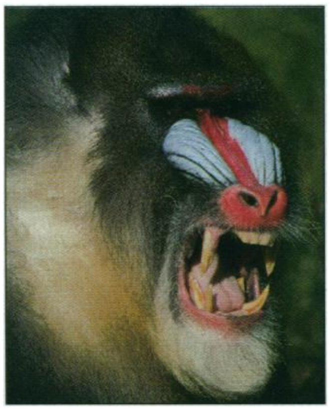
When Is a Mandrill Not A Baboon?

With their long faces and red-streaked noses, mandrills look like gaudy baboons. But scientists comparing bones and teeth have confirmed that mandrills are more closely related to long-legged monkeys called mangabeys. Their report, in the 2 February *Proceedings of the National Academy of Sciences*, is a case study in how evolution can dupe casual observers—building similarities into unrelated species and surprising differences into close cousins.



Mandrill molars furnish tip-off to ancestry.

Genetic studies had already hinted at these relationships. Now, John Fleagle of the State University of New York Health Sciences Center in Brooklyn and Scott McGraw of the New York College of Osteopathic Medicine in Old Westbury report that the molecular findings are reflected in morphology.

For example, the arm bones of mandrills resemble those of a mainly land-dwelling brand of mangabey more than they do those of baboons. Mandrills and mangabeys also share large molars that can crack hard nuts and seeds. Baboon bones, meanwhile, are more like those of tree-living mangabeys.

The revised monkey family tree, the authors contend, "is [a] striking departure from traditional views of primate phylogeny." But it's no surprise to molecular biologists. Fleagle "finally agrees with me," says Todd Disotell of New York University, who in the early '90s found that genetically, mandrills and ground-dwelling mangabeys have a lot in common. Molecular studies, he notes, "are causing people to go back and look at things they might not have looked at before."

NSF Deputy Named

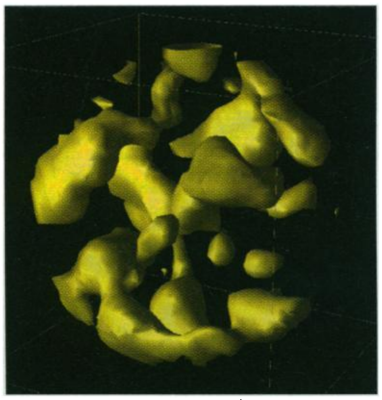
Joseph Bordogna has received a long-awaited nod from the White House to assume the post of deputy director of the National Science Foundation (NSF).

A former dean of engineering at the University of Pennsylvania, Bordogna has been acting deputy since Anne Petersen left in August 1996. In January 1998, Rita Colwell was picked for the post but ascended straight to the directorship instead when Neal Lane was named the president's science adviser. Bordogna still needs Senate approval.

Wide-Angle View

Astronomers have come up with the largest map to date of our corner of the universe—one that they say is big enough to enable cosmologists to test theories on how the universe has been expanding and structuring itself since the big bang.

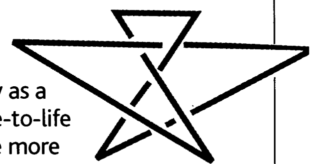
Mappers at five U.K. and German institutions combined data from separate optical and infrared surveys to show the locations of about 15,000 galaxies—about 1/5000 of the observable universe. For studies of galaxy clustering and dynamics, scientists need a large map that will furnish a reliable sampling of the universe, says principal investigator Will Saunders of Edinburgh University. For example, he says, "this is the first survey deep enough to show all the structures responsible for our [galaxy's] velocity through space"—which is about 600 kilometers per second.



In the image (left), which is over 1 billion light-years in diameter, a computer has used the data to create white blobs that look like potatoes, says Saunders, to indicate areas where the density of galaxies is at least 2.5 times the average. Earth is located in a small potato in the middle called the Local Supercluster.

The map "is the best measure so far of the large-scale galaxy distribution," says Princeton cosmologist Jim Peebles. He says it adds to evidence that less dense and more dense regions share a topological symmetry—a feature predicted by theories on the universe's expansion. Other renderings of the data can be found at www-astro.physics.ox.ac.uk/~wjs/pscz.html

Locked But Not Knotted



Once scientists had assumed that DNA and other long-chain biomolecules are as floppy as a strand of overcooked spaghetti. A more true-to-life model, however, says these biopolymers are more like chains or loops of linked rigid pieces, like bits of uncooked spaghetti joined by hinges.

This rigidity affects the shapes a molecule can assume, specialists in knot theory have now found. A newly discovered six-sided shape cannot be untangled—that is, manipulated to form a simple, flat loop—if its sides are rigid. But the twisted shape can be undone if its sides are made supple enough to bend.

Jason Cantarella, a differential geometer at the University of Pennsylvania, Philadelphia, had heard speculation that there might exist a stiff-sided polygon that can be "locked" without being knotted. (Knotted polygons can be untied only by breaking their loops, while a locked one, in theory, could be untied by letting its sides go limp.) Then one day, he says, "I was just doodling hexagons on a pad, and I said, 'That's it!' " He had drawn a hexagon with two long "wings" joined by three segments that twist around a horizontal collar, forming a loop at the top (above). The loop can't be unhooked from the collar without moving the wings, and the wings can't be spread without pulling the loop through the collar. "It's a Catch-22," says Cantarella, who unveiled this novel shape last month at a meeting of the American Mathematical Society in San Antonio.

Scientists say this is the first proof that polygons with flexible joints are prevented by geometry from being untangled. According to mathematician Ken Millett of the University of California, Santa Barbara, Cantarella's simple polygon is a step toward understanding how small-scale rigidity influences the shape of DNA and other complex molecules.

CREDITS: (TOP) ZIG LESZCZYNSKI/ ANIMALS ANIMALS; (BOTTOM LEFT) LUIS TEODORA AND CARLOS FRENK