I—HELIANTHOIDA.@@’

The typical representatives of this order are the *Actinia* or sea-anemonies. which abound on every European shore between tide-marks, rivalling in beauty and vividness of colouring their floral namesakes. It is now well ascer­tained that the animals of the madrepores, sea-mushrooms, and brainstones of tropical seas, differ from the Actiniæ no otherwise in essence than in their power of excreting, from the inferior portion of the body, a large quantity of calca­reous matter, the deposition of which under and around the body, and in the tissue of the folds formed by the tunics of the abdominal cavity, constitutes the cell or polypidom, into whose hollows the tenant can partially or wholly retire. “ The stony substances so formed are called *corals,* and their mode of formation causes them exactly to represent the animal which secretes them : the upper surface is always furnished with radiating plates, the remains of the calcareous particles which were deposited in the longitudinal folds of the stomach, before referred to ; and as these plates do not usually reach to the centre, there is almost always a vacant space in the middle between them.” The cells are either single and cupped, or they are branched like a tree, or they are aggregated together so as to resemble a cauli­flower, or even to imitate the human brains ; all these va­riations resulting from the manner in which the animal emits from the whole surface, or from a particular part of the sides of the body, the bud by which the new indivi­duals of the general mass or society are produced.

The Helianthoida are all oviparous, the ova being pro­duced in appropriate ovaries situated between the compart­ments formed by the septa that radiate from the outer parietes of the stomach to the skin. The ova are contrac­tile and motive, being carried about from the action of the cilia that clothe the surface. “ Under the microscope they prove of diversified form, many resembling flattened peas, some elongated or exhibiting irregular prominences, some almost spherical, and some which cannot be referred to any particular figure.” After moving about for several days, during which their forms suffer some slight change, they insensibly relax in their motility, the cilia disappear, and having become stationary, each ovum rapidly runs through the stages of development that lead it up to the similitude of its parent.

The productiveness of the species and the rapidity of their growth are very great. The calcareous species often form enormous masses of coral, of the size of which we cannot judge by the specimens usually shown in collections, which are small individuals taken in the sheltered places among the rocks, where they are not exposed to the action of the waves, and collected before they have reached their proper magnitude. “ The form of the masses appears to be greatly influenced by the positions in which they have grown, and the size of the individuals greatly depends on the quantity of nourishment they are able to procure. This is proved by the fact, that if all the individuals of the same mass are equally exposed, they are of an equal size, but if the surface of the coral is waved, as in the *Explana∙ ria,* the individuals on the convex part of the mass, which could procure the most food, are large, while those in the concave or sunken parts are small.”—*J. E. Gray.*

It is to the polypes of this order that the origin of the coral islands in the Pacific and other tropical seas are prin­cipally ascribed. The quickness of their growth, and the depths from which they rise, have been undoubtedly exag­gerated ; yet this, with every deduction, is so great that the coral-bearing Helianthoida are justly reckoned the principal operators in the mutations of the bed of every tropical sea, as they were in the seas of the primeval world. They roughen the bottom and fill up hollows in every shallow sea ; they occupy the tops of reefs in deeper ones, and bar up the entrance to harbours and lagoons ; they cap submarine mountains, and bring them to the surface ; and they lay up everywhere the materials for the formation of future quarries of limestone.

The families and genera into which the Helianthoida have been distributed are as follows :

Fam. I. *Acliniadoc.—*Actinia; Anthea; Adamsia; Iluantho."; Metridium ; Megalactis; Actinodendron ; Epicladia; Heterodactyla ; Lucernaria.

Fam. II. *Zoanthida—*Isaura; Hugbea; Zoanthus ; Mammillifera ; Corlicifera.

Fam. III. *Madreporida.—*Fungia; Turbinolia; Diplocterium ;

Cyclolithes; Desmophyllum ; Cyathina; Caryophyllia ; Manicina ; Oculina ; Stephanocora ; Cladocora ; Columnaria ; Strombodes; Cyatbophyllum ; Pterorrhiza ; Anthophyllum ; Stylina; Favia; Aslræa ; Dictyophyllia ; Favosites; Monticularia ; Meandra ; Dendrogyra ; Turbinaria ; Explanaria ; Alerulina; Pavonia; Agaricia; Polyastra; Haliglossa; Polyphyllia.

Fam. IV. *Poritida.—*Madrepora; Porites ; Alloporina.

Fam. V. *Paocilloporidae.—*Seriatopora; Anthopora; Pæcillopora;

Heliopora.

Fam. VI. *Milleporidae.—*Millepora.

Fam. VII. *Distichoporidæ.—*Distichopora.@@-

II— ASTEROIDA.@@3

The name of this order is derived from the starred marks that stud the surface when the polypes have con­tracted and hid themselves under the skin of the common mass or polypidom. These marks are produced by the incisures whence the tentacula are evolved ; and hence the number of rays in each mark is mostly eight, but sometimes only six in number, corresponding with the number of ten­tacula. These organs are, in this order, comparatively short, thick, and fringed or pectinated on the margins, and they radiate from a flat disc, in the centre of which the mouth is situated. This aperture is always circular, and leads by a gullet into a long cylindrical stomach, which is as it were suspended in a thin membranous sac or vesicle, and kept in its central position by eight or six septa or ligaments stretched between it and the vesicle, dividing the interme­diate space into as many distinct compartments. From the inferior extremity of the stomach there hang eight or six twisted, intestine-like, but probably biliary, append­ages, into a wide cavity, that communicates freely with the fleshy parenchyma by which the polypes are connected together, for the Asteroida are all compound Zoophytes ; that is, each species is a collection of numerous individuals participating in a common life, while each individual at the same time enjoys an independent vitality for every part of its body. The connection is effected partly through the medium of the skin, which is formed by the confluence of the outer thickened tunic of the polypes, and partly by aquiferous ducts that depart from the infra-abdominal cavity just mentioned, and permeate the entire mass in every di­rection.

The forms of the polypiferous masses are very various. Some are fleshy amorphous productions, covered with a coriaceous skin loaded with variously-shaped calcareous grains or crystals ; others resemble a quill, and are called Sea-pens ; others are like a rush or rod ; while many, like the Gorgonia and Coral, are eminently imitative of marine vegetations. The internal part of the amorphous species is

@@@\* Synonymes: Zoantharia, Blainrille; Zoantaires, Milne-Edwards.

*@@@’ Synopsis of the British Museum,* by J. E. Gray, p. 75. Lond. 1840.

@@@3 Synonymes : Zoophytaria or Ctenocera of Blainville ; Alcyoniens, Μ. Edwards.