U.K.'s average performance has improved," says Evidence chief Jonathan Adams. Britain's average number of citations per paper has increased from 23% above the world average to 38% since the last RAE. "It's a pretty stunning performance," says Adams.

HEFCE officials view the improvement in research quality as a validation of their approach of channeling more money into strong departments. "This is actually selectivity at work. We gave more money last time to those that were 5 and 5*. And what did they do with it? They invested it in more staff," says Bahram Bekhradnia, HEFCE's director of policy. Newby says there is anecdotal evidence of large staff turnovers in the past 5 years in which high-caliber researchers tended to replace underperforming staff members. Indeed, says Bekhradnia, "there's been a lot of evidence of deliberate policies to bring in new blood."

Sadly, many university departments whose improvements are not enough to place them in the upper echelon will find the RAE an exercise in frustration. The government has ruled out any extra cash for the funding councils to maintain current funding levels while also rewarding those departments that have improved their rating. Faced with the cash crunch, the HEFCE board has "committed ourselves to funding 5*'s: They will get the full amount," says Newby. But the simple solution—putting 3a and 3b departments into the pool that won't receive funding—would not erase the shortfall. The HEFCE board meets again on 23 January to decide on a final formula.

Skewing the funding even further toward the top-rated institutions is likely to provoke a furor in some departments. Research funding is already very selective, says Roderick Floud, president of Universities UK, an umbrella organization representing all of the U.K.'s universities. "It should not be made more selective," he says. Enderby says he would welcome a "flatter" funding model: "Small centers of excellence must not be squashed out."

"There is always a dilemma ... about research funding, about whether one puts all the resources toward the most excellent alone, or whether one holds some money back to fund research capability in areas which are not currently very strong but which have the potential to get stronger in the future," says Newby. As with most dilemmas, it's easier to describe than to resolve.

–ANDREW WATSON

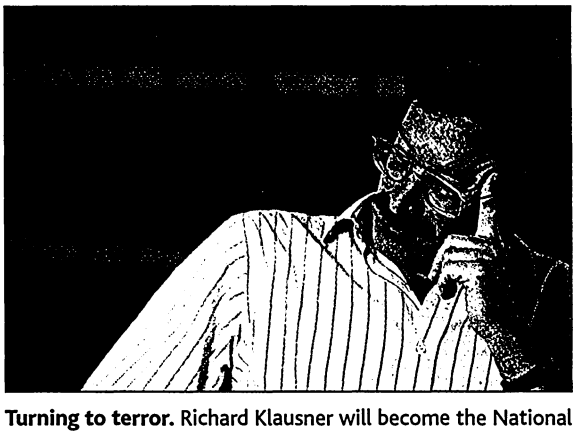
Andrew Watson is a writer in Norwich, U.K.

CREDIT: SAM KITTNER

BIOMEDICAL RESEARCH

Case Institute a False Start

Ten weeks after leaving the top job at the $4 billion National Cancer Institute (NCI) to start a new biomedical research institute, biologist Richard Klausner has jumped again, this time to help the government combat terrorism. He will serve as a liaison between the U.S. National Academies and the government's antiterrorism efforts while maintaining a lab at NCI. Klausner's surprise move means that the $100 million organization he was supposed to lead has folded before it even began.



Turning to terror. Richard Klausner will become the National Academies' point person on antiterrorism.

Klausner announced his departure from NCI on the morning of 11 September, just as the planes crashed into the World Trade Center and the Pentagon (*Science*, 14 September, p. 1967). He said he had a commitment from Jean Case and her husband, America Online founder Steve Case, to fund the Case Institute of Health, Science and Technology, with him at the helm. In October, he told *Science* that the Cases had agreed to spend nearly $100 million over the next few years on bioinformatics studies and other life sciences research, including awarding grants to outside researchers and hiring an in-house science team.

Those plans were shelved earlier this month, Klausner says, after his volunteer work as the co-chair of a new National Academies panel on antiterrorism began to take the lion's share of his time and interest. "The Cases and I felt that launching something new from scratch wasn't doable" given his time commitment to antiterrorism efforts, he says. "The nation's interests come first, and we fully support [Klausner's] decision," says Jean Case.

Klausner, who says that his new position "is a calling," estimates that it will take up half his time for at least a year, leaving him an opportunity to continue running his NCI laboratory. National Academy of Sciences president Bruce Alberts says Klausner will be responsible for keeping an eye on the academies' many studies on terrorism-related subjects, helping fulfill government requests for immediate technical assistance, and sharing potentially useful ideas with the White House Office of Science and Technology Policy (OSTP). OSTP head John Marburger says Klausner's knowledge of Washington will make him "a very effective interface" between science and government.

Jean Case says there are "no plans to revisit" the idea of creating the institute. Klausner's two assistants have shifted to other work within the larger Case Foundation, which supports a variety of education and technology programs.

–DAVID MALAKOFF

With reporting by Eliot Marshall.

PARTICLE PHYSICS

Sign of Supersymmetry Fades Away

Like that extra $223.78 that seemed to enrich your checking account before you realized your mistake, a tantalizing hint of new elementary particles has vanished once physicists double-checked their math. The culprit: an extra minus sign in one of the calculations.

In February, researchers at Brookhaven National Laboratory in Upton, New York, reported that a particle called the muon was 4 billionths more magnetic than predicted by the Standard Model of Particle Physics (*Science*, 9 February, p. 958). The muon's magnetism depends on other particles that flit in and out of existence too quickly to be directly observed, so the tiny discrepancy between the measured and predicted values suggested the presence of new, unaccounted-for particles. Many physicists interpreted the result as possible evidence of supersymmetry, a theory that

predicts a much more massive partner for every type of particle known today.

But the true cause of the discrepancy is far less exciting. Misled by an extra minus sign, theoretical physicists underestimated the predicted value of the muon's magnetism. To find that value, physicists must add up the results of a series of hugely complicated calculations, one for each combination of particles emitted and reabsorbed by the muon.

In 1995 two groups independently calculated the contribution for a combo known as "hadronic light-by-light scattering," but both got the sign of the answer wrong. If the negative results are made positive, the theoretical prediction for the muon's magnetism goes up enough to shrink the discrepancy by nearly half. That leaves the difference only slightly bigger than the theoretical and experimental uncertainties, spoiling the case for new particles.

$$a_\mu^{\mathrm{LbyL};\pi^0} = -e^6 \int \frac{d^4q_1}{(2\pi)^4} \int \frac{d^4q_2}{(2\pi)^4} \frac{1}{q_1^2 q_2^2 (q_1+q_2)^2 [(p+q_1)^2 - m^2][(p-q_2)^2 - m^2]} \times \left[\frac{\mathcal{F}_{\pi^0\gamma^*\gamma^*}(q_1^2, (q_1+q_2)^2)\, \mathcal{F}_{\pi^0\gamma^*\gamma^*}(q_2^2, 0)}{q_2^2 - M_\pi^2} T_1(q_1, q_2; p) + \frac{\mathcal{F}_{\pi^0\gamma^*\gamma^*}(q_1^2, q_2^2)\, \mathcal{F}_{\pi^0\gamma^*\gamma^*}((q_1+q_2)^2, 0)}{(q_1+q_2)^2 - M_\pi^2} T_2(q_1, q_2; p) \right]$$

Are you positive? The sign of this elaborate expression originally led physicists astray.

The sleuths who cracked the case were Marc Knecht and Andreas Nyffeler of the Center for Theoretical Physics in Marseille, France. The pair repeated the calculation after improving a key mathematical ingredient called a "form factor." "We thought perhaps with our better description we could get an improved value. But we didn't expect to get the opposite sign," Nyffeler says.

Knecht and Nyffeler's paper appeared on 6 November on the Los Alamos preprint server, leading the other two groups to double-check their work. Both found mistakes that affected the outcome.

In a paper posted on the Los Alamos server on 6 December, Masashi Hayakawa of the KEK laboratory in Tsukuba, Japan, and Toichiro Kinoshita of Cornell University in Ithaca, New York, report that in their 1995 calculation they had inadvertently introduced an extra minus sign when using a specialized computer program to help grind through the staggering quantities of algebra. "We misunderstood the program in a subtle way," Kinoshita says.

Meanwhile, Johan Bijnens of Lund University in Sweden says that in 1995 he and collaborators Elisabetta Pallante of the International School for Advanced Studies in Trieste, Italy, and Joaquím Prades of the University of Granada in Spain performed the calculation in two different ways, and now they think they've found a different mistake in each approach. "We're still checking it, but it seems that we have an overall sign error, too," Bijnens says.

The winnowing of the discrepancy is disappointing, says Lee Roberts, an experimental physicist at Boston University and spokesperson for the Brookhaven team: "You always want to be the first to discover something new and exciting." However, the discovery of the mistake has an upside, Roberts says. The scrutiny that unearthed the mistake has also improved the various calculations in ways that put the theoretical prediction on firmer ground. "I view it as a positive step that we have a lot more confidence in the theory than before," Roberts says.

The Brookhaven experimenters hope to publish an even more precise measurement for the muon's magnetism in March based on four times as much data as they used in their original measurement. Those results should allow physicists once again to say whether the magnetism of the muon adds up to a tiny sign of something big.

–ADRIAN CHO

Adrian Cho is a freelance writer in Boone, North Carolina.

CREDITS: (LEFT TO RIGHT) M. KNECHT AND A. NYFFELER; COSTANTINI/AP

GERMAN RESEARCH

Helmholtz Reforms Mollify Scientists

BERLIN—A controversial plan to inject more competition into Germany's largest research organization, the Helmholtz Association of National Research Centers, has been modified to ensure that basic research remains a priority. Physicist Walter Kröll, the newly elected president of the association, discussed details of the plan last week at a press conference following the first meeting of the reorganized Senate.

The reforms, to take effect in 2003, will replace a system of block grants for the 15

ScienceScope

No-Confidence Vote In a straw poll, some 150 genome scientists, physicians, and ethicists voted 3:1 in favor of ending the government-backed Human Genome Project when it finishes its work in 2003. The informal tally, taken last week at a meeting of human genome experts in Warrenton, Virginia, reflects concern among some scientists that proponents of the decade-long, $300 million effort have oversold its immediate benefits to biomedicine. But Francis Collins, director of the National Human Genome Research Institute, which funded and coordinated much of the sequencing effort, warned voters that "ultimately, you aren't going to decide this."

MOSE Advances Venice's lagoon may get its floodgates after all. Italian officials earlier this month approved a controversial plan to spend $2.3 billion to build MOSE, a set of inflatable floodgates designed to protect the historic city from tidal flooding. In March, officials had requested revisions in the plan after researchers complained that the project hadn't accounted for the latest predictions for sea-level rise due to climate change (*Science*, 6 April, p. 28).

Critics still argue that MOSE, which will take at least 8 years to build, will be an environmental and economic disaster. Some experts say that reengineering the lagoon's outlets would do better—and save money. And the environmental group WWF-Italy calls MOSE a "presumptuous technological bet." A separate controversy over contracting is likely to delay construction—and prolong debate.

Lander Take Off? Look for the renowned Whitehead Institute in Cambridge, Massachusetts, and its genome center run by Eric Lander to go their separate ways in 2002. The center served as the flagship organization in the Human Genome Project with its more than 200 employees and a vast collection of sequencing machines. With the bulk of that project complete, new Whitehead director Susan Lindquist and Lander are contemplating making the center into its own institute, affiliated—like the Whitehead—with the Massachusetts Institute of Technology, according to sources familiar with the talks. Whitehead spokesperson Seema Kumar acknowledges that "informal discussions" are under way to examine "organizational models" to best make use of the center's genomic expertise.