attempts to do this make use of philosophical speculations which are outside the realm of what is physically definable."

Now, the point in common between motion towards C, and increase in velocity of C, is increase in the angular velocity of an electron in C about the electron e. If v is velocity of the C electrons, and r the distance of e from the nearest element (charge q) of C, $d(v/r)/dt$ positive represents motion towards C, and we may write

$$F = -qe\frac{d(v/r)}{dt}.$$

For v constant, $F = \frac{qev}{r^2}\, dr/dt$, which is Ampere's Law.

For r constant, $F = -\frac{qe}{r}\, dv/dt$, which is Neumann's Law.

It would be interesting to know whether this relation has been already noted. If it could be generalized further to include motion of e parallel with C, the general law covering all forms of induction could be stated without any hypotheses concerning modes of action at a distance.

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July 10.

Cullwick, E. G., "The Fundamentals of Electromagnetism" (Cambridge, 1939), p. 83.

Mechanics of a Flagellum

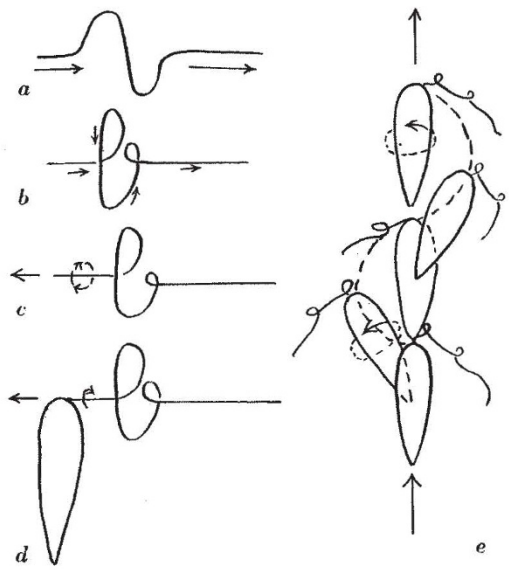
CONSIDER a simple homogeneous filament with a wave passing in the direction indicated and suppose that the filament is immersed in water (*a*). Allow also that the wave is passing along the filament with both an increase in velocity and amplitude and hence an increase in resistance from the water. It is then obvious, I think, that the wave must take up the form indicated (*b*). Thus the wave will pass along the filament with rotation in a clockwise or anti-clockwise direction. Let it be assumed that the rotation is anti-clockwise.

We are not concerned here with the nature of the force producing a wave, but that due to the wave acting on the water can be resolved into two components acting in different planes. The greater of the two forces will be one which would tend to force the filament to the left while the other would be acting in a clockwise direction with the main axis of the filament as its centre (*c*).

Now if we consider the filament to be a flagellum attached to a single cell such as that indicated (*d*) the one (the main) force of the flagellum would tend to push the attached end of the cell to the left while the other would tend to push the same tip of the cell below the plane of the surface of the paper. If, however, the inertia of the cell were greater than that of the distal end of the flagellum the effect would be to raise the greater part of the flagellum above the plane of the paper instead.

The continuous effect then of a series of waves passing along the flagellum at regular but frequent intervals would be to cause the tip of the cell to gyrate and rotate slowly as indicated in the diagram *e*, but it is obvious that the frequency of the waves passing along the flagellum must be high compared with the rate of rotation of the cell.

Now the following data have been obtained for *Euglena viridis* by means of high-speed cinema-photomicrography and direct observation. (1) The organism rotates about once per second. (2) Waves pass along the flagellum from base to tip at a frequency of 12–13 per second. (3) As the organism swims forward its anterior end gyrates and traverses a relatively large circle or spiral during the period of a single rotation. Contact prints showing flagella in motion were published in NATURE, **136**, 210 (1936). The flagellar movement of several monoflagellates and biflagellates has been diagnosed in the same way, and the paper containing a full description of the method and results has been accepted for publication by the Zoological Society of London.



It is commonly assumed that these monoflagellates possess a *tractellum* or a flagellum in which the waves start at the tip and travel towards the base and thus draw the organism through the water. There seems to be no concrete evidence of the existence of such tractella.

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July 20.

Prevention of Seed-Borne Diseases in the Flax Crop

FURTHER to references[1,2] already made with regard to the prevention of seed-borne diseases in the flax crop, it may now be stated that the seed disinfectant RD.7846 prepared by Messrs. Imperial Chemical Industries, Ltd., and containing tetramethylthiuram disulphide as its active constituent, has been named 'Nomersan'. Through the good offices of Messrs. Imperial Chemical Industries, Ltd., and Messrs. Plant Protection, Ltd., 'Nomersan' was made available in bulk for the dressing of flax seed sown in Northern Ireland in the present season, and upwards of two thousand tons of seed were treated. Disinfection machines of the Strickland pattern were found to be very suitable for the continuous treatment of seed in large quantities, and machines of this type were used throughout the work.