"The Colour Sensations in Terms of Luminosity." By Captain W. de W. Abney, C.B., D.C.L., F.R.S. Received February 23, —Read June 15, 1899.

(Abstract.)

This paper deals with a determination of the colour sensations based on the Young theory by means of measures of the luminosity of the three different colour components in a mixed light which matches white. At the red end of the spectrum there is only one colour extending to near C, and there is no mixture of other colours which will match it, however selected. At the violet end of the spectrum, from the extreme violet to near G, the same homogeneity of light exists, but it is apparently due to the stimulation of two sensations, a red and a blue sensation, the latter never being felt unmixed with any other. Having ascertained this, it remained to find that place in the spectrum where the blue sensation was to be found unmixed with any other sensation except white. By trial it was found that close to the blue lithium line this was the case, and that a mixture of this colour and pure red sensation gave the violet of the spectrum when the latter was mixed with a certain quantity of white. The red and the blue sensation being located, it remained to find the green sensation. The complementary colour to the red in the spectrum gave a position in which the green and blue sensations were present in the right proportions to make white, and a point nearer the red gave a point in which the red and blue sensations were present in such proportions as found in white, but there was an excess of green sensation. By preliminary trials this point was found. The position in the spectrum of the yellow colour complementary to the violet was also found. The colour of bichromate of potash was matched by using a pure red and the last-named green. To make the match, white had to be added to the bichromate colour. A certain small percentage of white was found to exist in the light transmitted through a bichromate solution with which the match was made, and this percentage and the added white being deducted from the green used, gave the luminosity of the pure green sensation existing in the spectrum colour which matched the bichromate. Knowing the percentage composition in luminosity of the two sensations at this point, the luminosity of the three sensations in white was determined by matching the bichromate colour with the yellow (complementary to the violet) and the pure red colour sensation. From this equation and from the sensation equation of the bichromate colour already found, the composition of the yellow was determined. By matching white with a mixture of the yellow and the

violet, the sensation equation to white was determined. The other colours of the spectrum were then used in forming white, and from their luminosity equations their percentage composition in sensations were calculated. The percentage curves are shown. The results so obtained were applied to various spectrum luminosity curves, and the sensation curves obtained. The areas of these curves were found, and the ordinates of the green and violet curves increased, so that both their areas were respectively equal to that of the red. This gave three new curves in which the sensations to form white were shown by equal ordinates.

A comparison of the points in the spectrum where the curves cut one another, and of those found by the red and green blind as matching white, show that the two sets are identical, as they should be. The curves of Koenig, drawn on the same supposition, are called attention to, and the difference between his and the new determination pointed out.

The red below the red lithium line, as already pointed out, excites but one (the red) sensation, whilst the green sensation is felt in greatest purity at λ 5140, and the blue at λ 4580, as at these points they are mixed only with the sensation of white, the white being of that whiteness which is seen outside the colour fields.

"The Conductivity of Heat Insulators." By C. G. LAMB, M.A., B.Sc., and W. G. WILSON, B.A. Communicated by Professor EWING, F.R.S. Received May 3,—Read June 15, 1899.

The comparative efficiency of materials used as insulators has been the subject of several investigations; the majority of these have been conducted at fairly high temperatures, and it may be questioned whether the results can be applied to the same materials when used as a lagging to protect bodies at low temperatures. Moreover the methods adopted do not seem susceptible of any considerable accuracy. The method to be described was devised with the object of using lower temperatures and smaller ranges than had been used in previous experiments, to attain a perfectly steady state of heat transference, and allow of greater accuracy and simplicity in the measurements.

The substances selected for experiment so far have been those which could easily be tested in the dry state, without being made up into cements; they include air, sawdust, charcoal, pine shavings, paper, asbestos, sand, silicate cotton, hair felt, rice husks, and a heat insulator known as "kapok."

The method employed consisted in placing the material under test in the space between two cylindrical copper pots, kept at a definite distance apart by pieces of vulcanised fibre; the inner pot contained a small