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Stratigraphy and Structure of West Central Vermont and Adjacent New York

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STRATIGRAPHY and STRUCTURE
of
WEST CENTRAL VERMONT
and
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STRATIGRAPHY AND STRUCTURE OF WEST-CENTRAL VERMONT AND ADJACENT NEW YORK

STATEMENT OF THE PROBLEM

By: E-an Zen

Precambrian gneisses form the core of the Green Mountain anticlinorium in the vicinity of Rutland. These gneisses are overlain unconformably on the west limb of the anticlinorium by fossiliferous Lower Cambrian sedimentary rocks, which pass westward into Middle Ordovician rocks. Except for the basal Mendon series (Brace, 1953), these overlying rocks are largely carbonates and clean quartzites, and the sequence contains no obvious stratigraphic break below the black mid-Trenton phyllite, the "Hortonville formation". This west-dipping and west-facing section is the east limb of the Middlebury Synclinorium, which is the structural complement to the Green Mountain anticlinorium (Cady, 1945). The stratigraphy of the west limb of the Middlebury Synclinorium corresponds to that of the east limb, except that the Upper Cambrian Potsdam formation, rather than Lower Cambrian units, rests directly on the Precambrian of the Adirondack massif with profound unconformity (Rodgers, in Rodgers, et al., 1952, p. 34). The plunge of the Middlebury Synclinorium is to the south.

The east limb of the Middlebury Synclinorium is complicated by two facts. The first is a mid-Trenton regional unconformity, which also marks a distinct departure in the sedimentary regime. The "Hortonville formation", above the unconformity, rests on units as old as the Precambrian gneisses, thus indicating a considerable hiatus. The second complicating fact is the presence of a zone of faults, both reverse and normal, which extends from northwest of Rutland (the Pine Hill thrust, Brace, 1953) at least as far south as the north slope of Dorset Mountain (Thompson, in Rodgers et al., 1952, Pl. 4). In several areas along this zone, Precambrian rocks are brought to the surface, abutting younger units.

In the area extending from the town of Sudbury and south to the Catskill quadrangle (Ruedemann, 1942), New York, the mid-Trenton black slate is overlain by a sequence of fossiliferous Lower Cambrian to Middle Ordovician argillites, with minor arkoses, greywackes, quartzites, and carbonates. These rocks constitute the Taconic sequence and, though lithologically distinct from the carbonate-orthoquartzite sequence of the Middlebury Synclinorium, the sequence is continuous with that of the Synclinorium in metamorphic grade; indeed the "Hortonville formation" appears, in west-central Vermont, to grade upwards into the Taconic sequence lithologically.

Accepting the abundant and well-studied fossil evidence, the Taconic sequence clearly occupies an anomalous position. The two prevalent explanations for this problem are: (1) that the Taconic sequence is in fact in the core of an anticlinorium. A rapid sedimentary facies change is envisaged to account for the lithological contrasts with the Synclinorium sequence, and the "Hortonville formation" is thought to lie unconformably upon the Taconic sequence. Though local complications due to marginal faults and overturning of the structure are allowed, no major displacement of the rocks is thought to exist. At least part of the phyllite of the main Taconic

Range is regarded as younger than, and in normal succession with, the "Hortonville formation" (MacFadyen, 1956). On the other hand, advocates of (2) the Taconic-klippe hypothesis hold that the entire Taconic sequence, including the phyllites of the Taconic Range, had been moved into the present position through a major thrust fault. The site of deposition of these rocks is thought to be in the present Green Mountains or even farther east, where rocks of like nature and perhaps comparable age are found. Deformation and metamorphism of the rocks subsequent to the emplacement then account for the gradational contact between the Taconic and the Synclinorium sequences.

Trips A and I (Zen) will study the detailed stratigraphy and internal structure of the Taconic sequence at its north end, as well as the relations between the two Sequences. Evidence for a Taconic thrust will be presented. Trip G (Theokritoff, Berry, and Shumaker) will demonstrate the continuation of the stratigraphic succession in areas immediately to the south. Recent discoveries of crucial graptolites from this area have done much to elucidate the Ordovician stratigraphy of the Taconic sequence. Trip H (Thompson) will study the relations of the two Sequences in the Wallingford-Danby-Dorset area, as well as of the faulted Precambrian with the younger units. Trip B (Kay) will study some of the structural complications in the Middlebury Synclinorium immediately north of the Taconic sequence, in the area of the Sudbury Thurst which Zen has shown to be structurally an integral part of the Taconic sequence. Trip C (Welby) studies the stratigraphy in the less deformed rocks of the Middlebury Synclinorium, and Trip F (Osberg) studies some stratigraphic and structural problems of the basal Cambrian units in the Green Mountain Front, which in the vicinity of Coxe Mountain is offset several miles to the west, bringing it close to the Taconic rocks. Trips D (Bain) and E (Theokritoff) are largely of economical interest, and are devoted to the study of marble and slate quarries, respectively, in west-central Vermont.

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