OF NOTE

TECHNOLOGY

Fluid lens flows into focus

By controlling a boundary between oil and water, researchers have created a liquid lens that can quickly alter its shape in response to electric signals.

Able to adjust its focusing distance from 5 centimeters to infinity in less than 10 milliseconds, the miniature lens may provide variable focusing for digital and cellphone cameras, medical endoscopes, and other products, claim Stein Kuiper and his colleagues at Philips Research of Eindhoven in the Netherlands. The company unveiled a crumbsize prototype of its new lens last month at a trade exhibition in Germany.

To make the lens, Philips researchers applied a water-repellent coating to the inside of a tiny tube capped at one end. Adding drops of a watery solution and oil to the tube and then sealing the open end with a transparent, uncoated cap, the researchers found that the water hunkered down into a hemispherical lens at the uncoated end.

By applying a voltage to the tube, the researchers could diminish the coating’s repulsiveness, allowing the lens’ outside edge to creep up the once-repellent walls by capillary action. As the water climbed the walls under various voltages, the curvature of its upper surface changed, modifying the lens’ focal length. —P.W.

NEUROGENETICS

Gene implicated in apes’ brain growth

The brains of people who have had the misfortune of inheriting specific rare mutations in the ASPM gene are only one-third the normal size. That gene is the locus of beneficial alterations that began to accumulate as early as 8 million years ago in populations of now-extinct apes, according to a report in the May Public Library of Science Biology, an online journal.

At least some of those ancient DNA changes led to bigger brains in various ape species long before human ancestors experienced unprecedented brain growth, theorize Vladimir Larionov of the National Cancer Institute in Bethesda, Md., and his colleagues.

The scientists sequenced the ASPM gene in chimpanzees, gorillas, orangutans, and rhesus monkeys. They then compared the gene’s nucleotide sequences among these primate species. Comparable data from people were already available.

Segments of the gene displayed systematic nucleotide additions and repetitions consistent with the evolutionary spread of useful mutations, Larionov says. These DNA fingerprints of natural selection appeared most strongly in gorillas and people. Comparisons of DNA sequences across species enabled the researchers to estimate when favorable ASPM-gene mutations began to spread.

This gene is thought to play a key role in the division of cells that later become neurons and may also have a role in certain cancers, Larionov says. —B.B.

ENVIRONMENT

Inhaling your food—and its cooking fuel

A federal study finds that cooking without a working exhaust fan can flood the air of a typical house with ultrafine pollution—particles less than 0.1 micrometer in diameter. Recent investigations by other scientists have linked such ultrafine particles, which can be inhaled deeply into the lungs, to serious breathing and heart problems (SN: 8/2/03, p. 72). No one has yet established what amount of this pollution is hazardous.

With the help of researchers from the National Institute of Standards and Technology in Gaithersburg, Md., Lance A. Wallace of the Environmental Protection Agency in Reston, Va., rigged his house with sensors and recorded airborne particles every 5 minutes for 18 months. To maximize cooking pollution, he disabled his gas range’s exhaust fan, while rigging another fan to circulate air year-round throughout the home’s ductwork.

During cooking, kitchen concentrations of ultrafine particles were initially about 10 times as high as those elsewhere. Within 30 minutes, however, the particles had spread fairly evenly throughout the house, and the concentration remained elevated for 2 to 4 hours.

Although Wallace’s family typically cooked for only a few minutes each morning and evening, concentrations of the ultrafine particles tripled throughout the house after those culinary efforts. Some 15 minutes of frying could spew roughly 100 trillion ultrafine particles, Wallace’s team reports in an upcoming Environmental Science & Technology.

Conventional filters can’t trap these particles. However, Wallace found that an electrostatic precipitator that he installed in his ducts could remove about 90 percent of the ultrafines, but only if the filtering system was cleaned monthly. —J.R.

IMMUNOLOGY

SARS vaccine tests well in mouse model

A vaccine that targets the virus responsible for severe acute respiratory syndrome (SARS) stops the infection in mice, scientists report.

Researchers fashioned the vaccine from a piece of viral DNA that includes the gene for a surface protein on the SARS virus. When injected into mice, the DNA becomes housed in mouse cells, which then use the genetic instructions to produce the viral protein. By itself, that protein doesn’t cause disease. However, it induces an immune response in the animals that includes production of antibodies and immune cells, says study coauthor Gary J. Nabel of the National Institute of Allergy and Infectious Diseases in Bethesda, Md.

Nabel’s team gave mice three injections of the DNA vaccine or of an inert substance over 6 weeks. Thirty days after the last injection, the scientists exposed all the mice to live SARS virus. The placebo group developed high concentrations of virus in their lungs within 2 days, while the vaccinated mice fended off the pathogen, the researchers report in the April 1 Nature. Antibodies to the surface protein did the work, presumably, by identifying the protein on the live SARS virus and neutralizing the virus before it could invade cells and spread.

Several research teams are experimenting with other SARS vaccines (SN: 1/10/04, p. 28). Some could enter human safety trials this year. —N.S.