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Most of the land in the Arctic, and nearly a quarter of all the land in the Northern Hemisphere—some five and a half billion acres—is underlaid by zones of permafrost. A few months after I visited Shismaref, I went back to Alaska to take a trip through the interior of the state with Vladimir Romanovsky, a geophysicist and permafrost expert. I flew into Fairbanks—Romanovsky teaches at the University of Alaska, which has its main campus there—and when I arrived, the whole city was enveloped in a dense haze that looked like fog but smelled like burning rubber. People kept telling me that I was lucky I hadn't come a couple of weeks earlier, when it had been much worse. "Even the dogs were wearing masks," one woman I met said. I must have smiled. "I am not joking," she told me.

Fairbanks, Alaska's second-largest city, is surrounded on all sides by forest, and virtually every summer lightning sets off fires in these forests, which fill the air with smoke for a few days or, in bad years, weeks. In the summer of 2004, the fires started early, in June, and were still burning two and a half months later; by the time of my visit, in late August, a record 6.3 million acres—an area roughly the size of New Hampshire—had been incinerated. The severity of the fires was clearly linked to the weather, which had been exceptionally hot and dry; the average summertime temperature in Fairbanks was the highest on record, and the amount of rainfall was the third lowest.

On my second day in Fairbanks, Romanovsky picked me up at my hotel for an underground tour of the city. Like most permafrost experts, he is from Russia. (The Soviets more or less invented the study of permafrost when they decided to build their gulags in Siberia.) A broad man with shaggy brown hair and a square jaw, Romanovsky as a student had had to choose between playing professional hockey and becoming a geophysicist. He had opted for the latter, he told me, because "I was little bit better scientist than hockey player." He went on to earn two master's degrees and two Ph.D.s. Romanovsky came to get me at ten A.M.; owing to all the smoke, it looked like dawn.

Any piece of ground that has remained frozen for at least two years is, by definition, permafrost. In some places, like eastern Siberia, permafrost runs nearly a mile deep; in Alaska, it varies from a couple of hundred feet to a couple of thousand feet deep. Fairbanks, which is just below the Arctic Circle, is situated in a region of discontinuous permafrost, meaning that the city is pocked with regions of frozen ground. One of the first stops on Romanovsky's tour was a hole that had opened up in a patch of permafrost not far from his house. It was about six feet wide and five feet deep. Nearby were the outlines of other, even bigger holes, which, Romanovsky told me, had been filled with gravel by the local public-works department. The holes, known as thermokarsts, had appeared suddenly when the permafrost gave way, like a rotting floorboard. (The technical term for thawed permafrost is "talik," from a Russian word meaning "not frozen.") Across the road, Romanovsky pointed out a long trench running into the woods. The trench, he explained, had been formed when a wedge of underground ice had melted. The spruce trees that had been growing next to it, or perhaps on top of it, were

now listing at odd angles, as if in a gale. Locally, such trees are called “drunken.” A few of the spruces had fallen over. “These are very drunk,” Romanovsky said.

In Alaska, the ground is riddled with ice wedges that were created during the last glaciation, when the cold earth cracked and the cracks filled with water. The wedges, which can be dozens or even hundreds of feet deep, tended to form in networks, so when they melt, they leave behind connecting diamond- or hexagon-shaped depressions. A few blocks beyond the drunken forest, we came to a house where the front yard showed clear signs of ice-wedge melt-off. The owner, trying to make the best of things, had turned the yard into a miniature-golf course. Around the corner, Romanovsky pointed out a house—no longer occupied—that basically had split in two; the main part was leaning to the right and the garage toward the left. The house had been built the sixties or early seventies; it had survived until almost a decade ago, when the permafrost under it started to degrade. Romanovsky’s mother-in-law used to own two houses on the same block. He had urged her to sell them both. He pointed out once, now under new ownership; its roof had developed an ominous-looking ripple. (When Romanovsky went to buy his own house, he looked only in permafrost-free areas.)

“Ten years ago, nobody cared about permafrost,” he told me. “Now everybody wants to know.” Measurements that Romanovsky and his colleagues at the University of Alaska have made around Fairbanks show that the temperature of the permafrost in many places has risen to the point where it is now less than one degree below freezing. In places where the permafrost has been disturbed, by roads or houses or lawns, much of it is already thawing. Romanovsky has also been monitoring the permafrost on the North Slope and has found that there, too, are regions where the permafrost is very nearly thirty-two degrees Fahrenheit. While thermokarsts in the roadbeds and talik under the basement are the sort of problems that really only affect the people right near-or above-them, warming permafrost is significant in ways that go far beyond local real estate losses. For one thing, permafrost represents a unique record of long-term temperature trends. For another, it acts, in effect, as a repository for greenhouse gases. As the climate warms, there is a good chance that these gases will be released into the atmosphere, further contributing to global warming. Although the age of permafrost is difficult to determine, Romanovsky estimates that most of it in Alaska probably dates back to the beginning of the last glacial cycle. This means that if it thaws, it will be doing so for the first time in more than a hundred and twenty thousand years. “It’s really a very interesting time,” Romanovsky told me.