By monitoring three lizards over several years, the researchers deduced that the patterns on the animals' backs were updating according to a well-defined algorithm: Over a period of a month or so, a given scale will change color—from green to black or black to green—with a probability *p* that depends on the colors of the scales around it. For, say, a green scale surrounded by green neighbors, *p* is around 50%. For a green scale with two or fewer green neighbors, *p* drops effectively to zero. The researchers confirmed the algorithm by modeling the reaction–diffusion equations that govern the evolving distribution of the lizard's various color-generating cells.

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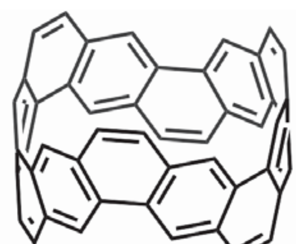
In essence, the reptile is the embodiment of a cellular automaton, a type of discretized model made popular by John Conway's Game of Life and used to simulate the spread of wildfires, the firing of neurons, and other phenomena. Although some cellular automata evolve indefinitely, the rules governing the ocellated lizard eventually steer it to a static pattern. Around the time the lizard turns four, its pixelated look becomes permanent. (L. Manukyan et al., *Nature* **544**, 173, 2017.) —AGS

FORGING A CARBON NANOBELT



Rings of carbon atoms can be fashioned into balls, tunnels, and sheets. Yet before the discoveries of fullerenes, carbon nanotubes, and graphene, chemists dreamed of building a different carbon-ringed structure: a loop of edge-sharing benzene molecules. Now, more than six decades after it was proposed, Guillaume Povie and colleagues at Nagoya University in Japan have created the elusive carbon nanobelt.

The researchers started by combining an aldehyde and a benzylic bromide. Using a series of creative chemical reactions, some of which had rarely been employed before, Povie and colleagues assembled building blocks, joined them together to form a ring, and then introduced additional bonds that solidified the belt configuration. X-ray crystallography measurements confirmed a roughly 8-Å-diameter nanobelt structure made up of a single strand of 12 benzene rings, as shown here. The hexagonal panels stand perpendicular to the cross-sectional plane of the belt, like the slats of a fence surrounding a garden.

The researchers performed fluorescence, light-absorption, and Raman spectroscopy measurements on their creation and found similarities to a metallic, single-walled nanotube that has the same diameter and orientation of benzene rings. The resemblances are especially notable because of the new nanobelt's potential to serve as a template from which to grow those (6,6) nanotubes. Current fabrication methods tend to produce a hodgepodge of nanotube species, each with different electronic and thermal properties. The new nanobelt, which is, in effect, an ultrashort nanotube open on both ends, could form the basis of a production method that yields uniform tubes. Povie and colleagues are working on ways to stack nanobelts to build lengthy nanotubes. (G. Povie et al., *Science* **356**, 172, 2017.) —AG

SEDIMENT SUPPLY PREDICTS RIVER GEOMETRY

Gravel-bedded rivers, such as the one pictured here in Yellowstone National Park, are major features of some of the world's most diverse ecosystems. Understanding rivers' bankfull geometry—the shape of a river during the stage just before flooding—is an important key to flood management in these regions.

Typical models for predicting a gravel-bedded river's geometry rely on a simple assumption: that the flowing water does not generate enough shear stress to move average-sized sediment until the river reaches its bankfull stage. If that assumption holds true, the stable "armor" layer of gravel that makes up the riverbed only shifts once every few years. However, a new paper by Allison Pfeiffer, a graduate student at the University of California, Santa Cruz, shows that many rivers generate much larger amounts of shear stress than standard models predict. Pfeiffer concludes that the amount of sediment being fed into a river is a major and previously unrecognized factor that influences the geometry and mobility of gravel-bedded rivers.

Sediment supply depends on the erosion rate of the surrounding landscape; a high erosion rate means that more rock is eroding from the land's surface and entering the river. Pfeiffer and coauthors Noah Finnegan and Jane Willenbring compiled data on nearly 350 gravel-bedded rivers in North America and found that rivers with a large sediment supply also experienced large amounts of shear stress. Because high-sediment rivers move gravel more forcefully than the models predict, they probably never form an armoring layer of coarse gravel like their low-sediment counterparts. Instead, their beds are constantly shifting and made of relatively fine-grained gravel.

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Significantly, most of the high-sediment, high-shear-stress rivers were located in western North America. Pfeiffer concludes that those rivers, which are often the major channels that carry water from areas prone to landslides, have developed geometries and bed structures that enable them to move a large amount of sediment quickly without becoming blocked. Once the findings are incorporated into geologists' models, they could have significant implications for civil engineering and ecological preservation. (A. Pfeiffer et al., *Proc. Natl. Acad. Sci. USA* **114**, 3346, 2017.) —MB PT