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ON FOUR SPECIES OF COPEPODA NEW TO CHESAPEAKE BAY, WITH A DESCRIPTION OF A NEW VARIETY OF *PARACALANUS CRASSIROSTRIS* DAHL

CHARLES C. DAVIS

Wilson (1932)[1] has reported forty-three species of Copepoda from Chesapeake Bay, or from its very mouth. At this time, four additional species, unreported by Wilson, can be added to the list of those species to be found within the limits of the bay. These are *Acartia tonsa* Dana, *Cyclops vernalis* Fischer, *Diaptomus spatulocrenatus* Pearse, and *Paracalanus crassirostris* Dahl var. *nudus* nov. The specimens from which the identifications were made were collected by means of Clarke-Bumpus nets, in use on the motor ship "Mahatru." Most of the specimens were collected during the regular hydrography cruise from the Chesapeake Biological Laboratory, in August, 1942, but some were obtained on special cruises at other times, especially during the winter months of 1942-1943.

Acartia tonsa Dana, 1848,[2] was present in nearly all the plankton samples examined, but it was not found in the samples taken off Perryville, at the very head of the bay, where the water is completely fresh. It occurred, however, off Howell Point at the mouth of the Sassafras River in water where the chlorinity amounted to 0.4 per mille only. It was also found at the hydrographic station off Cape Charles City, Virginia, where the chlorinity conditions approached those of the ocean, as well as at all of the intervening stations. It was usually present in large numbers, as a rule being the dominant animal form of the plankton, and for this reason it is remarkable that its presence in the Chesapeake Bay plankton had previously been overlooked. In certain tows taken in water in deep stagnant holes, on the other hand, where the oxygen content was very low, there were few specimens, and those that were present were frequently in poor condition, and were evidently examples that had died in the superficial, oxygen-rich water, and drifted down into the lower reaches. The species was sometimes (during the winter months) found together with *A. clausi* Giesbrecht. Wilson had reported *A. clausi* as the most abundant copepod species in the bay, while he did not mention the presence of *A. tonsa*. However, *A. tonsa* was always the more common of the two in the tows whose contents are summarized here.

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[1] Wilson, C. B. 1932. The Copepod Crustaceans of Chesapeake Bay. Proc. U. S. Nat. Mus., Vol. 80, Art. 15, pp. 1-54.

[2] Giesbrecht, W. 1892. Systematik und Faunistik der pelagischen Copepoden des Golfes von Neapel und der angrenzenden Meeres. R. Friedländer und Sohn, Berlin. Pp. 508, 511, 518-521; pl. 30, figs. 7, 24 ,34; pl. 43, figs 6, 10.

A. tonsa is easily distinguishable from *A. clausi* by the presence of well developed rostral filaments, which are entirely lacking in *clausi*, as well as by the structure of the fifth legs. The terminal (second) segment of the female fifth leg in *clausi* tapers smoothly to a point, whereas in *tonsa* the segment bears coarse teeth about two-thirds of the distance from the proximal border, distal to which the segment suddenly decreases in width and tapers to a point as a hair-like process. The ease with which the two species can be distinguished after a minimum of dissection makes it unlikely that Wilson was mistaken in his identification. The apparent change in the dominant copepod species would indicate an important ecological evolution in the Chesapeake Bay over the course of only a few years.

Cyclops vernalis Fischer, 1853,[3] was found only in the strictly fresh water off Stump Point at Perryville, Maryland, on August 27, 1942. This is just outside the mouth of the Susquehanna River, and at the very head of the bay. The samples that were available for analysis by Wilson were not taken north of the mouth of the Patapsco River, where the water is considerably brackish.

Diaptomus spatulocrenatus Pearse, 1906,[4] is another strictly fresh water species that occurred only at the Stump Point hydrographic station, on August 27, 1942.

Paracalanus crassirostris Dahl, 1894 var. *nudus* nov. was found at the following stations, all near the middle of the bay: off Cape Charles City, off Wolf Trap Light, off the Great Wicomico River, off Point-No-Point, off Cove Point, and off the southern tip of Tilghman's Island. These stations were all occupied in August, 1942. *P. crassirostris* is noteworthy as the smallest known species of Calanoid copepod. Females occurred rather consistently in the tows examined from the lower portion of the bay, but always in small numbers. No male specimens were encountered. The tows all were taken, however, with a silk net of coarse (No. 6) mesh, and thus no true picture of the distribution or abundance of this small species was obtained, since most examples passed through the net uncaptured.

Diagnosis of variety *nudus* nov.: Other authors describing *P. crassirostris* have made no attempt to recognize distinct varieties, and lacking specimens from other localities, it will not be possible to accomplish this task at this time either, beyond a description of the Chesapeake variety. Chesapeake specimens differ from all others that have been described having a less well developed spiny armature on the posterior faces of the rami of the swimming legs, and hence the variety was named *nudus*. The second leg is entirely naked in this respect, which is true of no other specimens in which the second leg has been described.

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[3] Gurney, Robert. 1933. British Fresh-Water Copepoda. Vol. 3. Cyclopoida. Ray Society, London. Pp. 198-210, figures 1598-1625.

[4] Pearse, A. S. 1906. Fresh water Copepoda of Massachusetts. Amer. Nat., Vol. 40, pg. 246, figures 6-9.

Dahl's (1894)[5] description of *P. crassirostris* is very short and does not describe the species in much detail. Chesapeake specimens differ from his in that the second segment of the fifth leg is much longer in proportion to the first segment.

Scott's (1894)[6] specimens, which he described as *P. pygmaeus* (Claus), are similar to those of Chesapeake Bay, but the exopod of the second antenna is only half the length of the endoped instead of the rami being sub-equal as in *nudus*. In addition to having more spines on the posterior faces of the second, third and fourth legs, Scott's specimens are provided with serrate outer margins on the second and third segments of the outer ramus, whereas these are present in *nudus* only on the third segment. The furcal rami of Scott's specimens are relatively shorter than in *nudus*.

Chesapeake specimens differ from those described by Gurney (1927)[7] in several characteristics. The last two segments of the first antenna of *nudus* are equal in length, where in Gurney's specimens the last segment is longer than the penultimate in the ratio of 21 to 16. Also, in Gurney's specimens the first antennae reach the furcal rami, where in *nudus* they reach only to the middle of the urosome. The second segment of the fifth leg is relatively shorter in Gurney's specimens.

A description of the salient features of Chesapeake female specimens follows:

Body (Plate I, figures 1 and 4). Length 0.476-0.567 mm. The proportional parts of the body are much as described and figured by other authors. Scott, however, figured the furcal rami relatively shorter. The rostrum (Plate I, figures 2 and 6), as is characteristic of the species, is short and thick, and the two branches are not filamentous.

First antenna (Plate I, figure 5). These are sufficiently long to reach about the middle of the urosome. This agrees with previous descriptions except that of Gurney, who says they reach the furcal rami. Each antenna consists of twenty-four segments, of which the last two are equal in length (Gurney reported the last segment as longer than the penultimate in the ratio of 21 to 16).

Second antenna (Plate II, figure 1). The rami are approximately equal in length, in contrast to the specimens reported by Scott, in which the exopod was described as only one-half the length of the endopod. The endopod in Chesapeake specimens consists of seven segments.

Mandible (Plate I, figures 7 and 8). The masticatory portion is provided terminally and subterminally with numerous small teeth,

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[5] Dahl, F. 1894. Die Copepodenfauna des unteren Amazonas. Ber. Naturf. Ges. Freiburg, Vol. 8, pg. 21, figs. 27-28.

[6] Scott, T. 1894. Report on Entomostraca from the Gulf of Guinea, collected by John Rattray, B. Sc. Trans. Linn. Soc. Lond., Ser. 2, Vol. 6, Pt. 1, pg. 27, pl. 1, figs. 1-8.

[7] Gurney, Robert. 1927. Report on the Crustacea, Copepoda and Cladocera of the Plankton. Trans. Zool. Soc., Pt. 2, 1927, pg. 144, figs. 16B, 17.

arranged in a complicated manner. On the inner corner there is a large double tooth, giving the whole masticatory portion a very different appearance than in that of *P. parvus* (Claus). The palp is small and the rami are approximately equal in length.

First maxilla (Plate I, figure 10). Typical of the genus. The first inner lobe bears nine heavy setae. The endopod consists of five segments.

Second maxilla (Plate I, figure 9). There are six segments. The first segment bears two inner lobes, each of which has two heavy setae. The second segment bears three such lobes, the first with three, the second and third with two setae. The third segment has one inner lobe and it bears three setae, one of which is shorter and stouter than the others. The other three segments are very short and bear from one to three setae each.

Maxilliped (Plate II, figure 2). Typical of the genus.

First leg (Plate II, figures 5 and 6). Each segment of the exopod bears a marginal spine on the outer distal corner, while the third segment has a second such spine about midway on the segment. The second exopod segment bears one and the third four inner setae. The first segment of the endopod bears one inner seta, while the second bears two setae on the inner margin and two terminally.

Second leg (Plate II, figure 8). There are no spinules on the posterior faces of the rami. In this, Chesapeake specimens differ from all other described specimens of the species. There are four serrations on the outer margin of the third segment of the exopod, proximal to the first marginal spine of the segment. In Scott's specimens, the second exopod segment also bears similar serrations.

Third leg (Plate II, figure 4). There is a curved row of about seven small spinules on the posterior face of the middle segment of the endopod, these constituting the only armature of this kind to be found on any of the legs. This differentiates the Chesapeake specimens from all other described specimens. In addition to the spinules, there is a row of fine hairs near the outer distal corner of the same segment. The third exopod segment bears six to seven fine serrations on the outer margin proximal to the first marginal spine. In Scott's specimens, the second exopod segment also bears such serrations.

Fourth leg (Plate II, figures 8, 9 and 10). The rami are proportionately narrower than in the other legs. There is no armature on the posterior faces of the rami, except that there is a row of fine hairs on the outer distal corner of the second endopod segment. The outer border of the third exopod segment, proximal to the first marginal spine, bears eight to nine fine serrations. In Scott's specimens, the second exopod segment also bears such serrations.

Fifth leg (Plate II, figure 3). The proximal of the two segments is considerably swollen and bears no armature. The distal segment is about one and one-half times the length of the other, and bears

terminally a small spine on the outer distal corner and a longer spine on the inner distal corner. Both of these spines are simple, and relatively thick compared to their length. The proportional length of the two segments agrees with the description of Scott, but differs from those of Dahl and Gurney.

Acknowledgments

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PLATE I

Figure 1. Whole animal, dorsal view. x 90.

Figure 2. Rostrum and anterior portion of head, ventral view. x 190.

Figure 3. Right furcal ramus, ventral view. x 390.

Figure 4. Whole animal, lateral view. x 90.

Figure 5. First antenna. x 190.

Figure 6. Rostrum and anterior portion of head, lateral view. x 190.

Figure 7. Masticatory portion of mandible. x 390.

Figure 8. Palp of mandible. x 390.

Figure 9. Second maxilla. x 390.

Figure 10. First maxilla. x 390.

PLATE 1

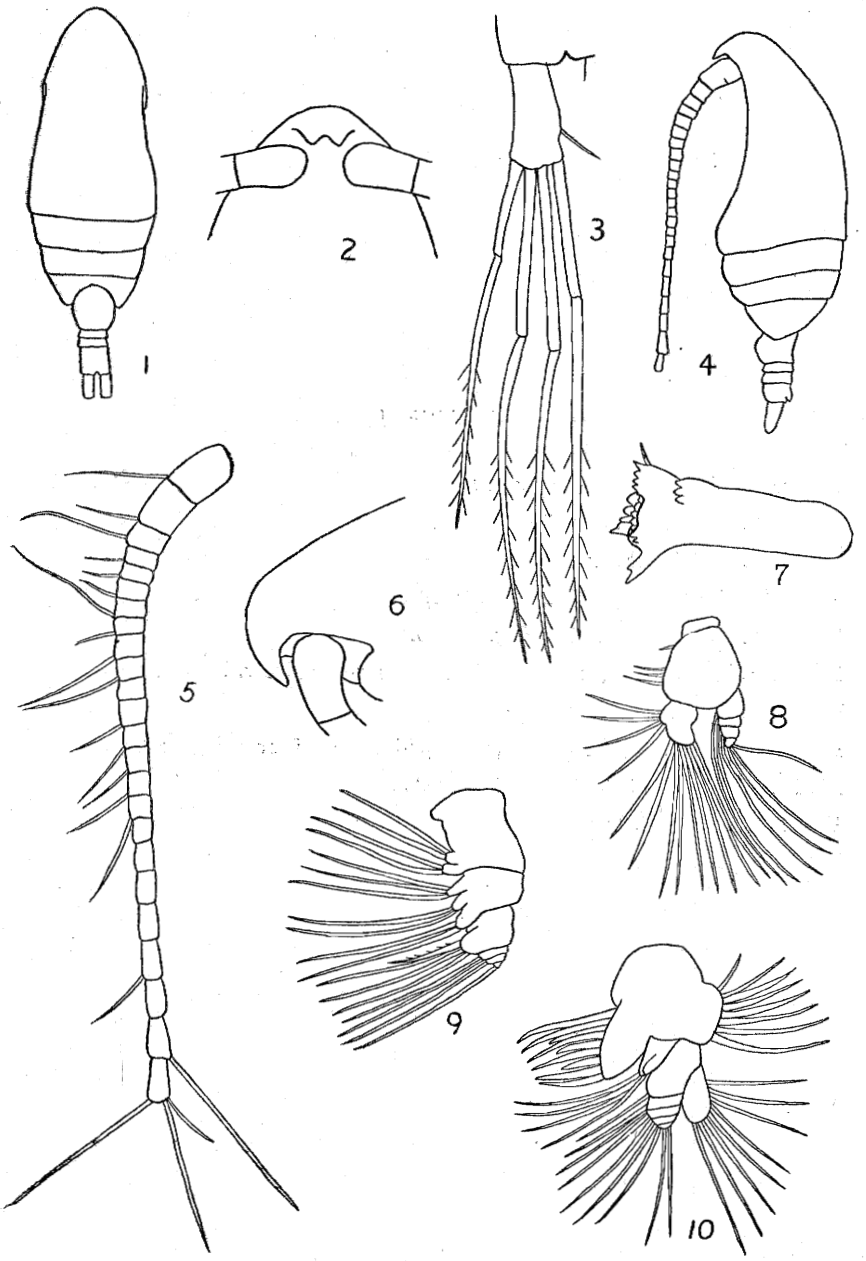

PLATE II

Figure 1. Second antenna. x 390.

Figure 2. Maxilliped. x 390.

Figure 3. Fifth leg. x 390.

Figure 4. Endopod of third leg. x 390.

Figure 5. Endopod of first leg. x 390.

Figure 6. First leg (endopod without its setae drawn). x 390.

Figure 7. Second leg. x 390.

Figure 8. Third segment of the exopod of the fourth leg. x 390.

Figure 9. Endopod of fourth leg. x 390.

Figure 10. Fourth leg. x 390.

PLATE II