With the compts of the Author

ON A

New Species of Lernæopoda from the West Coast of Ireland; and Polperro, Cornwall.

BY

W. F. DE VISMES KANE, M.A.

(*PLATES IX. and X.*)

A PAPER

Read before the **ROYAL IRISH ACADEMY**, January 25, 1892;

and

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XVI.

ON A NEW SPECIES OF LERNÆOPODA FROM THE WEST COAST OF IRELAND; AND POLPERRO, CORNWALL.

BY W. F. DE VISMES KANE, M.A. (Plates IX. and X.)

[Read JANUARY 25, 1892.]

Order,	. .	**COPEPODA.**
Sub-Order,	. .	**Lernæidæ.**
Family,	. .	LERNÆOPODIDÆ, Blv.
Genus,	. .	LERNÆOPODA, Blv.
Species,	. .	BIDISCALIS.

THE genus Lernæopoda, Blv., is composed of forms very nearly allied to those of Achtheres, the latter being chiefly distinguished from it and the rest of the family by its having preserved the thoracic segmentation, a character occurring elsewhere only in the immature stages of species, such as *L. galei*, *L. elongata*, Grant, and the present one, *L. bidiscalis*. Traces, however, of such segmentation are also distinguishable in the adult, *L. galei*. It seems, therefore, desirable to merge these two genera as was suggested long since by Van Beneden. The genus Brachiella is also linked to Lernæopoda by one species *B. pastinaceæ*, but the long neck which is generally characteristic of that genus allies it more closely with Anchorella. The family of Lernæopodidæ possess the following appendages according to Kürz:—Two pairs of antennæ, one pair of mandibles, one pair of maxillæ, and two pairs of maxillipeds. Posteriorly most species are further provided with two or more abdominal (?) lobes, and the females with two multiserial ovisacs as in Cyclops. Also I find that the males of *L. bidiscalis*, and *L. galei* are also furnished with a pair of cephalic lobular processes, projecting downwards from between the two pair of maxillipeds, the use and homology of which I am at a loss to decide, and which seem to have escaped the notice of previous observers. They will be again referred to in the description of the male. This new species was found by me in June, 1890, when on a cruise in the S.S. Fingal with the Rev. W. S. Green, H.M. Inspector of Irish Fisheries. When long-line fishing off the

coast between Valentia and the Skelligs a number of Tope (*Galeus vulgaris*) were taken, and I observed that nearly all the males had their claspers torn and ragged at the tip, and this mutilation was evidently not the result of the accident of their capture. On further examination I noticed that in many cases a specimen of this parasite was fastened in the wounds. None were to be found in any other situation, nor more than one on each clasper.

On one specimen, however, I took two *L. galei* from the depression behind the ventral fins, and also a specimen of *L. bidiscalis* from each clasper. I secured in all fourteen females of this latter new species. In colour they are uniformly dingy white, with the ovisacs yellower, and the anterior portion of the head is margined with bright orange antennæ.

The Rev. Canon Norman, to whom two specimens were sent, identified them as similar to two which he received about twenty-five years ago, from Polperro, of a bright vermilion colour, found on the smooth-hound (*Mustelus canicula*). These he obligingly sent me for comparison, and they proved identical in every respect except in colour. This, however, it would appear, is a very inconstant character also in *L. galei*, Kr., of which Van Beneden ("Ann. des Sciences Naturelles, 1851") states that he had examples from four different genera of Plagiostoma, namely, *Mustelus vulgaris*, *Trygon pastinaceæ* (in the nasal fossæ), Galeus (pectoral fins) and *Scyllium canicula* (claspers). All were almost perfectly similar except as to colour; but those found by him on Scyllium were most like those found by Kroyer on the Galeus; *i.e.* with slenderer body and longer "arms." Some had yellow bands on the head, in others the head, arms, talons, and antennæ were of a bright red, and in others the anterior part of the thorax only. The colour, moreover, was not destroyed by alcohol, a peculiarity I also noted of the red antennæ of *L. bidiscalis* except after prolonged immersion for a year or more. Van Beneden mentions also that the colour was the most vivid in those from Trygon and Mustelus. On careful examination of my specimens of the new species considerable variation was found to exist, although all agreed in general characteristics. The size and shape of the thorax varied somewhat, being more oval in some (Pl. IX., fig. 8), while in others it was squarer and shorter (Pl. IX., fig. 3). In some, too, the dorsal and ventral surfaces were divided longitudinally into two swollen lateral regions, with a more depressed intermediate area, wrinkled transversely (Pl. IX., figs. 1 & 2), especially at the edge, some of the depressions appearing to represent annular furrows. The

variation in the distension of the lateral portions no doubt depends upon the quantity of ova present in the respective specimens. Van Beneden remarks a somewhat analogous formation on both surfaces of the thorax of *Brachiella Chavesii*, female, which he says suggests traces of ancestral segmentation. The brachiform maxillipeds of *L. bidiscalis* also varied a little in their proportionate length, being considerably shorter in one specimen than the rest. (In *B. Chevreuxii*, Van Beneden has found a similar shortening of the maxillipeds in some individuals.) But in every instance their swollen character was preserved, tapering rapidly from the distal to the proximal end, which was furnished with a broad, fleshy, and extremely conspicuous terminal disc (Pl. IX., figs. 6 and 7). In one instance an aberration was noticed in which the disc of one arm was not fully developed, and did not much exceed in size that of *L. galei* (Pl. X., fig. 7). The ovisacs varied, as might be expected, in thickness as well as in length, and Canon Norman's two specimens appeared to have them better developed and blunter at the end than any of mine. At the date of my captures, mid-June, the ovisacs appeared in some cases to be of full size, and in one or two examples on the point of rupture, the nauplius being fully developed in the terminal ova. The present species differs markedly from *L. galei*, by the contour and length of its arms, thorax, and other features. The *L. obesa* of Milne Edwards approaches it in some particulars, but neither the conspicuous discoid terminations to the brachiform maxillipeds nor the so-called abdominal lobes are described as present.

The tenaculum by which *L. bidiscalis* is attached to its host is shaped like a shallow saucer of reddish chitin, and in two instances, one of which was a very young female (Pl. IX., figs. 1, 6), there were observable in the central depression two colourless spots which probably are the terminal insertions of muscular attachments. In none could I find any bulbous process, such as that I have noticed in *Anchorella uncinata*. I notice that Van Beneden (*père*) describes that of the last-named species and *A. rugosa* as being cup-shaped (Ann. des. Sc. Nat., 1851.) The various and remarkable forms of tenacula of this family require further study. Being difficult to detach without injury from the tissue of the host, they are frequently absent in specimens, in others only a portion remains, and in others a mass of cartilaginous tissue envelops them, and masks their real character. This accounts for the fact that the processes described by one author are sometimes sought for in vain by another, and that they are frequently not delineated in figured species. How they are primarily inserted into the host, and how they maintain so

firm a grip is worth consideration. It is possible that the discoidal terminations of the arm-like maxillipeds are at first capable of acting like suckers, and that subsequently in such species as are provided with a bulb, as *Basanistes huchonis* and *Anchorella uncinata*, or with a cup-shaped process as in Lernæopoda, &c., this grows up gradually into the tissue of the host, and by the irritation thus produced becomes encysted in an envelope of cartilage, or tough skin. This appears certainly to be the case with the dendriform tenacula of *Lernæa branchialis*, and I have more than once noticed when dissecting out its ramifications that an active inflammation had been set up in the branchial cartilaginous membrane of the host. Before leaving this subject I would wish to call attention to a very remarkable character stated by Van Beneden to exist in the cup-shaped tenaculum of the new Brachiella he has described under the name of Chevreuxii, namely, certain solid accessories, "qu'on designerait sous le nom de mandibles ou de machoires si elles se trouvaient à la bouche." If an apparatus of this sort is found attached generally to tenacula, the method of their penetration is to a large extent explained. It is to be regretted that no figure accompanies this interesting reference. I have been unable to detect any similar appearance in the present species, unless it be the whitish filaments already referred to. These are apparently, however, only muscular cores from the two maxillipeds, round which the cup is formed. The chitinous process, whether cup or bulb, appears to be only a modification of the chitinous talons which form the normal terminations to the maxillipeds generally.

Reproductive Organs.—I have not been able to find that any observations have been made as to the mode in which impregnation takes place among the Lernæopodidæ. The discovery of spermatophores attached to the genital orifices of a female of the species now described is therefore of interest. Their position and appearance, which is that of transparent ovoid sacs with peduncles crossing each other between the genital styles, exactly resemble those figured by Claus[1] on *Lutkenia asterodermi*, and also in general character those of *Caligus pectoralis*. The peduncles are so attenuated at their proximal end that I failed at first to trace their attachment, but eventually succeeded in following their course to the extremity of the styles, where they were fixed to a transparent membranous cap which closed the pore. I also succeeded in discovering similar spermato-

[1] "Beiträge zur Kentniss der Schmarotzerkrebse," Zeits. f. Wiss. Zool. xiv. 365.

phores extruded from between the genital styles of males of *L. bidiscalis* (Pl. x., fig. 4, ss.) and *L. galei*. The peduncles were not visible, and seemed to be still included in the ducts, the apertures of which lie at the inner bases of the styles, reminding one of the similar provision in Astacus. This observation throws some light upon the homology of the styles borne by both sexes of these species. It would appear probable that they are true thoracic appendages, analogous to the ultimate and penultimate thoracic legs, in the male and female Astacus respectively. And it seems likely that those of the male are used in the application of the spermatophores, and that the peculiar shape of their distal extremity is adapted for the purpose. The styles of the female vary much in projection and shape, being sometimes cylindrical and sometimes bell-shaped as in Pl. x., fig. 9.

In M. P. J. Van Beneden's recent Memoir on two new Brachiellæ, he describes the males of both species as provided with "a unique appendage which can be nothing else than a penis." It springs from immediately behind the maxillipeds, and is directed backwards when protruded. The situation strikes one as differing from that of the genital apparatus of the family in general, but there are three species the males of which have been found to possess an analogous organ. Van Beneden (*père*) describes that of *Anchorella rugosa*, and though he does not say that the appendage is double, he figures two testes. In Kürz's figure and description of *Anchorella emarginata*, male, he mentions a pair of papillæ of three segments, pointing forwards, in the same position, and in *Cestopoda amplectens*, male, he indicates a protuberance with two pores similarly placed. Again, in Steenstrup and Lütken's figure of the male of *Brachiella appendiculata* there appears to be an indication of some such protuberance. It is to be wished that in respect to *Brachiella Chavesii* and *B. Chevreuxii* mention had been made of the number and position of the genital pores. By analogy with those above referred to we should expect the apparatus to be either paired, or if single, to possess two orifices. I regret that I have been unable to consult a work of M. C. Vogt, in which he figures the males of certain species referred to in the Memoir above cited.

I have to acknowledge my indebtedness to the Rev. Canon Norman for kind assistance and for bibliographical references.

Description of Female.

Length.—12 to 13 mm., of which ovisacs, 8 ; thorax, 3 ; head, 2.

Colour.—Grayish white, with yellowish ovisacs. Sometimes entirely crimson.

Head.—Pyriform as seen from side, very slightly domed on vertex, but oblong, with the frontal margin narrower as seen from above. Longer and flatter than that of *L. galei.* Protected above by a chitinous shield serrated anteriorly.

Antennules.—One pair, erect and slender; composed of a coxopodite and three longer joints, the last bearing a few setæ.

Antennæ.—One pair, springing from close beneath the edge of the chitinous cephalic shield, and lying along the frontal margin. They are stout and of a similar number of joints as the antennules; the extreme one being prehensile with blunt fleshy exopodite and endopodite. In the specimens taken by me they were of a bright orange, which persisted after alcoholic immersion for a lengthened period.

Mouth.—Consisting of a siphon directed forwards from the frontal margin of the head plate. The aperture fringed with ciliæ.

Mandibles.—One pair, situated within the siphon, provided at the terminal portion with 10 teeth, the four last being the largest, with 3 minute ones intercalated between them, suggesting when focussed the appearance of a double row. The mandibles of *Brachiella pastinaceæ* figured by Kürz seem very similar.

Maxillæ.—One pair ; with three blades at the anterior end, and one nearer the base.

Maxillipeds.—Two pair, which represent the outer and inner pair of rami of the second pair of maxillæ of Cyclops (cf. Hartog, "Morphology of Cyclops," Trans. Linn. Soc., 1888). (*a*) The anterior or inner maxillipeds are small, two jointed, situated beneath the head at about half its length, ending in a powerful talon. (*b*) The posterior and outer pair are large arm-like appendages, springing from close to the base of the inner pair, irregularly swollen, translucent, and fleshy, tapering rapidly from the base and terminating in a very large fleshy circular or ear-shaped disc. These two discs approximate at the inner edge, and thence conjointly give rise to a dark reddish chitinous saucer-shaped tenaculum.

Thorax.—Short, thick, quadrangular or oval, generally about one-fourth longer than broad, usually protuberant at the lower corners. In

some specimens the dorsal and ventral surfaces show a central area, depressed and wrinkled transversely to the length. Two genital papillæ with pores, anterior to the anal aperture.

Abdomen.—Aborted, or perhaps represented by two fusiform appendages attached to the extremity of the thorax, between and in front of the junction of the ovisacs. Between their bases is the anal aperture.

Ovisacs.—Yellowish. Blunt at ends. Eggs arranged in multiserial order of 3 to 4 in breadth, and presenting hexagonal outlines.

Description of Male.

Length.—3·5 mm., usually attached to the back or side of the female.

Head.—Similar in shape to that of the female, but with antennules and antennæ proportionally longer, and projecting erect from base. The siphon is directed downwards, and not forwards as in the female, and just above it, below the cephalic shield, is a single eye slightly projecting in profile. The mandibles and maxillæ similar to those of the female.

Maxillipeds.—Not very disproportionate to each other in size. The inner pair similar to those of the female, but larger. The outer pair slightly exceeding the inner in length, two jointed, with the basal joint large, and the second joint short, broad, flat, and cheliform, something like the beak of a parrot.

Intermaxilliped processes are seen projecting like a pair of transparent lobes with a granular centre between the two pair of maxillipeds. Those of a young specimen I examined were proportionally much longer than those of adult specimens, suggesting that they may be survivals of ancestral appendages. These may possibly be what Van Beneden refers to[1] when speaking of the maxillipeds of *L. galei;* he says, "On voit entre elles des pieces très distinctes du squelette cutanée."

Thorax.—Very small proportionally to the head, bluntly oval in shape, without traces of segmentation, except in immature specimens, which in both sexes are divided into five segments, which is also the case with *L. galei* and (Steenstrup and Lütken) *L. elongata.* The remarks of Van Beneden, in his recent Memoir on *Brachiella Chavesii*

[1] "Recherches sur quelques Crustaces Inf.," Ann. des Sc. Nat. 1851.

upon the segmentation of *Charopinus Dalmanni*, figured by Kroyer, may be, perhaps, thus explained.[1]

Two genital styliform appendages project from the posterior ventral surface corresponding in situation to those of the female, slender in the middle, but broader at the distal end.

Between their bases are the orifices from which the spermatophores are extruded.

Abdomen.—Aborted as in the female. The two abdominal lobes are much stouter and broader, and of irregular ovoid shape. They bend backwards and upwards until they rest upon the dorsal surface of the thorax. In the immature stage they are almost globular, and project backwards from the point of attachment without any upward curve.

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[1] "Deux Lerneopodiens nouveaux." P. J. Van Beneden. Bull. Acad. Roy. De Belgique, No. 7, 1891.

EXPLANATION OF PLATES.

PLATE IX.

FIG.

1. *Lernæopoda bidiscalis*, an immature male, showing segmented thorax.
2. The same, ♀, showing dorsal area flattened.
3. The same, showing ventral aspect.
4. The same, with a more oval thorax and larger outer maxillipeds.
5. An adult male.
6. Outer and inner maxillipeds of female with saucer-like tenaculum.
7. Do. do. another aspect.
8. Dorsal aspect of a female highly magnified.
9. Head of do. seen from above, showing antennules, antennæ, and labrum.
10. Mandible.
11. Maxilla.
12. Siphon of female protruded from buccal aperture.
13. Mandible highly magnified.

PLATE X.

FIG.

1. Immature female of *L. bidiscalis* highly magnified.
2. Immature male do. do., showing intermaxilliped process.
3. Adult male do., *s.* = spermatophore.
4. Do., ventral aspect, showing situation of intermaxilliped processes and spermatophores.
5. Extremity of outer maxilliped of male.
6. Discs and tenaculum of female.
7. Do., with unequally developed discs.
8. Intermaxilliped process.
9. Genital papillæ of female with pores.
10. Do. do. of male.


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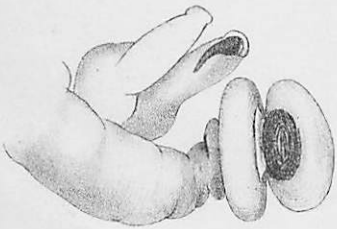
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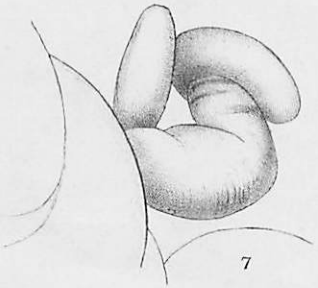
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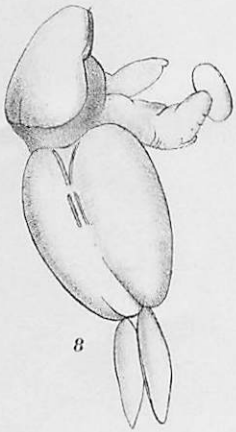
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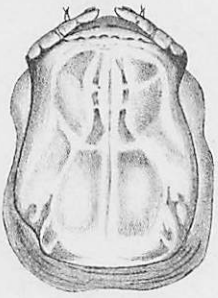
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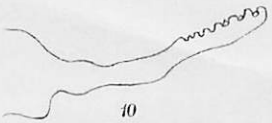
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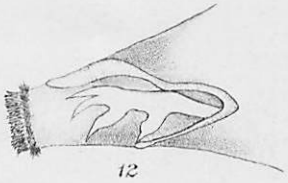
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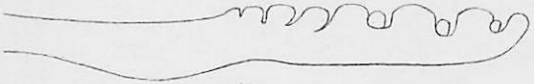
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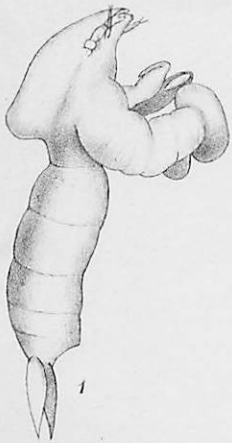
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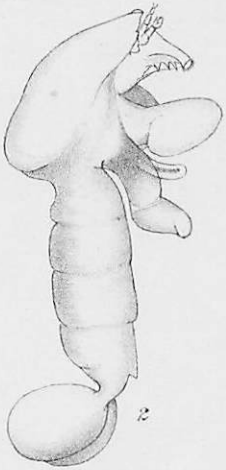
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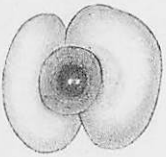
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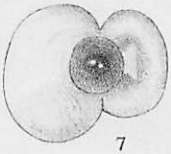
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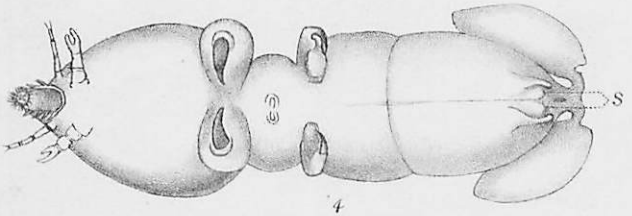
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