# How the Big Dinosaurs Perished

Clark M. Thomas


(The Western Ghats hills at Matheran in Maharashtra, India. Credit: Nicholas/Wikipedia)

The giant Yucatan asteroid had a lot to do with finally exterminating large dinosaurs some 66 million years ago. However, pre-existing and ongoing volcanic eruptions on the opposite side of the Earth, under what is now India, may have had a more important role.[1]

Megafauna dinosaurs were already highly compromised before the great impactor event. Some dinosaur giants might have hung on in isolated ecosystems for several million years more without a monster asteroid impact, decreasing in absolute numbers and in number of species.

Not every species in the biosphere perished. Many oceanic species survived, as well as a number of land species. Alligators, for example, are

[1] https://phys.org/news/2017-02-simulation-plumes-involved-deccan.html

very tough and resourceful reptiles that we encounter today. More interesting is the fact that today's yardbird chickens are the closest living relatives of the feathered T-Rex. There are also many other bird species that survive today. Therefore, why did certain species survive to evolve, while others perished?

About 70 million years ago two plumes of basaltic lava erupted under what is now part of western India. Those plumes both eventually produced a volume of lava equal to *60 million cubic kilometers of mantle.* This deep material covered an area roughly equal to both the American states of Washington and Oregon.

Some of that huge volume shot high into the air before it was deposited as high hills. Vast quantities of noxious gas were emitted for millennia into the atmosphere. Earth's atmosphere was darkened by sunlight-reflecting aerosol particulates for millions of years, and temperatures dramatically fell over the planet. Some equatorial areas of Earth were slightly warm, but skies around the entire earth were persistently occluded, seriously affecting edible vegetation photosynthesis.

These two liquid mantle plumes peaked around 68 million years ago. Only two million years later the infamous asteroid coincidentally struck our planet, adding lethal insult to injury. That impact was enough to sharply intensify the ecological disaster already underway, and to finish off all the enfeebled large dinosaurs, but not all dinosaur family species.

One of the great lava plumes slowed 40 million years ago – some 30 million years after it started. The second plume persisted until about 20 million years ago – some fifty million years after it started. Compare this timeline with how long the recent Mount St. Helens blast lasted.

When Krakatoa in Indonesia blew in 1883 it produced a global summer without summer, with June snow falling in New England.[2] Earlier, in 1613 BC the Minoan eruption of the Santorini super volcano destroyed the civilization that Plato called Atlantis.[3] Earlier still, about 74,000 years ago, the Toba super volcano in Sumatra threatened the very existence of our new human species, leaving only a few thousand survivors worldwide after years of dark cold.[4]

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2 https://www.volcanodiscovery.com/krakatau.html

3 https://www.volcanodiscovery.com/santorini.html

4 http://www.ranker.com/list/the-world_s-6-known-supervolcanoes/analise.dubner

Nearly all asteroids alone lack the kinetic energy to create a sustained mass global extinction. That level of damage could require a minor planet blasting into Earth. It is likely that if there had been no Deccan Traps we could still have some large dinosaurs today (assuming no poachers), even with the asteroid. There have been other fairly large impacts with no serious effect on species. One of these occurred about 35 million years ago at the southern tip of the Delmarva peninsula where the Chesapeake Bay now exists.[5]

Back to chickens and other survivors of the "*K-T extinction*" – meaning the extinction of large dinosaurs and others at the boundary between the Cretaceous period (K) and the Tertiary period (T). By 65 million years ago about half of all the Earth's species on land and in the seas were extinct.[6] Enough remained, however, to evolve into today's highly diverse biosphere.

The primary reason chickens and many birds survived, whereas their relatives, the huge feathered dinosaurs, did not is simple: *It's a simple matter of the ratio of feather insulation to body mass.* Chickens and many other birds with a high ratio of insulation survive quite well outdoors in modern winters. Chickens are endothermic and covered with many fluffy feathers, creating a nice layer of insulation. Other birds do well when they fluff up their feathers, creating a deeper layer of insulation.

Large feathered dinosaurs did not have a sufficiently deep layer of feathers to fluff up and protect their large mass from the extreme challenges following the Mayan impact. Many other large dinosaur species without feathers had already perished before, or because of the Deccan Traps.

Other reasons were in play for who would survive and who would not: Large herbivorous dinosaurs needed sufficient plant food to survive; and large dinosaur carnivores needed plant-eating dinosaurs to survive. In contrast, small omnivorous animals could survive during extended hard times. Endothermic mammals were small and versatile, so they persisted. In the seas, some shark species survived, while other shark species did not. Here was extreme biosphere "survival of the fittest."

That ancient crisis has led to today's beautiful biosphere — and yet we myopic humans are busy preparing to create a new mass extinction era of

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5 https://meteor.pwnet.org/impact_event/impact_crater.htm

6 http://www.ucmp.berkeley.edu/diapsids/extinction.html

our own making. It could start with near-term global thermonuclear war, or it could simply become the sixth great mass extinction, and the first since that of 65 million years ago.[7] I'm placing my bets on the wild chickens surviving either scenario, but not many humans.

When I speak of the few long-term surviving humans, similar to what happened some 70,000 years ago, I am not talking about gun-toting, gasoline-guzzling "survivalists" similar to Mad Max. The actual long-term survivors will be very traditional and far removed in the tropics from modern "civilization." Survivors will be meek by modern standards, but very resilient where it matters. As Jesus in the *Bible* said, "The meek shall inherit the Earth."[8]

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[7] http://www.livescience.com/13038-humans-causing-sixth-mass-extinction.html

[8] https://en.wikipedia.org/wiki/Matthew_5:5