

infected roots can be ascribed in great measure to the increase of size of the cells in a radial plane, and there is, on the whole, a reduction in longitudinal elongation which more than compensates for this increase, so that cell volumes are reduced. Correlated with such changes, xylem development and endodermal thickening occur nearer the apex of mycorrhizas. He is of the opinion that the area of surface of individual mycorrhiza rootlets is less than that of uninfected rootlets. He emphasized the point that this observation does not necessarily imply a reduction in the area of surface of the whole root system. Dr. Clowes referred to the recent work of Slankis on pine roots in culture, but pointed out that colchicine tumours are as similar to mycorrhizal structures as are the growths produced by hetero-auxin. A degree of caution is therefore required, for several equally attractive hypotheses could be formulated to guide future work on causal anatomy of mycorrhizal roots.

Dr. Ida Levisohn described several examples of pseudomycorrhizas found on pine and spruce roots. She uses the term 'pseudomycorrhiza' for structures superficially similar in general form to mycorrhizas but lacking sheath or Hartig net, or showing obvious evidence of parasitism. She outlined the diagnostic features of three important types, illustrating her account with photomicrographs and other slides. The ecological distribution and importance of each was particularly emphasized, and she concluded by asking for any available information upon the haustorial type of pseudomycorrhiza which is particularly prevalent in arable soil and worn-out nurseries.

Dr. John Ramsbottom opened the general discussion. He remarked that the variability of mycorrhizas in form and occurrence indicates that no single explanation of their effects upon their various hosts is likely to be found. Each particular example requires detailed study on its own. He showed slides of orchid mycorrhizas and demonstrated a specimen of the interesting saprophytic liverwort *Cryptothallus*. He believes that the Basidiomycetes associated with ectotrophic mycorrhizas possess a habitat in the soil apart from the root surface.

The discussion which followed was characterized by its friendly but very controversial spirit, and it centred particularly upon the ecology of root infection and of mycorrhizal and root-infecting fungi.

J. L. HARLEY

VELOCITY OF SECOND SOUND IN LIQUID HELIUM II

IN a letter to the *Physical Review*¹ (September 15 issue), Dr. J. R. Pellam and R. B. Scott, of the United States Bureau of Standards, give the results of their experimental observations on the quantitative behaviour of the velocity of second sound in paramagnetically cooled liquid helium II in the temperature range below 1° K. The helium was cooled by the demagnetization method using hydrated iron-ammonium-alum crystals immersed in the liquid. The remainder of the bath contained the apparatus for the generation and detection of the second sound by the pulse method, and the velocity of the second sound was determined from oscillographic observations of the transit time. Accurate

determinations of the temperatures of the liquid helium corresponding to the velocity values obtained could not be made, but it was established that the second sound velocity increases markedly with decrease of temperature below 1° K. reaching nearly twice its value for 1° K. at the lowest temperature attained. As the helium bath warmed up, the velocity minimum of 18.4 m./sec., observed originally by Peshkov², just above 1° K., was verified.

Tisza formed a theory of helium II in 1938 which was based on F. London's interpretation of the λ -point transition of helium as an Einstein-Bose condensation, and which predicted that the velocity of second sound should decrease with decrease of temperature below 1.5° K. (Both Tisza and London have discussed this theory recently in *Nature*^{3,4}.) On the other hand, Landau, who denied the relevance of Einstein-Bose statistics, predicted a strong increase in the velocity below 1° K. It would appear, therefore, that Pellam and Scott's results are direct evidence in favour of Landau's assumptions, though, as is pointed out in the letter, this does not necessarily weaken the original Einstein-Bose hypothesis but only the interpretations that have been given to it. In fact, the recent experiments of D. Osborne and co-workers⁵, which show non-superfluidity in helium-3, are exceedingly strong evidence in support of the condensation theory.

In the October 1 issue of the *Physical Review*, R. D. Maurer and M. A. Herlin⁶ describe experiments, similar to those of Pellam and Scott, in which they have measured the second sound velocity down to 0.86° K. They also verify the rise in velocity below 1.1° K. observed by Peshkov, but their values for the velocity below 1.2° K. are slightly higher than Peshkov's most recent evaluations. Qualitative indication that the thermomechanical effect in helium II remains strong down to the lowest temperature reached was obtained. They conclude that it is likely that a more refined form of the two-fluid model should contain elements of both the Tisza and Landau theories.

¹ *Phys. Rev.*, **76**, 869 (1949).

² *J. Exp. Theor. Phys.*, U.S.S.R., **18**, 951 (1948).

³ *Nature*, **163**, 102 (1949).

⁴ *Nature*, **163**, 694 (1949).

⁵ *Phys. Rev.*, **75**, 988 (1949).

⁶ *Phys. Rev.*, **76**, 948 (1949).

TRAINING OF TRADES UNION OFFICIALS

AT one of the sectional meetings of the conference of the British Institute of Management which was held at Cliftonville in May 1948, Mr. E. P. Harries, secretary of the Organisation Department of the Trades Union Congress, introduced a discussion on whether special facilities are required for the training of trades union officials in the principles and practices of management.

Mr. Harries stated that most trades union officials who had given any thought to the subject would unhesitatingly reply that such training is necessary. The General Council of the Trades Union Congress has already deliberately undertaken the task of re-orientating the attitude of mind of trade unionists to the problem of production and, since time is short, believes that the process could be considerably speeded up if trades union officials are given some insight into the nature of management.