A NEW INTERPRETATION OF THE TACONIC PROBLEM

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AA. HEWITT'S HYPOTHESIS

A possible interpretation of the evidence accumulated during the recent numerous studies of the Taconics has been suggested by Hewitt (Vermont Geol. Surv. Bull., in press). Reference to Plates 4 and 5 will assist the reader in the following discussion.

Probably the most vexing difficulty lies in the great disparity of opinion regarding the nature of the eastern front of the "High Taconics" section, that is, the Taconic Range proper. West of this area is the "Low Taconics" section. Workers north of the boundary between the Equinox and Pawlet quadrangles in Vermont believe that a fault exists along the eastern front of the Taconic Range. From the northern boundary of the Equinox quadrangle southward into New York, there has been no evidence reported of a fault along this eastern zone. MacFadyen (1956) believed the contact to be such that the sequence is a normal one and Hewitt (Vermont Geol. Surv. Bull., in press) believes that there is evidence indicating a gradational and interbedded contact between the Ordovician marbles and the overlying phyllites in several localities. These two interpretations of a fault in the one case as against the normal contact in the other appear to be diametrically opposed.

Although there is no general agreement regarding the supposed fault along the eastern front of the "High Taconics", virtually all students of the problem agree that a fault does exist along the western edge of this area. The same fault seems to be traceable from the west side of Stissing Mountain (Millbrook quadrangle, N.Y.) northeastward through New York State and into Vermont. Zen (1961) shows that the fault eventually bends eastward in the Castleton area. Adherents of the klippe hypothesis require that the fault turn southward and trend to the southwest roughly parallel to and eventually joining the westerly and generally accepted fault discussed above. Adherents of the normal sequential deposition theory do not accept the eastern fault since it is unlikely that the fault would occur at the contact between the marble sequence (Vermont Valley) and the overlying phyllites if that contact is gradational. It must be in some other position and this opposes the klippe hypothesis. They may agree that the western fault probably does arc to the east and south in the Castleton quadrangle. The fault cannot, however, continue its southward direction for any considerable distance, in the view of these workers.

It would appear that the two hypotheses are unreconcilable. The fault either is or is not present. Yet Zen (1960) believes that such reconciliation is necessary in view of the conflicting data.

Hewitt (Vermont Geol. Surv. Bull., in press) has suggested an interpretation which may in fact reconcile both views. This theory assumes general agreement about the fault (Fault A) along the western edge of

the "High Taconics" (Plate 5). The "High Taconics" ("Slice A") has been thrust over the "Low Taconics" ("Slice B"). If the "High Taconics" is in its normal position relative to the marble sequence, then the entire mass, including those rocks east of Fault A (the Taconic Range, marble sequence, and the Green Mountains) is part of the same "slice". These rocks have been thrust westward as a unit over the "Low Taconics" which was previously also faulted into its present site. Fault A then is on the eastern boundary of the "Low Taconics" and Fault B, which trends northeastward from the Troy area, is the western or leading edge of the klippe.

According to this hypothesis the area west of Fault B is the autochthone, "Slice B" the allochthone and "Slice A" (Also allochthonous) is thrust over "Slice B". In this fashion the klippe is entirely exposed at the north end as Zen (1961) states. As one tries to follow the klippe southward it is buried on the east by the "High Taconics" ("Slice A") which has been thrust over the trailing or eastern side of the klippe. The eastern part of the klippe can no longer be observed for it is overlain by the "High Taconics" (Plate 4, Figure AA.) and is cut off by the later fault (Fault A). Reference to an adaptation of Zen's cross-section (Plate 4, Figure A.) shows the klippe exposed on both east and west. Fault B is the major fault marking the western edge of the klippe. At its northern extremity it bends east then south and is covered in the rest of its southerly extent by Fault A which then becomes the major fault. The "Low Taconics" is allochthonous; the "High Taconics" is a second, more easterly, thrust sheet.

The value of this interpretation is that it simplifies the highly complex structure and stratigraphy required by the usual klippe hypothesis. At the same time it avoids the unusual sedimentologic conditions required by the facies change concept since all of the elements (the autochthone, "Slice A" and "Slice B") were originally deposited separately and are not necessarily related sedimentologically.

Some evidence that the Green Mountains and marble sequence as well as the Taconic Range have been thrust in should be presented also. Diment (1956, p. 1688) indicated in his gravity studies of a portion of that area that a very high gravity exists in the region of the northern part of the Green Mountains and a very low gravity under the Taconic Range. He suggested faulting as one possible explanation for these gravity anomalies. In addition Fisher (personal communication) reports that several Precambrian hills in the Schunemunk and Poughkeepsie quadrangles are probably rootless. Offield (personal communication) believes that gravity measurements of Stissing Mountain in Duchess County indicate that this Precambrian is also separated from the basement, although he suggests that lateral movement was probably not great.

If the Precambrian were formerly more extensive at the surface due to faulting, these rocks would have been an excellent source area for later (Ordovician) sediments and may provide a source for such units as the Rensselaer graywacke. These would then not necessarily be of Cambrian age but possibly of later Ordovician age. A full discussion of the historical sequence is included in the report on the Equinox quadrangle, Vermont (Hewitt, Vermont Geol. Surv. Bull., in press).

SELECTED REFERENCES

Diment, W. H. (1956) Regional gravity survey in Vermont, western Massachusetts and eastern New York: Geo. Soc. Amer. Bull., vol. 67, no. 12, pt. 2 pg. 1688 (abs.)

Hewitt, P. C., The geology of the Equinox quadrangle, Vermont and vicinity: Vermont Geol. Surv. Bull., In. press.

MacFadyen, J.A., Jr., (1956) The geology of the Bennington area, Vermont: Vermont Geol. Surv. Bull. no. 7.

Zen, E-An (1960), Time and space relationships of the Taconic rocks in western Vermont and eastern New York: Geol. Soc. Amer. Bull., vol. 71, no. 12, pt. 2, p. 2009 (abs.)

Zen, E-An (1961), Stratigraphy and structure at the north end of the Taconic Range in west-central Vermont: Geol. Soc. Amer. Bull., vol. 72 no. 2, pp. 293-338.