1-1-1969

Carbonate Facies of the Helderberg Group (Lower Devonian) of New York

Laporte, Leo F.

CARBONATE FACIES OF THE HELDERBERG GROUP (LOWER DEVONIAN) OF NEW YORK

Leo F. Laporte
Brown University

General remarks. Inasmuch as each participant has received a recent reprint discussing the stratigraphy, paleontology, and inferred depositional environments of the Helderberg (Laporte, 1969) it is unnecessary to repeat all that here. Instead I will provide you with an itinerary of the four localities we will be visiting as well as some of the major features or problems of Helderberg paleoecology that will be discussed at each stop.

Publications that serve as background for this trip are Rickard (1962) and Laporte (1967). Indeed, were it not for Dr. Lawrence Rickard's excellent critical re-study of Helderberg stratigraphy my work and that of my students would not have been possible.

Itinerary. Trip begins at intersection of Routes 9W and 396, some seven miles south of Albany. Go west 2.6 miles along 396 and turn south (left) along South St. for about 0.4 mile; turn into Callanan quarry.

STOP 1 - Loc. 53a*, Delmar 7 1/2' quad.
Outcrop on south wall of quarry of upper Silurian Rondout Fm. and lower Devonian Manlius Fm. lying unconformably on middle Ordovician Normanskill Fm. greywackes. (Higher Helderberg units exposed elsewhere in quarry.) Section records late Silurian-early Devonian transgression which occurred throughout central Appalachians. Here, both the Rondout and Manlius have a tidal flat aspect: laminated, mudcracked, dolomitic limestones and dolomite; some horizons, particularly in the Manlius have abundant scour surfaces with limestone-pebble conglomerates. Algal stromatolitic structures common within the Manlius - both irregular laminations sometimes swelling into small hemispherical masses as well as free-lying algal oncolites (concentrically algal laminated clasts or skeletal debris). The Rondout has few if any fossils while the Manlius has abundant tentaculitids, leperditid ostracodes, ramose ectoproct bryozoans, scattered snails, and U-shaped burrows. Note rapid vertical changes in carbonate rock types and difficulty of tracing individual horizons any significant distance. What we have here, in short, is a fossil shoreline.

Return north (left out of quarry) along South St. to 396 and turn west (left). Continue on for about 1.1 mile to four corners. Turn north (right) toward Feura Bush; stop at roadside exposure about one mile north of four corners intersection. Despite pastoral nature of this stop beware of traffic.

---

*Localities numbered and located in Rickard, 1962.

STOP 2 - Loc. 53b, Delmar 7 1/2' quad.
Outcrop along road of Manlius Fm. with massive stromatoporoid bed interfingering with fossiliferous pelletal muds. Beds below (around outcrop in woods) are thinly laminated, mudcracked and dolomitic. The undulating contact between the stromatoporoid bed and the pelletal mudstone suggests truncation by erosion of the underlying bed before the stromatoporoid unit was deposited (although the contact may be somewhat modified by compaction). I have interpreted this as a tidal channel formed in subtidal pelletal muds in which stromatoporoids flourished. This is analogous to modern channels in tidal flats where abundant oysters or mussels grow. Lateral migration of the channels causes the stromatoporoid beds here, and elsewhere in the Manlius, to appear as thin, laterally continuous time-stratigraphic horizons. Intimately associated with these subtidal horizons of the Manlius are the dolomitic, mudcracked, poorly fossiliferous laminated beds which indicate periods of subaerial exposure, algal mats, and occasional flooding by unusual events (storms, monsoonal tides, or perhaps spring lunar tides). Thus, the Manlius displays a "complex facies mosaic" of tidal flat and shallow subtidal horizons, caused by deposition near mean sea level. Slight fluctuations in sediment accumulation caused significant shifts in evironmental regimen. Migration of flats, tidal channels, and shallow subtidal areas results in the present day complex internal stratigraphy of the Manlius.

Turn around and return to four corners. Turn west (right) and continue on 396 for about 7 miles to the village of Clarksville where 396 joins 43 at "T" intersection. Turn northeast (right) and stop at roadside cut, 1 1/2 miles beyond village.

STOP 3 - Loc. 56, Clarksville 7 1/2' quad.
Outcrop of upper Manlius at low end of outcrop, up through the full Coeymans (about 30 ft.). The Coeymans is a pelmatozoan calcarenite (or biosparudite or grainstone) with tabulate corals, various ectoproct bryozoans, and brachiopods, expecially the pentamerid Gypidula coeymanensis. The Coeymans records deposition in a shallow, well-agitated, subtidal environment, seaward of the Manlius tidal flat-lagoon. Anderson (1967) has recognized four distinct facies within the Coeymans: Bioturbite facies, Cross-stratified facies (both seen here), Sheet-deposit facies and Bioherm facies (seen elsewhere, somewhat higher in the Coeymans). These are interpreted by Anderson as recording integrading environments from a somewhat deeper shelf to a shallower shelf interspersed with mud shoals and intershoal channels or with patch reefs.

Turn around and return 12.4 miles to 9W via 43 and 396. Turn south (right) on 9W and continue for about 15 miles. At route 81 turn west (right) and go about 1.3 mile. Outcrop on left of upper Coeymans, Kalkberg, and most of New Scotland formations.

STOP 4 - Loc. 48, Coxsackie 15' quad.
Coeymans exposed at east end of outcrop. Grades up into Kalkberg (boundary placed at first bed of continuous chert) which is a carbonate mudstone (biomicrite) with a great abundance and diversity of marine shelly invertebrates. Brachiopods, ectoprocts, and trilobites are especially common. Pelmatozoan debris is also present, being more abundant in the lower part of the unit. Thin shaly interbeds and chert layers are common. The unit is highly burrowed. The New Scotland Fm. lies transitionally over the Kalkberg and is more argillaceous and quartz silty. The fauna of the New Scotland is somewhat less abundant than the Kalkberg although perhaps more diverse; like the Kalkberg the New Scotland is also highly burrow-mottled. Toward the west end of the roadcut the New Scotland is deformed (small folds and thrusts). The Kalkberg and New Scotland record open shelf environments seaward of the Coeymans. The New Scotland had significant amounts of fine-grained terrigenous detritus entering from the northeast and is more properly considered an argillaceous, quartz silty mudstone alghough there are some lime-rock interbeds.

These four stops show the vertical sequence of Helderberg environments: 1) the tidal flat and restricted shallow subtidal (Manlius); 2) open, higher energy, subtidal (Coeymans); 3) open, lower energy, subtidal carbonate shelf (Kalkberg); and 4) the open, lower energy, subtidal clastic shelf (New Scotland). These environments coexisted from west to east, for several tens of miles; following the regional transgression, they migrated westward across New York State forming the stratigraphic sequence we have seen today.