

A NEW SPECIES OF BEAR-ANIMALCULE FROM THE COAST OF NORTH CAROLINA.

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For many years the presence of marine species of tardigrades, or bear animalcules, on the coasts of Europe has been known to the scientific world. In 1851 Dujardin described¹ a remarkable, very minute species, now known as *Microlyda dujardini* (Plate), which had been discovered two years previously at St. Malo, in northern France. In 1865 Schultze described² the species now known as *Echiniscooides sigismundi* (Schultze) which he had found at Ostend. In 1892 Cuénot found at Roskoff, in northern France, a species which he described³ under the name *Tetrakentron synaptae*, the creature being a parasite of *Synapta inhaerens*. In 1904 Prof. F. Richters discovered at Kiel and at Bergen, respectively, two marine species of the genus *Macrobotus* to which he gave the names *Macrobotus stenostomus* and *M. appellöfi*⁴. In 1907 the same indefatigable student of these microscopic animals, while working at Cancale, found another tardigrade which he described⁵ as *Halechiniscus quiteli* and in 1909, at Kiel, still another to which he gave the name *Batillipes mirus*.⁶

Having kept in touch with the literature of this group it appeared probable to the writer that some of these animals should appear on the American Atlantic coast, and at the first opportunity a search for them was begun. During the summer of 1911, while engaged, at Beaufort, North Carolina, in the study of the decapod crustaceans of the region, material was collected from time to time and examined for tardigrades. The material, as a rule, consisted of the washings from masses of seaweed, but occasionally the ooze from various parts of the harbor was obtained. Finally, on September 6, some washings from a large patch of *Dictyota* were examined and were found to contain hundreds of tardigrades belonging to the genus *Batillipes*.

¹ Ann. Sci. Nat., ser. 3, vol. 10, pp. 158-173.

² Arch. f. mikro. Anat., vol. 1, p. 428.

³ Rev. Biol. du Nord de la France, vol. 5, p. 16, pl. 1.

⁴ Zool. Anzeig., vol. 33, p. 84.

⁵ Idem, p. 81.

⁶ Ber. der Senckenb. Naturf. Gesell., 1909, p. 37, pl. 2.

The live animals were carefully studied, the details of their external structure were drawn, and a description was written, but before publishing it it appeared to be desirable to ascertain certain facts about the European species. A letter to Professor Richters brought a prompt reply in the form of a mounted specimen of *B. mirus*, several microphotographs, and a letter suggesting a reexamination of certain details of structure. For proper examination living specimens were necessary and a wait of a year was inevitable.

In 1912 and 1913 and again in 1914 only a single specimen was found and time was lacking to complete the work. In 1915 several specimens were obtained, but so late in the season that an unsatisfactory examination only was possible. In 1916 the writer was unable to visit the type-locality, and as it may be several years before he can return, it seems advisable to present what has been ascertained regarding the animal. It may be known by the following description:

BATILLIPES CAUDATUS, new species.

Plate 33.

Holotype.—Cat. No. 49639 U.S.N.M., and paratypes Cat. No. 49640 U.S.N.M., from Beaufort, North Carolina, collected September 6, 1911, from *Dictyota*, obtained from the jetties at the western end of Shackleford Bank.

Body stout, plump and covered with a finely-granulate, almost transparent skin. Head broad, flattened, and bearing seven cirri, one of which is situated on the median line of the top of the head some distance in front of the eyes; another (paired) is on the frontal border a little to one side of the middle line; another (paired) is below the frontal border about on a line with the mouth and another (paired) is on the lateral border about on a line with the eyes; all the cirri, with the possible exception of the pair near the mouth, spring from papillae and the last one bears at its base an elongate, thin, somewhat triangular flap. The eyes are small and almost colorless. The margins of the body project beyond and somewhat overhang the bases of the legs. On each side near the posterior end there is a slender cirrus and the body terminates in a small, acuminate tail-like process.

The legs consist of a stumpy basal portion into which the much smaller foot may be partially telescoped. Each leg of the last pair has a stout spine on its posterior surface. The foot consists of a small, knob-like piece to which are attached five, occasionally six, slender toes which are abruptly expanded at their distal ends into thin shovel-like portions.

The mouth is situated on the ventral surface of the head and opens into a slender esophagus on each side of which is a very small and slender tooth. The teeth do not appear to be forked at their

upper ends nor have bearers been detected. The pharynx is small, nearly spherical and does not appear to contain chitinous thickenings. The pharynx opens directly into the large, irregularly lobate stomach. The reproductive organ lies above the stomach. It is a large, fusiform structure which begins a little in front of the middle of the body and extends back nearly to the hind legs where it turns abruptly downward to join the posterior end of the stomach. The anal opening has the appearance of a small, round papilla on the ventral surface immediately in front of the last pair of legs. The muscle bands underlying the epidermis of the body and those extending into the legs are quite conspicuous.

In all the specimens examined the stomach is filled with a yellowish or greenish-brown mass evidently of vegetable origin and there can be no doubt that the animal devours the seaweed on which it occurs. In some of the specimens the reproductive organ appears to contain eggs but their outline is so indefinite that it is unsafe to state their number or character. In most cases the reproductive organ contains a granular mass the nature of which is not evident.

The species at hand resembles *B. mirus* Richters in all important characters but appears to differ markedly in the presence of eyes, the character of the sense organ at the base of the lateral cirrus of the head, the presence of the lateral cirri near the posterior end of the body and in having more slender toes with smaller terminal expansions.

In Professor Richters' original description of *B. mirus* the median frontal cirrus is not mentioned nor is the posterior tail-like process although the latter is plainly shown in the microphotograph which accompanies the description. In a subsequent article¹ the statement is made that the posterior cirri are represented by strong spines and these are shown in the figure. The frontal cirrus and the median posterior process are neither mentioned nor shown in the figure. In the separate of this paper, however, which was received from Professor Richters the statement concerning the posterior strong spines has been struck out and in a manuscript note the tail-like process is described. In the figure also Professor Richters has added the median frontal cirrus and a papilla at the base of the first pair of cirri.

The specimen of *B. mirus* which, thanks to Professor Richters, I have been able to examine, is mounted on a slide in such a position that most of the cirri in question can not be clearly discerned, but I strongly suspect that *B. mirus* and *B. caudatus* will be found to be more alike than they are now believed to be. The posterior pair of setae in *B. caudatus* are extremely delicate and, perhaps because they

¹ Verh. d. Deutsch. Zool. Gesell., vol. 19, 1909, pp. 84-94, pl. 3, fig. 5.

have been broken off, can not be found in every specimen; for the same reason they may have been overlooked in *B. mirus*. The papilla at the base of the first lateral cirrus does not appear to be present in *B. caudatus* at all. The sense organ at the base of the last lateral cirrus is described as rod-shaped or club-shaped in *B. mirus*. In preserved specimens of *B. caudatus* it has the appearance of a rod but on close examination proves to be a thin flap with a slight spiral twist. In *B. mirus* there is some evidence that the sense organ is similarly formed.

The marine tardigrades are of special interest, as has been pointed out by Professor Richters in the articles already cited, in that they furnish conclusive evidence that the group Xenomorphida (=Tardigrada of most writers) is an offshoot from the chaetopod worms and is not at all closely related to the Arachnida near which it is placed in nearly every textbook on zoology. The legs of the bear animalcules are properly to be regarded as modified parapodia and the claws and toes are specialized setae. The cirri of the head, especially those of *Halechiniscus* and *Batillipes* find their counterparts only among the Chaetopoda.

Five exclusively marine genera of bear animalcules are now known. A sixth, *Macrobotus* contains at least two species which live in the ocean, several which inhabit fresh water, and a number which are terrestrial. The genus *Milnesium* is represented by only one species and this inhabits fresh water. The genus *Diphascon* contains aquatic (fresh water) and terrestrial species. The genera *Oreella* and *Echiniscus*, the former with one and the latter with forty or fifty species, are terrestrial and are found on moss and lichens. Thus of the ten known genera, six are wholly or partly marine and only two are strictly terrestrial. This fact points strongly to a marine origin for the group and, taken in conjunction with the homologies pointed out by Professor Richters, goes far to support his belief as to its affinities.

EXPLANATION OF PLATE 33.

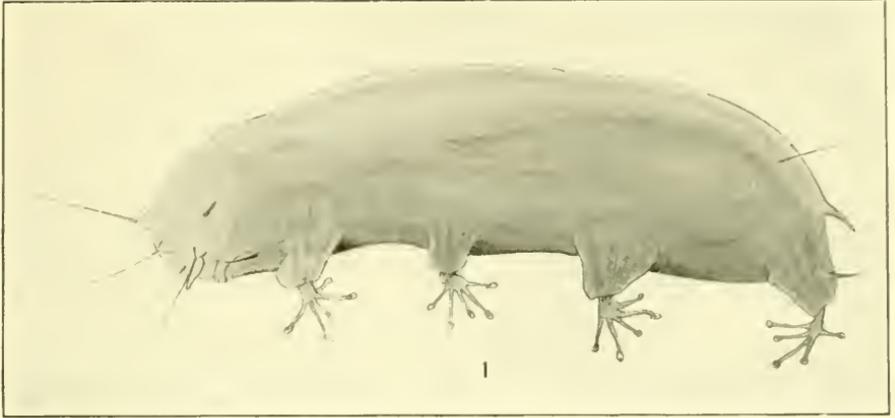
Batillipes caudatus Hay.

FIG. 1. Lateral view.

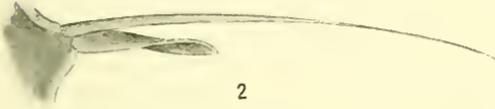
2. Large lateral cirrus of head with flap-like appendage at its base.

3. Detail of foot.

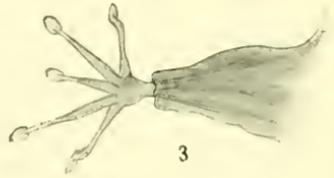
4. Female, dorsal view.



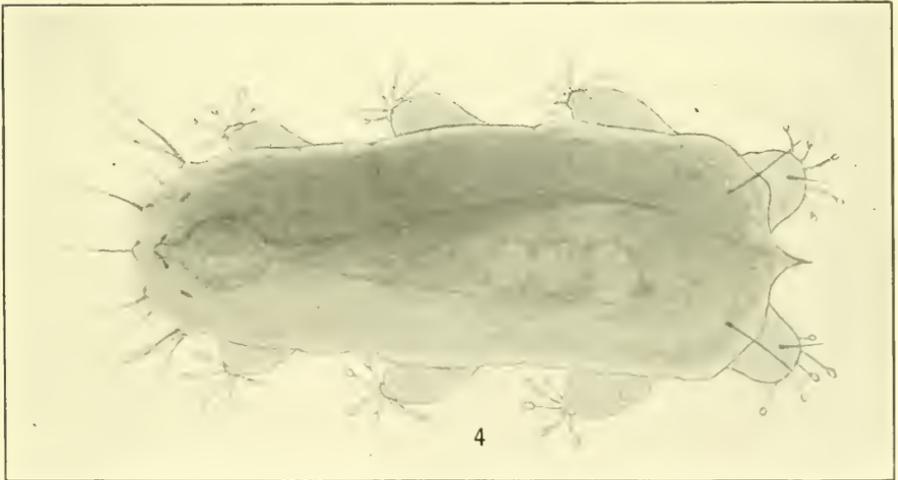
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A NEW BEAR-ANIMALCULÉ FROM NORTH AMERICA.

FOR EXPLANATION OF PLATE SEE PAGE 254.

