Chapter Twenty-Seven

The Melting Arctic Ice Cap

They settled into antique chairs in the family room and were quiet for a while, enjoying home-baked scones and peppermint tea.

Then Alistair looked at Larysa with his cordial blue eyes and said, "Larysa, Rose tells us that you are interested in protecting the Arctic."

She took a deep breath. Were they asking her to take on this overwhelmingly huge project? She, who could not yet protect one square meter of Ukraine.

She said, looking at Alistair, and at Elspeth, then at Rose, "Yes, I would like to work with a team of scientists and indigenous peoples and lawyers to develop new laws that work in harmony with nature's laws." She paused, then added, "I have come to understand, from my preliminary reading, that conditions in the Arctic affect the entire northern hemisphere of the planet."

"Correct," said Alistair. "The Arctic determines whether we live on a healthy green planet, or an overheated and very different planet. As the Arctic ice cap melts—as it diminishes in size year by year—so our chances for survival diminish. That cap of ice has been with us since we first learned to build fires in Africa."

He looked at Larysa with eyes not hard with anger, nor weak with despair, but with the firm, determined eyes of a scientist speaking the truth.

"Why is the Arctic ice cap so important? Because it reflects sunlight. The white ice and snow reflect about 90% of the sun's energy back into the sky. But as the ice cap melts—because the warming Arctic Ocean melts it from underneath—the shrinking cap of ice reveals more and more open dark water. And that dark water *absorbs* about 90% of the sunlight, and thus it becomes warmer."

He paused, as if to enable everyone in a conference audience, everyone in a classroom, to consider for a moment that simple process.

"As the Arctic ice cap shrinks, the Arctic Ocean becomes warmer and warmer. The warming water melts the underside surface of the ice . . . at an accelerating rate. The more the ice shrinks, the more the water warms, and the more the water warms, the more the ice shrinks. This feedback loop is exactly what is happening today."

Alistair held up one finger. "That is step one."

He held up two fingers. "Now comes step two. The winds that blow over the warming water pick up some of that extra heat. Part of the heat rises up into the upper

atmosphere, where it affects the jet streams. And part of the heat is carried by the winds to the land—the Arctic tundra—which wraps around the Arctic Ocean.

"The warming ocean warms the winds, the warming winds warm the vast areas of tundra—in Siberia, Alaska, northern Canada, and northern Scandinavia—and the warming tundra warms the sheet of ancient ice just below the surface of the tundra.

"That sheet of ice and frozen earth is called the permafrost, a remnant of the last ice age. For the past twelve thousand years, since the melting of the enormous glaciers at the end of the ice age, the permafrost has remained frozen because it has been insulated by the layer of tundra on top of it. But now as the tundra warms, the permafrost is thawing. It becomes rotten ice."

Alistair shrugged. "But who cares about rotten ice out in the middle of the Siberian tundra? That's not our problem. Everything here on Market Street is just fine."

He held up three fingers. "Now comes step three. Trapped beneath the permafrost—that sheet of hard ice which has been with us for twelve thousand years—is an unknown quantity of two gasses: carbon dioxide and methane. Before the last ice age, when the top of the planet was slowly cooling, the prairies of grass, and the forests of trees, and the wooly mammoths that lived in the far north, were slowly dying. The dead organic matter was eaten by bacteria, which gave off those two gasses, carbon dioxide and methane, during the process of decomposition.

"In that slowly cooling world, creatures died. Plants died. Bacteria flourished. And then the first layer of ice at the beginning of the ice age trapped all of that gas from organic decomposition. The CO_2 and the CH_4 were covered by a lid of solid ice . . . until now."

Alistair held up four fingers.

"Now comes step four. The hard sheet of permafrost becomes rotten ice. The two gasses begin to seep up through the permeable ice. They rise into the atmosphere, adding to the blanket of greenhouse gasses. The thickening blanket traps more of the sun's heat, warming the planet. The oceans absorb 93% of that extra heat. Ocean currents carry the heat around the world, in shallow water and in deep water. Some of the currents carry the increasing amounts of heat to the Arctic, where the heat melts the Arctic ice cap . . . at an accelerating rate.

"The permafrost continues to thaw, increasing amounts of CO_2 and methane rise into the atmosphere, and the blanket becomes thicker and thicker."

He held up five fingers. "Step five."

He stared at Larysa with eyes that burned with fear, that burned with outrage.

"At some point—the tipping point—the permafrost becomes so rotten that planetary amounts of the two greenhouse gasses are released into the atmosphere . . . and planet Earth becomes an entirely different planet."

He folded his fingers into a fist and thumped his fist on the arm of his chair.

"There will be nothing, absolutely *nothing*, which we people can do to stop a rapid increase in global temperatures. We will be utterly helpless while the oven gets hotter and hotter. We will have caused—willfully and knowingly caused—the extinction of a major portion of life on planet Earth."

"Do you know," asked Larysa, needing to know the truth, "how close we are to that tipping point?"

Alistair held up his finger and thumb, almost touching. "We are within a quarter-inch. It could have happened during this past summer, while we were busy fighting yet another war. It could well happen next summer, in July or August, in the eastern regions of Siberia, where year after year, temperatures are the highest. Putin is building his empire down in the southwest corner of Russia, while northern Siberia is about to release something more powerful than a nuclear bomb."

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