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This Week

Research Notes

Articles

Cover: Found along the southern coast of Australia, this fossil tooth belonged to a previously undiscovered type of hypsolophodontid dinosaur that lived over 100 million years ago and was about the size of a human being. At that time, this area was still attached to Antarctica and was close to the South Pole, where winters would have been long, cold and dark. This fossil and others from Australia and northern Alaska are raising questions about how the dinosaurs survived polar climates. (Photo: S. Morton/Monash University)

Departments

Letters

Knotty problems

Given all the mathematical difficulties in analyzing – much less solving – knot problems, and given the fact that the Princeton team is going to computer graphics methods anyway ("Shareware, Mathematics Style," SN: 1/2/88, p.12), it would seem that generating and viewing stereo pairs of their displays might prove fruitful. For one thing, reversing the stereo images instantly transforms any 3-D image in a unique way: All forward projections (bumps, peaks, etc.) become retractions (bowls, valleys, etc.) and vice versa.

More interesting, perhaps, might be the mathematics involved with the many kinds of "impossible figures" one can dream up, such as those pictured below. Even more intriguing is the fact that these illusions are also preserved when viewed in 3-D. Is there an analytical mathematical basis for all the kinds of impossible knots that would serve as analogs to the "impossible structures" shown here? Shouldn't these analytical descriptions be fundamentally unlike those corresponding to ordinary (i.e. possible) structures and knots? Perhaps a simultaneous study of both kinds of mathematical structures would give additional helpful insights.

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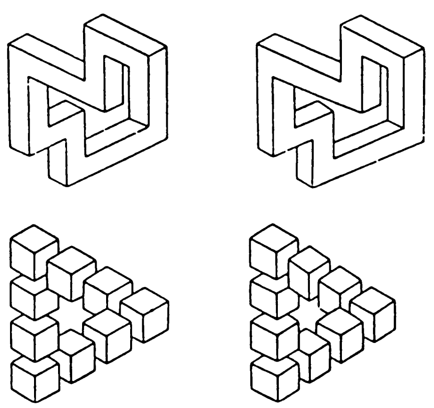
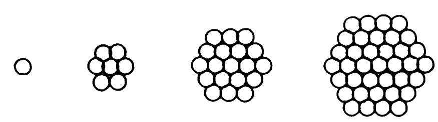


Penny for your thoughts

In spite of mathematician Richard Guy's theorem that "You can't tell by looking" ("A Shortage of Small Numbers," SN: 1/9/88, p.31), I refuse to be intimidated into believing that I don't see a fairly simple illustration that the hexagon-building example will hold for hexagons constructed of any number of pennies.



The hexagons shown in the example can also be visualized as corner views of three-dimensional cubes built of stacked spheres with each penny representing one of the spheres and a side of the hexagon representing an edge of the cube. The total number of spheres in each cube is the number of cubes in the edge cubed. The number of spheres not shown in a given view is equal to the number of spheres in a cube of the next smaller size.

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