

indications of the outlines of the relationship; and the very fact that this systematic relationship can still be traced so satisfactorily, not only at the present day, but even in past geological periods, shows us plainly that this range of variations of our twenty variables is far less great than is possible, and is kept within comparatively narrow bounds, otherwise the possible combinations would far exceed our ability to trace them.

In fact, in many classes of the animal kingdom the task of tracing their affinities and reducing them to the factors from which they originated by following the combinations, appears on the face of it a puzzle far exceeding our ability to cope with, and we might as well recognise the very narrow limits within which this problem has any solution. We are brought at once face to face with the number of definite things which we are able to carry in our mind at one time; this number is quite limited compared to the possible combinations which even the smallest number of variable factors represented by the changes the component structural features of any small group of animals may assume. Supposing that for twenty years we became acquainted with one species a minute for ten hours a day, we should not know as many possible combinations as can be formed out of ten such variables as I have mentioned, which affect radically the facies of any one of our 225 genera of Echinoidea; and taking it for granted that the 2300 known species of fossil and recent Echinids are the only combinations which become sufficiently permanent to have transmitted their principal characteristics for a certain space of time sufficiently long to be entitled to recognition as distinct species. We must also remember that the affinities they represent are the result of a far greater number of possible combinations than those to which I have referred, and that even a limited number of species like this baffles all our attempts at indicating these affinities, except in the most general way; or, putting it in a different manner, we are attempting an integration within very distant limits, and are, of course, trying to solve a most difficult problem, which is not a whit nearer its solution by being presented in the customary diagrammatic form of a genealogical tree, no matter how satisfactory this mode of presenting the affinities of the group may appear to its author. But I wish at the same time to be distinctly understood as not calling in question in the least the theory of the direct succession of the Echinids of the present epoch from those of the Chalk, in spite of the hopeless nature of the attempt to represent this succession, either diagrammatically or descriptively.

RELATIONS OF THE JURASSIC ECHINOIDEA TO THE ECHINID FAUNA OF THE PRESENT DAY.

Starting from the Jurassic *Pygaster*, which still has the closest possible relations to the *Desmosticha*, in which the anal system has passed into the odd posterior interambulacrum, we can readily trace the systematic connection to such forms as *Holectypus*, *Discoidea*, *Conoelypus*, in which the true Clypeastroid features are more and more