



MARK A. KESSLER, SCIENCE

GEOPHYSICS

Landscapers Need Not Apply

This Arctic rock garden tends itself

Water and ice, not aliens, are the invisible sculptors of these circles on the Arctic island of Spitsbergen. Geophysicists Mark Kessler and Brad Werner, working at the University of California, San Diego, have created a computer model to show how fields of randomly scattered rocks in polar and alpine regions can self-organize over time into shapes like doughnuts, stripes, polygons, or labyrinths, depending on the landscape's slope and the ratio of stones to soil.

Their research reveals how centuries of winter freeze and summer thaw can massage the landscape into geometric patterns. On Spitsbergen, for example, rocks lie on soggy ground during the summer. As winter approaches, the wet ground freezes. Ice crystals in the soil expand, forming raised areas. The icy soil draws water from

deeper ground, which forces soil particles to migrate into these mounds. In summer the icy ground melts again, and the centers of the mounds sag, but only slightly. Each year the cycle repeats, and the mounds grow larger and steeper. Eventually,

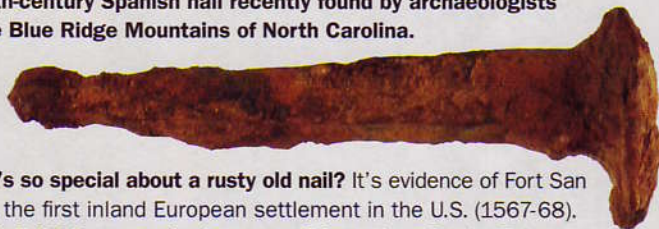
rocks resting on top roll off and come to rest around the base, forming a circle. According to the model, the stone circles on Spitsbergen are at least 500 years in the making.

"The Spitsbergen pattern is one of the most spectacular results of processes that are pervasive in nature," says Werner. "If you look at any landscape, you'll see it's not a random configuration—it's organized."

—Bijal P. Trivedi

WHAT IS IT?

A 16th-century Spanish nail recently found by archaeologists in the Blue Ridge Mountains of North Carolina.



What's so special about a rusty old nail? It's evidence of Fort San Juan, the first inland European settlement in the U.S. (1567-68).

Who left it? Someone in the party of Capt. Juan Pardo. This Spanish explorer set out from the Santa Elena settlement on Parris Island, South Carolina, in 1566 en route to the silver mines of Mexico, creating settlements as he went. Indians thwarted his progress in Tennessee, and the Spanish soon quit the Carolinas as well.

What if the settlements hadn't failed? The Spanish likely wouldn't have put up with the English, so imagine Spanish names for Charleston and Raleigh.

