develops. Comparison with the results for $AuCu_3$ may then provide more general evidence of the mechanism of superlattice formation than it has been possible to obtain from $AuCu_3$ only.

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Two New Superconducting Elements

The low temperatures produced by adiabatic demagnetization of potassium chrome alum have been used to cool various pure metals to about 0·1° K.; a copper rod was used for providing thermal contact between the metal and the salt[1]. The occurrence of any superconducting transition in the metal was indicated by a change in the magnetic susceptibility of the metal in an alternating field. Superconductivity was observed in osmium and ruthenium with transition temperatures of 0·71° K. and 0·47° K. respectively. A superconducting transition in ruthenium at 2·04° K. was previously reported by McLennan, Allen and Wilhelm[2], but their specimen had a high residual resistance; and since no transition was observed by Meissner and Voigt[3] down to 1·2° K. in a specimen with much lower residual resistance, it is probable that the high transition temperature was associated with impurity. The critical magnetic fields were found to satisfy the relation $H_c = H_0\ (1 - (T/T_c)^2)$; the values of H_0 and T_c are compared in the accompanying table with recent measurements by Goodman and Mendoza[4] on a number of other elements with low transition temperatures. The values for aluminium and zinc differ only slightly from those found by Daunt and Heer[5].

	T_c ° K.	H_0 gauss
Aluminium	1·197	106
Cadmium	0·560	29
Gallium	1·103	51
Zinc	0·905	53
Osmium	0·71	65
Ruthenium	0·47	46

The following elements were not superconducting down to the temperatures indicated: lithium (0·08° K.), sodium (0·09° K.), potassium (0·08° K.), barium (0·15° K.), yttrium (0·10° K.), cerium (0·25° K.), praseodymium (0·25° K.), neodymium (0·25° K.), manganese (0·15° K.), palladium (0·10° K.), iridium (0·10° K.), platinum (0·10° K.).

Before the discovery of superconductivity in uranium[6,7], rhenium[7], osmium and ruthenium, all the known superconductors were grouped together in two regions in the Periodic Table; it may be noted that these four elements occur in places between these regions, and the superconducting elements can no longer be regarded as so well localized in the periodic classification.

I am indebted to Prof. F. H. Spedding for the loan of pure specimens of yttrium, cerium, neodymium and praseodymium, and to Prof. E. Justi for the loan of one of the pure specimens of ruthenium used; his electrical measurements on this specimen[8] have shown that it has an even lower residual resistance than the specimen studied by Meissner and Voigt[3].

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Heat Conductivity of Liquid Helium I

Some properties of liquid helium I undergo an anomalous change as the lambda-point is approached. The entropy begins to drop rapidly with falling temperature between 2·6 and 2·19° K.[1], and a similar drop in the same temperature region has recently been found in the viscosity[2]. The question therefore arose whether in the same temperature interval the heat conductivity will begin to rise to the anomalously high value found below the lambda-point. Such measurements have now been carried out and the result would seem to merit a preliminary communication. The experiments have been carried out on a vertical cylinder of liquid at the top of which heat was supplied. The heat was conducted downwards to a heat sink which could be maintained at a constant temperature. Two resistance thermometers of leaded brass were arranged at different heights within the cylinder and parallel to its base. The liquid was enclosed by a glass container in the form of a Dewar vessel.

The salient feature of the results is the absence of any appreciable rise in the heat conduction of helium I as the lambda-point is approached. Any measurement of the heat conductivity of helium I faces a number of fundamental difficulties due to the fact that its absolute value is very small, while the mobility of the liquid and its specific heat are high. Moreover, the heat conduction of any container material, even glass, far surpasses that of the liquid helium. Consequently, our results for the effective conductivity of the arrangement, in addition to being subject to a mean scatter of $\pm$ 6 per cent, contain an appreciable correction for the heat flow along the glass envelope. Accurate numerical values for the heat conductivity of helium I cannot be given until the heat conductivity of the particular glass used has been measured in the same temperature-range. Using the values available for another type of glass, we conclude that the heat conductivity of helium I varies roughly proportional to the absolute temperature, and that our absolute value is of the same order of magnitude as the single determination by Keesom and Keesom[3] at 3·3° K.

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