SOME CARCINOLOGICAL RESULTS OF THE DEEPER WATER TRAWLINGS OF THE ANTON DOHRN, INCLUDING DESCRIPTION OF TWO NEW SPECIES OF CRUSTACEA

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The extent to which the crustacea taken at Tortugas in the course of certain hauls with a 30-foot otter trawl will alter the known bathymetric and geographic ranges of these species will not be fully known until the collections have been more completely studied.

The fauna of the region is proving even richer, more varied and more replete with surprises than anticipated from the accomplishments of past seasons.

To the Carnegie Institution and its yacht, the *Anton Dohrn,* this year goes the double distinction of having brought to light the largest as well as the smallest known specimens of that giant among isopod crustaceans, *Bathynomus giganteus* Milne-Edwards. The largest specimen is indeed of imposing proportions. It is a male and measures over all, from the clypeal point to the end of the median spine of the telson, full 14 inches, just about 356 mm., thus surpassing by more than 3 inches the length of the largest specimen hitherto known. Its greatest width across the epimera is 6⅝ inches. The smallest specimen is scarcely more than 1⅞ inches long, and

it is a little more than 7/8 inches wide over all. There is no external evidence as to its sex.[1]

Of no less interest is the capture by the *Dohrn* of an ovigerous female, the second of its kind. The only other female with eggs was taken by the Indian Marine Survey *Investigator* in the Bay of Bengal. The length of the one taken by the *Dohrn* exceeds that of the *Investigator* specimen by a shade more than 1¼ inches, the measurements being 9¼ inches as compared to almost 8 inches. The *Dohrn* specimen is 3⅞ inches wide. Within its brood pouch were found 32 eggs. The *Investigator* specimen carried 26 eggs and 8 empty shells "probably from a former brood." The eggs of the Tortugas specimen were as described for the one from the Bay of Bengal, "of a pale yellow colour, . . . seemed to be quite undeveloped, being entirely made up of liquid yolk material enclosed in a thick parchment-like shell." These eggs, of which part are in alcohol and part in formalin, appear to be about the same size as when fresh; if anything, they are slightly shrunken, ovoid in shape, and apparently slightly larger than the Indian ones, measuring 13 by 11 mm.

I have examined the pleopods of several specimens and find the plates in the articulating membrane about as those figured by Lloyd (Mem. Indian Mus., vol. 1, No. 2, 1908, pl. 10, fig. 3), and the latter in turn correspond rather closely with the drawing given by Bouvier (Mem. Mus. Comp. Zoöl., vol. 27, No. 2, 1902, pl. 6, fig. 1). The "fossette d'insertion . . ." of Bouvier corresponds in size and position with Lloyd's plate "2," and, judged from the specimens at hand, is of essentially the same composition as the other plates in this articulating membrane. However, plates "3" and "4" of Lloyd are not disarticulated as he shows them but rather directly connected somewhat as Bouvier indicates, but with more of their extent in contact, with a suture line marking their juncture.

Bathynomus giganteus, as is well known, is found in the Gulf of Mexico and in the Bahamas, as well as in the Indian Ocean and the Bay of Bengal. The new species of swimming crab taken last year and since described as *Benthocascon schmitti* (Rathbun, Jour. Wash. Acad. Sci., vol. 21, No. 6, 1931, p. 125) also finds its nearest relative and the only other member of the genus, *B. hemingi* Alcock and Anderson, in the Indian Ocean. Last year the four specimens of *B schmitti* were brought up from 180 fathoms. This year ten specimens were obtained, seven between 205 and 221 fathoms and three between 200 and 253 fathoms.

To these interesting records may be added the first record of the shrimp genus *Pasiphœa* not only for the Tortugas region, but for the entire Gulf of Mexico and adjacent Caribbean Sea, in the form of a new species described

[1] As regards secondary sex characters, the smallest male and female exhibiting them were captured by the *Investigator* and are respectively about 5⅛ inches and 6⅛ inches long. A specimen 3½ inches long, taken by the *Albatross,* is the largest of several small individuals which give no external evidence as to their sex.

In this *Albatross* specimen from the mouth of Exuma Sound in the Bahamas, 1169 fathoms, the last pair of legs reaches the distal margin of the antepenultimate joint of the preceding pair. In larger specimens the length of the last pair of legs becomes increasingly greater with individual size until they reach nearly to the end of the penultimate joint of the preceding pair of legs. In specimens smaller than the one from Exuma Sound the last pair of legs is, on the other hand, very much reduced in size, at first glance appearing almost as flagelliform appendages, so undeveloped and feeble do they seem to be, though their joints are present in full complement.

There are three specimens in the *Dohrn* collection smaller than the one from Exuma Sound. In the two larger, approximately 2⅝ and 2½ inches long, the last pair of legs does not attain the end of the basipodite of the preceding pair, while in the smallest, the smallest known *B. giganteus* now on record, they are altogether wanting!

below, *Pasiphœa merriami.* In fact, so far as I am aware, no *Pasiphœa* has been taken nearer Tortugas than off Charleston, South Carolina. The species which the Tortugas species seems most nearly to resemble are *P. flagellata* Rathbun, an Hawaiian species, and *P. unispinosa* Wood-Mason, known from the Indian Ocean (Andaman Sea, Bay of Bengal, and Arabian Sea).

Pasiphæa merriami[1] **new species**

An apparently undescribed species resembling *P. flagellata* Rathbun (Bull. U. S. Fish Comm., vol. 23, pt. 3, 1903 [1906], p. 928, pl. 23, fig. 2, text-fig. 78).

The relative length of the carapace and abdomen is about the same in both species, the abdomen, inclusive of the telson, measuring a little more than twice the length of the carapace. The carapace, though strongly compressed, is carinate only on the slope of the gastric tooth. The latter is somewhat similarly shaped in both species; its extremity falls short of the anterior margin of the carapace. The branchiostegal spine is anterior to the angle of the branchiostegal sinus and extends a little in advance of the front edge of the carapace. The sinus of *P. flagellata* is quite pronouncedly a right angle, or even a little less, while in the new species it is less sharply right angled and forms at times even a wider angle, as in the smaller of the two specimens from the type locality.

The acicle of our species is about two-fifths of the length of the carapace, and the telson is between four-fifths and three-fourths of the length of the sixth abdominal somite. The telson is but shallowly grooved, the groove becoming obliterated for a part of the distal third and again becoming faintly evident before the truncate end of the telson. In *P. flagellata,* on the other hand, the telson is deeply grooved throughout its length, and is, moreover, relatively longer than in our species, being but very little shorter than the sixth abdominal somite. The dorsum of the sixth abdominal somite is very bluntly and broadly carinate; the ridge, if it may be so called, is a low, wide, flattened, longitudinal band or area marked off by an appreciable angulation where the dorsum meets the sides of the somite. This flattened area is wider posteriorly than anteriorly, where, in about the anterior fifth of the somite, it narrows markedly and becomes more or less obsolescent. The hinder margin of this somite is evenly rounded off behind as in *P. flagellata;* neither species carries the small median spine or sharp projection found in so many species of *Pasiphœa.* On about the whole of the third, and for a short stretch at the hinder end of the second, abdominal somite there is a weak median dorsal carina which can readily be seen in the two larger specimens of the new species before me when the abdomen is carefully dried off for examination. The smaller of the two specimens in the type lot seems to show no trace of this faint carination on the second and third somites, nor is that of the sixth at all well marked. These may be signs of immaturity, but the specimen in actual measurements is not so very much smaller than the type.

Our species may at once be distinguished from *P. flagellata,* in lieu of other characters, by the armature, or rather lack of and reduction of armature of the first and second pair of legs. In *P. flagellata* the meri of these legs are each armed with a row of spinules on the ventral or posterior margin, while in *P. merriami* the meri of the first pair of legs are unarmed below and those of the second carry each a single stout spine or hook at

[1] Named for Dr. John C. Merriam, President of the Carnegie Institution of Washington.

about the beginning of the distal third of their length; thus they are armed as in *P. unispinosa* Wood-Mason with which I would have thought this species identical, without comparative material, but for the fact that the post frontal spine [gastric tooth] of Wood-Mason's species "is continued backward, almost to the posterior border of the carapace, as a distinct carina." From the figure given of *P. unispinosa* and of *P. sivado* (Kemp) with which it is compared (*Illustrations of the Zoology of the Investigator*, pl. 3), the telson appears to be about four-fifths the length of the sixth abdominal somite.

The basal joint of the antennæ carries a well-developed inferior spine as in *P. flagellata*. The antennular peduncle reaches nearly to the distal two-fifths of the antennal scale. The latter is exceeded by the third maxillipeds by about a fourth of the length of the terminal joint.

Both the basal and carpal joints of the first and second legs have their lower margins anteriorly produced as a sharp spine; the ischia are unarmed. The meri of the first and second legs reach about equally far forward; in the type their distal margin about coincides with the middle of the second segment of the antennular peduncle, and also about with the end of the first third of the antennal scale. The carpal joints are more or less subequal, those in the second pair being a little stouter and very little shorter than those in the first pair of legs. Both pairs exceed the tip of the antennal scale by about half the length of the palm (a little behind the midpoint in the second legs); in the first pair the fingers are about two-thirds the length of the palm, in the second only a little shorter than the palm.

Type locality, measurements—The type (Cat. No. 64734, U.S.N.M.) and one other specimen were taken in a 30-foot otter trawl by the *Anton Dohrn*, July 3, 1931, south of the Dry Tortugas in 253 to 283 fathoms. The former measures: carapace 33 mm. long; antennal scale 13.6 mm.; abdomen, inclusive of telson, 71 mm.; sixth abdominal somite 15 mm.; telson, 12 mm.; first left leg 44 mm. long, movable finger to articulation 7.2, palm from this point 10, carpus scant 4, merus 13.6 mm.; second left leg 55 mm. long, movable finger 11, palm 13, carpus 3.5, merus 17.5 mm.

The smaller of the two specimens in the type lot has the carapace 27 mm. long; antennal scale 11 mm.; abdomen, inclusive of the telson, 60 mm.; sixth somite 13.5 mm.; telson 10 mm.

The only other representative of the species at hand measures: carapace 35 mm. long; antennal scale scant 15 mm.; abdomen 75 mm.; sixth somite 16 mm.; telson 12.3 mm. This specimen was also taken south of the Dry Tortugas by the *Dohrn*, July 31, 1930, otter trawl, in 220 to 237 fathoms.

Corresponding measurements of the figured type of *P. flagellata* give: carapace 25.5 mm. long; antennal scale 11.5 mm.; abdomen, inclusive of telson, 4.8 mm.; sixth somite 10 mm.; telson 9.6± mm.

Several well-known east coast crustacea appeared in the trawl hauls this year:

Eusicyonia brevirostris (Stimpson) was taken on two occasions: a large male in 50 fathoms, and two males and a female of good size in 60 fathoms. The last named are from a depth exceeding the known lower limit of the distribution of this species by 11 fathoms.

Nephropsis aculeata Smith occurred in hauls made south of Tortugas in 153 to approximately 300 fathoms. These constitute a first record of the species in the Gulf of Mexico. Hitherto *N. agassizii* Milne-Edwards from 1568 fathoms, on the northern slope of the Campeche Bank, has been the only representative of the genus reported from this body of water.

Bathyplax typhla Milne-Edwards, though found well to the north and south of the Tortugas region within the Gulf, has never appeared in hauls of less than 280 fathoms until this year. The trawl yielded specimens from all depths explored from 200 to 290 fathoms.

Bathynectes superba (Costa) has heretofore been recorded no nearer the Gulf of Mexico than the coast of Georgia, except for three specimens from off Key West and one from south of the Marquesas. This year it was taken in quantity, 69 specimens, in a single haul between 153 and 158 fathoms.

Some of the larger crustacea from the deeper water hauls exhibited a very decided zoning or stratification. Certain predominating forms gave character to the hauls from different depths to such a degree that within the area worked south of the Dry Tortugas they might well be used as bathymetric indicators, as for example:

Portunus spinicarpus (Stimpson), a species ranging from the surface, where a specimen was once taken in floating gulf weed south of Key West to a depth of 208 fathoms, was taken by the *Dohrn* only between 10 and 80 fathoms, and in conspicuously large numbers between 40 and 60 fathoms. Nearly 300 specimens were obtained this year in one haul in 60 fathoms.

Acanthocarpus alexandri (Stimpson) was taken by the *Dohrn* during the past two seasons at depths from 60 to 158 fathoms. These limits correspond quite closely to the known bathymetric range of 60 to 169 fathoms of this crab based in part on specimens contained in the collections of the U. S. National Museum. South of Tortugas in the region worked over, *A. alexandri* was most abundant between 60 and 110 fathoms.

Glyphyocrangon longleyi, a new species described below, seems to be a form not heretofore recognized as distinct. In the *Dohrn* trawlings it proved to be common in the hauls made between 180 and 290 fathoms, being particularly plentiful in the hauls from 200 to 280 fathoms.

Glyphyocrangon longleyi [1] new species

A species near *G. spinicauda* Milne Edwards (Ann. Sci. Nat., Zool., 1881, p. 3; *Recueil de Figures des Crustacés nouveaux on peu connus,* Avril, 1883, pl. 39, fig. 1, 1a), but which is at once differentiated in the shorter distance to which the rostral point extends in advance of the anterior pair of lateral spines. In *G. longleyi* this rostral point does not exceed in length the distance between the anterior and cervical grooves; in *G. spinicauda* its length, measured from the anterior groove, runs past the cervical groove by one-third to one-half the length of the posterior portion of the carapace. Of the two, our species is more robust, stouter, and not so finely marked; the carinæ are not as sharp, nor the tubercles as fine or as numerous. The eyes are considerably larger in our species.

The hepatic spines are longer and more exerted in *G. longleyi* than in *G. spinicauda;* in the latter their tips fall short of a line connecting the posterior margins of the orbits; in *G. longleyi* these spines extend anterior to this line.

The hepatic region above the anterior moiety of the fourth carina has at most three, often but one, low, more or less inconspicuous pearly tubercles which are not visible unless the pubescence is brushed off; in the corresponding position in *G. spinicauda* there is a more or less longitudinal row of seven to nine microtuberculated tubercles with several irregularly sized tubercles, usually a larger and a few smaller above, and below an irregularly shorter secondary row of smaller tubercles, five or so in number, with about two yet smaller tubercles in the interspace between the two rows.

[1] Named for Dr. William H. Longley, executive officer of the Tortugas Marine Laboratory of the Carnegie Institution.

The anterior end of the third carina in our species terminates in quite a prominent tooth or tubercle, a little less than a right angle, with a sharp tip; anterior to this is a row of five or six tiny tubercles in an oblique line rising at an angle of about 45°, which ends in or just behind the anterior tubercle of the second carina; in *G. spinicauda* there is a corresponding row of about as many tubercles, which are individually more or less elongate in shape, and which rise to meet the anterior tubercle of the second carina less rapidly, at an angle nearer 30°. In the interval between the second and third carinæ in *spinicauda* there are five to eight small tubercles scattered about in the middle of the interspace; this count does not include the tubercles close to and more or less parallel to the second carina. In the new species, in the same area there may be one or two small tubercles, but these are more or less in its anterior portion usually close behind the cervical groove.

The anterior tubercle of the second carina of the carapace is low and blunt in *G. longleyi,* though larger and more prominent than the next several immediately behind it; in *G. spinicauda* this anterior tubercle is spiniform and in size and shape approximates the posterior lateral spines of the rostrum.

On their inner side the dorsal carinæ in *G. spinicauda* are paralleled by a more or less continuous but somewhat irregular row of smaller, rather close-set, rounded tubercles, both before and behind the cervical groove; in our species there are only occasional secondary tubercles similarly placed, which may at times appear to form more or less of a row paralleling the dorsal carinæ, but they are always much less numerous than in the corresponding row in *G. spinicauda,* and only one or two tubercles, if any, are to be found behind the cervical groove.

The anterior of the two marginal spines with which the epimera of the second to fourth abdominal somites are armed is stronger, longer and more sharply spiniform than in *G. spinicauda,* and in the third somite, which carries the longest anterior spine of these several somites, it is as long as a line drawn between the outer margins of the bases of the two marginal spines; the corresponding anterior spine in *G. spinicauda* is about half as long as the distance between the two marginal spines as measured above.

Type locality, measurements—A specimen taken south of Tortugas in 180 to 220 fathoms, *Dohrn,* July 31, 1930, has been selected as the type (Cat. No. 64735, U.S.N.M.). The carapace and rostrum together measure 51 mm. long; rostrum to hinder margin of orbit 19 mm.; from orbit to hinder margin of carapace 32 mm.; extended abdomen from hinder margin of carapace to tip of telson 68 mm.; and telson 16 mm.; the greater diameter of the cornea 6 mm.

Appended Notes

With the idea of making a visual record of the behavior of marine organisms under natural conditions, a number of trial shots with a standard film moving-picture camera were made. The fair measure of success attending these first attempts has justified the brief time devoted to the undertaking this season, and it is hoped will warrant more intensive work in this direction another year.

Two species of crustacea, first noticed by Messrs. Tandy and Colman in the course of their survey of Long Key, mentioned elsewhere in the report of the laboratory, constitute two new records for the Dry Tortugas. They are *Platypodia spectabilis* (Herbst) and *Uca speciosa* (Ives), neither of which has been reported nearer to the islands than Key West, Florida.