BLOG BIOLOGÍA TROPICAL

Vol 3 No 1 (2022) Revista de Biología Tropical

# Four tsunami indictors needed in the Tanis site, Hell Creek Formation, North Dakota

*Julián Monge Nájera | Ecologist*

*April, 12th 2022*

**It has been proposed that (1) the Tanis site, Hell Creek Formation of North Dakota, has the fossil remains of a tsunami and that (2) this tsunami was caused by the Chicxulub asteroid impact and the extinction of non-avian dinosaurs. If this interpretation is correct, Tanis should present the typical characteristics of tsunami sites. Here I list the characteristics that Tanis should have if it is a tsunami site.**

*Tyrannosaurus rex* (Hell Creek Formation, Upper Cretaceous; near Faith, South Dakota, USA). Source: Wikimedia.

If the Tanis site preserved the effects of the Chicxulub asteroid impact, as proposed by DePalma et al. (2019), it represents a landmark in the history of paleontology. However, little information is formally available, and if the interpretation is correct, the site should present the typical characteristics of tsunami sites. The effects of tsunamis on the shore include the inland movement of marine sediment, water and organisms, followed by an opposite flow of terrestrial material and biota; this phenomenon reaches deeper inland areas along watercourses. The first prediction for Tanis is thus the presence of marine sediment, water and organisms.

In the 2011 tsunami that affected Gamo Lagoon, Japan, there was a reduction of four parameters: submerged area, sand dune vegetation, forest and macroalgal patches. Bare intertidal flats grew in extension. One result is of particular interest to paleontologists: muddy sediment was flushed out and the local sediment became sandier, this should be reflected in the immediate post-impact fossilization at Tanis.

Animals that live in the mud, for example, mollusks, mostly perished during the tsunami, and, for a few months, marine species occupied the site (Kanaya, et al. 2014). However, fish and water-column invertebrates mostly survived (Ito et al. 2016; Shoji and Morimoto 2016). The Tanis site should reflect this, with large mortality of sediment organisms and less mortality of fish and water-column animals.

Little has been published on the Tanis site, but when it is studied in some detail, those characteristics should be found if we are going to believe that it indeed represents a tsunami event. That it represents the Chicxulub event and not any other tsunami, would still need to be proved.

**Julián Monge-Nájera**

Ecólogo y fotógrafo
Universidad Estatal a Distancia
San José, Costa Rica
Correo: julianmonge@gmail.com
Publicaciones: https://cr.linkedin.com/in/julianmongenajera-4a60a918/es

## REFERENCIAS

Ito, K., Katayama, A., Shizuka, K., & Monna, N. (2016). Effects of the Great East Japan Tsunami on fish populations and ecosystem recovery. The Natori River; northeastern Japan. In *Tsunamis and earthquakes in coastal environments* (pp. 201-216). Springer, Cham

DePalma, R. A., Smit, J., Burnham, D. A., Kuiper, K., Manning, P. L., Oleinik, A., ... & Alvarez, W. (2019). A seismically induced onshore surge deposit at the KPg boundary, North Dakota. *Proceedings of the National Academy of Sciences*, *116*(17), 8190-8199.

Kanaya, G., Maki, H., Suzuki, T., Sato-Okoshi, W., & Kikuchi, E. (2014). Tsunami-induced changes in a shallow brackish lagoon ecosystem (Gamo Lagoon) in Sendai Bay, Japan. *Glob Environ Res*, *18*(2014), 35-46.

Shoji, J., & Morimoto, M. (2016). Changes in fish community in seagrass beds in Mangoku-ura Bay from 2009 to 2014, the period before and after the tsunami following the 2011 off the Pacific coast of Tohoku earthquake. *Journal of oceanography*, *72*(1), 91-98.

Scientific and graphic edition by Katherine Bonilla Badilla.