A CONTRIBUTION TO THE SUBTERRANEAN FAUNA OF TEXAS[1]

By CARL JOST ULRICH

WITH FIVE PLATES

In the present paper I propose to describe some of the Arthropods collected by Dr. C. H. Eigenmann in the caves and springs about San Marcos, Tex. The collections were made with a grant from the American Association for the Advancement of Science. The report made by him to the Association at its New York meeting, describing the locality and general character of the cave fauna, may serve as an introduction to the detailed descriptions of species to follow.

"In the early part of September, 1899, I visited San Marcos, Tex., to secure, if possible, some living specimens of the cave salamander occasionally thrown out of the artesian well of the United States Fish Commission. This well taps an underground stream about 190 feet from the surface. No specimens of the salamander *Typhlomolge* came to the surface during my stay, but I received two living specimens from Supt. J. L. Leary.

"Besides the salamander three species of Crustaceans had been secured from this well. These were described preliminarily by Mr. Benedict, *Proc. U. S. Nat. Mus.,* Vol. XVIII. One of these, *Palaemonetes antrorum,* is very abundant, and many are thrown out from the well each day. The eyes of this species are degenerate far beyond those of the blind *Cambarus pellucidus* of the Mississippi valley caves. They will be described elsewhere. The second one, *Ciralonides texensis,* is not nearly so abundant as the first. During my stay of three days I secured several specimens. It can readily be seen in the receiving basin of the well when thrown out.

"The third, *Crangonyx flagellatus,* is much rarer, and no specimen

[1] Contributions from the Zoological Laboratory of the Indiana University under the direction of C. H. Eigenmann, No. 34.

was secured during my stay. Instead, however, a single specimen of a related species (*Crangonyx Bowersii*) was secured.

"These are all the species that can readily be seen with the naked eye, when swimming about the receiving basin. A screen of bolting cloth (No. 2) placed over the outlet for a short time secured a number of additional species, viz., the front half of a new species of *Caecidotea,* two new species of Copepoda, a *Cypridopsis,* and a Crustacean that defied identification and was later lost, as well as a flat worm. The evidence from the screening is that there is yet a rich subterranean fauna to be obtained from this well.

"There is near the well a spring arising evidently from the same source by the side of which the well is insignificant in its yield of water. No blind creatures have been recorded from this spring, and the difficulty in straining its output is much greater than that of straining the well. Through the liberal policy of the Hon. G. M. Bowers and Dr. Hugh M. Smith, of the United States Fish Commission, a plankton net is now in use at the San Marcos well, and we may expect other additions to the fauna of the well and the underground stream it taps.

"Near San Marcos are two small caves. Ezell's cave was formerly open to the public and provided with steps and other facilities for entrance. The opening leads into a pit about forty feet deep, with one side, that nearest the entrance, quite perpendicular, but with some projecting rocks. At the bottom of this pit and at the side furthest from the entrance a smaller opening led downward to the water, which was said to be about one hundred feet from the entrance. The Texas variety of small boy has found amusement in rolling rocks down the entrance, thus smashing the steps and closing the former opening at the bottom of the first series of steps. It was necessary to take a side branch to reach the water. This side branch, for sufficient reasons, I did not take to its end, although my assistants managed to get through to the water, without, however, securing any specimens. I was amply rewarded for not entering the deeper recesses by finding in the twilight of the entrance pit an abundant cave fauna.

"Not far from this cave is Beaver cave. This is a winding, twisting channel of no great height or width. All the available time was devoted to securing specimens, and the cave was not followed to the end. There is no water except in a pit dug in the cave.

"Animals, though few in species, were surprisingly numerous in both these caves. The following species were secured in the well and caves:"

1. A flat worm sp.?—Artesian well.

Mollusca

2. *Helicina orbiculata* Say. } Ezell's Cave.
3. *Vitrea petrophila* Bland, pale var. } Ezell's Cave.
4. *Bifidaria contracta* Say. } Ezell's Cave.
5. *Helicodiscus Eigenmanni* Pilsbry n. sp. } Ezell's Cave.

Crustacea

6. *Cypridopsis vidna obesa* Brady and Robertson. } Artesian well.
7. *Cyclops cavernarum* n. sp. } Artesian well.
8. *Cyclops Learii* n. sp. } Artesian well.
9. *Caecidotaea Smithii* n. sp. } Artesian well.
10. *Ciralonides texensis* Benedict. } Artesian well.
11. *Brackenridgia cavernarum* n. sp. and genus { Ezell's Cave. Beaver Cave.
12. *Crangonyx Bowersii* n. sp. } Artesian well.
13. *Palaemonetes antrorum* Benedict. } Artesian well.
14. *Larval crustacean*, unidentified. } Artesian well.

Myriopoda

15. sp.?—Ezell's Cave. Beaver Cave.

Arachnida

16. *Theridium Eigenmanni* Banks n. sp. { Ezell's Cave. Beaver Cave.

Thysanura

17. *Degeeria cavernarum* Pack. } Ezell's Cave.
18. *Nicoletia texensis* n. sp. } Beaver Cave.

Orthoptera

19. *Ceutophilus Palmeri* Scudder. { Ezell's Cave. Beaver Cave.

Diptera

20. *Larval Chironomus.*—Artesian well.

Vertebrata

21. *Typhlomolge Rathbuni* Stejneger.—Artesian well.

Crangonyx Bowersii n. sp. Pl. XIV.

Specific diagnosis.—Eyes absent, no trace of pigment. Upper antennae $^3/_4$–$^6/_7$ length of body; first joint of peduncle much larger than second; flagellum three times as long as peduncle, consisting of 26 segments; secondary appendage small and slender, of 2 segments. Peduncle of lower antennae little, if any, longer than peduncle of upper; flagellum a little longer than last joint of peduncle, consisting of 8 segments. First and second pairs of legs about equal, the propodos considerably wider than the carpus, palm long,

dactyl closing down between two rows of short, notched spines, about 15 in a row. Peraeopoda subequal; first two pairs nearly equal; the third, fourth, and fifth pairs increasing in length backward, and with expanded femora. The three pairs of pleopoda well-developed, nearly equal in length, two-branched. First pair of uropoda large and broad, with 2 well-developed branches, second pair similar, but shorter and smaller; third pair very small, inner branch rudimentary. Telson narrow, not emarginate, twice the length of third uropods, with 2 sets of 5 stout setae on posterior margin.

Color—White.

Length—About 10 mm.

Hab.—Obtained from artesian well of United States Fish Commission at San Marcos, Tex. (Dr. C. H. Eigenmann).

This species differs from *C. flagellatus* Benedict, also obtained from this well, in the number of segments of the upper antennae, being 40–61 in the latter and 26 in *C. Bowersii*. The flagella of the lower antennae of *C. flagellatus* consist of 8–19 segments, those of *C. Bowersii* of 8. The number of the spines on the propodas is also different, there being 15 in *C. Bowersii* and 24 in *C. flagellatus*.

It differs from *C. mucronatus* Forbes, in the shape and size of the telson, which, in the females of the latter, is very long and slender; in the males, short and emarginate. In *C. Bowersii* the telson is about twice as long as broad, and somewhat rounded at posterior margin. The uropods are different, the second and first pair in *C. mucronatus* being little longer than third, while in *C. Bowersii* they are much longer. The flagella of the lower antennae are not provided with olfactory clubs.

Additional details.—Having but a single specimen, it has not been possible for me to describe all the parts as satisfactorily as I would wish.

Body (fig. 1).—The body is compressed, narrow. Segments of peraeon increase in size from first to fourth. The fourth, fifth, and sixth are nearly equal. Inferior margins rounded. The first, second, and third segments of the pleon are large, exceeding the segments of the peraeon in length. The fourth, fifth, and sixth segments decrease in size backward. The last segment (telson, fig. 11) is as long as fifth and sixth combined, and narrow. Surface of body smooth.

The upper antennae (figs. 1, 2, 3) are about ¾ the length of the body. Peduncle of three segments: first broad and stout; second half as thick as first, not quite as long; third, about $^2/_3$ length of second, somewhat smaller. A few scattered spines on segments of peduncle. Primary flagellum three times as long as peduncle, consisting of 26 segments, all provided with spines, and all, except the first seven or eight and the last provided with a slender olfactory club. Secondary flagellum of 2 small segments, the first about four times as long as the second, and together a little longer than first segment of primary flagellum; provided with spines.

The lower antennae (figs. 1 and 4) are $^1/_3$ as long as upper. The peduncle consists of 5 segments: the first, second, and third short and thick, the fourth and fifth much longer, less thick and spiny. The flagellum consists of 8 segments, each with a few spines, but no olfactory clubs, and together a little longer than third segment of peduncle. Peduncle of lower antennae is not quite as long as that of the upper, but, being inserted somewhat forward of the latter, it reaches as far as peduncle of upper antennae.

The propodos (figs. 6 and 7) are about equal in length, which is 2 mm. The hand of the first is large, with a large palmar surface. Dactyl closes down between two rows of notched spines, a hair growing from the notch in each. There are about 15 such spines in each row. The carpus is about ½ width of hand, nearly triangular, the short posterior margin provided with a row of spines. The coxa has 4 or 5 long slender spines on its posterior margin. The second pair is smaller, the hand being $^1/_3$ wider than carpus, the latter larger than in first and more rounded, the posterior margin with three transverse rows of 5 spines each, as in *C. mucronatus.*

The peraeopoda (figs. 8 and 9) are much alike in structure. The first two pairs are rather short and do not have their femora expanded as is the case with the remaining three pairs. They are all more or less spiny and end in a claw. Fig. 8 shows a gill-like structure attached to the proximal end. Length of seventh leg, 4.5 mm.; width of femur, ¾ mm.

The pleopoda (fig. 10) are well developed. The basal portion is about ¾ mm. in length and rather stout. The branches are well developed, a little longer than basal portion and fringed with long plumose setae.

The uropoda (figs. 1 and 11). The first pair is very large. The

basal portion is equal in length to the third and fourth abdominal segments, while its two branches are nearly as long. The latter extend beyond the telson and the second and third pair of uropods. They end in 4 large spines. The second pair is much like the first in structure, but shorter and smaller. The third pair has a short basal portion, and one branch, the outer ending in 2 spines. The inner branch is an unarmed rudiment. In length the third uropod extends but a little beyond the peduncle of the second pair.

I take pleasure in naming this species for the Hon. G. M. Bowers, United States Commissioner of Fish and Fisheries.

Ciralonides texensis Benedict. *Proc. U. S. Natl. Mus.*, p. 615, 1895. Pl. XV.

The body of the largest specimen examined was 16.5 mm. in length with a width of 6.5 mm. In shape it is oblong elliptical. The depth is greatest at about the middle of the body, being about $^1/_3$ the breadth. All of the segments have the pleura produced below and posteriorly into scale-like projections, thus protecting the insertion of the limbs. Above, the surface is smooth.

The head is short, convex toward the top and front, and, seen from above, almost circular in outline. There is no trace of eyes.

The first segment of the peraeon is about twice as long as the second. It widens a little inferiorly, the antero-inferior parts partly surrounding the head. The posterior margin is nearly straight. The inferior margin is slightly convex. The second segment is the shortest of the seven composing the peraeon. The third, fourth, fifth, sixth, and seventh are much the same in size and shape. They are produced posterio-inferiorly, and this becomes more pronounced toward the pleon.

The segments of the pleon are much shortened, and all five of them together are little longer than one segment of the peraeon. They, too, are produced into a point inferiorly, but do not extend down quite as far as the segments of the peraeon. The first segment of the pleon is almost hidden by the last of the peraeon. As in other representatives of this family, the pleon is very distinct from the peraeon.

The telson is large and well-rounded behind. In width it somewhat exceeds the pleon.

The antennae consist of (*a*) a basal portion, composed of 5 segments, the first broad and short, the second and third about equal in length to the first and $^2/_3$ as wide, the fourth twice as long as the

third, and of nearly equal width, and the fifth $^1/_3$ longer than the fourth and $^2/_3$ its width; and (*b*) a flagellum consisting of 33–35 segments, of which the first is the longest, the second and third about as long as broad. The remaining segments are relatively longer and taper gradually to a point. There are setae at the joints, and the last segment terminates in a number of hair-like bristles. When applied to the sides of the body the antennae reach to the anterior margin of the seventh segment of the peraeon.

The antennulae have a basal portion consisting of three articles of which the first is nearly spherical; the second and third are elongated, about three times as long as broad. The flagellum consists of 15–16 segments, the first very short, the second longest, and the remaining ones all longer than broad. There are a few setae at some of the joints. The antennulae are about $^1/_3$ the length of the antennae.

The first pair of legs are short and stout, armed with a strong claw at the end and a number of spines along the inner margin. From their position and structure, it might be inferred that they are used in grasping food and conveying it to the mouth.

The remaining four pairs of legs are longer and more slender, serving as organs of locomotion. In structure they are much alike. Each is armed along the inner margin with spines and ends in a double spine forming a sort of claw.

The pleopoda are small and are completely covered by the pleon. Each consists of a short, basal portion to which are articulated two distal branches. The larger, outer branch consists of a broad, thin lamella, unsegmented in the first pair, but distinctly segmented in the remaining four pairs. Of these segments, the first is the larger, rather broad, almost square, while the second is shorter, rounded at distal margin, and fringed with a row of plumose bristles. This outer branch seems to be of firmer texture, and covers the more delicate inner branch. The inner branch in the first and second pairs is nearly as long as the outer, but much narrower, and consists of a single segment, fringed with plumose bristles at the extremity. In the remaining pairs this inner branch is also segmented, a fact which seems quite out of the ordinary in Isopods. The first segment is short and triangular, the second broad and rounded, and not fringed with bristles.

In Bronn, Klassen und Ordnungen des Thier-Reichs, Vol. V,

2, pp. 35–36, a comparison is made between the pleopoda of the Isopods and the so-called pedes fissi of Copepods. In the former the rule is that the branches are *not* segmented; in the latter that they *are* segmented, and the usual number of segments is 3. But there are Copepods in which the number of segments in both branches is reduced to 2, and even some in which the inner branch consists of a single segment. And, on the other hand, there are Isopods in which the outer branch consists of 2 segments, so that we notice a tendency of the two orders to approach each other in this respect. "Unter allen Umständen bekunden schon die vorstehend aufgeführten die an den Isopoden-Spaltbeinen hervortretende Tendenz, den Aussenast eine Gliederung eingehen zu lassen, während der innere eine solche stets vermissen lässt, zur Genüge." It will be noticed that the last statement in this quotation does not hold true in the present case. Nevertheless, the fact that in this case both branches are segmented adds another proof to the above statement, that the two orders approach each other.

The uropods are considerably shorter in this species than in other Isopods, extending but a little beyond the telson. They are stoutly built, with a triangular basal portion nearly as long as the distal portion. Of the latter, the inner branch is three times as wide as the outer, and its inner margin, as well as that of the basal portion, is fringed with plumose bristles. The extremities of both branches are provided with a number of stiff bristles.

The mouth-parts indicate that the animal is not parasitic, being clearly adapted for biting. The mandibles are large and strong, somewhat unequal, with a hard, rough cutting surface which is almost black in color. The maxillae are provided with several long, pointed teeth, their dark color indicating their hardness. The maxillipeds and palpi are much the same as in other related species, and are perhaps sufficiently described by the drawings.

Brackenridgia Eigenmann and Ulrich, n. gen. Pl. XVI.

Eyes none. Antennulae absent. Peduncle of antennae of 5 segments, flagellum shorter than fourth or fifth segment of peduncle, bristly. Legs long and slender, all ambulatory, increasing in length posteriorly. Pleopods with air-cells. Outer branch of uropods longer than pleon, conical. Inner branch much smaller, spiny. Mouth-parts much like those of *Titanethes* Schioedte; right mandible with two appendages back of cutting surface, first short, sec-

ond twice as long, fringed on inner side; another fringed appendage on the hind cutting surface. Left mandible with two fringed appendages next to cutting surface. Third maxilliped (labrum) with 3-segmented palpus, and two small projections on anterior margin. Body somewhat arched, oval, epimera drawn out postero-inferiorly. Last segment of pleon bluntly triangular. Cave dwellers. Allied to genus *Titanethes* Schioedte, which occurs in caves in Europe.

This genus has been named in honor of Mr. G. W. Brackenridge, of San Antonio, Tex., a liberal patron of the natural sciences.

Brackenridgia cavernarum n. sp. Pl. XVI, 1–9.

This interesting species, which forms the type of a new genus of the Isopoda, was collected by Dr. C. H. Eigenmann during the summer of 1899 in two caves near San Marcos, Tex. These caves are known as Ezell's and Beaver caves, and are but a short distance apart. The animal seems to be quite abundant here, some twenty or thirty having been obtained in a short time. Up to the present time no representative of the European genus *Titanethes* or of any closely allied genera has been described for the United States, and this genus and species form an interesting addition to the crustacean fauna of this country.

In size this species is rather small, being from 2–6 mm. in length. The body is slightly arched. The head is round in front, its posterior margin quite straight. The first thoracic segment partly surrounds the head on the sides. The thoracic segments are nearly equal. The inferior margins are drawn out to a point posteriorly, this being emphasized toward the pleon. The lower margins of the segments are beset with minute spines. The pleon is short, the segments not easily recognized, and the inferior margins not conspicuously drawn out. The sixth abdominal segment is slightly longer than the others, and bluntly triangular at posterior margin. The latter is beset with short spines.

There seems to be no trace of eyes or antennulae. The antennae are about ½ the length of the body, and consist of a basal portion of 5 segments and a short flagellum of 8 segments. Of the basal portion, the first three segments are short and stout, with a few short spines. The fourth and fifth segments are much longer, the former being 2½ times the length of the third, with equal width, the latter about $1\frac{1}{3}$ times the fourth, with nearly equal thickness. Both are beset with short spines along the sides, and the fifth has

one specially long spine near its distal end. The flagellum consists of 8 segments, rapidly tapering to the small extremity, and altogether less than the fifth basal segment in length. Each segment has a row of stiff hairs, probably sense organs of some kind, around its middle region. The last segment ends in a number of bristles.

The mouth-parts are such as we would expect in a non-parasitic Isopod. The outer maxilliped (labrum) consists of a broad blade with two pointed appendages in front which extend slightly beyond the head, and a three-segmented palpus. The first maxilla consists of a narrow blade fringed with bristles on the outer side and provided with a cutting surface having five notches, two being hard and three of softer texture. The inner branch of the same is also rather slender, with three teeth, two of them rounded and delicate, one longer and fringed. The mandibles are large and strong. The inner margin of the right mandible is provided with three appendages, the first short, the second and third longer and fringed along the inner margin. On the left mandible we find two equal fringed appendages, corresponding to the first and second in the right mandible.

The legs, all of which are ambulatory in character, are much alike in structure, consisting of five segments and a claw composed of two more. Short spines with broad bases are found scattered all over the surface of the legs, together with some longer ones, especially on the last segment. The claw needs perhaps a little more description. It consists of 2 segments, the first, larger one, ending in a spine on the concave side, and a shorter, pointed end segment. Besides these there are two appendages, one on the convex side as long as the claw and rather thin and narrow, ending squarely, and a pointed one, not quite so long and wide, on the concave side. In the allied genus *Titanethes* Schioedte these appendages end in a tuft of hairs, but nothing of the kind could be made out here. The legs increase in length toward behind, the last being half the length of the body.

The pleopoda are very small. As in other terrestrial Isopods, the anterior ones contain air-cells.

The uropoda consist of a broad basal portion with a stout conical outer branch, longer than the whole of the pleon, and tipped with four or five bristles, the longest of which are about ¾ the length of this branch. The inner branch is much smaller and shorter, beset

with numerous short spines on the inner margin, five or six, slightly longer, on the outer margin, and a stout spine at the tip. The basal portion of the uropods projects beyond the posterior margin of the telson on the outer side, but is covered on the inner side.

Color.—White; a dark longitudinal band often seen along the median dorsal surface, caused by the dark contents of the alimentary tract.

Caecidotea Smithii n. sp. Pl. XVI, figs. 10–18.

Body of loosely jointed segments. Head as in *C. stygia* Pack. No trace of eyes. Inner antennae short, not more than half as long as basal portion of outer antennae. Flagellum of inner antennae consists of five segments, the second ¼ of first, remaining ones longer. Last segment of flagellum with a spine more than twice length of segment, beside which there is an olfactory club $^2/_3$ as long. Another somewhat shorter olfactory club on penultimate segment. Last segment of the basal portion of the inner antennae provided with three spines, as in *C. stygia.* Outer antennae probably as long as body. Basal portion of 5 segments, the first three short and thick, the fourth and fifth much longer and more slender. The flagellum consists of at least 40 segments. Mouth-parts essentially as those of *C. stygia.* Legs long and slender, first pair sub-chelate, remaining ones with a weak claw. Inferior margin of the body segments beset with short spines.

Size.—Very small, probably not over 3 mm. in length.

Color.—White.

Hab.—Subterranean stream near San Marcos, Tex. Collected by Dr. C. H. Eigenmann from the United States Fish Commission well

The above description is from a fragment. The telson and caudal appendages were gone, also part of the outer antennae. The writer hopes soon to receive the material which will enable him to fill out the gaps in the above diagnosis.

In honor of Dr. H. M. Smith, in charge of scientific inquiry of the U. S. Fish Commission.

Palaemonetes antrorum Benedict. *Proc. U. S. N. Mus.,* p. 615. 1895. Pl. XVII.

Prothorax continued forward into a short, sharp rostrum, the upper margin of which is notched, there being about 12 notches, with plumose spines between the notches, also a few of these on the under side of the rostrum. Just below and to the outside are the

eye-stalks with very degenerate eyes. There is but one little group of cells left which indicates the original structure, but as far as practical use is concerned the eyes must be entirely functionless. Below the eye-stalks are the inner antennae, or antennulae, and below and to the outside of these the outer or true antennae. The former consist of a stalk composed of 4 segments, the first and second of which are broad and on the under side are continued into a keel-like structure fringed with plumose bristles. The third segment is narrower and a little longer than the others, while the fourth is very short. This bears three appendages, the outer one being the longest, equalling or slightly exceeding the length of the body. The inner flagellum is little over half the length of the outer. The third appendage is short and pointed, and bears along its inner margin a row of structures resembling olfactory clubs. The other two appendages have about the same structure as the true antennae, consisting of numerous segments which gradually taper off to the end. The outer antennae spring from a broad base consisting of three segments. The second of these divides, one part being continued into a large and broad antennal scale fringed with long bristles, and extending beyond the rostrum one-half its length. The third basal segment is much smaller than the others, and much less in thickness. The flagellum of the antenna consists of numerous segments, gradually tapering to the extremity. The total length of the antennae is 26–27 mm. in specimens whose body length is 17 mm.

The first and second pairs of maxillipeds (figs. 13 and 12) are somewhat alike in structure, consisting of a broad, flat portion, stronger in the second, provided with numerous spines and bristles. The third maxilliped has much the same character as a foot (fig. 11). All three are provided with a slender palpus, which ends in a tuft of hairs.

The legs are all very long and slender. The first and second pairs are chelate, but the chelae are so small that they can be of but little use to the creature. The remaining three pairs end in a crooked claw.

The swimmerets are well developed. There is a stout basal portion and two branches, an outer longer and stouter one, and an inner shorter one. The latter undergoes interesting modifications in the several pairs. In the first it is short and broad, membranous, and fringed with scattered bristles. In the second it has two little

branches springing from the inner side, the first unarmed, the second with a number of bristles (not plumose). In the third there is but one unarmed side branch, and the same is true of the fourth and fifth. In the basal portion of the fourth we find a single spine on the inner margin, but in the fifth both inner and outer margins are fringed with scattered bristles. The two distal branches are closely fringed with long plumose bristles.

The telson consists of a conical central portion, its posterior margin beset with two larger and several smaller bristles, and the broad side portions, modified swimmerets, all except the outer margin of which closely fringed with plumose bristles.

The gills are completely covered by the carapace. They agree in structure, etc., with those of the allied families of crustaceans.

CYCLOPS:

Two specimens of this widely distributed genus were found in the water of the artesian well mentioned above. They are both blind, as far as external examination can show. They were preserved in formalin which, in other cases at least, did not decolorize the eyes if there were any. The following descriptions are intended to be preliminary only, and as soon as the necessary material is at hand a more detailed study and comparison with other related forms will be made.

Cyclops cavernarum n. sp. Pl. XV, fig. 18.

Antennae 17-jointed, reaching to middle of second thoracic segment. No trace of eye. Cephalothorax oval-elongate. Abdomen stout.

Cyclops Learii n. sp. Pl. XV, fig. 19.

Antennae 12-jointed, scarcely reaching the posterior margin of first thoracic segment. Cephalothorax oval, shorter than in *C. cavernarum*. No trace of eye. Abdomen rather slender.

Cypridopsis vidua obesa Brady and Robertson.

This species was represented by numerous specimens in the collections from the artesian well.

Nicoletia[2] *texensis* n. sp. Pl. XVIII.

Two specimens were found by Dr. Eigenmann in Ezell's cave, near San Marcos, Tex. The body of the larger is about 18 mm. in length; that of the smaller about half as much. The antennae were not complete, but seem to be at least as long as the body. The same is true of the caudal appendages. In form and appearance the body is much like that of *Campodea staphylinus* Westw., though the head is relatively smaller and the thoracic region larger (see fig. 1).

Head.—Rather small, rounded on the sides, slightly pointed anteriorly, convex above (fig. 1). Antennae very long, of numerous segments (in the imperfect specimens I examined I counted about 40, and there might have been as many more, judging from the thickness of the last segment). The basal portion consists of 2 segments, the first half as long as head, rather stout, the next short, as long as broad; first segment of flagellum three times as long as second; second and following segments short, gradually lengthening toward distal portion. Basal portion as well as flagellum with numerous spines, some of them forked at tip. Besides these, the whole surface is covered with minute hairs (fig. 8). There seems to be no trace of eyes. The labrum is provided with a transverse row of bristles, as well as with some scattered ones. The mandibles (fig. 7) are large and prominent; there are four larger teeth and several smaller ones; the inner grinding surface is provided with a fine, comb-like arrangement. The maxillae (fig. 4) are also large and conspicuous. There is one large, hard tooth, then one with a comb-like arrangement, then follow five with one side finely serrate, another with smooth margins, and then a row of stout bristles forked at the tip. The maxillary palp is long and slender, having the appearance of an antenna. It consists of 5 segments, the first short and thick, the remaining ones long and slender; the second and

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[2] Key to the genera of Lepismidae by Nathan Banks.

1. With scales..... 2
   No scales..... 5
2. No eyes..... 3
   With eyes, body slender, cerci longer than abdomen..... 4
3. Body broad, cerci shorter than body, *Lepismina*
   Body slender, cerci longer than body, *Troglodromicus*
4. Maxillary palpi, 5-jointed..... *Lepisma*
   Maxillary palpi, 6-jointed..... *Thermobia*
5. Eyes present..... *Maindronia*
   Eyes absent..... *Nicoletia*

Nicoletia.—Abdominal appendages on segments 2-9, cerci nearly as long as body, no eyes, no scales, maxillary palpi 5-jointed, mandibles tridentate at tip, body not very slender.

Four species are known: *N. phytophila* Gerv., *N. geophila* Gerv., *N. cavicola* Joseph, *N. naggi* Grassi.

third each have a row of spines near the distal ends (fig. 5). On the end of the last segment there are five club-shaped structures, probably sense organs of some sort (fig. 6). The whole palp is covered with minute hairs and with larger spines. The labium is broad posteriorly, cleft anteriorly, with large palps, of four joints each, the last broad and heart-shaped, with three short cylindrical structures on the end (fig. 3).

The first thoracic segment is little longer than the head, but the second and third are much larger. The margin is somewhat produced postero-inferiorly. The legs are rather long and slender, hairy, with a triple claw (fig. 2). The latter seems hard and is yellow in color.

There are 10 abdominal segments. The last two are rather short. The abdominal legs are found on the second to eighth segments. The ninth is provided with two long appendages, while the last ends in one long median appendage. These three have been mentioned above under caudal appendages. The abdominal legs are rather weak, of one joint, ending in a straight claw, with several spines. The caudal appendages consist of numerous segments, lengthening toward the tip, and elaborately fitted out with spines and bristles, some of which are stout and forked, others very long and slender. They seem to be arranged in a definite way (see fig. 9).

Color of specimens preserved in formalin: yellowish white.

Degeeria cavernarum Pack. Pl. XVIII, figs. 11–13.

Two specimens of this common Podurid were obtained from Ezell's cave. They differ from the form found in the vicinity of Bloomington by the longer antennae. Especially the fourth segment is much longer than in forms found here.

DESCRIPTION OF A NEW CAVE SPIDER BY NATHAN BANKS

Theridium Eigenmanni n. sp.

Female, length ceph. 2.1 mm.; femur I=8.2 mm.; tibia I=7 mm.

Cephalothorax, legs, and sternum pale reddish yellow; mandibles a little darker; abdomen variable, sometimes entirely pale, sometimes black all over except two pale spots on highest part and a row of two or three reaching to the spinnerets; between these extremes are many grades of markings, some with a few black spots above, others with a row of chevrons behind and several large spots on each side above.

General structure similar to *T. tepidariorum*. Cephalothorax rather broad, depressed around dorsal groove; caput rather low, broad; posterior eye-row nearly straight; P. M. E. about twice their diameter apart, a little closer to the sub-equal P. S. E.; A. M. E. about once their diameter apart, a trifle farther from the slightly smaller A. S. E.; M. E. make a quadrangle slightly higher than broad, and broader above than below; mandibles of moderate size; sternum blunt-pointed between the hind coxae; legs long and slender, clothed with rows of fine short hairs; femur I full as long as the cephalothorax and abdomen taken together; tibia I a little longer than metatarsus I; abdomen high, strongly arched above at middle, suddenly descending behind, higher than in most of the allied forms; the lung-plates each side at base are reddish and hardened. The epigynum shows two dark spots with a narrow transverse opening behind. Male, unknown.

Specimens from Beaver cave and Ezell's cave, near San Marcos, Tex.; collected by Prof. C. H. Eigenmann, after whom the species is named. The specimens from Beaver cave are darker than the others.

CHIEF WORKS CONSULTED

1. BENEDICT, J. E.
Preliminary description of a new genus and three new species of Crustaceans from an artesian well at San Marcos, Tex. *Proc. U. S. Nat. Mus.*, Vol. XVIII. 1895.

2. BLATCHLEY, W. S.
Indiana caves and their fauna. *21st An. Rept. of Dept. of Geol. of Ind.* 1896.

3. BRONN.
Klassen und Ordnungen des Thier-Reichs. *Arthropoda*, Vol. V, Pt. 2. 1892.

4. CALL, R. ELLSWORTH.
Some notes on the flora and fauna of Mammoth Cave, Ky. Reprint from *Am. Nat.*, pp. 377-92. May, 1897.

5. CHILTON, CHARLES.
The subterranean Crustacea of New Zealand, with some general remarks on the fauna of caves and wells. 1894.

6. FORBES, ERNEST B.
A contribution to a knowledge of North American fresh-water Cyclopidae *Bull. Ill. St. Lab. of Nat. Hist.*, Vol. V. 1897.

7. FORBES, S. A.
List of Illinois Crustacea. *Bull. Ill. Mus. of Nat. Hist.*, No. 1. Dec., 1876.

8. HAMANN, OTTO.
Europäische Höhlenfauna. 1896.

9. HERRICK, C. L.
Copepoda, Cladocera, and Ostracoda of Minnesota. *Geol. and Nat. Hist. Surv. of Minn.* 1895.

10. LEUNIS, J.
Synopsis der Thierkunde, Vol. 2. 1886.

11. LUBBOCK, JOHN.
Monograph of the Collembola and Thysanura. 1873.

12. PACKARD, A. S.
The cave fauna of North America, with remarks on the anatomy of the brain and origin of the blind species. 1886.

EXPLANATION OF PLATES

Plate XIV

Crangonyx Bowersii Ulrich.

Fig. 1. C. Bowersii.
Fig. 2. Upper antennae, basal portion; 2*a*, secondary flagellum.
Fig. 3. Last three segments of upper antenna; 3*a*, olfactory club.
Fig. 4. Lower antenna.
Fig. 5. Maxilliped.
Figs. 6, 7. First and second gnathopods.
Fig. 8. One of the fourth pair of legs; 8*a*, gill.
Fig. 9. One of the sixth pair of legs.
Fig. 10. One of the pleopoda.
Fig. 11. The telson, uropoda, etc; 11*a*, fifth abdominal segment; 11*b*, sixth abdominal segment; 11*c*, telson, 11*d*, first uropod, 11*e*, second uropod; 11*f*, third uropod.

Plate XV

Figs. 1–17. *Ciralonides texensis* Benedict.
Figs. 2–6. Thoracic legs.
Figs. 7, 8. Upper and lower antenna.
Fig. 9. End of lower antenna.
Fig. 10. Uropod.
Fig. 11. Mandibles.
Fig. 12. Labrum.
Fig. 13. Maxilla.
Fig. 14. Ventral view of head.
Figs. 15, 16, 17. The first, second, and third pleopoda.
Fig. 18. *Cyclops cavernarum* Ulrich.
Fig. 19. *Cyclops Learii* Ulrich.

Plate XVI

Figs. 1–9. *Brackenridgia cavernarum* Ulrich.
Fig. 2. Antenna.
Fig. 3. Mandibles.
Fig. 4. Labrum.
Fig. 5. Maxilla.
Fig. 6. Thoracic leg.
Fig. 7. Claw.
Fig. 8. Telson, with uropods.
Fig. 9. One of the uropods.
Figs. 10–18. *Caecidotaea Smithii* Ulrich.
Fig. 11. Portion of lower antenna; 11*a*, basal portion of same.
Fig. 12. Upper antenna.
Fig. 13. Basal segment of upper antenna showing auditory spines, *an*.
Fig. 14. End segments of upper antennae, showing olfactory clubs, *ol*.
Fig. 15. Labrum.
Fig. 16. Maxilla.
Figs. 17, 18. First and second legs.

Plate XVII

Palaemonetes antrorum Benedict.

Fig. 1. *P. antrorum*.
Figs. 2–6. Thoracic legs.
Fig. 7. Basal portion of lower antenna.
Fig. 8. Portion of third (shortest) flagellum of upper antenna. *ol*, olfactory clubs.
Fig. 9. Basal portion of upper antenna.
Fig. 10. Telson.
Figs. 11, 12, 13. Maxillipeds.
Fig. 14. Gill.
Fig. 15. Rostrum.
Figs. 16–20. Pleopoda.

PLATE XIV

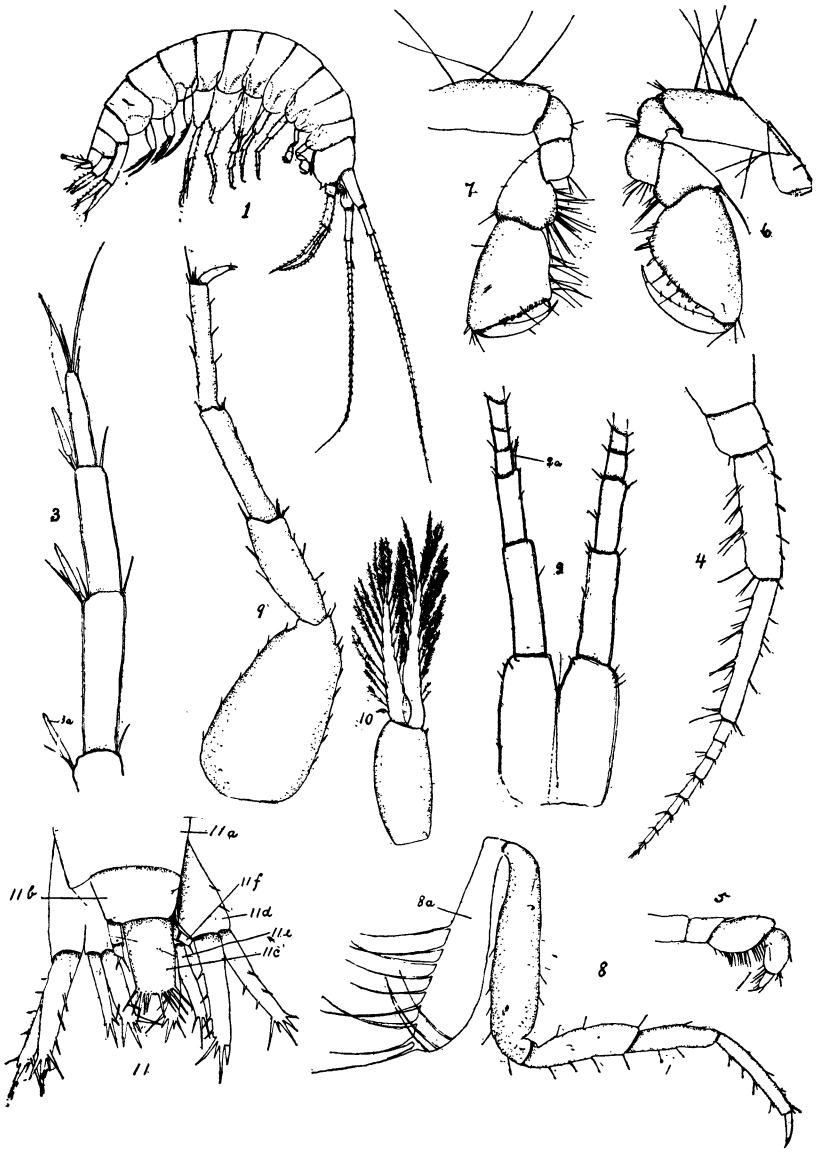

PLATE XV

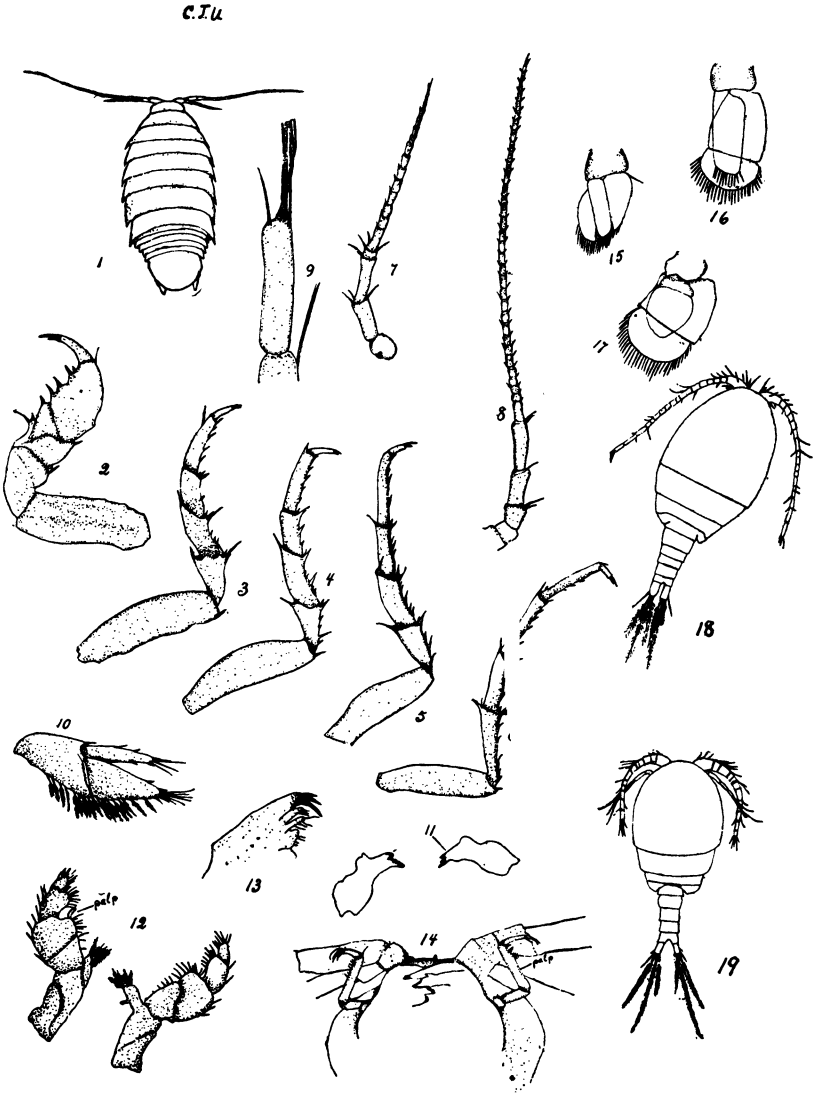

PLATE XVI

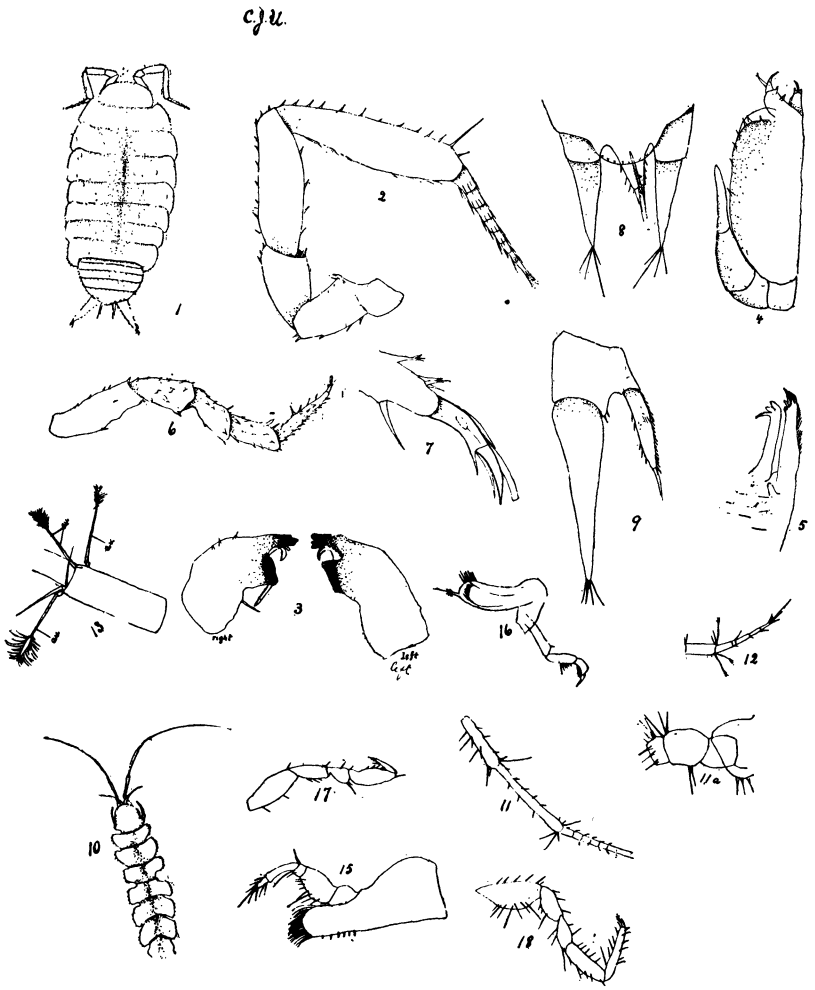

PLATE XVII

PLATE XVIII

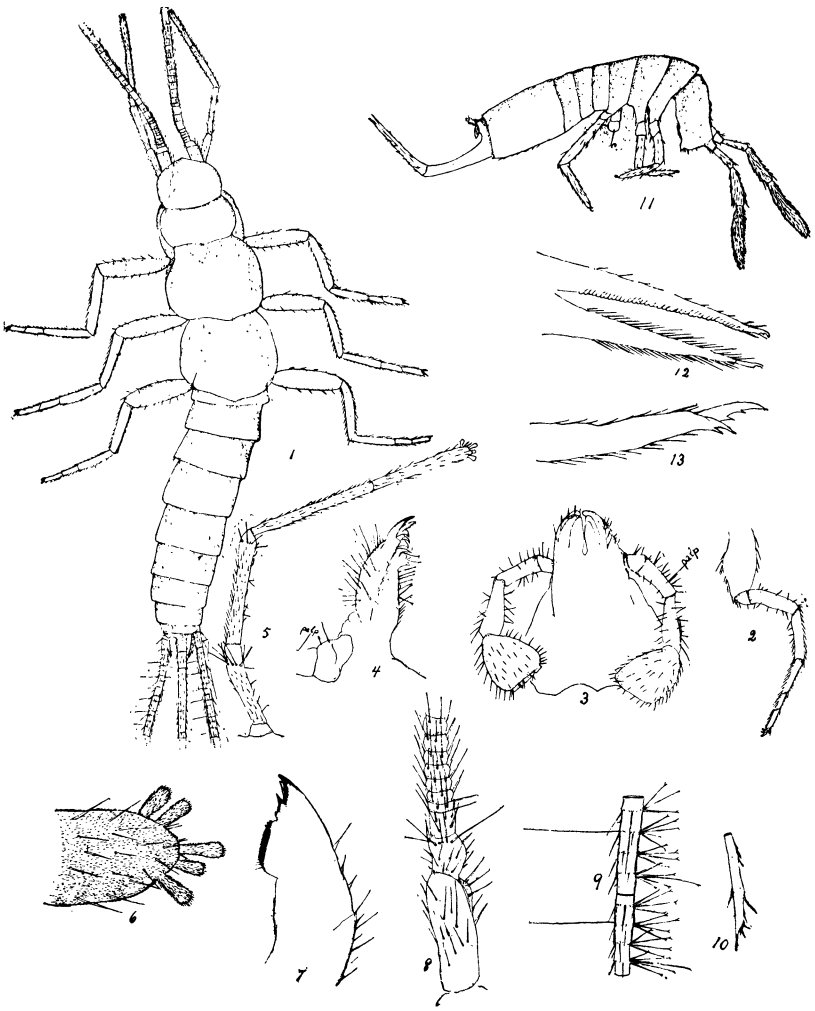

Plate XVIII

Figs. 1–10, *Nicoletia texensis* Ulrich.
Fig. 2. Thoracic leg.
Fig. 3. Labium.
Fig. 4. Left maxilla.
Fig. 5. Maxillary palpus.
Fig. 6. End of max. palpus showing peculiar sense (?)organs.
Fig. 7. Left mandible.
Fig. 8. Basal portion of antenna.
Fig. 9. Two segments of cercopod.
Fig. 10. Abdominal leg.
Figs. 11–13. *Degeeria cavernarum* Pack.
Fig. 12. End of elator.
Fig. 13. Claw.