Letters to the Editor

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NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 271.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Viscosity of Helium I and Helium II

DETERMINATIONS have recently been made in the Cryogenic Laboratory at Toronto of the viscosity of liquid helium in its two states, helium I and helium II.

Helium I denotes the liquid as it first forms at a temperature of 4·2° K. When the pressure above the liquid is progressively reduced, the temperature falls and the liquid bubbles freely as it boils under the reduced pressure. Suddenly, when a temperature of 2·2° K is reached, the liquid changes its state—a change indicated by complete cessation of boiling, although the temperature continues to fall as pumping is continued.

The viscosity of liquid helium was measured, step by step as the temperature was reduced, by means of observation of the logarithmic decrement and periodic time of the oscillation of a circular metal cylinder submerged in the liquid helium. The cylinder was 2·5 cm. in diameter, and 8·5 cm. in length over all, the top and bottom being bevelled in the form of cones, each 2·1 cm. in height. From the top of the cylinder a stiff phosphor-bronze rod 0·07 cm. in diameter extended 62·5 cm. The rod and cylinder were suspended by a fine phosphor bronze ribbon 14·0 cm. long. The rod was sufficiently long to ensure that the suspension wire was kept at room temperature.

Fuller reports of the experiment will be made elsewhere: the results only are announced here.

Helium I at 4·2° K:	$\eta = 0{\cdot}00011$	c.g.s. units
Helium I at 2·3° K:	$\eta = 0{\cdot}00027$	,, ,,
Helium II at 2·2° K:	$\eta = 0{\cdot}000033$	,, ,,

To show the definiteness of the viscosity change we may cite the following. During the course of the experiments the cylinder was set swinging in helium II ($< 2{\cdot}2°$ K) and the pressure over the helium liquid was allowed to change to that corresponding to a temperature of 2·7° K. The cylinder continued to oscillate throughout the interval of this change of temperature, but as the state of the liquid changed from II to I, there was a very distinct and abrupt change in the logarithmic decrement, which corresponded to the above changes in the coefficient of viscosity.

This work was carried out by Messrs. Wilhelm, Misener and A. R. Clarke.

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Jan. 9.

An Application of Infra-Red Photography to Palæobotanical Research

TRANSFER preparations of fossil plants, particularly those of Carboniferous age, provide the palæobotanist with the plant remains separated from the rock matrix and mounted on a transparent base of Canada balsam or cellulose ester. While many of these fossil remains are translucent and give the investigator the opportunity of studying some of their microscopic features by transmitted light, many are opaque with ordinary types of illumination.

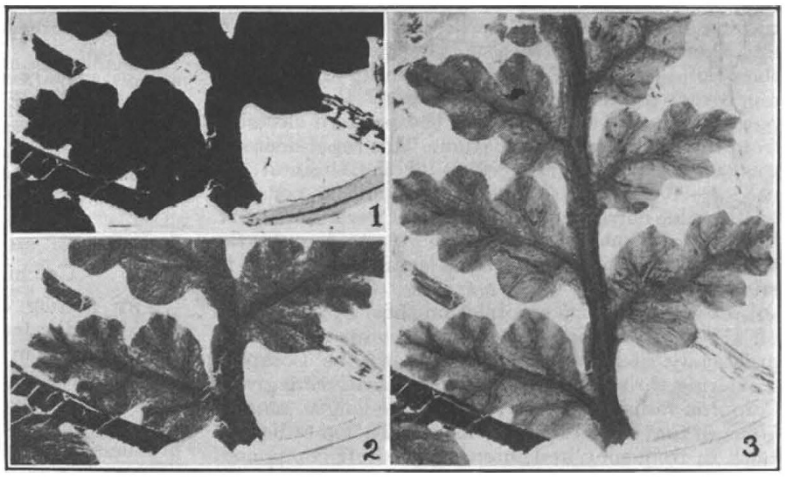

FIG. 1. Photographs of transfer preparation of a fossil plant: (1) by ordinary photographic plate; (2) by panchromatic plate; (3) by infra-red plate.

It has been found that some of these apparently opaque fossils are translucent with respect to infra-red rays, and photographs taken on plates sensitive to the infra-red part of the spectrum reveal quite a considerable amount of detail otherwise invisible. The accompanying illustration (Fig. 1) includes (1) a photograph by transmitted light of a fossil plant of Coal Measure age taken on an ordinary photographic plate; (2) is the same subject taken on a panchromatic plate with a dark red filter; and (3) is the same subject taken on an infra-red plate with an infra-red filter. The exposure required with the panchromatic plate was considerably longer than that required for the two other photographs. The exposure with the infra-red was one minute. The magnification is in each case 6·5.

It is clear that since this fossil is a thin layer of coal, this method of examining carbonaceous fossil plants may be very effective in coal petrology in the examination of coal in thin sections.

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Jan. 15.