Eyes on the Mountain

by Tom Vitron

In November, Dr. Deidre Hunter and predoctoral fellow Hongxin Zhang spent four nights observing dwarf irregular galaxies for the LITTLE THINGS* survey with the 4-meter Mayall Telescope at Kitt Peak National Observatory, southwest of Tucson. They graciously invited me to join them for a night of this “observing run” and I pounced on the opportunity with little hesitation. For them, data collected with the Mayall will add to the wealth of insights being gleaned about these special galaxies. For me, it represents the continuation of a charmed life for a lucky astronomy geek.

In the span of a year (1985-86), the suburban astronomical naïveté of my early youth dissipated as I saw Saturn through the 24” Clark Refractor and caught a glimpse of Halley’s Comet at l’Observatoire de Paris, Meudon. Getting to spend a night in the control room of the Mayall at Kitt Peak ranks alongside these previous experiences and was a privilege I did not take for granted.

As I neared “the mountain with eyes” in the early afternoon, the calmest sense of giddiness swept over me. After finding the dormitory and quietly settling in as others concluded their slumber, the three of us headed to the telescope for calibration around 4 p.m. Perched 18 stories high, the Mayall’s dome stands out above the rest of Kitt Peak. Once upstairs in the control room, it was a sight to behold: various tall structures of different shapes and sizes jut out from the plateau, and that’s just the array of coffee-making gear found in the control room’s kitchen area. Once calibration concluded, Dr. Hunter toured me around the telescope like a proud parent or a pilot showing off her gleaming machine. The Mayall is a special telescope and one that the Discovery Channel Telescope (DCT) project team looked at as a reference. Since it saw first light in 1973, the Mayall has been a cutting-edge 4-meter telescope, as the DCT will be when it becomes operational this year. (The 4-meter Blanco telescope at the Cerro Tololo Inter-American Observatory in Chile is a twin of the Mayall.)

After a quick dinner in the main cafeteria, we headed back to get positioned before the sun set. Dr. Hunter and I took one more look out the Mayall dome’s vents, a retrofit planned and implemented by Lowell’s Dr. Phil Massey when he was Kitt Peak’s 4-meter telescope scientist; the vents have improved temperature control, allowing for sharper imaging. As sunset nears, all the telescopes (save the McMath-Pierce Solar Telescope) come to life. It’s an orchestral deployment of world-class instruments, each surveying different objects in various parts of the...
Director’s Update

by Jeffrey Hall

Last month, I finished up my day by signing an especially large stack of thank-you letters to our Friends who had renewed their Lowell membership, and as the end of 2011 approached, a steady stream of these letters continued to arrive on my desk. Thanks to the continued efforts of Rusty Tweed and the outreach staff who make such a fine impression on our visitors, our ranks of Friends continue to grow, now at 2,300 and climbing.

You might imagine that in such a large support group any one person might be fairly anonymous, but that’s not the case. As I work through the stacks of renewal thank-you letters, I’m always struck by how many of the names I recognize, even if I’ve never met you. Gifts both large and small come with names I know I’ve seen before: Oh yes, there are those names from Texas, and here’s this family from Illinois. I take the letters back to Jonathan Wilkendorf in the development office for mailing, feeling quite grateful for all of you who help us carry out our mission.

I can’t overstate the importance of our Friends’ involvement and engagement in enabling basic science. Our scientific staff does very well in winning NASA and National Science Foundation grants for their research, but the funding prognosis heading into 2012 and beyond is grim and competition for each federal dollar gets ever stiffer. Your donations help buffer us against fluctuating appropriations – but that’s only part of the reason for Lowell’s efforts in creating connections to the private sector.

Federal appropriations and distribution via peer review will remain a useful and necessary method of enabling large programs and handling the management of many individual investigator projects, but the several steps between your tax dollar and a grant disbursement’s arriving in one of our astronomers’ project accounts creates a barrier – not solid, but definitely a bit opaque – between the enablers and the practitioners of science. Percival Lowell saw the value of scientific inquiry as a partnership with the public, as we at his observatory do today. Astronomers, to put it succinctly, educate themselves about the cosmos and if their pursuit is to thrive among the next generation of scientists, it is imperative to communicate that education transparently to all. The historian Will Durant, in the opening pages of his 11-volume magnum opus, put this concept as beautifully as I’ve ever seen it: Education, he wrote, may be defined as the technique of transmitting civilization. Forging direct conduits between our research and all of you who enable it is not merely a means to supporting our mission, but an integral part of that mission.

Therefore, in 2012, we’ll continue our daily programs, tours, and telescope viewing for tens of thousands of visitors and K-12 students. You’ll see a growing effort targeted at youth, from online videos for very small kids to summer camps for grade schoolers and unique learning opportunities for high school students. If you visit Lowell, you might run into one of our astronomers answering questions at our evening programs. And in June, our relationship with Discovery Communications will reach full speed with the airing of the first prime-time feature on the Discovery Channel Telescope.

In 1994, our then-new Steele Visitor Center vastly increased our ability to transmit the wonder and significance of what we do. In 2012, we, our institutional partners, and Discovery will extend this reach still further. We are perfectly positioned to transmit our part of civilization, and we could not (and should not) do it without you.

While many of us were braving the Flagstaff cold to see this event Lowell board member Michael Beckage took these gorgeous images of the lunar eclipse from Maui on 12/10/11. He used a Canon 20D attached to a 95mm Vixen telescope.
Mapping the Moon
by Kevin Schindler & William Sheehan

When John F. Kennedy gave his stirring and now legendary “We Choose to go to the Moon” speech on September 12, 1962, he galvanized Americans to combine their collective talents, ambitions, and skills toward the common goal of landing people on the moon. Over the ensuing years an estimated 400,000 individuals worked on the diverse efforts required to meet this challenge. In Flagstaff alone, scientists, engineers, and others built and tested equipment, trained astronauts, and developed communications procedures. At Lowell, scientists and artists combined forces on another relevant project: mapping the moon.

In 1959 the U.S. Air Force’s Aeronautical Chart and Information Center (ACIC) began mapping the moon based on lunar photographs. Scientists would ultimately use these maps to pinpoint landing sites for the Apollo program. Astronomer Gerard Kuiper, then at Yerkes Observatory, realized that the photos did not reveal adequate detail but that telescopic observations would. He suggested doing this in the southwest and in October 1960 ACIC cartographer William Cannell traveled to Flagstaff to experiment with the U.S. Naval Observatory’s 40-inch telescope.

Cannell was encouraged by the results and, learning that the 40-inch was not available for a regular observing program, contacted Lowell Observatory on the advice of USNO director (and future Lowell director) Art Hoag. Lowell director John Hall offered Cannell the use of the Clark 24-inch refractor and soon Cannell and assistants made monthly observing trips to Lowell. Due to this early success, the ACIC contracted with Lowell for a long-range observing project and on September 1, 1961 established an office at Lowell in the old machine shop just south of the wooden garage.

Cannell ran the office and was joined by observer James Greenacre and Patricia Bridges, a scientific illustrator and cartographer. Greenacre made telescopic observations and then shared these with Bridges, who reviewed them along with photographs of the moon. Using pens and an airbrush, she then rendered drawings that accurately depicted lunar features. Bridges’ drawings became the basis for topographic maps and were reviewed by lunar experts such as Kuiper and Ewen Whitaker at the Lunar and Planetary Laboratory in Tucson.

NASA approved of the maps and soon increased the lunar area to be covered. The number of ACIC staff grew, reaching a maximum of 18 by 1966. This larger staff required more office space and additions were made to the ACIC building, ultimately resulting in a new wing added in late 1964. While the original ACIC office is gone, the newer wing has been refurbished and today is known as the Hendricks Building and serves as the headquarters for the Discovery Channel Telescope.

ACIC’s expansion also resulted in the need for another telescope for making lunar observations. In 1963 Observatory director John Hall and trustee Roger Putnam arranged to purchase a 20-inch Tinsley refractor from Texas oilman Benjamin Morgan. After the telescope was moved to Flagstaff it was dedicated on April 15, 1964 and used by ACIC observers until the end of the program.

The ACIC office operated at Lowell from 1961 through 1969. During this time, staff produced drawings for more than 60 lunar charts. Also, thanks to the efforts of cartographer Jay Inge, ACIC developed a 16-inch lunar globe. A highlight for many of Lowell’s ACIC staff was the 1963 visit by the second group of NASA astronauts, the “Next Nine,” which included America’s first space walker Ed White and future moonwalkers Neil Armstrong, Pete Conrad, and John Young.

Today the Observatory still possesses many of the ACIC’s maps, drawings, and other documents. With the help of librarian Lauren Amundson, her legion of volunteers (including Winston Fredrickson, pictured), and a proper storage facility, they will remain an important record of Lowell’s contributions to fulfilling Kennedy’s quest.

During the astronauts’ January 1963 visit to Lowell Observatory, Lowell staff briefed them on the Observatory’s efforts to map the moon and Mars. Here, Neil Armstrong (standing at far left) and Tom Stafford (sitting at far right) look on as Lowell astronomer E.C. Slipher points out features on a Mars map.

Flagstaff Festival of Science
In September, Lowell hosted 10 Flagstaff Festival of Science talks, such as Dr. Kim Herrmann’s “Wonders Beyond Our Solar System.” Topics of other talks held at Lowell (and given by local scientists) included giant sloths, Joshua trees, turtles, volcanoes, Mexican wolves, climate change, and the Mayan calendar. Especially interesting to locals were presentations about northern Arizona’s 2010 tornado outbreak and the Schultz Fire, which has caused continued flooding events on the eastern edge of Flagstaff. Each of these presentations attracted approximately 400 attendees. Thanks to outreach manager Kevin Schindler for his efforts organizing the Festival and these events.

Eyes on the Mountain
continued from page 1
night sky. Also, the view across southern Arizona and into Mexico is breathtaking at dusk. “That’s one of the great things about being an astronomer: you get to be in beautiful places at sunset and sunrise,” explains Dr. Hunter.

As Zhang got started, he gauged the “seeing,” or measured image sharpness, in the field surrounding the first galaxy he wanted to observe and crafted a tentative script, or game plan, for the rest of the evening. A band of clouds loomed large, with the telescope operator and Zhang estimating that it would pass by around midnight. (The 4-meter operator is the “head of the hill” for the night, bearing responsibility for shutting down operations if the weather gets bad.) With this added impetus, Zhang gave the operator coordinates and so the observing began, using the FLAMINGOS* instrument. The Mayall makes unseen, somewhat ominous noises as it is slewed into position. It took about 20 minutes to execute each automated observing script, leaving time to keep a close eye on the weather. Each surrounded by no less than five screens, Zhang and Dr. Hunter monitored a multitude of data streams in real time. Even so, the cloud band arrived at 7:30 p.m., having gained speed over the Sea of Cortez. The disruption was temporary but affected the quality of at least one set of images. The issue of ongoing concern was focus, as it required keeping an eye on the truss temperature, the best gauge of the telescope’s temperature. The temperature proved fickle so finding the proper focus was a constant task.

After a quick visit to the ice-cold restroom and a walk around the dome’s indoor panoramic walkway for a complete view of the night sky, it was time for “night lunch,” or the meal astronomers eat in the middle of the night: oatmeal for me, sandwiches for Zhang and the operator, and soup for Dr. Hunter. After midnight, Dr. Hunter declared that it appeared the script was working perfectly, which she did not say lightly after Zhang’s unsuccessful observing runs earlier in the 2011. First, a run with the Mayall was cancelled when cracks were found (and subsequently repaired) in the dome; this lead to a “generous allotment” of time when Zhang reapplied, said Dr. Hunter. Then, she went to Chile to use the Blanco but no observing was possible on any of the four nights. Finally, a remote observing run from Tucson to utilize the Blanco, as well as this run, proved successful, though the data from these runs was not included in the special session regarding LITTLE THINGS held in Austin, TX at the 219th meeting of the American Astronomical Society in January.

As the weary hours of the night came and went without further glitches, a silent sense of success imbued the room. As the glow of dawn approached, Zhang completed his script and began copying the data. All this time, Dr. Hunter exhibited her trademark mentoring skills, both with Zhang and with a German researcher who wanted to sit in on the evening’s observation in preparation for her first observing run with the Mayall. From a novice’s point of view, the grandeur and privilege of observing with the Mayall was sealed with a classic orange-pink sunrise that did not fully explode with color until my overstimulated mind was futilely trying to fall asleep in the dormitory.

*LITTLE THINGS: Local Irregulars That Trace Luminosity Extremes and The HI (Neutral Hydrogen) Nearby Galaxy Survey

*FLAMINGOS: Florida Multi-object Imaging Near-IR Grism Observational Spectrometer, a wide-field infrared imager and spectrometer in use since 2001 and built by the University of Florida, in cooperation with NOAO.
Honoring a Legacy
by Tom Vitron

Hailing from the Midwest, David and Stacy Lerner (pictured above) discovered Lowell Observatory while visiting northern Arizona for pleasure. An organization development consultant and executive coach, David became a friend of Lowell; in 2008, he became a member of the advisory board on which he served until his passing in April 2010 of metastatic prostate cancer at the age of 45. “David always enjoyed his connection to Lowell and felt very much a part of that community,” recounts Stacy. “Before he passed away, he and I discussed the importance of me staying connected to Lowell and his desire that I continue to support programming and the mission of the Observatory.”

Though she had not been as involved with Lowell as David, Stacy did attend the June 2008 advisory board meeting and felt a strong tie to the place. As a physical therapist for nearly 19 years, Stacy specializes in working with infants and children with developmental and neurological impairments. “Given my strong science background in medicine, I felt connected to the work of Lowell and especially appreciated their desire to educate children about science and astronomy,” says Stacy. Recently, she spoke with development manager Rusty Tweed about supporting Uncle Percy’s Adventures in Space and doing so in memory of David. “Since his death, I have been trying to find impactful ways to honor his memory and felt this programming would greatly benefit many children throughout the U.S. and provide all children equal access to this type of education, all things that were important to David and are very important to me,” explains Stacy. “This program feels very in-line and consistent with those ideals.”

While the rollout of Uncle Percy is coming soon, the bonds and feelings that tie the Lerner family to Lowell continue to grow stronger. “It means so much for me to honor David’s life and values in such a small way through the great work of Lowell,” says Stacy. “My connection will always be strong and I am grateful for the opportunity to continue to support Lowell.”

Video Updates
Since August, we’ve been sending video e-mail updates to our Friends, keeping you abreast of observatory news and research updates in an engaging and appealing fashion. We hope you are enjoying these videos. If you are not receiving the updates, please subscribe by sending an e-mail to constantcontact@lowell.edu with “SUBSCRIBE” in the subject line.

DCT Agreements
As testing and commissioning of the Discovery Channel Telescope (DCT) continues, Lowell Observatory recently announced the first two partnership agreements for use and instrumentation of the telescope. First, Boston University (BU) signed a long-term agreement to become a partner for the DCT. The agreement in perpetuity grants BU astronomers use of the world-class, four-meter telescope for 40 or more nights each year. BU will pay $10 million divided into one-year installments during the next decade, most of which will go toward the University’s perpetual-use share of the DCT. Thereafter, BU will pay roughly $500,000 per year for ongoing operating costs for its share of both the DCT and Lowell’s telescopes on Anderson Mesa. BU is second only to Discovery Communications and Discovery founder John Hendricks in its contribution to the DCT project, and the only Lowell partner to have opted for a long-term use investment in the facility. In 1998, the Observatory and BU formed a partnership to share in the use and operational costs of the Perkins Telescope, along with Georgia State University. In addition, the University of Maryland (UMD) signed a five-year agreement for use of the DCT, including development of an instrument for the telescope. UMD will pay $450,000 per year for five years. Talks with other potential partners continue. (Photo credit: Len Bright)
Captain Stewart
by Tom Vitron

You don’t need to be an astronomer with an array of telescopes to know that we live on a relatively small planet. When United States Navy Captain Paul Stewart encountered Lowell trustee Bill Putnam at a space-related gathering a half-decade ago, what seemed to be a serendipitous run-in soon turned out to be the starting point for a strong professional relationship. Bill’s daughter Erica and Capt. Stewart’s sister were best friends in high school in Longmeadow, MA. Capt. Stewart, a space cadre officer, oceanographer, and the Commanding Officer of the Naval Research Laboratory since 2008, is now an advisory board member and technical advisor to Lowell. Though he knew about the Observatory when he was younger, Capt. Stewart’s first exposure to the ongoing relationship between the Navy and Lowell came when he joined the Office of Naval Research in 2005.

Located on Anderson Mesa, about 12 miles southeast of Flagstaff, the Navy Optical Interferometer (NOI) is the result of a collaborative effort between the U.S. Naval Observatory (USNO), the Naval Research Laboratory, and Lowell Observatory. Capt. Stewart “cherishes” mutually beneficial relationships such as this one that allow the government to work with academic and research institutions. NOI is a specialized astronomical telescope capable of producing extremely detailed stellar images. Instead of a single telescope, an array of telescopes spanning one-third of a mile collects and precisely directs beams of light from a star to a complex set of beam-combining optics, creating a high-resolution image equivalent to the combined spread of the telescope array.

The array’s recent renaming – from the Navy Prototype Optical Interferometer (NPOI) to the NOI – marks the beginning of the next chapter in the instrument’s history. As plans for expanding the telescope array are being pursued, the potential future of the Lowell-managed NOI is coming into focus. “We are keen to upgrade the NOI,” says Capt. Stewart. “The bottom line: we need to find the money to make this go forward.” The addition of interferometry expert Dr. Gerard van Belle to the Lowell staff “excites the Navy,” says Capt. Stewart. “He has the vision on where the NOI can go.”

As an advisory board member, Capt. Stewart’s concerns for Lowell go beyond just the NOI. He feels the Observatory’s strong leadership bodes well as the DCT era begins in earnest. “There is very real interest in the DCT,” says Capt. Stewart. “It will open up even more partnership avenues for Lowell.”

Volunteer of the Year: Richard Comnick
by Tom Vitron

Chemistry is at the heart of Lowell, be it chemical reactions inside celestial objects or finding the right mix of employees and volunteers. Volunteer of the Year Richard Comnick is no exception. After growing up in the small farming community of Lakefield, MN, Rich translated his interest in the composition of chemical substances into chemistry degrees, culminating with a PhD in organic chemistry from the University of Nebraska. He then worked as a Chemical Information Analyst for Chemical Abstracts Service (CAS) in Columbus, Ohio. There, Rich maintained the CAS Registry, the most comprehensive collection of disclosed chemical substance information in the world, according to him. “[The CAS Registry] contains more than 60 million unique organic and inorganic substances, and more than 62 million sequences,” explains Rich. “I mainly worked in the organic synthesis and natural product sections, being responsible for the content of abstracts, concept indexes and registry indexes.” Rich retired in 2006 after 36 years at the company.

Shortly after, he and his wife, Claire, moved to Flagstaff to be near their only daughter and her family in Prescott. “This move also fulfilled our desire to live in a western state,” says Rich, who loves hiking, skiing, travel, and photography. Intent on pursuing volunteer work once settled, Rich happened to meet advisory board member Sue Durling while hiking up O’Leary Peak, northeast of Flagstaff. Sue encouraged him to volunteer alongside her at the Observatory’s library. Soon, Rich was using his skills to scan and index the historical logbooks, starting with the

Continued on page 7
Continued from page 6

1894 books. “Many of Percival Lowell’s logbooks, containing both his observation notes and drawings, were about 100 years old, and the pages were yellowed and brittle,” recounts Rich. “It was difficult to interpret his handwritten notes, especially those describing the regions and markings on Mars referred to as canals by Lowell and others.” Putting in many long hours, Rich recently completed indexing Percival’s observations of Jupiter’s satellites, which were recorded only two days before Percival’s death. “It was meaningful to me to index his final notations,” says Rich, who also worked on the logbooks of A.E. Douglass, William H. Pickering, and Vesto Slipher. Rich finds volunteering at Lowell rewarding, both in educating him about historical astronomy as well as working with great people, like librarian/archivist Lauren Amundson and development officer (and former librarian) Antoinette Beiser.

Though Rich took home the prize - and deservedly so - we’d like to thank all our volunteers for their hard work and dedication to Lowell in 2011. We couldn’t do it all without you! 😊

Employee of the Year

Congratulations to Robin Melena on being named the 2011 Employee of the Year! Robin took on the challenging role of deputy director for operations during a very busy time. She is now looking forward to returning to her accounting duties as newly hired deputy director Kay McConagha takes the operations reins.

ARRIVALS
Diana Weintraub, Retail Specialist
Lisa Foley, NOI Observer
Kay McConagha, Deputy Director for Operations

DEPARTURES
Peggy Landau, Retail Specialist

TIME World’s 100 Most Important Places

TIME recently named Lowell Observatory one of the world’s 100 most important places in a special collector’s edition. The Observatory is listed in the “Places of Inquiry” section, alongside such iconic places as the Galapagos Islands, the Royal Observatory, and McMurdo Station, to name a few. We are humbled and thankful for the recognition!

School’s Out & Kids are Free
Monday, Feb. 20, 9 a.m. - 5p.m.

Enjoy family-friendly activities throughout the day, including science demonstrations, telescope viewing of the sun, tours of the campus and multimedia presentations. Kids can also complete a scavenger hunt for prizes. Sponsored by the Arizona Lottery. If your business would like to sponsor an event at Lowell, please call 928-233-3267 or e-mail tweedr@lowell.edu
2012 PUBLIC PROGRAM
WINTER SPECIAL EVENTS

Upcoming Flagstaff Nights: Weds. 2/1 & 3/7
Upcoming Star Fests: 5 p.m. - 9:30 p.m.:
Winter Sunday 2/19 & Spring Break Sunday 3/25

FEBRUARY

Regular Public Hours:
M/W/F/Sat   Noon - 9:30 p.m.
T/TH/Sun    Noon - 5:00 p.m.

SAT 18

Centennial Series at Lowell Observatory
(regular hours of operation) – This year we celebrate Arizona’s centennial
with a series of programs highlighting the unique contributions Lowell
Observatory has made to the scientific heritage of the state.

Tonight we celebrate the discovery of Pluto on this date in 1930.
At 7 p.m. Lowell outreach manager Kevin Schindler will present, “The Search
for Planet X”. Hear about the scientific and personal struggles that led to the
successful search for this tiny world.

MARCH

Centennial Series at Lowell Observatory
(regular hours of operation) – This year we celebrate Arizona’s
centennial with a series of programs highlighting the unique contributions
Lowell Observatory has made to the scientific heritage of the state.

Tonight we celebrate our founder Percival Lowell, born in March
1855. At 7 p.m. Lowell outreach manager Kevin Schindler will present,
“A Cultured Man of Science: The Life of Percival Lowell”. Hear about our
Observatory’s founder, a brilliant, passionate, controversial astronomer and
populizer of science.