

MYSTERIOUS MIND

Solving Uganda's Nodding Syndrome

IN 2009, THE CENTERS FOR Disease Control and Prevention (CDC) received a plea from officials in Uganda: Could the agency investigate a mysterious head-nodding disease spreading among more than 3,000 young people there? Healthy children would suddenly begin to nod their heads uncontrollably, sometimes falling into a trancelike state. The incidents



Rivers in sub-Saharan Uganda may hold clues to the disease's origins.

seemed to be triggered by food, so eating was a struggle for the victims; some were dying of malnutrition as a result.

"We saw families lock their children in their homes or tie them to trees to prevent them from injuring themselves while the family was working," says the CDC's Scott Dowell, an infectious disease specialist charged with finding the cause.

Examining the children with brain scans, Dowell determined the spells were seizures like those seen in epilepsy. But what was the cause? Blood and urine tests ruled out hundreds of viruses, as well as hepatitis E, measles, heavy-metal poisoning, tainted bush meat, and vitamin B₁₂ deficiency.

In August, the World Health Organization and the CDC cosponsored a four-day conference in Uganda's capital, Kampala, to identify new lines of research. One clue is that sufferers of a disease called river blindness are much more likely to have nodding syndrome as well. That cast suspicion on *Onchocerca volvulus*, a parasitic worm transmitted by black flies that breed in sub-Saharan rivers (among other places). The worm's larvae can trigger damage in the eyes, leading to river blindness if untreated.

Autopsies could determine directly whether they also cause brain damage in nodding disease sufferers, the CDC says. Infection with *O. volvulus*



Vicky Apari, 15, is one of thousands of children in Uganda suffering from the mysterious and sometimes fatal nodding disease now spreading there.

may be just one of the triggers, Dowell adds. He suspects that vitamin B₆ deficiency, known to cause a severe form of epilepsy, might contribute as well.

JENNIFER ABBASI

MAP: ISTOCKPHOTO; NODDING SICKNESS: AP PHOTO/STEPHEN WANDERA

CONNECTIONS

Water Worlds

When the Curiosity rover discovered evidence of an ancient stream bed on Mars in late September, it was an important and reassuring discovery. In fact, scientists have found increasing evidence of water on numerous moons, planets, and asteroids in recent years—an encouraging trend for those who see the familiar substance as the backbone of a future space-based economy. By harvesting water and converting it into a hydrogen-based rocket fuel, a space mining company like Shackleton Energy of Austin, Texas, could become the Exxon Mobil of the interplanetary highway.

"If they can figure out the engineering and the economics, the raw materials are out there," says planetary scientist Andrew Rivkin of Johns Hopkins University.

Here are six of the more interesting water worlds and the prospects for each. GREG MONE



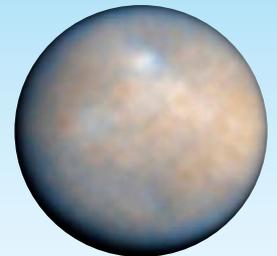
1. The Moon

The moon may hide a billion tons of water ice in shadowed craters near its southern pole and more than half that much in the north, according to Shackleton chief operating officer Jim Keravala. "The water estimated to be in the moon's north pole could fuel a shuttle launch every day for 2,200 years," he says.



2. Earth

Our home planet has enormous volumes of easy-to-access water, but sending a mere liter to the moon costs at least \$10,000. Still, some experts believe the cost of extracting and refining it on the lunar surface could be even greater.



3. Ceres

This 600-mile-wide asteroid may have five miles of ice beneath its rocky outer shell. Drilling there would be an engineering challenge, but space mining expert Dale Boucher of NORCAT in Sudbury, Ontario, says it would be possible, and the weak gravity would make it easy to transport the water away.

THE MOON: NASA/ZUBER ET AL.; EARTH: THINKSTOCK.COM; CERES: NASA