Pressure Solution

Under great pressure from overlying rocks or during structural deformation, individual sedimentary particles become soluble. The preferential dissolution of grains under pressure is called pressure solution. Features produced by this selective dissolution and by the recrystallization of grains are called pressure solution structures.

Stylolites are thin, dark zigzagged or undulating lines found most commonly in limestones and sandstones (Figure 4). The dark color is due to the concentration of insoluble mineral grains along planes of preferential grain dissolution -- insoluble residues in limestones are usually clay minerals. It is not clear why only certain planes within a rock develop stylolites, but the planes are always oriented normal to the direction in which stress (pressure) is applied. Stylolites are commonly parallel to bedding, such as when they result from the pressure of overlying sedimentary rocks, but can also be oblique or at right angles to bedding (pressure due to structural deformation, such as during folding). More than one set of stylolitic planes can be present in any rock.

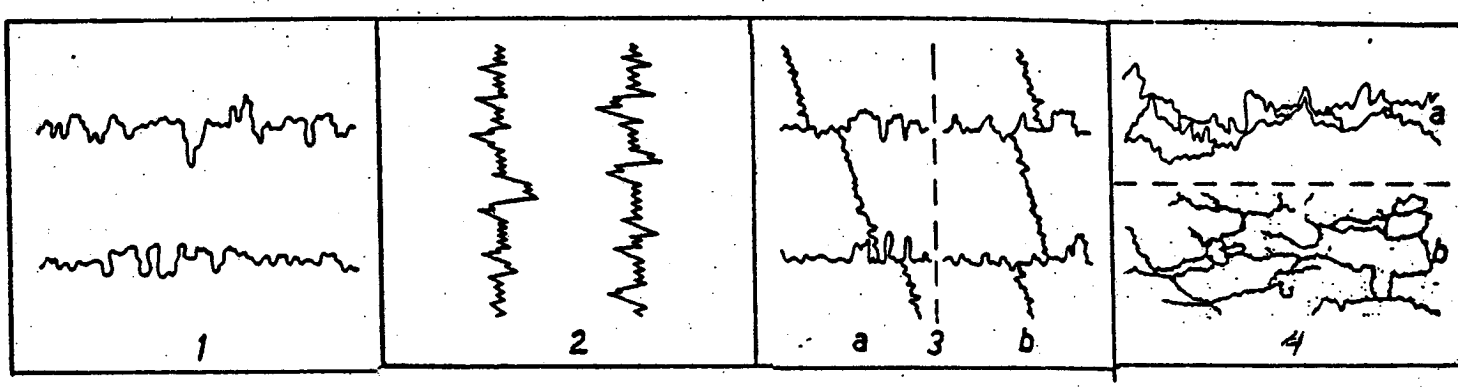

Figure 4. Stylolite types and combinations. 1) Undulatory, parallel to bedding; 2) zigzag, perpendicular to bedding; 3) cross-cutting, horizontal and inclined; 4) interconnecting networks (anastomosing stylolites). From Park and Schot (1968).

Cone-in-cone structures consist of stacks of inverted cones (points down) whose axes are normal to bedding. Individual stacks are 1 to 10 cm high, and usually form on the upper surface of bedding planes and around concretions. They are most common in impure limestones, mudrocks, silty fine sandstones, and occasionally in coals. The cones are constructed of long, fibrous crystals of calcite arranged parallel to one another into the cones; this fibrous structure is visible to the unaided eye. The formation of cone-in-cone structures is not completely understood, but they are clearly secondary sedimentary structures and appear to have formed by the crystallization of calcite under stress within lithified rocks. Unlike stylolites which result from dissolution under pressure, cone-in-cone are due to recrystallization under pressure.