

forms with narrow ambulacral areas and long slender serrated spines, while *Phyllacanthus* [this subdivision, as I have limited it, is equivalent to *Leiocidaris* and *Rhabdocidaris* of Desor] would include species with broad ambulacral areas, having the poriferous zones joined by a furrow more or less distinct; while *Cidaris* proper would be restricted to species in which the pores of the poriferous zone are not so connected. But thus far no characters derived from the many species described, either fossil or recent, can be given to define these sub-genera with any accuracy. The genus *Cidaris* has since the Triassic period been represented uninterruptedly by a large number of species, and as far as the radioles are known, while some of the types seem characteristic of the Jurassic or Cretaceous, yet from what we know of the extraordinary variations in the spines among the recent species, they hardly furnish a safe guide for any subdivision.

In fact, the species of the genus *Cidaris*, like those of many other genera, present soon after their appearance an extensive series of variations, showing an extraordinary degree of plasticity, which has gradually diminished somewhat as we pass from the Jurassic to the Cretaceous, the Tertiary, and finally the recent species. Among the latter we still find all the principal types of radioles represented, with the exception of the round-headed acorn-shaped radioles, like those of *Cidaris glandifera*, which appeared with the Triassic *Cidaris* and died out during the Cretaceous. This is thus far the only type of radioles of *Cidaris* of which no analogue exists among the species still living at the present day.

The family Cidaridæ is by no means so strictly circumscribed as it would seem from an examination of the living forms alone, and when we come to intercalate such forms as *Acrosalenia*, *Pseudocidaris*, *Hemicidaris*, and *Pseudosalenia*, with *Tetracidaris* and *Diplocidaris*, we find affinities developing among the genera allied to the Cidaridæ, pointing on the one side to the Cidaridæ proper which preceded them in time, and to the Pseudodiadematidæ on the other side, which have such an extraordinary development in the Cretaceous formation, the Cidaridæ types developing into the small groups of Salenidæ and of Cidaridæ proper which have persisted to the present day; and the Pseudodiadematidæ type gradually disappearing and being represented at the present time only by the *Phymosoma* group, and not developing into the Diadematidæ proper, which are evidently the successors of the Perischoechinidæ or the Echinothuridæ of the Chalk; though the structure of the abactinal and actinal systems of some of the Palæechinidæ, as will be seen hereafter, points to a far closer affinity between them and the Cidaridæ than has been hitherto acknowledged. In the descriptions of the young Gonicidaridæ we cannot fail to be struck with their similarity to the St Cassian Cidaridæ, and the tests of the diminutive Cidaridæ of the Trias show at a glance embryonic features, such as the young of all Cidaridæ have, which were at that epoch characteristic of the whole group of Cidaridæ.

The small Cidaridæ of the St Cassian are the most perfect embryonic Cidaridæ imagin-