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Arthur Hill Hassall Esq., M.R.C.S.L.

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XLIV.—*Remarks on the genus* Lepralia *of* Dr. Johnston, *with Descriptions of Six undescribed species, and notices of two other Zoophytes.* By Arthur Hill Hassall, Esq., M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

From the varied nature of the bases upon which the zoophytes comprised in this genus are found, the same species being sometimes met with on rocks, stones, shells and fuci, and from the unyielding and calcareous structure of the majority of their polypidoms, it might be supposed that the different species would be subject to numerous variations, and that the same species would not unfrequently present an altered appearance according as it was affected by either locality, age, mode of drying or injury, one or all of these causes operating upon it at the same time, and that therefore there was reason to apprehend that *conditions and varieties* of species would sometimes be described as *distinct* species. From the great number of species contained in this genus, to which I have paid a good deal of attention, which I have examined both in a recent and dried state, and from the number of specimens which I have now in my possession, I think that I have the means of ascertaining with tolerable accuracy the extent to which the *Lepraliæ* are altered by the influences alluded to; and from the evidence now about to be detailed, it will be apparent, I imagine, that the changes thus produced are neither so numerous nor so important as might at first have been surmised.

First as to locality. There are specimens before me of *Lepralia pediostoma* on granite, shale, stones, shells of various kinds, and on the root of *Laminaria digitata* and *L. saccharina*, its occurrence on these last being very rare; and in all these the characters of the species are well marked, and do not differ in any appreciable manner from the variety of the situations on which it is placed. Of *Lepralia punctata* I have examples on the same localities as the preceding species, its favourite site being however granite, and its presence on fuci being even more rare than that of *L. pediostoma*; of *Lepralia immersa* and *L. ciliata*, on granite, shells and fuci, the latter species being usually found on the roots of *Laminaria digitata* and *L. saccharina*, and of *Lepralia ovalis* on shells and granite. *Lepralia insignis** is generally met with

* I may here record the occurrence of this species on the English coast; it is probably a very widely distributed one. I have specimens of it on oyster-shells from Burnham, Norfolk, and last summer I found it among other zoophytes sent me by Miss Nolcken from Jersey. I have too within

on shells, more particularly on *Patella cærulea*; it is a delicate species, and the specimens found on this shell are usually very perfect, owing no doubt to the sheltered position which it occupies in the root of *Laminaria saccharina*, on the frond of which sea-weed it is also sometimes located. Of *Lepralia appensa** there are several examples before me; some on *Patella cærulea*, the majority on the roots of *Laminaria digitata* and *L. saccharina*, which are such great favourites with the *Lepraliæ*, and others on their laminæ: and of *L. ventricosa*, two on the smooth internal surface of a *Pecten*, and one on the rough exterior of an *Ostrea*. The numerous specimens which I have of *Lepralia nitida*, *L. coccinea* of Johnston, and *L. linearis*, are all upon granite; those of *Lepralia auriculata* and *L. semilunaris* upon shells; and the following species, *Lepralia hyalina*, *L. assimilis* and *L. diaphana*, on either the root or frond of *Laminaria digitata* or *L. saccharina*. Now the remark which I have made with reference to *Lepralia pediostoma* may be extended to the different species just enumerated thus variously situated, for not alone are all the essential characters of each of these species preserved, but I do not notice even minor differences attributable to the dissimilarity of their places of growth. The influence of locality, therefore, is so slight as scarcely to be appreciable.

Secondly, with reference to age. I have examined more than two dozen specimens of *Lepralia pediostoma* and *L. punctata*, as well as many of other species, and in all these the distinctive characters of each species are preserved; the walls of the cells present the same appearances in each (excepting only one species with transparent walls, *L. hyalina*), nor does the form of the aperture differ in any material respects, and out of so many specimens it may be fairly concluded that *some* are *young*, while *others* are *aged*. In some species, especially the following, *Lepralia appensa*, in which they are rarely absent, *L. coccinea* and *L. punctata*, situated at each upper angle of most cells are small triangular wing-like appendages, hollow, open at the top, and communicating with the interior of each cell below, one to each angle; these alæ are usually regarded as abortive cells; their presence is not constant, and may possibly depend upon the age of the polypidoms. In the same specimen

the last few days received a specimen of it from the Rev. David Landsborough, found at Stevenston, Ayrshire. Mr. Landsborough has also noticed my *L. pediostoma* at the same place, making a second English locality for the species.

* This zoophyte is also met with on the English coast. It occurs at Burnham, Norfolk, and specimens have been sent me from Jersey by Miss Nolcken.

some cells will be found to be furnished with them, while others are destitute of them. An occasional opacity of the walls of the cells of a species usually transparent, is certainly sometimes produced by age, but it is a rare effect, and the number of *Lepraliæ* with transparent cells is not great, and the other characters of the species still remain unaffected. It may be doubted how far the examination of a number of specimens of a species is necessary for the purpose of ascertaining the effects of age upon it, and whether one well-developed specimen would not furnish all the information to be acquired on this point, seeing that it presents examples of both young and aged cells, those in the centre from the circular development of most of the species of the genus being the aged ones, and those near the circumference of the crust being of course the most recently formed; and yet how little difference do we find between the central and circumferential cells! the former are, indeed, sometimes provided with opercula not present in the latter.

The changes produced in the *Lepraliæ* by age, therefore, are not numerous, nor are they such as would be likely to lead to errors in the discrimination of species; although candour requires the confession that I was once imposed upon by the altered aspect of a species, *L. hyalina*, arising from the opacity of the cells, which are generally transparent, and was led to regard it as a distinct species. This however, I feel assured, would not have occurred, had I at the time command of even a tolerable microscope. Thus my *Lepralia cylindrica* is nothing more than a peculiar condition of *L. hyalina*.

Thirdly, what are the alterations occasioned in the appearance of *Lepraliæ* produced by drying?

An alteration of colour is one: most *Lepraliæ* in a recent state are of a reddish colour, the tint varying with the species; this is in a great measure lost by drying, the specimens becoming more or less colourless. A second is, that the perforations contained in the walls of the cells of some species, visible in the *Lepralia* just removed from its native element, become more manifest and more defined, but still present in each species the appearances of size and form which are peculiar to that species; and as most *Lepraliæ* are figured and described from *dried* examples, they are therefore upon an equality in this respect, all having undergone the same process.

Fourthly, with regard to injury. The *Lepraliæ* are subject to injury and mutilation arising from several causes; thus they may be injured by the action of the waves while still attached to the objects upon which they grow, by the trituration of the shells and fuci on which they are placed upon each other as

they are thrown upon the shore, or by rough and careless handling; the damage which the *Lepraliæ* sustain from these several causes is however nearly the same in all, and consists in the removal of the spines with which the apertures of most species are furnished. I consider that it is in the first way that *Lepralia punctata*, *L. linearis* and *L. auriculata* are injured, for of these you may remove with the utmost care very many living specimens from their bases, and yet not find one perfect, that is, having the cells armed with spines; when these do occur, they are always met with on those cells which are sheltered by some indentation of the surface upon which they have developed themselves, thus clearly indicating that they pertain *equally to all the cells*, but have been removed by violence. Sometimes the spines are so abraded that no trace of fracture can be detected; this is the case with the three species just named; in others, however, especially the following, a portion of such spines usually remains behind, as in *Lepralia appensa*, *L. ovalis*, *L. immersa* and *L. insignis*.

It cannot be doubted also but that the spines are frequently either removed or obscured by a natural cause, viz. the development of an operculum, when they will still be found however on the marginal cells: this is frequently the case with *Lepralia auriculata*.

It may be asked whether an occasional development of spines ever takes place in species usually destitute of these appendages—it is my firm belief that such never occurs: the number of species not provided with spines is but small; I am acquainted with but two species possessing calcareous polypidoms whose apertures are not armed with spines, *Lepralia coccinea* and *L. pediostoma*, and on these the search for spines, I am convinced, would be a fruitless one. *Lepralia variolosa* is figured in Dr. Johnston's 'British Zoophytes' without spines, with which I have a strong suspicion that it will ultimately be found to be furnished.

Reviewing therefore the foregoing remarks, it will, I think, be manifest that the effects of *the operation of the first three causes, locality, age, and the drying of the specimens, are not material, whether acting singly or in combination on the same species, nor such as are likely to lead to error in the definition of species*; not so, however, with regard to the *fourth* cause, the mutilation of the specimens from violence; unless great care be employed to procure perfect specimens, there is reason to fear that injured and imperfect examples of a species will be mistaken for a distinct species. The form of the apertures I consider to be one of the best characters by which to recog-

nize species, and very little subject to even a slight variation, except from injury. Out of all my specimens I have only noticed one, of *Lepralia punctata*, in which the apertures of the cells present an appearance somewhat different from that by which it is usually characterized; in it the anterior wall of the cell is plain, and not continued up into the apertures—notwithstanding this the specimen is easily identified.

The polypes of the *Lepraliæ* resemble very closely those of the *Flustræ*; they are mostly of a pinkish colour; in one example of *Lepralia pediostoma* which I examined, and which may probably be regarded as the type of the genus, I repeatedly counted seventeen tentacula to each polype; but it is likely that I was deceived, and that the number really is either sixteen or eighteen, for there would appear to be a dislike to odd numericals in the Ascidian type of zoophytes.

On making a careful examination a short time since of a number of specimens of Irish zoophytes collected by me during the winter of 1840 and spring of 1841, and which had previously received but a partial and hasty investigation, I was gratified by the discovery of the following undescribed species belonging to the genus *Lepralia*, drawings of which will be shortly prepared and sent to Dr. Johnston for his 2nd edition of the 'British Zoophytes,' a work which, from the great progress which zoophytology has made within the last year or two, will doubtless be replete with interest, and the early publication of which is much to be desired.

Lepralia semilunaris.

Spec. Char. Crust when dry opake white; form of cells not very distinct; walls usually perforated; apertures semilunar, mostly furnished with an operculum; a single pointed tooth arises from the anterior wall of each cell about its centre.

Two or three specimens of the above well-marked species have occurred to me on old valves of *Pecten maximus*, trawled up off Bray, near Dublin; it is therefore most probably a deep-water species. Its distribution is not confined to Ireland, as I have since met with a single specimen on oyster-shells from Burnham, Norfolk. In some cells the anterior tooth is broken off, leaving an aperture in its place; there is also sometimes an appearance of two spines, one on either side the aperture, produced by the incomplete removal of the operculum.

Lepralia auriculata.

Spec. Char. Crust generally reddish even when dried, spreading circularly; cells but little raised, and their form ill defined; apertures pitcher-shaped, small, looking upwards (the spout-like prolongation being very prominent), and armed

with two slender divergent teeth, the length of which rather more than equals the diameter of the mouth of the cell.

This zoophyte resembles somewhat my *Lepralia linearis**, from which it differs *principally* in the number of the teeth, rarely more than two, and in the absence of the short rounded processes placed just below the aperture met with in it. It likewise approaches, I should think, near to the *Lepralia variolosa* of Dr. Johnston, a species with the characters of which I must confess myself but ill acquainted at present. Most probably a deep-water species, being found principally on the same description of shell as the preceding, than which it is less rare, as I have met with eight specimens trawled up off Bray; teeth but seldom present, and as they are very straight and somewhat divergent, they present the appearance of ears, whence the name of the species is derived. A cream-coloured variety is occasionally met with.

This species is also English, and is found on oyster-shells from Burnham, Norfolk.

Lepralia ventricosa.

Spec. Char. Crust when dry brownish and glistening; cells defined and ventricose; apertures circular, the lower lip rising up so as to form a pointed process; armed with four short, tubular, erect teeth.

The above is a very striking species; it is evidently one of the rarest of the genus, as I have but two Irish specimens, collected in the bay of Dublin. It is likewise found on the English coast at Burnham, Norfolk.

Lepralia tenuis.

Spec. Char. Crust translucent; cells but little elevated; walls distantly perforated; apertures semicircular and mostly provided with circular opercula, which are also perforated; a small tooth arises from the anterior wall of the cell just beneath the aperture.

This species can only be distinguished from *L. hyalina* by the aid of the microscope; it is generally found upon the frond of *Laminaria digitata*, upon which it forms circular patches of about one-third of an inch in diameter.

Dublin Bay, rare.

Lepralia assimilis.

Spec. Char. Crust transparent; cells rounded superiorly; apertures triangular and mostly furnished with an acuminate operculum. A large and very blunt process is placed beneath each aperture.

It is no easy matter at first to distinguish this species from

* See Annals, vol. vii. p. 368.

the preceding, from which however, as well as from *L. hyalina*, I am satisfied that it is distinct.

Four specimens are on old valves of *Pecten maximus*: Dublin Bay.

Lepralia ovalis.

Spec. Char. Crust whitish, glistening; cells well defined and oval; apertures circular, oblique, the lower margin rising up into a short process, usually bifurcate, and furnished with two, rarely three, teeth, the length of which exceeds greatly the diameter of the mouths of the cells.

This is a distinct, and, I imagine, a very rare species, as I have but one Irish specimen attached to a piece of granite, procured at Kingstown. From *L. trispinosa* of Dr. Johnston, a species with which I am not acquainted, it differs in being very rarely provided with three spines, and in the absence of the spout-like excavation represented in the figure of that species; while from *L. immersa* it is at once known by the much larger size of the cells, discernible plainly by the unassisted eye, as well as by other characters less obvious. This is likewise an English species, being found at Burnham, Norfolk.

Discopora verrucaria.

In my Catalogue of Irish Zoophytes, published in the 'Annals,' I mentioned the occurrence of *Discopora hispida* of Dr. Fleming in the Bay of Dublin. I now find this statement to be, so far as I am concerned, erroneous, the error having arisen from my having mistaken the *Discopora verrucaria*, Fleming, not uncommon in the Bay, and a very distinct species, for that zoophyte, which has still, I believe, to be searched for in the above locality. For a knowledge of the distinctness of the two species I am indebted to the Rev. David Landsborough, who kindly presented me with specimens of both, found by him at Stevenston, Ayrshire.

Madrepora verrucaria of Otho Fabricius?

A few weeks back I received specimens of a *Tubulipora* from the Rev. David Landsborough, marked with doubt as the *T. verrucaria* of Milne Edwards; an examination of these induced me to refer to some specimens of a *Tubulipora* which I obtained in 1839 in Dublin Bay, and which I had hitherto regarded as a variety of *T. patina*. The result of this reference was, that I found that my specimens and those of Mr. Landsborough represented the same species, mine being much the larger, and Mr. Landsborough's being distinguished by a circular ridge running midway between the centre and the circumference of each disc; but that neither were the *Tubulipora patina* of Lamarck, nor the *T. verrucaria* of Milne Edwards, but a distinct species; a description of which, together with

specimens, some mine and others Mr. Landsborough's, were sent to Dr. Johnston, who replied that he had long been acquainted with the *Tubulipora* as a British species, and that he considered it to be the *Madrepora verrucaria* of Otho Fabricius and the *Tubulipora Orbiculus* of Lamarck. These synonyms may be correct, but it is by no means clear that they are so. Milne Edwards considers the *Madrepora verrucaria* of Otho Fabricius, described in the 'Fauna Grœnlandica,' p. 430, as an injured condition of his *T. verrucaria*, and cites the description of Otho Fabricius in proof of his statement. The *Tubulipora Orbiculus* of Lamarck, Milne Edwards also regards as his *T. verrucaria*. Lamarck, in support of his description, refers to two figures which Milne Edwards says relate evidently to another genus, that of *Cellepora*. I have myself examined both these figures: that in plate 100. fig. 7. of that gigantic work, Seba's 'Thesaurus,' does certainly represent a *Tubulipora*, but of what species the figure is not sufficiently accurate to determine; but the second, in Esper's 'Pflanzenthiere, Madrep.,' pl. 17, fig. B, C, would appear to be a *Cellepora*, as Milne Edwards says, probably *C. pumicosa*.

Lamarck thus defines his *Tubulipora Orbiculus*:—

"Cellulis tubulosis in orbiculum hemisphericum aggregatis, osculo subdentato."

And in the notes appended to the definition he further observes:—"This species presents hemispherical and convex masses, with tubes straight, unattached and distinct in their superior half, and whose orifice is sometimes armed with from one to three teeth, and sometimes presents not one."

Now none of the many specimens of the *Tubulipora* of which I have specimens are hemispherical or anything approaching such a figure; they are but little raised from the surface of their growth; the cells are not unattached and distinct, but closely aggregated, the wall of one tube forming a portion of that of another, nor are their apertures ever smooth and toothless; moreover, the cells in the centre of each disc are far less distinct and much more closely approximated than those near the circumference, in this also differing from Lamarck's description.

Neither does the description of the *Madrepora verrucaria* of Otho Fabricius correspond entirely with the *Tubulipora* of which I am writing. Thus he says, "In aliis (exemplis) interstitia radiorum integra, in aliis et quidem majoribus porosa quasi reticulata."

I have already said that there are no interstices between the tubes in the *Tubulipora* to which I refer.

March 26, 1842.