direction of maximum principal stress in both compression and extension regardless of the orientation of the host crystals. Syntectonic recrystallization reaches a maximum at 600°C (Fig. 48) in short-time tests (strain rate about 10^{-4} per second).[43] At lower strain rates the maximum seems to occur at a lower temperature, since the phenomenon is common in specimens deformed at 350° to 500°C and at 10^{-7} sec^{-1}.[170] In these, recrystallization may be the major mechanism of steady-state flow. What is important here is that the recrystallized grains are always strongly oriented with their c_v aligned parallel to the axis of maximum principal compressive stress (Fig. 47(c)), a result which agrees with the Gibbs-Kamb[168] prediction (but in the presence of solutions).

Annealing recrystallization of calcite crystals and aggregates has also been produced experimentally.[172] The critical temperature of annealing of Yule marble is about 500°C, and the annealing time (15-120 min) did not influence the recrystallization. In contrast to the syntectonic process, the annealing tends to produce a random orientation, although traces of the inherited fabric of the original material remain. An interesting exception was noted in specimens of powdered Yule marble (fragments 1 to 2 μ) that were compressed between steel pistons at 1000°C for 30 min. After this treatment the material consists of groundmass, nearly uniform grains 10 to 20 μ in diameter, and porphyroblasts, about 0.2 mm in diameter. The c_v of the porphyroblasts tend to parallel the axis of compression, i.e., tend to lie normal to the piston faces (Fig. 49).

Crystallographic Orientations as Criteria for Dynamic Interpretations. The experimental fact that syntectonically recrystallized calcite crystals are oriented with their c_v parallel to the greatest principal compressive stress serves as a working hypothesis for the dynamic interpretation of natural calcite fabrics.

In calcite marbles c_v characteristically lie at high angles to the major foliation plane (e.g., Yule marble, Fig. 50).* According to the

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*For those marbles in which the grains are not highly elongated, one can reasonably be sure that the c_v subfabric has resulted from

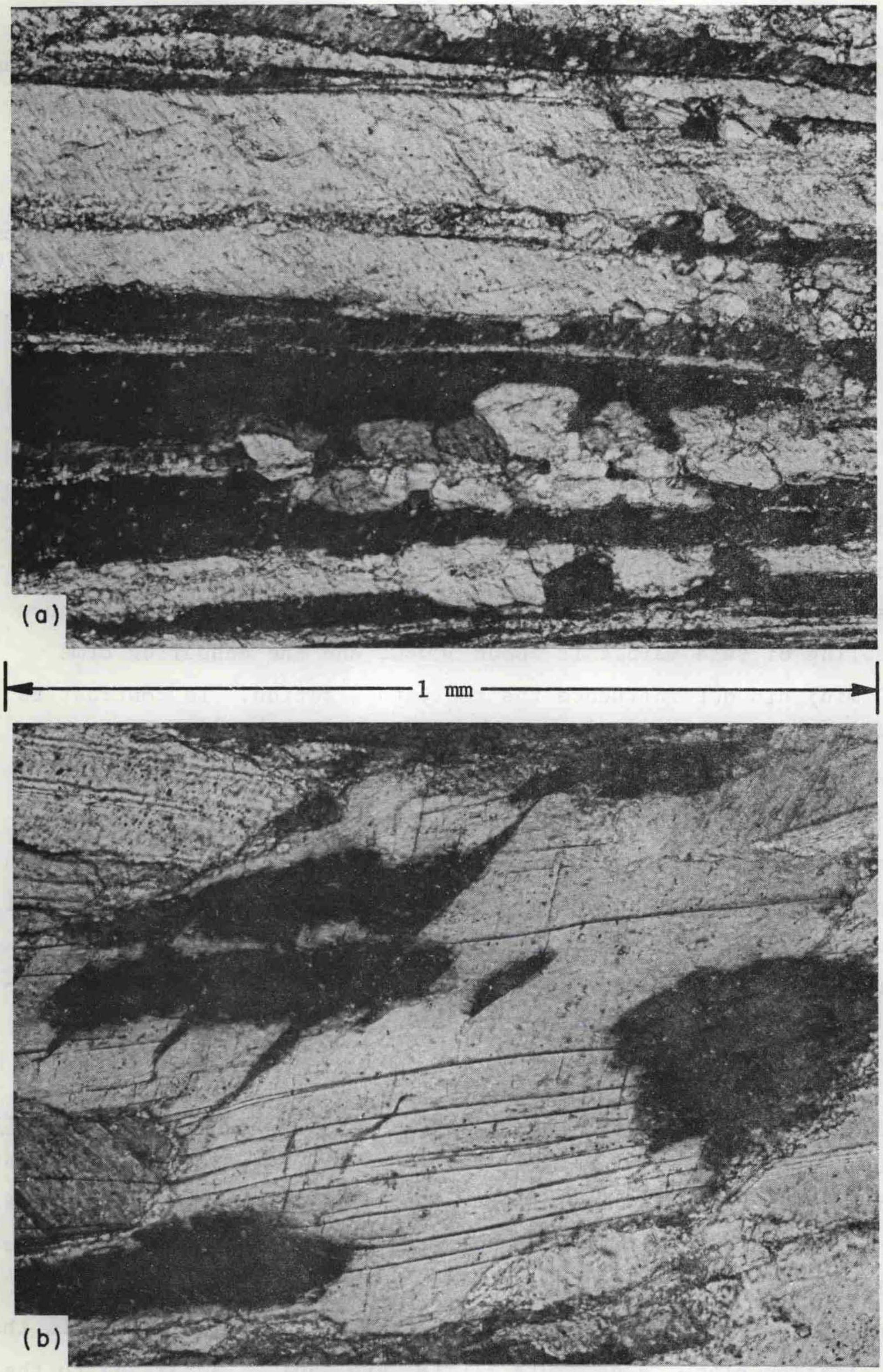

Fig. 48—Photomicrographs of Yule marble showing effects of syntectonic recrystallization (from Griggs, Turner, and Heard, Ref. 43, Plate 12). (a) New grains developed in marginal clusters in specimen locally elongated 590 per cent at 3-kb confining pressure and 600°C. Crossed Nicols. (b) New grains (dark) developed at three centers in single host crystal in specimen elongated 50 per cent at 3-kb confining pressure and 600°C. Crossed Nicols.