

perhaps from the commencement and its full development thereby having been unimpeded, and states that the *Proteus* feeds upon its like as well as upon other matter, inclosing its food within its own substance after the manner of the *Hydra*.

While examining the transparent border of a portion of sponge growing from the seed-like bodies, he has observed the contracting vesicles distinctly, and a little within this, the animals themselves distinguishable, though amassed together and ever changing their form; but he does not appear to have ever seen them inclose an object within their substance after the manner of the *Proteus*.

In the development of the contents of the sporangia or seed-like bodies, he observes, that when the latter are opened under water in a watch-glass, the transparent cells within them, having been eliminated, swell and are bursted by the imbibition (*endosmose*) of that fluid; and that then the true ova of the Sponge with which they are filled, spread themselves over the surface of the vessel. Each ovum appears, not to be globular or ovoid as he formerly supposed, but discoidal, very much resembling in size and appearance the globules of the blood, it being only when they are turned on their edges that they appear ovoid. The red spot in their centre he also now thinks to be an optical illusion, while he has every reason to believe that the ovum retains its planiform state until its transparent vesicles and granules have become developed and the power of locomotion in it fully established.—ED.

BIBLIOGRAPHICAL NOTICES.

Rare and Remarkable Animals of Scotland, represented from living Subjects; with practical Observations on their Nature. By Sir JOHN GRAHAM DALYELL, Bart. Volume first, containing fifty-three coloured Plates. London: John Van Voorst, Paternoster Row, 1847. 4to. Pp. 270.

[Continued from p. 139.]

THE most interesting chapter in this interesting volume is that which narrates the history of the *Hydra tuba*. This marine animal is called a Hydra by our author because it has the form and the characters of the freshwater polypes, and possesses also their qualities—their greed of living prey (p. 87), their proliferous evolution of young, their endurance of privations, their power to recover from apparently immedicable wounds, and their strange germinations and monstrosities under the influence and direction of the experimentalist (p. 93). This hydra is found attached to submarine bodies; the body is fleshy, inversely conical, encircled on the oral disc with

a series of long slender thread-like tentacula,—and thus it lives apparently for an indeterminate period, exercising all the functions of a perfect and adult animal even to the repeated production of young in all respects alike to the parent. So it lives until, from some unknown causes, a change comes over it, and it begins to unveil itself, and to exhibit one of the most wonderful revelations in animal transmutations. A pendulous column or roll is observed as if implanted on the disc of the hydra; at first it is faintly indented by circles and is terminated by a circular row of tentacula; the indenting circles become more deeply waved, the tentacula shorter until they are obliterated; and then each roll of the column is successively separated and liberated from the others until the whole embryonic column is dissolved, the individual rolls floating at freedom in the bosom of the waters, obviously the young of one of those large Medusæ which swarm our seas in the months of the latter summer and autumn!—Now this short sketch of the metamorphosis is not of any new discovery, for Sars had made us in some degree acquainted with it, but the account of it given by Sir John Dalyell excels all others in fullness and completeness, and in its freedom from conjectural explanations. The metamorphosis itself is wonderfully curious, but what strikes us as the most unaccountable fact in the process is the uncertainty of the periods at which the change shall take place. The *Hydra tuba* shall remain for years a hydra propagating its kind, and we know of no data to fix the period when it shall begin the process of change into its mature and final state; and, to add wonder to wonder, having cast off several of these medusean embryos, a basis remains out of which another *Hydra tuba* shall arise, to go through the same hydra life and the same medusean metamorphoses as its predecessor. We suppose that these facts—for facts they are—will not support the opinions of Steenstrup on alternating generations, nor can even be reconciled with them.

The way in which Sir John discovered that the *Hydra tuba* was the embryo of a Medusa was this: he took a large Medusa, of undetermined species but beautifully figured on plate 15, and placing it in a vase of sea-water the spawn—"a brownish matter like dust"—was shed from its ovarian fringes and settled at the bottom. This spawn consisted of "an host of animated creatures in quick and varied motion," partaking much of the nature of the *planules* of the Sertularians. The changes they rapidly underwent were noted and delineated; and in eleven or twelve days after "the planule had been discharged from the unwieldy Medusa, it was converted to a stationary hydra." (p. 105.) "This new animal was provided with a complement of eight arms, yet so immature as to be of unequal dimensions. Different groups, under metamorphosis, showed the utmost irregularity in respect to evolution, to their shape and proportions: nor was it until thirteen days later, or three weeks after their birth, that any appeared with eight regular tentacula. Thus was a most perplexing problem solved—the *Hydra tuba* proved to have sprung of a Medusa." (p. 105.)

The progress of discovery went on. Sir John had "remarked

colonies of minute transparent animals swimming in vessels of seawater, during the months of February, March and April. Their general aspect very much resembled a flock of birds in distant flight, as represented by landscape painters. After being transferred to vessels free of other subjects, they continued several days in activity and then disappeared. I could not account either for their origin or their transience. They occurred only at rare intervals, and always identically under the same form." (p. 111.) These very minute beings, for the expansion of an individual is only between one and two lines, were evidently allied to the *Medusæ* "both in configuration and in habits," but they differed from the *Medusæ* in the early date of their appearance. To distinguish them Sir John called the species *Medusa bifida*, and we have it minutely described and variously figured. Sir John was first led to remark that it was chiefly observed in vessels containing the *Hydra tuba* (p. 114); and subsequently, and as it were by accident, he discovered that the hydra was in fact their source; and moreover that the hydra was identical with the *Strobila* of Sars! The discovery is told in a most interesting manner, and with a truthfulness which there is no gainsaying.

We shall quote only a few of the many passages we have marked, previously observing that the *Hydra tuba* in its strobila-form is something like a fir-cone or a cylinder cut into several whorls, each whorl, when detached, becoming what is named the *Medusa bifida*. The strobila throws off these whorls in succession to the number of from ten to twenty, when the basis, as already stated, reassumes the form and habits of the hydra.

"First, a smooth fleshy bulb sustained a cylinder of about half its own diameter, indented by plain circles, which were soon converted to waving curvatures. A row of twenty or twenty-four tentacula crowned the summit of the cylinder, which row disappeared or was obliterated as the waving in its vicinity deepened, and the diameter of the cylinder there expanded, that is, towards the summit. Concomitant on obliteration of the terminal row, a new circle of tentacula, at first few, but gradually augmenting, was emerging from around the bulb, while the struggles of *Medusæ*, into which the waving strata were evolving, accomplished their liberation to swim unconstrained in the surrounding element." (p. 121.)

"Certain facts admit of no dispute; such as the existence of a vigorous hydra attached to a solid substance, with long flowing silky tentacula; an alteration in the figure of the body, or the formation of an embryonic roll of *Medusæ* on the disc; the gradual maturity of each *Medusa* and its liberation from the roll; the disappearance of the original tentacula of the hydra; the emerging of a new circle of tentacula from a smooth fleshy bulb, sustaining the embryonic roll, as the former are obliterated, and as the *Medusæ* approach maturity; the evolution of this fleshy bulb as a perfect hydra, along with their departure, which becomes the parent of progeny by gemmation, and its permanence as an independent animal." (p. 122-3.)

"All the *Medusæ* in the embryonic roll are separate and distinct animals. Each is in close application to that which is next below, if itself be uppermost, or lies between two if intermediate. The pro-

boscis is outermost if the individual be uppermost in the roll; thus all lie in the same direction, the proboscis outermost, as the Medusa escapes, from the next left behind. When the last remains in adhesion to the fleshy bulb, its proboscis projects outwards also. Thus the under surface of the embryo is always outwards, while a portion of the roll." (p. 124.)

"Although by repeated, long, and painful observation, I have endeavoured to learn the history of the *Hydra tuba* and the *Medusa* originating from it, my purpose has been but partially attained. I have selected many individuals, and I have chosen colonies of both, to discover whatever changes they should undergo. The hydra grew, it fed, it bred, its existence was long. The Medusa lived, it neither fed nor bred, its existence was infinitely shorter; nor did it undergo the smallest change from the first moment of liberation for fifty-five days. Its life could not be protracted, on any occasion, beyond sixty days. Between the form and habits of these two animals there is not the smallest correspondence." (p. 128.)

We pass on to take a cursory notice of our author's account of the Ascidian Zoophytes.

Plates 43 and 44 illustrate *Cellularia loriculata*. "The hydra is minute, lively and active, almost transparent or dingy white; it seldom protrudes from its dwelling, which has scarcely any perceptible margin. When doing so, twelve is the usual number of tentacula displayed. Some have fourteen." (p. 234.) Farre says that the tentacula are only ten in number.

Cellularia reptans occupies plate 45. The hydra has twelve tentacula.

Cellularia fastigiata is the subject of plate 46. The hydra has sixteen or eighteen tentacula.

Cellularia ciliata forms the subject of a pretty plate, no. 47. "None of the numerous tribe of Corallines can exceed the symmetry, elegance and beauty of this interesting product waving amidst the waters. The singularity of its parts and proportions seem to have originated with the vigorous efforts of a sportive organic nature." (p. 239.)—To the vigorous enthusiasm which dictates such a passage, and there are many such in the volume, we owe the strength which supported our author in his long yet unwearied labours.—The hydra has from twelve to fourteen tentacula, and is remarkably vivacious.

Cellularia avicularis is figured in plates 48 and 49. Of the latter we know not what to say: it does not please us, and is useless as a scientific drawing, however imposing it may look to the amateur or artist. Sir John has found the species only as a parasite on the *Flustra truncata*. "A lively ascidian hydra with fourteen, fifteen, and, I believe, sometimes sixteen tentacula, inhabits the cells." (p. 242.)

The bird's-head processes or *avicularia* our author has seen on *Cellularia ciliata*, *fastigiata*, *avicularis*, and *Flustra Murrayana*. The obscurity which hangs over their function has not been lessened or removed by his researches; and the conjecture which he throws out doubtingly that they may be parasitical seems to us altogether un-

tenable. "I cannot believe," says Sir John, "that it (the *avicularium*) is connected with the hydra, from finding it seated and active on the side of those cells wherein there are none. Nevertheless, it is an integral part of the zoophyte, in so far as being generated along with new or reproducing portions. This, indeed, does not exclude the character of a parasite; for I have understood that those infesting the larger animals sometimes occur in the foetus." (p. 245.)

Valkeria imbricata is well-figured on plate 50; *V. cuscuta* on plate 51, and on the same plate *V. spinosa* in a less satisfactory and less complete manner.

Sir John is of opinion that the genus *Serialaria* is unnecessary, and he places its only species in the genus *Valkeria*. It forms the subject of plate 52. The cells are not ranged in a straight line in single series as usually described, but "in partial alternation, the convex side of one being applied to the opposite recess formed by the union of two, somewhat like the position of two rows of cells in a honeycomb." (p. 250.) Like all *Valkeriae*, the polype has eight tentacula.

Bowerbankia repens and *B. densa* are figured in plate 53, and the species are described in the text. But beyond furnishing us with a series of interesting figures and authentic and original descriptions, we do not find that our author has added any novelty to our knowledge of ascidian zoophytes, beyond some additions to their external anatomy and some corrections of less careful observers.

And now we bid a farewell—we trust a short one—to our author, whose book has engrossed very pleasantly some days of our leisure. We learn that his portefeuille contains many similar memoirs to those herein published, and we could wish to have the influence of hastening also their publication; but surely such influence, if possessed, is unnecessary, for in the honourable fame this volume has secured for Sir John Graham Dalyell there is enough to urge him on to the completion of his ever-during monument.

PROCEEDINGS OF LEARNED SOCIETIES.

BOTANICAL SOCIETY OF EDINBURGH.

Feb. 10, 1848.—The Rev. Dr. Fleming, President, in the Chair.

The following communication was read:—

"An Account of a Botanical Excursion to Braemar, Clova, and Ben Lawers, with his pupils, in August 1847," by Professor Balfour. Having made some general observations on the botany of the alpine districts of Scotland, Dr. Balfour proceeded to give a detailed account of the localities visited and the plants gathered. From Aberdeen the party went to Ballater, thence by Lochnagar to Castleton of Braemar, where they remained ten days, examining Ben Aven, Benna-Muich-Dhui (on the top of which they slept for a night), Cairn Toul, Breriach, Glen Callater, Clova, Glen Isla, &c. Leaving Braemar, they walked by Glen Tilt to Blair Athol, and thence by the Pass of Killiecrankie to Kenmore, Ben Lawers and Loch Lomond. All the usual, and many very rare alpine species were gathered. *Carex*



1848. "Bibliographical notices." *The Annals and magazine of natural history; zoology, botany, and geology* 1, 311–315.

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