the Fraunhofer effect has now been established in the case of the spectrum of an organic compound of complex structure.

A more detailed account of this work will be published almost immediately. We wish to reserve this particular group of spectra for our own investigation, as we have already planned and in part carried out a connected series of investigations upon it, which we wish to complete before venturing upon the theory of the matter. We hope also to investigate the behaviour of solutions under the influence of the Tesla discharge.

J. K. MARSH.
A. W. STEWART.

The Sir Donald Currie Laboratories,
The Queen's University of Belfast,
January 8.

Distribution of the Organ-Pipe Diatom (*Bacillaria paradoxa*).

IN connexion with the interesting question raised by Mr. F. Chapman in NATURE of January 6, p. 15, as to the peculiar movements of *Bacillaria paradoxa* being due to osmotic pressure, I am writing to say that all the specimens observed by Mr. H. Weaver and myself that were gathered from the Staffordshire and Worcestershire Canal at Stourport and from ponds at Wilden and Hartlebury (see NATURE, vol. 108, p. 163) were very active and so continued during the period we kept them under observation (about a week in each case). The water in this canal and in these ponds is some eighty miles removed from the sea. It is quite fresh and not at all brackish.

J. W. WILLIAMS.

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Experiments on Hardness and Penetration.

As a student of colloidal chemistry I was much interested in the results of the experiments on the clay-water systems by Mr. A. S. E. Ackermann (NATURE, January 6, p. 17), showing that there was a continuous penetration of the systems by a heavy object when its pressure exceeded a certain critical value referred to as the " pressure of fluidity."

The phenomenon has been observed in many colloidal systems and also with the coarser systems such as paints, thick oils, etc. Bingham found zero fluidity or infinite viscosity with 4 per cent. china clay or 5·5 per cent. of graphite. E. Hatschek, investigating aqueous solutions of gelatine, showed that the viscosity varied with the rate of shear, and a similar conclusion was reached by Hatschek and Humphrey, working with systems of sifted rice particles in toluene-carbon tetrachloride. In general, at the lower rates of shear the viscosity is abnormally high and even infinite if the system be coarse-textured.

With the Stormer type of viscometer the curve relating the number of revolutions per minute of the cylinder rotating in a coarse system such as a paint or grease, with the load rotating it, is curvilinear and does not pass through the origin.

The minimum load required to start rotation, apart from that to overcome the friction of the apparatus, would correspond to the " yield point " obtained by the use of Bingham and Green's plastometer, or the " pressure of fluidity " by Mr. Ackermann.

It is evident that the viscosity of these systems has lost its usual significance since it is a variable function and any value obtained by any one method is empirical. This would apply to the value given by Mr. Ackermann for the viscosity of lead in the solid state.

Another interesting phenomenon in this connexion is that the rate of penetration by the object gradually decreases and eventually ceases; thus a steel ball remains suspended in a well-mixed paint after a fall of some distance. With some oils, a falling sphere cuts a path through the liquid, so that the apparent viscosity decreases with each determination by the falling sphere method.

E. MARDLES.

2 Hillfield Villas, Union Street,
Farnborough, January 9.

IT is with great interest that I read Mr. Ackermann's letter in NATURE of January 6, p. 17, with regard to the penetration of clay and lead by a loaded disc. The manuscript of a paper intended for the next meeting of the Iron and Steel Institute is now complete. The work deals with several of the deductions to be made from my formula for Brinell hardness (NATURE, December 9, vol. 110, p. 773).

While clay has not been examined, tests have been carried out on pitch and plasticine. Meyer's formula appears to be true for these two materials.

HUGH O'NEILL.

The Victoria University of Manchester,
January 9.

A New Gregarine Parasite of Leptoplana.

MR. SAM SETNA, who is working under my supervision on the Polycystid Gregarines, has just found specimens of a Cephaline Gregarine infesting a specimen of *Leptoplana sp.* recently obtained from the Marine Biological Laboratory at Plymouth. This Gregarine seems to be rather a rare parasite of Leptoplana, as no Gregarine has been described before from Leptoplana, according to lists given by Minchin (1903) and Watson (1916), or in literature published since. Indeed, extraordinarily few Sporozoa have been found from the Platyhelminthes as a whole. The find is all the more remarkable as Leptoplana is so commonly used as a type animal. Only a single specimen was found to be infected, and other specimens in the same tube that have been examined do not show the infection.

In the sections of the infected worm, a number of individuals of the Gregarine have been found in the parenchyma of its body. The trophozoite is solitary and quite large in size, measuring from 103 μ to 168 μ in length. The protomerite is quite distinctly marked off from the deutomerite. Only one young individual has been found showing the epimerite. The latter is large, hemispherical, and simple. The nucleus is large and rounded and measures 19 μ to 23 μ in diameter, and exhibits the characteristic Gregarine structure, with a slightly eccentrically placed karyosome and a number of chromatin particles disposed round it.

Unfortunately, no other stages of the life-history have been encountered, and it is consequently impossible to refer the parasite to any particular genus.

B. L. BHATIA.

Zoological Laboratory.
Government College, Lahore,
November 23.

Discovery of the Use of Phosphates as Fertilisers.

IN view of the interest attaching to the so-called artificial fertilisers, it may be worth recording that the idea of the possibility of utilising raw mineral phosphates as phosphatic fertiliser is to be found in the current agricultural publications some years before 1840, the date usually regarded as that of the first serious record.

In 1842 Lawes took out his patent for the manufacture of superphosphate. In a question of infringe-