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Note on the Luminous Appearance of the Sea, with descriptions of some of the Entomostracous Insects by which it is occasioned. By W. BAIRD, Esq. M.D., Assist. Zool. Dep. British Museum.

THE luminous appearance of the sea, so often mentioned by voyagers, is, especially within the tropics, very beautiful and interesting, and depends in a great measure upon the presence of minute Crustacea — such as the Entomostraca more particularly — and Medusae, the different kinds of animal producing a different kind of luminousness. This I may illustrate by an extract or two from a journal kept during a voyage to India.

“ May 28, 1832, lat. 1° 50' N. long. 21° 07' W. In the evening the sea, especially in the wake of the ship, where the water was agitated by the ship's way through it, was splendidly luminous; it presented a truly brilliant appearance at times, for the beautiful brilliancy of the luminousness was not equal at one time to what it was at another. — Sometimes the broad bright flash, which had distinctly occasionally a bluish colour, was vivid enough to illuminate the sea for some distance round, while the most splendid globes of fire were seen wheeling and careering in the midst of it, and by their brilliancy outshining the general light. These bodies were generally too deep in the water to be caught by throwing a bucket or net overboard.

“ May 29. Lat. 0° 35' S. long. 26° 02' W. The sea was very luminous again this evening, but differed from last night in there being fewer large globes deep in the water, and a much greater abundance of bright small specks on the surface. Drawing a bucket-full of water up, about 8, P.M., I allowed it to remain quiet for some time, when upon looking into it in a dark place, the animals could be distinctly seen emitting a bright speck of light. Sometimes this was like a sudden flash, at others appearing like an oblong or round luminous point, which continued bright for a short time, like a lamp lit beneath the water, and moving through it, still possessing its definite shape, and then suddenly disappearing. When the bucket was sharply struck on the outside, there would appear at once a great number of these luminous bodies, which retained their brilliant appearance for a few seconds and then all was dark again. They evidently appeared to have it under their own will, giving out their light frequently at various depths in the water, without any agitation being given to the bucket. At times might be seen minute but pretty bright specks of light dart across a piece of water, and then vanish, the motion of the light being exactly that of the Cyclops through the water. Upon re-

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moving a tumbler-full from the bucket and taking it to the light, a number of Cyclopes were accordingly found swimming and darting about in it.

"May 30. Lat. $3^{\circ} 35'$ S. long. $27^{\circ} 18'$ W. At times to-night the brilliancy of the water was sufficient to illuminate the whole stern of the ship and driver, and almost intense enough to throw a shadow. Occasionally a streak of luminous water was observed, running a long way out to windward; and then a whole host of bright balls were seen in the space cut by the ship, wheeling and careering along, and being mixed up with innumerable smaller spots, gave out such a bright light that it almost dazzled the eye to look steadily upon it."—Private Journal, H.C.S. Berwickshire.

The bright large balls or globes described above were no doubt Medusæ, and the smaller spots Entomostraca. These latter were very abundant, but, from their minute size they were difficult to be observed; and being very delicate and short-lived, were generally found dead and partially decomposed in the morning, if the water in which they were taken had been kept all night. The most common belong to the family Cyclopidae, several new species of which I succeeded in placing in the microscope, a description of these I here append.*

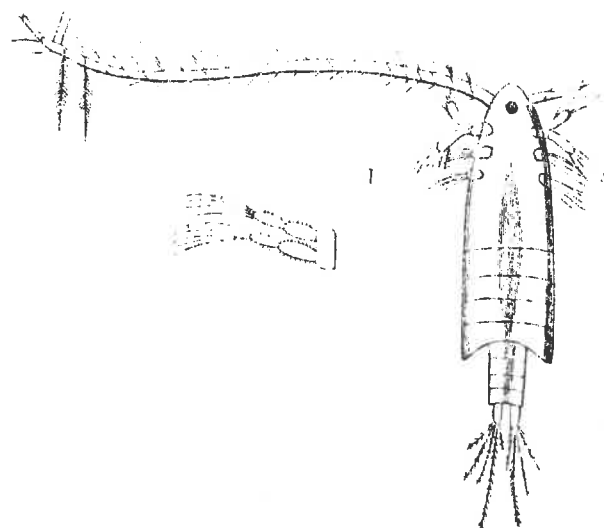
Genus.—CYCLOPSINA, *Edwards*.

Cyclopsina Arietis. Calanus Arietis, Templeton, Trans. Ent. Soc. i. 195, t. 21, fig. 9. Of an ovate form. First pair of antennæ long, many-jointed, and furnished with numerous setæ; the two last joints having each a long and strong bristle rising from the under surface, directed downwards and finely ciliated or plumose; the last joint has in addition to its long setæ, two short ones springing from its upper surface, directed upwards and not plumose: second pair of antennæ short, stout, divided into two branches of one joint each, terminated by rather long setæ. The body consists of five articulations, the last having a lobe on each side projecting beyond the articulation. Tail much shorter than the body, the last joint being bifurcated, each division giving out four or five moderately long filaments, which are beautifully and finely plumose. The abdominal legs are four pairs, beset closely with short spines on each side, and furnished with numerous long hairs or setæ.

This species is described by Mr. Templeton in the 'Transactions of the Entomological Society.' He takes notice of the ciliated or plu-

* These insects belong to the order Copepodes of *Edwards*: Lophyropa, *Latreille*: and to the family Cyclopidae: Monocles of *Edwards*: Carcinoidæ of *Latreille*.

mose setæ at the end of the antennæ, the fine cilia of which he says are perpetually in motion, but he does not mention the finely plumose filaments of the tail: the second pair of antennæ he describes as feet. Mr. T. observes that the fin-legs could not be well made out, on account of the minuteness of the animal, but that they appeared pretty numerous.

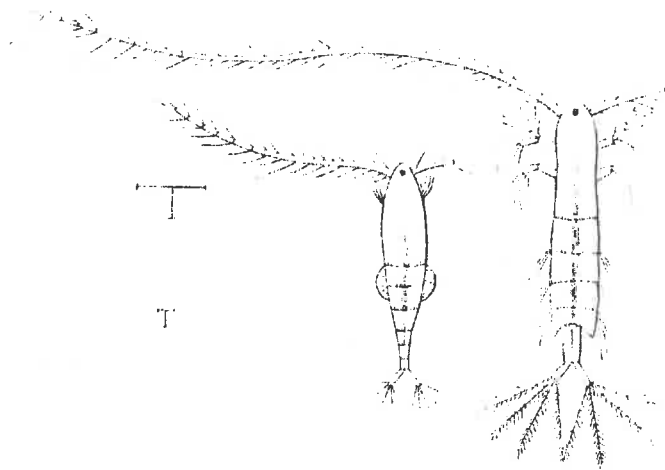


Cyclopsina Arietis. The short line shows the natural size. The detached figure represents an abdominal leg.

Inhabits the Atlantic Ocean. I first met with it in lat. $12^{\circ} 38'$ N. long. $20^{\circ} 14'$ W. on the 21st of May, 1832; and again off the Cape of Good Hope, in lat. $35^{\circ} 29'$ S. long. $21^{\circ} 50'$ E. when I noticed the male also, which is distinguishable by the swelling and large joint of the right antenna. During the previous night the sea was luminous.

The genus *Cyclopsina* is constituted by Milne Edwards, to receive those species of the genus *Cyclops* of Muller, which have the second pair of antennæ divided into two branches. The type of the genus is the *Cyclops rubens* of Muller, the *Monoculus Castor* of Jurine. The genus *Calanus* was established by Leach, to receive those species which had no second or posterior pair of antennæ, and had the anterior ones very long. The type of this genus is the *Monoculus finmarchicus* of Gunner. On reference however to the figure of this species given by Gunner, in the *Kiøbenhavn. Selsk. tom. x. p. 175, fig. 20—23*, it appears that a second pair of antennæ do exist in it, and as they are found in all the other species resembling it, it is evident that the genus *Calanus*, as constituted by Leach, cannot stand. I have therefore preferred the genus formed by Milne Edwards.

Cyclopsina Rivillii, Baird. Body of animal nearly cylindrical, slightly sinuated on each side, about the middle of first articulation. Tail short. Antennæ very long, nearly double the length of the body, numerous articulated, and covered with long setæ. The last articulation of tail is bifurcated, each division giving out four rather long filaments, which are strongly and beautifully plumose or feathered; these plumose filaments could be distinctly seen by the naked eye, and form a very marked character of the species.



a. *Cyclopsina Slabberi*. b. *Cyclopsina Rivillii*. The lines show the respective sizes.

Inhabits the North Atlantic Ocean. "May 22, 1832, in lat. $10^{\circ} 53'$ N. long. $20^{\circ} 30'$ W., the water appearing luminous during the night, I drew up a bucket-full to be examined in the morning." "Found several animalcules in the water drawn up last night, one of which is the species described above."—Private Journal.

M. Godeheu de Riville, in a paper on the luminousness of the sea published in the *Mém. Savans Etrang.* vol. iii., describes an insect which he caught in the sea off Ceylon, and found to be luminous in the water, which very closely resembles this species, (vide p. 275, t. 10, fig. 5). He gives it two eyes, and the whole figure is exaggerated, but the plumose tail is given with very considerable accuracy, and I have little doubt it is the same species as the one here described. He calls it, from the extreme beauty of the tail, the "Paon de Mer." M. de Riville (after whom I have named the species), says "the plume with which the tail is ornamented deserves particular attention. The extremity of the body is terminated by a fork, each branch of which has a projection, to which are attached four true plumes of a rose co-

lour, which produce an admirable contrast with the green colour of the body, which is a little transparent and spotted with brown rays, artfully arranged. *Quelles découvertes ne doit on pas espérer de faire désormais dans l'Histoire Naturelle, puisqu'on trouve des poissons avec des plumes!*"—p. 275.

Cyclopsina Slabberi, Baird. Body oval. Tail short. Antennæ long, shorter than in the last species, about the length of the whole insect; numerous articulated and provided with rather long and numerous setæ. The last articulation of tail is bifurcated, each division being furnished with five short stout setæ, which are not plumose.—The ova, in the specimen figured in my Journal, appear lying across the centre of the body instead of the tail, as in the *Cyclopsina Castor*, &c., and I have noticed this peculiarity in my notes at the time.

Inhabits the Southern Indian Ocean. "July 20, 1832, in lat. $11^{\circ} 36'$ S. long. $105^{\circ} 39'$ W. The water this evening was still more luminous than last night. Upon drawing up a bucket-full from along-side, and leaving it at rest for a short time, several beautiful bright spots or bodies might be distinctly seen floating in it, and at times darting through the water with great rapidity. Upon examination in the morning, I found four different kinds of animalcules in it, of which two were species of Cyclops. There is no doubt these were the luminous bodies seen in the water, and which were observed darting through it at such a rate."—Private Journal.

Slabber, in his work upon the microscope,* gives a figure of a "Zee-water huis," which very much resembles this species, (see p. 52, t. 17, fig. 3). He represents it with two eyes, and makes body and tail in one, but the antennæ and caudal filaments, together with the general form of the animal, leaves no doubt in my mind as to the identity of the two insects: I have therefore named it after him as its first observer.

Genus.—*OITHONA*, † Baird.

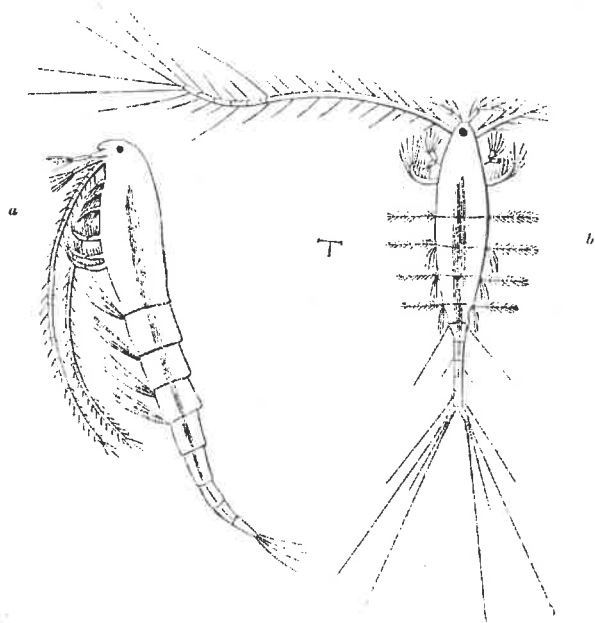
This genus is distinguished from *Cyclopsina*, by having a pair of short antennæ situated immediately in front of the long pair. The antennules, as in the last genus, are divided into two branches.

Oithona plumifera, Baird. This is a very beautiful species, but very minute in size. The body is rather slender, oval, and of an elegant appearance. Tail elongated and slender. The long antennæ are fully the length of the whole insect, numerous articulated and cili-

* *Natuurkundige Verlustingen behelzende Microscopise Waarneemingen, &c., door Martinus Slabber. 1778.*

† *Oithona*, Virgin of the wave.

ated, the cilia or setæ being long, especially at the extremities, where the antennæ are knobbed or dentated on the upper surface. Immediately above the long antennæ are the two short ones, each consisting of only about two or three articulations, and furnished with setæ: the antennules, as in the genus *Cyclopsina*, to which this insect is nearly allied, are divided into two branches, which are terminated by rather long cilia. On each side of the body, attached to the sides of the insect, we see four feathery bodies, which spread out straight from the body, the use of which I do not know; they did not appear attached to the legs, nor did their movements seem apparently connected with them. Being regular in number and situation, they would appear to belong to the insect and not to be parasitical. The legs are each furnished with numerous setæ or branchial filaments, as in all the other insects of this order. The last articulation of the tail is bifurcated, each of the divisions sending off two long filaments and a short one.



a. *Oithona splendens*. b. *Oithona plumifera*. The line shows the natural size of both.

Inhabits the Atlantic Ocean. "May 27, 1832, in lat. $3^{\circ} 24'$ N. long. $22^{\circ} 07'$ W.; during the middle watch, the sea was observed to be extremely luminous. In the morning drew up some water from along side, and upon examining it found several small animals in it, one of which is the one here described."—Private Journal.

Oithona splendens, Baird. Body long and rather slender. Tail tapering. Long antennæ about the length of the body of insect, numerous articulated, and furnished with numerous very short setæ or prickles: the upper short antennæ are terminated by a bundle of rather long setæ. First segment of body long. Last articulation of tail terminated by several short setæ or filaments.

Inhabits the South Atlantic Ocean. Off the Cape of Good Hope. "June 18, 1832, in lat. 36° S. long. 10° E. Observing in forenoon large flocks of the bird called the snow petrel by sailors, flying about and very low on surface of water, hauled up a bucket-full from along side, and found a great many Cyclopes in it, one of which was the species here figured." "June 23rd, lat. 38° S. long. 31° E. The sea this evening was very luminous. While drawing up a bucket of water from alongside, in addition to numerous bright spots in the water, there was one adhering to the rope near the neck of the bucket. At first, the moment it was withdrawn from out of the water, this spot appeared about the size of a crown piece or dollar. As the water however left the rope and it became a little drier, the spot became smaller, but still of a beautiful luminousness and of a slight bluish tinge. Upon bringing it to the light I found, to my no small surprise, that this large and bright mass of fire proceeded from a small species of Cyclops. I removed it with a pencil from the rope, and placed it in a tumbler-full of water, in which there was also another specimen taken from the same bucket. It was very lively, and when the glass was removed to a dark place, these two little creatures again began to be distinctly luminous. Upon examining them by the microscope I found them both to belong to the same species, and that they were exactly the same as that taken and figured on the 18th of June."—Private Journal.

W. BAIRD.

Notes on Captures of Hymenopterous Insects at Hawley, and description of a new British Bee. By FREDERICK SMITH, Esq., Curator to the Entomological Society.

To the north of the quiet little village of Hawley, in Hampshire, is a wood, about a mile and a half in length by a quarter of a mile in breadth; it is composed of fir, with the exception of about one hundred yards at the end towards the village, and terminates in an abrupt sloping sand-bank with a southern aspect, forming altogether one of the most desirable localities which any collector of Hymenoptera