

the polygonal plates of the crust. These balls serve for the support of the spines,* which have grooves or sockets at their base, allowing of their accurate application to the spherical surface of the tubercles. They thus constitute ball-and-socket joints, allowing of free motion in all directions. Each joint is connected with the plate on which it turns, by means of the integument, which acts the part of a capsular ligament; and sets of radiating muscular fibres are provided for effecting the movements of the spines. By employing these spines as levers, the Echinus advances with great facility along plane surfaces at the bottom of the sea. This animal is also aided in its progressive motion by the employment of suckers, which are placed at the end of the slender tubes, protruding from the pores of the ambulacra, and analogous to those of the Asterias.

The *Spatangus*, a genus belonging to this order, buries itself in the sand by the action of its spines, which on its under surface are short, thick, and expanded at the ends, like the handle of a spoon, with the convexity downwards; and which have a limited rotatory motion. Those which grow from the sides are more slender, and taper towards the extremities, and when not in use they fall flat upon the body with their points directed backwards. Besides these, there are a few longer bristles, arranged in a crescent on the back, and converging till their points meet, but capable of being erected to a perpendicular position. The animal, when placed on sand, commences its operations by revolving the lower spines, thus soon creating a hollow quicksand, into which it sinks by its own weight so far as to enable the lowest of the lateral spines to co-operate with them, by scattering and throwing up the loosened particles; while these, at the same time, contribute, by their re-action, still farther to depress the body. As the animal sinks, a greater number of spines are brought into action, and its progress becomes

* It has been ascertained by Mr. Haidinger, that the structure of these spines is crystalline; and that their cleavage presents the exact rhomboidal angles characteristic of carbonate of lime. See his Translation of Mohs's Mineralogy, vol. ii. p. 91.