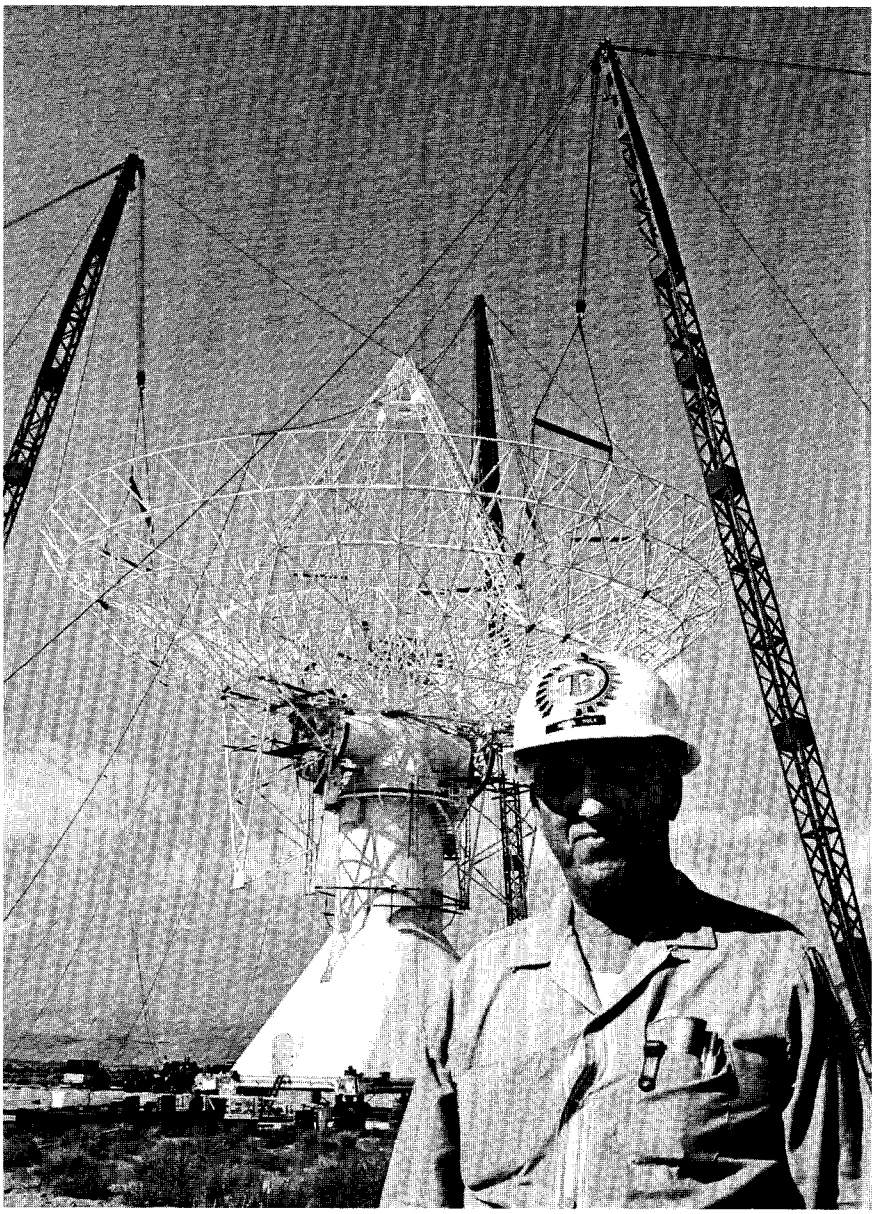
Man of Parts

by GRAHAM BERRY



Bruce Rule relinquishes a few of his many titles

NOTING that the once lowly peanut has now achieved a certain prominence, Bruce Rule thinks the time is propitious to reveal the unique contribution that peanuts have made toward the advancement of astronomy.

For nearly three decades the roasted pods of *Arachis hypogaea* have played a key psychological role in the aluminizing of the Hale Telescope's 200-inch mirror at Palomar Observatory — a job that has to be done every now and then if the big mirror is to maintain its high reflectivity.

When Rule set up the aluminizing system nearly 30 years ago, it was a difficult, tedious job for his trained crew of opticians and technicians. They had to remove the 30-ton disk of pyrex glass from the telescope tube, clean it with solvents and lanolin, get it into what was then the world's largest vacuum tank for the actual aluminizing, and then get the refurbished mirror safely back in the telescope tube.

It was an exhausting task, physically and emotionally, and that's where the peanuts came in. Bruce Rule had sacks of them available for munching at the first break. *Eating* the peanuts was only a peripheral benefit, however. What the tired crew really enjoyed was scattering the peanut shells over the otherwise immaculate observatory floor. This decompression exercise relieved their tensions so well that it has become an important ritual in all subsequent realuminizings.

In April 1975, when the 40-inch mirror was to be aluminized at the Hale Observatories' new Chilean observatory at Las Campanas, Rule learned that there were plenty of peanuts in South America, but, unfortunately, they were all raw. That didn't rattle Rule. He saw

to it that the 40-inch's auxiliary instruments were shipped from Pasadena to Las Campanas cushioned by North American roasted peanuts. The gesture was typical of the kind of consideration Rule always had for his staff.

Although officially retired as of last June 30 from such titles as chief engineer and staff member of the Hale Observatories, staff member of Caltech's Owens Valley Radio Observatory, and chief engineer and project officer of the 100-inch Irénée du Pont Telescope at Las Campanas, Rule is not substituting golf for telescopes. He'll continue to work on telescopes as long as he's able to make a contribution, he says.

Contributing is one of the things Rule does best. For 40 years he has designed and engineered astronomical instruments, and he has been associated with the design and construction of 18 of the world's major optical and radio observatories. He still maintains an office at the Hale Observatories building in Pasadena, where he consults on the overall design and logistics of large telescopes and also on wind tunnel optical systems.

Ironically, the 67-year-old engineer who has done so much to expand man's vision of the universe has suffered severe impairment of his own vision, including the loss of sight in one eye. He now carries on his work with the aid of dark spectacles and a magnifying glass.

Recently, Rule and his wife, Ethel, returned from the dedication of the DuPont Telescope at Las Campanas. It was, of course, a memorable occasion for him. He was especially happy to see Mr. and Mrs. Paul Scherer of Glenn Dale, Maryland, there because some 30 years earlier he had shown Mrs. Scherer — then Margaret Hale — the great Hale Telescope at Palomar soon after it was completed. Mrs. Scherer is the daughter of George Ellery Hale, for whom the big Palomar telescope and the Hale Observatories are named. Scherer is the son of the late James A. B. Scherer, who was president of Throop Polytechnic Institute — as Caltech was known in the early 1900's.

Bruce Rule has been associated with Caltech since he was a student, graduating from the Institute in 1932 with a BS in electrical engineering. While still in school he designed and installed power generators and equipment for wind tunnels and water tunnels. With a group of Caltech graduates he worked on the forerunner of dictating machines, using a magnetic steel cylinder instead of a magnetic tape. He held patents on switches for dictating machines and on instruments for directional drilling in oil wells.

He joined the Caltech staff in 1937 as superintendent of engineering projects and chief engineer. During World War II he developed an aerial reconnaissance camera for the Air Force and underwater sound devices, on which he held patents. He also worked on the design of antisubmarine rockets and torpedoes (and lost part of a finger in the process, in a scale model of a torpedo launcher in the basement of Robinson Laboratory). He organized underwater research at Morris Dam in the San Gabriel Mountains for the Navy, and received two Navy awards for his services. For 12 years he was chief engineer of Caltech's 1.2-billion-electron-volt synchrotron laboratory.

When he finally started working with telescopes after the war, Rule knew where he wanted to apply his engineering talents. He was largely responsible for the mechanical, electrical, and drive systems for all the Hale telescopes and for the design of the coudé spectrograph and other auxiliary instruments on the 200-inch telescope.

Rule's versatility was particularly useful to Jesse Greenstein — who is now Lee A. DuBridge Professor of Astrophysics — when he first came to Caltech in 1948 to start the graduate school in astronomy. "Bruce could do anything," Greenstein says. "He was always cheerful, always willing to cope with tasks concerning personnel, budget, the building, and general problem-solving. In a less highly organized and smaller Caltech, he was an essential element of my survival."

Rule worked with the three successive directors of the Hale Observatories—Walter S. Adams, Ira S. Bowen, and Horace W. Babcock. For all of them he was a key person in the design and construction of that strange combination of massive mechanical moving structures with high-precision delicate goals that is a telescope.

"As new instruments were being designed," says Horace Babcock, "Bruce was always available to the staff, always sympathetic and quick in his suggestions on how to plan it, how to make it work, how to fix it.

"As mechanical and electrical problems arose and were solved, Rule adapted himself to the coming age of electronic control. It is still a remarkable fact that the 200-inch Hale telescope drive and electrical design, in large part due to Rule, is still competitive after 30 years."

But Rule hasn't confined himself to working just for the Hale Observatories. He was consultant or adviser for such big instruments as the 236-inch Russian telescope; the 120-inch Lick Observatory instrument; the 84-inch one at Kitt Peak; the 156-inch at Cerro Tololo, Chile; the 156-inch Anglo-Australian telescope in Australia; the 140-inch of the European Southern Observatory at La Silla, Chile; and the 150-inch Canadian-French Hawaiian telescope at Mauna Kea, Hawaii.

His work on radio telescopes began in 1955 with the design and construction of the two mobile 90-foot dish antennae, and later, the 130-foot antenna at Caltech's Owens Valley Radio Observatory. He has also been consultant on numerous other large radio telescopes, as well as big solar and infrared telescopes.

He organized and was director of Caltech's Central Engineering Services, where large astronomical research equipment is built, and he started the observatories' Astro-Electronics Laboratory. From 1960 to 1964 he was a member of the National Academy of Sciences advisory panel on astronomical facilities.

Small wonder he has long been known by astronomers as Mr. Telescope. □