

The Food-Stores of the Mole. By Dr. FR. DAHL, of Kiel.

In the year 1886 I published, in the 'Schriften des naturwissenschaftlichen Vereins für Schleswig-Holstein,' an account of a large store of earthworms which had been found in the burrow of a mole. I then expressed the opinion that in all probability this was not a case of a winter food-store, as had hitherto been believed; on the contrary, since the supply was found at the end of a prolonged period of keen frost, we were rather led to the conclusion that it was precisely in winter that the mole was able to capture its prey most easily, and therefore in excess. However, I added that further observations were greatly to be desired.

Herr A. Schröter, a market-gardener of Hassee, near Kiel, then had the kindness to continue the observations in his own grounds, partly assisted by myself. I am especially grateful to him, since it is difficult for a town-dweller to select the right moments for observation.

On December 14, 1886, before the frost set in, we together examined two burrows: we found no stores. Herr Schröter then examined two burrows on Jan. 9, 1887, after a slight frost, and two more on March 6 of the same year, without discovering a store of worms. The winter this year was very mild, so that the ground was never frozen deep nor continuously.

At the beginning of the next winter, on Nov. 27, 1887, Herr Schröter again examined two burrows without finding stores. The next spring, however, after a prolonged and severe frost, there were found on April 8, 1888, in one of the burrows examined—

578 Earthworms;
67 larvæ of *Hepialus lupulinus*, L.;
4 Cockchafer grubs; and
3 larvæ of Skip-jack Beetles.

A second burrow which was examined at the same time was likewise filled with a number of worms.

At the commencement of the third winter, on Dec. 23, 1888, after a short slight frost, there were again no stores found. But on March 12, 1889, after a severe and long-continued frost, we found in the first burrow 550 earthworms, and the rest of the burrows exposed also contained large food-stores.

Before the beginning of last winter, on October 27, 1889, no worms were found, as was once more the case on Dec. 26, after a short slight frost. On the 18th of March there was again nothing found in the first of the burrows examined, while in the second there were only eight worms. It is true that in this year the soil was frozen for about three weeks, but the frost was very superficial.

The observations therefore completely confirmed my previous conclusion: it is only after a long-continued and severe frost that large stores of worms and larvæ are found. The mole must therefore be able to capture these creatures more easily during the rigours of winter. With reference to the condition of the worms, I wrote

as follows in my previous paper:—"Most of them were pretty severely crushed, in part even mutilated. Some, however, on being brought into a warm room, soon so far recovered again that no injury whatever could be perceived." This is not quite correct. In the year 1888 Dr. Döderlein informed me that his attention also had been drawn by an agriculturalist near Strassburg to the winter supplies of the mole. He stated that examination revealed the fact that the first segment of all the worms was severely injured, so that they could not burrow. A new investigation of my own completely confirmed this statement. In all the specimens the first segment was injured, and often several others besides. It is true that in many instances the wounds were already almost completely cicatrized; the most recently captured individuals were, however, still bleeding. The worms were therefore prevented from escaping not only through being securely imprisoned within the walls of the dwelling-chamber and passages, but also through this highly practical mutilation, and were nevertheless preserved alive. The crushings, which, as I stated previously, are not always present, are probably to be regarded as of a secondary nature, and result from the worms being pressed into the walls.—*Zoologischer Anzeiger*, Jahrg. xiv. no. 353, Jan. 5, 1891.

On the Development of the Chromatophores of Octopod Cephalopoda.
By L. JOUBIN.

The anatomical structure of the chromatophores of adult Cephalopoda is now tolerably well understood, and the theory which attributed the movements of the pigmented matter to contractions of muscular fibres appears to be definitely abandoned; but people are far from being agreed as to the mode of development of these organs. Having had the opportunity of studying the embryogeny of *Argonauta* and *Octopus* at Banyuls, I have arrived at results which appear to me to be very different from what was found to be the case in the Decapod Cephalopoda.

Contrary to the opinion of M. Girod, who regards the chromatophores of the Decapoda as developing at the expense of the mesoderm, contrary, too, to the belief of M. Phisalix, who considers the pigmented cell of *Sepiola* as resulting from the fusion of a number of other cells, I hold that the chromatophore of the Octopod is of ectodermic origin, and that its accessory parts alone are mesodermic. This is tolerably comparable to what is found in the organs of sense.

In the embryo of *Argonauta* the integument consists of a simple ectodermic epithelium covering a loose mesodermic connective tissue.

In the dorsal region enclosed between the two eyes we observe, better than anywhere else, certain scattered ectodermic cells becoming larger than those surrounding them, then, little by little, sinking down into a sort of depression shaped like a funnel, dragging the neighbouring cells with them.



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