

On Saturday a joint excursion was carried out with the Dublin Naturalists' Field Club; some members of the Belfast Field Club being also present by invitation. The whole party drove from Bray up Ben Cree to Loughs Bray, the Rev. Maxwell Close explaining the glacial dam that separates the two lakes, and the moraines in the mountain-hollows round them. The descent was made by the romantic grounds of Luggela, which were kindly thrown open by Mr. Stepney. Here the granite abuts on the metamorphosed Ordovician, and displays, on Lough Tay itself, a fissile foliated structure of unusual delicacy. On climbing out of the deep hollow to the main road, abundant large erratics of granite, resting on Ordovician schist, were seen on all the moorland slopes.

On Sunday, July 30, Dr. V. Ball, F.R.S., conducted the party over the geological and antiquarian collections in the Museum of the Science and Art Department, Dublin, Major M'Eniry pointing out the treasures of the Royal Irish Academy collection.

THE DEVELOPMENT OF ECHINOCYAMUS PUSILLUS.¹

THE year 1891 will remain memorable to echinologists for the richness of its products upon the morphology of the class with which they deal, not the least brilliant and far-reaching of which is the discovery by Brooks and Field of the primary bilateral symmetry of the water-vascular system of *Asterias*; but the following year will not pale beside it, if only on account of the magnificent treatise to which we now call attention. The amount of solid work which the author has compressed into his fifty-seven pages is little short of astonishing. The monograph is written in excellent English, and illustrated by nine plates well worthy of the text; and from whatever standpoint it is judged, a verdict of unstinted praise must be given.

After a short introduction, the author furnishes an account of his methods, incidentally alluding to a remarkable result obtained by fertilising ova derived from females reared in a dirty locality with spermatozoa obtained from males dredged in the open sea; and he next proceeds to the detailed consideration of the sexual elements and fertilisation, in the course of which evidence pointing to a possible chemiotaxis is adduced, in what is termed the "attractive forces" of the ova and spermatozoa. The segmentation of the oosperm is next considered. The author remarks that he has more than once seen very delicate connective filaments crossing the cleavage-cavity from one segment to another at the earliest stages in the formation of the former; and later on, in dealing with the phenomena of mesenchyme formation, he calls attention to the significant fact that in young gastrulæ it is common to find mesenchyme cells "attached by one pseudopodium to the ectoderm, and by another to the archenteron," giving the impression "that they facilitate the process of invagination." Interesting as are these facts in their bearing upon the general question of protoplasmic continuity in the animal body, they fall into insignificance beside that portion of the work which deals with the vital phenomena of segmentation itself. In the course of it the author remarks that when studying the phenomena alluded to "one gets the impression that the segments alternately attract and repel each other, and that the highest degree of attraction occurs when the nuclei after a completed segmentation have obtained their rounded distinct form and are in a state of repose." This conclusion is reached after extensive and careful observation, and the tendency of current research in cytology appears to us to suggest that the near future may show the author to have herein formulated a general law.

Dealing next with the blastula and gastrula stages, an apical disc bearing a tuft of long cilia, akin to that of the annelid larva, is described; and the author, having proved that it has nothing to do with locomotion, provisionally suggests that it may be a larval sensory organ. The formation of calcareous deposits is recorded to first occur during the blastula stage, and the spines, interradial plates, and spherids of the young urchin, are alike traced to a "first indication" in the form of a minute tetrahedron originated by the agency of mesenchyme cells; and the author, after full consideration, inclines to the belief the "teeth" also "originate as small tetrahedrons." The detailed observa-

tions incorporated in this section of the work are of intense interest, especially in their bearing upon the attempt of Dreyer to reduce the skeletogenesis of the echinodermata and certain other invertebrated animals to a common principle of purely mechanical origin.

The young urchin is traced to a "first indication" in an ectodermic invagination of the Pluteus, as previously described by Agassiz and Mentschnikoff, and the author observes that the disc-like sac thus formed becomes differentiated into a "thick-walled bottom," which plays an important part in the development of the young urchin, and a remaining portion which "only serves as a kind of amnion."

One very curious and interesting discovery which is announced is that of a choano-flagellated condition of the cells of the ciliated band of the Pluteus, which, in the author's words, "curiously remind one of collar-cells in the Porifera;" and it is not a little remarkable that this observation should have been closely followed by that of Franzé that Bütschli's so-called "*mund vacuole*" of the Choano-flagellate Infusoria (*Codosiga botrytis*) is in reality a delicate membrane connecting the collar with a specialised sucking vacuole.

In his introduction the author confirms the surmise of Johannes Müller that certain of his (now classical) descriptions of Echinoid larvæ were those of *Echinocyamus pusillus*, and in so doing points out that nobody has in the meantime published anything on the development of that animal. Our appreciation of the excellence and value of the author's work may, perhaps, be best expressed in the assertion that it appears to us in every way worthy of this unique association with that of the great founder of our modern comparative anatomy.

FRANCE AND INTERNATIONAL TIME.

THREE years ago M. W. de Nordling made a communication to the French Geographical Society with regard to a universal hour. In a further communication to the same society, on April 7, he traces the changes that have been made since 1889. The state of things at the present time are summarised as follows:—

(1) The time of eastern Europe, which differs by only one minute from that of St. Petersburg, is employed in Russia, Roumania, Bulgaria, and Roumelia, to Constantinople.

(2) The time of Central Europe prevails in Sweden, Germany, Austria, Hungary, Bosnia, Servia; and its adoption is assured in Switzerland, Italy, and Denmark.

(3) The time of Western Europe (Greenwich time) is in use in Great Britain, Holland, and Belgium, and, to complete its European domain, needs the addition of France, Spain, Portugal, and Ireland.

With regard to France, M. de Nordling dwelt on the fact that while civil time is referred to the Paris meridian, the railway service runs according to Rouen time, which is five minutes behind Paris time. The French Commission of 1891 remarked upon the absurdity of this system in the following words:—

"In order that there should be no ambiguity in the use of the uniform hour adopted, it will be necessary to put an end to the curious habit that exists only in France, where two timepieces are seen at all railway stations having between them a constant difference of five minutes.

"It is useless for the railway companies to say that the interior time of their stations concern them particularly, and only refer to their service; only error and confusion can result from the system. The hours of departure being regulated by the interior clock, there must always be a tendency to consider these indications as the most exact.

"To our knowledge, in no other country outside our own, is this peculiarity found, which perpetuates an error, and, in fact, puts the trains behind by five minutes."

"It is said," remarked M. de Nordling, "that the five minutes retardation are regarded with approval by travellers.

"This was probably true in 1840, when one would only go to Saint-Germain and Versailles, but to-day, when everybody discounts the five minutes, they have lost their virtue, and only force the passenger to make incessant calculations. The uncertainty is increased in the buffets, where it is doubtful whether the clock on the wall indicates interior or exterior time.

"It is not only from a national point of view that this dual hour is vexatious, but also from an international point of view. In fact, it renders our hour absolutely inappropriate to all international usage. Suppose Switzerland had adopted Paris time;

¹ A Monograph, by Prof. Hjalmar Théel, Nova Acta Reg. Soc. Sci. (Upsala: Ser. iii. pp. 1-57. 1892.)