expected to find high concentrations of nitric oxide in patients with severe illness including cerebral malaria. To test this hypothesis, Weinberg's former Duke colleague Nicholas M. Anstey, now at the Menzies School of Health Research in Darwin, Australia, spent a year in Dar es Salaam, Tanzania, collecting blood and urine samples.

Anstey studied 191 children at Muhimbili Medical Centre. Forty of the children were healthy or had noninfectious ailments; the rest were divided into four groups, based on the severity of their malaria.

The results were startling, Weinberg says. "In the sickest patients, the NO concentrations were even lower than the concentrations found in normal Tanzanian children." This phenomenon may be explained by laboratory tests indicating that the children with severe malaria produced excess interleukin-10, a protein that blocks nitric oxide synthesis, he adds.

In contrast, children who were infected but symptom-free had the most nitric oxide. The study concludes: "NO appears to have a protective rather than a pathological role in African children with malaria."

Hall, however, cautions that Weinberg's team reported evidence of nitric oxide only in the blood and urine, not in cerebrospinal fluid (CSF). This leaves open the possibility that nitric oxide plays a dual role in malaria: Nitric oxide may cause severe illness in the brain, in line with Clark's reasoning, but protect against infection elsewhere in the body.

"If they could measure what was going on in the CSF, they might find that concentrations of nitric oxide there are much higher than elsewhere in the body," Hall asserts.

Although certain drugs, including nitroglycerin and sodium nitroprusside, raise nitric oxide levels, Weinberg and Hall agree that tests of these drugs in humans would be premature. If high nitric oxide concentrations in the brain do complicate cerebral malaria, they say, such treatment may do more harm than good. *— S. Sternberg*

Kuiper belt comets not so pristine?

Preserved in the deep freeze of space, comets don't look a day older than they did 4.5 billion years ago, when they formed during the birth of the solar system. At least that's what most planetary scientists have thought. Two researchers now challenge that assumption.

Although comets came in from the cold, they may not all represent pristine relics. A significant number may be mere fragments of objects that originally assembled during the earliest days of the solar system, assert Paolo Farinella of the University of Pisa in Italy and Donald R. Davis of the Planetary Science Institute in Tucson. The researchers base their view on a numerical model that charts the evolution of the Kuiper belt, a flattened reservoir of comets lying just beyond the orbits of Neptune and Pluto (SN: 7/27/96, p. 60).

Astronomers have so far identified 32 objects in the Kuiper belt, each of them at least 100 kilometers in diameter, or about 10 times larger than a typical comet. In addition, the Hubble Space Telescope has found evidence of about 30 smaller, comet-size bodies in the same region (SN: 6/22/96, p. 395). Kuiper belt comets that visit the inner solar system have orbital periods of 60 years or less and move in the same plane as the planets.

Using established estimates of the density and size distribution of objects in the Kuiper belt, the researchers deduce that comets originate when larger parent bodies in the storehouse smash into each other at speeds of up to several hundred meters per second. Such collisions would have cut some of these icy bodies down to comet size. A few of these fragments may also have been compressed by the collisions, which could explain why some comets are less fragile than others, notes Davis. He and Farinella present their work in the Aug. 16 SCIENCE.

The team calculates that Kuiper belt residents larger than 100 km resisted breaking apart during collisions, so they may truly represent pristine bodies from the solar system's formation. However, about 75 percent of the residents that are as small as 10 km in diameter, and virtually all objects 1 km or smaller, arose from collisions of larger parent bodies, the researchers conclude. Their results generally agree with a different, less detailed model proposed by S. Alan Stern of the Boulder, Colo., branch of the Southwest Research Institute.

Scientists have proposed that other comets, those that visit the inner solar system less frequently, come from an even more distant reservoir called the Oort cloud. Davis notes that this reservoir is thought to be so vast that its members would rarely have a chance to collide. Thus, these comets would more likely bear witness to conditions during the early solar system.

Astronomers are just beginning to record spectra of Kuiper belt objects. Tetsuo Yamamoto of Hokkaido University in Sapporo, Japan, notes that if the surface spectra of the smaller objects show a wide range of composition and colors, it would indicate that collisions played a key role in sculpting these comets. *— R. Cowen*

Plastic glows with bright laser light

For 6 years, since they discovered it gives off light when electricity passes through it, scientists in Cambridge, England, have set their sights on a plastic called PPV. Now, the researchers have even higher hopes for the material. They have demonstrated that PPV can emit not just any light, but coherent laser light.

PPV is one of a class of polymers that researchers are developing as light-emitting diodes (LEDs) for use in electronic displays (SN: 10/16/93, p. 246). Getting PPV to produce laser light proves that "it's extremely good for light emission, which was questioned in the scientific community," says Richard H. Friend of the Cavendish Laboratory in Cambridge. That bodes well for polymer LEDs now in development. Friend and his colleagues Nir Tessler and Graham J. Denton report the work in the Aug. 22 NATURE.

To create the laser, the researchers sandwiched the PPV between two mirrors: a thin silver film and a layered material called a distributed Bragg reflector, which reflects visible light with almost 100 percent efficiency. Like any laser, this device produces light by a process called stimulated emission. Shining light through the reflector causes the PPV to emit photons, some of which are reflected back and forth between the mirrors, in turn triggering a cascade of more photons. The photons that are not reflected but pass through the silver film have a single wavelength and are in phase, forming the coherent laser beam.

The light emitted was yellow-green, but polymer laser light could, in principle, cover a range of visible wavelengths, Friend says. Most commercial lasers emit in the red or infrared range. The next big goal is to develop polymer lasers that can be excited by electricity rather than light.

Polymers can be easily deposited over large areas. How that quality can be exploited for lasers remains to be seen, but it's useful when making large, flat LED panels such as computer screens or billboards. With polymers, researchers "don't have to grow single crystals like for other semiconductors," says Alan J. Heeger, chief scientist at UNIAX Corp. in Santa Barbara, Calif.

At the International Conference on Synthetic Metals earlier this month in Snowbird, Utah, Heeger and other UNIAX scientists and a group at the University of Utah in Salt Lake City reported independent evidence of laser-emitting polymers.

"These materials look fantastic," Heeger says. "They will set the community looking in a new direction." *— C. Wu*