dependent on the magnitude of the initial stress σ_0. The stress level* was varied from 0.1-1.8 kg/mm². Creep curves were taken and the instantaneous deformation sector and transition area studied. The test lasted from 5-50 hr.

The specimens were creep tested in the following structural stages; (1) with a stable b.c.c. lattice, at 180 and 300°K; (2) with supercooled b.c.c. lattice at 77°K; (3) after prior deformation of 35 per cent in liquid nitrogen, perpendicular to the tension axis at 77°K.

At the same time as the low-temperature creep the electrical resistivity was also measured in specimens in the single-phase and two-phase initial states. Spring clamps were used for the electrical contact. For these measurements the grips were insulated from the apparatus with fluorplast. The behaviour of the microstructure was also studied during the low-temperature creep.

RESULTS AND DISCUSSION

1. *Creep of original polycrystalline lithium.* The mechanical creep curves for lithium specimens at 300, 180 and 77°K have an instantaneous deformation section, a transitory stage of creep and a stage of steady flow. As an example Fig. 1 shows the creep curves of Li specimens at 77°K.

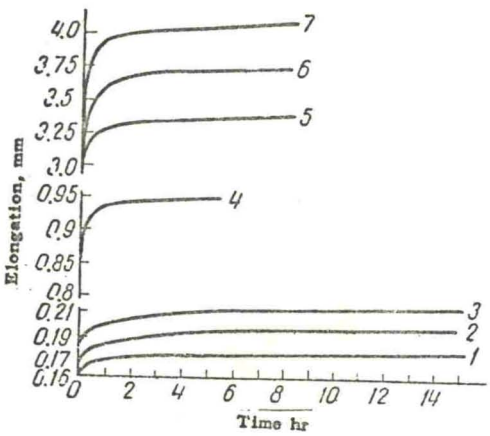

FIG. 1. Mechanical creep curves of lithium specimens at 77°K and different initial stresses σ_0:
1 — 0.1; 2 — 0.2; 3 — 0.3; 4 — 0.6; 5 — 1.2; 6 — 1.3 and 7 — 1.5 kg/mm²

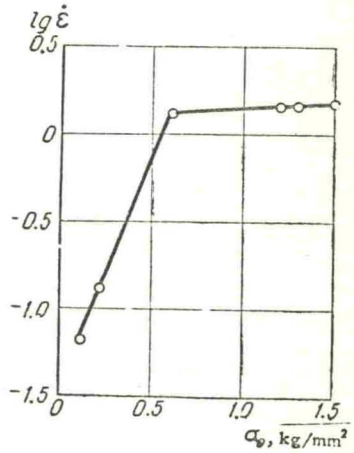

FIG. 2. Rate of steady-state creep for lithium specimens at 77°K as a function of the initial stress.

As the testing temperature falls the magnitude of the instantaneous deformation, transitory stage and rate of steady-state creep diminish for any given stress value. For instance, at $\sigma_0 = 0.1$ kg/mm² the instantaneous deformation was 640 and 170 μ at 300 and 77°K respectively; the size of the transitory flow stage was 310 and 16 μ; the rates of steady-state creep differed 45 times. An increase in stress has the same effect on creep as a rise in temperature. But the stress has the greater influence. Some of the creep parameters (stress dependence of the steady-state flow rate for instance, Fig. 2) have non-monotonic dependence. Like the steady flow rate, the magnitude of the instantaneous deformation and deformation at the transitory stage undergo a sudden change at stresses above 0.6 kg/mm². This may be due to the polymorphous transition at the initial stage of creep which takes place as from a given stress level. As a result of the partial transition and formation of complex system, the rate of steady creep practically ceases to

* Under static tests in this temperature range the yield point was 0.2-0.6 kg/mm².