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ESR DATING THE VILLAFRANCHIAN IN FRANCE AND ELSEWHERE: A "HANDICAPPED" STUDY?

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To our knowledge, no one has ever attempted a fully blind ESR dating study. Standard ESR dates require that the external dose rate at a site be measured in order to calculate the ESR date. Here, we report the first fully blind ESR study for teeth "supposedly" from the Villafranchian site, Senèze, in the Massif central, France. The only sediment available with these museum samples was that still attached to the teeth. For each tooth, 5-8 subsamples were independently dated by ESR in order to calculate an isochron for each tooth (Blackwell & Schwarcz, 1993, *Applied Radiation & Isotopes* 44: 243-252). Since the tooth acts as its own dosimeter, an isochron date can provide both the external dose rate and the age for the tooth.

The Villafranchian site at Senèze contains numerous extinct species found in a normally magnetized layer between two reversely magnetized layers of lacustrine sediment. A maar lake formed some time after the basal lava at 2.48 ± 0.06 Ma, when the volcanic cone exploded. The lake was subsequently filled by more than 120 m of sediment that includes a sequence of varve-like sediments that may record 20-30 ky of annual layers. During the last phase of lake infilling, periodic floods washed bone-rich sediment into the lake from the surrounding slopes. The fauna includes several type species, including rare monkeys (*Paradolichopithecus arvernensis* and *Macaca sylvanus*). Dates suggested for the sites have ranged from 1.6 to 2.48 million years old based on faunal associations or dates on the underlying lava.

Two teeth have now been completely analyzed and four more are in progress. Assuming linear U uptake (LU), one tooth dated at 81 ± 11 ka. Even assuming recent U uptake (RU), this tooth still is significantly younger than expected. If this tooth is indeed from Senèze, it is been reworked into the faunal deposit from much younger sediments, or it is a "red herring" added to the study to determine if we could recognize younger teeth. Assuming RU, the second tooth dated at 2.47 ± 0.12 Ma. This blind study has demonstrated that ESR can provide reliable precise ages for teeth in the age range of the Villafranchian.

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