establishing connections for the *Journal of Psychological Abstracts,* of which he has been made editor.

AT the University of Minnesota, the following promotions have been announced in the School of Chemistry: Dr. George H. Montillon, from assistant professor to associate professor of chemical engineering; Dr. Lloyd H. Reyerson, from assistant professor to associate professor of inorganic chemistry; Dr. Henry M. Stephens, from instructor to assistant professor of inorganic chemistry, and Dr. Arthur E. Stoppel, from instructor to assistant professor of technological chemistry. The following promotions have been made in the College of Engineering and Architecture: J. O. Jones from associate professor to professor of hydraulics; George L. Tuve from instructor to assistant professor of steam engineering, and Orrin W. Potter from instructor to assistant professor of drawing and descriptive geometry.

DISCUSSION

AMOEBOID MOVEMENT

IN an important recent paper on the subject of amoeboid movement[1] Professor S. O. Mast refers to a hypothesis suggested by me in a former paper.[2] In a footnote on page 407 he says:

> Pantin concludes that locomotion in Amoeba is due to differential imbibition and contraction. He says (p. 61): "Water is actually abstracted from the hind end of the amoeba, and imbibed by the protoplasm at the anterior end. A water current is therefore set up towards the anterior end. This current, aided by the contraction of the ectoplasmic tube, would give rise to the endoplasmic stream." He does not, however, explain contraction, and it seems to me that entrance of water at the anterior end and exit at the posterior end would tend to produce a current in the plasmasol from the anterior toward the posterior end, not in the opposite direction as maintained by Pantin.

I do not want to discuss here fully the complex mechanics of amoeboid movement, but as the above criticism is based upon a misunderstanding I would like to make the matter clear.

(1) The question of the contraction of the gelated "ectoplasm" (= plasmagel) surrounding the fluid "endoplasm" of the amoeba (except at the anterior end) is fully discussed in my paper and on my hypothesis a simple explanation of the contraction is offered, based on the analogy between this and the syneresis of gels (particularly on pages 61, 63 and 64 of my paper).

(2) It would seem that Professor Mast assumes that I intended to convey the idea that, during locomotion, water is imbibed by the anterior end of the amoeba *from the external medium.* As he points out (and as is also pointed out earlier in my paper on page 37), this would result in a protoplasmic stream from the anterior to the posterior end of the amoeba; the reverse of that actually observed.

But on page 37 in my paper reasons are given for supposing that such an imbibition from the external medium does *not* occur. It is there suggested that water gained by the swelling protoplasm of the anterior end comes not from the external medium *but from the posterior protoplasm of the amoeba itself.* Obviously, this will cause a stream from the posterior to the anterior end of the amoeba, as is actually observed to be the case. My hypothesis is thus consistent with these facts.

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[1] *Journ. Morph. and Physiol.,* 41, p. 347.

[2] *Journ. Marine Biol. Assoc. U. K.,* XIII, p. 24.

DO CILIATED ORGANISMS ROTATE COUNTER-CLOCKWISE WHILE SWIMMING?

IN SCIENCE of April 9, p. 385, E. E. Wildman asks, in the title of his paper, Why do ciliated animals rotate counter-clockwise while swimming? The best complete answer to this question is: "They don't."

In this paper Wildman says, "A study of ciliated and flagellate protozoa, the larvae of sponges, coelenterata, echinoderms, lamellibranch molluscs and annelids resulted in the rather surprising discovery that they all show a counter-clockwise rotation on the polar axis while swimming."

This far-reaching conclusion is based on the observation of twenty-six species of organisms, including two ciliates, "a *Paramecium* and a *Vorticella* species."

It was fortunate for this generalization that only twenty-six organisms were observed—the twenty-seventh might have turned to the right! For among the ciliate protozoa sixty-two species out of 165 turn to the right (Bullington, '25, Archiv für Protistenkunde); and in the rotifers, another ciliated group, very nearly all of about one hundred species studied (Professor Frazier Cochrane) turn to the right. A large proportion of the flagellates also turn to the right.

From his twenty-six observations recorded above, Mr. Wildman comes to the conclusion that "for the biologist" the meaning of "the freedom of the will" must be limited. The connection is a bit obscure; the paper becomes clear and logical, however, if one substitutes therefor the *obvious* conclusion that "the freedom of drawing conclusions" be limited.

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