a 0.8–giga electron volt synchrotron that has been mothballed in Berlin. Last month in Cairo, Jordan promised to fund a building for the accelerator and its upgraded beamlines at a site at Al-Balqa' Applied University outside Amman. At the same time, German research officials said they would ship BESSY shortly after groundbreaking this summer. "When this was announced, the whole atmosphere became positive, since SESAME members now think that the project will fly," notes Herwig Schopper, former CERN director-general and head of SESAME's interim governing council.

Schopper says five more countries have expressed interest in the project, making the total 16 and leaving Saudi Arabia and Syria as the only major nations in the region that have not yet joined. The members will help pay for the estimated $8 million in upgrades needed. Construction on the new building, to cost $11 million, is expected to begin this fall and be completed by the end of 2002.

The council also approved plans for a biomedical institute alongside SESAME. The new entity, to be called the Middle East Biological Sciences Institute for Research, will make use of the synchrotron's beamlines. "We hope it will foster regional cooperation in the life sciences," says Said Assaf, director-general of the Arafat National Scientific Center for Applied Research in Ramallah and the Palestinian Authority's representative to SESAME. "Science, like medicine, is for all who could utilize it best—and appreciate it." Work on the new institute will wait until after completion of SESAME.

–ROBERT KOENIG

JAPAN

Reforms Could Threaten Facility Spending Hike

TOKYO—The Ministry of Education, Science, Technology, Sports, and Culture last week promised to spend $13 billion over the next 5 years to renovate and expand cramped and outdated research facilities in Japan's universities. Now, the country's researchers and educators are waiting to see whether the promise survives the expected election this week of Junichiro Koizumi as prime minister and the resulting government reshuffle.

A recent ministry survey found that about one-fourth of the total floor space at national universities was more than 25 years old, meaning not only that the buildings are aging but also that they probably don't meet current standards for resisting earthquakes. Universities have also not expanded their research facilities in step with increased funding for research and additional numbers of postdocs and technicians. "The condition of facilities is really choking [research activities]," says Reiko Kuroda, a professor of chemistry at the University of Tokyo and a member of the Council for Science and Technology Policy, the country's highest policy advisory body. The council has made improving research facilities one of its priorities in a new 5-year spending plan.

The new infrastructure money is seen as a sign of the government's intent to follow the council's overall plan, which calls for spending $195 billion on research-related projects. The problem was supposed to have been addressed under the previous 5-year plan. But a lack of coordination between the Education Ministry and the Ministry of Construction, which builds and remodels public buildings, held down spending to $8 billion, far below the target. The council was given increased authority to carry out the program as part of a government restructuring earlier this year. "To facilitate this rebuilding, we will be trying to coordinate [efforts] among the different ministries," says Hiroshi Tamada, deputy director of policy planning for the council. The chief beneficiaries are expected to be graduate school classrooms and labs, designated centers of excellence, and biomedical facilities.

Although Japan prides itself on its ability to carry out such long-range plans, the fate of the initiative is uncertain. Koizumi, a self-proclaimed reformer within the ruling Liberal Democrat Party best known for advocating the privatization of the country's huge postal savings system, has pledged to examine public works spending, which has been used repeatedly over the last decade to stimulate a stagnant economy.

Shinichi Yamamoto, director of the University of Tsukuba's Research Center for University Studies, says he believes there will be strong support for continuing the recent boost in science funding. "And I think there is widespread understanding that we cannot perform research just with money; we need infrastructure, too," he says. Still, he and others realize that it may be a while before they find out if the new government agrees.

–DENNIS NORMILE

Structural changes? Junichiro Koizumi has pledged to take a close look at all government spending.

CREDIT: ITSUO INOUYE/AP

TASTE RESEARCH

New Gene May Be Key to Sweet Tooth

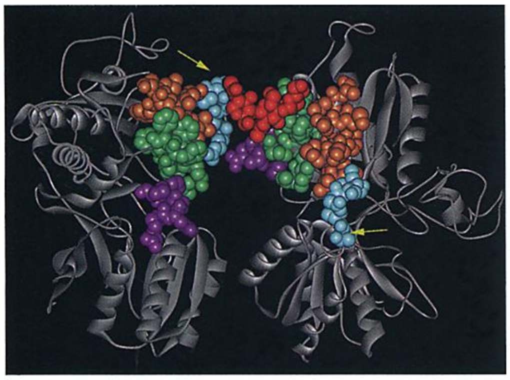
Can't resist sweets? Sensory scientists have discovered a gene that may be responsible for your sweet tooth. Variations in the gene seem to explain why some mice prefer sweet flavors more than others do, and the same may be true for humans as well.

Researchers have known for many years that taste cells on the tongue recognize five distinct tastes—sweet, sour, bitter, salty, and umami (or monosodium glutamate). For sweet, bitter, and umami tastes, this is done with the aid of cell surface proteins called receptors that bind to a particular taste chemical and then send a message to the brain. (Sour and salty directly change the ion flux of taste cells.) Last year, scientists found genes for receptors that recognize bitter and umami tastes. But the sweet receptor has remained elusive, leaving a major gap in our understanding of how humans recognize the spectrum of subtle flavors in the gustatory universe.

Now, four research groups have isolated a gene that may code for the sweet receptor. The work is published in the May issue of *Nature Neuroscience* by Robert Margolskee and co-workers at Mount Sinai School of Medicine in New York City; in the May issue of *Nature Genetics* by Linda Buck's group at Harvard Medical School in Boston; and in the May *Journal of Neurochemistry* by a team led by Susan Sullivan of the National Institute on Deafness and Other Communication Disorders. A fourth group led by Gary Beauchamp at the Monell Chemical Senses Center in Philadelphia announced its results on 27 April in Sarasota, Florida, at the annual meeting of the Association for Chemoreception Sciences.

Taste physiologist Sue Kinnamon of Colorado State University in Boulder says that the discovery of the gene "is very exciting. It allows you to really start asking what is the whole pathway that mediates this response." Understanding that pathway could, among other things, help the food industry develop better artificial sweeteners and help basic researchers identify potential links between taste and dietary health.

The search for the various taste receptors has been hampered by the fact that taste cells are sparsely distributed on the tongue and are



Taste block. Extra sugar molecules (red) on an altered sweet receptor may quell a mouse's sweet tooth.

buried within nontaste tissue, making direct receptor isolation difficult. And because researchers haven't been able to culture taste cells or express working receptor proteins in cultured cells of other types, they've lacked a good way to test whether candidate receptor genes respond to particular taste molecules.

The availability of the sequence of the human genome, however, has provided another way of tracking down stubborn genes. To narrow their hunt, all four teams turned to strains of mice having different sweet preferences. Some strains, called tasters, prefer liquids sweetened with sucrose or saccharin over nonsweetened solutions. Other strains, called nontasters, show no preference for sweets. Previous work by several groups had shown that genetic variations mapped to a region on the mouse genome dubbed *Sac* underlie this difference.

To home in on the specific gene involved, the researchers combed the region of the human genome sequence that corresponds to the mouse *Sac* locus. All four groups pinpointed a single gene, called *T1R3* by two of them, which seems to encode a protein with the right characteristics for a sweet receptor. The protein's sequence suggests that it is a G protein–coupled receptor—a member of a family of proteins that span the cell membrane and transmit signals into the cell via so-called G proteins. In addition, the mouse version of the gene, identified with the aid of the human gene sequence, is expressed exclusively in taste cells, and variations in the gene sequence distinguish taster mice from nontaster mice.

For example, the protein produced by nontaster mice carries a site, not found in the protein of tasters, where sugar molecules could be attached, says Margolskee. He thinks that sugars at that position could prevent receptor interactions needed to activate the internal signaling pathway. That could explain why nontaster mice are indifferent to sweets, although more work is needed to pin down whether sugars do in fact attach at that site, and if they do, whether they affect sweet taste perception.

There are also intriguing hints that *T1R3* variations might underlie differences in human responses to sweet tastes. The Monell group looked at the gene sequence of 30 human volunteers and found that 10% of them carried variations in the sequence. Although the variations are different from those distinguishing taster and nontaster mice, their positions in the sequence suggest that they are in the part of the protein that protrudes from the outside of the cell. If so, they could disrupt binding of the receptor either to a taste compound or to other receptors. Danielle Reed of Monell says their team is now looking to see if the two versions of the gene are linked to variations in sweet sensitivities of human populations.

Still, although the results strongly suggest that the researchers have finally identified a sweet receptor, they do not yet prove that beyond a shadow of a doubt. That will depend on showing that the gene from taster mice will confer sweet sensitivity, either to nontaste cells in culture or to nontaster animals.

–R. JOHN DAVENPORT

ARCHAEOLOGY

The First Urban Center In the Americas

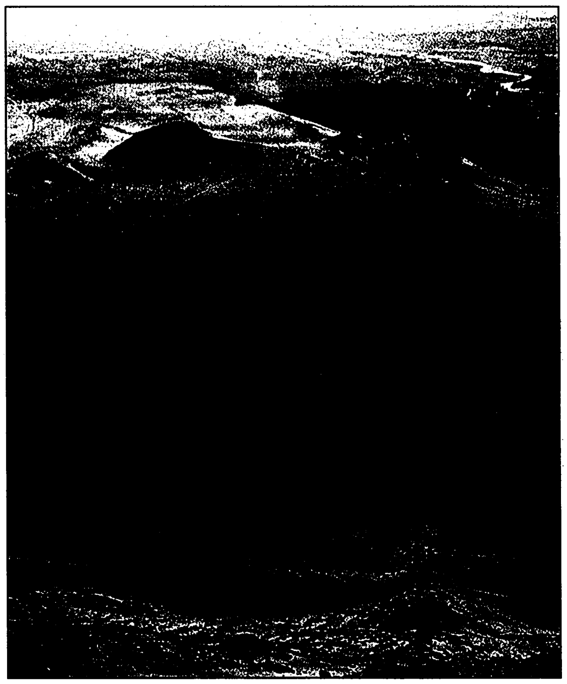
Peru's coastal desert, one of the most parched places on Earth, does not look like a particularly inviting spot for early civilization. But to the puzzlement of archaeologists, the region has given birth to a succession of spectacular cultures. Now, new dates from a Peruvian-American archaeological team working at the sprawling inland site of Caral, some 200 kilometers north of Lima, indicate that inland settlements there were even more important early on than most archaeologists had realized. The dates, published on page 723, push back the emergence of urban life and monumental architecture in the Americas by nearly 800 years—to 2627 B.C.—and cast serious doubt on one commonly held view of the relationships between inland and coastal centers in early Peru. But the research suggests an answer to the puzzle of why the desert sites became so prominent early on: Some were easy to irrigate.

"It looks like Caral is really the first complex society in the New World historically," says Jonathan Haas, a co-author of the paper and an archaeologist at the Field Museum in Chicago, who specializes in the rise of early states. "Caral gives us an opportunity to look at the development process."

Situated in the middle Supe River Valley, 23 kilometers from the Pacific Ocean, Caral was the architectural wonder of its day in the Americas. At its apogee, it boasted eight sectors of modest homes and grand stone-walled residences, two circular plazas, and six immense platform mounds built from quarried stone and river cobbles. Warrens of ceremonial rooms, which probably served as symbols of centralized religion, crowned the mounds, the largest of which towered four stories high and sprawled over an area equivalent to 4.5 football fields.

To determine the age of these structures, lead author Ruth Shady Solis, an archaeologist at the National University of San Marcos in Lima, and her associates obtained carbon-14 dates on 18 excavated plant samples from the site. Some were taken from bags woven from short-lived reeds, which the builders used for hauling stones and left inside the mounds. "The team has got very nice dates that we can associate with a specific human event," such as the building of the mounds, says Brian Billman, an archaeologist at the University of North Carolina, Chapel Hill.

Exactly what fueled the early construction boom at Caral is still unclear, but the excavators point to a new development in the Americas: irrigation agriculture. After running out of floodplain land in the Supe Valley, farmers turned to Caral, several kilometers away. To grow squash, beans, guava,



Arid birthplace. New dates indicate that Caral in Peru was the first complex society in the New World.

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