more favourable to cathode life than lower-density currents. This tentative conclusion assumes, of course, that deleterious ohmic heating of the cathode is not encountered, and that no spatial ionizing voltages exist across the cathode-anode space to cause the evolved gas to be driven back into the cathode as fast as it is evolved.

Results obtained by my colleague, Dr. S. Wagener, in an investigation of the influence of density of emission on the life of oxide cathodes[1], confirm these conclusions on a quantitative basis.

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Nature, **164**, 358 (1949).

Rheological Properties of High-Viscosity Solutions of Long Molecules

UNDER the above heading, we presented a note in *Nature*[1] in which we directed attention to certain peculiar phenomena observed with concentrated solutions of rubber or of aluminium soaps in hydrocarbons and gave an explanation. These phenomena concerned secondary flows, high inlet losses for flow in pipes, existence of 'retardation layers' with flow in small-diameter pipes and an increase in the surface energies of these systems when they are strained. It was noticed that the free energy of these systems increased on straining. Due to absence of experimental data, this increase in free energy was ascribed to a decrease in entropy, in analogy with the kinetic theory of rubber elasticity.

Experimental observation performed since this previous note has shown that the free energy does increase measurably and in a fairly reproducible manner on straining these systems. However, unlike rubber—which has a constant internal energy and a decrease in entropy with straining—these systems show increases both in the internal energy and the entropy. Thus, the previous conclusions remain valid except for these basic amendments in the *mechanism* of the occurrence of the phenomena.

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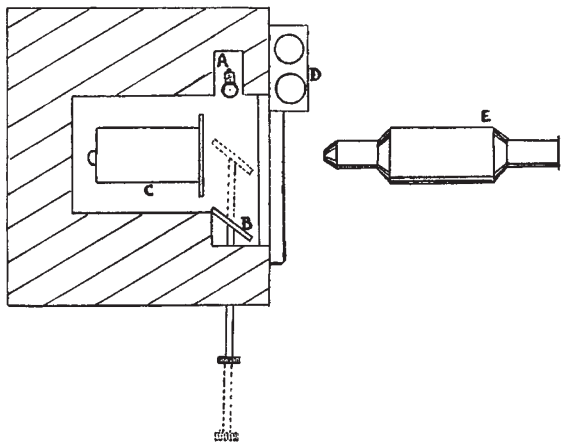
[1] Garner, F. H., and Nissan, A. H., *Nature*, **158**, 634 (1945).

Use of Geiger Counter for Quantitative Estimation of Phosphorus-32 in Histological Sections

IN a recent communication[1] details were given of a method for the quantitative estimation of radioactive isotopes in histological sections. A similar piece of apparatus was made by me some time ago for investigating the distribution of phosphorus-32 in sections of human enamel. In order to determine exactly what portion of the enamel was over the scanning hole, a low-voltage lamp and mirror were arranged inside the 'castle' to throw a beam of light out through the hole. The mirror was mounted on a sliding rod, so that it could be pulled to one side of the counting tube. A microscope was arranged horizontally to view the scanning hole and the specimen; the general arrangement is shown in the diagram.



A, lamp; *B*, adjustable mirror; *C*, counting tube; *D*, mechanical stage; *E*, microscope

The scanning holes must be made with great accuracy, and the piercing of sheets with a needle is not recommended as the holes so produced tend to be conical and also not at right-angles to the surface of the metal sheet. Holes for my apparatus were made by clamping the lead or copper sheet between two plates of mild steel and drilling with a sensitive drill; suitable drills are found in the letter sizes or in Bridge's drills.

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[1] Bourne, G. H., *Nature*, **163**, 923 (1949).

Transpiration into a Saturated Atmosphere

IN a paper published in 1949, Dixon and Barlee[1] provided evidence of activated absorption of water by cut shoots, the leaves of which are in a saturated atmosphere or submerged in water, which does not appear to be open to the objections raised by Smith, Dustman and Shull[2] to Dixon's earlier experiments[3]. The fact that an atmosphere of nitrogen brings such absorption to an end, in some cases reversibly, shows that neither a residual water deficit nor transpiration from the leaves attributable to small temperature differences (due to absorption of light by the leaves) can account for the absorption observed when oxygen is available. It is nevertheless difficult to conceive a mechanism whereby transpiration into a saturated atmosphere could be maintained.

If the walls of the mesophyll cells abutting on the air spaces are to be regarded as permeable to water, root pressure or any other mechanism for increasing the turgor pressure beyond the saturation point would result in exudation of water on to the surface of the cells. Exudation activated by an electrosmotic potential difference would have the same result. In neither case should the vapour tension be greater than that at a free water surface; evaporation should therefore not occur, and the air spaces should become injected.

A greater vapour tension could, however, occur over a convex meniscus, maintained by pressure