

**COMMENTS ON: MIDDLE ORDOVICIAN
NORMANSKILL FORMATION, EASTERN NEW YORK,
AGE, STRATIGRAPHIC, AND STRUCTURAL POSITION**

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Drs. Rickard and Fisher (1973, p. 580-590) are to be congratulated not only for suggesting a novel possible alternative to Taconic region late Middle Ordovician depositional and tectonic history but also for having sorted through and resolved the diverse graptolite zonal interpretations of northeastern North American Middle-Upper Ordovician rocks and their graptolite faunas in their discussion entitled *Middle Ordovician Normanskill Formation, Eastern New York, Age, Stratigraphic, and Structural Position*. Their interpretation includes three points, however, regarding which comments may be made.

Their assignment of certain shelly fossil-bearing graywackes and mudstones of about late Middle Ordovician age in eastern New York to a specific formation appears, as it has for many years, to be a matter of debatable opinion. Ruedemann (1914, p. 94) noted that the rocks he included in his Snake Hill Shale were "dark gray to bluish and greenish gray argillaceous shales which are difficult of separation from the Normanskill shales, save by the inclosed faunas". He (Ruedemann, 1914, p. 95-99) went on to point out that relatively few graptolites were present in his Snake Hill Shale and that the faunas from that formation were dominated by bivalves, brachiopods, gastropods, trilobites, and crinoids. He (Ruedemann, 1914, 1930) used the faunal contents of the rocks as a primary criterion for separating his Snake Hill Shale from the Normanskill Formation. Rickard and Fisher's remarks concerning the "Trenton" brachiopod-bearing sandstones, mudstones, and shales at Snake Hill, in the vicinity of the old quarry N 40° W from Troy, and in outcrops in the Schunnemunk, Newburgh, and Poughkeepsie quadrangles suggest that they have used a similar criterion for recognizing a sandstone-mudstone-shale unit (a part of their "Snake Hill-Canajoharie Shale and/or Schenectady Formation") distinct from the Austin Glen portion of the Normanskill Formation.

Rickard and Fisher note that the outcrop 2.4 km east of Rensselaer indicated by Berry (1962, p. 714) as including Austin Glen Graywacke is "an exposure of the melange beneath the Giddings Brook slice of Zen". They go on to state that "Lithologically, these graywackes appear to be typical Austin Glen turbidites. We were unable to find graptolites at this outcrop. It is important to know whether the specimens Berry collected came from the graywacke beds, intervening shale beds, or from the shale matrix into which these large blocks of Normanskill were emplaced." The *Orthograptus truncatus intermedius* zone graptolites collected at that locality by J. G. Elam and by Berry and Elam together

came from graywacke. Elam (ms) cited other outcrops east of the Hudson River from which graptolites indicative of Berry's (1960, 1970) *Orthograptus truncatus intermedius* zone had been collected. The graptolites from at least one of these localities, that at St. Joseph's Seminary, are in graywacke.

Rickard and Fisher state that "there is no reason to suggest that any part of the Black River Group is contemporaneous with any part of the Normanskill". Data cited by them suggest, however, that the Normanskill Formation is indeed, at least in part, coeval with the Black River Group. Rickard and Fisher indicate that the Black River limestones may be identified in the subsurface of Anticosti Island "by their unique gamma-ray log pattern". They (Rickard and Fisher) go on to state that: "Here they (the Black River limestones) contain graptolites of the *multidens* zone (Riva, 1969, p. 539-540)". Riva (1969, p. 539, 540) actually stated that the graptolites from the limestones that Rickard and Fisher suggest are Black River limestones (Riva indicated that the limestones were Trenton limestones) are "Normanskill forms" and "Normanskill graptolites". Riva's (1969, p. 539-540) "Normanskill graptolites" in cores from the N.A.C.P. and L.G.C.P. wells on Anticosti Island include *Dicellograptus sextans exilis*, *Glyptograptus euglyphus*, *Pseudoclimacograptus eximius*, *Pseudoclimacograptus* cf. *P. scharenbergi*, and *Amplexograptus* sp. These graptolites are, by Riva's (1972, p. 8) criteria for recognition of his *Nemagraptus gracilis* zone, indicative of that zone and not of his *multidens* zone as Rickard and Fisher state, and they include a *Dicellograptus* whose absence is a characteristic feature of Riva's *Diplograptus multidens* zone (Riva, 1972, p. 8). The graptolite and gamma-ray log data from the wells on Anticosti Island thus suggest that the Normanskill Formation and the Black River Group are at least partial correlatives (as Berry, 1963, suggested on the basis of a then relatively unsupported correlation) and not the Normanskill wholly older as Rickard and Fisher (see particularly their fig. 1, p. 582) suggest.

In summary, the question of precisely what rocks should and should not be included in the Normanskill Formation is open to continuing debate. If the *Orthograptus truncatus intermedius* zone (Berry's (1960) zone 13) graptolites from 2.4 km east of Rensselaer are concluded to have come from Austin Glen Graywacke, as Rickard and Fisher's discussion seems to suggest, then at least some rocks included by Rickard and Fisher in the Normanskill Formation are coeval with the Trenton Group, using the correlations indicated by Rickard and Fisher. The Normanskill Formation would thus appear not to be wholly older than the Trenton Group as Rickard and Fisher indicate (see their fig. 1, p. 582).

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