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the egg-capsules. These are in fact nothing more than killed distorted protozoa of the genus Epistylis or Zoöthamnium, clusters of which I have frequently observed in the living condition on the ends of the egg-capsules in fresh material presenting almost precisely the appearance represented in Fig. 2 *b c*, of Gissler's note. They are present or absent according as opportunity may have been afforded for the protozoans to attach themselves, the oldest capsules and those from which the embryos had escaped, being the ones to which the Vorticellinæ had most often affixed themselves. At the time my note was written I did not think it worth while to mention the occurrence of the protozoa which are very common, the stalked forms especially. So numerous are these, in places, that to estimate their occurrence at one hundred per square inch of horizontal surface, we find the population of a square rod to be nearly four millions (more exactly 3,896,800). From what I have seen in the Chesapeake, this estimate, in many localities, would be very low, from which it may be inferred that the importance of the part played by the protozoa in the economy of the world of life is, like that of the earth-worm, not yet appreciated at its right value.—*J. A. Ryder.*

Notes on Some Fresh-water Crustacea, Together with Descriptions of Two New Species.—*Palæmon ohionis* Smith.—(*Palæmon ohionis.* Smith, S. I., Freshwater Crustacea, U. S. 640; Forbes, S. A., Bulletin Ills. Mus. Nat. Hist., No. 1, 5.) While seining for fishes in the vicinity of Vicksburg, Miss., during the past summer, I captured numerous specimens of this species. The largest specimens were taken in the open river with a small, fine-meshed, collecting seine. In some places they occur in enormous numbers. On the 4th of July we were in Louisiana, across the river from Vicksburg, seining in some ponds formed in the making of levées along Grant's canal. At a single draw of the net we brought out not less than a half bushel of these river shrimps. Considering their size and abounding numbers, they must constitute an important part of the food of the fishes of these waters. They are captured for bait, and are used to some extent for food; and I can, from actual experience, testify that they are not to be despised by the hungry hunter. My largest specimens agree exactly in size with those obtained by Professor Smith from the Ohio river at Cannelton, Ind. Many of the females were laden with eggs. The mandibles of this species, as in the case of many other crustaceans, are not perfectly symmetrical. The biting portions of the two mandibles are alike and tridentate. The triturating process of each is long, and stands out at right angles to the body of the mandible. That of the left mandible is truncated at nearly right angles; that of the left is quite oblique, so that a dentated edge is presented to the other mandible. Both molar surfaces are tuberculated.

Palæmonetes exilipes Stimpson.—(*Palæmonetes exilipes* Smith, S. I., loc. cit., 641 ; Forbes, S. A., loc. cit., 5.) I have collected this species in tributaries of the Tombigbee and Noxubee rivers, in Eastern Mississippi, in the Mississippi river at Memphis, in Pearl river at Jackson, and in the Chickasawha river at Enterprise, Miss. It is now known to occur as far north as Ecorse, Mich., in South Carolina and Florida, in Mississippi and in Illinois.

Crangonyx lucifugus, n. sp.—This is a small, rather elongated species, that was obtained from a well in Abingdon, Knox county, Illinois. As befits its subterranean mode of life, it is blind and of a pale color. In length the largest specimens measure about 6^{mm}.

Male.—Antennulæ scarcely one-half as long as the body. The third segment of the peduncle two-thirds as long as the second; this, two-thirds the length of the first. Flagellum consisting of about fourteen segments. The secondary flagellum very short, and with but two segments. Antennæ short, only half as long as the antennulæ. Last two segments of its peduncle elongated. Flagellum consisting of but about five segments, and shorter than the last two segments of the peduncle taken together.

Second pair of thoracic legs stouter than the first. Propodite of first pair quadrate, with nearly a right angle between the palmar and posterior margins. Palmar surface on each side of the cutting edge, with a row of about six notched and ciliated spines, one or two of which at the posterior angle are larger than the others. The cutting edge is entire. Dactylopodite as long as the palmar margin, and furnished along the concave edge with a few hairs.

Propodite of the second pair of legs ovate in outline, twice as long as broad. The palmar margin curving gradually into the posterior margin. The cutting edge of the palmar surface uneven, and having near the insertion of the dactyl a square projection. The palmar surface also armed with two rows of notched and ciliated spines, five in the inner row, seven in the outer. Dactyl short and stout.

Two posterior pairs of thoracic legs longest of all and about equal to each other. All the legs are stout and their basal segments squamiform.

Postero-lateral angle of first abdominal segment rounded; of second and third, from obtuse-angled to right-angled.

First pair of caudal stylets extending a little further back than the second; these exceeding slightly the third. The peduncle of the first pair somewhat curved, with the concavity above, the rami equal and two-thirds as long as the peduncle. The peduncle of the second pair little longer than the outer ramus. Inner ramus nearly twice as long as the outer. Third pair of caudal stylets rudimentary, consisting of but a single segment. This somewhat

longer than the telson, broadly ovate, two-thirds as broad as long and furnished at the tip with two short spines.

Telson a little longer than wide, narrowing a little to the truncated tip, which is provided at each postero-lateral angle with a couple of stout spines.

Female.—In the female the propodite of the anterior pair of feet resembles closely that of the corresponding foot of the male. The palmar margin of the second propodite is less oblique than in the second foot of the male, and does not pass so gradually into the posterior margin. It is also destitute of the jagged edge and the square process of the male foot. There are fewer spines along the margin. One of the spines at the posterior angle is very long and stout.

This species appears to resemble *C. tenuis* Smith, but is evidently different. In that species, as described by Prof. S. I. Smith, the first pair of feet are stouter than the second, and have the palmar margin of the propodite much more oblique. The reverse is true of the species I describe. Nor do I understand from the description of *C. tenuis* that the posterior caudal stylets each consist of a single segment. There are some minor differences. From *C. vitreus*, judging from Prof. Cope's description in AMERICAN NATURALIST, Vol. VI, p. 422, it must differ in the caudal stylets. "Penultimate segment, with a stout limb with two equal styles," is a statement that will not apply to my species, whichever the "penultimate" segment may be.

Crangonyx bifurcus, n. sp.—General form and appearance those of the Western variety of *C. gracilis*. Length of specimens about 9^{mm}. Eyes oval, black. Antennulæ scarcely half the length of the body. First two basal segments of the peduncle about equal in length; the first much the stouter; the third segment about two-thirds as long as the second. Primary flagellum about twice the length of the peduncle, consisting of about twenty-four segments. Secondary flagellum scarcely as long as the basal segment of the primary flagellum, consisting of but two segments. Antennæ about one-half as long as the antennulæ. Basal segments short, the first provided with a prominent process, which appears to be perforated (the opening of a gland?). Ultimate and penultimate segments of the peduncle elongated and equal in length. Flagellum shorter than the two distal segments of the peduncle and consisting of about eight segments. The antennæ furnished with about a dozen curious sensory organs; three of these on each of the two distal segments of the peduncle; the segments of the flagellum with one each, except the terminal three or four, which have none. These organs in alcoholic specimens resemble, under the microscope, a lanceolate or oblanceolate leaf having a midrib and parallel veinlets running from this to the margins.

Propodite of first thoracic foot subquadrate in outline; a very little longer than wide. Palmar surface somewhat oblique, armed

on each side of the cutting edge with about a dozen notched and ciliated spines. Two or three short, stout and serrated spines at the posterior angle. A number of stiff, slender hairs planted among the spines. Dactylopodite scythe-shaped, bent rather abruptly near the base, then straight, and finally incurved near the tip. Propodite of second foot more elongated than in the first foot, and with a more oblique palmar surface; armed with about fourteen spines along each side of the cutting edge. The first, second, and third abdominal segments have their postero-lateral angles drawn backward into a decided tooth.

Of the three pairs of caudal stylets, the first extends backward beyond the second; the second beyond the third. The latter consists of a stout peduncle and a single ramus, which is about two-thirds as long as the peduncle and provided with a few slender spines. There appears to be no inner ramus, but there is to be seen on the inner side of the ramus present a process of the peduncle that represents, perhaps, the inner ramus. There is, however, no involution of the integument at the base of this process. Telson elongated, twice as long as broad, the sides nearly parallel. The posterior border is provided with a notch that extends nearly three-fourths of the distance to the base. Each prong is armed at the tip with from three to five spines.

This species differs from *C. gracilis* more particularly in the form of the telson, and in the length of the outer ramus of the posterior stylets as compared with the peduncle. From *C. antennatum* Packard (AMERICAN NATURALIST, 1881, p. 880), it differs in the form of the telson, and in the much greater size of the eyes. Found by myself about 1st of April, 1880, in a rivulet flowing down the limestone hills into the Noxubee river, at Macon, Miss. Only four specimens were secured, all of which appear to be males.

The three species, *C. gracilis*, *C. bifurcus* and *C. lucifugus* present an interesting gradation in the forms of the posterior caudal stylets. In the first-named the outer ramus is twice the length of the peduncle, and the inner ramus is present, but rudimentary. In *C. bifurcus* the outer ramus is but two-thirds as long as the peduncle, while it is doubtful whether there is anything whatever to represent inner ramus. In *C. lucifugus* both the outer and inner rami are absent, and the peduncle itself is much reduced.—*(To be Continued).*—*O. P. Hay, Irvington, Ind.*

REVIVAL OF TARDIGRADES AFTER DESSICCATION.—The truth of the occurrence of this phenomenon has been denied by various observers, and the appearances explained by Ehrenberg as due to the development of fresh specimens from eggs left by the animals, which die in the process. Professor Yung, however, considers that his observation of the process, in a single specimen of Milnesium, proves the correctness of the old opinion. The specimen was taken from a ditch, contained eighteen eggs, and manifested