

In the wake of a harassment report, Francisco Ayala resigned from the University of California, Irvine.

for sex, Ayala did not cross those boundaries," she notes. "But he clearly made multiple women feel degraded. ... Senior university officials warned him to stop acting in these ways, but he continued."

Robert Cook-Deegan, a historian of science with Arizona State University who is based in Washington, D.C., and also read the report, concluded that "Norms are changing really fast and I think this 84-year-old got caught in a norm shift."

Ayala, who was elected to the National Academy of Sciences in 1980, did pioneering work in evolution and genetics and was a prominent public defender of evolution. In 1995, he was president of AAAS, which publishes *Science*. Since 2010, he has donated more than \$11 million to UC Irvine.

Ayala admitted to making the "sit in my lap" comment to complainant Jessica Pratt, an assistant teaching professor, in 2015, as she prepared to present at a crowded faculty meeting. Ayala told investigators it was a one-time lapse showing "a horrendous lack of judgment." (A graduate student who was interviewed as a witness described a separate instance in which she said Ayala invited her, too, to sit in his lap.)

Pratt complained to the then-EEB department chair, prompting Ayala to visit Pratt in her office, according to the report. Ayala told investigators that he "apologized profusely" to Pratt, telling her he intended the comment to be playful, like he was addressing a niece or granddaughter. But when Pratt told Ayala that the comment was

overheard—something other witnesses corroborated—Ayala called her a liar, according to the report. Pratt lodged an informal complaint with UC Irvine's Office of Equal Opportunity and Diversity. She told investigators that Ayala's conduct "made her question whether he respected her work. ... She even began to question her own merit as a scientist."

As a result of Pratt's complaint, Associate Chancellor Kirsten Quanbeck warned Ayala in 2015 to watch his language with women and told him that his conduct was viewed as unwelcome and was out of line with university policy. The EEB department chair gave him a similar warning, the report says.

One complainant, Benedicte Shipley, an assistant dean in UC Irvine's School of Biological Sciences, told investigators she

felt she had to put up with Ayala's attentions because of his power as a major donor. "I just learned that women don't like to be told they're beautiful, but I know you don't mind," Shipley recalled Ayala saying in 2016, rubbing her sides while kissing her cheeks in greeting—a behavior that occurred repeatedly, she said. A male professor noted this encounter and asked Shipley afterward whether she was all right, the report says.

Shipley told investigators she was relieved when Ayala's attention shifted to Treseder, to whom she said Ayala was "glued" at a department social event not long after. Distressed, Treseder asked a male colleague, who corroborated her claim to investigators, to attend such events with her.

In early November 2017, just before the complaints against Ayala were filed, Treseder, who had recently been named the department chair, proposed a code of conduct concerning sexual harassment at a faculty meeting. Ayala pushed back, according to the report, saying the "ladies" in the dean's office wanted him to hug and kiss them.

In the fourth complaint, graduate student Michelle Herrera alleged that Ayala put his hands on her bare shoulders—a behavior Ayala admitted to—and leaned his front against her back as she sat at a picnic table. Ayala vigorously denied leaning against her. Investigators concluded that the incident probably occurred but might not have been gender-based. They found Herrera's claims that Ayala repeatedly commented on her appearance not credible. Herrera could not be reached for comment.

UC Irvine's investigators also assert that Ayala "has engaged in a campaign with the highest University officials to influence the outcome of this investigation." The report says he wrote to Gillman and to Janet Napolitano, president of the UC system, reminding them of his financial and academic contributions to UC Irvine. According to the report, Ayala told the senior investigator as the probe launched that it "needed to end quickly and in his favor and [that] he had lawyers waiting if [it] did not."

Speaking with *Science* last week, Ayala said he had wanted to avoid a protracted legal struggle so he could focus on his science. He added: "I didn't say anything about lawyers."

Olivarius predicts the Ayala case will have an impact beyond UC Irvine. "Dr. Ayala's very public punishment will send a loud signal that times are changing—that harassment ... does not mean just extreme misconduct," she says. ■

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Ann Olivarius.
McAllister Olivarius

NUCLEAR PHYSICS

Electron-ion collider wins key endorsement

National Academies report calls for accelerator to look inside protons and neutrons

By **Adrian Cho**

The next dream machine for U.S. nuclear physicists got an important boost this week in a report from the National Academies of Sciences, Engineering, and Medicine. The report committee glowingly approved of the science that could be done with the proposed Electron-Ion Collider (EIC), a billion-dollar accelerator that would probe the innards of protons and neutrons. The endorsement should help the Department of Energy (DOE) justify building the EIC at one of two national laboratories competing to host it, although the project probably won't get the go-ahead for several years.

"We're basically saying, 'You've really got to do this,'" says Ani Aprahamian, a nuclear physicist at the University of Notre Dame in South Bend, Indiana, and co-chair of the report committee.

The inner structure of the proton and the neutron remains mysterious. Crudely, a proton consists of three subatomic particles called quarks, bound by the strong nuclear force. In actuality, a proton is far more complex. Because of the uncertainties inherent in quantum mechanics, its interior roils with quark-antiquark pairs popping in and out of virtual existence. It also teems with gluons, the quantum particles that convey the strong force. The mess is so complex that even basic properties of the proton remain unexplained. For example, its three quarks account for less than 5% of its mass, the rest arising somehow from energy of the virtual quarks and gluons.

By blasting a beam of electrons into a beam of protons or ions, the EIC would help solve this mystery and a parallel one: how the proton gets its spin. Just as in the case of mass, the proton's spin is not simply the sum of the spins of the three quarks; it also has unknown contributions from glu-

ons and from the quarks orbiting around one another. Finally, the EIC could probe the gluons' behavior for so-called emergent properties. For example, some theories predict that a proton's gluons crowd into a single quantum wave a bit like laser light. The EIC would be better for such studies than a machine that smashes protons into protons, such as the Large Hadron Collider (LHC) near Geneva, Switzerland. That's because the electron is an infinitesimally small particle and produces cleaner, easier to interpret collisions, Aprahamian says.

The EIC would help maintain U.S. expertise in colliding beams, says Gordon Baym, a theorist at the University of Illinois in Urbana and co-chair of the report committee. "It's the only collider in the U.S. that's being considered for the next 50 years or so," he says. Now, the United States only has the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory in Upton, New York, which was completed in 1999. Europe has the newer LHC and Japan runs the newly upgraded SuperKEKB electron-positron collider in Tsukuba.

Physicists at two DOE labs propose to assemble the EIC in different ways. At Brookhaven, RHIC smashes together heavy nuclei such as gold to melt them and create a soup called a quark-gluon plasma, the stuff that filled the universe just after the big bang. Brookhaven physicists eventually want to add an electron accelerator to convert RHIC into the EIC.

However, the Thomas Jefferson National Accelerator Facility in Newport News, Virginia, has recently upgraded its Continuous Electron Beam Accelerator Facility (CEBAF), which fires electrons into stationary targets to study protons, neutrons, and nuclei. Jefferson Lab researchers hope

to add an ion accelerator to it to make the EIC. Jefferson Lab is a smaller facility that's more narrowly focused on nuclear physics than Brookhaven, and its long-term survival could depend on landing the EIC.

The report avoids comparing the two labs' proposals, but offers DOE officials a scientific case for the EIC. However, on top of running RHIC and CEBAF, DOE's \$684 million office of nuclear physics is also building the \$730 million Facility for Rare Isotope Beams at Michigan State University in East Lansing, which upon completion in 2020 will generate exotic nuclei. Given the costs of operating those facilities, DOE probably can't afford the EIC any time soon, notes Donald Geesaman, a nuclear physicist at Argonne National Laboratory in Lemont, Illinois, and former chair of DOE's Nuclear Science Advisory Committee.

More time may be welcomed, anyway, as the Brookhaven and Jefferson Lab proposals cannot yet meet key technical requirements. From 1992 to 2007, physicists in Germany ran the Hadron-Electron Ring Accelerator (HERA), which also collided electrons and protons and revealed the gluon. The EIC will run at lower energy than HERA did, but to achieve its goals, it will have to generate collisions at a rate 100 to 1000 times higher with highly polarized electron and proton beams.

For now, Brookhaven and Jefferson Lab scientists are collaborating on the R&D rather than competing. "It's been very exciting to see the community self-assemble," says Jefferson Lab Director Stuart Henderson. Brookhaven Director Doon Gibbs says, "The immediate objective is to keep walking down the road together with both labs in lockstep." If all goes well, however, the two labs' ambitions will eventually collide. ■

SCIENTIFIC ETHICS

Study of 'sea nomads' under fire in Indonesia

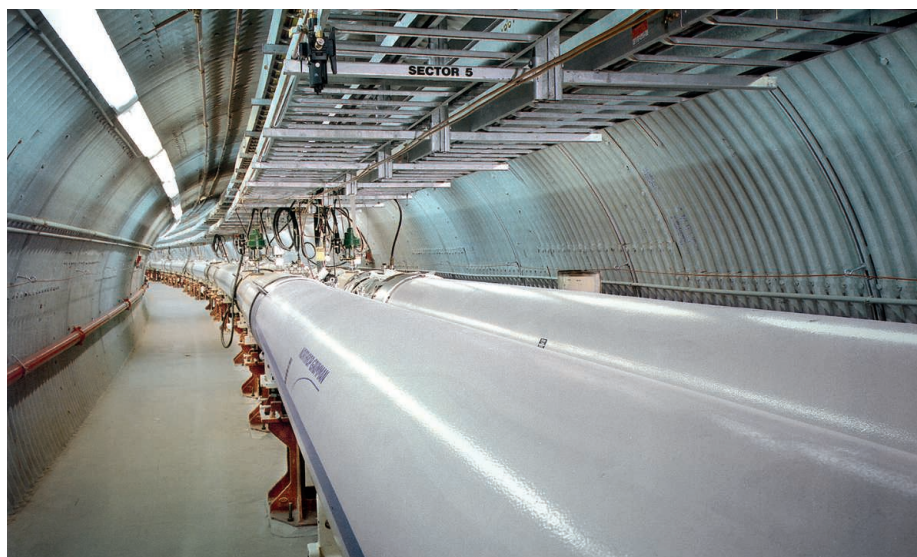
Critics say study lacked local ethical approval and role for Indonesian experts

By Dyna Rochmyaningsih

In April, a paper showing why Indonesia's Bajau people are such great divers drew worldwide attention as a striking example of recent human evolution (*Science*, 20 April, p. 244). But the study, published in *Cell*, has created a different kind of stir in Indonesia, where some say it is an example of "helicopter research" carried out by scientists from rich countries with little consideration for local regulations and needs.

"Too many mistakes were made here," says geneticist Herawati Sudoyo, who heads the Eijkman Institute for Molecular Biology in Jakarta. Indonesian officials say the research team failed to obtain ethical approval from a local review board and took DNA samples out of the country without the proper paperwork. And some Indonesian scientists complain that the only local researcher involved in the study had no expertise in evolution or genetics. But Eske Willerslev, director of the University of Copenhagen's (KU's) Centre for GeoGenetics, says the team he headed had a permit from the Indonesian government and worked hard to follow the rules. "I would never participate in research that I felt was unethical," Willerslev says. The government hasn't informed him about problems, he says, but, "If we have made an error that violates national or international guidelines, we would like to apologize for that."

The issue escalated in late May, when Pradiptajati Kusuma, a geneticist at the Eijkman Institute who has also studied the Bajau, suggested in a tweet that the team could have faced prosecution under strict new rules on foreign research, proposed by the Indonesian government and now under debate. "Jail? Possible," Kusuma wrote. He later deleted the tweet, but Melissa Ilardo, the *Cell* study's first author, says she was so rattled that she canceled a July trip to Indonesia during which she planned to



The main accelerator at Brookhaven National Laboratory could be repurposed into an electron-ion collider.

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