getting that many of these attributes exist because they are properties of protoplasm. The tendency to regard the protoplasm of more primitive forms of life as less intricate, less responsive, if not "less living" than that in more highly developed forms is evident in such statements as, "there is considerable objection to the use of the word 'injure' in reference to plants." I recall the delightfully courteous remark of the English chemist, H. R. Proctor, who, finding my mechanistic interpretations of protoplasmic behavior rather harsh, asked if he might not still be allowed to regard life as, so to speak, a new departure.

In my turn, I ask the reader merely to admit that protoplasm is alive, for in so doing he tacitly grants that it exhibits irritability, in other words, nervous response.

It is interesting to contemplate the possible relationship between the rhythmical pulsations responsible for protoplasmic streaming in myxomycetes and the rhythmical contraction of sympathetically controlled muscle-tissue.

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IN-VITRO SYNTHESIS OF LACTOSE

RECENT work by Graham and Turner, working with goats, and the undersigned, working with dairy cattle, have shown that the active mammary gland removes lactic acid from the blood. The inactive mammary gland does not remove lactic acid. The quantity of lactic acid removed from the blood is such that lactic acid was suspected of being concerned with the synthesis of lactose in the milk. Galactose, which with glucose forms the lactose molecule, can theoretically be accounted for by the condensation of two molecules of lactic acid.

Proof of the correctness of the hypothesis that lactose is synthesized from lactic acid and glucose would lie in in-vitro synthesis of lactose from lactic acid and glucose. Solutions of glucose with lactic acid and various salts of lactic acid were prepared, to which was added macerated mammary gland tissue from lactating cows. This was incubated under toluene at 37° C. The mammary gland tissue was squeezed in muslin bags before and after grinding to express, in so far as possible, the milk retained in the ducts and aveoli. Blanks containing only mammary gland tissue and water incubated simultaneously with the experimental lots showed but the faintest traces of lactose.

Positive proof of the synthesis of lactose was established by the formation of lactosazones and by the isolation of 847 milligrams of material shown to be lactose.

Heating concentrated solutions of lactic acid or salts of lactic acid with glucose also produced lactose as indicated by osazones.

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THE USE OF MUCUS BY MARINE PLANKTON FEEDERS

WITH the exception of the crustacea, and perhaps the protozoa and sponges, apparently *all* the marine plankton feeders make use of mucus to entangle the microscopic materials upon which they live. This fact seems to have been overlooked by zoologists in general. After many years of study and reference work I have found that the rôle of mucus as an essential part of the feeding mechanism of marine animals has been greatly underestimated.

In 1928 I described the feeding habits of the gephyrean, *Urechis caupo,* in joint papers with Dr. W. K. Fisher,[1, 2] in which he gave the classification and description of the worm. At that time this method of feeding was considered unique by those biologists who became acquainted with the paper; but I have since found that this method is not unique, for other animals use a similar method of entangling their food, for example, *Chaetopterus variopedatus* and the tunicate, *Diplosoma macdonaldi.* In the case of many other animals in which the cilia have been credited with the selective function of obtaining food, I have found that the mucus forms a plate through which water is strained, and actually the cilia furnish only the mechanical power for creating the currents. One reason why mucus has not heretofore been accredited with its important rôle is that it is perfectly transparent, unless heavily laden with food; and another reason is that investigators have used such materials as carmine, India ink, etc., which, in most cases, cause a cessation of the secretion of mucus. Hence, what the investigators have done is to make plots of the ciliary currents, which often were reversed from what they actually are during feeding operations.

I have found that the method of feeding in *Chaetopterus* is by the secretion of a slime bag or funnel through which all water entering the burrow during feeding passes. As the bag is being secreted at the top by the aliform notopodia, it is rolled into a ball at the bottom by the accessory feeding organ; but at intervals secretion of slime ceases and this food ball is passed forward to the mouth, after which a new slime bag is formed. Therefore, the actual operation of food getting by *Chaetopterus* is quite different from that described by Enders,[3] whose paper is by far the

1 W. K. Fisher and G. E. MacGinitie, *Ann. Mag. Nat. Hist.*, ser. 10, Vol. 1, pp. 204–213, 1928.
2 *Ibid.*, Vol. 1, pp. 199–204, 1928.
3 H. E. Enders, *Jour. Morph.*, 20: 3, 479–532, 1909.