Zoology Part IX: Report on the ECHINOIDEA. By Alexander Agassiz, Bound in Volume 3,1881.

The type of *Holectypus* with its regular outline, its buccal cuts, the anal system on the actinal surface, and the diminution of the size of the tubercles to uniformity in the two areas, the restriction of the poriferous zone to a single vertical row, all tend to show that the tendency to the Clypeastroids is already highly specialised. The existence of such forms as *Pyrina* with their simple ambulacra leads directly to the Nucleolidæ and Echinolampadæ. On the contrary, we can only obtain such forms as the present deep sea types from the earlier Cretaceous types like *Infulaster*, and their derivation from such forms as *Collyrites* seems probable, if we take into account such extraordinary forms as have been figured by Ooster (Echin. Alp. Suissces, pl. x. figs. 1–4), as *Dysaster calceolatus* (see also de Loriol, Echinod. Crét. de la Suisse, pl. xxxiii.).

When we take the Spatangoids of the Chalk, they lead us directly through the Palæostominæ and the Collyritidæ[1] to the Ananchytidæ, which have persisted to the present day; and also to the Spatanginæ proper, represented by but few genera, as *Micraster*, *Hemiaster*, and *Prenaster*, which already possess the structural features characteristic of the recent Spatangoids. That is, we find genera with a peripetalous fasciole, a subanal fasciole, sunken ambulacra, petals of different degree of development, spines specialised on certain areas of the test, a trace of a sunken anterior groove, of an anal beak, of an actinal plastron, of a snout, of a lateral fasciole, and of a specialisation of the primary and secondary tubercles. But, of course, the extent to which these features may be developed in Tertiary and recent genera contrasts often strikingly with the rudimentary nature of the structural features found in the Cretaceous or Tertiary genera. The simple actinostome of the Palæostominæ is combined with a well-marked specialisation of the ambulacra above the ambitus, the petaloid feature of the early Spatangoids which appears later than in the Cassidulidæ; while in the Ananchytidæ the well-developed labium of all the more recent Spatangidæ is combined with a comparatively more rudimentary state of the ambulacral zones.

Among the Cretaceous genera, *Hemipneustes* and *Ennalaster* are extremely instructive. They show, perhaps better than any others, the passage which exists between the earliest Spatangoids with more or less petaloid ambulacra, and the older Spatangoids without petals, and in which the ambulacra have the same simple structure from the apical system to the actinostome. In both these genera the petaloid structure is limited to the posterior poriferous zone of the lateral ambulacra; the only recent genus in which a similar structure still exists is *Agassizia*. In this genus, however, the posterior lateral petals are normally developed as in other Spatangoids, or perhaps we must consider this as the last trace in normal Spatangoids of the simple condition of the ambulacra, such as we still find it in the Pourtalesiæ. It is specially interesting to compare these genera first to the Ananchytidæ, then to the Toxasteridæ, and finally to such recent genera as *Genicopatagus*, *Homolampas*, *Argopatagus*, and the like. These comparisons lead us to detect

[1] The Collyritidæ in their turn showing most striking affinities to such genera as *Hyboclypus and Galeropygus*.

http://19thcenturyscience.org/HMSC/HMSC-Reports/Zool-09/README.htm