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To be substituted for section 9, on p. 227. 3

*Classification of animals based on the principle of Cephalization;* by J. D. Dana.—A modification of the brief section on the elliptic method of decephalization, at page 227, is suggested in a note on page 352. The subject admits of much fuller elucidation, and the following is here presented as a substitute for the section referred to.

9. *Elliptic.*—Exhibited in the defectiveness or absence of segments or members normally pertaining to the type of the order or class containing the species, and arising from *abnormal weakness* in the general system, or in an organ. It is exhibited especially in the degradational or inferior types. The cases are—

Incomplete or deficient (1) segments, or (2) members, in either (*a*) the *anterior*, or (*b*) the *posterior* portion of the body; as in the absence of some, or all, of the teeth in Edentates; of the posterior limbs in Whales; of the abnormal appendages and posterior thoracic segments in some Schizopods or degradational Macrurans; of the antennæ, either one or both pairs, in many inferior Entomostracans; of wings in the Flea, etc.

This method of decephalization differs from the defunctionative in implying a deficiency not only of function but also of organ or member.

The incompleteness or deficiency of normal parts referred to above will be better appreciated if contrasted with deficiencies from other causes. The principal other causes are the following:

(1.) A *high degree* of cephalization or cephalic concentration in the system.—Thus in the Crab, the highest of Crustaceans, the abdomen is very small, and *elliptic* both in segments and members, because of the *high degree* of cephalic concentration; while in the Schizopods referred to above, and in the Limulus and many other inferior Crustaceans, the same deficiency comes from *weakness* of life-system or decephalization.

(2.) High development of one part of an organ, at the expense of other adjoining parts.—This principle may be said to include the preceding, since, in that, there is a high development of the anterior or cephalic portion of the structure at the expense of the posterior or circumferential. But here, there is reference to special organs rather than to the structure as a whole. Thus, in the foot of a Horse, there is an enlargement of one toe, normally the third, at the expense of the others, and this enlarged toe has the full normal strength that belongs to the foot under the Herbivore-type.

It is apparent from the facts in paragraphs (1) and (2), that there may be an *elliptic* method of *cephalization* as well as of *decephalization.* The Crab-type is a striking example of the former. The foot of the Horse, considering separately the *Horse-type*, is a case under the former rather than the latter; for, in any related species, a lessening of the disparity of the toes would be evidence of weakness and inferiority *under that type.* Yet, as compared with the higher Carnivore-type, in which the life-system has the strength to develop all the toes in their completeness and fulness of vigor, with great strength of foot, the foot of the horse is *elliptic*, and a mark of inferior cephalization. In the typical Ruminants, the complete