SCIENCE CITIES

Bonn Trades Bureaucrats for Scientists

BONN—This city, Germany's capital for almost 50 years, will soon be bidding farewell to scores of politicians, bureaucrats, and lobbyists as the government carries out its decision to move itself to Berlin by the year 2000. Moving in to take their place, city administrators hope, will be a small army of researchers. To compensate for the loss of most of the national government, Bonn and the surrounding region will soon be getting a hefty dollop of research funds.

Earlier this month, undersecretary of state for science Gebhard Ziller unveiled the centerpiece of an effort to turn the region into a high-tech mecca: a new high-profile facility dubbed CAESAR, the Center of Advanced European Studies and Research. Covering the "growth areas" at the boundaries between physics, chemistry, and biology, the institute will be financed through an independent foundation, which will start out with a lump sum from the government of $450 million. "CAESAR will be unique because of its independence from the annual budget circus and also for its salaries and flexibility," says geneticist Ernst-Ludwig Winnacker, who headed a team of experts that drew up the concept for the institute.

CAESAR is part of a $1.7-billion investment planned for the Bonn region between 1995 and 2004 that will include two new polytechnic universities, two new research centers at the University of Bonn to study European integration and conflicts between the developing and developed worlds, and possibly a new Max Planck Institute or Fraunhofer Institute in or near Bonn. In all, 60% of the planned investment will go to science or education. Says Günter Reiner, who heads the science ministry's program to boost Bonn's science base: "We are happy that we got such a large piece of the pie."

"CAESAR will be unique because of its independence...and also its salaries and flexibility."
—Ernst-Ludwig Winnacker

CAESAR's structure is modeled on Germany's "gene centers" in Munich, Cologne, and Heidelberg, where small teams of young scientists are given 3- to 5-year contracts instead of the lifetime tenures that predominate at universities. Other role models cited by Winnacker, who heads the Munich gene center, are the Institute for Advanced Study in Princeton, New Jersey, IBM's research centers in the United States and Switzerland, and the European Molecular Biology Laboratory in Heidelberg. Winnacker expects that at least one third of the institute's scientists will be recruited from abroad.

Specific research areas will depend on who is hired, but the focus will be on interdisciplinary studies such as drug design, nanotechnology, cluster physics, and simulation of molecular structures using parallel computers. The institute will have space for 60 research groups, made up of 270 scientists and 130 support staff. Half will be funded with interest from the foundation's capital, and it is hoped that industry will help support the rest. The budget committee of Germany's parliament, the Bundestag, is expected to give its approval this summer.

–Michael Simm

Michael Simm is a science writer in Bonn.

SEISMOLOGY

Bolivian Quake Deepens a Mystery

When last week's magnitude 8.2 earthquake struck beneath Bolivia, days after a catastrophic shallower quake in Colombia, its effects were muted by the 640 kilometers of rock between the quake and the surface. But since then what may be the largest deep earthquake of the century has shaken up the scientific community, sending researchers scrambling to decode this signal from the planet's depths. And the first message they are taking from it is a sharp reminder that the descent of Pacific ocean crust into the mantle beneath South America isn't following the textbook pattern.

Deep earthquakes trace this process of subduction because they take place within the descending slab of tectonic plate, marking its slope to depths as great as 670 kilometers. The deepest ones are triggered, say recent theories (*Science*, 26 April 1991, p. 510), when the pressures of the deep Earth transform the rock from one crystalline phase to another. Thin layers of the new phase form and propagate so suddenly that the rock fails along these "anti-cracks," generating an earthquake.

In a textbook case, such quakes would be distributed evenly along the lowermost slab. But just days before the Bolivian quake, Emile Okal of Northwestern University in Evanston, Illinois, Stephen Kirby of the U.S. Geological Survey (USGS) in Menlo Park, California, Robert Engdahl of the USGS in Denver, and Wei-Chuang Huang of Northwestern had finished assembling convincing evidence that South American deep quakes don't follow this pattern. They recalculated the locations of this century's deep South American quakes using modern techniques and found that five of the seven biggest ones fell in two clusters, each cluster hundreds of kilometers away from the nearest smaller deep earthquakes. One of the clusters, a pair of quakes that struck in 1958 and 1963, sat in the middle of a 1000-kilometer-long gap in deep earthquake activity. And this latest quake fell right in the same lonely cluster of big, deep earthquakes, making it stand out all the more.

But why should the deep slab be especially prone to big earthquakes at that point? Seismologists Raymond Russo and Paul Silver of the Carnegie Institution of Washington's Department of Terrestrial Magnetism can't say for sure, but they have found indications that the slab may be under some unusual stresses right at the Bolivian cluster. Because of the westward movement of South America, the descending slab itself is steadily moving to the west, pulling through the ductile rock of the mantle like a garden hoe through soil. The mantle rock has to flow around the slab, and by studying how seismic waves from earthquakes propagate near the slab, Russo and Silver mapped this flow. They found that instead of being carried down with the descending slab, the mantle diverges like fine soil around a hoe, flowing north and south along the west face of the slab (*Science*, 25 February, p. 1105).

The flow isn't smooth, however; in three places it is disrupted where the slab changes its angle of descent. The Bolivian cluster of big deep earthquakes, Silver notes, lies at the bottom of one of these slab wrinkles. It's the most abrupt of the three, and because the mantle flow around the slab diverges just to the south of the wrinkle, the flow is most powerful in that region. No one is yet willing to speculate on just how the turbulent mantle flow might touch off giant earthquakes. But seismologists are hoping that this latest earthquake will help them sort out the complicated collision of continent, slab, and mantle beneath Bolivia.

–Richard A. Kerr