

ON THE POSSIBLE EXISTENCE OF AN  $\alpha$  - ACTIVE  
POLONIUM ISOTOPE WITH GEOLOGICAL HALF-LIFE

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RESUMEN

*The range distribution in nuclear emulsion of  $\alpha$  tracks from samples prepared in 1955 by R. Ripan et al. by chemical methods from Transsylvanian altaite has been compared with the  $\alpha$  range distribution of Po-210. A  $\chi^2$  test shows that there are good reasons to admit that both distributions are identical; the same conclusion arises from comparison of the mean ranges. The existence of an unknown Po isotope with geological half-life, as supposed by the quoted authors, becomes thus highly improbable. A possible explanation of the unexpected presence of Po-210 in the sample prepared from altaite, lies in the fact that all chemical processing has been carried in Cluj, where the contamination level of the water net work with Ra and Rn is somewhat higher than normal.*

## INTRODUCTION

By chemical methods R. Ripan et al.<sup>1</sup> have separated from an altaite collected in Stanija (Transsylvania) - a telluride of lead, bismuth and gold, - a Polonium isotope, which they deposited electrochemically on a silver foil. These authors report that the  $L\beta$  and  $L\gamma$  X rays of this substance are identical with those identified previously by H. Hulubei and Y. Cauchois<sup>2</sup>, and so they come to the conclusion that this Polonium isotope might be one of very long (geological) half-life.

In this note we intend to put forward some considerations concerning the possibility that the Polonium isotope detected<sup>1</sup>, be identical with Polonium-210. The method used is a comparison of  $\alpha$  range distributions in nuclear emulsions of the Po isotope under investigations and Po-210.

Experiments have been performed with the following specimens used in ref.<sup>1</sup>:

- a) 4 silver foils ( $\sim 1 \text{ cm}^2$  each), denoted herein by A, B, C and D, in the order of their introduction into the final solution of ref.<sup>1</sup>;
- b) 3 salt specimens obtained in different stages of the separations performed in ref.<sup>1</sup>;
- c) 1 specimen of Stanija altaite, of the same kind as used as raw material in ref.<sup>1</sup>.

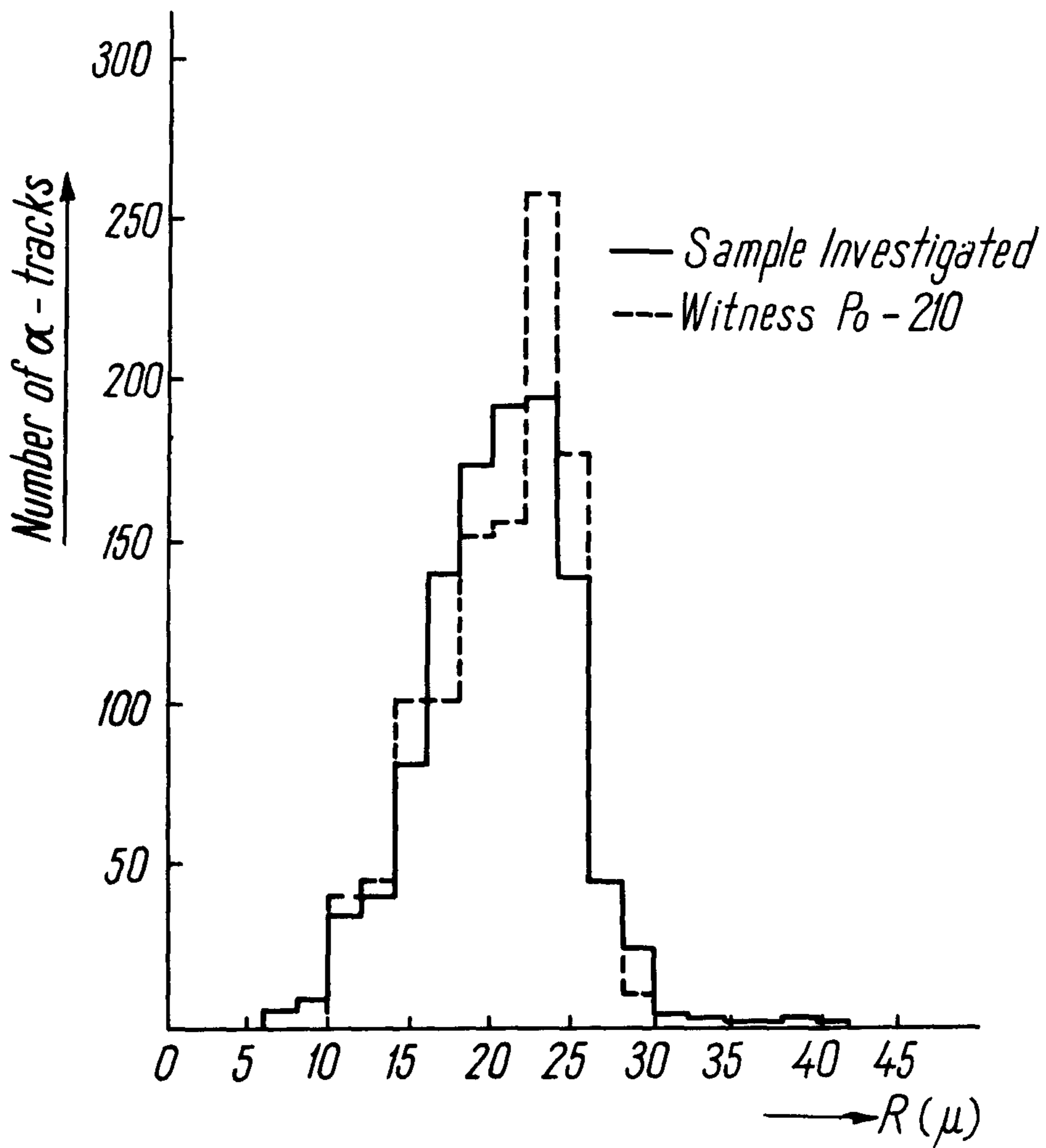
The radioactivity of these materials has been investigated by contact exposure on nuclear emulsions prepared by the author<sup>3</sup>, with the same properties as those used in ref.<sup>4</sup> In order to prevent fading all exposures have been performed in exsiccators with  $\text{CaCl}_2$  at  $\sim 10^\circ \text{ C}$ , with emulsions of the same batch. The plates have been processed according to the procedure given by the manufacturer for Ilford C2 emulsions. For scanning and range measurements has been used a MEOPTA binocular microscope, with 6x eye-piece and 90x oil objective (total magnification  $\sim 810 \times$ ). This salts have been analysed in two ways: 1) by deposition of finely ground salt powder on a nuclear emulsion and 2) by soaking the nuclear emulsion with a solution of these salts with correspondingly adjusted pH.

As witness, a silver foil with Po-210 has been radiographed, too.

Table I presents the experimental results. Fig. 1 shows the range histograms, normalized to the same area, for both specimens.

TABLE I.

Nº	Specimen	Exposure days	Number of $\alpha$ tracks recorded	Mean range of $\alpha$ tracks $\mu$	Scanned area $\text{cm}^2$
1	Po-210 silver foil	0.0208 (30 minutes)	215	$19.44 \pm 0.28$	0.01056
2	Silver foils A and B	21	1089	$19.24 \pm 0.14$	0.43 A 0.53 B
3	Silver foil C	21	Weak radioactive contamination		
4	Silver foil D	21	Idem		
5	Salts: 1, 2, 3 powders or solutions	30	Idem		
6	AltaTe	40	Idem		



## CONCLUSIONS

A  $\chi^2$  test between these two distributions<sup>5</sup> yields  $\chi^2 = 10.4$  with 6 degrees of freedom, i.e.  $P\chi^2 \sim 0.10$ . Thus there are good reasons to suppose that both distributions are identical. The average ranges given in the fifth column of Table I, have been computed from the individual ranges of each  $\alpha$  track. The fact that they are practically coincident ( $\Delta \bar{R} = 0.20 \pm 0.31 \mu$ ) is in perfect agreement with the  $P\chi^2$  value quoted.

A possible explanation of the supposed presence of Po-210 in the sample prepared in Cluj (Transsylvania)<sup>1</sup>, might be the fact established by G. Atanasiu<sup>6,7</sup> and A. Szabó<sup>8</sup>, that the ordinary water supplied by the Cluj network has a relatively high level of contamination with radon, 1.138 millimicrocurie/litre and  $1 \times 10^{-12}$  g. Ra/litre.

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