complete series of all the stages through which the species to which they belong has to pass before their growth is completed. The only difference between this process and the direct observation of any development is, that in the one case we observe in one and the same individual that succession of changes which, in the other, we trace through a series, as complete as possible, of several indivi­duals. Such is the course that I have taken with respect to the Echinodermata. The young Echini have a small number of plates in each of their vertical series ; they ap­pear to be slowly increased in size by the deposition of calcareous matter at their circumference, until those which surround the mouth have completed their growth, and are entirely consolidated. The superior plates continuing to grow, increase, from the top downwards, the periphery of the body, which remains depressed so long as the inferior are the only plates consolidated ; but in proportion as a greater number of plates becomes immoveable, and as there is formed, in the upper region, a greater number of plates reaching down to the circumference of the spheroid, the testa becomes rounded, and finally assumes a spherical form. It is to this cause that we are to ascribe the diffe­rences of contour exhibited by the Echini at different ages. In some species there are found individuals presenting even a pyramidal shape, and this takes place when there is still formed a great number of plates subsequently to the con­solidation of those occupying the greater diameter of the animal’s body. These facts sufficiently explain the gradual growth of beings which approximate more or less nearly to the spherical form ; and shew how carefully we should guard against the introduction of nominal species in consequence of a mere difference of form resulting from age only.

“ It would be interesting to trace the development of these animals *ab ovo.* But no naturalist has yet observed the state of the Echini on their first issuing from the egg. As to the spines, it is evident, especially in the *Cidarites,* that those surrounding the mouth are the first that attain their full growth, while the largest are those in the upper tier of the disc ; and those which have not yet completed their growth are found around the oviducal plates on the outside. The correctness of these observations will be de­monstrated by comparing the differences of development exhibited in this region by the spines that stand nearest to each other. We should be mistaken however as to the growth of the Echinodermata, did we think that there is a generic connection between the plates, on account of their forming vertical series from the mouth to the summit of the disc. It has been already remarked, that the plates of each space are alternately a little more elevated than each other ; but no attention has been paid to the manner in which the plates of all the spaces succeed each other in the same Echinus ; and yet, if we consider it closely, we shall see that the new plates are developed in spiral lines, passing without interruption from one series to another, through all the spaces from the circumference of the mouth to the dorsal summit, so that those which rest on each other in a vertical line do not make their appearance in immediate succession. It appears to me well worthy of remark, that in these animals, holding so low a rank among organized beings, we should find the succession of the solid parts composing the integument so strikingly analogous to the arrangement of the leaves around the stems of plants ; an arrangement the laws of which have been recently disco­vered by Μ. Schimper, and explained, so far as regards the *Coniferce,* in a memoir of Μ. Braun on the arrangement of the scales of their cones.

“ The small plates surrounding the mouth, and those around the anus, are arranged in a peculiar manner. They are easily moved, and thus facilitate the deglutition of the food, and the voiding of the excrements. In general the testa of the Echini is not so immoveable as one who had not observed them in a fresh state might be led to suppose. All the plates forming the upper part of the disc are often set in motion ; sometimes they sink, sometimes they rise, and, in the oblong species, the longitudinal diameter is often extended beyond its ordinary length.”@@1

The Echinides are in general littoral animals. The species with a thin brittle shell, covered with small hairs like bristles, as the Spatangi, burrow in the sand, covering themselves up by the aid of their spines ; but those with a stronger prickly crust hide themselves in rocky places. Looking at their rotund limbless forms, we might imagine that they must constantly be fixed to one spot, or, if move- able, that, from the difficulty in bringing members so nume­rous and opposite to co-operate, or from hesitation in what tract to move, seeing that they are all alike and look to all sides, still a perpetual sedentariness would be their choice. But it is not so, and their motions are neither less regu­lated nor slower than those of the majority of avertebrated animals. They usually advance on their flat basis, but when an individual chooses, it can move forward by turning on itself like the wheel of a coach. From the nature of their localities, they are much exposed to bruises, and worse foes in the shape of fish and worm. The latter they repel by their spinous panoply, which they can erect and stiffen, presenting a thousand spears on every side, and no point unguarded ;@@2 the bruises they bear with impunity, and it must be a wound only short of total disorganization from which they cannot recover. Monro has even seen the pieces of a broken shell walk off in different directions. By what organs the Echinides exercise their locomotive powers has been disputed. Most authors assign this duty to the spines of the areæ and the ambulacral suckers con­jointly. Baster tells us, that the latter are the principal organs;@@3 and, according to Blumenbach, they are the only ones,@@4 the prickles being merely organs of offence and de­fence. Now, says Μ. Agassiz, this is a very erroneous opinion,—vox et præterea nihil,—for it owes its birth and continuance to a mere verbal influence, the term *ambulacra* being first translated into alleys or walks, and then the organe which grow in them were subsequently supposed to be the walkers. Without questioning this very question­able transition, we know that Agassiz is wrong in denying the tentacula their pedestrious function. “ How, in fact,” he asks, “ could these small tentacula, with all their soft­ness of texture, situatcd, as they generally are, in that part of the body which is never brought into contact with the ground when the animal moves, and overhung by calcare­ous solid spines ; how, I ask, could those flexible tubes be used as organs of motion ? It is an undeniable fact, and I have often observed it myself, that it is with their spines the Echini move themselves, seize their prey, and bring it to their mouths, by turning the rays of their lower edge in different directions.”@@5 Our own observations, on the contrary, have satisfied us that the common Echinus moves from place to place solely by the aid of the tentacular suckers ; the spines, as Mr Couch correctly states, acting as levers or crutches. Agassiz exaggerates the littleness and weakness of the suckers : in the common Echinus, whose spines are not above half an inch in length, the suckers can be extended one inch and a half, so as greatly to overreach the spines; and they can at the same time be rendered firm and rigid

*@@@*1 Agassiz in *Annals of Nat. Hist.* i. p. 40-42.

*@@@*, The following epigram of Martial (xiii. 86) is very descriptive:—

Iste licet digitos testudine pungat acuta,

Cortice deposito mollis echinus erit.

*@@@\* Opusc. Subs.* i. iii. p. 110-4. Also Fleming, *British Animals,* p. 476.

*@@@\* Introd. to Nat. Hist.* trans. p. 267.

*@@@5 Annals of Nat. Hist.* i. 36