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XLIV.—On the Phosphorescence of Zoophytes

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sary a careful investigation of the structure of the maxillæ in both sexes of the types of the different subgenera and genera of *Celoniidæ*, in order to learn their natural relations. Beyond this, however, there are various other particulars which are requisite to be determined before we can introduce a single species of *Melitophila* into its natural position with respect to the others. It will be serviceable to give these in the words of Burmeister's letter:—"In the first place, it is necessary to determine whether the specimen under description be a male or female; the former sex may be known by the channelled ventral surface of the abdomen, the convex perpendicular pygidium, and the anterior tibiæ, which are often narrower and toothless, whilst the female has two or three teeth on the outside. The maxilla must then be examined to determine whether the galea or upper lobe be corneous, arcuated, trigonate, with simple or cleft apex; or membranous, arcuated, or truncated at the apex, and of smaller size. In like manner the lower lobe or mando must be examined to determine whether it be armed with a tooth or unarmed, according to the sex:—the form of the clypeus, the mesosternum, prosternum (whether it possess a spine in front of the coxæ or not); the tarsi (whether longer or shorter than the tibiæ); the tibiæ, determining the number and position of the teeth according to the sex; the emargination of the clytra above the coxæ, whether very deep as in *Schizorrhina*, or very feeble as in *Goliathus*. The form of the under lip is also very important in the *Cremastocheilidæ*." Besides these characters, the form of the mandibles, the outline of the prothorax, and the existence of onychiæ between the unguis of the tarsi; and lastly, the variation in the form of the antennæ, according to the sexes, must be noticed.

Unless such particulars as these are attended to, we may as well content ourselves with the Linnæan or Fabrician state of the science, instead of doing our utmost to give to it a higher and more philosophic tone.

XLIV.—*On the Phosphorescence of Zoophytes.* By ARTHUR HILL HASSALL, Esq. M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

To the Editors of the Annals of Natural History.

GENTLEMEN,

ON reading the Rev. D. Landsborough's paper on the Phosphorescence of Zoophytes in your last Number, p. 281, I am led to refer to my paper read before the Natural History Society of Dublin, November 6, 1840, and published in your

journal for June last, as detailing similar observations made three months before the reading of the paper.

The passage is the following:—

“I have ascertained that all the more transparent Zoophytes,” (under which title I include the marine orders of the Hydroid, Asteroïd, and Ascidian classes, which embrace all the species individually noticed by Mr. Landsborough) “possess highly luminous properties. This fact I first discovered in a specimen of *Laomedea gelatinosa*, and subsequently in a great variety of other species. If a portion of it, adhering to the sea-weed to which it is attached, be taken from the water and agitated, a great number of bright phosphorescent sparks will be emitted; these sparks proceed from each of the denticles of the coralline containing polypi, and the phenomenon is equally apparent whether the specimen be in or out of water. The imagination could scarcely conceive a more beautiful spectacle than would be furnished by the shining of countless myriads of these tiny lamps, lighting up the dark recesses and caves of the ocean.” “The fact of the phosphorescence of one species of *Sertularia*, *S. pamila*, was, I have lately learned, discovered by Stewart some time since; but the announcement of it did not, it appears, lead to further inquiries into this interesting subject.”

From a perusal of the above account, to which I shall add some additional observations, it is manifest that priority of upwards of a year, of the discovery of the general phosphorescence of Zoophytes, is due to me, and not to Mr. Landsborough.

I have stated that the phosphorescence is equally apparent whether the specimen be in or out of water, that is, in air or water; and this is the fact, the only requisite in either case for its development being the friction of motion.

Numerous friends, among others G. J. Allman, esq., of Bandon, can bear witness to the exceeding brilliancy of the phosphorescent light emitted by a great variety of species which I was frequently in the habit of exhibiting to them. Once each week I received from the master of a trawling vessel on the Dublin coast, a large hamper of Zoophytes in a recent state; in the evening these were taken into a darkened room, and the spectators assembled; I then used to gather up with my hands as much of the contents of the hamper as I could manage, and tossing them about in all directions, thousands of little stars shone out brightly from the obscurity, exhibiting a spectacle, the beauty of which to be appreciated must be seen, and one which it has been the lot of but few persons as yet to have looked upon. Entangled among the corallines were also numerous minute luminous Annelides, which added their tiny fires to the general exhibition.

Provided the Zoophytes had not been exposed to wet or

frost, which destroys their vitality, the same appearance could be repeated on the second and third night, but with diminished brilliancy.

With respect to the phosphorescence of some Fishes, *Mol-lusca tunicata*, and the *Medusæ*, spoken of by Mr. Landsborough, instances of it in all these are I believe on record; and of the phosphorescence of the latter distinct mention is made by Professor Rymer Jones in his 'Outlines of the Animal Kingdom;' and indeed it is to the *Acalepha*, the animals composing which class vary in size from particles almost imperceptible from their transparency to creatures exceeding a foot in extent, that the ocean is principally indebted for its luminous properties. I well remember the admiration, not un-mixed with wonder (for then I knew not to what agencies the power by which water seemed suddenly to kindle and glow, as though turned to liquid fire, was to be attributed), which I felt when first I viewed the beautiful phosphorescence phenomenon of the ocean. Beautiful as this spectacle is even in our own seas, in warmer latitudes, and in the Mediterranean, it is far more splendid; but to be seen at all it is necessary that the water should be disturbed in some way—the slightest breeze curling the surface of the tranquil ocean, calls forth from its waters a flash of phosphorescent fire as it sweeps along—the wave, as it falls from the vessel's side and breaks into ten thousand pieces, reveals innumerable globes of animated fire suddenly called forth from the darkness which enveloped them—each stroke of the dripping oars scatters thousands of living gems around them, unequalled in brilliancy by the glittering of a kingly diadem—a golden path of light, increasing in breadth as the distance becomes greater, follows, like an attendant comet, the wake of the vessel urged onwards by the impelling wind—and the fisher's net, just raised to the water's edge, and laden with spoil collected from the secret beds and hiding-places of the great deep, seems converted into a golden framework set with precious jewels, by the presence of numerous zoophytes entangled in its meshes. Indeed, in whatever way the water is agitated, the same beautiful appearance follows; if a little be placed even in the palm of the hand, and shaken, bright scintillations will be emitted; but, of course, the phenomenon will be more striking in proportion to the quantity of water put into commotion.

ARTHUR HILL HASSALL.

Cheshunt, Herts, Dec. 8th, 1811.

[NOTE. In publishing Mr. Landsborough's paper, we might, with great propriety, have taken occasion to direct the attention of our readers (and it was perhaps an oversight on our part to have omitted it) to that passage in Mr. Hassall's, in which he had detailed his

interesting observations of the luminous properties of Zoophytes. At the same time, it does not appear that Mr. Landsborough, in communicating his observations, has laid any claim to priority. Not having seen Mr. Hassall's paper, his record of phenomena of the same class which have come under his personal notice has still its independent value. The observations of each of our correspondents will be most acceptable to the lovers of natural history; and the degree of originality which they may possess will no doubt be duly estimated by those who are most extensively acquainted with what has been written upon the subject. Both agree in stating that the inquiry was suggested to them by the remark of Mr. Stewart.—ED.]

XLV.—Excerpta Botanica, or abridged Extracts translated from the Foreign Journals, illustrative of, or connected with, the Botany of Great Britain. By W. A. LEIGHTON, Esq., B.A., F.B.S.E., &c.

No. 7. Notes on the genus *Corylus*. By ED. SPACH. (Ann. des Sc. Nat. n. s. xvi. 98.)

GENERIC CHARACTERS.

Flores monoici, hiemales, foliis multò præcociores: *masculi* 5- ad 8-andri, aperianthi, in amenta squamosa, ebracteolata, cylindracea, gracilia, multiflora, jam æstate præteriti anni nascentia moxque perulis denudata dispositi; *feminei* perianthio aduato præditi, staminibus (imò rudimentariis) omninò orbati, in glomerulos parvos sub-multifloros, sub anthesi gemmaceos sessiles perulis (per actâ anthesi tandem deciduis) obtectos, post anthesin demùm in ramulum foliatum excrecentes aggregati, *singuli involucrati*.

Amenta mascula lateralia v. lateralia terminaliaque (in ramulis præteriti anni), e singulis gemmis ad rachin breviusculam nunc gemina (rard solitaria), nunc 3 ad 6-spicata, jam virginea pendula. *Squamæ staminiferæ* pluriseriatim imbricatæ, unifloræ, concavæ, unguiculatæ, haud peltatæ, subverticales, subcoriaceæ, ciliolatæ, staminibus longiores, cuneato-obovatæ, mucronatæ, anticè appendicibus 2 (squamæ subconformibus et paulò longioribus) infernè cum ungue confluentibus instructæ. *Stamina* secus squamarum basin inordinatim inserta. *Filamenta* brevina, capillaria, indivisa, æstivatione recta. *Antheræ* monotheçæ, ellipticæ, 2-valves, dorso affixæ, apice barbata. [Filamentis indivisis, antheris monotheçis, staminibusque igitur quasi dimidiatis, *Corylus* a cæteris affinibus generibus omnibus differt.]

Glomeruli feminei solitarii, sub anthesi laterales (ad ramulos præteriti anni, nunc ex iisdem axillis ac amenta mascula, nunc ex axillis inferioribus, semper autem ex aliis geminis), squamosi. *Involucra* (sub anthesi minima, perulis obtecta, setulis rigidis simul ac ovaria densissimè vestita) subcampaniformia, variè divisa, in rachii brevissimâ spicata, imbricata, geminatim inserta, plerumque postea abortientia; par quodvis bracteâ solitariâ herbaceâ