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K-AR DATES FOR PLUTONS FROM THE IRON MOUNTAIN AND STURGILL PEAK AREAS OF WESTERN IDAHO

Thomas A. Henricksen,
Steven J. Skurla,
and
Cyrus W. Field
Department of Geology
Oregon State University
Corvallis, OR 97331

We report K-Ar dates for two nearby but geologically distinct plutons in the Hitt Mountains of Washington County, Idaho. The dated samples consist of quartz diorite from the Iron Mountain area and granodiorite from the Sturgill Peak area. They were collected during regional geologic mapping along the Snake River boundary between eastern Oregon and western Idaho.

The K-Ar age determinations were performed by Donald J. Parker of Oregon State University at the Kline Geological Laboratory of Yale University and under the direction of R. L. Armstrong. Constants used in the reduction and analytical data were: $\lambda_\epsilon = 5.84 \times 10^{-11}$/yr.; $\lambda_\beta = 4.72 \times 10^{-10}$/yr.; and $K^{40}/K = 1.19 \times 10^{-4}$ atoms/atom. Potassium was determined by atomic absorption, argon by isotope dilution (Armstrong, 1970). The geochronometry laboratory of Yale University is supported by NSF Grant GA 26025.

GEOLOGIC DISCUSSION

Isolated granitic plutons lie along a north-northeast trending zone at least 85 miles long that extends from near Huntington, Oregon, to the Seven Devils Mountains west of Riggins, Idaho. This zone is subparallel to the Snake River and lies between the Jurassic or younger Wallowa Batholith, approximately 30 miles to the northwest, and the Cretaceous Idaho Batholith, approximately 40 miles to the east. The plutons intrude a eugeosynclinal assemblage of folded sedimentary and volcanic rocks that have been subjected to low-grade regional metamorphism and to contact metamorphism locally. Country rocks are Paleozoic (?), Triassic, and Jurassic in age as inferred solely from imperfect faunal evidence.

The Hitt Mountains are approximately midway along the north-northeast trending zone of plutons. At the southernmost sample locality, a medium-grained equigranular quartz diorite crops out on and west of Iron Mountain over an areal extent of about six square miles. The Iron Mountain quartz diorite forms a plutonic core to the now dormant Mineral mining district. At the northernmost sample locality (no. 2), 6.75 miles northeast of Iron Mountain, a medium-grained porphyritic granodiorite having quartz phenocrysts crops out over an area of less than one square mile on the south flank of Sturgill Peak in the headwaters of Mann Creek. The porphyritic granodiorite intrudes a quartz diorite that is lithologically similar to and probably contemporaneous with that exposed at Iron Mountain nearby to the southwest.

The K-Ar age determinations provide minimum dates of 200±4.0 m.y. and 120±2.4 m.y. for the Iron Mountain quartz diorite and the Mann Creek granodiorite respectively. Because of the spatial proximity of these two distinct yet compositionally similar plutons, further discussion of these divergent dates is warranted.

Mackin (1953) originally correlated the Iron Mountain quartz diorite with satellitic plutonism associated with emplacement of the "late Jurassic (?) Idaho batholith" to the east. However, on the basis of subsequent radiometric studies, our date of 200 m.y. for the Iron Mountain quartz diorite is markedly older than the Early Cretaceous or earlier age (125 to 156 m.y.) of major Idaho batholith plutonism reported by McDowell and Kulp (1969). This 200 m.y. date is similar to other K-Ar dates (171 to 216 m.y.) we have obtained for major plutonic phases in the nearby Cuddy Mountains 15 miles north-northeast of Iron Mountain (Field and others, 1969; Armstrong and Besancon, 1970; Bruce, 1971). Moreover, these older Mesozoic dates (approximately 200 m.y.) are analogous to many reported

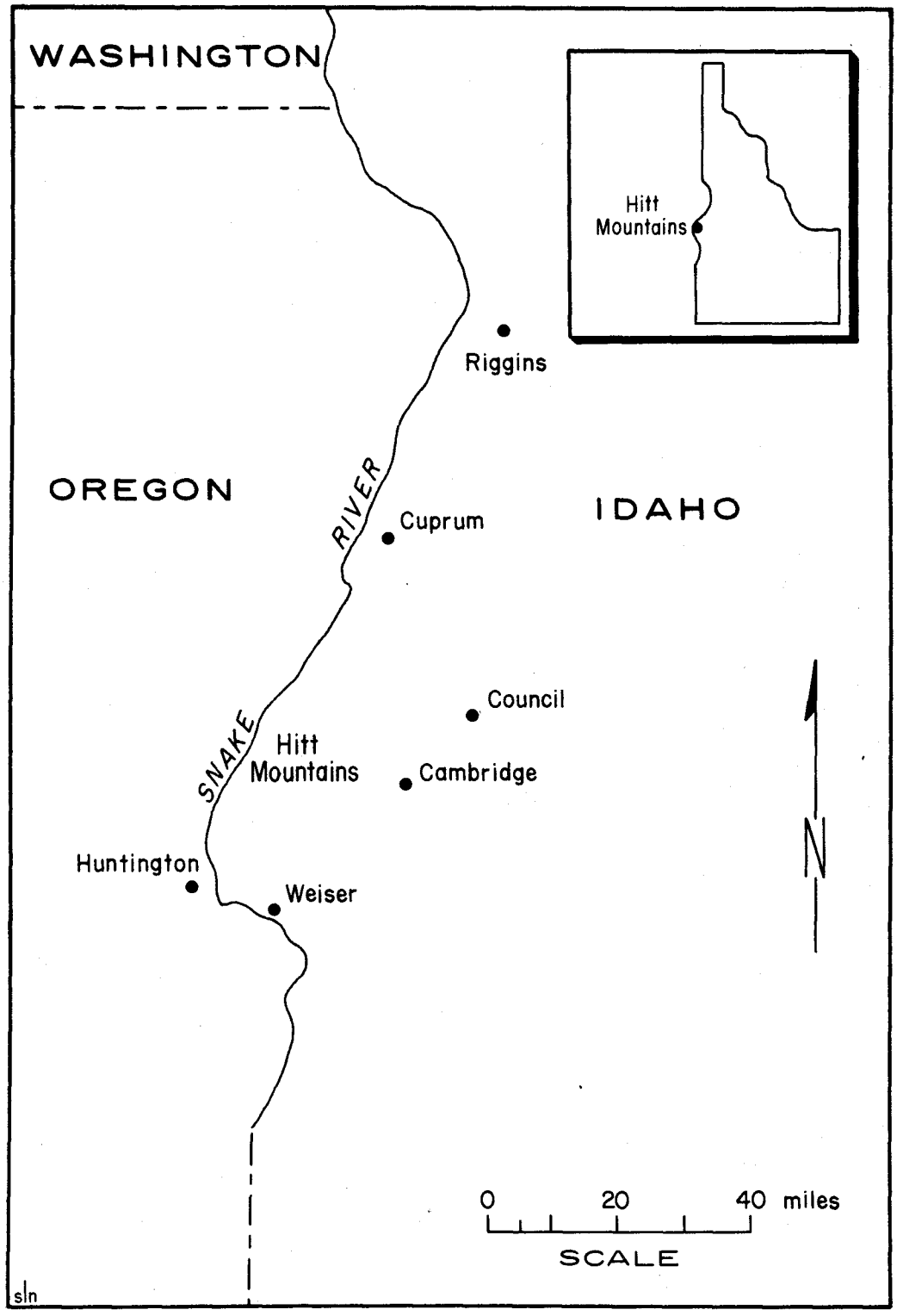

Figure 1. Location map of area studied.

by other investigators for small plutons and larger batholithic masses of the Western Cordillera that extend northerly from southern California through Washington and British Columbia to at least south-central Alaska.

In contrast, the Mann Creek granodiorite (120 m.y.) yields a minimum date that is markedly younger. It is similar to dates of 121 and 127 m.y. for the Deep Creek stock in the Seven Devils Mountains of Idaho (White, 1972), approximately 44 miles north-northeast of Sturgill Peak. More importantly, on the basis of regional proximity to the Idaho batholith and to a date of 125 m.y. reported by McDowell and Kulp (1969) for a major granitic phase of that intrusion, it may be postulated that the Mann Creek granodiorite and other younger plutons were emplaced during a temporally common and widespread magmatic event in Early Cretaceous time.

For reasons enumerated above, we believe that the apparently large age difference between the Iron Mountain quartz diorite (200 m.y.) and Mann Creek granodiorite (120 m.y.) is real and records two separate episodes of Mesozoic plutonism. We correlate the earlier event with older Mesozoic plutonism (approximately 200 m.y.) that occurred elsewhere along the Western Cordillera of North America and tentatively correlate the younger event (approximately 120 m.y.) with possibly more local plutonism associated with emplacement of the nearby Idaho batholith. On the basis of geologic evidence, we reject a possible later thermal event, such as faulting or uplift and erosion, as an alternative hypothesis to account for the younger Mann Creek granodiorite. Additional geologic work and radiometric age determinations are needed to confirm or deny the inferred bimodal distribution of Mesozoic plutonism along this north-northeast trending zone of intrusions between eastern Oregon and western Idaho.

SAMPLE DESCRIPTIONS

1. YU-I-161 K-Ar (biotite) 200±4.0 m.y.

Iron Mountain pluton. Medium-grained equigranular quartz diorite (NW/4, SW/4, Sec. 23, T14N, R6W; 44°31′59″N, 117°03′24″W; Mineral 15′ quad.; Washington Co., ID) composed of plagioclase (minor sericite), quartz, biotite (minor chlorite), hornblende, orthoclase, and minor magnetite; chemical analysis SiO_2 = 65.7%, Al_2O_3 = 15.6%, total iron as FeO = 4.8%, CaO = 4.6%, MgO = 2.1%, Na_2O = 3.5%, K_2O = 2.5%, and TiO_2 = 0.44%. Analytical data: K = 5.13%; $\overset{*}{Ar}^{40}$ = 43.1 x 10^{-6} cc/gm (88% Σ Ar^{40}). Collected by: T. A. Henricksen, Oregon State Univ.

2. YU-SS-60-A K-Ar (biotite) 120±2.4 m.y.

Mann Creek pluton. Medium-grained inequigranular porphyritic granodiorite (SW/4 SW/4, Sec. 27, T15N, R5W; 44°37′07″N, 116°56′24″W; Sturgill Peak 15′ quad.; Washington Co., ID) composed of plagioclase (minor sericite) = 55%, quartz = 21%, orthoclase = 8%, biotite (minor chlorite and magnetite) = 8%, and hornblende = 6%. Analytical data: K = 6.64, 6.64%; $\overset{*}{Ar}^{40}$ = 32.9 x 10^{-6} cc/gm (94% Σ Ar^{40}); 32.7 x 10^{-6} cc/gm (91% Σ Ar^{40}). Collected by: S. J. Skurla, Oregon State Univ.

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