

COMMENT ON "TECTONIC HISTORY OF THE
LUNKSOOS COMPOSITE TERRANE IN THE
MAINE APPALACHIANS" BY M. REID
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The data on the paleomagnetism of the volcanic rocks provided by Wellensiek et al. [1990] (hereinafter referred to as Wellensiek et al.) are welcome contributions to ongoing studies of the tectonic history of Maine and the northern Appalachians. Deficiencies in the presentation of important aspects of the geology of the region and of the particular area of the study by Wellensiek et al. motivate this comment, better to inform readers of the context of the paleomagnetic findings.

REGIONAL SETTING

1. The Lunksoos "terrane" (formerly Weeksboro-Lunksoos anticlinorium [Osberg et al., 1985], also Lunksoos anticlinorium [Boone and Boudette, 1989]) is not part of the Kearsarge-Central Maine synclinorium. The latter is a broad Acadian structural feature that preserves a Silurian-Devonian trough. The northwestern boundary of this trough is the hinge zone defined by Moench [Moench and Pankiwskyj, 1988] in the Rangely area, northwestern Maine that may correspond with the deeply buried eastern margin of Grenvillian crust [Stewart, 1989]. This hinge zone is manifested along the SE flank of the Lunksoos anticlinorium by unnamed conglomerate of Silurian age (map unit Sg of Neuman [1967]).

2. Of the several anticlinoria ("terrane" of Wellensiek et al.) in northern Maine the Lunksoos is

the only one that preserves a non-North American Early Ordovician fauna, the Celtic brachiopod assemblage of the Shin Brook Formation [Neuman, 1984]. The Miramichi anticlinorium that extends across New Brunswick to the east also has Lower Ordovician fossiliferous rocks that contain such a fauna, but none of these is known to occur in Maine in the southwestern end of this anticlinorium. The few identifiable Ordovician shelly fossils elsewhere in northern Maine are all younger than those of the Shin Brook Formation, and they are assemblages of "Scoto-Appalachian" provincial affinities [Neuman, 1984].

3. The statement that the "Stacyville volcanics" overlie the Shin Brook Formation is incorrect. No such relations are known to exist in the Lunksoos anticlinorium where only undated "metadiabase" overlies the Shin Brook. Such a relationship might be inferred, however, from known or estimated ages within the Lunksoos anticlinorium and from apparently unfaulted sequences of similar rocks of the same age span of the Miramichi anticlinorium in the Hayesville area, New Brunswick [Irrinki, 1980].

4. The presence of the Katahdin Granite, the largest granitic body in Maine, should have been shown on Figure 1 of Wellensiek et al.. Its eastern margin is as close as 3 km SW of the three sample sites, wmc, wv3, and wv4.

GEOLOGIC SETTING OF THE "STACYVILLE
VOLCANICS" IN THE SHIN POND AREA

1. The source of the map (Figure 1 of Wellensiek et al.) is not attributed; apparently it was taken from an enlargement of a part of the 1985 state bedrock geologic map [Osberg et al., 1985] that was

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compiled from parts of the Traveler Mountain [Rankin, 1961], Shin Pond and Stacyville [Neuman, 1967], and Island Falls [Ekren and Frischknecht, 1967] 1:62,500-scale quadrangles. As a "lithologic map," all boundaries are shown with the same dashed-line convention. Some important information shown on the 1:62,500-scale maps that was preserved on the state map was lost, particularly the faults. One could interpret from Figure 1 of Wellensiek et al. that the "Stacyville volcanics" constitute a contiguous body of rocks, an inference that cannot be drawn from the complex interleaving of Ordovician volcanics and chert and Silurian rocks of several kinds on the state map and on the detailed maps from which it was made.

This seems particularly relevant in considering the volcanic rocks of the belt SE of Lunksoos Lake. The rocks of this belt are different from those west of the East Branch of the Penobscot River in that the pillows in the eastern block are outlined by red and green chert compared to the epidote-rich selvages west of the river. Important questions are raised by the west-facing parts of this sequence, as shown in Figure 1 of Wellensiek et al. and from pillow lavas on Plate 2 of Neuman [1967]. Do these indicate that the entire block consists of west-facing rocks, and that the block is a strike-slip fault fragment, probably from from the south, that simulates the east limb of the Lunksoos anticline? Alternatively, if east-facing rocks can be found, these volcanics might prove to be isoclinally folded. In any event, the variety of rocks in the vicinity of the East Branch near the mouths of the Seboeis River and the Wassataquoik Stream, and the structures inferred to explain them, remain an unresolved puzzle. Logging roads east of the East Branch to Bear Mountain and Peaked Mountain Pond, built several years ago, reveal outcrops that require revision of Neuman's [1967] mapping; remapping of that area should assist in the solution of this problem.

2. In the discussion of metamorphic and deformation history, the temporal correlation of sequentially numbered structural features (F1, F2, etc.) is unsupported. Such sequences designate relative ages, independent of the times of their formation; there is nothing age specific in multistage folding. In this case, if F1 structures are not present in rocks of the Shin Brook Formation, how can those of the Wassataquoik Chert be of the same age as F1 in the Grand Pitch?

The formation and area from which the data for Figure 2 of Wellensiek et al. were drawn should have been specified. Compare the "subhorizontal" F2 fold axis of Figure 3 of Wellensiek et al. with the steeply plunging ones of Figure 3 of Neuman [1967], the two pictures having been taken on opposite sides of the Seboeis River at essentially the same place, i.e., porpoising fold axes.

Compare Figure 1 of Neuman [1967] with structure symbol (40°NW) of Wellensiek et al. at

approximately that place. What is the meaning of that number where complex folding is laid bare? The same applies to the many well-exposed arrays of folds along the East Branch in the Pond Pitch-Bowlin Brook sector.

Mention should also be made of Boone's finding [Boone and Boudette, 1989] that the area mapped as Grand Pitch Formation [Neuman, 1967] contains two units, the Grand Pitch Formation itself and an unnamed *mélange* unit beneath it. The boundary between these two units had not been identified or mapped in 1989, but it has been apparent for several years that it may lie near the trough of the syncline that contains the Shin Brook Formation. Rocks identical to those of the type Grand Pitch Formation, including red slate with the trace fossil *Oldhamia*, occur to the northwest of that syncline, whereas on its southeast flank the assemblage of slate and quartzite is like that associated with the *mélange* unit.

DISCUSSION

In the discussion section of Wellensiek et al. two possibilities are offered and diagramed to explain the superposition of rocks of low-latitude origin above those deposited in moderate to high latitudes. One invokes structural translation to superimpose the low-latitude volcanics over the (relatively) high-latitude older rocks; the other requires reinterpretation of the high-latitude depositional site of the older rocks. The first of these interpretations was first posited by Wellensiek et al., [1988a], and shortly thereafter restated, citing supporting geochemical evidence [Wellensiek et al., 1988b] that was not referred to in the paper under discussion. A third possibility, neither entertained nor referred to by Wellensiek et al., was offered by Neuman et al. [1988] for the same superposition: namely, that ocean-closing accretionary events, as manifested in Newfoundland by the Humber phase of the Taconic orogeny, had moved the crustal fragments containing rocks having high-latitude signatures (Celtic brachiopod fauna, no carbonate rocks) equatorward to receive carbonate sedimentation and Appalachian faunas.

OMISSIONS

These final comments I make with profound regret. Although the lack of success in obtaining paleomagnetic results from rocks of the Grand Pitch Formation was mentioned by Wellensiek et al., no mention was made of the lack of success with the Shin Brook Formation. Neither is there acknowledgment of the significant assistance rendered by the Maine Geological Survey and the Maine Forest Service during the course of this work, nor of the student from the University of Maine (Presque Isle) for her help as field assistant during the 1987 field season.

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