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K-Ar AGES OF VOLCANIC ROCKS FROM THE CENTRAL SIERRA PEÑA BLANCA, CHIHUAHUA, MEXICO

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We report K-Ar ages from six samples of volcanic rocks from central Sierra Peña Blanca. The samples come from the Mesa, Escuadra, Nopal, and Corrales Formations. Mineral separates (all sanidines with one exception) were partially prepared by José G. Solorio at the Institute of Geology, University of Mexico, and completed at the U. S. Geological Survey, Isotope Geology Laboratory, Menlo Park, California. Potassium analyses were done by Lois Schlocker by flame photometer, using lithium metaborate fusion (Suhr and Ingamells, 1966), the lithium serving as an internal standard. Argon extractions were made by RF induction heating in high-vacuum pyrex extraction lines using isotope dilution techniques described by Dalrymple and Lanphere (1969). Mass analyses were made with a Neir type, 6-inch, 60° sector mass spectrometer operated in the static mode. Estimated analytical uncertainty is ± 2 percent at one standard deviation. Constants used in age calculation are: $\lambda_e = 0.585 \times 10^{-10} \text{ yr}^{-1}$, $\lambda_\beta = 4.72 \times 10^{-10} \text{ yr}^{-1}$, $K^{40}/K_{\text{total}} = 1.19 \times 10^{-4} \text{ mole/mole}$.

GEOLOGIC DISCUSSION

In the central Sierra Peña Blanca a thick sequence of clastic sedimentary rocks and volcanic rocks of lower Tertiary age were deposited on underlying lower Cretaceous carbonate rocks (fig. 1). Two distinct stages of volcanism occurred.

The Tertiary units are shown on the geologic column (fig. 1), and their ages are summarized as follows (from older to younger): Pozos Formation — calcareous and volcanic conglomerates; Corrales Formation — rhyolite lavas and ash flows (42 and 54 m.y.); Nopal Formation — rhyolite lavas and ash flows (44 m.y.); Escuadra Formation — rhyolite ash flows and lavas, and basal calcareous conglomerates (44 and 38 m.y.); Peña Blanca Formation — rhyolite ash flows, and basal calcareous conglomerates; and Mesa Formation — trachyte and rhyolite flows (37 m.y.).

The first stage of volcanic activity is represented by the Pozos, Corrales, Escuadra and Peña Blanca Formations. Uranium mineralization occurs, principally in the Nopal volcanic rocks, but can also be found in the other formations of this stage. The Mesa Formation is believed to be a slightly later stage of volcanic activity since the lavas are practically horizontal and have suffered only post-Laramide high angle faulting. The age of the Mesa Formation is not significantly younger than that of the upper part of the Escuadra, so that a long time break in the volcanic sequence is not apparent.

The two samples from the Corrales Formation were collected at the same outcrop, but at different elevations. The younger sample (42 m.y.) came from 5 meters higher than the older (54 m.y.). It is considered unlikely however, that such a large difference in age exists between the two samples. The apparent discordance may be due to alteration which has affected the formation at this locality. The data indicate that the lower Tertiary volcanic activity took place at least from 54 to 37 m.y. ago.

SAMPLE DESCRIPTIONS

1. CH-72-5 K-Ar (sanidine) 37.3 \pm 0.7 m.y.
 Mesa Formation, trachyte (29°09'00"N, 106°04'06"W, Chihuahua, Mexico). Analytical data: $K_2O = 6.69, 6.70\%$; $*Ar^{40} = 3.73 \times 10^{-10} \text{ moles/gm}$; $*Ar^{40}/\Sigma Ar^{40} = 0.845$. Dated by: U. S. Geological Survey, Menlo Park, CA.

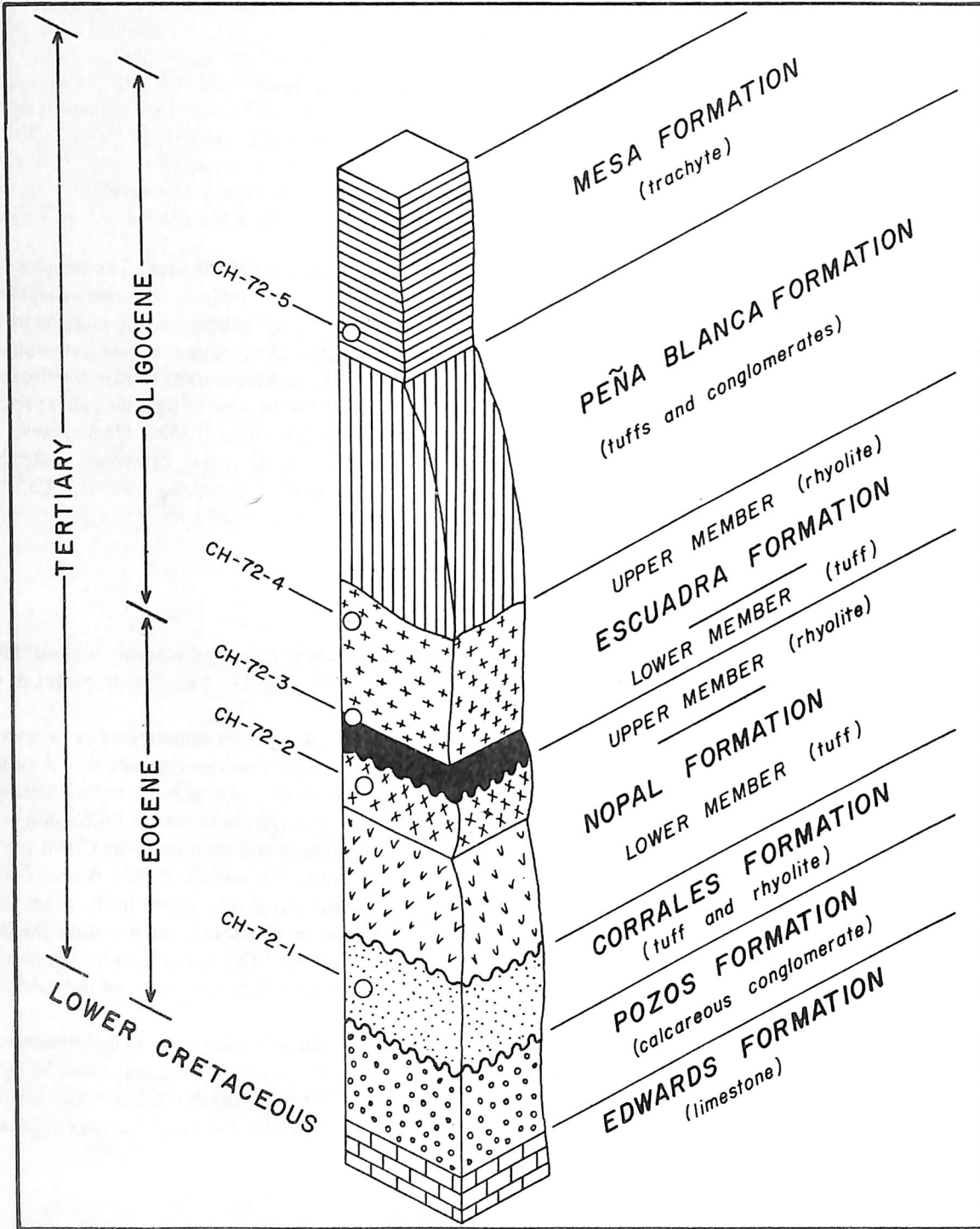


Figure 1. Geologic column of the rocks in the central Sierra Peña Blanca.

2. CH-72-4 K-Ar (sanidine) 38.3 ± 0.8 m.y.
Escuadra Formation, upper member, rhyolite ($29^{\circ}08'06''$ N, $106^{\circ}03'30''$ W; Chihuahua, Mexico). Analytical data: $K_2O = 8.08, 8.10\%$; $*Ar^{40} = 4.62 \times 10^{-10}$ moles/gm; $*Ar^{40}/\Sigma Ar^{40} = 0.897$. Dated by: U. S. Geological Survey, Menlo Park, CA.
3. CH-72-3 K-Ar (sanidine) 44.5 ± 0.9 m.y.
Escuadra Formation, lower member, rhyolite ash flow ($29^{\circ}08'06''$ N, $106^{\circ}03'30''$ W; Chihuahua, Mexico). Analytical data: $K_2O = 8.72\%$; $*Ar^{40} = 6.02 \times 10^{-10}$ moles/gm; $*Ar^{40}/\Sigma Ar^{40} = 0.904$. Dated by: U. S. Geological Survey, Menlo Park, CA.
4. CH-72-2 K-Ar (sanidine) 43.8 ± 0.9 m.y.
Nopal Formation, upper member, rhyolite ($29^{\circ}06'54''$ N, $106^{\circ}00'48''$ W; Chihuahua, Mexico). Analytical data: $K_2O = 7.18, 7.18\%$; $*Ar^{40} = 4.69 \times 10^{-10}$ moles/gm; $*Ar^{40}/\Sigma Ar^{40} = 0.897$. Dated by: U. S. Geological Survey, Menlo Park, CA.
5. CH-72-1-II K-Ar (sanidine) 42.2 ± 1.0 m.y.
Corrales Formation, rhyolite ($29^{\circ}09'36''$ N, $106^{\circ}05'48''$ W; Chihuahua, Mexico). Analytical data: $K_2O = 6.36, 6.36\%$; $*Ar^{40} = 4.01 \times 10^{-10}$ moles/gm; $*Ar^{40}/\Sigma Ar^{40} = 0.955$. Dated by: U. S. Geological Survey, Menlo Park, CA.
6. CH-72-1-I K-Ar (biotite) 53.8 ± 1.1 m.y.
Corrales Formation, rhyolite ($29^{\circ}09'36''$ N, $106^{\circ}05'48''$ W; Chihuahua, Mexico). Analytical data: $K_2O = 7.57, 7.60\%$; $*Ar^{40} = 6.12 \times 10^{-10}$ moles/gm; $*Ar^{40}/\Sigma Ar^{40} = 0.802$. U. S. Geological Survey, Menlo Park, CA.

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