CRITICAL SLOWING DOWN IN WILDLIFE

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For systems having a state of unstable equilibrium, the phenomenon of critical deceleration is characteristic. Critical slowdown when approaching an unstable equilibrium (catastrophe) is a universal phenomenon [1–3], inherent in systems of diverse nature, evolving to a catastrophic change in their state. The essence of this phenomenon lies in the fact that as the system approaches a catastrophe, natural oscillations of the determining parameters are excited in it (due to random influences that are always present in a real system), with a frequency decreasing as the catastrophic threshold is approached. In the mathematical theory of catastrophes [4], "critical deceleration" is called one of the "flags" of a catastrophe, i.e. the event that preceded it. Critical deceleration also determines other features of the behavior of systems in the vicinity of a critical transition - an increase in autocorrelation and dispersion of random oscillations of the system [5]. The evolution of living nature is one of the examples of processes that may be characterized by a critical slowdown. According to the discontinuous evolution hypothesis, the sequential development of living systems at some point may be replaced by abrupt changes [6]. At the same time, the reasons for such behavior can be not only changes in the habitat, but also reasons of a biotic nature associated with unfavorable mutations of living organisms. As shown by the results of a study published in [7], 10 million years before the catastrophic event, which is believed to have led to the death of non-avian dinosaurs, they were already experiencing problems with the formation of new species. In addition, as shown in this paper, there is a critical slowdown in the dynamics of the number of species presented in [7]. This indicates that the population is approaching a catastrophe, and the collision of an asteroid with the Earth 66 mil-lion years ago was only a trigger for the extinction of non-avian dinosaurs.

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