trend. Congress has decreased the number of research-related earmarks in the bill funding the Department of Agriculture, in particular those for new buildings and facilities. In the past, such earmarks have totaled about $60 million in the agriculture bill. And the bills funding the National Science Foundation (NSF) and the National Institutes of Health, with their strong traditions of peer review, remain generally free of pork.

But those agencies are the exceptions, say congressional and Administration officials, who note that there is less pressure now to avoid earmarks. "Members are trying to build a more bipartisan relationship to get the [appropriations] bills through," says one Administration official. Earmarks, added as a favor to key members of Congress, "get the legislation through more smoothly." And the class of 1994—part of the new Republican majority—no longer has the power it once did to make an appropriations chair think twice before adding pork to a bill.

Antipork forces lost an ally when former Science Committee Chair Bob Walker (R–PA) retired. He and former chair George Brown (D–CA) battled many R&D earmarks during the past several years. "You have to go to the floor and fight them," says Walker, now with the Wexler Group in Washington. He says the practice "makes for bad science" because it gives an advantage to research that "passes no test but a parochial and a political one." He acknowledges that earmarks can benefit small universities that are not part of the "old-boys' network" of larger research institutions, but he says doling out pork is not the best way to overcome biases in the funding system.

Beneficiaries of congressional largess see it differently. Money for the Leland Center goes for peer-reviewed grants to researchers largely outside Texas, says Ray Campion, the physical chemist who is the center's president. He argues that EPA refuses to request money for the center because it is independent "and they don't control our research agenda." As a result, the center must turn to Congress.

Specific earmarks don't tell the whole story. Many legislators now target specific research areas rather than individual institutions, with the expectation that the program will benefit particular institutes and universities. Senator Kit Bond (R–MO), for example, added $40 million for a plant genome initiative at NSF, knowing that such an effort could well involve such important constituents as farmers, the Monsanto Co., and Washington University in St. Louis.

So while the practice of earmarking may change form, it is unlikely to go away. "It's like Whack-a-Mole," one staffer says, referring to the carnival game. "You hit in one place, and it comes up in another."

–Andrew Lawler

KOREA

In Land of Industrial Giants, Universities Nurture Start-Ups

SEOUL, KOREA—Sunyoung Kim, a molecular biologist at Seoul National University (SNU) in Korea, never thought of himself as an entrepreneur. His impressive academic pedigree—a Ph.D. from Oxford University, followed by a postdoctoral stint at the Massachusetts Institute of Technology's Whitehead Institute and an assistant professorship at Harvard Medical School in Boston—marked him as a dyed-in-the-wool researcher. But after developing a new gene-therapy technique, the 41-year-old associate professor at SNU's Institute for Molecular Biology and Genetics found himself not only the founder of a company to commercialize the technology but also a role model for Korean entrepreneurs. In March, his relatively modest deal with a British pharmaceutical firm won him front-page newspaper and television coverage, admiring letters from high schoolers, and envious phone calls from friends. "Everyone was thinking I had become a billionaire," Kim says.

D. NORMILE

New breed. SNU's Sunyoung Kim, with Seung Shin Yu, standing, and Seon-Hee Kim, seated, in a corner of the institute that serves as his company's lab.

His first billion is still a long way off, but the attention is real. Korean planners and economists believe that the nation's reliance on a few large conglomerates, the so-called chaebol that include such familiar names as Samsung, Hyundai, and Daewoo, has reached a dead end. The chaebol are staggering under mountains of debt and poor management, and the country's former ferocious economic growth has slowed to a crawl. "The only hope for the Korean economy is in venture businesses," says Jang Woo Lee, a professor of management at Kyungpook National University in Taegu, who says academia is an ideal place to spawn them.

Because venture business success stories are rare—Lee puts the number at 20 or so—university and government officials are taking several steps to boost that number. This spring faculty at the country's national universities earned the right to take a 3-year leave to start a new business. Those who fail may return to the classroom. More significantly, universities are expanding or setting up venture business incubators, which typically provide would-be entrepreneurs with free or low-cost space and access to university computers, test and measurement equipment, and machine shops. Supported by government and university funds and some private contributions, they offer management seminars, faculty advice, and some sort of networking scheme to connect entrepreneurs and potential "angels." The model adopts many features of successful incubators in the United States and elsewhere.

The Korea Advanced Institute of Science and Technology (KAIST) pioneered this approach in 1992, and this month it expects the government to sign off on a new facility that will allow it to quadruple the number of businesses under its wing. "We have far more applications than we have space for," says Ho Gi Kim, director of the center, which now nurtures 23 companies.

But KAIST is hardly alone. In June, SNU's College of Engineering inaugurated its University New Technology Network, which will open university facilities and provide other support to budding entrepreneurs. "At the beginning of this year we recognized the importance of venture [activities] for the college of engineering," says Jang Moo Lee, dean of the college. Pohang University of Science and Technology (POSTECH) plans to join the crowd in November by opening a venture business center, and it has already expanded the incubator concept by creating POSTECH Venture Capital Corp., a $30 million fund to invest in selected venture businesses. "No one else is combining an incubator with funding," says Jeon-Young Lee, who doubles as POSTECH's dean of research and as president of the new venture capital firm.

The goal of these incubators is to produce successors to Korea's most famous start-up group, the Seoul-based Medison Co., which was founded in 1985 by a group of KAIST graduate students. Medison, which employs 300 people and had sales last year of $92 million, holds a third of the world market for

small ultrasound imaging systems used in medicine.

But the effort to lure researchers into business faces plenty of hurdles. Government policies traditionally have favored the chaebol, and financial regulations make it difficult for new businesses to raise capital. Korea's compulsory military service, a 26-month stint facing most university students upon graduation, can disrupt the career plans of budding entrepreneurs. And still-standing government regulation prevents national university professors from serving on the boards of private corporations—a rule that keeps Sunyoung Kim off the board of the company he started.

D. NORMILE

Starting small. SNU's Jang Moo Lee says universities still have a lot to learn about incubators.

No one expects the incubators to produce success stories overnight. The average start-up may need 3 to 5 years to get on its feet, KAIST's Kim says. He admits that only one company, Mari Telecommunication Co., has "graduated" from its incubator, although he expects two or three more to take off shortly. Mari, with 26 employees, had sales last year of $1.2 million from two computer games. Ironically, the company is moving its head office to San Jose, California, to be closer to the U.S. market and its competitors, although it will keep an R&D center in Korea.

The universities are also wrestling with such issues as intellectual property rights and whether successful ventures should return some portion of their earnings to academia. SNU's Lee says one possibility is for academic departments to ask for stock options in the companies they spawn. "We're in an incubation period ourselves," he says.

Despite those unresolved issues, Sunyoung Kim's venture has benefited from the warmer climate for entrepreneurs at universities. The company aims to commercialize a retroviral vector, a vehicle used in gene therapy to implant target genes in the host. Kim had modified the vector, a murine leukemia virus, to make it safer, more versatile, and easier to use than other vectors. A presentation at a conference at Cold Spring Harbor, New York, in September 1996 drew the attention of several pharmaceutical companies, which offered to support further development work.

Kim was excited by the prospect of having an impact on real-world medicine. "You publish a paper and nobody reads it, because there are so many good papers," he says. "I think curing one patient is better than publishing one good paper."

Acting on the advice of one firm, Sunyoung Kim and seven other investors gathered $250,000 in capital and established ViroMedica Pacific Ltd. Earlier this year, the company signed contracts with Seoul-based Korean Green Cross Corp. and the U.K.'s Oxford Biomedica for $1.6 million over 3 years to support further development work in return for rights to use the vector.

Although not under the wing of any formal incubator, ViroMedica is treated like a member of the SNU molecular biology institute's family. It occupies a corner of the institute's lab, its four full-time employees are recent SNU graduates, and the company also employs several grad students on a part-time basis. The additional duties have been a strain, Sunyoung Kim admits, but they haven't diluted his love for science. "I am working even harder on regular university duties," he says, "as I do not want my colleagues to think that I am neglecting [them] because of a money-making business."

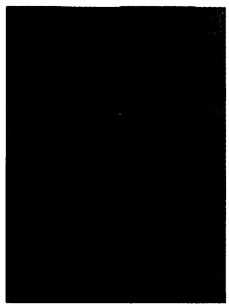
Even so, Kim already talks like a veteran entrepreneur, describing plans to commercialize spin-off technologies and to raise money for his own building. Through it all, he exudes what may be the most important characteristic of a successful entrepreneur. "You have to be optimistic," he says.

–Dennis Normile

FRENCH RESEARCH

Government Restores Funding Cuts

PARIS—Most of France traditionally shuts down for the month of August. In contrast to what usually happens, French scientists returning to their labs next week will get a pleasant surprise. The Socialist government plans to restore about $43 million in higher education and research funding cuts that the previous conservative administration—which was turned out of office in last June's elections—had intended to enact this September. In addition, the new government will immediately create 220 new research positions and 300 new scholarships for doctoral students.



Scoring points. Research minister Claude Allègre.

The news is sure to be welcomed by French researchers, who in recent years have become accustomed to receiving bad tidings when they returned from vacation, usually in the form of temporary funding freezes that later became permanent. As a result, scientists have lived in constant fear of overspending their budgets. "We are told not to spend more than one-twelfth of our research budget each month," says microbiologist Richard D'Ari of the Institut Jacques Monod, a major research unit in Paris of the giant CNRS public research agency. "And we never know for sure whether we will get all 12 installments."

Vincent Courtillot, chief adviser to education and research minister Claude Allègre, says the intended cuts were part of severe austerity measures the previous government had been planning before it lost the election. "Everyone would have found out about it when they went back to work in the fall," he adds. The funds saved from the chopping block include $7.9 million for CNRS and $9 million for university research.

The government added the 220 new research jobs—120 permanent posts and 100 temporary positions, mostly in public research organizations such as CNRS and the biomedical research agency INSERM—as a first step in a long-term plan to step up recruitment of young scientists, which has not kept up with the retirement of senior scientists. Courtillot says the government eventually hopes to boost the annual recruitment rate from the current figure of 2.3% to 4%. But some researchers caution that the desire to increase the total number of scientists must be balanced against the limited funds available for research. "It is necessary to have a fairly solid influx of young people each year," says D'Ari, "but at some point you reach a ceiling."

The new government, which has scored points with French scientists for its positive attitude toward research, will have another opportunity to increase its popularity when it unveils its proposed budget for 1998, probably in September. Yet Courtillot says scientists should not expect a major rise in overall research spending: "Claude Allègre doesn't want to ask for more money." Rather, Courtillot says, Allègre hopes to free up money for laboratories by redirecting scientific priorities and cutting administrative costs (*Science*, 18 July, p. 308). Ultimately, the government's long-range plans to overhaul French research will depend on the success of this effort. But as Courtillot points out, "it's easier to make reforms when you're increasing research spending than when you're decreasing it."

–Michael Balter