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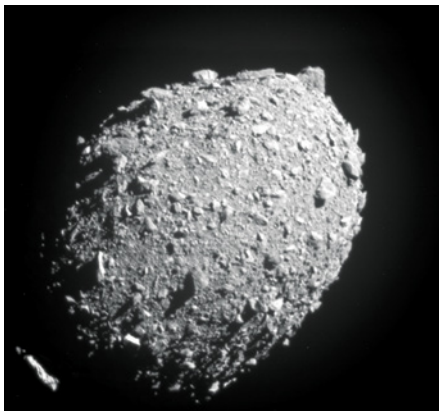
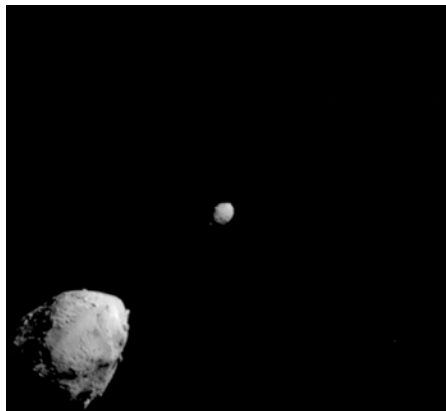
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Nudging a Space Rock

That's one small change in an asteroid's orbit, one giant leap for humanity.



ON SEPTEMBER 26, 2022, the Double Asteroid Redirection Test (DART) spacecraft ended its existence in spectacular fashion by smashing into the asteroid Dimorphos (*S&T*: Jan. 2023, p. 8). Many of us watched spellbound as DART's cameras fixed upon the approaching target. At first, we saw only Dimorphos's larger orbital companion, 65803 Didymos, as a bright pixel, but soon it resolved into two objects. In the final minutes, the target suddenly loomed, filling the screen with a final, brief, fantastically detailed glimpse of its surface (see video at <https://is.gd/DARTsmash>).

The approach reminded me of my student days witnessing the Voyager encounters. The monitors at JPL would show a distant target growing gradually for days, followed by a few hours of quickening expansion to a differentiated object that filled the screen. I'd pretend the monitors were windows and we were flying past newly seen worlds.

I had that sensation again with the New Horizons spacecraft at Pluto in 2015, and now again with DART. Except that those other encounters were flybys, not crash-intos. And instead of days, this event took place within an hour. You could almost hear the swooping Star Trek alert sirens and the command to "Brace for impact!"

▲ The asteroid moonlet Dimorphos, roughly 160 meters (525 feet) long, appears 2.5 minutes, 11 seconds, and 2 seconds before the DART spacecraft intentionally crashed into it.

The impact shortened the roughly 12-hour orbit of Dimorphos around Didymos by about 32 minutes (*S&T*: Feb. 2023, p. 9). Such a small change might sound inconsequential. But arguably it represents a significant turning point in the history of our planet, our biosphere, and our solar system. The influence of the Anthropocene Epoch, marked by humans as a geological force, has begun to extend off-planet.

I don't know who first said that the difference between us and the dinosaurs is that they lacked a space program, but this joke is both funny and profound. Our solar system now has a new kind of planet — one that can begin to defend itself. The knowledge gained will help us forestall dangerous cosmic impacts that, if we waited long enough and did nothing, would inevitably cause regional destruction and, eventually, new mass extinctions on Earth. We're no longer helpless against this threat, and so, assuming we keep our act together and retain a technologically advancing global civilization, our biosphere and our planet need never again suffer such catastrophes.

Before we get too cocky, though, remember that dinosaurs walked the planet for 180 million years. Humans have been here for a few percent of that. And our burst of technical ingenuity has created new, self-imposed threats. Need I enumerate them? We certainly are gaining skills that could allow us to survive while the big lizards perished. But whether our wisdom keeps pace with our prowess and allows us to create the kind of global society that can harness that cleverness in the service of dinosaur-scale longevity is still TBD.

Back in the 1990s, Carl Sagan warned against messing with asteroids, lest someone get the crazy idea to direct one *towards* Earth. But in a world armed with thousands of nuclear weapons, that's the least of our worries. At least now we're taking baby steps toward protecting ourselves against a truly long-term, planetary-scale threat.

We, the adolescent technological species from Earth, have started, ever so slightly, to rearrange the solar system. Hopefully this is part of growing up. If so, then someday we may save not just our species but our biosphere.

■ Contributing Editor **DAVID GRINSPOON** is author of *Earth in Human Hands: Shaping Our Planet's Future*.