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How DART (double asteroid redirection test) will save us

TALK OF THE stars
with Professor Donald Kurtz

MASS DESTRUCTION: Artist's impression of the asteroid striking Chicxulub, Yucatan, 66-million years ago ***Picture: Don Davis***

Sixty-six million years ago the Yucatan Peninsula in Mexico was struck by an asteroid 10km in diameter travelling at 70,000 km/h.

This giant space rock drove deep into the Earth's crust and exploded with an energy equivalent to 100-million hydrogen bombs.

The ensuing tsunami inundated the US coast from Texas to Washington DC, Ireland, England and Western France, and most of the Amazon basin. The firestorm burnt the rest of North America and travelled around the globe. Soot from the fires, vapour from the rock and water filled the atmosphere and the skies went dark for years.

In a few short years, 75% of all species were driven to extinction. No four-legged animal weighing more than 25kg survived. Of the dinosaurs, only the small, feathered ones that later became birds made it through.

Gone were the behemoths that had dominated the Earth's ecosystems on land, the giant sea reptiles that roamed the oceans, and the flying pterosaurs with wing spans up to 10m that glided through the skies. It was the end of the Cretaceous geological period that had lasted 79-million years.

At that time our mammal ancestors were small and kept well out of the way of the large dinosaurs.

When the long darkness came, they could survive on what little food remained and their fur kept them from freezing. When the skies finally cleared, they spread across the globe and are now the dominant species, with us at the top of the food chain.

Could this happen again? Yes.

Will it happen again? That depends on us.

There are over a million identified asteroids in the solar system. They range in size from the giant Ceres, which is big enough to be called a dwarf planet, down to small rocks.

About 30,000 of them are known to cross the Earth's orbit, so have the potential to collide with us. A big one will come – maybe soon, maybe not for millions of years.

When we see it coming, what do we do? We will not do what Hollywood does in films such as *Armageddon* and *Deep Impact*. We will not blow the asteroids up. That does not help if we get hit by all the debris. Our plan is to hit them hard enough to give them a nudge to the side, so that they then miss the Earth and just pass by harmlessly.

For that we need to find them long before they can hit us. Then we need to get out to them in good time to give them a nudge.

On September 26 Nasa tested an asteroid impact by crashing a 610kg spacecraft, DART, into Dimorphos, a 160m diameter little moon of the larger 780m asteroid Didymos (which means twin in Greek).

The spacecraft slammed into the surface of Dimorphos at 24,000km/h raising a great plume of debris and dust that could be seen through ground-based telescopes as a long tail – the first human-made comet!

It is easy for us to measure how long Dimorphos and Didymos take to orbit each other. Nasa confirmed on October 11 that the orbital period had shrunk from 11 hours 55 minutes to only 11 hours 23 minutes. The collision had taken energy from Dimorphos and made it drop into a smaller orbit. The mission was a success.

At the end of the Cretaceous era, the dinosaurs that witnessed the 10km asteroid explode and met the firestorm, the tsunami, and the dark winter that followed, could only suffer and die in terror.

DART showed that humans can deflect asteroids that are on target to hit Earth and prevent us, and the species we share the planet with, from going extinct in a future asteroid impact. The science and engineering to make this possible are amazing; they are some of the crowning achievements of being human.

— Donald Kurtz is extraordinary professor at North-West University in Mahikeng. He has an A-1 rating from the South African National Research Foundation, its highest rating. He also holds appointments in the UK of emeritus professor at the University of Central Lancashire and visiting professor of astrophysics at the University of Lincoln. He was previously professor of astronomy at the University of Cape Town, where he worked for 24 years. Don has over 500 professional publications and was awarded the 2022 Service Award of the Royal Astronomical Society for a lifetime of public outreach and for his service on many international committees. He and his wife, who is originally from Makhanda, now live in Port Alfred.