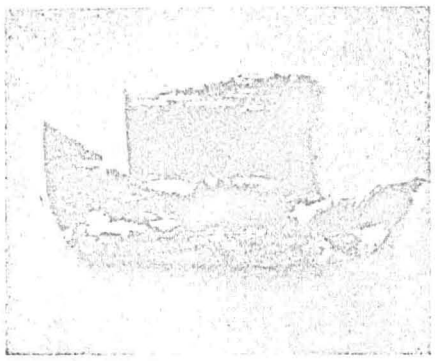

Fig. 6. Beryllium single crystals deformed at 500°K and macrosheared along the second-order pyramidal plane $(11\bar{2}4)$. δ_p = 4.3%, δ_{tot} = 27.3%, σ_b = 124 kg/mm^2, γ = 60. (× 10).

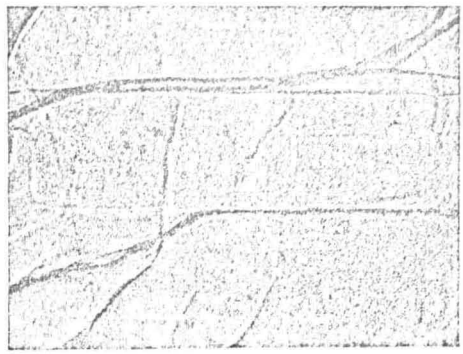

Fig. 7. Slip traces in a beryllium single crystal deformed at T = 700°K, δ_p = 5.7%, σ_b = 78.4 kg/mm^2. The plane of the photograph coincides with the first-order prismatic plane $(10\bar{1}0)$. The inclined slip traces correspond to shear along the second-order pyramidal planes $(1\bar{2}14)$ and $(1\bar{2}12)$; horizontal traces represent slip along the basal plane (0001). (× 340).

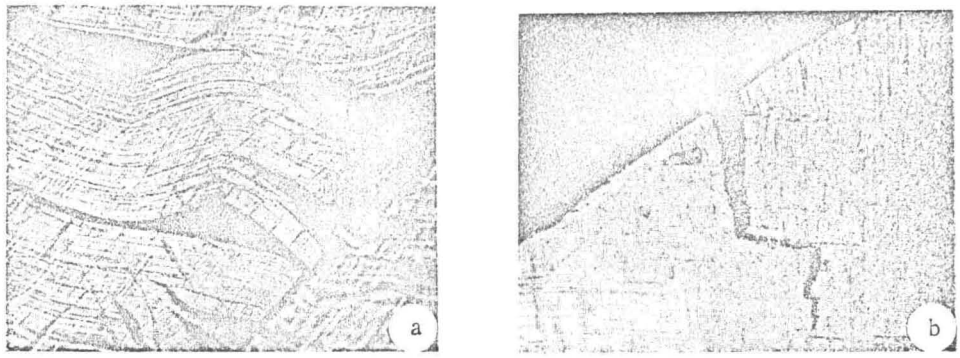

Fig. 8. Fracture of beryllium single crystals at T = 500°K, δ_{tot} = 27.3%, σ_b = 124 kg/mm^2. a) Longitudinal bending of (0001) layers with formation of cracks in the basal plane; (× 340). b) Principal elements of fracture: $(1\bar{2}14)$, $(11\bar{2}0)$, and (0001). (× 200).

graph of a beryllium single crystal which was deformed at T = 500°K to fracture and which suffered a macroshear of relative magnitude γ = 60 along a second-order pyramidal plane. By plotting the stereographic projection from the back-reflection Laue diffractogram it was found that the macroshear on fracture occurred along one of the $\{11\bar{2}4\}$ planes. It is characteristic that the macroshear accounted for almost 80% of the total deformation after fracture. At still higher temperatures the fracture of single crystals was also preceded by similar macroshear.

The microscopic picture of slip in beryllium single crystals of the given orientation is of great interest. Two types of slip traces were found on the polished surfaces of samples tested at 500, 700 and 900°K; these were inclined and horizontal traces. The inclined traces and some of the horizontal traces represented the emergence of pyramidal slip traces, mainly those due to slip along the second-order pyramidal planes $\{11\bar{2}4\}$ in the direction $[11\bar{2}3]$ (Fig. 7). Shear along this plane predominated both in the initial stages of the plastic deformation and in the fracture of the single crystals, which usually occurred after macroshear along one of the $\{11\bar{2}4\}$ planes. In addition, slip was observed along the second-order pyramidal plane $\{11\bar{2}2\}$ and the first-order pyramidal planes $\{10\bar{1}1\}$. Other horizontal traces on both surfaces of the sample obviously belonged to a different slip system, since the density of the horizontal traces was greater than the density of pyramidal slip traces. In our opinion some of the horizontal slip traces are simply traces of basal slip. Although the contribution of basal slip to the total deformation of the beryllium single crystals of the given orientation was negligibly small, the existence of such slip for this orientation was nonetheless extremely interesting. The direction of shear along the basal plane coincides with one of the diagonals of the plane (0001). This was established by measuring the breaks in the inter-