior margin, one in the distal part, the other somewhat distally of the middle. The exopod is well developed, no epipod is present.

The endopod of the first pleopod of the male is ovate and ends in a short and slender process, which bears no cincinnuli. The second pleopod of the male has the appendix masculina very short and without hairs; the appendix interna is long and slender.

The uropods are elongate. The outer margin of the exopod ends in a short rather blunt tooth, which on the inner side is flanked by a long slender spine; no other spines are present on the diaeresis.

The present species is very close to *Typhlatya pearsei* Creaser from the Yucatan Peninsula, Mexico. In fact the resemblance is so close that at first we were inclined to consider our material to belong to Creaser's species. The differences, however, are of such a nature that we feel compelled to treat the Cuban specimens as belonging to a separate species. These differences are the following:

1. The telson in our specimens is not so wide at the base as shown in Creaser's figure 39. It is possible, however, that the shape shown in Creaser's figure is due to pressure of the cover glass on the object during drawing.

2. The scaphocerite in Creaser's figure shows no tooth on the outer margin. However, since this feature is not discussed in the text, it may be due to an inaccuracy of the artist.

3. The third maxilliped is said by Creaser to have two arthrobranches; and two well-developed arthrobranches are shown in his figure. Only one such a well-developed arthrobranch is present in *T. consobrina*.

4. The first and second legs of *T. consobrina* are more slender than in *T. pearsei*.

5. The merus of the fourth and fifth legs of *T. pearsei* are described by Creaser as having two stout spines on the posterior margin. The merus of the third leg in Creaser's figure shows no spines at all. In *T. consobrina* there are three small spines on the merus of the third and fourth, and two on that of the fifth leg.

6. In *T. pearsei* the exopod of the fifth leg is said to be greatly reduced, in *T. consobrina* it is well developed, like that of the other legs.

When Creaser stated that all the legs of *T. pearsei* have epipodites, he actually meant to say that they have mastigobranchs, as he described (Creaser, 1936, p. 129) the epipods as "composed of rounded base and two flagellae". It is practically certain that in *T. pearsei* like in *T. consobrina* epipods are present on legs 1 to 4 and mastigobranchs on legs 1 to 5.

It is possible that a reexamination of Creaser's types or of topotypical material of *Typhlatya pearsei* will show some of the above differences to be nonexistent, and eventually *T. consobrina* may have to be treated as only a subspecies of *T. pearsei*.

It is interesting to note that one of the localities whence the present new species is collected, is situated on the extremely western Guanahacabibes Peninsula of Cuba, which is directed straight towards Yucatan.

Palaemonidae

Troglocubanus Holthuis, 1949

This genus consists of 5 species, all of which are subterranean. Four of the species occur in Cuba and are dealt with below, the fifth, *Troglocubanus jamaicensis* Holthuis, 1963, was found in subterranean waters in Jamaica.

Troglocubanus calcis (Rathbun, 1912)

Palaemonetes calcis Rathbun, 1912, p. 451 (p.p.), pl. 1 figs. 1-3, 5; Chace, 1943, p. 25, 27, 28, 29, 31, 34, pl. 5.

Troglocubanus calcis Holthuis, 1952, p. 144, pl. 36; Holthuis, 1956, p. 59 (references); Nicholas, 1962, p. 174; Vandel, 1964, p. 179; Vandel, 1965, p. 140; Chace & Hobbs, 1969, p. 112, Fig. 28 b.

Material:

Cueva del Agua, Sierra de Cubitas, at the foot of Cerro Tuabaquei, very near to "Finca la Entrada" (NE from the town Camagüey), prov. Camagüey; in a subterranean lake; 25 April 1969; leg. L. Botosaneanu, st. 30. — 1 female, cl. 9 mm.

Cueva de la Lechuza, Sierra de Cubitas, prov. Camagüey; in a subterranean lake; 26 April 1969; leg. N. Viña, st. 31. — 3 males, cl. 7–8 mm. Several females were seen but could not be caught.

The specimens agree quite well with the description and figures given by Rathbun (1912), Chace (1943) and Holthuis (1952).

So far the species was known only from the type locality, a freshwater pool in a limestone cave between Madruga and Aguacate, prov. Habana, Cuba. The present records show that the species not only occurs in western Cuba, but also in Camagüey province in the eastern half of the island.

Troglocubanus eigenmanni (Hay, 1903)

Palaemonetes eigenmanni Hay, 1903, p. 431, Fig. 2; Macagno & Cucchiari, 1957, p. 14.

Troglocubanus eigenmanni Holthuis, 1952, p. 146, pl. 37; Holthuis, 1956, p. 59 (references); Nicholas, 1962, p. 174; Vandel, 1964, p. 179; Vandel, 1965, p. 140; Chace & Hobbs, 1969, p. 113, Fig. 28 c.

Palaemonetes (*Palaemonetes*) *eigenmanni* Fleming, 1969, p. 444.

Material:

Cueva Emilio, near "Aston" (= Ashton), not far from the towns Alquizar and Artemisa, prov. Habana; in the subterranean lake; 19 April 1969; leg. L. Botosaneanu, st. 22. — 12 specimens, cl. 6–16 mm.

Cueva de los Animales, near "Aston" (= Ashton), Barrio las Cañas, Artemisa, prov. Pinar del Rio; in the subterranean lake; 19 April 1969; leg. L. Botosaneanu, st. 24. — 1 female, cl. 17 mm.

Cueva del Jagüey, Peninsula Guanahacabibes at "El Veral", prov. Pinar del Rio, near the westernmost point of Cuba; in the subterranean lake; 3 June 1969; leg. V. Decu and St. Negrea, st. 43. — 3 juveniles, cl. 4.5–7 mm.

Two or three of the dorsal rostral teeth are placed behind the orbit, and 3 to 5 on the rostrum proper. The proximal two or three of the latter stand over the orbit and, together with the teeth behind the orbit, form a regular series of evenly spaced teeth. The distal two dorsal rostral teeth are much wider spaced, the ultimate often being subapical. Although this arrangement is usual, it shows some variation: in some cases the subapical tooth is absent, in others the teeth are more evenly spaced throughout. In the juveniles the rostrum is relatively shorter and bears fewer teeth. So, the specimen with cl. 4.5 mm has only four dorsal teeth: two before and two behind the posterior limit of the orbit. In the young specimens the teeth are more regularly divided over the rostrum. The lower margin of the rostrum in all specimens is unarmed.

This seems to be the most common of the Cuban cave shrimps. It has been reported from more localities than any of the others. The records in the literature are: Cave near Ashton, S. W. of Alquizar, prov. Pinar del Rio (Hay, 1903; Rathbun, 1912; Holthuis, 1952), caves at Modesta, Jaiguan and San Isidro, near Cañas, prov. Pinar del Rio (Hay, 1903), caves near Cañas (Pike, 1906), cave near San Cristobal, prov. Pinar del Rio (Holthuis, 1952), cave near Güira de Melena, prov. Habana (Rathbun, 1912; Holthuis, 1952), cave near Alacranes, prov. Matanzas (Chace, 1943; Barbour, 1945, Barbour indicated this locality as Unión de Reyes). It is interesting to note that all the localities, whence this species so far has been reported, lie in the western part of Cuba, in the provinces Pinar del Rio, Habana and Matanzas.

Troglocubanus gibarensis (Chace, 1943)

Palaemonetes gibarensis Chace, 1943, p. 28, pl. 7.

Troglocubanus gibarensis Holthuis, 1952, p. 149, pl. 38; Holthuis, 1956, p. 60 (references); Nicholas, 1962, p. 174; Vandel, 1964, p. 179; Vandel, 1965, p. 140; Chace & Hobbs, 1969, p. 113, Fig. 27.

Material:

Lago Marti, Cueva Grande de Caguanes, Cayo Caguanes, northern coast of prov. Las Villas, NE from the town Jaguajay; 29 April 1969; leg. L. Botosaneanu, st. 36 c. — 1 male, cl. 8 mm.; a second specimen was seen but could not be caught.

The single specimen agrees well with Chace's (1943) excellent description of the species.

So far the species was only known from the type locality: Aguada del Montañes, El Jobal, Barrio de Cupeysillo, Termino de Gibara, prov.

Oriente (Chace, 1943). The present record extends the known range of the species to the west. The species is certainly very rare at our locality.

Troglocubanus inermis (Chace, 1943)

Palaemonetes calcis Rathbun, 1912, p. 451 (p.p.), pl. 1, Fig. 4.

Palaemonetes inermis Chace, 1943, p. 26, pl. 6.

Troglocubanus inermis Holthuis, 1952, p. 150, pl. 39; Holthuis, 1956, p. 60 (references); Nicholas, 1962, p. 174; Vandel, 1964, p. 179; Vandel, 1965, p. 140; Chace & Hobbs, 1969, p. 113, Fig. 27.

Material:

Cueva del Agua, Sierra de Cubitas, at the foot of Cerro Tuabaquei, very near to "Finca la Entrada", NE from the town Camagüey; in a subterranean lake; 25 April 1969; leg. L. Botosaneanu, st. 30. — 4 males, cl. 9–10 mm; 5 females, cl. 11–12 mm; 2 juveniles, cl. 2 and 3 mm.

This very characteristic species is well described and figured by Chace (1943).

The species so far was only known from the type material which was taken from a pool in a cave between Madruga and Aguacate, prov. Habana. The present find greatly extends the known range of the species to the east. It is interesting to note that both the type specimens and the present material were found together with specimens of *Troglocubanus calcis* (Rathbun).

Typhlatya and *Troglocubanus* are only found in purely fresh cave waters. These are always "lagos freaticos" as the cubanese speleologists call the sumps, or "nappes d'eau siphonnantes". In the cave-chambers where the "lakes" are located, the darkness may be complete or not; the registered water temperatures were between 22.4°C and 25°C. Usually, only one or at most two species of subterranean shrimps are reported to live in one cave's "lake", but we shall call the attention to the interesting case of the Cueva del Agua (Sierra de Cubitas, st. 30): in one of the lakes in this cave, three species of subterranean shrimps were found swimming together, and namely *Typhlatya consobrina*, *Troglocubanus calcis*, and *Troglocubanus inermis*.

Hippolytidae

Barbouria Rathbun, 1912

Of this genus only a single species is known, which so far had been reported from Cuba only. In the present paper it is shown that not only its range within Cuba is greater than usually accepted, but that it also occurs outside Cuba.

Barbouria cubensis (Von Martens, 1872)

Hippolyte cubensis Von Martens, 1872, p. 136, pl. 5, Fig. 14.

Barbouria poeyi Rathbun, 1912, p. 455, pls. 2-5; Jaume, 1954, p. 1500; De la Torre y Callejas, 1960, p. 97.

Barbouria cubensis Holthuis, 1947, pp. 7, 33; Holthuis, 1963, p. 272, Fig. 2 (references); Vandel, 1964, p. 180; Vandel, 1965, p. 139; Riedl, 1966, p. 217, 218, 223, 237, Fig. 142; Chace & Hobbs, 1969, p. 116, Figs 28 f, 29.

Material:

"Pozo de la Yana", a "casimba", something like a small natural well in the limestones, near Guarda la Vaca (= Guardalabarca), prov. Oriente; brackish water; 6 April 1969; leg. L. Botosaneanu, st. 14.—2 males, cl. 14 and 15 mm.

Punta de Guana, about 2 km from Matanzas, prov. Matanzas; vertical crack ("grieta") in calcareous rock, with brackish water; 22 April 1969; leg. Carlos Fundora, st. 29.—3 males, cl. 11-12 mm.

This species, the oldest known of the Cuban cave shrimps, has been well described and figured by various authors. In the second half of the last century it was discovered by Felipe Poey, who sent material to the Berlin Museum, where it was described as a new species by Edward von Martens (1872), who gave the type locality only as "Cuba". Rathbun in 1912 described the same species as new and made it the type of a new genus. Her material was collected by Thomas Barbour, who learned about the species from manuscript notes by Poey's. Barbour visited Poey's collecting site, a "deep" (= vertical) cave (= sink hole) between Cojimar and Morro Castle, prov. Habana, where he collected a good series. This obviously is the same locality where Poey obtained the material sent to Berlin and it must be considered the type locality of the species. Until 1954 this was the only place whence *Barbouria cubensis* was known. Then Jaume (1954) discovered it in a small hole at about 80 or 100 m from the sea, about half a kilometer E. of Rio Cojimar, close to the type locality. The type locality is now destroyed, having been dynamited to make it to a swimming pool, while also the second locality was threatened. It is most fortunate therefore, that the present material shows the species not to be restricted to a small area in Habana province, but to occur over a wide extent of the Cuban coast.

In the Institute of Marine Sciences, University of Miami, Florida, U.S.A., a sample of several well developed specimens of *Barbouria cubensis* was found by one of us (Holthuis). This material was collected on 10 January 1966 by R. B. Swanson on the south coast of Cayman Brac Island, one of the Cayman Islands, situated in the Caribbean Sea S. of Cuba. That is the first and so far only record of the species from outside Cuba.

This species is coloured bright crimson red with white tips to the walking legs. It not only differs in colour from the other Cuban subterranean shrimps, which are white or transparent, but also lives in a very different habitat. In fact, *Barbouria cubensis* may not be treated as cave-dwelling animal, but as species engaged in the conquest of the subterranean realm. The available documents prove it lives only in the giant

network of cracks, completely or partly filled with brackish water (or even with almost salty water), which pierces in all directions the limestones along the sea shores. We penetrate this crack-network only through "casimbas" or through "grietas", and the two localities of Cuba we quote here, as well as Jaume's one, are examples for these two situations. "Pozo de la Yana", 50—60 m far from the shore, has brackish water on the bottom; in the "grieta" at Punta de Guana, notwithstanding the fact it opens about 100 m far from the shore, the water was *strongly* brackish. It is clear that the water in this crack network has some underground connection with the sea, being usually under the influence of the tides. It would evidently be interesting to know how far *B. cubensis* penetrates into the inner parts of the islands, and if it lives in the cracks of the submerged limestone platform too.

We may add that the animals are very fastly moving when disturbed, hiding quickly under or between the stones on the bottom of the cracks.

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