We may have another classification of the main groups of sponges if we consider as the first principles of classification, not those important differences of the tubular and vesicular canal-system (corresponding to the structures of the tubular and vesicular glands), but the differences in the materials of the skeleton. The great value of these skeletal differences has been acknowledged since Grant's time, and employed in various ways by later authors up to this time, but it seems to me that no single author has pointed out the important difference, phylogenetically, between a primary want of the skeleton and a secondary one (by reduction); further, all authors of recent time, in my opinion, have followed too far the monophyletic way (especially in judging of the Keratosa), whilst in animals of such simple structure and low degree of organisation polyphyletic hypotheses often approach nearer to the truth.

Particular attention should be paid in this respect to the Psammospongiæ, under which name I comprise those remarkable so-called Keratosa in which no trace of spongin is found, but in which the whole skeleton consists only of agglutinated xenophya, crowded in the maltha, and is therefore a false or pseudo-skeleton. These Psammospongiæ, or pure arenaceous sponges, are represented in the Challenger collection by the Ammoconidæ (Pl. VIII.) and Psamminidæ (Pl. VII.) described above, with six genera and twelve species of peculiar interest. Most authors, following the presently accepted views, would regard these Psammospongiæ as most reduced forms, derived from Silicosa, which have lost the siliceous spicules as well as the spongin-skeleton. In my opinion, it is more natural to regard these low forms as primitive ones, as Archispongiæ, which begin the skeleton formation by taking up xenophya.

Accepting this theory, we may even assume that the double formation of the mineral skeleton of sponges, the calcareous and the siliceous, has a causal relation to the double composition of the deep-sea ooze, from which the eldest Psammospongiæ have taken their skeleton materials, the calcareous Globigerina ooze and the siliceous Radiolarian ooze. The descendants of the oldest Archispongiæ (which certainly were skeletonless) began to take up deep-sea ooze from the bottom, and to crowd this supporting and protecting material in their maltha. By and by the mesodermal tissue was adapted to dissolve certain quantities of those two mineral bodies, and afterwards a certain portion of the dissolved mineral matter contained in the maltha was secreted in the form of spicules. This secretion may have been perfectly independent from the formation of spongin-fibres in the maltha. In such a manner the oldest Calcispongiæ (Asconidæ) may have descended perhaps from Psammospongiæ, which had taken up Globigerina ooze (*e.g.*, *Ammolynthus haliphysema*, Pl. VIII. figs. 2–4), and in a similar manner the Silicispongiæ (perhaps polyphyletically in several independent branches) may have arisen from the oldest Psammospongiæ, which had taken up Radiolarian ooze (*e.g.*, *Ammolynthus prototypus*, Pl. VIII. fig. 1).

Starting from this standpoint, we may accept as provisional the following classification