

staining the surrounding skin; it is seated in a depression in the centre of converging corrugations. On irritating this part slightly, the tortuous frilled bands (commonly called seminal) that occupy so large a portion of the interior of all *Actiniadae* were protruded. I examined a very minute portion of one with the microscope, and found it to contain a few elliptical thread-capsules, which presented nothing peculiar.

I presume that the usual membranous septa run down the interior cavity; for pale longitudinal lines are seen through the dimly-pellucid integuments of the body, which appear to indicate such a structure.

The skin is coriaceous, not mucous, but covered with minute irregularly-transverse corrugations, as if it lay excessively loose, and was wrinkled up.

P. H. Gosse,

Weymouth, August 5, 1853.

XVII.—On two new species of Calanidæ, with Observations on the Spermatic Tubes of Pontella, Diaptomus, &c. By JOHN LUBBOCK, Esq., F.Z.S.

[With a Plate.]

[Continued from p. 124.]

Antennæ.

ALTHOUGH the right anterior antennæ of the males of *Labidocera Darwinii*, *magna* and *Patagoniensis*, *Pontella Bairdii*, *Anomalocera Patersonii* and *Monops grandis*, appear at first sight to differ very materially from one another, and from the corresponding antennæ of the left side, which, on the other hand, agree with those of the female, a little examination will prove that they are all reducible to one type, and that their differences are formed by the development of certain parts at the expense of others. I have therefore, when describing the above species, said little about these organs, intending to consider them all together. Extraordinary as are the forms, and beautifully adapted as is the prehensile apparatus of each, yet that which has struck me most is the regular arrangement of the hairs, of which there are five sorts.

1st. Short down, which I have only found on the external side of the basal segments of the female and left male. I never saw any on the right antennæ of the male.

2ndly. The plumose hairs so prevalent among the Entomostraca, and which chiefly prevail at the basal portion and the

apical segment, being apparently replaced from the 1st to the 12th segments inclusive (counting from the apex) by

3rdly. Ordinary, cylindrical tapering hairs, and

4thly. By transversely wrinkled hairs. These two last gradually pass into one another, and though generally perfectly distinct, yet it is sometimes difficult to know to which form the smaller hairs belong. And

5thly. Flattened lanceolate hairs. Hairs of this shape are represented on the antenna of a *Calanus quinqueannulatus* in Gaimard's 'Voyage en Scandinavie,' but I do not remember ever to have seen similar ones on any other animals.

The normal arrangement of these hairs is three on each segment, all on the inner side. I have already observed, however, that the short down is, when present, on the outer side. The exceptions to this rule are the three apical segments, of which the terminal bears seven hairs; and the other two have each one on the outer side in addition to those on the inner. These two hairs (Pl. VII.) are very conspicuous in *Cetochilus septentrionalis*, *Calanus communis*, and *Oithona setiger*, Dana, and are also present in *Pontella*, *Acartia*?, Dana, *Catopia*, Dana, *Caudace*, Dana, *Undina*, Dana, *Euchæta*, Dana; in short, I believe they will be found throughout the family. The plumose, wrinkled and ordinary hairs appear often to pass gradually into one another, the secondary setæ becoming further and further apart, and the wrinkles less and less distinct; they also often replace one another, the plumose prevailing on the apical and the twelve basal, and being almost entirely absent on the intermediate segments. On the other hand, the lanceolate hairs are much more constant and definite in form; there is not one on every segment, but wherever a segment is provided with its three hairs, one is lanceolate, and to this rule I know of no exception. The other two are generally (in that part of the antenna containing the second and eleven following joints to which our attention is now chiefly directed) one ordinary and one wrinkled, sometimes however two wrinkled or two ordinary. I have already remarked that each segment, except the three anterior, is normally provided with three hairs, the apical with seven, and the second and third with four each. The number is often less, but never more than this. In the ordinary unswollen antenna, two of the hairs, one of which is the lanceolate, are attached to the upper end, and one to the middle of each segment, but in the swollen prehensile antennæ they are all found at the apex.

In the females, and in the left antenna of the males, we find on the eleventh segment a strong hair larger than the rest, and evidently homologous with the hair marked (a) on *Pontella Bairdii*. This again as evidently represents that marked (a) on

L. Darwinii, *P. Bairdii*, *A. Patersonii*, *M. grandis*, and *L. Patagoniensis*; and finally, the large annulose appendage of *L. magna*, in which it attains to its maximum development. If now we count the segments from the apex in *A. magna*, we shall find that it is apparently situated on the ninth; two therefore are evidently either soldered together or missing, and at the same time the fourth shows traces of consisting of three; in *M. grandis* the apical one of these three is distinct from the other two, and in *L. Darwinii* there are transverse lines, which divide it into three segments, but are very indistinct. We have now therefore reduced the twelve anterior segments of the prehensile and non-prehensile antennæ in the two sexes to the same type, and no doubt the same might be done with the basal portion; here, however, the joints are much more indistinct, and differ with age; I have not therefore thought it worth while to devote to this inquiry the time which would be necessary to work it out satisfactorily, but will content myself with a description of the apical portion, especially dwelling on the law which has evidently presided over the arrangement of the hairs.

The three first or apical segments are always somewhat alike, small and either distinct as in *P. Bairdii*, or soldered together as in *L. magna*; in either case, however, the boundaries are well marked by the hairs. On the first, these are seven in number. The most internal is the largest, and is either simple or wrinkled; the next is simple or plumose, the third *always* lanceolate, and the rest either simple or plumose. In some cases these hairs are so delicate, that I could not quite convince myself that they agreed with the above description, and in my single specimen of *L. magna* several had unfortunately been broken off. I know of no case, however, which *disagrees* with this rule.

The second segment has in every case three hairs, two internal and one external. One of the two internal is always lanceolate; the other two either simple or ringed.

The third bears one internal and one external, either simple or ringed. In *L. Patersonii*, however, the external is plumose.

The following segments are provided with hairs on the outer side only:—

The fourth segment, which in *L. Patagoniensis*, *P. Bairdii*, *L. magna*, and *M. grandis*, is intimately united with the two following, bears a simple hair in *A. Patersonii*, a wrinkled one in *L. Darwinii* and *P. Bairdii*, and two wrinkled and a small spine. This spine I consider, not as homologous with a lanceolate hair, but rather as a rudimentary plate, of the same nature as those which are more developed and provided with teeth in the succeeding segments.

The fifth bears a lanceolate hair in *L. magna*, *Patagoniensis* and

Darwinii, *P. Bairdii* and *M. grandis*, and a simple one in *A. Patersonii*. It is also provided with a dentated plate in *L. Patagoniensis* and *magna*, with a spine (analogous to a plate) in *M. grandis* and *A. Patersonii*; and perhaps a part of the large anterior plate of *L. Darwinii* and *P. Bairdii*, which rises from the next segment, may be considered to belong to this.

The sixth has a lanceolate hair in *L. Darwinii* and *P. Bairdii* only, and bears a dentate plate in every species except *L. Patagoniensis*.

The seventh has a dentate plate in every species, and with the preceding forms the most important part of the prehensile apparatus, the teeth being turned in such a direction as to retain firmly any object seized.

The eighth has two hairs, one lanceolate and the other generally ringed, but sometimes simple, and also either a dentated plate, as in *L. Patagoniensis* and *magna*, *M. grandis* and *A. Patersonii*, or a spine as in *L. Darwinii* and *P. Bairdii*. This is the first segment of the swollen portion, which includes the ninth, tenth, eleventh, twelfth and thirteenth.

The ninth bears a lanceolate hair in every species except *A. Patersonii*; and two large, generally wrinkled hairs, one of which however in *M. grandis*, and both in *A. Patersonii*, are simple.

The tenth a lanceolate and two others, which in *L. Darwinii* and *P. Bairdii* are one wrinkled and one plumose, and in *L. Patagoniensis* and *M. grandis* one wrinkled and one simple; in *L. magna* both wrinkled, and in *A. Patersonii* both simple.

The eleventh has a lanceolate hair; a prehensile spine, which in *L. Darwinii* and *P. Bairdii* is represented by a large ringed hair; and a third which is simple in *M. grandis* and *A. Patersonii*, wanting in *P. Bairdii*, and wrinkled in the other three species. It is evident therefore, as I have remarked above, that the prehensile spine, which is large in *L. magna*, is no new organ, but merely a hair very much developed.

Finally, *the twelfth* has, like the preceding segments, a lanceolate hair, and two others which are either wrinkled or simple, or in *M. grandis* plumose.

The remaining joints are so indistinct, and it is often so difficult to determine to which the hairs belong, that I did not think it worth while to examine them as carefully. It is however evident that the hairs are arranged according to the same plan, the chief difference being, that whilst the lanceolate remain unaltered, the wrinkled and simple have been replaced by plumose hairs. The same regularity in the number, structure and arrangement of the hairs is also found on the other organs, and the more they are examined, the more does this become apparent. I hope I shall not be considered to have described the

above with unnecessary minuteness, as it was the very closeness of the agreement which struck me, and which brought before me in quite a new light the text which says, that "the very hairs of our head are all numbered." Who can help adoring that omnipotent power whose influence we perceive in everything around us, and which extends to things which we should have thought almost too insignificant for His notice!

Geographical Distribution.

The species belonging to the genus *Labidocera* have hitherto only been found in the Atlantic Ocean and in the southern hemisphere. *L. Darwinii* and *Patagoniensis* were collected by Mr. Darwin off the coast of Patagonia, Lat. $38^{\circ} 40'$ S. Ascending towards the Equator, at L. 18° to 22° S., and from $2^{\circ} 30'$ W. to 4° E., we find their places supplied by *L. magna*, *Pontella Bairdii*, and *Monops grandis*; further north again these yield to *A. Patersonii*, which is found from the north of Ireland 54° N. to 60° N., and from 6° to $25^{\circ} 45'$ W. Probably every part of the Atlantic is inhabited by one or two species of this group. They are all inhabitants of the open sea, and as they swim in great shoals must furnish abundant food for fishes, Medusæ, and other marine animals. All these species form, though belonging to different genera, a group characterized by having the right anterior antenna of the male swollen and provided with dentated plates, and, as far as we know at present, the Atlantic Ocean is the only part of the world in which this group occurs. Among the large number of *Calanidæ* obtained by Dana in the Pacific, and among those figured by Gaimard in the "Voyage en Scandinavie," the antennæ are only geniculated, as in the common *Cyclops vulgaris*. There are probably many species of this group as yet undescribed, but I do not know of any others at present existing in our collections.

Classification.

The presence or absence of superior and inferior eyes, and the structure of the right antenna of the male and the fifth pair of legs, whether prehensile or not, have hitherto been considered as generic characters, and upon them the classification of the family is founded. The eyes present the most useful characters; and though the antennæ and fifth pair of legs, being simple in the females, are not so convenient, yet as the species generally occur in shoals, in which the two sexes are found together, it will in most cases be found tolerably easy to make out the names. It may be doubted, however, whether these are really of generic value; for instance, *Monops grandis* and *A. Patersonii*, both of

which I have very carefully examined, have been placed in different genera, because the former has no superior eyes, and the latter has four; in all other respects, however, at least as far as regards their external anatomy, they agree very closely. The same may be said of *Labidocera Darwinii* and *P. Bairdii*. Following however in the steps of my predecessors, I was obliged to act as I have done, for if I altered their classification I was bound to propose a better, which I must confess I could not do. It seemed best, therefore, to retain an arrangement, which, if it is rather artificial, is undeniably convenient, and to delay attempting to form natural genera, until the discovery of new species, and a more intimate acquaintance with the old ones, and especially with their internal anatomy, should give more hopes of success.

Note on Anomalocera Patersonii.

For the purpose of comparing together the right male antennæ of all the species in which they are so much developed, I applied to Dr. Baird to know if he could furnish me with any specimens of *A. Patersonii*, Tem. Neither he, however, nor the British Museum, has any of Templeton's specimens, but he sent me some *Calanidæ* marked *A. Patersonii*, which have been recently brought from the North Atlantic by Dr. Sutherland. To my great surprise, however, I found that these, far from having no superior eyes, had *four*; each of the two normal eyes being divided. Considering that in this family the number of the eyes is a variable character, being sometimes one, sometimes two, and sometimes three, naturalists will not be surprised at there being also a case in which they are five in number; still it is interesting to find a Crustacean with five eyes. At first I thought this must be a new species, nay, even a new genus, for it seemed highly improbable that such accurate observers as Dr. Baird, Goodsir, and Templeton should all three have overlooked so curious a character. The structure of the fifth pair of legs, of the antennæ, the maxillæ and maxillipeds, the shape of the cephalothorax, and all the other parts in which specific differences are usually found, agreed however so closely with the corresponding organs of *A. Patersonii*, that I asked Dr. Baird to examine these five-eyed specimens, and give me his opinion on the subject. This he did with his usual kindness, and in a letter to me, he says, "I have no doubt that the specimens collected by Dr. Sutherland are the true *Anomalocera*."

The species which I have described as *Monops grandis* would have belonged to the genus *Anomalocera*; I was therefore rather doubtful whether to retain Templeton's name, alter the generic character and describe my species as a new genus; or to refer

my species to the genus *Anomalocera*, and make a new genus for the old species. Dr. Baird, however, thinks that the name ought not to be altered; it will be necessary therefore to give a new generic character.

Genus ANOMALOCERA.

Antenna antica maris geniculans, tunida. *Oculi superiores* quatuor. *Oculus inferior* unicus. *Pes posticus maris dexter*, prehensilis.

The four superior eyes fully distinguish it from every genus hitherto described. Probably in Goodsir's and Templeton's specimens they were not so distinct as in Dr. Sutherland's. The posterior angle of the cephalothorax on the right side is much longer than that on the left. The rostrum, on the contrary, is symmetrical.

Monops agrees with *Catopia*, Dana, in the eyes, but that genus in the 'Proceedings of the Am. Ac. of Arts and Sciences' is described as follows: "Oculis superioribus nullis, inferioribus grandibus, antenna maris antica dextra geniculante; aliis Calano affinibus;...." in Calanus, and therefore in *Catopia*, the posterior feet are "non-prehensile, often obsolete;" in *Monops*, on the contrary, they are prehensile.

EXPLANATION OF PLATE VII.

Fig. 1. <i>Labidocera Patagoniensis</i> .	Right antenna of the male.	
Fig. 2. — <i>magna</i> .	Ditto	ditto.
Fig. 3. — <i>Darwinii</i> .	Ditto	ditto.
Fig. 4. <i>Pontella Bairdii</i> .	Ditto	ditto.
Fig. 5. <i>Monops grandis</i> .	Ditto	ditto.
Fig. 6. <i>Anomalocera Patersonii</i> .	Ditto	ditto.

XVIII.—*Notes on the Ornithology of Ceylon, collected during an eight years' residence in the Island.* By EDGAR LEOPOLD LAYARD, C.C.S.

[Continued from p. 107.]

32. BATRACHOSTOMUS MONILIGER, Layard.

Only two specimens of the above new species have as yet been procured; one was caught at Avishavelly and sent to Sir J. E. Tennent, who, with his wonted kindness and liberality, transferred it to my collection. It lived three days with me, but refused all food; during the day it slept, squatting on the ground, with its head sunk between the shoulders; on being alarmed it sprang upwards with a sudden jerk, and after executing a rapid summersault in its confined cage, it would again alight and settle down like the *Caprimulgi*. I am informed this species is not uncommon in the locality from whence it was procured,



Lubbock, John. 1853. "XVII.—On two new species of Calanidæ, with observations on the spermatic tubes of Pontella, Diaptomus, &c." *The Annals and magazine of natural history; zoology, botany, and geology* 12, 159–165.
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