



ELECTRON SPIN RESONANCE DATING OF *N. PLATENSIS* FROM CÓRDOBA, ARGENTINA

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Introduction: Among the megamammals that occurred in South America during the Quaternary, the mastodon *Notiomastodon platensis* stands out due to abundance of fossiliferous records on the continent. Its temporal distribution varies from Ensenadense (Middle/Inferior Pleistocene) to the Early Holocene, with predominance in the Upper Pleistocene (Lujanense). Information about new records and absolute ages for specimens of *N. platensis* expands the knowledge about its existence, increasing the precision of its geographic and temporal distributions. This work presents age results obtained by Electron Spin Resonance of these proboscides found in Córdoba, Argentina. The localities include 4 regions: Serrana Region, Piedemonte Este, Central Aeolian Plains and Southern Aeolian Plains. **Material and method:** The enamel of each tooth sample was separated from the dentin using the thermal method or mechanical drilling with Dremel drill. Subsequently, the enamel layer was subjected to a treatment with 1:5 HCl acid, in an ultrasonic bath, until its thickness was reduced by at least 100 μm . The material was dried and ground manually with agate mortar and pestle until the particles < 100 μm [1]. The material was divided into approximately 50 mg aliquots for irradiation that was carried out in a Cobalt-60 source, with the samples between an acrylic layer of 5 mm in order to produce the electronic equilibrium.

One of the aliquots of enamel, as well as dentin and associated sediment were analyzed by neutron activation in order to obtain the concentration of U, Th and K.

Subsequently, the ESR spectra of the irradiated enamels were recorded in the JEOL spectrometer. The peak-to-peak intensity of the CO_2^- spectrum at $g_{\perp} = 2.0025$ was associated with the dose using a single saturation exponential function [2]:

$$I = I_0 \cdot \left(1 - e^{-\left(\frac{D+D_E}{D_0}\right)}\right) \quad (1)$$

Where I is the Intensity, I_0 and D_0 the intensity and dose at saturation and D_E the equivalent dose.

The equivalent dose (D_E) was converted to age using the ROSY software [3].

Results:

Table 1 lists the main results from the 7 teeth:

Table 1: Equivalent dose and age of the *N. Platensis* teeth from Córdoba

Sample	Location	D_E (Gy)	CU (ka)
1	Pampa Vaca Corral	65.6 ± 6.8	47 ± 7
2	Rio Segundo	445 ± 30	53 ± 6
3	Almafuerte	84.5 ± 8.6	54 ± 7
4	Rio Segundo	231 ± 22	70 ± 20
5	Sitio El Silencio	1000 ± 100	87 ± 9
6	Rio Cuarto	2312 ± 188	320 ± 20
7	Rio Segundo	3358 ± 282	560 ± 40

The oldest known absolute datings were obtained for all locations. The ages of 320 ± 20 ka and 560 ± 40 ka are the oldest datings for the Province of Córdoba, the latter being the oldest for the proboscis *N. platensis* in all South America.

Conclusions: Results indicated that *N. platensis* inhabited the Province of Córdoba throughout the Middle and Upper Pleistocene (Ensenadense to Lujanense), in low to high altitude locations.

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References:

- [1] A. Kinoshita, A. M. G. Figueiredo, G. D. Felice, M. Lage, N. Guidon, and O. Baffa, *Nucl. Instruments Methods Phys. Res. Sect. B Beam Interact. with Mater. Atoms*, **266**, 4, 635–639, (2008).
- [2] M. Ikeya, "New Applications of Electron Paramagnetic Resonance. Dating, Dosimetry and Microscopy." World Scientific, New Jersey, USA, p. 500, 1993.
- [3] B. J. Brennan, W. J. Rink, E. M. Rule, H. P. Schwarcz, and W. V. Prestwich, *Anc. TL*, **17**, 9, (1999).