TAIWAN

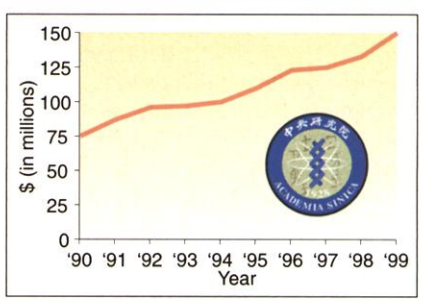
# Lee's Special Status Fuels Academy's Rising Reputation

**Nobel Prize–winning chemist Lee Yuan-tseh is using his scientific skills and political savvy to raise the quality of research at the venerable Academia Sinica**

**TAIPEI, TAIWAN**—The teenaged girls stopped, stared, and squealed. Then they pulled out pens and notebooks for an autograph. Their idol wasn't a musician or movie star. Instead, he was a stoop-shouldered, 63-year-old chemist who happens to be Taiwan's only Nobel laureate. Even on a 1996 hike in Taiwan's rugged central mountains, Lee Yuan-tseh was recognized "by every single person we met," recalls his friend and hiking companion Henry Schaefer, a chemist at the University of Georgia, Athens. And with those teenaged girls, "it was Leonardo DiCaprio treatment!"

It is hard to exaggerate Lee's stature in Taiwan. His 1986 Nobel Prize brought him respect. And since he returned home in 1994 after 3 decades in the United States, that respect has turned to admiration for his stellar public service—pushing educational reform, leading efforts to assist earthquake victims, and speaking out against governmental corruption. Indeed, Lee's reputation is so strong that his last-minute endorsement of Chen Shui-bian in the recent presidential election is seen as an important factor in Chen's victory. Chen subsequently offered Lee the premiership, which he turned down (*Science*, 7 April, p. 28).

**Nobel force.** Y.-t. Lee presides over the growing budget of Taiwan's Academia Sinica, which rests on the promise of world-class research.




And those are just his extracurricular activities. Lee's real job is running Academia Sinica, the island's premier collection of research institutes. Under his leadership, the academy is earning the sort of recognition in scientific circles that Lee gets on the hiking trails. "I don't know of any institute's scientific prestige going up so far in such a short period of time," says Schaefer, remarking on a decade that has seen a sixfold jump, from 200 to 1220, in peer-reviewed papers in international journals. Adds P. C. Huang, a molecular biologist at Johns Hopkins University in Baltimore, "Academia Sinica is definitely a major force to watch."

It hasn't always been so. Founded on the mainland in 1928 and sharing its birthday and Chinese name with the Chinese Academy of Sciences, Academia Sinica is both an honorary society of 177 "academicians" and a collection of 24 research institutes spanning the natural sciences, mathematics, the social sciences, and humanities. For decades it was starved of cash, as Taiwan had little to spend on science. That lack of resources, plus an oppressive military government, drove many promising scientists abroad to pursue advanced degrees and research opportunities.

By the 1980s, however, the scientific climate was improving. Taiwan was evolving into a democracy, its universities had started turning out Ph.D.s., and its fast-growing economy was providing sufficient wealth for the government to invest in research. Academia Sinica, then headed by physicist Wu Ta-you, responded by modernizing facilities and the research agenda, often with the advice of prominent Chinese-American scientists. When Wu was ready to retire, President Lee Teng-hui offered Lee the job. He accepted because the academy was, in his view, the only scientific organization on Taiwan "that would be able to catch up to a world-class level in a relatively short time."

**Making his move.** The son of a well-known artist and a schoolteacher, Lee was born in Hsinchu in 1936 and left Taiwan in 1962 to pursue a Ph.D. in chemistry at the University of California, Berkeley. He returned briefly in 1972 as a visiting professor at Tsinghua University, but his hopes of strengthening Taiwan's scientific capabilities ran up against inadequate levels of support. Although his work on chemical reaction dynamics was getting international attention, Lee felt he was too young "to make things move."

So he returned to the United States, where in little more than a decade his efforts were crowned with a Nobel Prize. By the early 1990s, he was ready to give his homeland another try. "We had a lot of exceptionally bright youngsters working here," he says about the academy's workforce. "But they needed some guidance."

His timing was good. Many senior Taiwanese scientists had made their marks abroad and were open to nurturing Taiwan's scientific efforts. Despite never having run anything larger than his 25-member team of postdocs and grad students, Lee was viewed as a vital catalyst in achieving scientific respectability. "I thought Lee was just what Academia Sinica needed," says chemist Lin Sheng-Hsien, who left Arizona State University in Tempe to become head of the Institute of Atomic and Molecular Sciences once Lee accepted the job. Lee even appealed to scientists lacking homegrown ties. Sunney Chan, a chemist Lee lured from the California Institute of Technology in Pasadena to be vice president for academic affairs, was born in the United States of parents who hailed from the mainland. "I simply believe in Lee and what he's trying to do here," Chan says.

That faith seems to stem from Lee's approachable nature and an air of concern that reflects his genuine interest in people. "He's a very plain, very ordinary person, without anything [resembling] arrogance," says James Shen, who left the University of California, Davis, to become director of the Institute of Molecular Biology in 1994. These qualities have extended his influence far beyond Academia Sinica. As chair of an educational reform commission, Lee left the capital of Taipei to criss-cross the island, visiting schools and listening to parents and teachers. That kind of dedication has led the Taiwanese media to tag Lee as the island's "conscience."

Lee's explanation for his popularity is consistent with his nature. "I think people respect me because they know I'm a very honest, sincere person trying to do my best for society," he says. "I feel tremendous responsibility to be a role model. After being

CREDIT: (LEFT) D. NORMILE; (RIGHT) SOURCE: ACADEMIA SINICA

## Researchers Say New Institutes Offer Them a Chance 'To Do Good Science'

**TAIPEI, TAIWAN**—Academia Sinica's 24 institutes have counted on Lee Yuan-tseh to raise standards and to keep the money flowing. But they are on their own when it comes to research agendas and strategies. That combination has been a potent force in creating world-class science at two of Academia Sinica's newer and more productive institutes.

The Institute for Molecular Biology (IMB), set up in 1986, is the child of a dedicated team of Chinese-American scientists. Several of these scientists—including James Wang, a molecular biologist at Harvard University, and Ray Wu, a plant scientist at Cornell University—also served as part-time directors during the institute's early years. The big attraction, says Chien Cheng-Ting, who joined IMB after earning his Ph.D. at the State University of New York, Stony Brook, and completing a postdoc at the University of California, San Francisco, is the ability "to do good science" without leaving Taiwan. Director James Shen confesses that he planned to stay for 3 years and then return to the University of California, Davis. "But I'm still here [after 6 years], because it's very exciting scientifically," he says. And Stanley Cohen, a molecular biologist at Stanford University, says that several teams are doing work "on a par with first-rate laboratories in the U.S., Europe, and Japan."

**Nothing subpar.** The submillimeter-wave interferometric array in Hawaii is one of several instruments helping the astronomy institute earn its stellar reputation.

CREDIT: SMA PROJECT

Chien is one of IMB's up-and-coming researchers, earning attention for his work on *Drosophila* neural development. Others include Henry Sun, who has identified genes regulating *Drosophila* eye development, and Li Shiu-min, whose work elucidating how protein is imported into plant chloroplast earned her a special "Frontier of Science Grant," Taiwan's most prestigious research grant.

Those planning the Institute for Astronomy and Astrophysics (IAA), established in 1993, faced a different problem. Top astronomers are attracted to leading-edge instruments, yet funding agencies want to see a core group of qualified astronomers in place before underwriting big-ticket observatories. The solution for IAA, says director (Fred) K. Y. Lo, is to focus on "unique forefront projects," where a modest investment promises significant scientific returns.

The institute's first major achievement was to join the submillimeter-wave interferometric array (SMA) planned by Harvard University's Smithsonian Astrophysical Observatory atop Mauna Kea in Hawaii. The SMA, to start up later this year, will be the first to use interferometry at these wavelengths, which penetrate the interstellar gas and dust and promise a glimpse into the formation of stars and planetary systems. IAA made a timely offer to add two antennas to the originally planned six. "It is a very shrewd investment," says David Jewitt, an astronomer at the University of Hawaii, Manoa. He says IAA's contribution will "significantly expand the scientific capabilities" of the array and give institute scientists a role in running the facility.

Closer to home, the institute is building an array of three automated optical telescopes to count the smaller objects in the Kuiper belt, the area of the solar system beyond Neptune where many comets originate. The data should shed light on the mass of matter that evolved into the sun and the planetary system and sharpen our knowledge of the threat to Earth from comet collisions. In addition, the institute has just won government approval to build the Array for Microwave Background Anisotropy. This compact array of millimeter-wave antennas will put the IAA "at the forefront of a global race to get more precise indications of the age of the universe," says Masato Ishiguro, a radio astronomer at Japan's National Astronomical Observatory.

While waiting for these instruments to come on line, the institute's 35-person staff has borrowed time on other observatories and published more than 150 papers in international journals. But the real attraction is the chance to plow fresh ground with a new instrument. "I wouldn't have come here if [the SMA] wasn't going ahead," says Lo, who came to the institute from the University of Illinois, Urbana-Champaign, despite the lack of ties to Taiwan.

Ishiguro says that the SMA is just the beginning. Once IAA scientists get their own instruments up and running, he predicts, "we can really look forward to some exciting results."

**–D.N.**

under a repressive regime for such a long time, people are still looking for leaders."

Lee turned down the premiership partly to maintain the purity of that role model. "You have to make a lot of compromises [as a] politician," Lee says. Instead, he will serve as a special adviser on Taiwan's delicate relations with the mainland. But his real job will continue to be running Academia Sinica, which he hopes to make "one of the world's leading research organizations."

**People power.** To succeed, Lee must keep the money flowing (see graph). And that means dealing with a legislature still controlled by the party whose presidential candidate he opposed. "There may be some resentment," he admits, but he doesn't think it will be serious. His political foray also hasn't derailed his ability to garner private-sector support: The academy expects to announce soon an agreement under which five Taiwanese tycoons will put up $80 million over 5 years for a functional genomics program, giving the academy an important presence in an emerging field. And despite Lee's endorsement of Chen, who was fiercely opposed by Beijing, work continues on the largest ever collaboration between mainland and Taiwanese scientists. The teams hope to study neutrinos captured at a distance from one of Taiwan's nuclear reactors.

Lee must also find a way to keep people on their toes. Tenure, once almost automatic, is now reserved for principal investigators who clear a series of hurdles. Salaries and research budgets are set after rigorous performance reviews, and international panels pass judgment on the portfolios of programs and institutes. But there are still a number of older researchers who moved up the ladder before review standards were tightened.

Lee's biggest concern, however, is to attract and retain the best talent. One sticking point, says Kenneth Wu, a former director of the Institute of Biomedical Sciences, is "the difficulties that productive investigators [face in] expanding their laboratories." There is deep-seated cultural resistance to giving one person too much support, a holdover from the postwar years when scarce resources had to be shared. This atti-

tude, Wu says, was a factor in his decision last year to return to the United States and join the University of Texas at Houston Health Science Center.

Lee recognizes the problem. "Especially for those who are doing well, we have to give them more resources, more assistants," he says. But he doesn't have a free hand. Salary scales have to be vetted by the president's office, which hasn't wanted Academia Sinica to get too far ahead of the national universities. And the academy's charter does not permit a career path for engineers and technicians, making it hard to retain good support personnel.

Lee says he is making gradual progress in addressing these issues. He recently won authority to appoint locally hired scientists to the higher paying "distinguished fellow" positions originally intended to lure researchers back from overseas. He also hopes to create an English-language Ph.D. program. The program would generate a ready supply of graduate students for larger research teams, while English instruction would enlarge the talent pool by attracting students from around the world. Lee hopes to win final government approval in time to enroll the first class next summer.

Such challenges are likely to fill the remaining 4 years of Lee's self-imposed 10-year tenure. In the past, academy presidents were appointed for life, but characteristically, Lee is changing the charter to limit a president to two 5-year terms. "I'll definitely be the youngest retiring Academia Sinica president," he says. "But I don't want to be one [of those scientists] who becomes a stumbling block in the path of the younger generation."

–DENNIS NORMILE

ECOLOGY

# Everglades Restoration Plan Hits Rough Waters

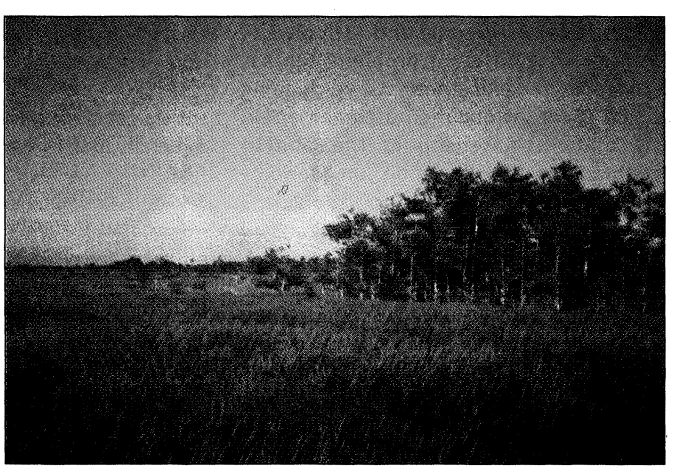
**An 11th-hour proposal to boost water flow into the Everglades has a Native American tribe—and some scientists—up in arms**

**MICCOSUKEE RESERVATION, CENTRAL EVERGLADES**—Zigzagging by airboat through a maze of saw grass, Ron Jones spies a scene of ecological carnage. He cuts the propeller's engine to drift in for a closer look. A teardrop-shaped island, once covered with gumbo-limbo and other hardwoods, is a tangle of rotting snags. Battered by years of high waters, this and other tree islands in the central Everglades have become shadows of their former selves. That's bad news, says Jones, a wetlands ecologist at Florida International University in Miami, as the islands are havens for several endangered species, including snail kites, snakes, and panthers.

If tree islands are like canaries in a coal mine, gauging the vitality of the Everglades, then these canaries are drowning. The culprit is the biggest water engineering project in U.S. history: a network of levees, pumps, and canals built since 1948 to protect cities from flooding and to ensure that central Florida's sugarcane farmers get enough water for irrigation. Now the same agency that installed the plumbing, the U.S. Army Corps of Engineers, wants to rip much of it out and restore the so-called River of Grass to something resembling its natural state. After years of bickering over how to carry out the unprecedented project, the Clinton Administration last month sent to Congress a proposal to spend $7.8 billion over 20 years on a Comprehensive Everglades Restoration Plan.

Threatening to derail the plan, however, are concerns over funding and the science driving the massive project. One issue now complicating an already difficult congressional debate over the plan is an 11th-hour proposal to allow 20% more water—245,000 acre-feet—to flow into Everglades National Park (ENP) each year to nourish the park's ailing marshes and provide better habitat for wading birds and fish. Some scientists have pushed hard for this extra water. "In many years, the park is absolutely bone dry and the River of Grass dries up," says Stuart Pimm, an ecologist at Columbia University. "If you don't have any water, you don't have any water birds."

But the extra water may come at a cost to the central Everglades, which will have to bear the increased flow. A few years ago, scientists who helped draft the plan had mulled delivering this extra water to ENP. But they vetoed the idea because the ecological trade-off seemed too costly. "We didn't solve the problem of how we would get that extra water to the park without damaging the central Everglades" and its fragile tree islands, says John Ogden, an ecologist with the South Florida Water Management District (SFWMD), which is paying half the tab for the restoration and spearheading the state's Everglades research effort.



**Sinking ship?** Some scientists worry that more water means more trouble for tree islands such as this one in the central Everglades.

The idea's sudden resurrection has sparked a rebellion among a few erstwhile restoration backers whose support is deemed vital to the plan's political acceptance. Leading the charge is the Miccosukee Indian Tribe, a major player in Everglades politics. The Miccosukee say they use tree islands for hunting and for ceremonies. At a Senate hearing last week, a tribe lawyer accused the federal government of giving the central Everglades "second-class status" and thereby jeopardizing the restoration.

For years, the Everglades—which stretches from Lake Okeechobee to the Florida Keys—has been edging toward ecological collapse. Fragmentation of the wetland has parched some areas and flooded others, disrupting seasonal water flow. Invasive Brazilian pepper and melaluca have supplanted native plants, while agricultural runoff has diminished water quality. Wildlife are swooning Since the turn of the century, populations of wading birds such as wood storks, herons, and egrets have plummeted 90%.

Alleviating the Everglades's ecological ills is only one of several goals of the federal-state Everglades plan, known as the "restudy." It calls for the removal of 400 kilometers of dikes and levees over 20 years and the construction of new filtering marshes, canals, and underground reservoirs. That would allow water to flow more naturally through the central Everglades and into the park. To compensate for the increased flow through the park, the plan would shore up flood controls and fun-