accuracy. The surfaces again 'stick' and the process is then repeated.

The white trace measures the surface temperature. It will be seen that the surface temperature remains sensibly constant during the 'stick'; but, at the instant that 'slip' occurs, there is a sudden very rapid rise and fall of the temperature. The whole temperature 'flash' may be over in less than one thousandth of a second. (The temperature rise is shown by the downward movement of the white trace. It appears only faintly on the photograph. The more obvious upward kick beyond the zero is instrumental and may be ignored.)

The fact that an intermittent clutching and breaking away of the surfaces takes place during sliding and that the friction and the surface temperature are fluctuating violently has an important bearing on the theory of friction and lubrication.

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[1]Bowden and Ridler, *Proc. Roy. Soc.*, A, **154**, 640–656 (1936).

Possible Role of Urea in Formation of Cancerous Growths

THE interesting method of treatment of osteomyelitis developed in recent years in the United States is well known. First 'surgical maggots' were used. Then it was found that the beneficial effect was due to the presence of allantoin in the natural excretions of the maggots, so that the use of the latter could be eliminated. Later research showed that the chemically related (and much cheaper) substance urea could be substituted for allantoin in the treatment of osteomyelitis.

Apparently, one effect of urea is to cause rapid multiplication of cells. Is it possible that urea may be a factor in the formation of cancerous growths in the human body, either owing to an excess of urea in the blood stream or to certain organs being made more susceptible to the action of urea by minor lesions?

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Points from Foregoing Letters

FURTHER evidence for the existence of particles with mass between that of the electron and that of the proton is given by Dr. E. J. Williams and E. Pickup. They describe four curved tracks obtained in a Wilson chamber using magnetic fields of 1,000 and 2,200 gauss. The tracks indicate that the mass of the new particle is nearly 200 times the electronic mass.

Photographs showing the sedimentation (in an ultra-centrifuge) of cucumber viruses 3 and 4, are submitted by Dr. W. C. Price and Dr. R. W. G. Wyckoff. Two highly infectious heavy components were almost completely separated by a field of 40,000 times gravity acting for half an hour. They have the same sedimentation rate as the tobacco virus, but are 'insoluble' in water. The presence of a homogeneous high molecular weight substance, other than the virus, was also demonstrated in the cucumber plant, and the authors consider that the study of such non-infectious heavy proteins may throw light on the origin of the virus.

Graphs showing the cosmic ray intensity and the magnetic horizontal force between January 16 and 26, when magnetic storms and brilliant auroral displays occurred, are given by Prof. V. F. Hess, R. Steinmaurer and A. Demmelmair. The graphs show a close parallelism (the variation of the ionization due to cosmic rays being 0·82 mJ for a change in the magnetic horizontal component of 1γ or 0·00001 gauss). The effect, the authors state, may be explained by Chapman's hypothesis of corpuscular ring currents, fed by solar eruptions, encircling the earth at a distance of a few earth radii.

A curve showing the canalization effect of an iron tube 70 mm. diameter and 8 mm. thick upon gamma rays from radium (B + C) filtered by 0·5 mm. of platinum, is submitted by Prof. F. L. Hopwood and Dr. T. E. Banks.

Dr. L. Landau calculates that the laminæ of the intermediate state of supraconductors have to become thinner towards the surface, producing a kind of mixed phase very close to the surface.

A curve illustrating the changes in the resistance to extension of wool fibres in buffer solutions of varying pH, with and without previous cyanamide treatment, is given by Dr. J. B. Speakman, B. Nilssen and C. S. Whewell. The authors state that the results support the salt-linkage hypothesis of the structure of wool.

Prof. J. Runnström and E. Sperber submit graphs showing the consumption of glucose by baker's yeast —with and without the addition of cystein—through respiration, fermentation and synthesis of higher carbohydrates. Baker's yeast which has been kept in a dry state resembles to some extent that to which cystein has been added.

D. M. Reid writes that in a collection of the freshwater shrimp *Gammarus* from Ireland, he has found that all the specimens belong to the species *G. duebeni* and not to *G. pulex*, which is the usual species in the fresh waters of Europe.

According to H. Lehmann, the formation of Embden ester in extract of muscle and dried yeast from glycogen and inorganic phosphate is considerably retarded by minute amounts of insulin.

Prof. D. Kostoff finds that the distal ends of the chromosomes in *Triticum monococcum* stain more deeply when fixed with platinum chloride and formalin and treated with Newton's gentian violet. He suggests that the presence of heterochromatin is responsible for the end-to-end association of the chromosomes.

A detailed analysis of the kinetic friction between unlubricated metals made by Dr. F. P. Bowden and L. Leben shows that the frictional force is not constant but is fluctuating violently. Sliding is not a continuous process; motion proceeds by a process of 'stick and slip'. When 'slip' occurs the surface temperature rises and falls again very rapidly. Even if the metals are lubricated with mineral oils the behaviour is essentially the same.