Chemical Precipitation

Most chemical sedimentary structures are not primary but are secondary in origin, and reflect conditions of chemical diagenesis. Concretions and nodules are regular to irregular bodies having spherical, ellipsoidal, or flattened shapes and are composed of calcite, siderite (iron carbonate), pyrite, chert, and phosphate. Concretions exhibit concentric internal laminations and range from several mm to several meters in diameter. Nodules lack an internal structure, or have hollow centers lined with crystals (geodes). Like concretions nodules range in size from a few mm to several meters in diameter.

Nodules and concretions are most frequent in terrigenous mud rocks and in fine-grained limestones where they grew in-plane at or just below the seafloor surface when sediments were still soft. The early growth of these bodies can be recognized from the way laminae curve around the nodule, and by the presence of undeformed fossils within nodules. Some concretions and nodules form later in diagenesis, however, after compaction of the sediment. In these, laminae pass unaffected through the nodule. Most nodules and concretions occur in distinct horizons within sedimentary rocks and usually coincide with bedding planes. They are thus useful as lithologic markers within thick stratigraphic sequences of otherwise monotonous mudrock or limestone.

Cavities filled with sediment and cement assist in the determination of stratigraphic up and down and are called geopetal structures. Cavities in a sediment form in many ways -- as voids under overturned shells, within fossil hardparts (chambers), between and underneath reef-building organisms, from gas bubbles and open burrow structures, and beneath seafloor crusts. The partial sedimentary fill of such cavities will always be in the lower part (stratigraphic down) because of the influence of gravity; sparry calcite cement will fill the remaining, upper part of the void (Figure 5).

Figure 5.