By Bruce Fellman

Enchanted Evenings

Ladd Observatory Turns 100

Photographs by John Forasté

Illustration by Sandra Reinbold

"Wow – I see that. . . . How far away is that? It's gorgeous! It's so great I can't even believe it!"

Joe, who's no more than six and up way past his bedtime, is mesmerized as he peers at a star called Vega through the lens of the historic telescope at the Ladd Observatory. One hundred years ago, Brown astronomer Winslow Upton and a host of luminaries celebrated the opening of the Hope Street facility, which crowned "Tin Top Hill" – a dump for tin cans – and at the time afforded viewers an excellent look at the heavens. One hundred years after the doors were opened and the telescope saw its first light, the observatory continues to give University students and community members like Joe a window, albeit smudged, on the universe.

The masonry and wood building, along with a wealth of scientific instruments, was a gift from Herbert Warren Ladd, the governor of Rhode Island. "It was a premier astronomical facility that could handle anything required of a nineteenth-century observatory," explains astronomer David M. Targan, Ladd's seventh director and an assistant dean of the College. "And it was dedicated to research, teaching, and public service."

Unfortunately, air pollution and electric lights soon obscured the skies over Providence, so it was never possible to make significant discoveries at Ladd. But though progress prevented much research there, the observatory has more than fulfilled its two other mandates, Targan says.

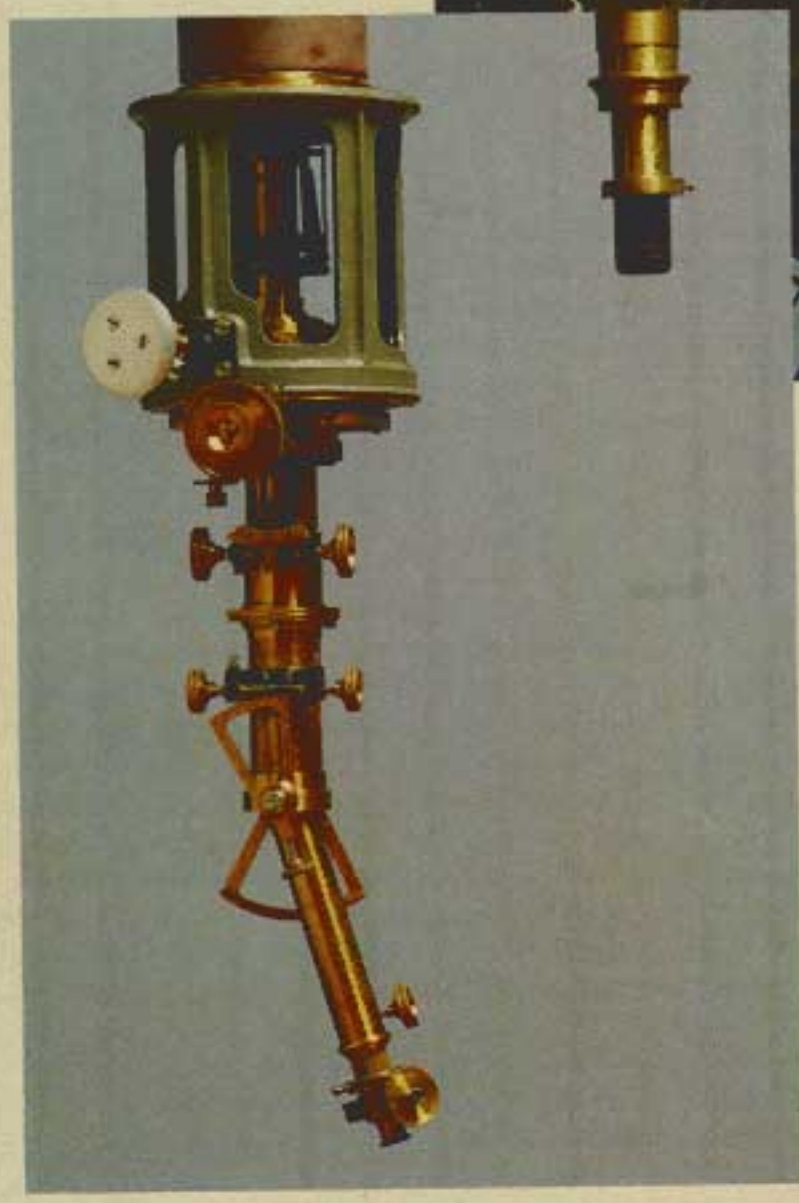
Generations of students have studied the cosmos at Ladd, and interest in astronomy courses is strong. Undergraduates use the facility for a variety of purposes, and on a recent visit, a group of late-nighters were busy sketching the rings of Saturn, while other students were comparing the observations they'd made through the telescope with what they'd seen when they looked through a small scope the size of Galileo's.

In addition, Ladd hosts courses sponsored by the Brown Learning Community. Over its century-long existence, the observatory also has offered a myriad of educational and practical services to Providence and the surrounding community, not the least of which is giving Joe and countless other kids a chance to get starlight in their eyes.

"Curiosity brings people out here," notes Francine Jackson, an enthusiastic amateur astronomer who for the last twenty years has coordinated the observatory's Wednesday-night public sky-watching sessions. "Sometimes, it's people who've seen the building and have no idea what it is, so when they see the doors open, they just come right in. We also have a lot of regulars – this has become a meeting place for local amateurs. And often, we get parents with their children, because this is a great place to quench a kid's thirst for science and to introduce everyone to the beauty of the night-time sky."

The Observatory's dome opens (right), and its twelve-inch refracting telescope gains access to a sky full of stars. Made of brass and other metal, the telescope measures fifteen feet long. "The scope is genuinely beautiful," says an astronomer who worked with it in the 1980s.

Below: a detail of the spectroscope attached to the telescope.



Then-Chancellor of the University William Goddard would surely approve. At the dedication ceremonies, he spoke eloquently about the universal appeal of the cosmos.

"Only to those who realize how close is the relation of the study of astronomy to the common life of man is the worth of an observatory apparent. We know how much the best literature of the world owes to the heavenly bodies. The Psalmist's loftiest flights of poetic inspiration were toward the sun and the moon and the stars, which declared the glory of their Creator, and in every age and in every language the poet and the moralist have found in them forms of passionless beauty and emblems of spiritual grace," Goddard noted.

Then he shifted gears, and briefly outlined the observatory's practical task. "But it is through the aid of the science of astronomy that the paths through the great waters are made clear, that the boundaries of space are established and time itself is measured and divided."

And time itself is measured and divided. Figuring out accurate ways to represent the passage of time was one of the primary reasons people studied the sky, and the invention of precision clocks in the eighteenth century did nothing to diminish the importance of this activity. In fact, the need to determine whether or not clocks were actually on time was a major selling point for the creation and continuation of many an observatory, including Ladd.

"Clocks could be checked against the stars," Targan explains, adding that accuracy, or what came to be called *standard time*, became an issue in the last half of the nineteenth century because of the demands of railroad schedules. "The observatory was supposed to be worth having because it would provide a time-keeping service for Providence. This started in 1891 and continued until 1972, and it may be the longest time-keeping history of any observatory."

Therein lies an intriguing tale, one of many – concerning everything from backwards lenses to literary ghosts – in the Ladd history. In the observatory's early days, telling Providence when it was exactly noon required both transit telescopes, which keep tabs on the positions of certain stars, and extremely accurate clocks [see sidebar]. The idea is that these indicator stars pass through the crosshairs of the transit scope once every day, which gives the observer an astronomically precise standard by which to set a clock. (It's actually not quite so simple, because a star day is roughly four minutes shorter than a solar day.) Since observatories throughout a particular time zone followed the same procedure, noon in Providence was noon everywhere in the region. And precisely at noon, the official time-keeper at Ladd sent an electrical signal to various points in the city, which enabled clocks throughout the capital to be synchronized with the heavens.

The transit observations, conducted in a wooden part of the observatory where the roof could be opened with a pulley turned by a ship's wheel, continued until 1919, when it became possible to calibrate Ladd's clocks to radio signals sent out from key locations around the world. Even though the transit scopes were no longer used, the observatory continued to let Providence know when it was 12 o'clock for more than another half-century.

"We sent signals to the fire department until 1972, when someone called them to ask if they still needed the time service," notes Targan. "They said, 'What time service?', which means that for who-knows-how-many years, we were sending out a signal no one was using, or even aware of."

While its time-keeping history may not be one for the Guinness Book of World Records, the Ladd Observatory otherwise seems to have justified its namesake's investment of approximately $30,000.

"They built the place to last," says Targan. Still in use after 100 years are the observer's ladders; the nineteen-foot-diameter, copper-clad dome; the hand-cranked clock drive that keeps the telescope centered on one object; and the hand-pulled ropes and pulleys that turn the observatory dome.

"This is aerobic astronomy," quips Targan. "I get my workout when I use the facility."

The observatory's crown jewel was – and is – a twelve-inch refracting telescope whose main lens was ground by John A. Brashear, a famed Pittsburgh craftsman. "This is a majestic telescope," notes John Briggs, an engineer at the famed Yerkes Observatory in Wisconsin, who spent a lot of time at Ladd in the 1970s and eighties peering through the fifteen-foot-long brass and metal instrument.

Briggs, who is also a historian of astronomical equipment and facilities, got to know Ladd as a

Time Machines

Astronomy and horology – the study of time and time-keeping – have had a parallel existence throughout their history. In fact, many of the great astronomers were horologists as well," says Michael L. Passano, the volunteer clock expert at Ladd.

Passano, who works for Wells Fargo, explains that the Observatory's clock vault houses three precision time-keeping instruments, each of which is more than ninety years old. The "master clock" was made by Sigmund Riefler, a premier German engineer whose timepieces were standard features in most of the world's observatories. The Riefler, a gift from the class of 1875, was considered "state of the art" in its day, and Ladd's two regulator-type clocks – one made by Robert Molyneux, the other by Edward Howard – were extremely accurate. In addition, Ladd owns an exceedingly unusual, grandfather-type clock designed by Hezekiah Conant, a Pawtucket, Rhode Island, textile manufacturer. It tracks star time and solar time, and it uses a unique "duplex differential" mechanism to link the two modes. This enables the clock to track the position of the sun and moon through the zodiac.

Passano, who had been repairing clocks and watches since he was ten, first came face-to-face with Ladd's timepieces in 1973. The fourteen-year-old was stunned by what he saw. "I felt as though I'd been whisked off to a horologist's playground," he recalls, "but I was saddened, because the clocks were not operating. I knew deep down inside that some day that would change."

In 1985, he took charge of the work. The Howard and Molyneux regulators were in good shape, and restoring them was a relatively straightforward task. The same was true with the Conant clock (for history's sake, Passano didn't replace a pickle jar that was pressed into service as a mercury-filled pendulum when the original broke).

The internal workings of the Riefler, however, were damaged beyond repair, so Passano, assisted by Horace Stoddard, a Massachusetts horologist, found a rare book containing plans for the necessary parts and built them from scratch. The clock now keeps time to within one-hundredth of a second per day. "It beats my quartz watch," says Passano, whose fascination keeps him tinkering.

"As I look at them ticking the hours away, I think about what's gone on in the past and what will come in the future, while these instruments are still recording time," notes the horologist, explaining his fascination. "Clocks are the closest thing to the Aquarian desire for a time machine."

– B.F.

BROWN ARCHIVES

Professor Winslow Upton (above), director of Ladd from 1890-1914, threatened to quit the Brown faculty unless he was given an observatory.

member of "Skyscrapers," a Rhode Island astronomy club that began at the observatory more than fifty years ago. "The scope is genuinely beautiful," he says, "and what you can see through it is beautiful. When you introduce students to this combination of beauty, you can really inspire them."

However, Briggs's initial views were anything but inspirational. "Brashear made darn good lenses, but the first time I got a chance to use the telescope, I was disappointed by the images I saw. They were shockingly crummy," he notes, "and they should have been great, because the lens is capable of resolving well under one arc second – the size of a basketball thirty-nine miles away – between the two components of a double star system."

Briggs tested the lens and discovered that it was in backwards, which turns out to have been an easy mistake to make. "Brashear was noted for a comparatively unusual lens design, and if you were unacquainted with this historic bit of trivia, you might think the lens was in wrong, when in fact it's in correct as Brashear made it," says Briggs, who explains that the error probably occurred during one of the lens's periodic cleanings.

Precisely how long the telescope had been both astigmatic and near-sighted is impossible to know, but once Briggs rectified the problem in the early 1980s, the lens's performance improved dramatically. "We were rewarded with some of the best views of Mars we'd ever had, along with spectacular sightings of Saturn's rings," Briggs notes.

The rewards continue, as both Brown astronomy students and southern New England residents flock to the observatory [see sidebar, "Happy 100th Birthday"]. "We're open most clear nights," says Targan. "This is a very heavily used university and public facility, and if there's something exciting to see, it's not uncommon to have more than a hundred people here."

For example, Francine Jackson recalls overflow crowds in 1985 and 1986, when Halley's Comet made its once-every-seventy-six-years return. "We really packed them in," she notes, adding that the comet's popularity posed something of a problem.

In its last go-round, Halley was a dud, so she and fellow astronomer Roger Menard, who has manned the telescope since the early 1970s, along with the volunteers who staff the observatory, had to avoid raising anyone's hopes. "We built it up as a disappointment," Jackson explains, "and so whatever visitors saw was better than the nothing they expected. People were happy they could see something to tell their great-grandkids about seventy-five years from now."

Planets, bright stars, a meteor shower, the moon, and maybe a stray comet or two . . . Sky conditions may be less than excellent, but there is still plenty to observe and learn. In fact, light pollution and smog may help the learning process. "Only the brightest stars shine through the haze, so this is one of the best places to learn the constellations," says Jackson. "If you tell people

Happy 100th Birthday

Exactly 100 years, four hours, and thirty minutes after a stellar assemblage officially opened the Ladd Observatory, an equally august group, along with nearly 1,000 well-wishers whose lives had been touched in some way by the facility, assembled for a birthday celebration complete with speeches, reminiscences, music, a cake in the shape of the observatory, and, of course, skywatching.

The sky was uncooperative, but the off-and-on-again clouds did nothing to dampen spirits.

Providence's ebullient Mayor Vincent A. Cianci lauded the observatory as a "key educational facility that has served the city well." He also explained that Ladd had helped his recent re-election bid. "I used to come here every Wednesday night to look at the stars and see what kind of a shot I had."

Jack Lubrano '24, who still teaches astronomy to "youngsters" at retirement homes, amazed the crowd, which had assembled in a tent set up next to the observatory building, with his recollections of Halley's Comet the first time it appeared this century – in 1910, when Lubrano was a ten-year-old. "That star with a tail was my first interest in astronomy," he explained, and it led to his pursuing the subject at Brown, where he peered through the same telescope in use today.

William Penhallow '55, astronomer and professor of physics at the University of Rhode Island, told the audience about the problems of calculating the paths of solar eclipses, work he did for his Brown mentor, Charles H. Smiley. "Most of you don't appreciate what you have in personal computers," said Penhallow. "We had to do the calculations on adding machines, and many times I remember walking back to campus down Hope Street as the dawn broke."

Phillip J. Stiles, dean of the Graduate School and dean of research, directed the observatory from 1970 to 1986, and he is credited with Ladd's resurrection. "The facility had been going downhill for quite some time, and in 1970, I came into a deserted building that was filled with scientific treasures. But it was sad – the telescope didn't work," says Stiles. So as a family project, he, his wife, and their six children cleaned the place up, and once the dirty work was done, he opened Ladd's doors to the public every Wednesday night.

Physicist Hendrik J. Gerritsen, observatory director from 1986-89, spoke as eloquently about the value of viewing the heavens as did University Chancellor William Goddard 100 years earlier. "Astronomy does important things for the human spirit, and it encourages us to look at our own planet in a new way," Gerritsen said. "All the other planets, however beautiful, are barren and lifeless, and that fact should make it hard to commit violence and waste our wonderfully unique life."

– *B.F.*

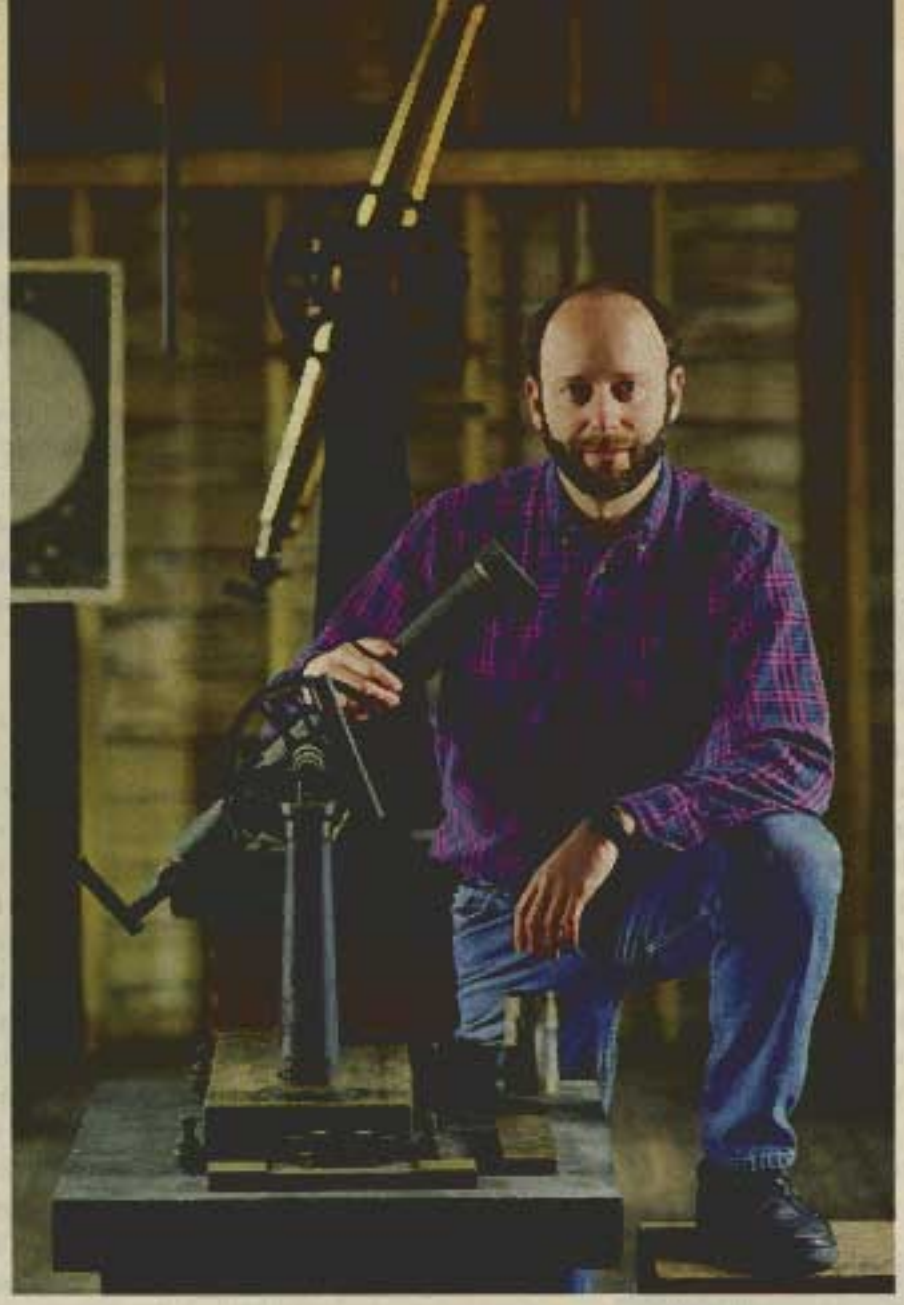
there's a triangle in the sky, that's all they can see, so they can get the prominent shapes and patterns fixed in their minds."

Ladd's open-door policy dates from Winslow Upton, whose threat to quit the faculty unless he got an observatory prompted Governor Ladd's gift. "Upton was more a public astronomer and teacher than a researcher," says Arthur Hoag '42, recently-retired director of the prestigious Lowell Observatory in Flagstaff, Arizona. In 1940, Hoag lived at Ladd, where, in exchange for looking after the furnace and calibrating the clocks, he got a free room in the basement, complete with a cot and a sink. "It was a little on the spartan side, but it was a boon as far as money was concerned," he recalls with a laugh.

Hoag, like his predecessors and successors, was deeply involved with the open-night program. "People were excited, and I was excited by the whole business myself," he explains. "Ladd was the center of amateur activities in town."

One of the early amateurs was none other than Providence author Howard Phillips Lovecraft, the master of the macabre. Upton was a Lovecraft family friend, and young H.P. was a devoted student of the heavens who planned to follow in his mentor's astronomical footsteps. The acolyte had the run of the observatory, and as a teenager he wrote surprisingly sophisticated columns about astronomy in the local papers. Alas, his journalistic skill did not help him pass algebra, a failure that precluded his attending Brown. The young man apparently was so crushed that he never set foot in the observatory again.

At least, not in the flesh. Some say his despondent spirit haunts the place.



The Observatory's seventh director, Assistant Dean of the College David Targan, poses in Ladd's transit room with the two transit telescopes, which once were used to calculate the exact time from the positions of certain stars.

Since Lovecraft's day, other amateur astronomers have "haunted" the observatory in a different way. Over the years, they've worked with the Brashear telescope and taught their science to the public. They've also built sophisticated instruments such as the Schmidt and Schwarzschild cameras that the late Charles H. Smiley, Ladd's director (1931-1970) and "Mr. Astronomy" at Brown, used in the solar eclipse research that took him to the far corners of the Earth and even above it in jet aircraft.

"Amateurs have made major contributions," notes Hoag. Today, volunteers like Jackson and Menard are the heart and soul of the observatory, and a recently formed, Ladd-associated group called the Celestial Observers of Rhode Island is building a new telescope that will be based on land Brown owns in the dark-sky country atop Jerimoth Hill, in western Rhode Island.

And so the observatory goes into its second century.

Last spring, NASA gave Brown a four-year, $600,000 "space grant" designed in part to increase public awareness and education in astronomy and the space sciences. "Ladd is going to play a big role in this effort," says Targan.

There's a push to get the Hope Street facility on the National Register of Historic Places. "It's a beautifully preserved example of a late-nineteenth century observatory," says John Briggs. "Such places are becoming all too rare, especially in terms of being complete with their original equipment – the telescope, the clocks, the spectroscopes, and the transit instruments."

Inclusion in the National Register would celebrate the observatory's importance in the history of American science and technology. It would also help secure the funds required to keep the facility in good shape for the next 100 years.

"... (T)he future of astronomy is going to depend largely upon America during the next half a century," noted E.C. Pickering, director of the Harvard Observatory, speaking at Ladd's opening ceremonies. Pickering had been to Europe and noticed that the European commitment to science was faltering as the twentieth century approached. Our time for eminence was at hand, he told the audience, and the Ladd Observatory was an apt symbol of our scientific and technological prowess. "We have a great future before us," he said.

Apt words, then and now. ■

This old wooden shipping box found in the attic was used to transport astronomical instruments by Charles Smiley, Ladd's director from 1931-70, on his eclipse expedition to Karachi, Pakistan.