spicules by their accumulation produce. In the higher forms of the family the radial spicules alone are developed; for this I am not prepared with an explanation. In many of the Stellettidæ and the Geodiidæ the same absence of transversely disposed spicules is also a constant characteristic.

If instead of a sigmaspire we consider an aster situated in the interior of the sponge, and enlarging by growth into a megasclere, the results will be but slightly different, in some cases the radial tensions will lead to the overdevelopment of the two actines which lie in the line of growth and the remainder will be suppressed, so that an oxea will result; and in other cases some of the actines will be developed under the action of the transverse tensions, or rather of tensions which are the resultants of the transverse and radial tensions, the result of this might be the development of a triaxon spicule with six actines, or of a calthrops; in some sponges the triaxon and in others the calthrops is produced; in the Tetractinellida it is characteristically a calthrops, as on *á priori* grounds might have been expected. Thus in this case there are not two sets of oxeas, developed one along lines of transverse, and the other along lines of radial strain, as in the Tetillidæ, but the different actines of the same spicule are some directed radially and some transversely, as in the Pachastrellidæ.

The effect of the tangential strains at the surface of the sponge may be best considered by first studying the effects of a uniformly distributed strain on a thin pellicle which yields by fissuring. The fissures so produced are rectilinear and intersect either at right angles, producing a rectangular system of cracks, or at angles of 60° or 120°, producing a system of hexagons or equilateral triangles; the hexagons, since they present the smallest perimeter in relation to the area, are the most likely to result. Triradiate fissures thus produced have given rise to the hexagonal form of basaltic columns. The rectangular cracks are common in the glaze of "crackled" pottery. Though in the skin of the sponge actual fissures are not produced yet the lines along which they tend to be produced are lines of least resistance, and if spicules or the actines of spicules tend as we maintain to develop along such lines, we should expect to find them symmetrically arranged so as to form rectangular, hexagonal, or triangular areas, and on the principle of least action as already suggested, we should expect rather to find a hexagonal system than either of the others. And this or the triangular system is actually that which is most commonly met with in the dermal skeleton, not only in the Tetractinellida, but in the simpler Calcisponges, in the horny Sponges, the Monaxonida, and outside the Sponges altogether in the Radiolarian test (*Haliomma*, &c.), and in the spicules and skeletal network of the Echinodermata; the rectangular system occurs both in the Radiolaria and the Echinodermata, and in the Hexactinellid Sponges.

The application of these conclusions to the interpretation of the forms of sponge spicules is obvious; take the case of a rhabdus spicule growing under the influence of radial tensions within the interior of the sponge till it meets the skin; here it meets an