Nuclear Decay Rates and the Cosmos

by Zbigniew Jaworowski

A paper by J.H. Jenkins et al. on "Evidence for Correlation Between Nuclear Decay Rates and Earth-Sun Distance," dated Aug. 25, 2008, was circulated on CCNet, Aug. 28.[1] The same phenomenon was described in 1998 by S.E. Shnoll et al. from Lomonosov Moscow State University (shnoll@iteb.ru) in a paper titled "Realization of Discrete States During Fluctuations in Macroscopic Processes," published in English in *Physics-Uspekhi*,[2] It was also reviewed in *21st Century*, Summer 2000 (www.21stcenturysciencetech.com/articles/ time.html)

The abstract of the Shnoll paper reads: "It is shown that due to fluctuations, a sequence of discrete values is generated by successive measurement events whatever the type of the process measured. The corresponding histograms have much the same shape at any given time and for processes of different nature and are very likely to change shape simultaneously for various processes and in widely distant laboratories. For a series of successive histograms, any given one is highly probably similar to its nearest neighbors and occurs repeatedly with a period of 24 hours, 27 days, and about 365 days, thus implying that the phenomenon has a very profound cosmological (or cosmogonic) origin."

This paper is an effect of more than 40 years of studies, and parts of it were published several times before, after the first observation in 1955 of this phenomenon in various biochemical reactions. The paper cites 14 publications on this subject in Russian, the first in 1958. Later the phenomenon was found in homogenous chemical reactions with low-molecular compounds, as well as in diverse physico-chemical measurements: (a) velocities of latex particles in an electric field; (b) discharge time delay in neon lamp RC oscillator; (c) transverse relaxation time tau[2] of water protons using the spin echo technique; (d) amplitude of concentration fluctuations in the Belousov-Zhabotinsky reaction; and (e) radioactive decay of various isotopes.

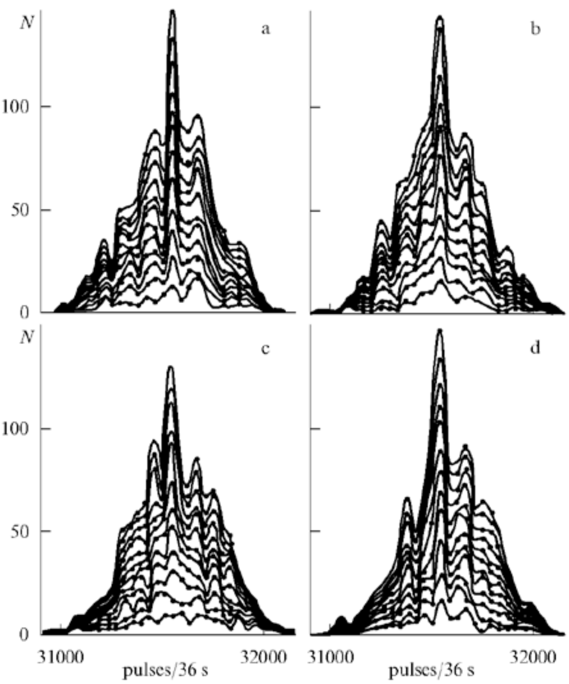
It was found that the phenomenon does not depend on the measurement techniques or the nature of the phenomena under investigation. The measurements of radioactivity, for example, were performed with Geiger counters, liquid and solid scintillation counters, and solid state detectors. The beta, alpha and gamma activity of 11 radionuclides was measured: H-3, C-14, P-32, Co-60, Tl-204, Ra-226, Po-210, Po-214, Po-218, Pu-239, and the secondary X-ray quanta at 5.9 keV and 6.3 keV, which accompany the K-capture associated with the Fe-55 to Mn-55 transformation.

The bulk of the experimental data, however, were derived from the measurements of the alpha activity of Pu-239 specimens firmly attached to silicon solid state detectors. Control measurements were performed as necessary for eliminating the dependence of the results on the amplitude cut-off regime, etc.

The geographical distribution of the simultaneous measurements was rather large; the minimum distance between a pair of laboratories was more than one hundred and up to many thousands of kilometers. The study sites were at Moscow,

Figure 1

ILLUSTRATION OF NON-RANDOMNESS OF THE DISTRIBUTION OF MEASUREMENTS OF RADIOACTIVITY



Results of 1,200 consecutive measurements of an Fe-55 preparation show the non-randomness of the radioactivity. Layer lines are drawn after each 100 measurements. Instead of the expected bell-shaped curve, sharp peaks are found at certain pulse rates of the scintillation counter. The mean activity is about 31,500 pulses per second, but peaks are seen at other activity levels in the four separate trials of 1,200 consecutive measurements shown here.

Source: Courtesy of Shnoll et al., 1998. *Upsekhi Fisicheskikh Nauk*, Vol. 41, No. 10.

Pushchino, Tomsk, Leningrad, the Pacific Ocean, the Indian Ocean, and the White Sea beyond the Arctic Circle.

Shnoll et al. summarized their results as follows:

"Because of fluctuations, any sequence of measurements of processes of arbitrary nature yields a series of discrete values. Some of such values occur much more often than others—we observe 'allowed' and 'forbidden' states of microscopic objects. The corresponding histograms exhibit extrema—peaks and troughs. The shape of the spectrum of allowed and forbidden states—the relative distances between the levels and their populations—is at all times similar for processes of different natures, and is very likely to vary synchronously for different processes, even when they occur in laboratories many miles away from each other. There is a certain 'lifetime'; for the given shape of histograms: in series of consecutive histograms, a histogram is most likely to be similar to its closest neighbors. The shapes of histograms are very likely to recur with a period of 24 hours, 27 days, and 365 days. All this (regular time variation of consecutive histograms, similarity of histograms for simultaneous independent measurements of processes of different nature and possibly occurring at different geographical points) points to existence of a universal cosmophysical (cosmogonic) cause of this phenomenon."

In their conclusions, the Russian authors (six of them) analyzed a question: Why have there been no results from other laboratories?"

The Jenkins et al. paper is probably the first paper from such an "other laboratory."

One may find other English papers by Shnoll et al. at http://www.allais.info/priorartdocs/shnoll.htm

References

1. The Cambridge Conference Network, CCNet, is an electronic interest group moderated by Dr. Benny Peiser.
2. *Uspekhi Fizicheskikh Nauk*, Vol. 41, No. 10, pp. 1025-1035, 1998, Russian Academy of Sciences, (PACS numbers: 01.90.+g,06.20.+f, 89.90.+n).