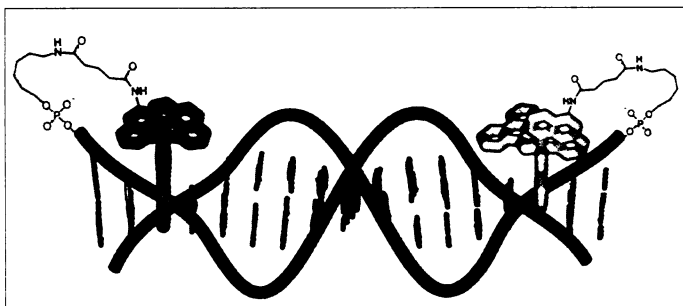


traordinary," Barton says. She and Zewail describe their findings in the May 25 PNAS.

If DNA does conduct electricity, wouldn't Mother Nature have noticed? "DNA isn't just some polymer," says Barton. Its role as the carrier of genetic information suggests that organisms might take advantage of its electrical properties somehow. "The fact that DNA can transfer electrons probably has some biological implications, but no one knows what they are," says Schuster.

Researchers can speculate, though. Since the 1960s, radiation biologists have wondered whether the effects of gamma rays can travel down DNA and cause damage.

In 1996, Barton found that light shone on a tethered intercalator can oxidize pairs of adjacent guanines located farther down the DNA strand. Some biological molecules, such as tryptophans, can be intercalated into DNA, she adds. Perhaps some carcinogens wreak havoc with DNA by inserting themselves into the pi-stack.



An electron-donating ruthenium complex (red) and an electron-accepting rhodium complex (yellow) slip in between the bases of a DNA molecule. The complexes are chemically tethered to the ends of the strand so that they will remain a fixed distance apart.

Ironically, DNA might also repair itself with this process. Barton has found that electron transfer can fix a mutation known as a thymine dimer, in which two thymines on the same DNA strand bond together.

One encouraging finding suggests that cells might actually have the equipment to modulate the electrical properties of DNA. Barton's group reports that an enzyme known as methyltransferase, which is ordinarily involved in DNA repair, can interrupt electron transfer by inserting an insulating chemical group into the pi-stack. The researchers report

their finding in the June 16 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

The debate over electron transfer, at times, has gotten quite huffy. Is the latest evidence of a hybrid mechanism in DNA strong enough to settle the issue?

"No!" Barton declares. "I think the tide is moving in that direction, though. This is the first time we've measured what the rate is. Now, we can begin to talk about the mechanism."

Though the exchanges between scientists researching this area are sometimes harsh, Barton feels they have lifted the quality of the research. "It pushes you to do better and better experiments. The more you learn, the more questions you have," she says.

Schuster says that the saga of electron transfer in DNA exemplifies the scientific process: provocative initial observations, preliminary explanations, and finally, refinements of those theories.

"Science is a search for the truth," he says. "Now, we're beginning to circumscribe the truth." □

Astronomy

New moons make Uranus the champ

Astronomers have discovered two small bodies that are almost certainly moons of Uranus. If the discovery is confirmed, this distant planet would have 20 known moons—more than any other planet in the solar system. The former champion, Saturn, would become the runner-up, with 18 satellites.

J.J. Kavelaars of McMaster University in Hamilton, Ontario, and his colleagues announced their finding in a July 27 circular of the International Astronomical Union. The team used the 3.5-meter Canada-France-Hawaii Telescope atop Hawaii's Mauna Kea to spy objects in the outer solar system's reservoir of comets, the Kuiper belt, as well as to search the vicinity of Uranus. A search within 100 million kilometers of the planet revealed only the two bodies.

There's a small possibility, says Kavelaars, that these small bodies are not satellites of Uranus but escapees from the Kuiper belt that are orbiting the sun. However, both the location and the speed of the faint objects—they lie near Uranus and appear to move with the planet—make that possibility remote, he says. The researchers estimate that each body has a diameter less than 20 km and resides several million kilometers from the planet.

Two years ago, using the 5-meter Hale Telescope on Palomar Mountain near Escondido, Calif., Kavelaars and his colleagues discovered the 16th and 17th moons of Uranus (SN: 12/6/97, p. 360). This past spring, Erich Karkoschka of the University of Arizona in Tucson, found an 18th moon in images taken by the Voyager 2 spacecraft as it flew past the planet.

The moons found by Kavelaars' team in 1997, as well as the objects announced in July, share an unusual trait. They are the only bodies with orbits inclined relative to the planet's equator.

Kavelaars suggests that soon after Uranus formed, two chunks of debris that resided near the planet collided and broke into fragments. The fragments then passed through gas

in Uranus' young, bloated atmosphere that slowed them down until they were captured by the planet's gravitational field.

If the collision theory is correct, Uranus may have several more moons, but most would be too small and dim to detect, Kavelaars says. —R.C.

Extrasolar planet with an Earthlike orbit

Tracking the wobbling motion of several hundred nearby stars, astronomers over the past 4 years have found evidence of some 20 planets outside the solar system. The latest find, announced July 29, stands out from the crowd. Its orbit more closely resembles that of Earth than any extrasolar planet previously found.

The planet lies an average of 137 million kilometers from its parent, the sunlike star iota Horologii. That's 92 percent of the distance between Earth and the sun. The planet's mass, however, is at least 2.26 times that of Jupiter, or 718 times that of Earth, report Martin Kürster of the European Southern Observatory in Santiago, Chile, William D. Cochran of the University of Texas at Austin, and an international team of colleagues.

Rather than having a solid surface, the planet is most likely a giant blob of noxious gases like Jupiter and is unlikely to support life, Cochran says. However, "if such a planet has a system of satellites around it, they would be an excellent place for life to develop," he adds.

Geoffrey W. Marcy of San Francisco State University and the University of California, Berkeley says there's another reason he finds the new object intriguing. Like the other 11 extrasolar planets that reside farther than 29 million km (20 percent of the Earth-sun distance) from their parent star, this one has an elliptical orbit. "This new planet adds to the suspicion that our solar system with its neat, circular, coplanar orbits, may be the exception rather than the rule." —R.C.