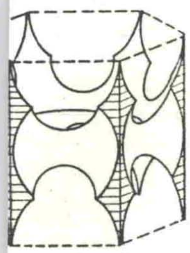
h changes *size* and changes
i surface remains, of course,
e proportion to the volume
louin zone is changing shape,
with the zone boundaries are
urface in the reduced scheme



(b)

a divalent hexagonal metal in the
onding to an axial ratio of 1·633;
(From Harrison, 1965.)

other (cf. Figs. 6a and b).
alter the *c/a* ratio sufficiently,
Fermi surface. Lifshitz (1960)
odynamic and transport pro-
is connectivity is broken. The
he impulses behind the study
etals.

lculate the changes in dimen-
i surface of Zn when the *c/a*
ly-free-electron picture holds
out in detail (Harrison, 1960;
predictions for changes under
xtremal area of the needles
b_3 is given by:

$$\sqrt{3}\,z \Big/ \pi\, c/a \Big)^{\frac{1}{3}} - 1 \Big]^2 \qquad (8)$$

ssion is in the form given by

O'Sullivan and Schirber use this expression to derive the pressure derivative $\partial \ln S_1/\partial P$. With the appropriate values of (c/a) and its pressure derivative, equation (8) yields a value for $\partial \ln S_1/\partial P$ of $13\times 10^{-2}\,\text{kb}^{-1}$ compared with an experimental value of $32 \pm 1{\cdot}5\times 10^{-2}\,\text{kb}^{-1}$. The authors emphasize, however, that the direct comparison must not be taken too seriously because of the *extreme* sensitivity of the result to small variations in the initial c/a value.

To make a more realistic comparison of the nearly-free-electron prediction, O'Sullivan and Schirber compare their result with measurements of changes in S_1 due to alloying by Higgins and Marcus (1966). On alloying, both the c/a ratio and the value of z (the number of valence electrons per atom) may change: in the pressure experiments, of course, only c/a changes. In their work, Higgins and Marcus found that on adding Cu to Zn, the value of $\partial \ln S_1/\partial \ln \varrho$ was $2{\cdot}70\times 10^2$ where $\varrho = z/(c/a)$. O'Sullivan and Schirber note that the contribution to changes in S_1 from the factor a^2 in the denominator outside the square bracket in equation (8) is negligible. Consequently, S_1 depends essentially only on $z/(c/a)$, i.e., on ϱ. Thus the pressure results can be compared directly with those from alloying; from the pressure results, O'Sullivan and Schirber deduce a value for $\partial \ln S_1/\partial \ln \varrho$ of $2{\cdot}78\times 10^2$ which is very close to the value deduced from the alloys.

In addition to these observations on the needles, O'Sullivan and Schirber made measurements on other characteristic dimensions of the Fermi surface of Zn. In general, they found qualitative agreement with the nearly-free-electron model; if allowance is made for discrepancies between this model and the true Fermi surface of Zn at atmospheric pressure, the agreement is within a factor of about 2. O'Sullivan and Schirber also made some rather more refined calculations (see Section III D 3).

Measurements of effective mass, m_c^*, were also made on Zn to determine how m_c^* changes with pressure. The cyclotron mass is defined in relation to ω_c the cyclotron frequency as follows:

$$\omega_c = \frac{e}{m_c^*} H \qquad (9)$$

ω_c measures the angular frequency with which an electron executes the particular orbit concerned when the applied field is H. In de Haas–van Alphen measurements this will be an extremal orbit.