The most commonly identified genus of phylloid algae in the Farley Limestone is *Archeolithophyllum* (Figure 2.6). Other phylloid algae such as *Eugonophyllum* and *Anchicodium* have been identified in the Farley in the past (Crowley, 1969; Harbaugh, 1960; Heckel & Cocke, 1969; Johnson, 1946, 1963; Konishi & Wray, 1961; Wray, 1968) and may be present but unrecognizable due to obliteration of the original structure. The associated fauna is dominated by brachiopods, bryozoans, and crinoids, whereas bivalves, gastropods, small rugose corals, ostracodes, and trilobites are present but much less common.

Shelter pores beneath algal blades (Figure 2.5 a, b) and phylloid algal molds contain coarse, blocky calcite spar. Fractures are typically filled with blocky calcite spar or in some cases coarse baroque dolomite. The facies generally shows little or no extant, large-scale porosity. In a few locations, however, phylloid-algal blades and other fossils have been leached leaving molds that are lined with light to moderate brown (5YR 5/6-5YR 4/4) residue.

On outcrop and in hand sample, the matrix appears to be homogeneous micrite. Petrographic examination, however, reveals a variety of micrite fabrics dominated by clotted or peloidal micrite. The clots of micrite are approximately 50 to 75 micrometers in size and occur in two forms. The most abundant form is a peloidal micrite sediment that occurs in interparticle and intraparticle spaces. (Figure 2.7a). The other dominant form is a growth framework that fills interparticle spaces and binds grains together (Figure 2.6 b, c). Other types of micrite occur as encrustations and micrite envelopes on many skeletal grains (Fig. 2.6d), especially phylloid-algal fragments. Micrite is also present as matrix that has been altered to microspar and pseudospar. These later three types of micrite are less common than the clotted and peloidal forms.

The dominant types of spar within the phylloid-algal facies are interparticle

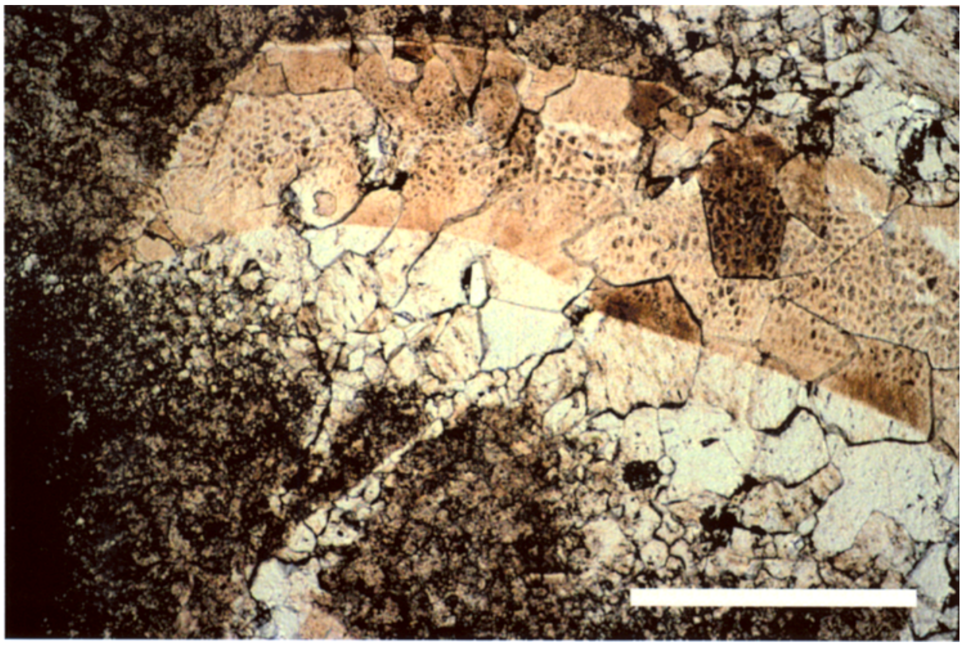

Figure 2.6 Photomicrograph of *Archeolithophyllum* thalli. Note neomorphic calcite that overprints fabric and preserves the cellular, internal structure (Sample RW-7; transmitted light; scale bar = 1 mm).

cement and neomorphic calcite. Coarse, sparry calcite cement (= 0.5 mm) is common in shelter pores and fractures whereas neomorphic spar replaces fossil grains (Fig. 2.6) and is present as an aggrading neomorphic replacement of micrite. Early, fibrous to bladed cements typically line the inside of such fossils as brachiopods and gastropods and are generally overprinted with blocky neomorphic spar (Figure 2.8). Associated with these early cements is a later partial infilling of micrite or peloidal micrite sediment with a final blocky calcite spar filling the rest of the pore space.

Environmental Interpretation

Wray (1964) interpreted the growth habit of *Archeolithophyllum* as encrusting, locally attached, or free forms that formed semirigid crusts capable of providing a self-supporting skeletal framework and a sediment-binding function in the depositional environment. Furthermore, Wray (1964) compared *Archeolithophyllum* to the modern genus *Lithophyllum*, which is exclusively marine and extensively developed in shallow regions down to approximately 30 meters. By this comparison, and because algae depend on sunlight for important metabolic processes, it is reasonable to infer that the phylloid-algal facies was most extensively developed in shallow water, well within the photic zone. Additionally, other phylloid algae such as *Eugonophyllum* and *Anchicodium* also have been interpreted to live most abundantly in shallow water and effectively baffle and trap carbonate mud as well as to make direct contributions to sediment accumulation in the form of blades, crusts and fragments (Heckel & Cocke, 1969).

The phylloid algae were not likely to have been the only organism trapping and binding sediment. Tsien (1985) discussed possible microbial or bacterial origins of