



WATER ON THE MOON?
Lunar missions find evidence of ice and hydrated minerals.
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NASA

Leslie Biesecker, who heads the ClinSeq study at the National Human Genome Research Institute in Bethesda, Maryland, is uncovering evidence to support that idea. ClinSeq has enrolled 725 patients and sequenced 251 of their genes, including two genes that, when mutated, cause familial hypercholesterolaemia (FH), a disease marked by high cholesterol levels. In seven patients with high cholesterol, Biesecker found mutations in the two FH genes, even though some of the patients had not been diagnosed with the condition. Biesecker estimates that 75–100 family members of these patients probably have undiagnosed FH, and is trying to contact them.

“If we can leverage the finding to diagnose and treat 75–100 people for FH, I can go to bed at night feeling like our sequencing money has been well spent,” he says.

Plummeting prices

Cost is still a roadblock to broader sequencing, however, so scientists at the meeting were interested in a report from collaborators of Complete Genomics, of Mountain View, California, which says it will dramatically cut the price of sequencing by offering human-genome sequences for US\$5,000 next year. The company sequenced a family of four people for \$20,000 apiece, including two children with undiagnosed symptoms, for the Institute for Systems Biology in Seattle, Washington, whose founder, Lee Hood, is on Complete Genomics’ scientific advisory board. Lee Rowen, a researcher at the institute, said that its analysis of Complete Genomics’ data has yielded three candidate genes for the children’s disorders. “We were happy with what they gave us,” Rowen says.

However, she also estimates that there could be roughly 10–20 errors per megabase of DNA, which would translate to tens of thousands of errors per genome. The group is resequencing each error to try to pinpoint the error rate more closely.

That left many in the audience unsatisfied. “What use is a \$20,000 genome if you have to spend even more money to figure out if it’s right or not?” Mardis said.

Some contenders in the crowded sequencing field hope to ultimately push costs as low as hundreds of dollars per genome. Until then, the ultimate payoff on the promise of genomics — a true understanding of common diseases — remains over the horizon. But for now, a down payment appears to have been made. ■

Erika Check Hayden

The elephant and the neutrino

India’s environment minister Jairam Ramesh will visit the site of a proposed underground neutrino laboratory next month, to try to break the impasse between physicists and environmentalists over its construction.

The US\$160-million India-based Neutrino Observatory (INO) was to have been completed by 2012 to study the elusive particles known as neutrinos (see *Nature* 450, 13; 2007). But its construction is mired in controversy over the wisdom of locating the facility in prime elephant and tiger habitat at Singara in the Nilgiri Biosphere Reserve, 250 kilometres south of Bangalore.

The observatory applied for permission to begin construction at the Singara site in 2006; “there has been no reply to date,” says project spokesman Naba Mondal, a physicist at the Tata Institute of Fundamental Research in Mumbai. “All I know is we have not cleared it,” says A. S. Balanathan, principal chief conservator of forest for the state of Tamil Nadu, who declined to comment further.

Last month, 11 leading physicists, including Nobel laureates Sheldon Glashow and Masatoshi Koshiya, wrote to India’s prime minister Manmohan Singh urging that the project move forward. “The INO will bring more big science to India and enhance India’s role as an important player in front-line science,” they wrote. Meanwhile, prominent Indian conservationists are circulating and signing a letter laying out their concerns and asking that the observatory be sited elsewhere.

The Nilgiri reserve includes more than 5,500 square kilometres of continuous forest cover and six protected areas. The proposed location for the INO comes as close as 7 kilometres to the edge of one of the sanctuaries. The project involves digging out a 120-metre-long cavern at the end of a 2-kilometre-long tunnel inside a mountain. The cavern will house a magnetized iron calorimeter to detect the muons that are produced occasionally when neutrinos interact with matter.

The controversy stems from disagreements over the impact of the tunnelling and the increased human population on the fragile ecosystem. “Transporting the estimated 630,000 tonnes of debris and 147,000 tonnes of construction material would require about 156,000 truck trips through 35 kilometres of forest — and two tiger reserves,” says the NBR Alliance, a group of Indian organizations

concerned about the reserve. This means 468,000 hours of disturbance to animal movement routes, the alliance estimates.

The INO team “could hardly have picked a site in India more likely to damage wildlife,” says John Seed, an Australian environmentalist who has researched elephant habitats in India. “As well as being home to the largest single population of Asian elephants in the world,” he says, “the Nilgiri is also one of the most important tiger habitats in the country.”

Mondal disputes the tally of construction debris and says that the project will limit the number of daily truck trips and restrict them to daytime. But Priya Davidar, an ecologist at Pondicherry University, says that the environmental impact assessment the project submitted to state officials is seriously flawed. Davidar is president of the Association for Tropical Biology and Conservation, based in Washington DC, which passed its own resolution urging the Indian government



Big hurdles for India’s neutrino-detection lab.

not to permit construction and to look for an alternative site.

Davidar criticizes the project for limiting its search to only two sites; a better location, she says, would have been the Kolar gold mine in neighbouring Karnataka state, used for neutrino detection in 1965. But the Kolar mine is now closed and filled with water, and is not suitable for lowering heavy materials down, says Mondal. He says that after considering other sites, his team, along with the Geological Survey of India, identified Singara as “the best available site for locating the INO, based on safety, seismicity, as well as year-round accessibility”.

The minister will visit on 10 October. If a construction permit is denied, INO may have to start looking for another site. ■
Killugudi Jayaraman

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