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TIMING OF DEFORMATION ALONG THE LEADING EDGE OF THE FOLD AND THRUST BELT, CRAZY MOUNTAINS BASIN, MONTANA

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A new radiometric age relevant to the timing of deformation along the eastern margin of the foreland fold and thrust belt in Montana is reported. The study area encompasses the northeast margin of a distinctive convex-east bulge or salient in the fold and thrust belt east of the Boulder batholith termed the Helena Salient. This zone is characterized by asymmetrical, eastward verging folds and thrust faults to the west and open, slightly asymmetrical folds to the east. The easternmost folds of this region may be the expression of blind thrust faults or detachment faults at depth, and they represent a transitional zone from thin-skinned fold and thrust structures to the basins and uplifts of the Rocky Mountain foreland to the east (Woodward, 1981).

The broad timing of deformation of the fold and thrust belt in Montana is generally accepted to span the late Paleocene to early Eocene (McMannis, 1965; Roberts, 1972). However, it is not always possible to determine precise dates for many thrust faults and associated folds due to the lack of syn-tectonic clastic wedges and suitable fossil assemblages. In contrast, the structural development of the Wyoming-Idaho-Utah salient of the fold and thrust belt has been clearly documented through stratigraphic and paleontologic means (Dorr and Gingerich, 1980; Wiltschko and Dorr, in press). However, alkalic intrusive rocks in the Crazy Mountains Basin appear to be pre-, syn-, and post-folding along the eastern margin of the Helena salient (fig. 1). The folds are characteristically broad and open, slightly asymmetrical to the east (Garret, 1972), generally plunge at shallow angles, and as previously suggested, may be cored with blind thrusts or a decollement. Therefore, careful mapping of intrusive relationships, coupled with radiometric and paleomagnetic data, may provide the bracketing ages of deformation along the eastern margin of the fold and thrust belt.

PRELIMINARY RESULTS

One sill, exposed on the eastern flank of Robinson anticline, has yielded a date of 48.5 ± 4.6 m.y. or post early-mid Eocene. This age is younger than, or possibly coeval with, motion on the La Barge thrust fault in Wyoming, which is the easternmost and youngest thrust in the Wyoming-Idaho-Utah salient (Wiltschko and Dorr, in press). Furthermore, this new age is younger than the widely accepted Paleocene-early Eocene time span for southwest Montana (Roberts, 1972).

This work is preliminary and will continue through 1983-1984. Specifically, continued research in the Crazy Mountains Basin will emphasize detailed mapping, structural analysis of the folds, radiometric dating of concordant and discordant igneous rocks, and paleomagnetic studies of the folded igneous rocks. Attention will also be focused on the nature of the alkaline rocks in this area, including their evolution and relationship to other igneous rocks in the greater Crazy Mountains Basin.

SAMPLE DESCRIPTION

1. 82-VP-2 (Geochron A-6412) K-Ar
Gray platy hornblende-pyroxene porphyritic trachyte sill (46°12'N, 110°27.5'W; NW¼ SE¼ S10,T5N,R10E; Davey Butte Ridge; Virginia Peak 7.5' quad., Meagher Co., MT). *Analytical data:* K = 0.167%, *Ar⁴⁰ = .000584 ppm, *Ar⁴⁰/ΣAr⁴⁰ = 18.3%. *Collected by:* Stephen S. Harlan and David R. Lageson. *Analyzed by:* Geochron Laboratories, Inc. *Comment:* This date indicates a post early-mid Eocene age for late stages of folding associated with fold and thrust activity in the Crazy Mountains Basin.
(hornblende) 48.5 ± 4.6 m.y.

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Figure 1 on following page. 

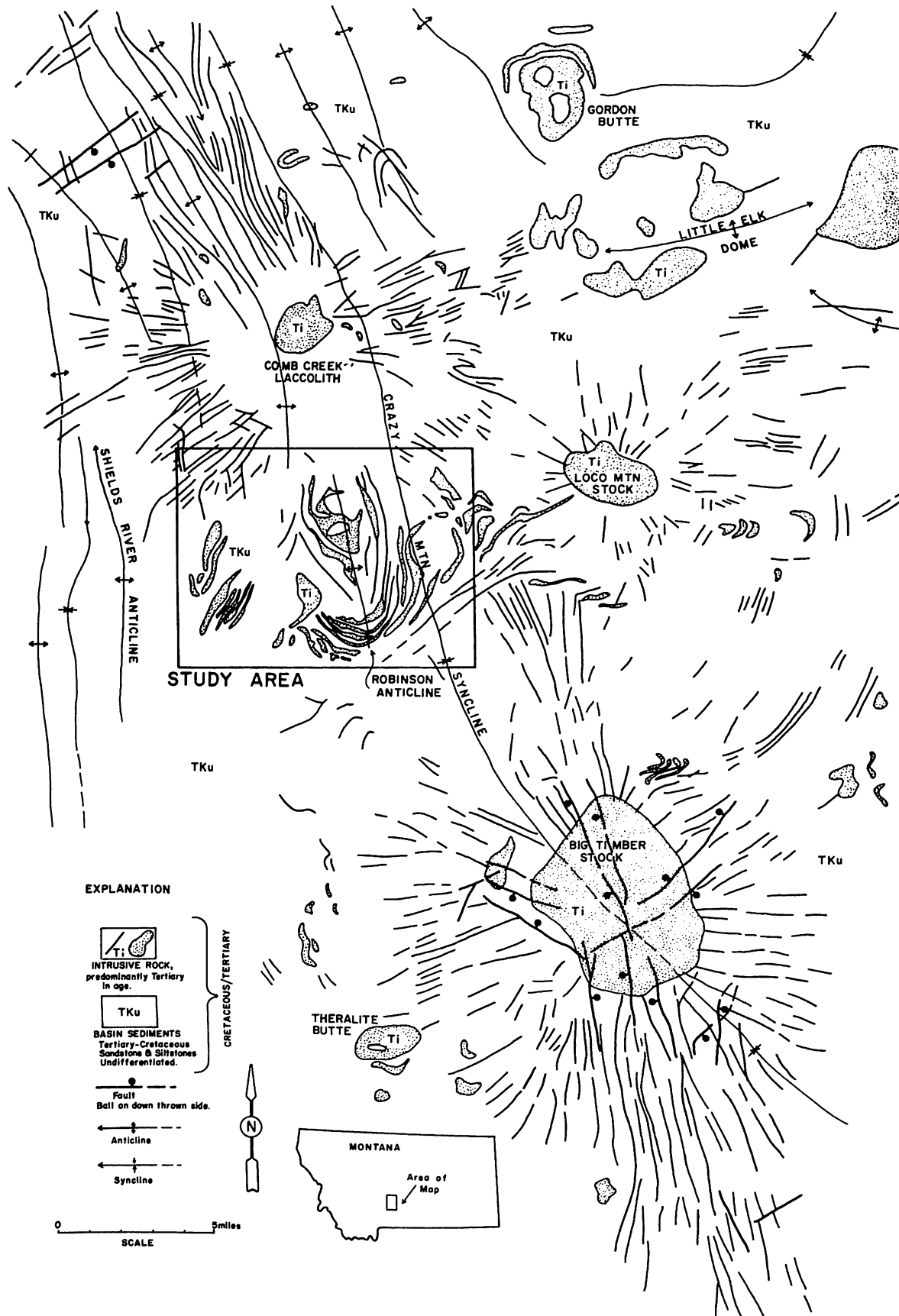


FIGURE 1. Index map of the western Crazy Mountains Basin, Montana, showing the distribution of Tertiary intrusive rocks. The study area is centered on intrusive rocks exposed along the flanks of Robinson anticline. (Modified from Roberts, 1972.)