

Figure 2.20. Hand sample of *Osagia*, brachiopod packstone facies. *Osagia* coatings are easily visible as white coatings on skeletal fragments and whole fossils (arrows). Also note the abundance of dense micritic matrix (sample BS-5).

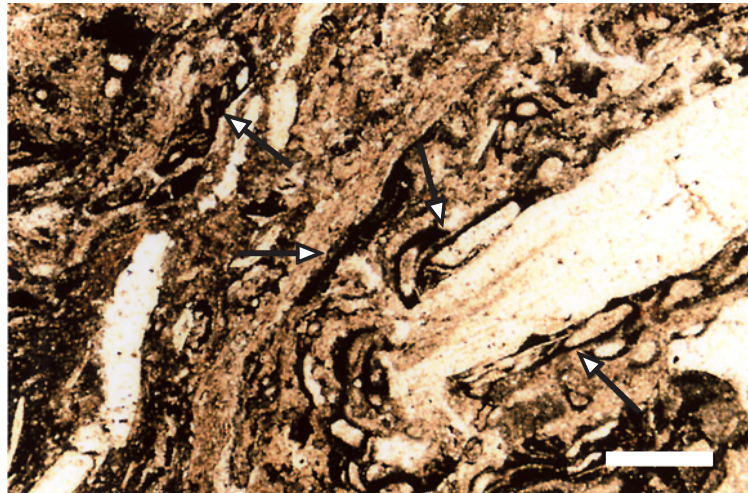


Figure 2.21. Photomicrograph of *Osagia*, brachiopod packstone facies. Note the large brachiopod fragment with a coating of *Osagia* (arrows) recognized by the chambers (typically spar-filled) surrounded by dense (black) algal growth (transmitted light; sample SH-8; scale bar = 1 mm).

supporting the algal coatings. In many cases the *Osagia*-coated grains are skeletal fragments and small brachiopods that would not have required significant wave energies to move them. Furthermore, the abundance of micrite matrix suggests a moderate to low-energy environment as does the preservation of brachiopods articulated valves. Furthermore the presence of a low-diversity fauna dominated by *Composita* brachiopods indicates a somewhat restricted environment (Ramsbottom, 1978).

Fossiliferous Siltstone

Richly fossiliferous siltstones occur in the Farley and Lane-Island Creek shales throughout the study area. The fossiliferous siltstones represent the thinnest (20 to 150 cm thick) overall accumulations of siltstone in the Lane-Island Creek and middle Farley. They have a platy to blocky texture and a light bluish-gray to medium-gray color (5B 7/1-N5) on outcrops and in cores. The siltstones are highly calcareous and slightly micaceous and have no sedimentary structures, although burrow molds are present in some outcrops (Figure 2.22).

Most fossil material is fragmental although there are whole brachiopods, gastropods, and bivalves in some localities and the fossiliferous texture shows up best in weathered sections (Figure 2.23). In cores the fossiliferous siltstones are blocky to massive and contain variable amounts of fossil material (Figure 2.24). In the Lane-Island Creek, these fossiliferous siltstones are dominated by crinoid ossicles and calyx plates as well as articulated crinoid columnals, with brachiopods and fenestrate and ramose bryozoans also abundant. Fusulinid foraminifera are also present in minor amounts in two sections in the Island Creek. In the middle Farley siltstones, the fossil assemblage is dominated by fenestrate bryozoans and brachiopods with crinoids, bivalves, and gastropods present but less abundant.

Environmental Interpretation

Crinoids and other echinoderms are stenohaline, and their remains are originate in sediments of fully marine origin (Clarkson, 1993). Brachiopods are also normal-marine organisms, whereas bryozoans are able to survive in restricted conditions; but they prefer normal-marine environments (Heckel, 1972b).

We interpret the environment of the fossiliferous siltstones as one of normal marine salinity and low energy levels. The most likely situation that gave rise to the fossiliferous siltstone facies is deposition in areas between the Lane and Island Creek deltas and in areas distal to the middle Farley delta. In these deeper areas between or distal to thickened delta lobes, water was clearer and calmer; and a normal-marine fauna could exist. Occasionally, influxes of large quantities of silty material from the deltas swamped and buried the organisms. Following this, the fauna recovered and bioturbation destroyed sedimentary structures and disrupted and disarticulated the buried fossils.

Lenticular Bedded-Laminated Siltstone and Fine Sandstone

Siltstones with millimeter- to centimeter-scale lamination and lenticular bedding occur in both the middle Farley and Lane-Island Creek shales. The nature of this facies is most visible in cores (Fig. 2.25) and on very fresh outcrops. On weathered outcrops this facies appears as a platy to fissile, fine sandstone to siltstone (Figure 2.26). Colors vary with grain size with the siltstone being medium-light to medium gray (N6-N5) and the sandstone very light gray to light gray (N8-N7). The siltstone is noncalcareous, but the sandstone lenses and laminations are slightly calcareous. Fine sand-sized and coarser mica grains are abundant in this facies and are most visible in cores and on very fresh outcrops.