In all, the UCSC structure reveals about 30 of these molecular connections, quite a few more than the six first discerned by Frank's cryoelectron microscopy studies in the mid-1990s. Frank thinks that some of these bridges—the exact chemical nature of which is still unclear—help keep the two subunits in register with one another. Others—likely those in contact or close to the tRNAs—communicate the status of protein production, and the rest participate either passively or actively in the movements of the subunits themselves as they ratchet, possibly making room for tRNA movement.

Like Frank, Moore sees these bridges as key: "The making and breaking of these bridges are almost certainly part of the protein synthesis process." Therefore, a logical next step, which several teams will likely pursue, would be to make mutations that alter these bridges in specific ways to observe the effects of those changes on protein production.

But some biologists, especially Noller, Cate, and their colleagues, will not be diverted from their quest to make even better crystals to get ever closer to a view of the atoms behind the ribosome's many parts. Says Moore: "You never run out of your desire to go after ever higher resolution."

–ELIZABETH PENNISI

RESEARCH REACTORS

German Neutron Source Faces New Demands

BERN, SWITZERLAND—Plans to open a long-awaited neutron source this fall in Garching, near Munich, were thrown into confusion last week after the German cabinet called for a change in the research reactor's fuel source to avert a potential proliferation threat. It also said the State of Bavaria, rather than the federal government, should pick up the tab for building a storage facility—which might cost as much as the reactor itself—to dispose of spent fuel elements. Unless a compromise is reached, those new demands could delay the start-up of the $500 million FRM-II reactor and make its operations more expensive.

In a 21 March statement, the cabinet said the nearly completed reactor, designed to use highly enriched uranium (HEU) fuel, should shift to medium enriched uranium (MEU) fuel within 5 years. That would bring it in line with an international effort to phase out HEU-fueled research reactors, mainly because of fears that terrorists could divert HEU for nuclear bombmaking. The cabinet's negotiating position—developed with input from both the research and environment ministries—sets up delicate talks between federal officials and those in the Bavarian government, which has resisted a rapid conversion to MEU fuel and has insisted that nuclear-waste storage is a federal responsibility. Berlin, however, holds a trump card: FRM-II must receive a final permit from the environment ministry before it goes on line.

The political sensitivity of using HEU fuel is not new. In the mid-1990s, the U.S. government pushed for the Technical University of Munich, which will house the FRM-II, to redesign the reactor to use less-enriched uranium (*Science*, 4 August 1995, p. 628). Bavarian officials refused, and the dispute died down until a coalition of Social Democrats and Greens took power late in 1998 and appointed an expert committee to examine the fuel question. In June 1999, the panel suggested that conversion would be a good thing, but that it would be costly and time consuming to alter the FRM-II's design. Some experts favored postponing conversion—which would cost as much as $55 million—until a new generation of high-density MEU fuel (based on a uranium-molybdenum alloy now used in some Russian reactors) is developed, probably by 2008 (*Science*, 25 June 1999, p. 2065). Bavaria's science minister, Hans Zehetmair, started talks this week with federal research minister Edelgard Bulmahn. Zehetmair told *Science* that the cabinet's proposed deadline for the reactor's conversion to MEU—1 January 2006—is untenable. "You can't yet set an exact date because scientists are still trying to improve the MEU fuel," he says. And Bavaria opposes building a separate nuclear-waste storage facility for the FRM-II, Zehetmair says, because "the law makes it clear that this is a federal responsibility."

A SAMPLING OF FRM-II INSTRUMENTATION

- RESEDA neutron resonance "spin echo" spectrometer
- High-resolution "time-of-flight" spectrometer with cold neutrons
- Crystal time-of-flight spectrometer
- Small-angle scattering diffractometer
- REFSANS diffractometer for reflectometry and small-angle scattering
- Instruments for long-wavelength neutrons
- BSM back-scattering spectrometer
- PANDA three-axis spectrometer for cold neutrons
- PUMA double-focusing three-axis spectrometer with thermal neutrons
- Ultracold neutron source
- Instrument for fundamental physics with cold neutrons
- Radiography/tomography with cold neutrons
- MAFF fission fragment accelerator
- HEIDI single-crystal diffractometer with hot neutrons

Hot debate. A proposed fuel change could delay start-up of the FRM-II reactor.

SOURCE AND CREDIT: FRM-II, GARCHING

Caught in the middle of the dispute are scores of physicists, materials scientists, and structural biologists who have labored for years on instruments for the FRM-II's beam lines. "They need a clear message about its future," says Winfried Petry, a Technical University physicist who heads the FRM-II's scientific board. "Some of these instruments are unique, and others are the best of their kind worldwide."

The two dozen instruments for the beam lines (see chart) include the Munich Accelerator for Fission Fragments (MAFF), a machine designed by University of Munich physicist Dieter Habs that would smash neutron-rich nuclei into heavy elements to forge long-lived superheavy elements with atomic numbers up to 126. "We'll be extremely disappointed if [a political contretemps] causes a delay" in the FRM-II start-up, Habs says. And the longer the reactor is in limbo, the more

uncomfortable the situation will grow for researchers who have built instruments especially for it. One such device is a double-focusing three-axis spectrometer, designed by Peter Link of the University of Göttingen's Institute for Physical Chemistry. "You can't move it anywhere else without significant changes," he says. Petry and Zehetmair say they are not opposed to using MEU eventually—after the high-density fuel recipe is perfected and tested to ensure that the loss in neutron quality would be minimal. But even the next-generation MEU would require changes in the reactor's moderator tank, and using any less-enriched fuel would require boosting the core size and the reactor's power.

Both sides are hopeful that a deal can be worked out. "I still think we can get this reactor running within 6 months," says Zehetmair. Federal officials agree that it is feasible for the final operating permit to be issued before midyear—if the Bavarians compromise. Meanwhile, scientists are at the starting blocks, waiting for the gun. "Once the final permit is granted, the first fuel element could be installed in about 6 weeks," says Petry. "The fuel elements are ready and waiting in France." —ROBERT KOENIG

CONSERVATION

No Easy Answers for Biodiversity in Africa

Wilderness areas, those vast regions untouched by humans, hold great allure. But in terms of conservation, focusing on only pristine, uninhabited spaces would leave many species vulnerable to extinction, according to a new analysis of human population and biodiversity in sub-Saharan Africa. On page 2616 of this issue, researchers report that some of the most densely populated regions on the subcontinent also contain the greatest biodiversity. "You can't do conservation and development in very different places," says Andrew Balmford, one of the study's authors. "If your goal is to preserve most of Africa's biodiversity, you're going to have to grapple with the challenges of preserving biodiversity where there are quite a lot of people."

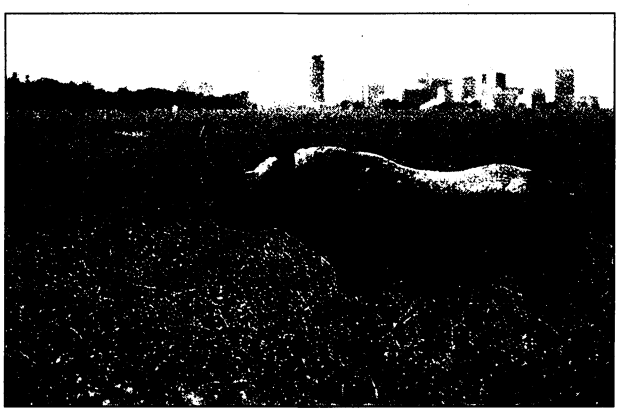
The analysis does not surprise most conservationists, who for years have been talking about global "hot spots," areas rich in varied or rare species and also under exceptional pressure from human populations. But the current study provides a more detailed look, says ecologist Gustavo da Fonseca of Conservation International in Washington, D.C. "The fact that these hot spots are emerging even at this finer scale is really surprising," he says. "We were never sure if we could find hot spots within our global hot spots."

Balmford, a zoologist at the University of Cambridge, zoologist Carsten Rahbek of the University of Copenhagen, and their colleagues mined a comprehensive database at the Zoological Museum in Copenhagen describing vertebrate populations across sub-Saharan Africa. The team analyzed human census data and data on 1921 bird species, 940 mammal species, 406 snake species, and 618 amphibian species in geographical squares approximately 100 kilometers on a side.

Areas rich in species also tend to contain more people, the team found. To test whether the correlation might be explained by sampling bias—a possible tendency for species lists to be more comprehensive in easily accessible regions close to human population centers—the team compared the correlations separately for different animal groups. If a sampling bias was causing the correlation, says Sir Robert May, a zoologist at the University of Oxford, one would expect the effect to be stronger for less studied groups, for which data are sparse. But in fact, the correlation was stronger for better studied birds and mammals and weaker for relatively uncataloged amphibians.

The pattern is probably not unique to Africa, says Balmford. In North America, for example, "some of the highest conservation priorities have the highest real estate values," most notably along the East and West coasts. Smaller studies in South America show a similar pattern as well, says ecologist Stuart Pimm of Columbia University in New York City.

The team found no easy answers when it analyzed which 100-km squares would need some kind of protection to preserve nearly all known species in the database. A strategy that started in regions with minimal human populations still identified a set of squares



Crowded. Areas rich in biodiversity overlap with centers of human population, such as at Nairobi National Park in Kenya.

CREDITS: (TOP TO BOTTOM) SAYYID AZIM/AP; WILLIAM CONWAY/WILDLIFE CONSERVATION SOCIETY

ScienceScope

Leakey Ousted Kenya President Daniel arap Moi this week sacked prominent paleontologist and politician Richard Leakey (right) from his posts as head of the nation's civil service and an anticorruption team. Moi had appointed Leakey—a leader of the opposition and one of his staunchest critics—to the posts 20 months ago in a bid to stabilize his regime, which is under increasing pressure from foreign aid donors and in-country critics advocating greater democracy.

Leakey's tenure was marked by controversy over his management style and efforts to reform Kenya's bloated bureaucracy. His ouster, says a source close to the researcher, came as no surprise.

Westward Go! Germany's premier basic research organization, the Max Planck Society, is looking west again after a decade focused on building institutes in former East Germany. The society's governing board last week approved plans to build its 79th institute, for vascular biology, in cooperation with the University of Münster.

The new institute, which will focus on the molecular and developmental biology of the circulatory system, will be led by Belgian angiogenesis researcher Peter Carmeliet and German biochemist Dietmar Vestweber. Münster rector Jürgen Schmidt predicts the initiative "will give the university a big boost."

A Stretch Japan aims to dramatically boost public spending on science—if its economy recovers. This week the Cabinet was expected to endorse a plan to spend $195 billion over the next 5 years on R&D. If achieved, the outlay would raise government science spending to 1% of Japan's gross domestic product (GDP)—and put the nation near the top of global rankings based on the portion of GDP spent on R&D by private and public sources combined.

But reaching that goal rests on "a big assumption," says Hiroshi Tamada of the Council for Science and Technology Policy, a top advisory body. Japan's GDP would have to grow by 3.5% over the plan's span—a rate not seen since 1990.

Meanwhile, Japan's legislature last week approved nearly $27 billion in science spending for the 2001 budget that begins 1 April. The 0.5% increase falls below the amount needed to meet the new target. Officials are still looking for items that might boost the bottom line for science.