

a vain effort of the limited faculties of a finite nature. Yet nearly all these periods have come and gone since the reptilian animals played their parts in the triassic and permian worlds.

"It is hard to realize the surpassing interest with which the evidences of such ancient life are first received, scrutinized, and compared, and by which is lightened the labour of gaining ideas of the frames, the limbs, the weapons, and ways of life of these long-since perished animals. Unlike the poet, and dealing with denser elements, the geologist nevertheless, but with eyes fixed and gaze intent, 'bodies forth the forms of things unknown,' 'turns them to shapes,' and, in the transitory continents which successively come into and fade away from his field of vision, gives to them 'a local habitation and a name.'"

## MISCELLANEOUS.

*Note on the Embryogeny of the Tunicata of the Group Lucinæ.*

By M. A. GIARD.

I HAVE repeatedly insisted \* upon the necessity that exists for separating clearly the compound Ascidia of the group Didemnidæ from other forms belonging to a very different type, of which I have made the family Diplosomidæ. Besides important anatomical and embryogenical differences, the presence of numerous calcareous spicules in the tunic of the Didemnidæ is a practical character which enables them to be easily distinguished from the Diplosomidæ, in which these spicules are replaced by pigment-granules.

This new family includes:—1, the genus *Diplosoma*, MacDonald ; 2, the genus *Pseudodidemnum*, containing a great number of species, specially *Didemnum gelatinosum*, M.-Edw., *Leptoclinum gelatinosum*, M.-Edw. (*Polyclinum*, Lister), the *Lissoclina* of Verrill, &c. ; 3, the genus *Astellium*, including many new species, one of which, no doubt, answers to *Leptoclinum punctatum*, Forbes.

The Ascidian so well investigated by Kowalevsky under the name of *Didemnum styliiferum* † appears to be intermediate between the genera *Diplosoma* and *Astellium*.

The species that I have taken as the type of the latter genus, *Astellium spongiforme*, first found on the coast of Brittany, is also common at Saint-Vaast-la-Hougue in Normandy and on the shores of the Boulonnais. I have this summer undertaken some fresh investigations upon the curious embryogeny of this Ascidian ; the results at which I have arrived, brought together with those of the magnificent work of Kowalevsky on the embryogeny of *Pyrosoma* ‡, seem to me to throw an unexpected light upon the relations of the Diplosomidæ with the other Tunicata.

\* Archives de Zoologie, tomes i. & ii. 1872 and 1873.

† Schultze's 'Archiv für mikr. Anat.' Bd. x. 1874.

‡ Schultze's 'Archiv,' Bd. xi. 1875.



I reserve for a more detailed memoir the investigation of the formation, segmentation, &c. of the single ovum, and I shall confine myself at present to calling attention to some points of the organization of the hatched tadpole-like larva. The large vesicle which I regarded as the first rudiment of the common cloaca has certainly this physiological signification; but its morphological importance is greater than I had supposed.

This part, in fact, possesses the value of an individual; that is to say, it is the homologue of the Cyathozoid of the embryo of *Pyrosoma*. The arrangement of the other Ascidians relatively to this vesicle is exactly the same as that of the young Ascidiozooids of *Pyrosoma* relatively to the Cyathozoid. To be convinced of this it is only necessary to compare Kowalevsky's fig. 54, pl. xli. with the figure given by me for *Astellium*, in my 'Recherches sur les Synascidies' (pl. xxvi. fig. 6). To render this comparison perfect we must reverse the figure of the *Pyrosoma*, and turn it 45° from right to left round a longitudinal axis. The presence of a very abundant white pigment renders the continuous observation of the embryos of the Diplosomidæ very difficult, and prevented my perceiving this remarkable agreement.

The differences of structure which exist in the adult state between the branchiæ of *Astellium* and *Pyrosoma* are in relation to the different modes of existence of these animals. Moreover the embryos of an allied group, the Botryllidæ, have a branchia which astonishingly resembles that of *Pyrosoma*.

We may therefore regard the Diplosomidæ as representing the fixed state of a type of which *Pyrosoma* is the swimming or pelagic form. Consequently the group Luciæ of Savigny may be divided into two families, Pyrosomidæ and Diplosomidæ, presenting reciprocally the same relations as the Siphonophora and the Hydriformes among the Acalephan Cœlenterata.

A last fact which is important to indicate is, that in the peculiarities of the development of the Luciæ (defined as we have just seen) we find a new application of the law enunciated by us as the consequence of our embryogenic investigations on the group Molgulidæ. The Pyrosomidæ, which live free, present an abridged and condensed development, a partial segmentation, and an anurous embryo destitute of organs of sense; while the sedentary Diplosomidæ in the adult state have a dilated metamorphosis and a urodelous embryo, furnished with a well-developed visual and auditory apparatus. I may add that the tadpole-like larva of *Astellium spongiforme* possesses a caudal appendage, the musculature of which is very complex, while its membranous part is traversed by horny filaments, like those described by us in the simple Ascidians of the group *Cynthia* and in the Synascidians of the genera *Botryllus* and *Botrylloides*.

Lastly, in *Astellium*, as in *Ascidia scabra*, Müller, and *A. gelatinosa*, Risso, the tunic of cellulose is formed independently of the embryo, during (and even before) the segmentation of the vitellus. However, this process is less distinct than in the Ascidians in which we have observed it.—*Comptes Rendus*, December 13, 1875, pp. 1214-1216.



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