$\partial \ln K/\partial \ln V$ correlates with the sign of the thermoelectric power. (There is also rough correlation between its magnitude and the quantity ξ derived from the temperature dependence of the thermo-power); (3) the variation of resistivity with volume over a wide range of volumes shows a rather diverse pattern of behaviour in the alkali metals; the behaviour of K is quite similar; (4) the variation of resistivity with volume in the liquid metals appears, as far as it is known, to be quite similar to that of the corresponding solids.

With these ideas in mind we will now look at some of the theoretical interpretations of how K depends on volume.

E. THEORETICAL WORK

As I have mentioned above, the conventional way of calculating electrical resistivity is to consider in detail the geometry of the scattering processes and this combined with a knowledge of the electron–phonon matrix elements and the phonon dispersion curves enables the resistivity to be calculated (cf. Bardeen, 1937; Ziman, 1954; Bailyn, 1960). To calculate how the resistivity varies with volume we must therefore know how all these features change under compression.

Bailyn (1960) made calculations of the effect of pressure on the resistivity of the alkali metals. In his model, the electron properties were derived from quantum-defect calculations although for simplicity the Fermi surfaces were treated as spherical both at normal pressure and under compression. Bailyn emphasized, however, that he did not expect the model to represent the behaviour of Li well. His results indicate a fall in electrical resistivity with pressure for all the alkali metals; they cannot therefore explain the rather diverse behaviour found by experiment.

Subsequently, it was generally supposed that the varied effects of pressure on resistivity could be explained in terms of the progressive distortion of the Fermi surface under pressure and that the different behaviour of the different metals was due to the different degrees of distortion (Cohen and Heine, 1958; Dugdale, 1961; Ham, 1962). The emphasis here was very much on the geometry of scattering, although of course the matrix elements themselves and the electron velocities would be altered. No detailed calculations were attempted and no quantitative estimates were made until the work of Hasegawa.