

Fetal DNA Extracted From Mother's Blood

Rare genetic diseases could be detected without a niocentesis, nature.com reported. A non-invasive blood test can now detect the gene for the fatal disease beta-thalassemia in a growing fetus. Its developers believe that the technique could be applied to a range of other diseases, overcoming the

need for a more invasive procedure called amniocentesis. Screening a mother's blood can already determine whether unborn children have certain hereditary diseases. But current screens can only detect large-scale irregularities in the baby's chromosomes, such as those found in Down syndrome, says Sinuhe Hahn, a mol-

ecular biologist from the University Women's Hospital in Basel, Switzerland. Doctors use amniocentesis to spot single-gene mutations, such as the ones that cause beta-thalassemia. The test involves inserting a needle in the mother's abdomen to draw amniotic fluid out of the womb. But the invasive method

can lead to damage or loss of the baby in up to 1% of cases. Hahn and his colleagues have found that trace fragments of fetal DNA can be separated from the mother's genetic material in her blood. This allows them to pinpoint single mutations in the baby's DNA, which is normally swamped by the mother's own DNA.

Black Holes Bend Light the Wrong Way

Refraction effect may be distorting astronomers' results, nature.com reported. Astronomers could be misinterpreting their observations of distant stars, suggest mathematicians. Starlight may be bent in odd directions when it passes close to a rotating black hole, the researchers say, unexpectedly shifting its source's apparent position in the sky. The cause is a recently discovered phenomenon called negative refraction, which physicists are still struggling to understand. Astronomers already adjust their observations to account for the fact that light is bent by massive objects such as black holes, an effect called gravitational lensing. But Akhlesh Lakhtakia, a mathematician at Pennsylvania State University in University Park, has studied what happens when a black hole rotates. In this case, light is bent in the direction opposite to that predicted by conventional theory. "Astronomical measurements, particularly those

relating to black holes and other massive stellar bodies, need careful reinterpretation," says Tom Mackay of the University of Edinburgh, UK, who worked with Lakhtakia on the analysis, published online in Physics Letters A1. Negative refraction is new to astronomy, but has been causing a stir in materials science in recent years. When light crosses a boundary, it is bent in a characteristic way; this is why an oar dipped in water looks as though the submerged part is angled towards the surface. But in 2001, US researchers showed that certain artificial materials bend light in the opposite direction. If water had this property, the submerged oar would appear to angle away from the surface. The revelation prompted a flurry of research, most of which has focused on understanding and developing negative refracting materials. "But this is exactly the same phenomena," Mackay points out.

Hope to Cure Deafness

A pioneering form of gene therapy has cured deafness in guinea pigs. It raises hopes that the same procedure might work in people, reports New Scientist. "It's the first time anyone has biologically repaired the hearing of animals," says Yeohash Raphael, head of the US-Japanese team that developed the technique. The therapy promotes

the re-growth of crucial hair cells in the cochlea, the part of the inner ear which registers sound. After treatment, the researchers used sensory electrodes around the animals' heads to show that the auditory nerves of treated - but not untreated - animals were now registering sound. Raphael's team first gave the guinea pigs antibiotics which destroyed their inner-

ear hair cells. They then apparently repaired the damage by injecting them with genetically engineered adenoviruses. "The recovery of hair cells brought the treated ears to between 50% and 80% of their original hearing thresholds," says Raphael. Raphael warns that there are many obstacles to overcome before the procedure could be used in people.

Longer Lives for Organic LEDs

The performance of organic light-emitting diodes can be improved by doping them with carbon-60 according to scientists at Samsung in South Korea. The carbon-60 molecules can also extend the lifetime of the devices by a factor of two, PhysicsWeb.org said. Organic light-emitting diodes (LEDs) are potentially attractive for applications because they are easy to process and can emit over the full visible

spectrum. Light emission from organic materials relies on electrons and "holes" combining to form excited states called "excitons" that subsequently emit photons when they decay. A typical LED contains a thin light-emitting layer sandwiched between layers that transport the holes and the electrons. One way of improving the performance of organic LEDs is to increase the mobility of the holes in the hole-transport layer by adding a dopant. This should lead to more holes combining with electrons in the device.

Jun Yeob Lee and Jang Hyuk Kwon at Samsung's Corporate R&D Center in Yong-In City studied the effect of carbon-60 doping in phosphorescent devices that rely on an organic material called "TDAPB" as the hole-transport layer. Lee and Kwon varied the concentration of carbon-60 in the TDAPB from 0 to 3% while measuring the properties of the device with a spectrophotometer. They found that the mobility of holes in devices doped with 3% carbon-60 was five times higher than that of pure TDAPB. The current density also increased by a factor of three, and there was a 30% increase in the luminance of the LED. Doping with 3% carbon-60 also increased the lifetime from 700 hours for the undoped device to 1400 hours. Carbon-60 is an electron acceptor that protects the TDAPB from being "attacked" by excess electrons ejected from the light-emitting layer.

Lobsters Feel No Pain

Lobsters probably do not feel pain when they are dropped into a pot of boiling water, claims a new study. According to ananova.com, animal activists claim lobsters are in agony when being cooked, and that boiling them alive is torture. But the study, by a scientist at Oslo University, suggests



Lobsters and crabs have some capacity of learning, but it is unlikely that they can feel pain. Lobsters and other invertebrates such as crabs, snails and worms probably don't suffer. "Lobsters and crabs have some capacity of learning, but it is unlikely that they can feel pain," concluded the report. Biologists maintain that the lobster's primitive nervous system and underdeveloped brain are similar to that of an insect. "It's a semantic thing: No brain, no pain," said Mike Loughlin, a biologist at the Maine Atlantic Salmon Commission.

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