ing to polar globules, thrown off from the germ-cells before they develop into embryos; third, the 'residual nuclei' of the germogens set free, as the final event in the history of infusorigens. The infusorigen is a group of cells, consisting, at one period, of a peripheral layer of cells partially enveloping a large central cell. Its development from a single cell by a process of cleavage, and the epibolic growth of its peripheral layer, give ground for believing that it passes through a gastrula stage. In diphygenic individuals the germ-cells are different for the two kinds of embryos. The first to appear, one or two at a time, are the large germ-cells of the infusoriform embryos. After these embryos escape, there remain in the parent-body small cells, which multiply until they fill the greater portion of the axial cell, and eventually give rise to vermiform embryos. The difference between developmental division (cleavage) and multiplicative division of cells is here brought in striking contrast. No definite evidence of fecundation has been obtained, but it perhaps occurs with one form of embryo. In the development of the vermiform embryo, karyokinesis splits the germ-cell into two unequal parts. Then follows a three, and next a four celled stage, in which three cells form a cap over the fourth. This leads to a gastrula, in which a single entoderm-cell is enveloped by a small number of ectoderm-cells. The blastopore closes, and the multiplication of cells at this pole soon leads to the pyriform embryo, of which the pointed end is the blastoporal region; while the rounded end corresponds to the future cephalic pole. In this stage the first germ-cell appears at the hind end of the entoderm; the second germ-cell, at the anterior end; and from these two arise the other germ-cells. There is, therefore, a triploblastic stage, if we regard the two germ-cells as representing the mesoderm.

It may be added, that important errors of van Beneden have been corrected by Whitman, whose article is one of unusual interest and merit. As to the relationship of the dicyemids, Whitman says, "I see no good reason for doubting the general opinion that they are plathelminths, degraded by parasitism. Whether they, and their allies the Orthonectidae, have descended from ancestors represented now by such forms as Dinophilus, or from the Trematoda, is a question which further investigations must decide."

C. S. MINOT.

TEMPERATURE AND ICE OF THE BAVARIAN LAKES.

AFTER an account of temperature observations on Swiss lakes by earlier observers, as Brunner and Fischer, Simony and Forel, A. Geistbeck (*Ausland*, 1882, 961, 1006) gives a detailed tabulated statement of his observations during 1881 on sixteen Bavarian lakes, showing the following results. As to variation with depth, the first six metres are almost constant; between six and eighteen metres there is a rapid cooling; then, to fifty metres, a slow decrease; and, below this, an almost constant temperature of a little less than 5° C. Daily variation is distinct to six metres, but ends at eighteen. Annual variation is reduced to from 0.2° to 0.9° at the bottom of the deeper lakes. Two groups are noted. The warm lakes, with an average temperature of 7.3° to 17°, are less than one hundred metres deep, their bottom temperature is below 5°, and they have a decided annual variation through their entire depth. The cold lakes, Königs, Starnberger, Walchen, and Achen, are from 115 to 196 met. deep, and, below fifty metres, are always cooler than 5°, with an average temperature of 5.2° to 5.6°: these have, therefore, a great volume of cold water even in midsummer, and a slow and small annual temperature range. The cause of this difference is seen partly in the depth of the lakes, and further in the relation of lake-surface to drainage-area, which, in the cold lakes, averages 1 to 10, and, in the warm, 1 to 30. Exceptions, here and elsewhere, to the rule of depth, are Barm (31.5 met. deep), Gosau (63), and Toplitz (105), which belong under the cold group; for, in spite of their moderate depth, they are well protected by steep shores from warming by sun and wind. On the other hand, Geneva (334) and Gmundener (190) approach the warm group, presumably on account of their large drainage-area. Certain small mountain-lakes, fed mostly by springs, show a relatively low summer and high winter temperature. Form of the bottom, and nearness to entering-streams, have strong control over the water's warmth. The lacustrine flora and fauna are determined chiefly by temperature and light. Reeds and algae are common along shallow shores, but all rooted plants end at a depth of twelve metres. The littoral molluscan and crustacean fauna disappears at twenty metres. In deeper water there is a special 'pelagic' fauna. (In this connection, see Forel, La faune pélagique des lacs d'eau douce, — *Arch. sc. phys. nat.*, viii. 1882, 230.)

The lake temperatures fall quickly in the autumn by circulation, but rise slowly in the spring by conduction and wave action. In winter a temperature lower than that of maximum density penetrates to a considerable depth: less than 3° has been found at forty metres. Ice forms first on the shallows along the shore, and spreads outward. The high lakes freeze every year, sometimes as early as October or September; the larger lower lakes, at later dates and more seldom. Walchen has frozen over only three times in this century; Constance, seven times since 1277; Gmundener, five times in the last four hundred years. In the severe winter of 1879–80 Tegern closed on Dec. 21; Zurich, in the middle of January; Walchen, on Feb. 3; and Constance and Gmundener, on the 6th. Changes of temperature produce long cracks in the ice, so characteristic as to have local names — *lehnen*, *schübe*, *wunen*, *frageln* — on the different lakes. Further description is given of the thickness and color of the ice, and certain peculiarities in the freezing of some of the lakes.

W. M. DAVIS.

LETTERS TO THE EDITOR.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Zoölogical 'regions.'

MY attention has been drawn, by a notice in one of the last numbers of SCIENCE, to what seems to me to be sources of error. I refer to the determination of zoölogical regions by percentage calculations, and the idea that regions should have a certain amount of numerical equivalence. This seems to be an artificial and hence fallacious method of dealing with the subject, engendered by the lack of a proper conception of the matter under consideration. No definition or description of a 'region,' or synonymous word, can be found in any of the leading works on zoogeography; but, if we put two and two together, an idea can be formed which will, I hope, help solve some mooted questions.

Regions are known to differ in the kinds of animals occupying them, as well as in location. All, or all but one, are geographically very distinct; and all are well