

and corresponding pair of nerves and vessels in either Fish, Reptile, Bird, or Mammal, as a segment of the body of a Vertebrate.

Now, it requires no formidable stretch of the imagination to reduce any single Polyp, or any Acaleph or any Echinoderm, to a spheroidal form. Indeed, the sphere is the essential form of all Radiates,—not the mathematical sphere, but the organic sphere, loaded in different directions, according to the peculiarities of the subordinate groups of this type. It has its nearest approach to the sphere in the *Echinus*; it becomes a cylinder in the *Holothuria*; it is stellate in the *Star-fish*; it is bell shaped in the *Acaleph*; it is trumpet shaped in the *Polyp*; and in all it has an oral opening in the centre of structure, which may not be the centre of figure.

Keeping in mind this starting point, if we consider the natural position of the animal in its element, we find in *Polyps* the so-called mouth turned upward in the centre of the broadest expansion of one side of that organic and flexible sphere, while the opposite end, more or less tapering, becomes a base of attachment. *Hydroids* retain the same attitude, and bear the same general relation to the surrounding medium. Not so with the *Medusæ*, in which the sphere is freed from all attachment and the oral aperture turned downward, the whole body being more or less hemispheric or bell shaped. In *Echinoderms* we have not only the *Crinoids*, recalling, in their relations to the surrounding mediums, the *Polyps* and *Hydroids*, but also the *Sea-urchins* and *Star-fishes*, in which the mouth is turned downward as in *Medusæ*, and the *Holothurians*, in which it is directed forward. In order, therefore, to have a normal position for all Radiates, we must compare them with one another, not in their natural attitudes, but in such a position as would exhibit, in all, the centre of their structure in the same relation to the surrounding medium.

The necessity of thus distinguishing the natural attitude and the normal position of animals is particularly obvious in the study of Radiates. But the distinction is quite as important in other branches of the animal kingdom. Everywhere the possibility of acquiring an insight into the typical structure of any natural group depends primarily upon the position in which its representatives are compared. Had not Rathke taken these relations into consideration, we should not know the antagonism which prevails between the *Articulates* and *Mollusks* in their embryonic development. Without keeping them in mind, we shall never be able to homologize the *Bryozoa* and *Tunicata* with the other *Acephala*. Without knowing that an animal may move in a position entirely at variance with the normal position of the other representatives of its class, a description of its characteristic features may appear in direct contradiction to its habits, or mislead us with reference to its natural relation to the surrounding medium. In proportion as we are better