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'In the end we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught.'

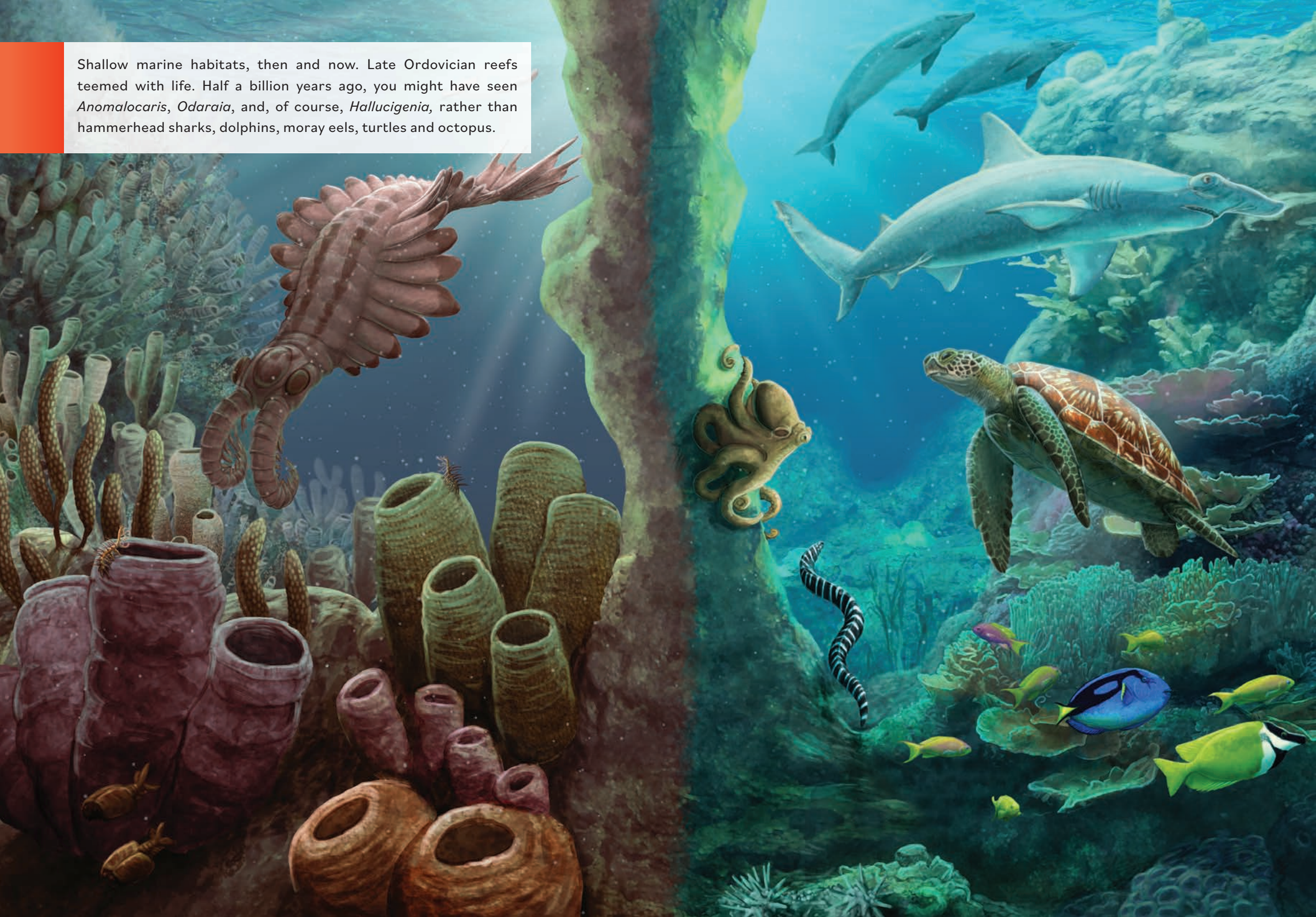
Baba Dioum



THE END ORDOVICIAN MASS EXTINCTION

WE START with the first of the best-known five mass extinctions: the End Ordovician (ordo vish-EE-un) mass extinction, which was made up of two different extinctions. These took place roughly one million years apart, with the first event beginning around 443 million years ago.

Said to be the second most devastating mass extinction ever, this claimed 85 per cent of the species living in seas

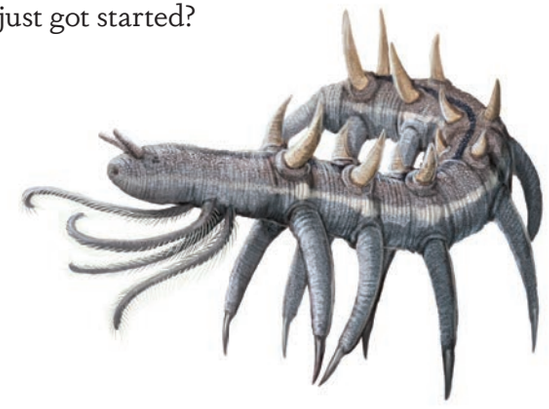


Shallow marine habitats, then and now. Late Ordovician reefs teemed with life. Half a billion years ago, you might have seen *Anomalocaris*, *Odaraia*, and, of course, *Hallucigenia,* rather than hammerhead sharks, dolphins, moray eels, turtles and octopus.

Hallucigenia was a very strange marine invertebrate – an armoured worm covered in spines and frills, which inhabited a planet alien to us today. In a time when giant predatory invertebrates lurked in the shallow-water habitats and the early ancestors of humans were still fish, what caused huge ice sheets to cover the planet? And what caused sea levels to drop, leaving many of the shallow marine ecosystems dry and unable to sustain life at a time when really, it had only just got started?







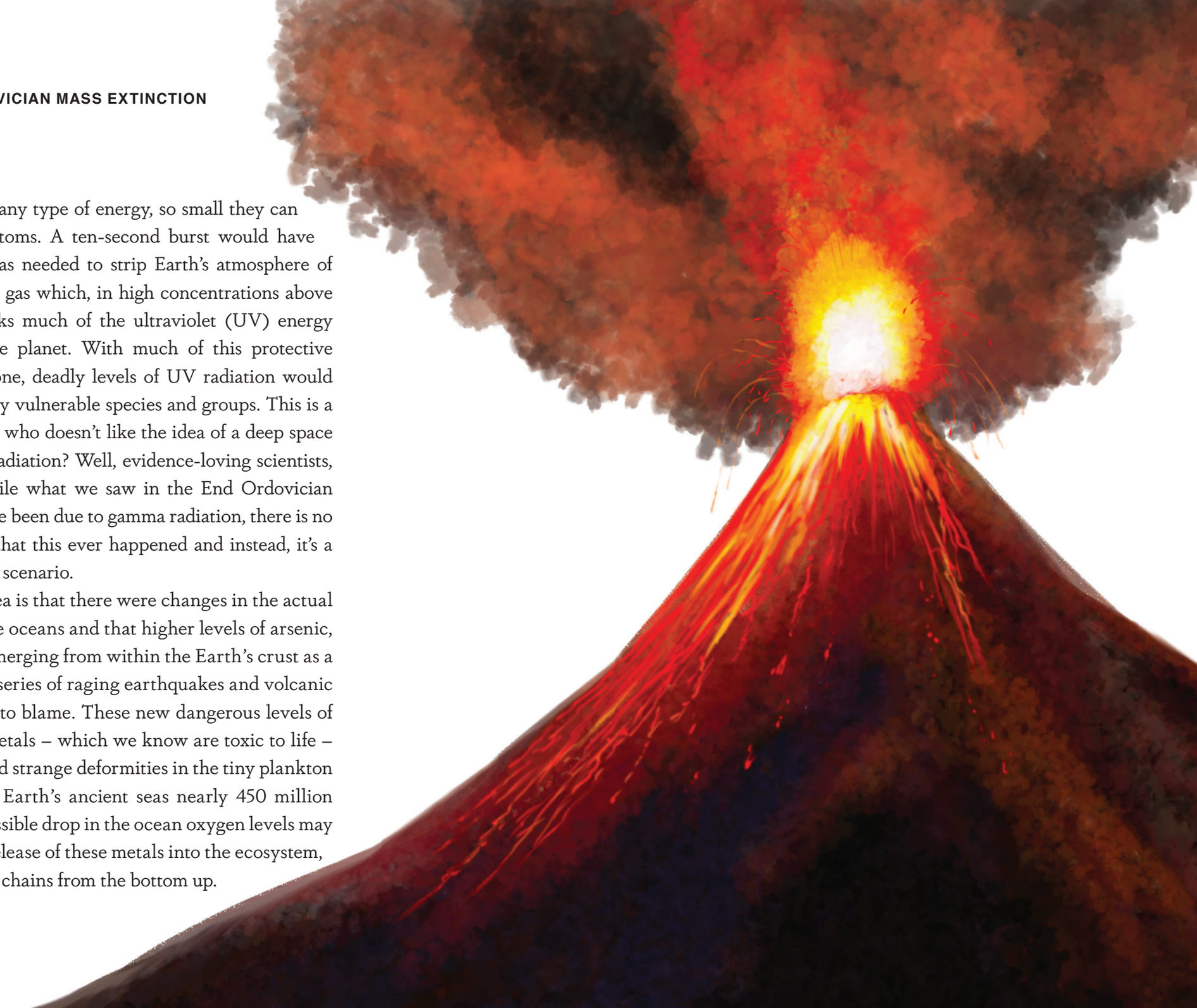
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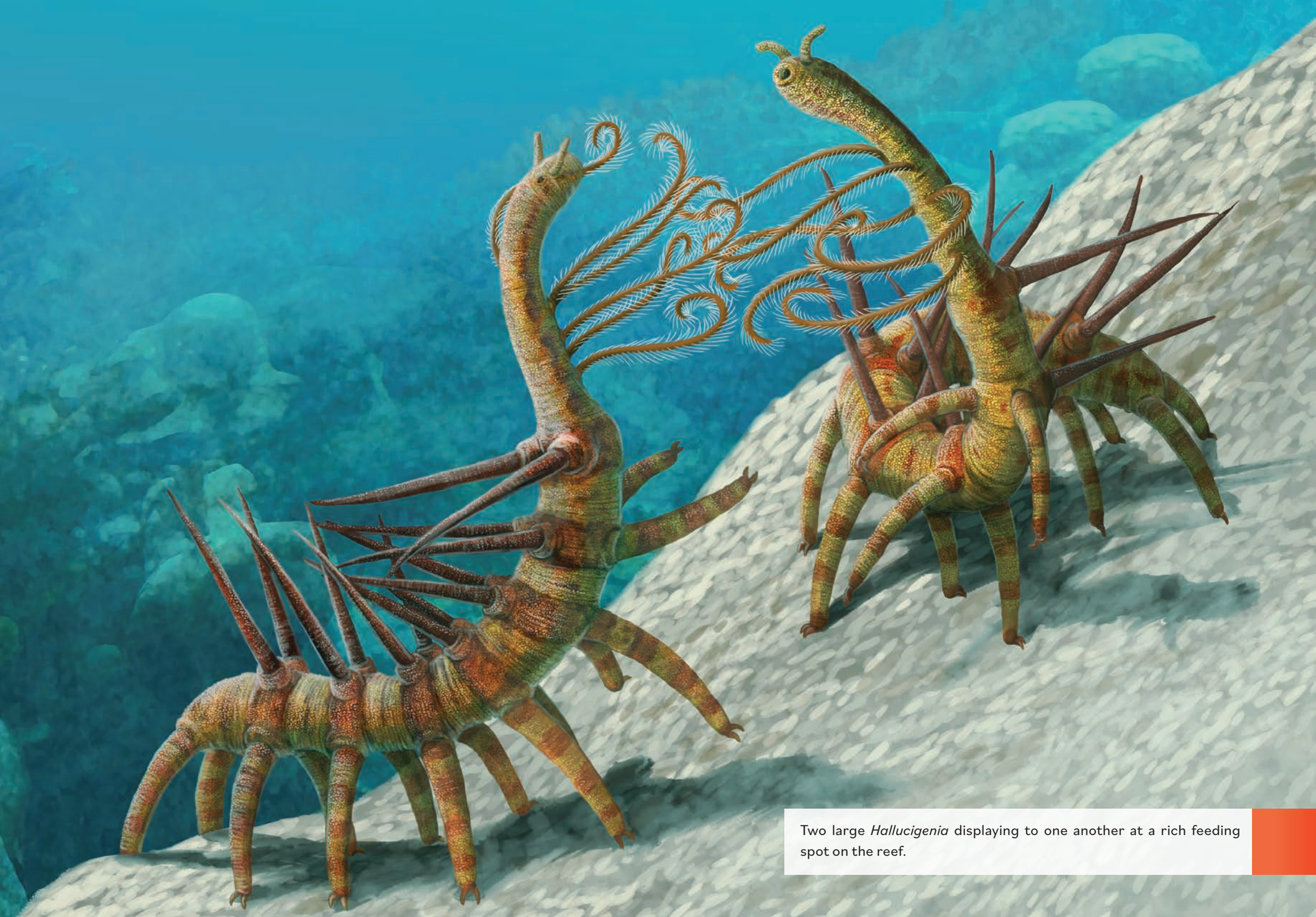
When trying to piece together an event that occurred nearly half a billion years ago, it's important to keep an open mind and to remember that there might not be many clues left. First, because of the actions of tectonic plates and the movement of continents, the actual seabed itself gets churned up and almost recycled every 200 million years or so. This means that some evidence, such as a convenient asteroid crater, or fossils themselves are eventually lost.

When looking at the older mass extinctions, there have been some complicated explanations, some strange ideas and, in all honesty, some bonkers theories. An idea that won't go away is related to the End Ordovician event. Some scientists believe that, in a far-off branch of the Milky Way, there was a hypernova, which is a form of huge space explosion, some 6,000 light years from Earth. If one light year is the same distance light can travel over a year, which is about nine trillion km (9,000,000,000,000km), then this particular hypernova would have been approximately 54,000,000,000,000,000km away from where you're sitting now. It would have released a short, but fatal, burst of gamma-ray radiation, which has the smallest

wavelengths of any type of energy, so small they can pass between atoms. A ten-second burst would have been all that was needed to strip Earth's atmosphere of half its ozone, a gas which, in high concentrations above the Earth, blocks much of the ultraviolet (UV) energy from hitting the planet. With much of this protective gas suddenly gone, deadly levels of UV radiation would have killed many vulnerable species and groups. This is a cool theory and who doesn't like the idea of a deep space explosion and radiation? Well, evidence-loving scientists, that's who. While what we saw in the End Ordovician event could have been due to gamma radiation, there is no clear evidence that this ever happened and instead, it's a bit of a 'what if' scenario.

Another idea is that there were changes in the actual chemistry of the oceans and that higher levels of arsenic, lead and iron emerging from within the Earth's crust as a result of a long series of raging earthquakes and volcanic eruptions were to blame. These new dangerous levels of minerals and metals – which we know are toxic to life – may have caused strange deformities in the tiny plankton that teemed in Earth's ancient seas nearly 450 million years ago. A possible drop in the ocean oxygen levels may have seen the release of these metals into the ecosystem, destroying food chains from the bottom up.





Two large *Hallucigenia* displaying to one another at a rich feeding spot on the reef.