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XI

CRUSTACEANS FROM YUCATAN

By Edwin P. Creaser

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Introduction. Isopoda. Amphipoda. Mysidacea. Decapoda. Origin of the Malacostracan Fauna of Cenotes. Cirripedia.

INTRODUCTION

This is a report on the larger crustaceans collected during the summer of 1932 while the writer was a member of an expedition to the Yucatan Peninsula. The Copepoda and Cladocera, which have been studied by C. B. Wilson, the Ostracoda, studied by Norma C. Furtos, and certain parasitic crustaceans, which have been reported upon by A. S. Pearse, are not included.

ORDER ISOPODA

Family SPHÆROMIDÆ

Sphæroma destructor Richardson 1897

Representatives of this species were found boring holes in an old log several hundred yards up the Rio Champoton, Champoton, Campeche on July 13, 1932. *Sphæroma destructor* has been previously known only from fresh water at Palatka, Florida, and from southern California.

Family CIROLANIDÆ

Cirolana mayana Ives 1891

A single specimen was obtained among mangrove roots at the mouth of the Rio Champoton, Champoton, Campeche on July 12, 1932. This female specimen has a nearly triangular telson and the excavation on the outer part of the inner ramus of the uropod is not present. The spination of the appendages, the bristles on the antennæ and the free pleuræ of the fifth abdominal segments are typical. The differences noted in this specimen may be sexual or juvenile in character.

Cirolana sp.

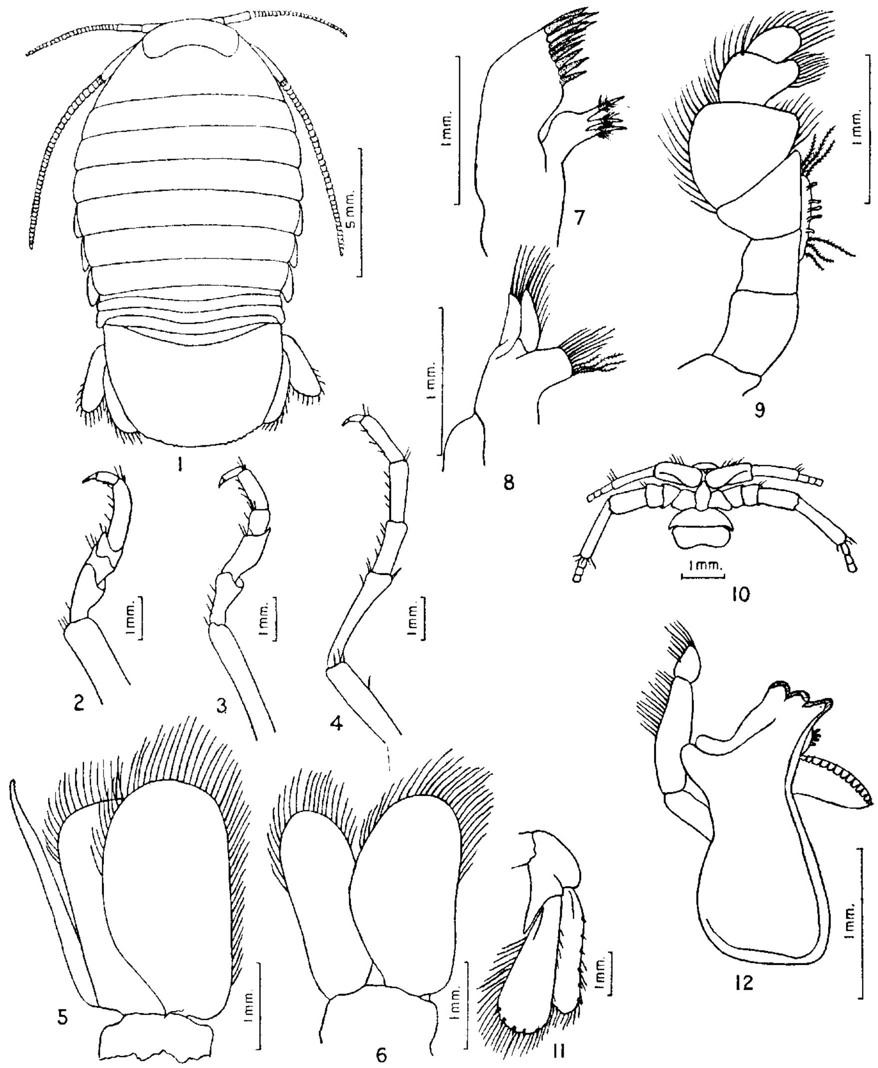
Ocean just off the mouth of the Rio Champoton, July 13, 1932. A single specimen, probably immature, is not determinable. The telson has a black semicircular ring and posterior to this are four longitudinal black bars connected by a transverse bar at the top. The first antenna has five segments in the flagellum.

Cirolana anops n. sp.

Figs. 1 to 12

Eyes wanting. Head (fig. 1) oblong; twice as wide as long; posterior margin very slightly concave. Second and third thoracic segments equal; about half length of first thoracic segment. Fourth, fifth, sixth and seventh thoracic segments subequal. Epimera of first thoracic segment, the largest. Epimera of second to seventh thoracic segments carinate and distinctly separate. Epimera of sixth and seventh segments shield-shaped; the anterior ones, exclusive of the first, squarish.

Antennæ and mouth parts—first pair of antennæ (figs. 1, 10) with two segments in peduncle; flagellum with about twenty-six segments. Second pair of antennæ (fig. 10) with five segments in peduncle; flagellum composed of forty segments. Frontal lamina (fig. 10) with greatest width anterior to mid-length, then narrowing abruptly and rounded at apex. Clypeus (fig. 10) broader than long; with concave surface at point of attach-



Cirolana anops

FIGS. 1 to 12—1, dorsal view; 2, first walking leg; 3, second walking leg; 4, seventh walking leg; 5, second pleopod of male; 6, first pleopod of male; 7, first maxilla; 8, second maxilla; 9, maxilliped; 10, first and second antennæ, lamina, clypeus and labium; 11, uropod; 12, mandible.

ment; with frontal lamina and with lateral horns. Labium (fig. 10) with concave posterior margin. Maxilliped (fig. 9) with seven segments; inner laminar protuberance with feathery setæ and with about five short stout spines. First maxilla (fig. 7) with lacinia of first article inflated and armed with three spines; each spine with tufts of setæ at mid-length; lacinia of third article swollen, armed with twelve spines, and each spine equipped with a saw-tooth edge at mid-length on one side; interspaces between bases of spines with glands. Second maxilla (fig. 8) with lacina of second article extending at right angles with other laciniæ; apex truncate, armed with feathery setæ; lacinæ of third and fourth articles armed with long spines on inner margin. Mandible (fig. 12) with palp of three articles; anterior margins of last two articles with spines; two triangular protuberances situated above proximal segment of palp; molar surface trifid; posterior margin below molar surface with spines; movable lacinia armed with a row of stout spines.

First pair of legs (fig. 2) with small carpopodite, meropodite and ischiopodite; their combined lengths scarcely longer than propodite. Following six pairs of legs (figs. 3, 4) with combined length of carpopodite, meropodite and ischiopodite much longer than propodite. Legs increasing in length posteriorly.

Six distinct abdominal segments. Lateral pleura of fifth abdominal segment covered by the fourth segment. Telson slightly truncate posteriorly and sculptured with tiny notches; breadth one and one-half times length. Inner ramus of uropod (fig. 11) longer than outer; peduncle with inner angle strongly produced; margins of rami beset with sharp spines and setæ. Stylet of second pair of pleopods (fig. 6) longer than the submembranous rami; outer ramus slightly longer than inner in first and second pleopods; outer ramus of third, fourth and fifth pleopods; truncate at distal margin, distinctly longer and more membranous than inner part; inner ramus of third, fourth and fifth pleopods without setæ. Greatest breadth of isopod, about half total length. Color in life white.

Sexual appendage on mid-ventral surface of seventh thoracic segment with two filaments; appendage slightly bifid at apex. Surface of body with very fine setæ. Female similar to male, marsupial plates not prominent.

The genus *Cirolana*, with a very few exceptions, occurs in marine habitats. The occurrence of this species in the underground caverns can be attributed to immigration from the sea. It is interesting to note that a blind species, *Cirolana cubensis* Hay 1903, occurs in a cavern in Cuba. This species differs from the present species in several respects, the most conspicuous of which is the lack of spines along the posterior margin of the telson in *Cirolana anops.*

Distribution of Cirolana anops: Santa Elena Cave, three miles south of Talcha, Yucatan, July 31, 1932. This was a small cavern which contained a pool of water not more than three feet in diameter. Two isopods and a blind shrimp were captured here with the dip net. The locality is about twenty-four kilometers north of Motul.

San Isidro Cave, Salar Colony, Merida, Yucatan, July 27, 1932. This cavern is dark with long narrow pools of water along both sides. Toward the small entrance the pools on either side combine and widen into a sizeable pond. The water is crystal clear, covered by a thin scum, shallow in many places, and fresh. Seven isopods were obtained by baiting a minnow seine with an old piece of venison. Two exceedingly large individuals were captured; the largest, a female, is 21.8 mm. long.

San Bulha Cave at Motul, Yucatan, July 26, 1932. This cave has been equipped as a swimming pool and the opening enlarged and provided with concrete stairs. Back from the entrance and cut through the solid rock is another opening, through which water is obtained. The water extends about a hundred feet from the entrance, then ends; toward the further end it is very deep but near the main entrance it is relatively shallow. Many catfish were found in this cave and some were placed in a cloth bag hanging in the water to keep them alive. Several died, however, and when the bag was pulled from the water 46 isopods of all sizes were found clinging to the sides.

Amil Cave on Tixcacal Hacienda, 14 kilometers southeast, 2 kilometers east of Merida, Yucatan, July 25, 1932. This cave has two small clear pools of water about 30 meters from the entrance. One isopod was found in one of these.

Type from the San Bulha Cave, Motul, Yucatan; collected on July 26, 1932, No. 53406 in the University of Michigan, Museum of Zoology Collection of Crustaceans. Paratypes (No. 53407) from San Bulha Cave, Motul, Yucatan, July 26, 1932; No. 53408 from Santa Elena Cave three miles south of Talcha, Yucatan, July 31, 1932; No. 53409 from San Isidro Cave, Salar Colony, Merida, Yucatan, July 27, 1932; No. 53410 from Tixcacal Hacienda 14 kilometers southeast, 2 kilometers east of Merida, Yucatan, July 25, 1932. Paratypes from the type locality, San Bulha Cave at Motul, Yucatan, have also been deposited in the United States National Museum.

Family LIGYDIDÆ

Ligyda baudiniana (Milne Edwards) 1840

Cienaga at Cerro Isla, Progreso, Yucatan, August 1, 1932.
Pond along road 3 kilometers south of Progreso, Yucatan, August 3, 1932.
Miramar spring near Talcha, Yucatan, July 31, 1932.
This isopod occurs in great abundance along the shores of the cienaga.

Family ONISCIDÆ

Porcellio lævis Latreille 1804

Vicinity of Ixil Cenote, 4.8 kilometers southeast of Chichen Itza, Yucatan, June 15, 1932.

Metoponorthus pruinosus (Brandt) 1833

Under leaves on an estate at Merida, Yucatan, July 20, 1932. This isopod frequently occurs for a short period of time in great numbers as a sort of "plague," according to the inhabitants of Merida.

ORDER AMPHIPODA

Family TALITRIDÆ

Orchestia grillus (Bosc.) 1802

Ocean beach under algæ above high tide, Champoton, Campeche, July 13, 1932.
Cerro Isla in the cienaga near Progreso, Yucatan, July 30, 1932.

Orchestia darwinii F. Müller 1864

From roots of mangroves at Champoton, Campeche, July 8, 1932. Our single specimen is the first recorded for this species since Müllers original description. I follow Stebbing (1906, 501) in assigning *darwinii* to the genus *Orchestia.* The female is still unknown.

Hyalella azteca (Saussure) 1818

Xanaba Cenote Grande (2) eight kilometers southwest of Chichen Itza, Yucatan, June 27, 1932.

Santa Ana Cenote, Valladolid, Yucatan, July 2, 1932.

Ixil Cenote, 3.2 kilometers southeast of Chichen Itza, Yucatan, June 15, 1932.

Orchestia grillus is a common Gulf coast marine species. *Orchestia darwinii* has been previously recorded only from Brazil. The species found in the cenotes, *Hyalella azteca*, is widely distributed in fresh water throughout North America. This species occurs in both "open" and "closed" types of cenotes. It is of sporadic occurrence in the cenotes, which suggests accidental transplantation.

ORDER MYSIDACEA

TRIBE MYSINI

Family MYSIDÆ

Subfamily MYSINÆ

Antromysis n. g.

Pleopods, one, two, three and five of male: rudimentary; with flattened basal plate and setiferous apices. Fourth pleopod: with outer ramus composed of two segments; basal segment about one-twentieth length of apical segment; inner ramus composed of two segments without lateral processes; basal segment of inner ramus the longest; apical segment armed at apex with two spines. Eyes without a trace of pigment. Telson short; apex truncate bearing two small centrally located spines together with a stout spine on either margin of the truncate portion of the telson; lateral margins of telson without spines. First and second thoracic appendages unlike the appendages following.

This genus approaches the characters of *Indomysis* Tattersall, but is sufficiently distinct, especially as regards the pleopods in the male and the condition of the eyes, to warrant the erection of a new genus for its reception.

To my knowledge this is the fourth known cave-dwelling species in the order Mysidacea. The first, *Lepidophthalmus servatus* Fage 1924, was described from specimens taken in Zanzibar. This species was made the type of a new family, Lepidophthalmidæ, which combines characters of Lophogastridæ and Mysidæ. The species described by Fage does not have the eye completely without pigment. The second species is completely blind and has been named *Spelæomysis botazzii* by Caroli (1924, 512-513). Caroli's specimens were obtained in "la Zinzulusa" cave in "Terra d'Otranto" in company with *Typhlocaris salentina*. He assigned it to the family Lepidopthalmidæ. The third cave-dwelling species, *Heteromysis cotti*, has just recently been described by Calman (1932, 127-131) from the island of Lanzarote. This species is not completely blind.

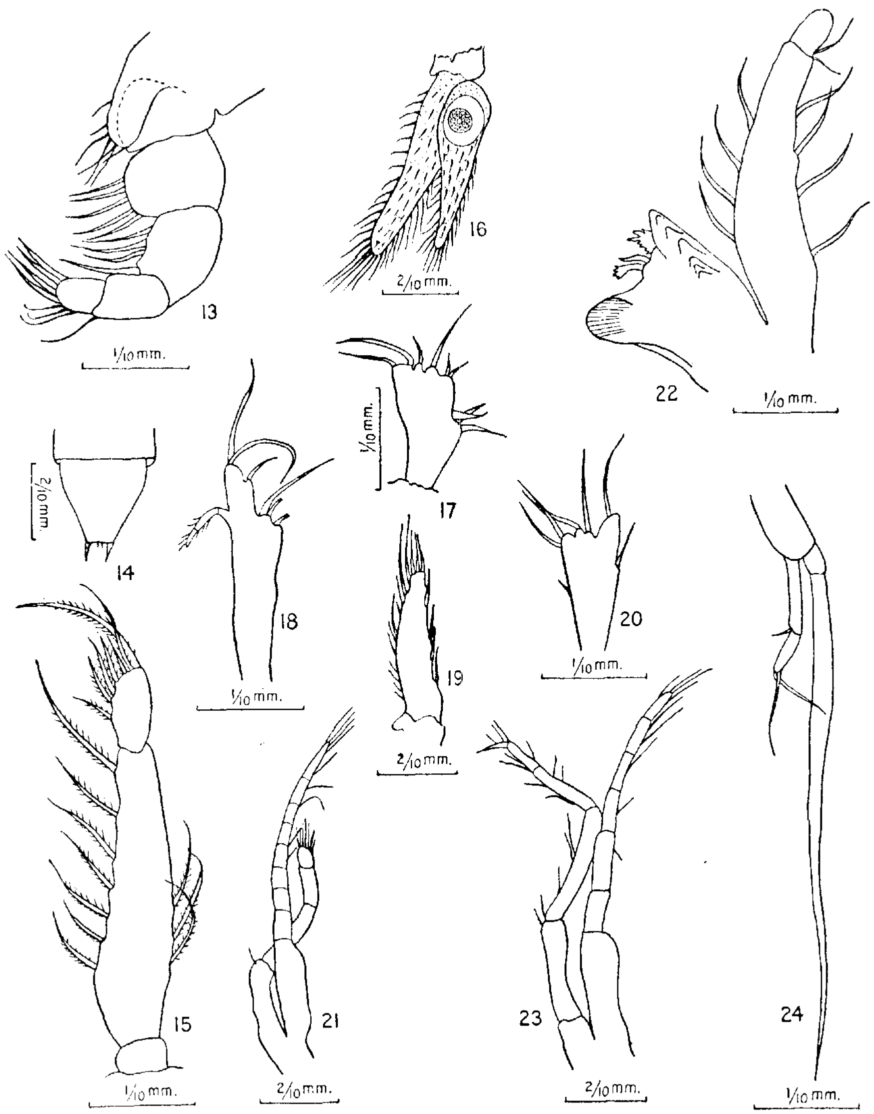
The tribe Mysini now includes the following genera: *Antarctomysis, Mysis, Paramysis, Caspiomysis* (subgenus), *Schistomysis* (subgenus), *Synmysis* (subgenus), *Katamysis, Praunus, Macropsis, Stilomysis, Neomysis, Diamysis, Limnomysis, Indomysis, Anisomysis, Mysidia*. These genera are those given by Zimmer (1915, 202-216). *Austromysis, Mesomysis, Metamysis* (of Sars), *Themisto, Kesslerella, Podops* are considered by Zimmer as synonyms of other genera in this tribe. The genus *Macropsis* has been renamed *Mesopodopsis*, and *Potamomysis* has been included in this tribe since Zimmer's synopsis (Tattersall, 1922, 483, 487-488). Tattersall (1922, 488-489) has also described a new genus, *Idiomysis*, and presents evidence to show that *Lycomysis* should also be included in this tribe.

Antromysis cenotensis n. sp.

Figs. 13 to 24

Eyes without pigment areas. Carapace with dorsal indentation posterior to gastric region. Rostrum very short and acutely pointed.

Mandible (fig. 22) with a palp of two segments; apical segment rounded, basal segment greatly elongated with stout marginal spines; molar surface with one toothed ridge and one rounded striated protuberance. Between these two ridges, extending over the margin, are two irregularly shaped protuberances and between these a spine-like protuberance.



Antromysis cenotensis

FIGS. 13 to 24—13, second thoracic appendage (maxilliped); 14, telson; 15, first thoracic appendage (gnathopod); 16, uropods; 17, second pleopod of male; 18, fifth pleopod of male; 19, antennal scale; 20, third pleopod of male; 21, third thoracic appendage (first true leg); 22, mandible; 23, sixth thoracic appendage (third true leg); 24, fourth pleopod of male.

Apex of first thoracic appendage gnathopod, with an elongated spine, longer than the segment from which it springs, together with one feather-like seta and several setiferous spines. Apex of second thoracic appendage maxilliped, with a cluster of spines of approximately the length of the terminal segment; a single elongated spine arises at the distal apex of the segment posterior to the apical one.

Third thoracic appendage not greatly different from those following but with the apex of the inner ramus terminating in an oval segment bearing setæ at the apex. Following thoracic appendages (fig. 21) similar with annulated endopodite; exopodite of approximately same length as endopodite and terminating with a spine; margins of both rami of thoracic appendages with setæ.

First, second, third and fifth pleopods (figs. 17, 18, 20) consisting of a flattened plate with setæ at apex. Fourth pleopod of male (fig. 24) with outer branch composed of two segments; proximal very short, apical segment elongated into a spine, twenty times length of basal segment; inner ramus with two segments; basal segment half again as long as apical; apex of basal segment with a single spine; extreme tip of inner ramus with two spines which are longer than the apical segment.

Telson (fig. 14) with sides narrowing to apex which is truncate, bearing two median tiny spines and two outer larger spines; length about half that of outer ramus of uropod. Outer ramus of uropod (fig. 16) longer than inner; margins of both with setæ; inner ramus of uropod with static organ on basal half.

The maximum length of any specimen that I have seen, not counting the antennæ, is 3.8 mm.

This species is related to those mysid shrimps in which the males have rudimentary third pleopods composed of a one-segmented flattened plate and in which the fourth pleopods have two segments on the outer (distal) part. The following genera fall in this group: *Neomysis, Diamysis, Limnomysis* and *Indomysis.* The close resemblance of *Antromysis* to *Indomysis* may be due to parallel evolution.

Distribution—These minute mysids were first observed in the Balam Canche Cave, 4.8 kilometers east, 8/10 kilometer south of Chichen Itza, Yucatan on June 24, 1932. Later some mysid shrimps were obtained in the San Isidro Cave, Salar Colony, Merida, Yucatan, on July 20, 1932. The specimens from this last-mentioned locality unfortunately became dried during transit and their identity can not with certainty be established.

Type, male No. 53417; Allotype, female No. 53418; Paratypes, males and females No. 53419; from Balam Canche Cave, three miles east, half mile south of Chichen Itza, Yucatan, June 24, 1932; deposited in the University of Michigan, Museum of Zoology, Collection of Crustaceans. Paratypes have also been deposited in the United States National Museum.

ORDER DECAPODA

Most of the decapod crustaceans were obtained along the coast, but two extremely interesting species were obtained in fresh water underground passageways. Dr. Waldo Schmitt is responsible for the identification of the porcelainnid crab, and Mary J. Rathbun for the identification of part of the Family Grapsidæ.

REPTANTIA

ANOMURA

Family HIPPIDÆ

Emerita talpoida (Say) 1817

A single specimen was obtained on the Cerro Isla in the cienaga near Progreso, Yucatan, on August 1, 1932.

Family PORCELLANIDÆ

Petrolisthes armatus (Gibbes) 1850

These specimens were obtained along the stony ocean beach near the mouth of the Rio Champoton, Champoton, Campeche, on July 13, 1932.

Family PAGURIDÆ

Clibanarius sclopetarius (Herbst) 1792

From the ocean beach at Champoton, Campeche, July 13, 1932.

BRACHYURA

Family GRAPSIDÆ

Goniopsis cruentata (Latreille) 1803

Mangrove swamp at Champoton, Campeche, July 8, 1932. One male and two ovigerous females.

Sesarma cinereum (Bosc.) 1802

Many specimens containing some ovigerous females were collected near the mouth of the Rio Champoton, Champoton, Campeche, on July 8, 13, 1932

Sesarma curacaoense de Man 1892

From mangrove roots near mouth of Rio Champoton, Champoton, Campeche, July 10, 1932. One ovigerous female and several males.

Aratus pisonii (Milne Edwards) 1837

Mangrove swamp near mouth of Rio Champoton, Champoton, Campeche, July 8, 10, 1932. Several specimens including two ovigerous females.

Family GONEPLACIDÆ

Panoplax depressa Stimpson 1871

Three specimens, two of them ovigerous females, were obtained in a trawl in the ocean a quarter of a mile off Champoton, Campeche, on July 13, 1932.

Family GECARCINIDÆ

Cardisoma guanhumi Latreille 1825

One specimen from the vicinity of Champoton, Campeche, July 10, 1932.

Family OCYPODIDÆ

Uca speciosa (Ives) 1891

Cerro Isla in the cienaga near Progreso, Yucatan, July 30, 1932. One of the females bears eggs.

Uca thayeri Rathbun 1900

A single male specimen was obtained in the mangrove swamp near the mouth of the Rio Champoton, Champoton, Campeche, on July 10, 1932.

Uca mordax (Smith) 1870

Mangrove swamp near mouth of Rio Champoton, Champoton, Campeche, July 10, 1932.

Uca pugilator (Bosc.) 1802

From the Uluman Savannah containing fresh water, 17.7 kilometers east of Champoton, Campeche, on the Rio Champoton, July 12, 1932.

Family XANTHIDÆ

Panopeus herbstii Milne Edwards 1834

Forma crassa Milne Edwards 1880

Mangrove swamp, vicinity of Champoton, Campeche, July 8-10, 1932.

Family PORTUNIDÆ

Callinectes sapidus acutidens Rathbun 1896

Ocean and mouth of Rio Champoton, Champoton, Campeche, July 8, 13, 1932.

Family MAJIDÆ

Libinia rhomboidea Streets 1870

Champoton, Campeche, July 14-15, 1932. Our specimens, one male and one female, agree with the description by Rathbun (1925, 324) of a female specimen from the Port of Silan, Yucatan. These specimens lack the median spines and very possibly should receive subspecific ranking.

REPTANTIA

ASTACURA

Family ASTACIDÆ

Crayfishes were obtained at two localities. Several specimens, all immature, were obtained in the Yalic Aguada several kilometers south of Champoton, Campeche, on July 14, 1932. A single immature crayfish was obtained in a pond near the road, 3 kilometers south of Progreso, Yucatan, on August 3, 1932. The crayfishes from both localities are of the same species.

This species has two spines on each side of the carapace; the annulus ventralis is moveable and there are two spines along the anterior edge of the carapace above and below the cephalic groove. The rostrum has strong lateral and postorbital spines, the chelæ are weak and the merus is provided with a few sharp teeth below. It is impossible to determine the arrangement of the hooks on the pereiopods since the male specimens are all of the second form. *Cambarus versutus* Hagen 1870 of Florida and southern Alabama is doubtless a closely related species since it possesses the characters given above. However, *C. versutus* differs in having a very long rostrum and antennal scale and a very short posterior section of the carapace. The Yucatecan crayfish is probably new to science. Adult material is needed before an adequate description can be given. It is worthy of note, perhaps, that the faunal relationship here is not with a Cuban or other West Indian species.

NATANTIA

PENEIDEA

Family PENEIDÆ

Peneus brasiliensis Latreille 1817

This shrimp was taken in abundance by trawling one-third of a kilometer from shore in the ocean off Champoton, Campeche, on July 13, 1932. Most of the specimens obtained were immature.

NATANTIA

CARIDEA

Family CRANGONIDÆ

Crangon armillatus (H. Milne Edwards) 1837

Rocky ocean beach near mouth of Rio Champoton, July 14, 1932. Many specimens including several ovigerous females.

Family PALÆMONIDÆ

Palæmonetes carolinus Stimpson 1874

Pond along road 3 kilometers south of Progreso, Yucatan, August 3, 1932.

Cienaga 5 kilometers east of Progreso, Yucatan, August 2, 1932.

Cerro Isla, cienaga near Progreso, Yucatan, August 1, 1932.

Rio Champoton 17.7 kilometers from mouth, east of Champoton, Campeche, July 11, 1932.

Palæmon morleyi n. sp.

Figs. 25 to 30

Eye bullet-shaped, without pigment; not extending as far anteriorly as third dorsal tooth of rostrum. Rostrum (fig. 25) with 7 to 10 teeth above and 1 to 3 below, upper margin fringed with setæ; first tooth on carapace; second tooth situated above ocular indentation; spine or spines on lower margin situated anterior to mid-length. Carapace (fig. 25) with two spines along anterior lateral margin.

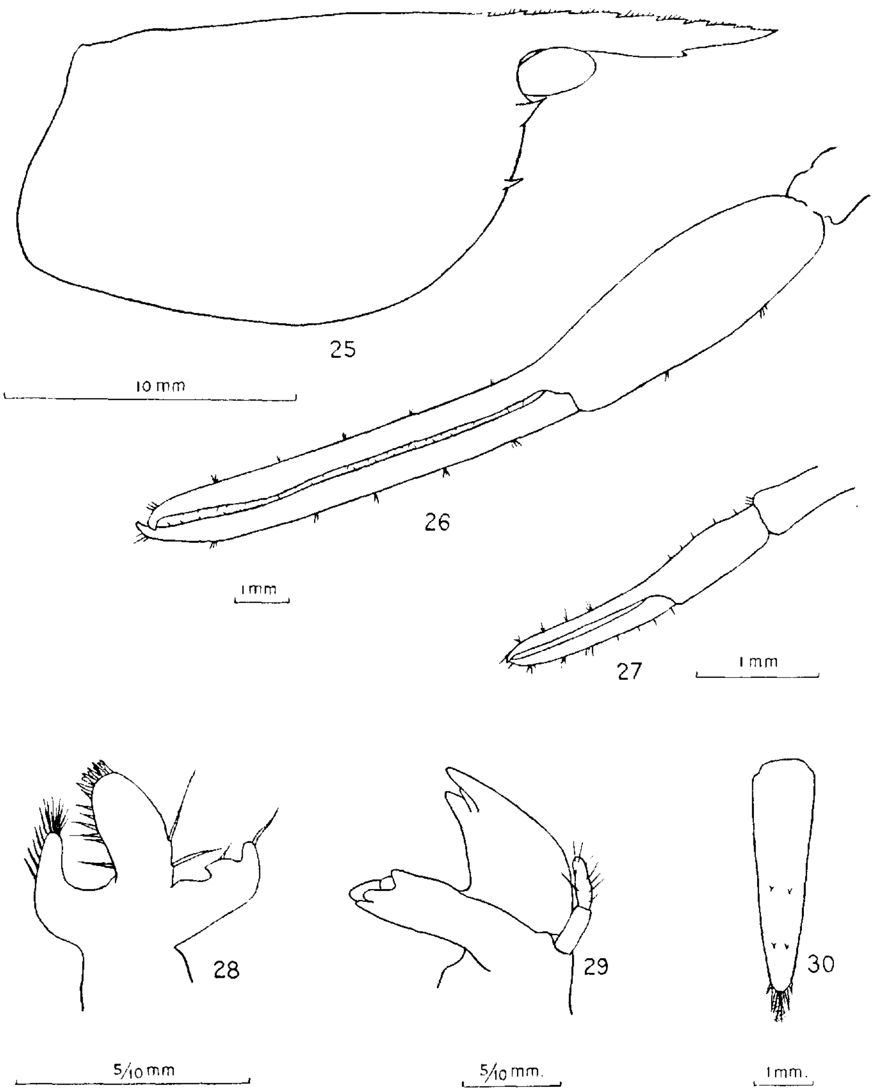
Antennules with inner flagellum about as long as carapace, rostrum included; short flagellum of outer part with 17 conspicuous segments; total length less than length of rostrum; longer flagellum of outer part exceeding length of animal. Flagellum of antenna about twice length of body; antennal scale slightly exceeding rostrum.

Second maxilla (fig. 28) with three laminate processes; endopodite with two protuberances, each armed with a long spine; middle process, basipodite, terminating with short stout spines, some of which are slightly curved at apex; coxopodite bent like a boomerang, terminating with a cluster of spines. Mandible (fig. 29) peculiar in possessing a palp of two segments; apical segment with spines, first (basal) segment unarmed; vertical molar process of mandible with three apical teeth, the middle the smallest; horizontal molar process with five rounded ridges. First maxilliped with narrow endopodite, fully twice as long as exopodite; ischium alone about length of exopodite. Second maxilliped with flattened endopodite less than length of exopodite. Third maxilliped with endopodite consisting of a single flattened plate. Apices of all exopodites with setæ.

First walking appendage (fig. 27) with chela about as long as carpopodite, remaining segments small; fingers of chela considerably longer than palm; margins of fingers with tufts of setæ; opposed margins without teeth. Second walking appendage (fig. 26) considerably longer than first; carpopodite and meropodite much smaller than chela; meropodite, next to chela, the longest segment; fingers of chela much longer than palm, with tufts of setæ along margin; opposed margins of fingers without teeth (see discussion of claw from San Bulha Cave). Third walking leg with propodite and meropodite the longest segments and of about equal lengths; ischiopodite longer than carpopodite. Fourth walking leg similar to third. Fifth walking leg with the propodite the longest and the meropodite the next longest segment.

Telson (fig. 30) armed above with four spines on posterior half; apex acute with small outer spines, large spine adjacent on the inside and a median cluster of bristle-like spines.

A single claw obtained in the San Bulha Cave at Motul differs from those of the present species. The movable finger has a prominent indentation at the base, and op-



Palæmon morleyi

FIGS. 25 to 30—25, lateral view of carapace; 26, chela of second leg; 27, chela of first leg; 28, second maxilla; 29, mandible; 30, telson.

posite this on the immovable finger there is a serrate tubercle. This is a very large claw measuring 16 mm. in length and may possibly be the condition in large individuals.

Measurement of type from San Isidro Cave, Salar Colony, Merida, Yucatan—Length of carapace including rostrum, 13.8 mm. Length of first chela, 3.0 mm. Length of second chela, 8.2 mm. Total length, 33.5 mm.

Distribution—San Isidro Cave, Salar Colony, Merida, Yucatan, July 27, 1932. Balam Canche Cave 4.8 kilometers east, 0.8 kilometer south Chichen Itza, Yucatan, June 30, 1932. Amil Cave on Tixcacal Hacienda 14 kilometers southeast, 2 kilometers east of Merida, Yucatan, July 25, 1932. (?) San Bulha Cave, Motul, Yucatan, July 26, 1932, claw only.

Type, from San Isidro Cave, Salar Colony, Merida, Yucatan, No. 53414; in University of Michigan, Museum of Zoology, Collection of Crustaceans; Paratypes, No. 53415; from Balam Canche cave; Paratypes, No. 53416 from Amil Cave. A paratype from Amil Cave has been deposited in the United States National Museum.

The presence of this species in the underground passageways can be attributed plausibly only to immigration from the sea. The typically fresh-water genus of Central America is the closely related *Macrobrachium*.

TABLE 1—*Showing variation in rostral spines of Palæmon morleyi.*

Locality	Spines above	Spines below
San Isidro Cave..........	8	2
Balam-Canche Cave......	8	2
Balam-Canche Cave......	9	1
Balam-Canche Cave......	9	1
Balam-Canche Cave......	8	1
Balam-Canche Cave......	7	1
Amil Cave..............	10	3
Amil Cave..............	8	3

These crustaceans were observed crawling about on the bottom and were obtained with a dip net and seine. Some other individuals were seen in deep water in the San Isidro Cave and futile attempts were made to obtain them by baiting. These crustaceans are swift swimmers and are extremely sensitive to vibrations in the water.

Family ATYIDÆ

Typhlatya n. gen.

This genus should be included in the series Caridinienne as defined by Bouvier (1925, p. 42). Seven pairs of gills, two of which are arthrobranchs on the third maxillipeds. All pereiopods with exopodites, that of the last pair reduced. Rostrum short, without teeth above or below. Anterior margin of carapace without spines. Carpus of both pairs of chelate pereiopods excavated. Palm of chela well developed. Eyes without pigment.

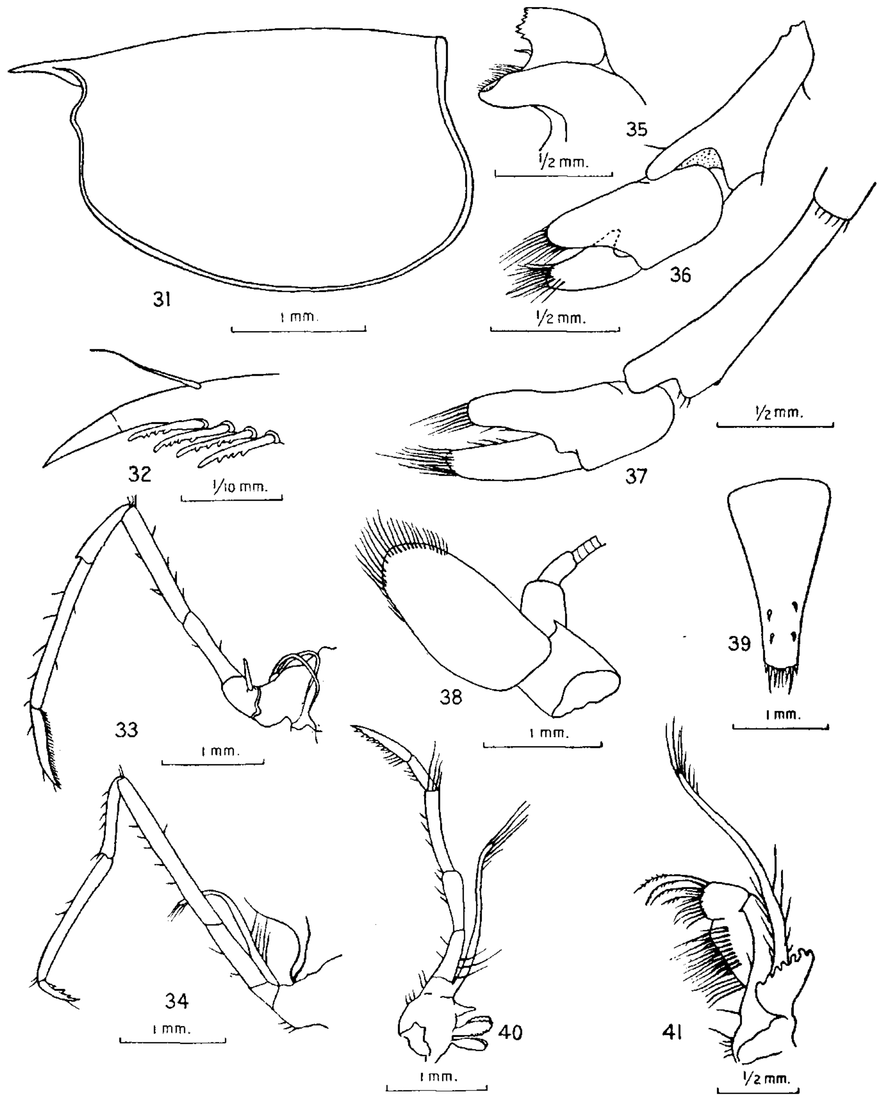
Typhlatya pearsei n. sp.

Figs. 31 to 41

Eye without pigment, small, not extending forward as far as midlength of rostrum. Carapace (fig. 31) without spines along anterior margin but with a rounded lobe below eye. Rostrum (fig. 31) short, not flattened laterally, acutely pointed, reaching nearly to distal end of second segment of antennular peduncle.

Antennules biflagellate, inner flagellum the longest; both flagellæ longer than carapace. Antennal scale exceeding peduncle of antennules; flagellum about three times length of cephalothorax; basal segment of peduncle with spine along outer margin.

All pereiopods with exopodites, that of the fifth pair greatly reduced. First and second pereiopods (figs. 36, 37) with carpopodite distally excavated to receive the propodus; first pereiopod shorter than second. Epipodites of pereiopods (figs. 33, 34) composed of rounded base and two flagellæ; meropodite of fourth and fifth legs with two stout spines; propodite the longest segment in the fifth pair of pereiopods; dactylopodite of fifth leg with a closely crowded row of pectinate spines.



Typhlatya pearsei

FIGS. 31 to 41—31, lateral view of carapace; 32, apex of claw of fifth leg; 33, fifth leg; 34, third leg; 35, mandible; 36, first leg; 37, second leg; 38, peduncle of antenna and antennal scale; 39, telson; 40, third maxilliped with arthrobranchiæ; 41, second maxilliped with podobranchium.

Measurement of type from Balam Canche Cave: Length of cephalothorax, 5.0 mm.; total length, 13.2 mm.

Relationships—This new genus is apparently related to *Ortmannia*. This relationship is manifest in the form of the chelate appendages, shape of rostrum and pereiopods. The relationship is not so obvious, though, when branchial formulæ are considered.

Distribution—Balam Canche Cave, 4.8 kilometers east, 0.8 kilometer south Chichen Itza, Yucatan, June 24, 28, 30, 1932. Santa Elena Cave, 4.8 kilometers south of Talcha, Yucatan, July 31, 1932.

Type, No. 53411 in University of Michigan Museum of Zoology, Collection of Crustaceans from Balam Canche Cave; Paratypes, No. 53412 from Balam Canche Cave and Paratype, No. 53413 from Santa Elena Cave. Paratypes from the type locality have been deposited in the United States National Museum.

This species is of unusual interest in the consideration of the origin of the fauna of the cenotes. Ortmann (1894, 410-416) believes that the Atyidæ have long been established in fresh water. Here, however, we have a species living in underground water channels which are certainly of very recent origin. Moreover the species in question has a branchial and appendicular formula unlike the related members now living in fresh water of Central America. Furthermore this species lives with other crustaceans (new species of Isopoda, Caridea and Mysidacea) which are almost certainly immigrants from the sea.

TABLE 2—*Branchial formula of Typhlatya pearsei*

	Pereiopods					Maxillipeds		
	V	IV	III	II	I	3	2	1
Pleurobranchiæ...	1	1	1	1	1	0	0	0
Arthrobranchiæ..	0	0	0	0	0	2	0	0
Podobranchiæ....	Ep.	Ep.	Ep.	Ep.	Ep.	Ep.	1	Ep.
Exopodites.......	rud.	1	1	1	1	1	1	1

With these considerations in mind, it seems far more plausible to assume that some of the atyid shrimps were marine inhabitants until a relatively recent date, Pleistocene or shortly before, when the cenotes were formed.

ORIGIN OF THE MALACOSTRACAN FAUNA OF CENOTES

The malacostracan crustacean fauna casts considerable light on the problem of the origin of the fauna of the cenotes.

Four species are peculiar to the underground passageways. All of these species, with the exception of the atyid shrimp *Typhlatya pearsei*, have their clos-

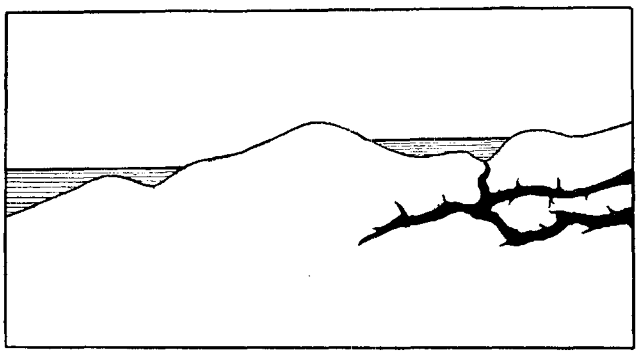


FIG. 42—Diagram showing brackish water pool fed by spring.

est relatives now living in marine situations. In view of the occurrence of *Typhlatya* with these other species it seems plausible that it too had a marine history. The suggestion arises that all of the atyid shrimps may have been only recently established in fresh water. Ortmann (1894), however, presents an opposing view regarding the atyid shrimps.

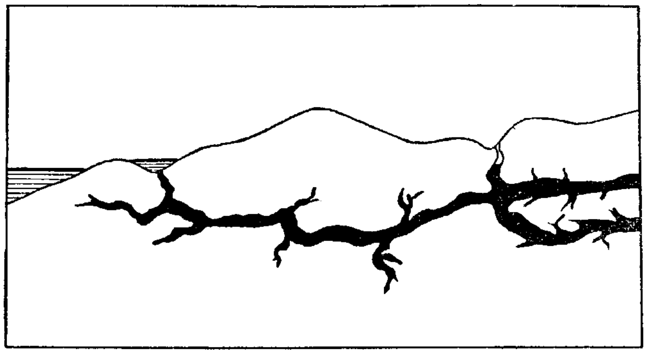


FIG. 43—Diagram showing possible effect of an elevation of the land. A new outlet of the spring has formed, causing former brackish pool to be drained.

Springs flowing into salt marshes (fig. 42) are sometimes found along the coast of Yucatan. A very typical example is the Miramar Spring near Talcha, Yucatan. The water pours from this spring at a fair rate of speed and forms a small stream which meanders toward a brackish water marsh. It would seemingly be an easy task for marine animals to enter into the underground channels in such a situation after they had become physiologically adapted.

TABLE 3—*Showing distribution of the Malacostracan fauna of the cenotes of Yucatan.*

	Hyalella azteca	Cirolana anops	Palæmon morleyi	Typhlatya pearsei	Antromysis cenotensis
Balam Canche Cave Chichen Itza	....	....	X	X	X
San Isidro Cave, Merida	....	X	X	....	X (?)
Amil Cave, Near Merida	....	X	X	....	....
San Bulha Cave, Motul	....	X	X (?)	....	....
Santa Elena Cave, Near Talcha	....	X	....	X	....
Xanaba Cenote Grande, (2) Chichen Itza	X	....	....	....	....
Ixil Cenote, Chichen Itza	X	....	....	....	....
Santa Ana Cenote, Valladolid	X	....	....	....	....

In the event of the land slowly rising (fig. 43), a new spring might form or break through the rock closer to the sea. This might drain the area formerly fed by the spring. The animals living near the spring would then be swept into the underground passageways as the old marsh was drained.

Such species as the amphipod, *Hyalella azteca*, presumably have become established in the cenotes by other means of dispersal. Wind or animal carriers might cause the establishment of this part of the fauna.

Table 3 shows the distributional relationships of the various members of this part of the cenote fauna and indicates that the underground passageways must be exceedingly extensive with possibilities for exchange of fauna. The occurrence of the same species in underground passageways one-hundred and fifty kilometers apart (Chichen Itza and Merida) can plausibly be attributed only to extensive underground passageways with many ramifications and connections. These connections would not necessarily be continuous at any one time. Separate connections from one cenote to a distant one may well have been open at successive geological times.

ORDER CIRRIPEDIA

Family BALANIDÆ

Balanus amphitrite niveus Darwin 1854

Numerous specimens of this barnacle were found attached to a sunken log near the mouth of the Río Champoton, Champoton, Campeche, on July 10, 1932. The same log was riddled with holes gouged out by the isopod, *Shæroma destructor.*

BIBLIOGRAPHY

BOUVIER, E. L.

1905. Observations Nouvelles sur les Crevettes de la famille des Atyidés. *Bull. Sci. France et Belgique*, vol. 39, pp. 57-134.

1925. Récherches sur la Morphologie, les Variations, la Distribution Geographique des Crevettes de la Famille des Atyidés. *Encyclopédie Entomologique*, pp. 1-370.

CALMAN, W. T.

1932. A cave-dwelling crustacean of the family Mysidæ from the Island of Lanzarote. *Ann. Mag. Nat. Hist.*, vol. 10 (55), pp. 127-131, 6 figs.

CAROLI, E.

1924. Su di un misidaceo cavernicolo (Spelaeomysis bottazzii n. g., n. sp.) di Terra d'Otranto. *Atti Reale Acc. Naz. Lincei*, vol. 33, Sem. 2, pp. 512-513.

FAGE, LOUIS.

1925. *Lepidophthalmus servatus* Fage. Type nouveau de Mysidace des eaux souterraines de Zanzibar. *Arch. Zool. Exper. Gen.*, vol. 63, pp. 525-532, 7 figs.

ORTMANN, ARNOLD E.

1894. A study of the systematic and geographical distribution of the decapod family Atyidæ Kingsley. *Proc. Acad. Nat. Sci. Phila.*, pp. 397-416.

RATHBUN, MARY J.

1925. The spider crabs of America. *Bull. 129 U. S. Nat. Mus.*, pp. 1-613, 283 pls.

STEBBING, T. R. R.

1906. A New Costa Rican amphipod. *Proc. U. S. Nat. Mus.*, vol. 31, pp. 501-504, 1 pl.

TATTERSALL, W. M.

1922. Indian Mysidacea. *Rec. Ind. Mus.*, vol. 24, (4), pp. 445-504, 28 figs.

ZIMMER, C.

1915. Die Systematik der Tribus Mysini H. J. Hansen. *Zool. Anz.*, vol. 46 (7), pp. 202-216, 19 figs.