

the author. He then adverts to the "swarm-spores," which are said to possess only a primordial utricle, and is of opinion that the earlier limitation of these bodies is simply formed by the young cell-wall itself, which is unable to resist the powerful influence of re-agents, whilst at a later period, as the zoospore is more fully formed, it presents a stronger and firmer consistence. In a note, he remarks that the cilia of the zoospores are not motile organs, but for the purpose of attachment, and that the motion is induced in consequence of the perforation of the outer membrane, at which points a more active endosmosis takes place, as may be seen in the zoospores of *Edogonium*, in which, when germinating, the opening through the outer membrane of the spore is always visible, from which the first commencement of the root proceeds.

The eighth section gives a *resume* of the foregoing observations, and in the ninth the author adds a few supplementary remarks upon the methods to be pursued in researches of this kind, and particularly upon the application of chemical re-agents under the microscope, and with respect to the period at which the division of the cells in the *Confervæ* may be best observed.

A MANUAL OF MARINE ZOOLOGY FOR THE BRITISH ISLES. By PHILIP HENRY GOSSE. London: Van Voorst.

A HANDBOOK TO THE MARINE AQUARIUM. By PHILIP HENRY GOSSE. London: Van Voorst.

ALTHOUGH the microscope is more capable of affording amusement than most philosophical instruments, there are few who have used it for any length of time but have discovered that it is an important aid in scientific research. Even those who have purchased their first instrument to wile away a leisure hour have gradually got interested in its structure, and the nature of the objects investigated, so that, although beginning in play, they have ended in work. No one can know that they have observed, for the first time, a fact new in the history of science, without the rising of the feeling that constitutes the discoverer in science—the seeker after truth. It is thus that many great microscopic observers have arisen among classes who have had no previous scientific education that has prepared the world for the result of their labours. The structure of the instrument, involving as it does the greatest mechanical accuracy with the most interesting problems of optical science, has excited the attention of one set of inquirers, whose labours have resulted in the

present perfection of the instrument. On the other hand, the habits of minute observation developed by the daily use of the microscope have produced a number of observers, whose contributions to science are known wherever its progress is regarded with interest. To those who are pursuing the latter path, all works on those departments of science to which the microscope is applied are of interest.

These two books by Mr. Gosse will be found useful additions to the microscopist's library. The Marine Zoology is the first part of a work devoted to the Zoology of the sea-side. To those who make a practice of taking their microscope to the sea-side, this book will be found very useful, for although it does not give an account of every species of animal to be met with, it gives descriptions of families and genera, and contains illustrations of above three hundred species. It is, however, only right to add that Mr. Gosse has omitted any description of the Infusoria, the only really microscopic family of animals. He excuses himself on the ground of the uncertainty naturalists are in as to the real nature and position in the animated scale of these minute beings. We miss also the Rotifera, but surely the same objections would not apply to giving an account of these animals.

One of the most useful adjuncts to the microscope is an Aquavivarium. Even a piece of *Vallisneria*, *Chara* or *Anacharis* in a jar will not only afford the materials for interesting observations in themselves; but the creatures that nestle in the leaves of these plants, and which live in the water they cerate, are almost innumerable. But what is true of these fresh-water plants and animals is also true of those of the ocean. With a little care, sea-weeds and marine animals can be kept as easily for observation as the plants and animals of fresh-water; but they require care, they demand knowledge; the domestication of Dulse and Sea Cucumbers is an art, and Mr. Gosse comes forward with a tiny hand-book of instructions for those who are ignorant and need a guide. From this book we give a short extract, by way of recommendation:—

In deep pools, and narrow clefts near the verge of lowest water, where the overshadowing rock excludes the sun's rays and imparts a genial obscurity, grow several of our most delicate and beautiful *Algae*. Foremost among them is the Oak-leaved Delesseria (*D. sanguinea*), with tufts of crimson leaves, exquisitely thin, much puckered at the edge, and strongly nerved. The *Irida*, whose leaves are smooth and leathery, and of a dark-brownish scarlet, is often the companion of the former. Here, too, we find the *Phyllophora*, another weed of brilliant red hue, with unnerved leaves much divided, giving origin to other leaves, and these again to others. It is usually much covered with the cells and shrubs

of various species of *Polyzoa*, exquisitely beautiful objects for the microscope. The *Gelidium corneum* is another fine red weed, commonly of small size and slender, but prettily fringed with processes all round the edges of the leaves. This and the preceding are very hardy in confinement, and form very suitable plants for an Aquarium.

When we can no longer work at so low a level, we recede to the slopes of the ledges yet uncovered, and find other species in the quiet sheltered pools. A weed is found here, growing in dense mossy patches on the perpendicular and overshadowed edges of the rock, which, when examined, looks like a multitude of tiny oval bladders of red-wine, set end to end in chains. This pretty sea-weed is called *Chylocladia articulata*.

Here also grows the stony Coralline, a plant bearing some resemblance to that just named, in the peculiar jointed form of its growth. Low-lying pools are often incrustated with a coat of stony or shelly substance of a dull purple hue, having an appearance closely like that of some lichens; the crust investing the surface of the rock, and adhering firmly to it, in irregular patches, which continually increase from the circumference, in concentric zones. This is the young state of the *Corallina officinalis*, which by and by shoots up into little bushes of many jointed twigs, diverging on every hand, or hanging in tufts over the edges of the rock-pools. Young collectors are eager, I perceive, to seize such specimens as are purely white; but this condition is that of death; in life and health, the shoots are of the same pale purple hue as the lichenous crust. This plant in both states (for plant it undoubtedly is, though principally composed of lime, and of stone-like hardness) is suitable for a tank, as it survives and flourishes long; and your pieces of rock-work you may select from such places as are covered with the purple crust.

The most valuable plant of all for our purpose is the Sea Lettuce (*Ulva latissima*). Every one is familiar with its broad leaves of the most brilliant green, as thin as silver-paper, all puckered and folded at the edge, and generally torn and fretted into holes. It is abundant in the hollows of the rocks between tide-marks, extending and thriving even almost to the level of high water, and bearing with impunity the burning rays of the summer's sun, provided it be actually covered with a stratum of water, even though this be quite tepid. It therefore is more tolerant than usual of the limited space and profuse light of an Aquarium, where it will grow prosperously for years, giving out abundantly its bubbles of oxygen gas all day long. It is readily found; but owing to the excessive slenderness of its attachment to the rock, and its great fragility, it is not one of the easiest to be obtained in an available state. The grass-like *Enteromorpha* have the same qualities and habits, but their length and narrowness make them less elegant. The *Cladophora*, however, are desirable; they are plants of very simple structure, consisting of jointed threads, which grow in dense brushes or tufts of various tints of green. Some of them are very brilliant; the commonest kind is *C. rupestris*, which is of a dark bluish-green; it is abundant in most localities.

GENERAL OUTLINE OF THE ORGANISATION OF THE ANIMAL KINGDOM, AND
MANUAL OF COMPARATIVE ANATOMY. By THOMAS RYMER JONES.
LONDON: VAN VOORST.

This work has long been one of the most complete in our language devoted to the subject of Comparative Anatomy. At the same time such has been the great advance of anat-