a global range in causing disaster. It will break at heights measured not in yards but in block-lengths on any shores in the middle distance, five hundred to one thousand miles away. Even at its antipodes it will wreak havoc comparable with that worked by Krakatoa at about one hundred miles range. Coastal belts all over the world—a sizable total area —will be in peril.

If the meteorite should fall within a confined ocean basin such as the Arctic, damage will recur. Before coming to rest, such a body of water will oscillate in a series of "seiches." The effect here depends on the natural frequency of the particular body of water. The series of waves would diminish in frequency—but the first few returns could all be catastrophic!

We had best abort the Vredevoort II mission while there is still time. Disintegrate that asteroid, Cadet Kinnison!

The ocean strike is clearly very different from the continental fall. The most vital distinction is this: the energy of the land strike is more violently localized and hence its destructive power is more carelessly squandered. On land, the enormous sessile fireball clings to the target surface, unable to rise because it runs out of atmosphere to rise in, even before it is fully expanded. Early in its career it is forced to spread out over the adjacent "craterscape," exposing a majority of its surface to space. So most of the heat radiates away from earth. A significant proportion of the total energy leaves the planet in this way. When the fireball has starved itself to extinction, the incandescent crater takes its turn in wasting energy in the same way over the weeks to come.

The marine fall works in a more efficient, synergic, cumulative manner. From the beginning its energy works with cruel economy. The radiation of the fireball is quenched and veiled and husbanded by steam and storm-wrack. Its heat is conveyed far and wide by the monstrous steam geyser. This also quenches and transfers the power of the ocean-floor inferno, and thus retains it on Earth. Rain follows rain, tidal waves recur, typhoons sweep again and again over a sunless world. In the districts swept by the tsunamis, the storms destroy the last chances of survival for all that grows or moves. The strike's power is transformed down to biological intensities, directed where it will harm the biosphere. When

the hell-pit on the seabed is doused, and when, weeks later, the storms have died, dust and cloud veil the Earth. The long Nimbul winter begins.

My picture is unexaggerated. We consider the release of energies equal to the detonation of one megaton bombs pitched down at five-mile intervals over the entire surface of the world. True, even the ocean strike will distribute its energy less evenly than this. It is, however, precisely my case that it will come nearer to so doing than the continental impact. Most of the power of this operates to overkill an already blasted region, a district the size of a nation, but still a limited area.

Above all, remember that what I have depicted *has occurred many times*. The craters of the Canadian Shield are probably a more reliable guide to the number and timing of the past incidents than are those of North America as a whole. The Canadian Shield is a record sheet in stone; it has been ground clean, to receive the indelible and plainly legible account of more than two gigayears of meteoric history. It is about a million square miles in area, roughly one half of one per cent of the world's surface. There are craters of moderate size and upward scattered across it. One of these, Manicouagan, is in the Vredevoort size range. I leave out the larger Nastapoka Island Arc, well over one hundred miles in diameter, as well as Hudson's Bay itself. Five of these incidents seem to have occurred in the last five megacenturies, the post-Cambrian era; this is one every hundred million years on average. Multiply this by the ratio of size between the Shield area and the whole world; we then obtain the figure of two fair-sized strikes per megayear somewhere or other upon Earth. Events of Vredevoort strength will be distinctly more rare perhaps one every five megayears—but the majority of these will happen at sea. When is the next due? Equally to the point, when did the last occur?

Here we owe a pertinent question to Mr. J. W. Campbell. It is my recollection that some years ago he posed the enigma of the Mammoths, whose frozen carcasses house undigested stomach contents. This is very puzzling indeed. The carcasses of Blue Whales are sometimes left unflensed in the cold Antarctic Ocean for just a few hours too long. When this delay occurs, the Whale's flesh is quite literally roasted within the insulating blubber by the heat of its own putrefaction.