detected as varying in multiples of the molecular 'length.'

The lever has an effective length of 0·0337 cm., and consists of a vertical piece of thin steel sheet (about 1 cm. × 1 cm.) to the lower edge of which three $\frac{1}{32}$ inch diameter ball-bearings were soldered, not quite in a line. The outer ball-bearings rest on the two poles of a permanent horse-shoe magnet, enabling the lever to be conveniently maintained in equilibrium (even though the central ball is only $\frac{1}{3}$ mm. out of line with the outer ones). The beam of light, after reflection from the mirror, forms an image (of an illuminated slit) at about 123 cm. from the mirror. This image is viewed through a Hilger travelling microscope graduated to $\frac{1}{100}$ mm. (read to $\frac{1}{1000}$ mm. by estimation). A setting can be made considerably more accurately than to the half-width of the central bright diffraction band. (See Dr. Burton, *Phil. Mag.*, 1912.) The average of ten consecutive microscope settings had a probable error of about $\frac{1}{1000}$ mm.

The results of the tests on a steel-to-steel contact show that contact can be repeated (when care is taken) to approximately $\frac{1}{3} \times 10^{-7}$ cm. (These tests have not yet been fully analysed.)

A thin sheet of mica was then placed under the central leg of the lever. On tilting the lever and letting it return on to the mica, changes in reading were observed without moving the mica by hand. Three sets of experiments were performed. Ten or more microscope settings were made between one move of the lever and the next, and successive mean values were subtracted. (In two of the three sets of observations a gradual drift of the readings had to be allowed for.) The 32 differences so obtained ranged from 0·0005 mm. to 0·45 mm. (The differences appear to have a probable error of the order $\frac{1}{1000}$ mm.) Of these, the 20 readings below 0·040 mm. were analysed for a periodicity between 0·004 mm. and 0·020 mm.

A periodicity of about 0·00745 mm. was found, its presence not being accountable for by 'chance.' This corresponds to an integral change in the thickness of the mica of about

$$\frac{0{\cdot}000745 \times 0{\cdot}0337}{2 \times 123} = 10{\cdot}2 \times 10^{-8} \text{ cm.}$$

(The mica used was white and biaxal, but has not been definitely identified.)

This value may be compared with that obtained by C. Mauguin by an X-ray method (*Comptes rendus*, p. 288, July 25, 1927) of $9{\cdot}95 \times 10^{-8}$ cm. for muscovite or white mica ($Al_3Si_3KH_2O_{12}$).

The 12 larger readings not included in the above analysis do not contradict the above estimate, but do not give any measurable evidence for the periodicity. It is not difficult to see reasons why this may be the case.

It is hoped that a fuller account of these experiments may be prepared for publication shortly.

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June 26.

Quality of Soil in Relation to Food and Timber Supply.

I have read with great interest the lucid letter by Mr. Forbes under the above heading which appeared in Nature of July 14, p. 54. When replying to Mr. Hiley's letter in Nature of June 2, I did not rule out the importance of the production of meat as one source of the food supplies in Great Britain, as the last sentence of my reply bears witness. I am in agreement with Mr. Forbes when he says that many of the forests producing commercial timber in Europe are growing on soils which are by no means poor. But in many cases these soils would become poor and degraded if the forests were cut down and the land left exposed for a long period. Instances are known to me in Europe where magnificent hardwood forests are occupying a light soil of low quality, as is evidenced by the agricultural land in their vicinity. The latter areas once formed part of these forests and produced as fine a timber. It would now take a rotation at least before they could be brought into a condition to produce the same quality timber. It is known that areas which were disforested as late as the early years of last century now consist of a very poor agricultural soil.

Those possessing a first-hand knowledge of the disforestation which has proceeded apace in parts of the British Empire overseas are well aware of numberless cases where the hopes based on the agricultural development, to promote which the areas were disforested, resulted in disappointment. The land, with the long built-up humus layer and resulting forest soil, was a good forest land; but once exposed soon became worthless for agriculture.

Mr. Forbes says, "a country cannot both have its cake and eat it." We ate our 'cake' when our ancestors, several centuries ago, cut the forests, both from the real agricultural lands and from the true forest ones. The latter have since been woefully mismanaged, and Mr. Forbes rightly fears that they will not produce commercial timber. The same applies to many of the poorer degraded grazing grounds. But this is no argument justifying the forester selecting agricultural land, however poor from the agricultural point of view at the present day, and placing it under tree crops. I repeat that the money, in a densely populated country like Britain, would be more correctly spent in improving the food-producing lands, whether crop or meat ones. In parts of Europe the improvement of the grazing lands is a recognised part of the forest officer's duties; it has been brought to a high level and merits a close study by foresters in Great Britain.

As regards the production of timber, it may be suggested that the State forester's real business in Britain is to set to work to bring back the poor degraded forest soils to a state in which, in a future rotation they will be able to produce commercial timber—a heart-breaking and thankless task for the present and several future generations of foresters, be it admitted. But if we are considering the economic position from its broadest viewpoint, in the interests of the nation in the future, a century or two hence, this, from the professional point of view, is the present chief duty of the State forester—and a hard one.

The Writer of the Article.

Overpotentials produced by Films of Hydrogen less than one Molecule thick.

In the course of recent work in the Physical Laboratory of this University on hydrogen overpotential at a mercury cathode, large changes of electrode potential were found to take place, and considerable overpotential was produced with depositions of hydrogen corresponding to very much less than a monomolecular layer. It was felt that these observations were of considerable interest, as they showed that, for the overpotential so obtained, any theory requiring gas in bulk (such as a surface tension theory, or one requiring a continuous film offering resistance to the current) would be untenable.

We have since had the opportunity of reading some unpublished work by Mr. F. P. Bowden carried out in the Physical Chemistry Laboratory in Cambridge with Dr. E. K. Rideal. He arrives at the same con-