

OWLS IN SPACE:

RICE UNIVERSITY'S CONNECTIONS TO NASA JOHNSON SPACE CENTER

By Jessica A. Cannon

On September 12, 1962, President John F. Kennedy gave a speech from a stage in the middle of Rice Stadium restating America's commitment to send a man to the moon by the end of the decade. Yet, beyond this historic moment for the city of Houston, other Rice University associations with the space program are less well known.

In fact, Rice worked closely with leadership in the National Aeronautics and Space Administration (NASA) beginning in 1961 with the selection of Houston as the site for the new Manned Spacecraft Center. This involvement was even acknowledged by Kennedy toward the end of his speech:

last half-century, have helped sustain scientific research at these institutions individually, but they have also contributed on a larger scale to making Houston world-renowned as Space City, U.S.A.

Rice's link to what would become JSC began in early 1961 as Humble Oil and Refining Company Chairman Morgan Davis, Texas Congressman Albert Thomas, and Rice officials tried to convince NASA to build its sixty-million-dollar facility to support manned spaceflight in Houston. Thomas, who graduated from Rice in 1920, had tried unsuccessfully throughout the late 1950s to convince the Atomic Energy Commission to create a laboratory and research program at his alma mater. In August and September of 1961, he succeeded in convincing NASA Administrator James Webb and a site selection committee of the virtues of a Houston facility—access to Ellington Air Force Base, a climate that allows for year-round training and flights, and proximity to a major city with established communications and computer resources, industry, and educational institutions. Thomas had assistance from his friend and fellow Rice alumnus George R. Brown, then chairman of the Rice Board of Trustees, and Rice officials President Kenneth S. Pitzer and Chancellor Carey Crounse, as well as the Houston Chamber of Commerce and other leaders in the city. In fact, Davis transferred 1,000 acres of land to Rice University from Humble Oil's holdings near Clear Lake, and Rice in turn gave the land for the new NASA Manned Spacecraft Center (MSC) to be constructed. Soon thereafter in early 1962, NASA purchased another 600 acres from Rice (also deeded to the university from Humble Oil) for \$1.4 million.²

NASA announced the site of the new MSC on September 19, 1961, to the elation of many people in Houston.³ The availability of the land from Rice for the NASA site demonstrates the work that went on locally to win this coveted government installation, but it did not end there. On September 22, NASA officials from the Space Task Group—including Walt Williams, Robert Gilruth, and Martin Byrnes—arrived in Houston to tour the site and the relevant city facilities. They were treated to a warm welcome by



A Gemini spacecraft model garners attention at Rice University, December 1963.

"I am delighted that this university is playing a part in putting a man on the moon as part of a great national effort of the United States of America."¹

The connections between NASA and Rice, especially through the Lyndon B. Johnson Space Center (JSC), over the

Rice University Alumni Astronauts

members of the Houston Chamber of Commerce. After touring the Clear Lake site, NASA officials sat in the president's box before a crowd of seventy-three thousand to see Rice defeat LSU 16-3 in football. That evening they attended a party at Rice Dean of Engineering Franz Brotzen's home with city officials, members of the Rice and University of Houston administration, and Rice faculty.⁴ Meetings and letters between NASA Administrator James Webb and Rice officials Kenneth Pitzer, George Brown, Carey Croneis, and others on both sides continued throughout the fall of 1961 and well into 1962 as plans were finalized and both sides outlined their goals for cooperative efforts.⁵

NASA officials were particularly interested in seeing Rice continue its program of materials research and its strong engineering programs. "It is clear that the Manned Spacecraft Center will want to look to Rice for advanced training of the Center personnel," wrote Homer Newell, director of NASA's Office of Space Sciences, but also "we will wish to go further than this...to develop a relationship between elements of the Manned Spacecraft Center and Rice similar to those that now exist between Jastrow's Institute for Space Studies and the universities in the New York area."⁶ President Pitzer and Rice officials had similarly high aspirations. In a speech before the Houston Chamber of Commerce on December 7, 1961, Pitzer illustrated how Rice fit into the larger goal for space exploration: "Rice is participating effectively in this sort of [theoretical and practical] research activity and we anticipate expanding our activities with the aim of contributing further knowledge and providing trained manpower for the space program." Specifically, Rice could offer the MSC "great enthusiasm for the project" and "complete cooperation" of a "supporting academic and scientific environment." Additionally, Rice's "traditional emphasis on excellence" would complement "an effort such as Apollo, where the failure of even a minor valve or control circuit can mean the failure of an entire mission and can endanger the life of the astronaut." One final contribution was "the willingness of Rice University to expand its activities to meet space age needs and the ability of the community to support such expansion."⁷

Although Pitzer only vaguely mentioned "new programs" in his December 1961 speech, he quickly set about creating graduate courses of study and organizing a program around space studies during 1962. Pitzer briefly considered adding these courses to the current Physics Department but instead won approval from the Committee of Faculty, Students, and

John S. Bull	BA, BS '57	Mechanical Engineering
Takao Doi	PhD '04	Astrophysics
Jeffery Hoffman	MA '88	Engineering-Materials Science
Tamara E. Jerrigan	PhD '89	Space Physics and Astronomy
James H. Newman	MA '82 PhD '84	Physics
John D. "Danny" Olivas	PhD '96	Mechanical Engineering and Materials Science
Peggy Whitson	PhD '86	Biochemistry
Shannon Walker	BA '87 MA '92 PhD '93	Space Physics

Other Noteworthy Alumni and Friends

N. Wayne Hale, Jr. BS '76 Mechanical Engineering

*Deputy Associate Administrator of Strategic Partnerships
Former Program Manager, Space Shuttle Program*

Janice Voss Graduate work in Space Physics at Rice 1977-78
Astronaut

Curt Michel Professor of Astrophysics at Rice
Scientist-Astronaut from 1965 - 69

Alumni to start a new Department of Space Science. On January 4, 1963, the "first Department of Space Science in any college or university in America" was announced, with Alexander J. Dessler from the Graduate Research Center of the Southwest in Dallas named as head of the department. The department offered a graduate course of study leading to the Masters and Doctor of Philosophy degrees, with "a well-balanced program...in the most important fields that constitute Space Science and will develop scientists who are proficient in most areas of Space Science and expert in at least one."⁸ With the department established and numerous students applying to study at Rice, there was a need to find laboratory space for the new program. Funding for a Space Science Building to be built on the Rice campus was provided by NASA and by the university, and ground-breaking ceremonies were held in February 1965. It was completed in 1966.⁹

In June 1963, also immediately following the creation of the Space Science Department, the university established a Satellite Techniques Laboratory to serve as the basis “for the design, construction, check-out and environmental testing of individual instruments and complete payloads” at Rice. The lab housed a telemetry management and command station and the necessary equipment to analyze data received from satellites in addition to design and fabrication equipment. Curtis D. Laughlin was brought in to head the new lab, as were Brian J. O’Brien, newly appointed Professor of Space Science at Rice, and Ray Trachta. These three men had designed and built the Injun 1, 2, and 3 satellites at the University of Iowa (funded by the U.S. Navy).¹⁰

One of the lab’s first projects was a contract with NASA to design and build six rocket payloads to be launched atop Nike-Cajun rockets. The payloads were named in honor of Rice’s mascot Sammy the Owl, making them Sammy 1, 2, 3, and so on. Sammy 1 was launched from Wallops Island, Virginia, on January 14, 1964, to the cheers of a number of alumni who flew to Virginia to see Rice’s first space traveler (albeit a mechanical one). The rocket reached an altitude of 90 km, and Sammy 1 functioned according to plan, sending back data to waiting Rice graduate students on the ground. The remaining Sammys (2 through 6), with more complex equipment to study the auroras, were launched successfully that winter and the next from Fort Churchill in Canada. A report on the flight of Sammy 5 dated March 23, 1964,

recorded “a complete success” with “three beautiful flights into auroral conditions which were very satisfactory.” The Sammy payloads made pioneering studies of the auroras, and they provided valuable design and launch experience for the students, some of whom earned their degrees based upon these projects and went on to contribute to the study of space during their careers through research and teaching.¹¹

In addition, the Rice Space Science program won the honor of building the first satellites in NASA’s University Explorer Program. This program allowed universities to design and build complete satellites, instead of their instruments being simply added to other NASA satellites. Rice faculty and students designed a two satellite system that studied the auroras in both hemispheres, and the types of particles that caused them. The satellites, code-named Owl 1 and Owl 2, were initially set to be launched in 1967 from the Vandenberg Air Force Base in California, although they were delayed by budget issues and development problems.¹² They were never launched, but several instruments developed for the Owls, including a low-level auroral TV camera, were later flown on manned spacecraft.¹³

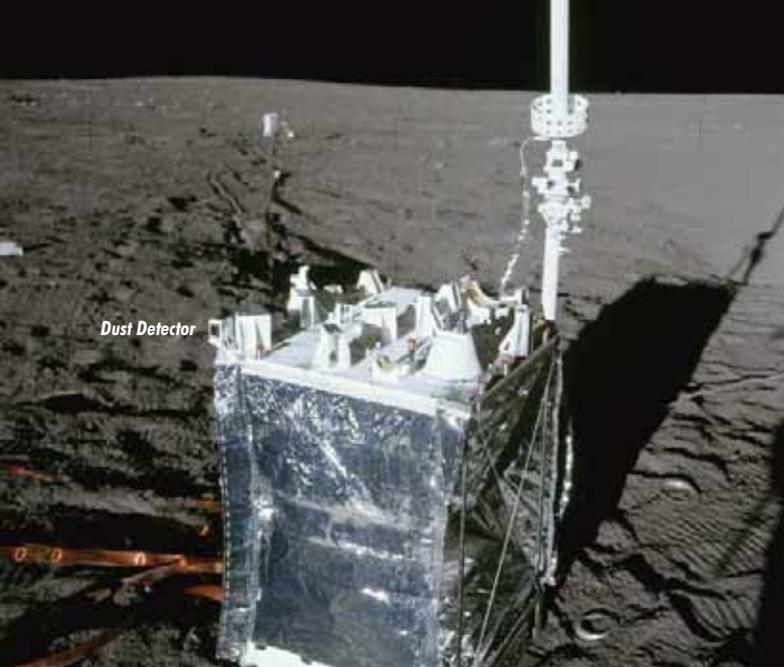
Other scientific instruments and satellites were developed during the 1960s at Rice. The Biosatellite Research Program in the Department of Biology, a NASA-sponsored program, developed two satellites—Biosatellite-A and -B—that were launched from Cape Kennedy in December 1966 and September 1967, respectively. These satellites used vinegar flies to test the effects of radiation and weightlessness on living organisms. The first satellite was never recovered, but the second was recovered near Hawaii after a forty-five hour flight.¹⁴ Back in the Satellite Techniques Lab, Brian O’Brien and the Space Science students built a Navy-funded satellite to conduct further research on the auroras and the Earth’s magnetosphere. Called Aurora 1, the satellite was put into orbit in June 1967.¹⁵

NASA’s Apollo missions to the moon (11, 12, and 14 through 17) included scientific equipment designed to be left on the moon by the astronauts. The Space Science faculty and students designed three different instruments that were included in these Apollo payloads. John Freeman’s Suprathermal Ion Detector Experiment (SIDE) was set-up on the moon by Apollo 12 and Apollo 14 astronauts. The Charged-Particle Lunar Environment Experiment (CPLEE) developed by Brian J. O’Brien was on the Apollo Lunar Surface Experiments Package (ALSEP) payload for Apollo 13, and was deployed on the moon by Alan Shepard on the Apollo 14 mission. The CPLEE was, in fact, an electronic ancestor to equipment developed for the Aurora 1



Rice graduate student works on an Owl satellite in 1966.

WOODSON RESEARCH CENTER, RICE UNIVERSITY



The Dust Detector Experiment was one of only two experiments placed on the moon during Apollo 11, and included on three other missions. The matchbox-size detector is shown (left) as part of the ALSEP, placed on the lunar surface by Apollo 12, November 1969.

satellite. The Dust Detector Experiment (DDE), also developed by O'Brien, was perhaps the most noteworthy experiment of the three. The matchbox-size detector weighed just 270 grams, and was one of only two experiments placed on the moon during the historic landing of Apollo 11 (the other was a seismology monitoring device). The DDE was also deployed on Apollo missions 12, 14, and 15. Data sent back to scientists on Earth showed dust accretion was a significant problem on the moon's surface—research that is still important today as NASA plans new missions to the moon. Transmissions from the DDE ended only when NASA turned off all the ALSEP equipment in December 1977, although these small pieces of Rice remain on the moon today, much like the footprints of twelve men who also made the long journey from Houston.¹⁶

There have been other connections between JSC and Rice since the 1960s. Although the focus at JSC rapidly became design and applied engineering (on items like spacesuits, capsules, and later the space shuttle), Rice University was able to maintain some research relationships with JSC and to capitalize upon its strong engineering program in training several past and present astronauts. Members of the Rice faculty lectured to astronauts on various scientific topics, and Brian O'Brien specifically was asked to serve on a NASA commission to discuss radiation dangers to the astronauts.¹⁷ Collaborations with the MSC continued with the creation of the Lunar Science Institute to handle materials brought back from the moon. Rice owned the West Mansion (as part of the lands initially give to the institution from Humble Oil in 1961), so when NASA began seeking a facility for a Lunar Receiving Laboratory to house the lunar samples and research, the adjacent lands of the West Mansion near JSC made sense. Rice, along with grants from NASA and the National Academy of Sciences, created the Lunar Science Institute, renamed in 1978 the Lunar and

Planetary Institute. It was operated at this location by Rice and the Academy until 1990, when it relocated to another site in the Clear Lake area.¹⁸

Additionally, Rice's Fondren Library staff cooperated with the new MSC library in obtaining needed technical books through a book sharing agreement, and Fondren Library became "an official repository for general purpose educational-information materials from NASA," as opposed to the purely technical reports.¹⁹ In the 1980s, Professor Alexander Dessler studied data received from Voyager 1 (which passed by Jupiter and Saturn) and Voyager 2 (that went past Neptune and the planet's moon Triton).²⁰ From 1982 until 2000, the Woodson Research Center, by agreement with NASA, housed the Johnson Space Center History Collection, making the records of the Mercury, Gemini, Apollo, and Apollo-Soyuz Test Project Programs available to the public.²¹ Even today, there are ongoing collaborations between JSC and Rice's Center for Nanoscale Science and Technology.²²

While the connections today between Rice and JSC may be on a seemingly smaller scale compared to such institutions as Cal Tech and the Jet Propulsion Laboratory, there is a great deal of history between these two Houston icons. Rice University officials and alumni—including Congressman Albert Thomas, class of 1920—were very influential in bringing NASA to Houston. The university also seized the opportunity to develop a stronger graduate program in the sciences with the creation of the Department of Space Science to further facilitate the relationship with the MSC and, later, JSC. Three satellites were launched out of the Rice program, including Aurora 1, which may still be in orbit. And three different pieces of equipment designed at Rice were deployed on the moon through the Apollo ALSEP program, and they remain there today.

These links between the two institutions continue today and are reinforced by the numerous people who were trained at Rice over the last fifty years. Astronauts who have earned degrees from Rice, including Peggy Whitson (PhD '86)—who recently broke the U.S. record for longest cumulative time in space and was the first female commander of the International Space Station—and other alumni like former Space Shuttle Program Director Wayne Hale (BS '76) contribute in obvious ways to space exploration, but other Rice graduates participate behind the scenes through their valuable ongoing research that helps to make space travel possible.²³ ★