

Space Center in Maryland and Marshall Space Flight Center in Alabama. Rice scientists are concentrated in astronomy and plasma, with roles in the Hubble mission, the Global Geothermal Satellite project and joint missions with the Europeans and Japanese.

As a small centre, the Rice space science programme has found itself vulnerable to the fluctuations of the US space programme. Eight million dollars of annual funding for the operation of three NASA solar plasma and physics missions has shrunk to almost nothing over the past two years as NASA decommissioned the probes. Analysis of the old data is all that remains of the three solar programmes at Rice, but the university hopes to become involved in future missions.

Another Texas university space science group that must avoid placing too many of its eggs in one basket is the University of Houston's Space Vacuum Epitaxy Laboratory. Funded since 1987 through NASA's Office of Commercial Programs, the laboratory has been at the forefront of work on novel vacuum-growth technologies both on Earth and in space, in particular thin-film materials. In November 1993, the laboratory hopes to launch from the bay of the space shuttle a stainless steel wake shield, a disk 12 feet in diameter, that will trail the shuttle. It is intended to create a nearly perfect vacuum in which to manufacture materials for better computer microchips.

A potential bonanza if it succeeds, the experiment has only a small foreign contribution (from the Canadians) and must demonstrate its commercial viability quickly. Because the technology is in the public domain, however, it is hard to keep secret: the Japanese, for instance, plan to fly a similar mission in 1994 on the basis of information they have obtained from the Houston effort. And its first launch is critical: researchers must demonstrate to NASA that the wide-shield technology is feasible to win support for the remaining four launches in the series.

Despite the hurdles, Texans consider space science to be an important element in the state's plans for technological growth in the 1990s. Although the Johnson centre and the surrounding institutions expect to grow little throughout the decade, state officials hope that a new regional technology transfer centre in Houston, funded by NASA, will serve as a broker of space services between the government and industry. At the same time, they expect the centre to attract to Texas other federal agencies — including the Departments of Defense, Energy and Transportation — with money to spend on space science. And if the space station makes it through the political grinder, Texas's focus on manned space may actually start to look like an advantage.

**Alcestis Oberg**

## San Antonio aims for spot on high-technology map

**San Antonio.** When most people think of San Antonio, the first thing that springs to mind is the Alamo, the Franciscan mission where, in 1836, Texans were besieged and massacred by Mexican troops. Today, San Antonio is a culturally diverse city, with strong social and economic ties to Mexico. And it is home to many distinguished military and civilian research facilities. Included among these are the Armstrong Laboratory at Brooks Air Force Base, Brooke Army Medical Center, Wilford Hall Medical Center at Lackland Air Base, the University of Texas Health Science Center at San Antonio, the University of Texas at San Antonio, the Cancer Therapy and Research Center of South Texas, the Southwest Foundation for Biomedical Research and the Southwest Research Institute. The last two were founded by a local industrialist, the late Thomas Slick, Jr, who studied biology at Yale University and who died in an airplane crash in 1962 at the age of 46.

With all this academic and clinical research, it may seem surprising that there are only four pharmaceutical and five biotechnology companies in the San Antonio area. But, whereas Houston has three or four venture capital firms willing to seed new biomedical ventures, San Antonio lacks a venture capital community of its own and has failed so far to attract the attention of out-of-state investors.

Despite the odds, the Texas Research and Technology Foundation (TRTF) has been promoting economic development in south and central Texas since 1984. Funded largely through philanthropic gifts and with no state or federal government support, TRTF owns and manages the 1,500-acre Texas Research Park situated in rolling hill country about 20 miles west of the city. The land was donated to TRTF in 1986 by Tom Pawell, president of the Concord Oil Company.

The first major research facility to be built within the park is the University of Texas Health Science Center's Institute of Biotechnology, funded by a \$15-million grant from the family of industrialist and presidential hopeful H. Ross Perot. This two-storey, 58,000-square-foot building is expected some day to house about 110 scientists, post-docs and support staff.

Just a stone's throw away, construction is under way on two additional and complementary research facilities — the Cancer Therapy and Research Center's Institute for Drug Development and the national headquarters of the Southwest Oncology Group (the largest clinical trials organization in the United States). Due to

be completed by the autumn, the institute is headed by Daniel Von Hoff, one of only six investigators selected by the National Institutes of Health's cancer institute to direct phase I clinical trials. Its mission is to shorten the time required to develop new anticancer agents.

Groundbreaking ceremonies have yet to be held on the new campus for the Southwest Foundation for Biomedical Research, which plans to relocate to the park from a site closer to town. The foundation maintains the world's largest colony of baboons for use in medical research and conducts research on organ transplantation, cardiovascular diseases, AIDS, premature birth and behavioural medicine.

As well as recruiting companies to the park, TRTF is also helping small start-up companies and individual researchers by subsidizing laboratory and office space. Researchers are using these 'incubator' facilities to test the commercial viability of their research projects before raising venture capital. The current crop of researchers are expected to outgrow their incubator facilities within three years, at which time they will have the chance to lease or purchase land or facilities within the park. In addition to the incubator facilities, TRTF hopes that the manufacturing facility being built on site to meet US Food and Drug Administration specifications will attract companies to the site.

Two years ago, TRTF spun off a for-profit venture capital company called the VenTex Group, Inc. to make limited funding available to new companies. VenTex raises and manages seed and growth capital for high-technology companies, and invests in the biomedical, environmental, computer and material sciences. Charles McLaughlin, president of VenTex, says the company is willing to back research projects at a very early stage and will provide up to \$250,000. So far, VenTex has made five investments.

It is too early to judge whether TRTF will succeed in its efforts to attract a healthy mix of academic institutions, start-ups and more established high-technology companies to the park and stimulate the local economy. But there are signs that its job will not be easy. Three years after ground was broken for the Institute of Biotechnology, more than 75 per cent of the park remains undeveloped. And so far TRTF has failed to entice an existing biotechnology or pharmaceutical company to the park.

**Diane Gershon**

Thanks to Barbara Ann Bukowski for her helpful information on bioscience industries in the Southwest.