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gie' for 1844, page 12, that *Menestho* stands between *Scalaria* and *Velutina*. His allocation of other genera constituted by Möller are less happy: e. g. *Amaura*, between *Natica* and *Margarita*; and *Admete*, between *Mitra* and *Lottia*. It is certainly not the *Monoptygma* of Lea, which has an obliquely spiral fold on the pillar. Couthouy placed a North-American species (*striatula*), allied to the present, in Brown's genus *Pyramis*, the type of which is *Eulima subulata*. *Pyramis striatula* of Couthouy has been referred by Stimpson and Binney to the *Menestho albula* of Möller; but it is very much larger and more cylindrical, and the sculpture is different.

O. albula appears to be the sole representative in the Arctic seas of the numerous family of Pyramidellidæ.

XX.—Description of *Niphargus puteanus*, var. *Forelii*.

By ALOIS HUMBERT*.

THE existence of Amphipod Crustaceans living in wells and more or less deprived of visual organs was indicated in 1835 at Paris and in Germany. MM. P. Gervais and C. L. Koch, who were the first to discover them, referred them to the genus *Gammarus*. Some years later, Schiödte, who had discovered a species of the same group in the caverns of Carniola and Istria, perceived that these subterranean crustaceans deserve to form a distinct genus, to which he gave the name of *Niphargus*, which is now generally adopted.

A great number of memoirs have since been published upon these animals; and these have furnished us with much information as to their organization and geographical distribution. New species of the genus *Niphargus* and even new genera allied to the latter have been discovered, both in the subterranean waters of wells and caverns and in the sea. Finally, in 1869 M. F. A. Forel indicated for the first time the existence of blind Gammaridæ (*Niphargus*) in the depths of the lake of Geneva, and in 1873 he found the same animals in the lake of Neuchâtel.

Although we may say that our knowledge of the Crustacea of this group has been greatly extended, we must unfortunately add that the subject still presents many doubtful points, and

* Translated by W. S. Dallas, F.L.S., from an abstract by the author in the 'Bibliothèque Universelle: Archives des Sciences,' 15th January, 1877, pp. 58-75. The original paper appeared in the 'Bulletin de la Société Vaudoise des Sciences Naturelles,' tome xiv. (1876), pp. 278-398, pls. 6 & 7.

that the most divergent opinions are still entertained as to the value of the different specific and generic forms.

The *Niphargi* observed by Caspary, Hosius, and De la Valette-St.-George were described under the name of *Gammarus puteanus*, invented by C. L. Koch. Schiödte distinguished two other species in his genus *Niphargus*, which also includes this *Gammarus puteanus*. One of these, obtained from the Austrian caverns, is his *N. stygius*; the second, found in a well in England, is his *N. aquilex*. Spence Bate has introduced two new species under the names of *N. fontanus* and *N. Kochianus*. Costa has described a *Gammarus longicaudatus*. Joseph has indicated a new species from the caverns of Carniola under the name of *G. orcinus*. Czerniawski has described a *Niphargus ponticus* from the Black Sea. Lastly, we must also refer to an old species described by Leach under the name of *Gammarus subterraneus*. The genus *Eriopis*, established for a marine species (*E. elongatus*) found off the shores of Scandinavia at a depth of from 40 to 60 fathoms, seems to be synonymous with *Niphargus*. Finally we have to mention a very nearly allied but easily distinguishable generic group, the genus *Crangonyx*, Sp. Bate, the only known species of which (*C. subterraneus*) has been found in a well in England.

According to M. de Rougemont*, to whom we are indebted for the latest work published on this subject, a great part of these specific and generic names ought to disappear, as they apply only to different forms simply representing the successive stages of development of a single species. Among the specimens collected by him in a well at Munich, M. de Rougemont has found five distinct forms, which, however, are transformed one into the other. The first, which is from 2 to 4 millims. in length, corresponds with *Crangonyx subterraneus*, Sp. Bate, and *Gammarus pulex minutus* of Gervais. The second, varying between 3 and 6 millims., is the *N. Kochianus*, Sp. Bate. The third, measuring from 5 to 8 millims., is referred to the *Gammarus puteanus* of Caspary and Hosius. The fourth (12–14 millims.) is assimilated to the *N. fontanus*, Sp. Bate†. The fifth (12–18 millims.) is determined as the

* Philippe de Rougemont, 'Naturgeschichte von *Gammarus puteanus*, Koch,' Inauguraldiss., 8vo, pp. 40, Munich, 1875. More recently M. de Rougemont has published in French, under the title of 'Etude sur la Faune des eaux privées de lumière' (4to, with 5 plates, Paris, 1876), a memoir, which contains a translation of that above cited, together with a description of *Asellus Sieboldii* and observations on a *Hydrobia* found in a well at Munich.

† We reproduce this synonymy with great reserve, because there are contradictions between M. de Rougemont's text (p. 23) and his table of species (p. 29) with regard to the third and fourth forms.

N. stygius of Schiödte and the *N. puteanus* of Koch. To these five forms observed at Munich, M. de Rougemont adds a sixth found in a well at Neuchâtel, and measuring 33 millims. in length. Besides its colossal dimensions, the specimen from Neuchâtel is distinguished by a considerable number of joints (51) in the superior antennæ, and by the almost complete disappearance of the accessory flagellum, which only shows itself in the form of a mere spine.

It is to be regretted that the author, who has himself dredged *Niphargi* in the lake of Neuchâtel, does not tell us whether these Crustaceans fall under any one of the six forms which he establishes for the Gammaridæ of the wells.

M. de Rougemont was struck with the discovery in a single well of five different forms, and found it difficult to believe that five species so nearly allied to each other should live together in so limited a space. He sought in vain for small specimens representing the young condition of the larger forms. Out of about a hundred individuals he found none of the dimensions of 2-4 millims. which approximated to the form which attains 18 millims. He then asked himself, whence came these large individuals? and he arrived at the conclusion that these five forms are not species, but only different stages of development of one and the same species, namely *Gammarus puteanus*, Koch.

Thus, according to him, something of the same kind would take place here as in the case of the salmon, which, when they are not more than 6 inches long, already present completely developed reproductive organs and nevertheless continue to grow until they attain a length of 5 feet. In the *Gammari*, as in the salmon, characteristic forms would seem to make their appearance as the animal increases in age. This naturalist isolated certain forms, with the object of ascertaining whether they really underwent metamorphoses. His experiment was successful. He saw individuals pass by change of skin from the first form (*Crangonyx subterraneus*) to the second (*Niphargus Kochianus*); and he also observed the transformation of the fourth form into the fifth. Hence the author concludes that the genera *Crangonyx* and *Niphargus* must not be separated, since they only represent different states of one and the same species. He goes even further, and proposes the suppression of the genus *Niphargus*, which he regards as being nothing more than the result of a modification of *Gammarus pulex*.

The facts upon which M. de Rougemont relies are doubtless very curious and of much significance. It cannot be denied that we have in them observations worthy of the utmost attention on the part of zoologists. I think, however, that we

cannot without reserve accept all the combinations of species and genera proposed by this author. Side by side with very interesting observations expounded most ingeniously, M. de Rougemont's memoir contains a certain number of weak points, which prevent our being completely convinced by it. In the first place the discordancy between different parts of the text with respect to the arrangement of the old species under the different forms observed leaves room for doubt as to the validity of the proposed identifications. Other things also increase our distrust in this respect. Thus fig. 4 on pl. i. represents the last two joints of a foot, reputed to be those of the two anterior pairs of the fourth, fifth, and sixth forms. Now if we compare this figure with that given by Bate and Westwood of *Niphargus fontanus*, it will be seen to differ completely. The species of the English authors would be still more difficult to recognize in fig. 3, which represents the second and third forms.

The figures of the two anterior pairs of feet of the first form are different from those given by Bate and Westwood for *Crangonyx subterraneus*; and it is the more difficult to decide whether M. de Rougemont really had this genus under his hands, because he does not tell us whether his specimens presented the entire telson and the last pair of feet with a single unjointed ramus, which are important characters serving to distinguish *Crangonyx*.

Lastly, my observations on the *Niphargi* of the Lake of Geneva do not agree with those of M. de Rougemont. Among the animals of this genus communicated to me by M. Forel, some are very small, measuring 2 millims. from the front of the head to the extremity of the last saltatory feet. These individuals ought therefore to take their place under the first form of M. de Rougemont, including all the specimens from 2-4 millims., and consequently correspond to *Crangonyx subterraneus*, Bate. But this is by no means the case. These young individuals undoubtedly present certain differences dependent on age, and consisting in a much smaller number of joints in the antennæ, a smaller quantity of setæ upon the different parts of the body, &c. But as to the generic characters properly so called, they are already well marked; and in particular *the first two pairs of feet have already the same form as in the adult, and the telson is deeply cleft*.

It seems to me, therefore, that whilst we must take account of M. de Rougemont's observations as furnishing a very valuable indication of the metamorphoses which the crustaceans of the group under consideration may undergo, we cannot yet definitely accept the changes which he proposes in the classification of the forms hitherto observed. I have there-

fore provisionally retained the genus *Niphargus*, modifying it and completing its diagnosis.

In the state of confusion which prevails at present among the species of this genus their determination is difficult, whether we accept the arrangement of Schiödte and Spence Bate, or, like De Rougemont, only regard the forms described as representing the successive phases of a single type.

The *Niphargus* of the Lake of Geneva, and that which I have found in a well in the environs of Geneva, although very different in size and presenting some slight differences of organization, did not seem to me to need separation otherwise than as varieties. This point once settled, I had to inquire whether the species was new, or whether it fell under one of those which were already described. It seemed to me to be quite distinct from *N. aquilex*, *fontanus*, and *stygius*, and, although more nearly allied to *N. Kochianus*, could not be confounded with it.

As to the six forms of M. de Rougemont, there is not one to which I could with any probability or confidence refer those which I have before me. The figure given by that author representing the last two joints of a foot of the fourth, fifth, and sixth forms, resembles these same parts in my specimens; but as I have already stated, that figure is not in accordance with some of those of the authors quoted.

It will be always difficult to arrive at a decided opinion with regard to the *Gammarus puteanus* of Koch, which is described and figured in a very unsatisfactory manner. Nevertheless the name given by Koch has been in a manner fixed in science by the memoirs of Caspary and Hosius, who have given very good figures of the species. Thus it seems to me that, until the contrary is proved, we may regard the name of *Gammarus puteanus* as applying to the species which has been described and figured by these two authors. Now it is to this that my two varieties seem to approximate most closely, notwithstanding slight differences in the proportion of the propoda of the first two pairs of feet. I have consequently adopted for the species the name of *Niphargus puteanus*, Koch, distinguishing each of the two local varieties, however, by a special name: the form from the Lake of Geneva is *Niphargus puteanus*, var. *Forelii*; and that found in a well at Onex, *N. puteanus*, var. *onesiensis*. I have completely described only the former, and contented myself with indicating the differences which exist between it and the second form by placing in a tabular form those which seemed to me well marked. A detailed comparison with the type of the preceding authors is impossible, because the latter has not been described with sufficient exactitude.

In my memoir there will be found a very detailed description of the species, founded upon the examination of a great number of specimens, which M. Forel had the kindness to furnish me with. I hope I have thus brought out characters derived from organs which are often too much neglected, at the same time avoiding the mention as specific of purely individual peculiarities. I shall content myself here with indicating some points in the organization of these crustaceans which seem to me more particularly to deserve the attention of anatomists.

Of the authors who have treated of the species of the genus *Niphargus*, some say positively that the eyes are deficient; others that they are without pigment and not apparent, which is as much as to say that they have not perceived them; others, again, describe them as yellow or as imperfectly formed. M. Plateau asserts that they exist, but are destitute of pigment. It appears, however, from his memoir that he did not see them, and only convinced himself of their existence by physiological experiments, which proved to him that the *Niphargi* were sensible of light. M. de Rougemont saw some irregular pigment-spots on the sides of the head; but he does not believe in the presence of an optical apparatus. For my own part, I have been unable to perceive the least trace of eyes or even of a deposit of pigment.

M. de la Valette-Saint-George described and figured some very small organs situated on the dorsal parts of the segments, and composed of a small capsule, from which issues a filament which bifurcates. I have examined these singular organs, to which I have given the name of *sensitive capsules*, in rather more detail, and ascertained that they occur not only on the segments, but also along the anterior margin of the head and on the first two joints of the peduncle of the superior antennæ. The capsule, placed beneath the chitinous envelope, is ovoidal, delicate, transparent, and open at both its poles. Through the exterior orifice issues a hyaline and homogeneous filament, which is straight for the greater part of its length, but is curved towards the end and has its extremity obliquely truncated. A fine dark line, probably indicating a furrow, commences near its origin, and runs as far as its distal extremity. At about $\frac{2}{3}$ of the length of the filament (that is to say, at the point where it begins to bend) a much finer filament detaches itself from the former, on the convex side of the curvature, at an acute angle. This secondary filament, which is very thin at its origin, soon becomes excessively slender and sometimes difficult to follow. Its length somewhat exceeds that of the principal filament. Sometimes only the parts that I have just described exist; but in other cases,

which seem to me to be the most frequent, the complication is a little greater. Thus two or three secondary filaments often originate upon the principal one. I have also represented a filament of peculiar appearance, destitute of longitudinal furrow, and emitting from its extremity six or seven secondary filaments, which are slender from their origin, and one of which is particularly elongated.

It is absolutely impossible for me to form any judgment as to the functions of these capsules and their filaments; but, although I have been unable to ascertain the entrance of a nerve into their interior, I think they must have some sensitive function.

The antennæ have several kinds of sensitive organs. Besides the *sensitive setæ* which are organized like those of *Gammarus neglectus*, so well described by Sars, we find in them *olfactory cylinders*, *sensitive capsules*, *olfactory setæ*, and, lastly, what I have called *hyaline bacilli*. These last organs are usually borne by the joints in pairs, from the fourth joint of the flagellum (var. *onesiensis*), or the sixth (var. *Forelii*), to the sixteenth. The last joint also bears a bacillus; but this is much shorter than the others and of a more clumsy form. It is situated quite at the extremity of the joint, like the setæ in the midst of which it is placed.

The bacilli are of pretty uniform diameter throughout, being only a little constricted in their middle region, and slightly inflated in their terminal portion. Their extremity is rounded and completely closed. Their diameter at the base is equal to one half or two thirds of that of the peduncle of the olfactory cylinders; their length is not quite half that of the latter organs. They are entirely pale, without any apparent structure; no enveloping membrane can be distinguished in them. Standing in the same direction as the olfactory setæ and cylinders, they are nearly straight, presenting at the utmost a slight undulation. The length of these bacilli is from 0.033 to 0.038 millim.; that of the last joint is not more than from 0.008 to 0.018 millim. in length.

These organs perfectly resemble those figured by Sars upon the joints of the outer branch of the superior antennæ of *Mysis oculata*. This author only mentions them as "peculiar cylindrical appendages, of a very delicate nature, which occur along the inner border of the first part of this branch."

In a memoir on the sensitive organs of the antennæ in different Crustacea, Claus has figured an antenna of the second pair in a *Cypris*, in which the inner margin of the third joint bears an elongated spadiciform appendage which greatly resembles the hyaline bacilli of *Niphargus*. But in the *Cypris*

this organ has, in the first half of its length, a chitinous wall of a certain thickness; and the author says that it is larger in the adults than in the young, and chitinized throughout its length, and then more resembles the organs of this nature that are met with in insects.

I do not know of other figures or descriptions that may be referred to these organs. It is very possible that they have been described in a memoir by Jarschinski*, which I have been unable to consult, and of which I must content myself with reproducing the title from the 'Zoological Record.'

On the inferior antennæ sensitive setæ, hyaline bacilli, and auditory setæ are also met with.

The buccal organs and the feet present extremely varied forms of setæ, the arrangement and number of which exhibit a remarkable constancy in the two varieties which have been comparatively studied.

This is not the place in which to enter into further details as to the structure of these Crustacea. I shall content myself, in conclusion, with reproducing the paragraphs in which I have treated of the habitat of the *Niphargus* of the Lake of Geneva, and discussed the problem of the origin of those crustaceans which inhabit waters destitute of light.

"What is the origin of the blind Gammarids which we find in wells, in caverns, and in the depths of seas and lakes? Such is the problem which cannot fail to force itself upon the minds of all who investigate these crustaceans. Two different solutions of it may be given. It may be assumed that these animals were created such as they are now, because, being destined to live in places deprived of light, they had no occasion for visual organs. This explanation, or, rather, this reply, formerly the only one admitted, now-a-days satisfies only a very small number of naturalists; and many powerful arguments may be brought to bear against it. It will be sufficient to cite a single one, namely the fact that other animals living under the same conditions of obscurity are furnished with perfectly organized eyes. Thus certain *Gammari* of Lake Baïkal, living between 50 and 500 metres, have the eyes well constructed and furnished with black pigment. The *Munidæ*, which are dredged in the sea at depths of 1000-1200 metres and more, have the eyes exceptionally developed and apparently extremely sensitive. The *Gnathophausiæ* dredged by the naturalists of the 'Challenger' between 1830 and 4020 metres have normal pedunculated

* F. Jarschinski, "On the Leydigian organs of the antennæ of the Crustacea Amphipoda," Premier congrès des naturalistes Russes à St. Pétersbourg, 1868, pp. 311-318 (in Russian).

eyes, and over and above these an accessory eye on each of the maxillæ of the second pair.

"The second solution, founded on the theory of transformation, assumes that these blind creatures originate from ancestors furnished with eyes, which have by degrees, under the influence of disuse, lost these organs, which have become useless. One of the best proofs in favour of this view may be drawn from the transitions observed in certain species. In some Gammarids of Lake Baïkal we can ascertain a tendency on the part of the visual organs to become less perfect in proportion as the animal inhabits greater depths. We may cite, as examples, *Gammarus Ussolzevii* (var. *abyssorum*) and *G. Borowskii* (var. *dichrous*, subvar. *abyssalis*). But this transformationist explanation, which is now-a-days generally accepted, and which appears to me to be the true one, does not settle the whole problem. It may be asked, among other things, with regard to this or that blind species, whether its origin dates back to a very ancient epoch or is comparatively recent, whether it originated from extinct or from still existing forms. These questions have sometimes been settled by a dash of the pen; and, amongst others, this has been the case with the *Niphargi* of the caves and wells. Nevertheless the problem presents itself in a very complex fashion, and appears to me to necessitate a greater number of observations than we possess at present before it can be regarded as completely solved. I even believe that it is impossible now to arrive at any thing precise with regard to the origin of the *Niphargi*; we can only claim to indicate the probabilities, and to clear the ground by getting rid of some erroneous notions.

"The *Niphargus* of the Lake of Geneva lives at a depth of from 30 to 300 metres. Now, according to the observations of M. Forel*, the chemical action of the solar rays in the waters of the lake ceases to make itself felt in summer below 40 or 50 metres, and in winter below 80 or 100 metres. Consequently, although inhabiting an open sheet of water, this crustacean is subjected, throughout the greater part of the zone occupied by it, to the same conditions of obscurity as its congeners enclosed in wells or caverns. We seem, therefore, to be justified in concluding that it is under the influence of this obscure medium that our species has lost its visual organs. This is the explanation that has been proposed by the naturalists who have sought to account for the origin of the *Niphargi* of wells and caverns. Some have even gone still

* F. A. Forel, "Recherches photographiques sur la transparence de l'eau," Bull. Soc. Vaud. des Sci. Nat. 2^e sér. tome xiv. (1874) p. 24.

further and wished to derive them directly from *Gammarus pulex*. I cannot share in this last opinion, which seems to me to be that of a narrow Darwinism; and I think that, both with respect to the *Niphargus* of the Lake of Geneva and to those of other dark places, there are strong arguments to be brought against this theory of *G. pulex* becoming transformed into *Crangonyx* and *Niphargus*. The following are the chief of these objections:—

“1. So far as we know at present, *Gammarus pulex* only descends to a small depth from the surface; and there is a zone destitute of Gammarids, extending between the lower level at which we cease to find *G. pulex* and the upper level attained by the *Niphargus*. This fact would be very difficult to explain if the *Niphargus* originated from *G. pulex*. In this case, on the contrary, we ought to find representatives of this latter species at all depths, and even to meet with individuals establishing a passage between one form and the other.

“2. If the *Niphargi* originated from *Gammarus pulex*, and had in their youth, as asserted by M. de Rougemont, the form of *Crangonyx subterraneus*, we should find ourselves face to face with facts completely opposed to the general laws of development. We know, in fact, that the characters which separate two representatives of the same group are less marked in youth than in the adult state. Forms which resemble each other during the first phases of their development may subsequently diverge in a very striking manner. This embryonic and phylogenic law is particularly verified among the Crustacea, in which affinities which are strongly marked in the larvæ almost entirely disappear in the adult animal. Now what do we see in the Gammarids before us?

“In the *Gammar*i proper the last pair of saltatory feet are biramous; *Gammarus pulex* even has the two branches nearly equal. The *Niphargi* have these branches very unequal, but both of them still exist. In *Crangonyx*, on the contrary, there is only a single branch. The *Crangonyches*, therefore, in this respect, represent a type further removed from *G. pulex* than the *Niphargi*. We could understand, therefore, a development in which the second branch inherited from the ancestor would exist during youth, and afterwards disappear, by atrophy, at a more advanced age—in other words, a *Niphargus*-phase afterwards attaining the state of *Crangonyx*. The inverse of this (that is to say, a metamorphosis of the kind observed by M. de Rougemont) appears to us to be discordant with all that we know of the metamorphoses of the Crustacea.

“The same abnormal reversal of the laws of development would also be observed in the case of the telson, which is

double in *Gammarus*, of a single piece but deeply cleft in *Niphargus*, and completely entire in *Crangonyx*. By adopting the theory of M. de Rougemont it would therefore be necessary to assume here that the *Niphargi* differ more in their youth than in their adult state from the *Gammarus pulex* from which they originated.

"3. If we consider that *Eriopis* ought to be united with *Niphargus*, it is difficult to understand how these marine Gammarids could have originated from the *Gammarus pulex* of the fresh waters, and get into the North Sea and the Black Sea.

"4. We find the *Niphargi* distributed over a great part of Europe in waters deprived of light, both in wells and caverns and at the bottom of lakes. On the other hand, in Lake Baikal, so well explored by M. Dybowsky, who has found there ninety-seven species of Gammarids, including *Gammarus pulex*, no species of *Niphargus* appears to exist*. Nevertheless this immense lake presents depths much greater than those of the Lake of Geneva and the Lake of Neuchâtel; and the solar rays, which are more oblique in Siberia than in Switzerland, must make their action felt to a still less depth than in our waters. It may be added that the astonishing number of species which inhabit Lake Baikal, and the variety of their forms, would tend to make us suppose that this vast sheet of water has a fauna more ancient than that of the Swiss lakes, and that the modificatory causes have consequently had more time there to act upon the species.

"These various considerations lead me to believe that *Niphargus* is an ancient genus descended from a form now extinct, as is evidently the case with *Proteus*, *Leptoderus*, *Anophthalmus*, &c. As to the question whether the *Niphargi* of the lakes are colonies originating from animals of the same genus which inhabit subterranean waters, or whether the reverse is the case, it is difficult to solve, and its solution is even complex. Assuming that the genus *Niphargus* appeared before the glacial epoch, it is impossible to say any thing about its place of origin. But, not to carry the question so high, and considering only the existing fauna, I should be disposed to think that our *Niphargi* of the Swiss lakes have originated from those which inhabit subterranean waters. Having reached the lakes, they would have acclimatized themselves in the depths which present the darkness that they seek. In this more or less obscure zone they found themselves under conditions which allowed them to exist; whilst in the illuminated zone they could not have escaped their enemies, or maintained the struggle against their near allies furnished with visual

* A *Crangonyx* is known from the subterranean waters of Kamtschatka.

organs. Considering the larger dimensions attained by the forms living in wells, it would seem that those of the lakes, although inhabiting much larger pieces of water, are in circumstances less favourable to their development, and are, in a manner, atrophied."

XXI.—*Hermaphroditism among the Parasitic Isopoda. Reply to Mr. Moseley's Remarks on the Generative Organs of the Parasitic Isopoda.* By J. BULLAR, B.A., Trinity College, Cambridge.

IN the January number of this Journal Mr. Moseley attacks some statements which I had made in a paper on the Generative Organs of the Parasitic Isopoda (Journ. of Anat. and Phys., Oct. 1876). He discredits my discovery of hermaphroditism in this group, and bases his arguments mainly on the supposition that the organs which I have described as testes are, in reality; spermatophores or parts of them.

Before answering Mr. Moseley's objections, I may perhaps be permitted to supplement my previous account of the anatomy of the testes by some facts which, though they do not fully elucidate the development of the spermatozoa, are, I trust, amply sufficient to demonstrate the untenable nature of Mr. Moseley's suggestions.

The testes in these animals consist of three pear-shaped bodies, each invested by a special membrane, which is constricted to form a narrow neck before becoming continuous with the wall of the ovary. In the case of *Anilocra mediterranea*, the narrow portion is elongated to form a short duct. Each of the testes receives at its free end a special bundle of blood-vessels. The testes usually contain numerous spermatozoa, which may be seen passing down along the outer border of the ovary into the vas deferens. In some cases, however, they contain few or no spermatozoa, and are filled with a cellular blastema, from which, doubtless, the spermatozoa are developed.

The position of the testes is so invariable and their structure so uniform, that it is incredible that, had Mr. Moseley seen my preparations (which, I need hardly say, I should have been only too delighted to have shown him, and thus have saved him the trouble of writing his communication) and not merely the drawings, he could have mistaken the testes for spermatophores.

The vas deferens is a narrow duct lined by a flattened epithelium; at its lower extremity it presents an enlargement, and opens into a distinct penis situated on the ventral wall of the last thoracic segment.