apparent bifurcation of two of the primary canals at distances varying from a fourth to three-fourths of the distance toward the margins.

Several specimens were likewise found with five canals. Indeed, this was a not uncommon feature and the medusa was divided into a regular pentamerous form, quite similar to reports made by several observers of pentamerous Aurelias.

Of those with three canals several varieties were found, those with three symmetrical canals dividing the bell into thirds, or making a trimerous form, the canals being at angles of 120 degrees. In other cases the one-half of the bell was equally divided by the third canal into quadrants while the other half remained undivided, showing that in this case there had been the total suppression of one of the canals.

In a few cases a sort of aboral circular canal was present, the radials instead of entering directly into the gastric pouch entered a circular canal which surrounded it. Of these there were several forms which only diagrams can make clear.

In conclusion it may be suggested that there was an apparent absence of any correlation of variation and also of any 'meristic' feature.

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LATERAL LINE ORGANS IN EUNICE AURICULATA n. sp.

In a hitherto undescribed species of *Eunice*, to which I have given the above specific name, occurs a lateral line organ which, so far as I can learn, has not previously been discovered in this family. The specimens were collected in Porto Rico by the U. S. Fish Commission Steamer *Fish Hawk* during the winter of 1898–99.

The parapodium, as is characteristic of this genus, is uniramous, only the notopodium remaining, *not*, Fig. 1. Dorsally this carries a long cirrus *d. c.*, and a gill *gill* attached to this cirrus. These gills are absent from the most anterior segments and appear first on the parapodia of the 19th segment. The parapodium carries a single

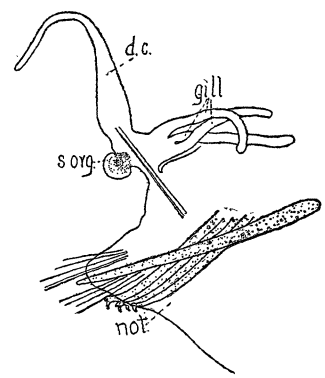

Fig. 1.

stout, straight, aciculum, with several smaller ones, toothed at the ends, and crossing the first at an angle. A dorsal and a ventral bundle of fine setæ are present. Anteriorly there is a thick ventral cirrus, which is much smaller toward the posterior end of the body (not shown in the figure.) A bundle of fine setæ extends into the dorsal cirrus.

The organ in question is situated on the outer side of the base of the dorsal cirrus, *s. org.*, Fig. 1. It appears on the first segment as a slight swelling, which becomes more

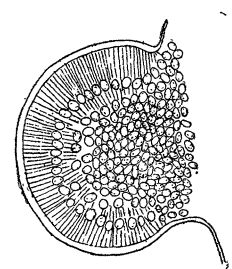

Fig. 2.

and more prominent posteriorly, until it reaches the condition shown in fig. 1. It is a rounded, smooth projection, slightly

constricted at the base, and in preserved material, showing no trace of pigment.

Examination of stained specimens shows that they apparently have the structure of the lateral line organs described by Eisig for the Capitellidæ.* There is the same arrangement of the nuclei, and the same radiations extending from the center toward the periphery (Fig. 2). No trace of cilia could be seen on preserved material, and the organ is apparently not capable of retraction into special sacks in the body wall. The cuticle, also, is relatively more thickened on the outside of the organ than is represented by Eisig's figures.

I am unable to give any details of the finer anatomy of these organs. The material at my disposal is not well enough preserved for histological study, and macerations and sections have thus far yielded no results. My only excuse for presenting this incomplete note is that while it is desirable that the existence of the organ in the group should be noted, there seems no probability of securing more favorable material.

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WOODS HOLL, Aug. 10, 1900.

*'Fauna und Flora Golfes v. Neapel' 16, p. 76, *et seq.*

SCIENTIFIC BOOKS.

An Outline of the Theory of Thermodynamics. By EDGAR BUCKINGHAM, PH.D. (Leipzig), Associate Professor of Physics and Physical Chemistry in Bryn Mawr College. New York, The Macmillan Co.; London, Macmillan and Co., Limited. 1900. 14 x 22 cm. Pp. xi + 205.

In the preface of this newest book on thermodynamic theory, the author states his aim in the following words: "In the course of studying thermodynamics I have found a considerable gap between the text-books available and the modern memoirs. This volume has been written to spare other students some of the time which I have had to spend in bridging over the gap for myself. As the title indicates, it is not a book of applications, but a brief outline of the theory, the applications having been selected solely with a view to their illustrative value." The book is evidently intended for the beginning student.

The treatment begins with the necessary introductory concepts, then takes up successively the first and the second laws of thermodynamics, and concludes with a discussion of the criteria of thermodynamic equilibrium, and of the phase rule.

Under the first of these general heads appears a lucid and brief chapter on thermometry, an elaborate analysis of the idea of a quantity of heat, and the statement that only systems that have equations of equilibrium are to be considered. It is not emphasized, as it might well have been, that a quantity of heat is a purely auxiliary quantity, a convenient but wholly arbitrary mathematical fiction. In connection with the first law of thermodynamics, we find a simple discussion of the law, an exposition of the law of constant heat sums and of the relation between heat of reaction and temperature, and a study of specific heats. A recapitulation at this point completes the first half of the book.

Passing to the second law of thermodynamics, we are introduced to: reversible processes and Carnot's theorem; the ideas of absolute temperature and of entropy, derived from the properties of ideal gases; the combination of the two laws, to yield the differential of the energy of a system; and Gibbs's fundamental equations, which result from changing the independent variables. This part of the book is completed by an admirably clear and consistent account of the theory of the porous-plug experiment, and a number of simple illustrative applications of the general theory. The final three chapters are devoted mainly to the criteria of thermodynamic equilibrium, and to the phase rule as applied to systems in which no chemical combination occurs. It is not made clear here that the criteria of equilibrium are consequences of the inductively reached principle of the spontaneous dissipation of work availability.

In all this, Professor Buckingham has done pretty satisfactorily what he set out to do. The subject-matter is well arranged; the book is