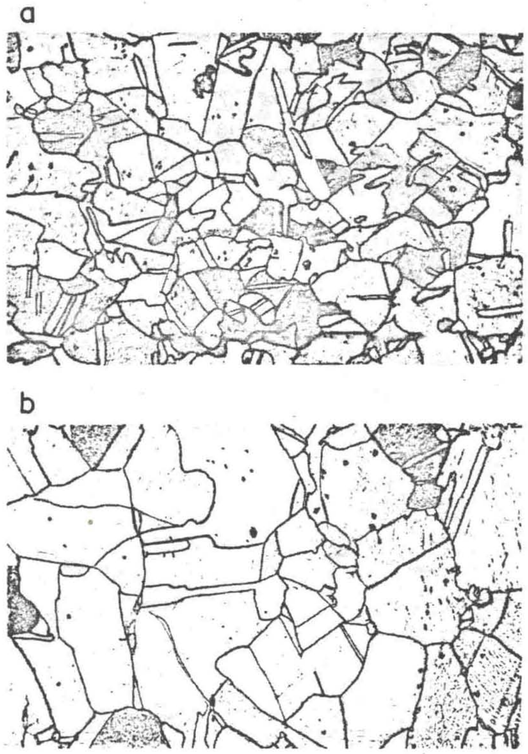

FIG. 5. Microstructures of copper after shock loading at 500° (*a*) and 400° (*b*). Cooling in water; × 100.

process this difference is quite natural, and is evidence of the important part heat stored in the metal plays in deforming it. Grain refinement is also observed at the actual surface of the copper specimen, where cooling is greater than in the centre. The recrystallization must therefore be finished immediately after the shock-wave front has passed, even before the specimen is dropped into the water.

Auxiliary experiments were performed on specimens of commercial-grade aluminium, which underwent big deformations (up to 24%) by shock. The analogous presence of secondary recrystallization was detected when they were microanalyzed.

A peculiarity of the effect of shock waves has been established in [8]. There is a change in the mechanisms of plastic deformation at certain characteristic wave pressures. In particular, for each metal under loading programmes similar to that described above, there exists a pressure at which the velocity of the plastic becomes equal to that of the elastic wave. Under these conditions there arises a characteristic state which is accompanied by loss of lattice stability and is due to the high levels of the instantaneous tangential stresses which have not been successfully relaxed. This state has a close analogy to a phase transition.

In [10, 11] it has been shown that total secondary recrystallization of iron will take place at room temperature under pressures above 670 kbar, where the transition of shock momentum to a single wave structure takes place. Of course, at elevated temperatures the secondary recrystallization should start at a lower pressure, which we were also able to show in this work. A prior rise in temperature is to a