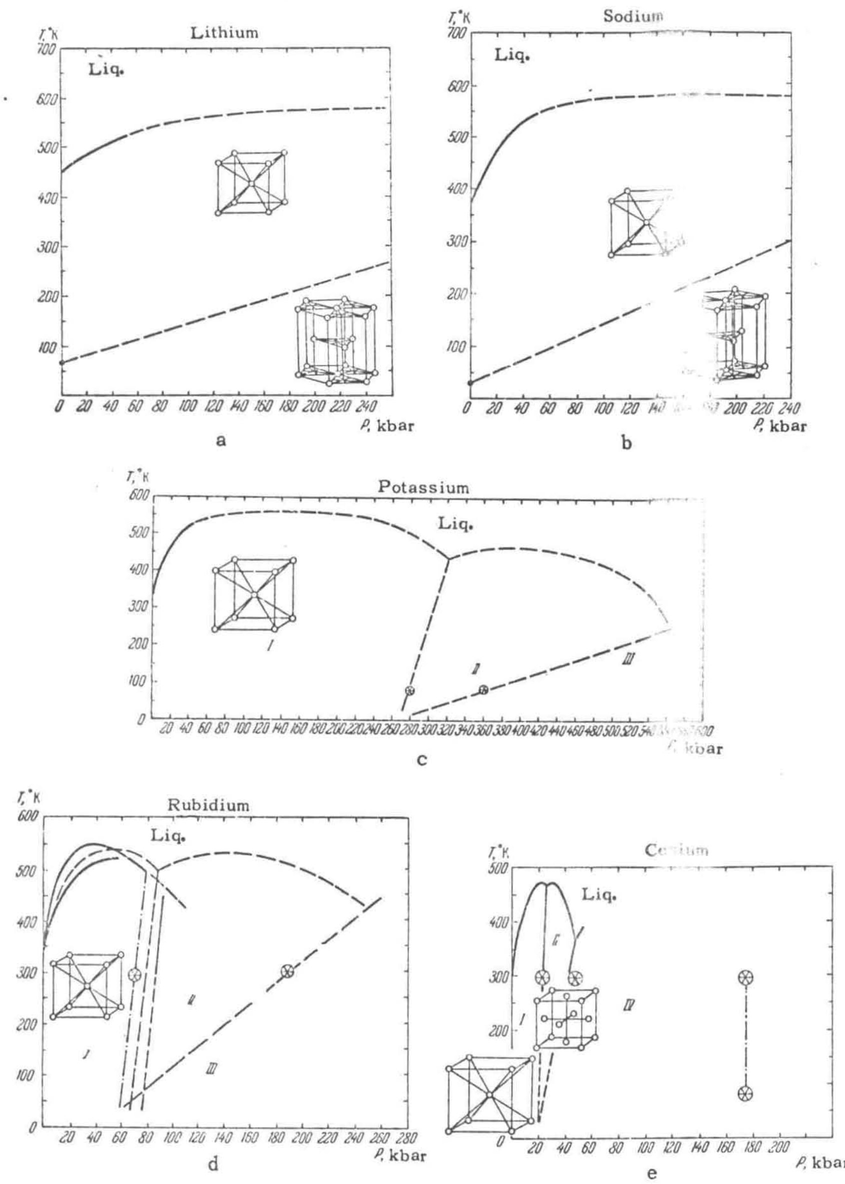

FIG. 1. P–T phase diagrams of Li, Na, K, Rb, and Cs. The fusion curves were obtained by the DTA method in [27]. The points on the ordinate in the Li and Na diagrams represent the polymorphic transition temperatures,[29] and the "stars" in all the diagrams represent the coordinates of the polymorphic transitions, found from electrical resistance discontinuities.[28] The upper fusion curve of Rb and a part of the phase boundary between RbI and RbII, shown by continuous lines, were obtained from electrical resistance discontinuities.[30] The Cs diagram up to 60 kbar was obtained by the DTA method[23] and the polymorphic transitions at 175 kbar were found from electrical resistance discontinuities.[24] In these and later diagrams, the hypothetical phase boundaries are shown dashed.

morphism of elements in the periodic system using the available information.

2. ALKALI METALS OF GROUP I-A

Normally, all alkali metals have the bcc lattice of type A2,* with a packing factor (which is the ratio of the volume occupied by atoms to the total volume of a cell) $\varphi = 0.68$. When cooled under pressure, the crystal structure of these metals changes. This can be seen clearly in their P–T phase diagrams, which are shown in Fig. 1.

In the pressure range up to 60 kbar†, the most well defined among the P–T diagrams is that of cesium. While investigating the specific volume of cesium and its electrical resistance as a function of pressure, Bridgman established the existence of two polymorphic transitions, at 23 and 45 kbar.[20,21] Particularly important were the results found for the transition at 45 kbar, because this transition was accompanied by a surprisingly large discontinuity in the volume (12%) and a change in the electrical resistance of an unusual type—the curve had a peak. Consequently, cesium has become the subject of a host of investigations; it was recently shown that the pressure dependence of the electrical resistance of cesium was more likely to be a sharp peak with a small plateau at its apex.[22]

Figure 2 shows this dependence, together with the curve found by Bridgman. This form of pressure dependence suggested that another modification of cesium, Cs III, existed over a very narrow range of pressures (0.5 kbar only).

The P–T phase diagram of cesium was determined to 60 kbar and showed boundaries between the regions of stability of three modifications: Cs I, Cs II, and

*Here and later, we shall use the structure notation proposed in "Strukturbericht." A2 is a bcc cube of the tungsten type.

†1 bar = 10^6 dyn/cm² = 1.0197 kg/cm² = 0.98692 normal atmospheres.