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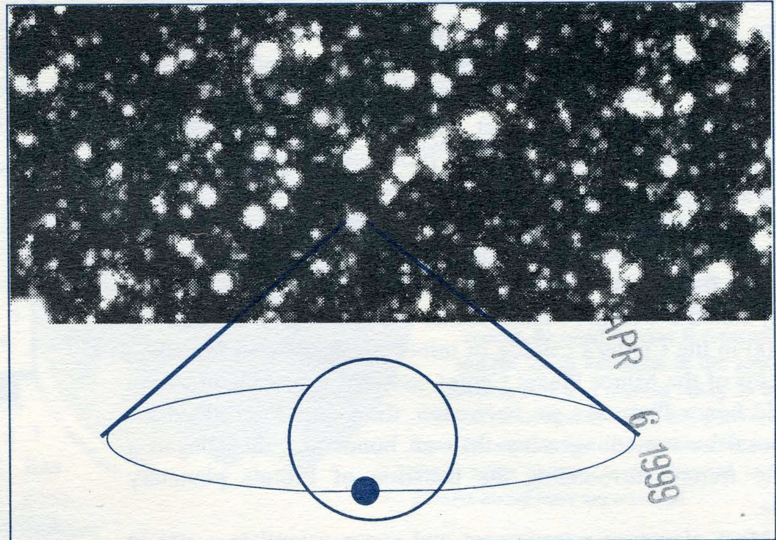
The quarterly newsletter of Lowell Observatory.

Extrasolar Planet Discoveries on the Rise

"One day with life and heart is more than time enough to find a world."
- Percival Lowell

Percival Lowell most likely had Planet X on his mind when he wrote these words, but the recent discovery of planets orbiting other stars has given it new meaning. As an astronomer at Lowell Observatory, I am involved in two separate projects designed to discover extrasolar planets. The technique that will be used in both cases depends on measuring the apparent drop in brightness of a planet's parent star when the planet passes in front of it – or transits – as seen from the Earth. A transit will only happen if the orbit of the planet is nearly edge-on, so it is necessary to monitor many stars in order to see a few that show transits.

A transit is the only way that the apparent size of an extrasolar planet can be determined, short of making a telescope or interferometer large enough to do the job. It is easy to understand how this works because the fractional change in the brightness of the star during a transit is equal to the fraction of the area of the star that the planet blots out. In addition, detection of several transits defines the "year" for the planet, which in turn defines the distance of the planet from its parent star, and that helps limit the possible temperature of the planet. It's amazing to think that it is possible to estimate the size and temperature of a planet that you cannot see orbiting hundreds of light-years away simply by staring intently at its star!



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The top part of this figure shows a small part of a planet search image. If we could miraculously zoom in on a star that has a transiting planet, we would see a little black spot move across the disk of the star once during every orbit. This is shown in the cartoon below the star field along with a thin curve showing the orbit of the planet.

The most productive technique to date for detecting extrasolar planets is the radial velocity method. This technique measures the tiny change in line-of-sight speed of the star that is caused by an orbiting planet. It gives an estimate of the mass of the orbiting planet, but not its size. If a given planet can be detected by both the radial velocity and transit methods, both the size and mass of the planet can be found. Therefore, its density can be estimated to determine whether it is a rocky world like ours, or a gas giant such as Jupiter or Saturn.

Ground-based transit searches will be successful only for larger

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Director's News

This column is the first of a series intended to be a regular feature of our quarterly newsletter. I plan to use this space to give you a behind-the-scene look at recent or pending happenings, either at Lowell or in the broader astronomical community.

In this issue, I want to talk about Pluto. You were all, I expect, witness to the recent media blitz regarding Pluto's status as a planet. In the papers, over the radio, and on television nationwide, it was announced that "astronomers" either had demoted, or were about to demote, Pluto from its previous status as one of the nine planets of our Solar System. In what seemed at the time a carefully coordinated sneak attack, a series of pundits opined learnedly that Pluto was not a planet because it was too this or too that, or because it was instead an asteroid, a Kuiper Belt Object, or a comet. Then, a couple of weeks later, having thoroughly riled up the professionals and confused everybody else, the International Astronomical Union (IAU) – the global association of astronomers – announced that Pluto was indeed still a planet. What in the world was going on here?

The fracas was started by a proposal to the IAU from an entity called the Minor Planet Center to assign Pluto the number 10,000 in the Center's catalog of minor planets. Brian Marsden, director of the Minor Planet Center, asserted that such an action would honor Pluto. As we have seen, the media interpreted his proposal as something other than an honor and thus began a public frenzy surrounding the question of Pluto's planetary status.

Most planetary astronomers and space scientists – not to mention NASA officials – were as blind-sided by this onslaught as was the public, and it took a few days to organize a response. But respond they did, and in force. The IAU and those individuals involved with the Pluto deliberations were the target of a barrage of e-mail. Perhaps more importantly, the governing committee of the Division for Planetary Sciences of the American Astronomical Society, the largest organization of solar system scientists in the world with over 1,000 members, issued a press release stating that the proposed IAU action was both harmful and without scientific merit.

To dampen the uproar, the IAU quickly announced that Pluto's status as a planet had never been at risk and that the ninth planet would not be assigned number 10,000 in the Minor Planet Center's catalog. Following that announcement, sporadic sniping continued but now seems to be waning as astronomers turn their attention to more productive enterprises.

So, you may ask, where does Lowell Observatory stand on all this? In our view, Pluto is indeed a planet, not because it was discovered here, but because with an atmosphere, a large satellite, and distinct surface markings, including polar ice caps, it more closely resembles the other objects we call planets than any other class of solar system body.

Pluto, in fact, may very well be the prototype of a new class of icy, outer solar system planet. Others as large or larger could well lurk in the region beyond Neptune. To that end, a team of astronomers from Lowell Observatory, MIT, and Ohio State has begun a search for distant solar system bodies using the Mayall Telescope at Kitt Peak National Observatory in Tucson.

Our group has found 20 new Kuiper Belt Objects, but nothing yet of planetary status. Stay tuned, however. If we find anything exciting, you will be among the first to know. ★

Bob Millis

~ Quote of the Quarter ~

"...he then showed that element of genius without which very little is accomplished, the persistence to follow up a clue."

On Giovanni Schiaparelli in The Solar System, by Percival Lowell

Extrasolar planets continued

planets - most likely those orbiting close to their parent stars. The recent radial velocity planet detections have shown that planets of this kind, sometimes called "hot Jupiters," are quite common. There are three main reasons that transits by "hot Jupiters" are relatively easy to detect. First, the transit signal is big enough to see in spite of the instability of the Earth's atmosphere. Second, "hot Jupiters" have short "years" of only a few days to a week or two, so transits happen often and last only a few hours – good conditions under which to observe. Third, they are so close to their parent stars that transits will happen even if the orbit of the planet is not terribly close to edge-on.

Happily, I have been approved to work on a ground-based search for transits by "hot Jupiters" under the auspices of the NASA Origins program. The program will be coordinated with similar searches to be carried out by colleagues Tim Brown of the High Altitude Observatory in Boulder, Colorado, and Bill Borucki of the NASA Ames Research Center. The searches will use CCD cameras attached to large, fast lenses to image crowded starfields in the Milky Way. With three stations to improve the odds against cloudy weather, we expect to discover several new planets in the next year or two – something our founder could have appreciated very much. ★

Ted Dunham, Lowell astronomer

Global Warming on Triton

Triton, Neptune's largest satellite, has been a puzzle to astronomers since its discovery in 1846. For one and a half centuries, even deducing basic details about its size and surface proved difficult. Then came Voyager 2's revealing flyby in August 1989. Based on that quick reconnaissance, we now realize that Triton is a wild place. Although the temperature there is only a few dozen degrees above absolute zero, numerous episodes of geologic activity have been written on Triton's icy face. Most remarkable are the dark plumes that were seen rising several kilometers from the surface before being sheared into invisibility by jetlike winds in the moon's thin atmosphere.

What sets Triton most apart from Neptune's other satellites is its highly inclined, retrograde orbit. This indicates that it did not form around Neptune – it was probably snared from the Kuiper Belt in the very distant past. Triton is also much larger and more massive than its satellite siblings, which allows it to retain its mostly nitrogen atmosphere. Unlike Earth's atmosphere, nitrogen molecules in Triton's are sublimating from the surface into the atmosphere at the same rate that they are freezing onto the ground, producing a state of vapor-pressure equilibrium. For a given temperature, there is only one surface pressure for which this equilibrium holds. Moreover, the equilibrium relationship between temperature and pressure is very steep: a temperature increase of only 1 degree Centigrade (1.6 degrees Fahrenheit) will approximately double the atmospheric pressure.

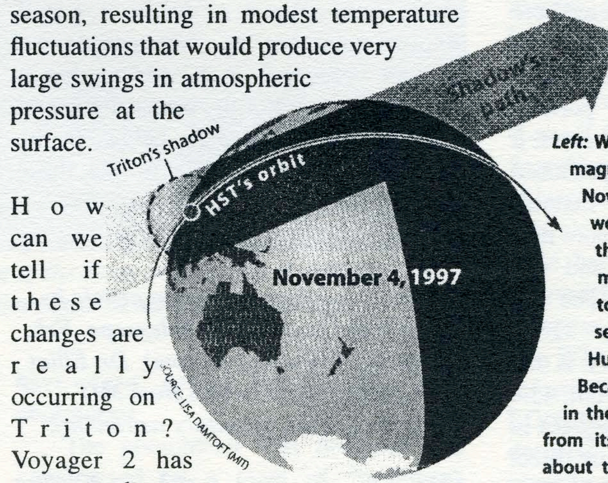
An atmosphere in vapor-pressure equilibrium exhibits two phenomena that we do not experience here on Earth. First, Triton's atmosphere can transport heat very effectively from the equator to the poles and from its sunlit side to its night side. When a molecule sublimates from sunlit frost, it removes some heat and the frost cools. This heat is deposited onto the shadowed side when the molecule recondenses. The result is that all the surface frost is at very nearly the same temperature.

A second consequence is that large changes in surface pressure can occur for small changes in the surface temperature. Because of orbital geometry and precession, Triton undergoes extreme seasonal changes over time scales of centuries. Depending on its properties, the surface might absorb very different amounts of sunlight with the changing season, resulting in modest temperature fluctuations that would produce very large swings in atmospheric pressure at the surface.

How can we tell if these changes are really occurring on Triton? Voyager 2 has come and gone, with no further spacecraft planned to visit Neptune and Triton, so we must rely on ground-based methods. Thermal emissions from Triton are weak, and the extreme seasonal geometry at present means that we can measure the radiation only from the Southern Hemisphere. These factors create relatively large uncertainties in establishing an accurate surface temperature. Using infrared spectroscopy we can detect subtle changes in the shape of nitrogen frost's absorption band, which is sensitive to temperature, but this method also has limited accuracy.

Another approach is to exploit the steepness of the temperature-pressure equilibrium relationship: a reasonably accurate measurement of the surface pressure will yield a very precise value for the equilibrium temperature. We can do this from Earth during a stellar occultation.

A stellar occultation works as such: a star's light enters Triton's atmosphere as parallel rays. The atmospheric density changes exponentially with altitude, causing the starlight to be refracted more at deeper layers and spreading out the parallel rays into divergent angles. An observer passing through this pattern sees the star dimming at a rate dictated by how fast the gas density changes with altitude. By carefully measuring the star's intensity versus time and by making certain assumptions, we can reconstruct the density, pressure, and temperature structure of the atmosphere.



Left: **When Triton crossed in front of a 10.6-magnitude star in northern Sagittarius on November 4, 1997, astronomers on Earth were ready. In this hypothetical view of the event as seen from Triton, the moon's shadow crossed Earth from left to right at a velocity of about 15 km per second. By good fortune it covered the Hubble Space Telescope in the process. Because HST was moving along its orbit in the same direction at 8 km per second, from its perspective the occultation lasted about twice as long as an observer on the ground would have experienced.**

In order to apply the occultation technique to Triton, we of course needed to find stars that this moon would occult. This proved to be a good project for the 24-inch refractor at MIT's Wallace Astrophysical Observatory. Then we had to carefully refine the relative position of Triton and the star to be occulted. The transit circle provided the most accurate astrometric information far in advance of an occultation. As the date of each event neared, Triton and the candidate star could be imaged on a single CCD frame. The most accurate astrometry came from the 61-inch reflector at the US Naval Observatory's Flagstaff station, an effort led by Amanda Bosh of Lowell Observatory.

Attempts to observe a Triton occultation took place on several occasions since the first effort in July of 1993, some with more success than others. After failed attempts to observe an occultation in November of 1997 with facilities in Hawaii, an excited call came from Edward Nelan, who had just

retrieved data from the Hubble Space Telescope (HST) pipeline. As project scientist for the Fine Guidance Sensor (FGS) at the Space Telescope Science Institute, he had taken a special interest in this unusual application for the FGS and had helped Otto Franz and Larry Wasserman, both of Lowell Observatory, and me to plan our HST observations. From these observations, we conclude that Triton is undergoing a period of global warming – in some ways analogous to the situation suspected here on Earth, but much more rapidly.

What caused this temperature increase over the eight-year period? Since Triton has neither cars nor cows, it can't be due to a biologically produced excess of greenhouse gases. Instead, Triton has somehow absorbed more heat than it has reradiated away, and this could be due to several factors. The first possibility, considered by John Stansberry of Lowell Observatory, is that the subsolar latitude moved from 45.4 degrees south in 1989 to 49.6 degrees in 1997. This shift has allowed more direct illumination of the southern pole, thus warming the polar cap slightly, accelerating the sublimation of surface frosts, and increasing the atmospheric pressure. Another possibility, proposed independently by John Spencer of Lowell Observatory and Candice Hansen of the Jet Propulsion Laboratory, and their colleagues, is that the surface frost patterns have changed since Voyager's flyby. Depending on what changes are occurring, either more heat has been absorbed or less reradiated than at the time of the Voyager encounter. Finally, it is conceivable that one or more of Triton's geysers have erupted, dusting the regional landscape with a dark veneer.

Our preferred explanation is the first of these hypotheses, increased insolation of the south polar cap, since it involves fewer assumptions. But we cannot rule out the other possible reasons. Triton's global warming may be part of a repetitive seasonal cycle or due to a recent climatic change.

In any case, we are just beginning the daunting task of understanding what must be a complicated interaction between the tenuous atmosphere and the surface frosts. In principle, "weather" on Triton should not be as complex as Earth's. We can count the influencing factors on one hand: clouds and hazes, solar activity, surface frost patterns, and seasonal changes in solar illumination. However, to solve this puzzle we need to probe the atmospheric structure whenever we can with stellar occultations. Unfortunately, occultation opportunities are becoming less frequent as Neptune moves away from the galactic plane. Of course, a more systematic solution will involve returning to Triton with an orbiting spacecraft that can provide a continuous record of the atmospheric and surface changes going on below. In the meantime, we will continue to seek those star-cast shadows, wherever they may fall. ★

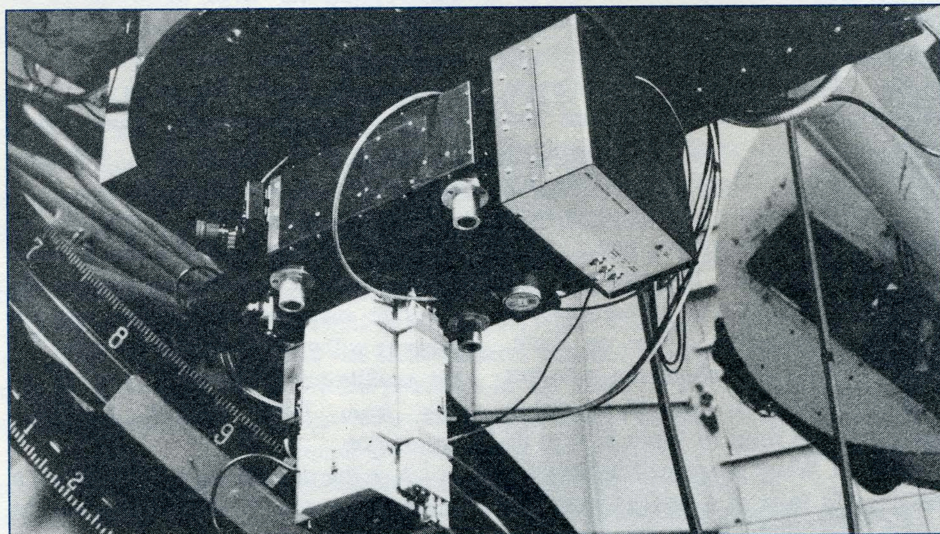
This story is adapted from an article by James Elliot from ***Sky & Telescope****, Feb. '99 edition (www.skypub.com). Dr. Elliot is on sabbatical at Lowell from MIT where he teaches planetary astronomy.*

Photometer Sheds Light on the Subject

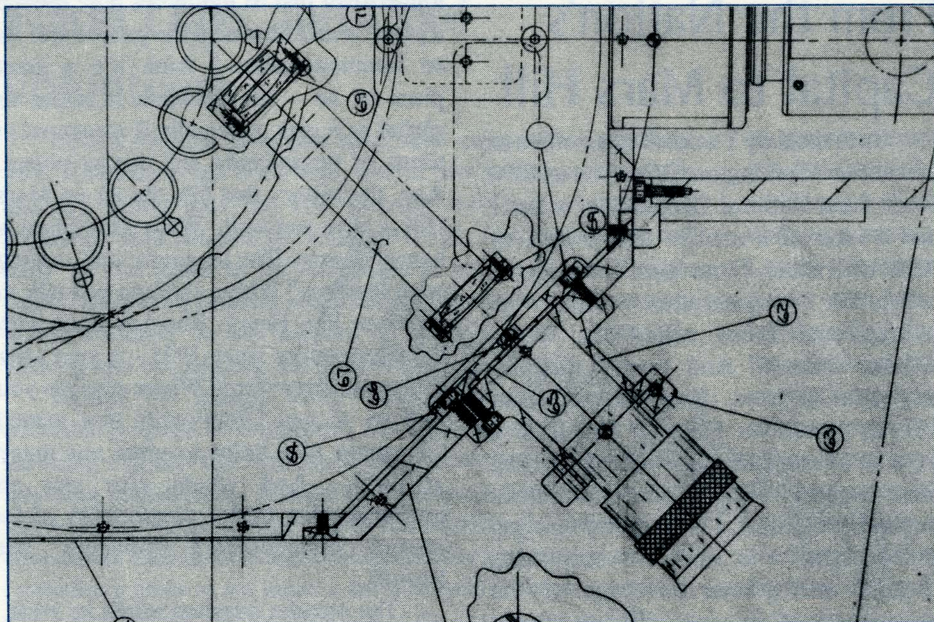
This winter saw the successful completion and first operational use of a new instrument at Lowell Observatory – the Kron photometer. The new instrument, designed to be attached to several telescopes at our Anderson Mesa observing site, is a major step forward compared to its predecessors of the past quarter century.

In its simplest form, a photometer consists of a light detector, which produces electric current in proportion to the amount of incoming light. This current is then amplified and measured for later analysis. Additional components include a series of apertures, from which one is selected to restrict the light to that of the object being observed. In addition, a series of filters isolates a particular color or wavelength of light from the object. Finally, the entire instrument must be "light-tight" to prevent stray light from reaching the detector, which is usually operated at sub-zero temperatures to minimize noise generated by the electronic components.

Used to make very precise measurements of the amount of light emitted or reflected by an object, such as a comet, the photometer has been a mainstay instrument at nearly all observatories since the middle of the century. In recent years, CCD cameras have largely supplanted photometers since they can provide measurements of the light from many objects within a single image simultaneously. However, photometers still play a vital role in certain circumstances. For instance, photometers can routinely yield higher-precision measurements than a CCD



The Kron photometer as it recently appeared on the 72" telescope at Anderson Mesa.



A section of Ralph Nye's intricate drawing of the Kron photometer. A dying art, the expert draftsmanship here shows the eyepiece seen in the photo to the left.

camera. For a variety of reasons, not the least of which can be attributed to the astronomers' comfort levels, the new photometer is motorized, which means it can be operated from the control room, relieving the astronomer from the need to spend hours in the cold working directly at the back end of the telescope.

A primary project for the Kron photometer is the continuation of our long-running program to study the chemical composition of comets. Begun in 1976 by Robert Millis and Mike A'Hearn of the University of Maryland, my own participation began in 1979 while a graduate student at Maryland. Using filters to isolate light emitted by several molecules, such as CN (cyanogen – a poison gas used in World War I) and OH (the "daughter" species that remains after a water molecule is split by ultraviolet sunlight), along with light reflected by dust particles, we can determine the number of molecules and the amount of dust in the head of a comet. These measurements can, in turn, be used to derive the chemical composition of the icy nucleus of the comet. Thus far, over 120 comets have been measured during more than 600 nights of observations, eight of which have seen action by Lowell's new photometer.

The photometer was designed and constructed by a team of "in-house" experts. Engineer Ralph Nye handled the overall design work, while astronomer Ted Dunham designed the optical components. Machinist Jim Darwin completed the metal work, and both Jim and Ralph assembled the mechanical components. Of course, we're nowhere without electronics, and those details were handled by Lowell's electronics expert, Rich Oliver. The photometer was brought to life by astronomer Larry Wasserman who wrote the software needed to remotely command the instrument from the control room. He also created the capability to automate some of the observing procedures.

Gerald and Katherine Kron, long-time supporters of Lowell Observatory, generously provided primary funding for the new instrument. Already the performance of the new photometer has been excellent, and its presence promises to help keep a few more astronomers warm through frigid winters' nights. ★

David Schleicher, Lowell astronomer

COMET DISCOVERED

In the early morning hours of Saturday, February 20, 1999, Shawn Hermann, an observer for Lowell Observatory in Flagstaff, Arizona, discovered a faint comet. Mr. Hermann, an undergraduate physics major at Northern Arizona University, was making routine observations using the LONEOS telescope at Lowell Observatory's facility on Anderson Mesa, southeast of town. The LONEOS (Lowell Observatory Near Earth Object Search) equipment is used to take images of large areas of sky in order to search for asteroids – both near-Earth asteroids and main belt asteroids – and comets. Dr. Edward Bowell, of Lowell Observatory, manages the LONEOS project.

When Mr. Hermann followed up on information from the computer at LONEOS that an unusual motion was detected, he confirmed the object visually, noting that the tail was visible.

The comet is reported to be 90 million miles from Earth and has a broad, short, fan-like tail with a length of 2.2 arcminutes (for comparison, the moon is 30 arcminutes across). A report of the observation was sent to the Minor Planet Center in Cambridge, Massachusetts, where it was confirmed as a discovery. Twelve hours later, Dr. Petr Pravec, an astronomer in the Czech Republic, confirmed the discovery. Another confirmation came from James V. Scotti at the Spacewatch telescope in Tuscon, Arizona.

After one week of further analysis, it was found that the new object is a short-period comet, which in this case means that it takes 13.4 years to make its trip around the sun. More is also known about its orbit, which crosses Jupiter's orbit and comes in as far as Mars and goes out beyond the orbit of Saturn.

The comet, officially named P-1999 D1 (Hermann), will reach maximum brightness in a year, so have your telescopes ready. ★

Cynthia Webster

Employee of the Year - 1998

At the holiday party this past December, the "employee of the year" was announced as is tradition at Lowell Observatory. This particular "employee of the year" is a person who in many ways holds things together at Lowell, for without his talent as a computer systems manager, we would all have a tough time communicating. Lowell is pleased to congratulate "our" computer whiz, Padraig Houlahan, as "employee of the year".

Padraig not only knows computers, he knows astronomy. Having received his Ph.D. in astronomy from the University of Texas at Austin, Padraig went on to two years of research in Austin, at which time he developed software for analyzing Giant Molecular Cloud spatial structure. From 1990 to 1995 he was a professor at Embry-Riddle Aeronautical University in Prescott. In 1995, he left Arizona for Oregon State University, where he was Systems Analyst. Here at Lowell, Padraig administers the computer and network infra-structure, which includes 30 SUN workstations, 30 Macintoshes and 20 PCs networked via Ethernet. To top it all off, he's pleasant to work with. And, says Bob Millis, Lowell's Director, he has a "willingness to help out, no matter how mundane the task".

With a background in theoretical physics and astronomy, Padraig is at home at the observatory. At any given moment he can be seen helping out astronomers with their computing needs or can be found in the business office lending a programming hand to the financial end of things at Lowell. I'll have the pleasure of working with the "employee of the year" on Lowell's website. And lucky for me, Padraig is a patient teacher. For the record, he doesn't consider himself a whiz, he says he's a "survivalist." Anyway, if all this gets to be too much, he can always fly away – he's a certified flight instructor and commercial pilot. ★

Cynthia Webster

From the Nation's Capital to Mars Hill

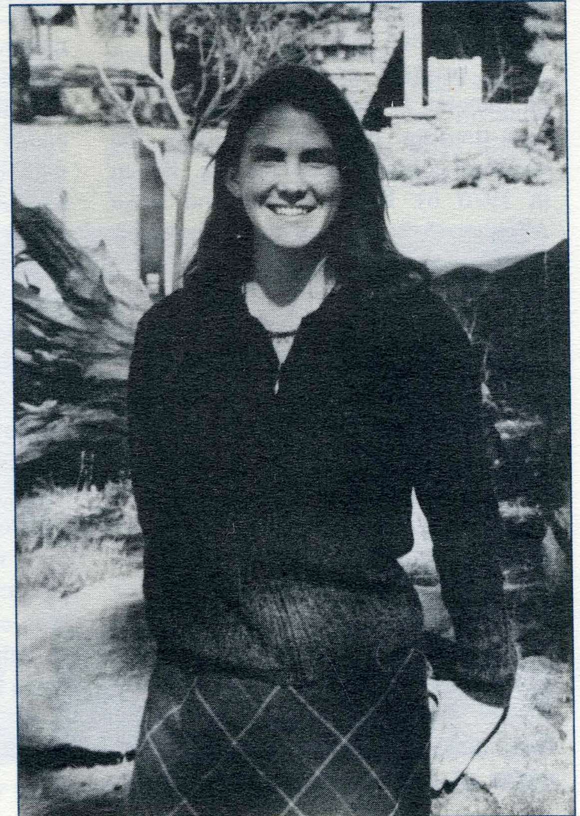
Until recently I worked in an office in downtown Washington, DC, about a half a block from National Geographic, where I had a view of a satellite dish owned by ABC television. From there I managed a non-profit organization with an international focus called the World Affairs Council. And there I happily stayed for 11 years. Now I sit atop Mars Hill in downtown Flagstaff and have a view of Mount Elden and the surrounding pine forest. And, as the new public information officer, I have a very new job ahead of me – to work on establishing broader and greater coverage of the observatory, its research, and educational programs.

As an undergraduate international relations major, I knew upon graduating from Duke University that I would gravitate to my birthplace – Washington, DC. I had a terrific job at the World Affairs Council from 1987 until 1998 and was especially honored to have been executive director of the organization from 1995 until my departure. Through the Council I learned a great deal about the world, foreign policy, and diplomacy. I was also given the opportunity to travel professionally to many countries, including Vietnam, Taiwan, South Africa, Morocco, Egypt, and the Soviet Union (when it was!) Although I lived in a city, I took advantage of the surrounding beauty through kayaking the rivers of Virginia and hiking the mountains (relatively speaking!) of Virginia and West Virginia.

So, what am I doing here at Lowell Observatory? Simple: upon moving here I kept my eye on the *Daily Sun* for listings of interesting jobs, got lucky, and found one. At the writing of this brief introduction, I have been working at Lowell for a little over one week. It doesn't take any longer than that to figure out how special a place is and how neat the people are. As an internationalist, I think it's a great place to be – the universe is about as global as it gets, especially if measured in terms of far-reaching and distant places. And, the history that fills the air on Mars Hill is alive and well. What other place is home to story-like longevity and cutting edge research? Where else can you talk to a person like Henry, who has been with the Observatory since 1931 – a year after Pluto was discovered? Where else can you find an ancient Observatory dog named Cinnamon who helps to greet our many visitors? And where else can an internationalist find a comfortable niche among astronomers? Nowhere but Lowell.

The broader question might be what am I doing in Flagstaff at all? I followed a physicist here and am now fortunate enough to also follow the stars. ★

Cynthia Webster



PUBLIC PROGRAMS

Warm Days and Cool Volunteers

Lowell's public programs have been enjoying an excellent year. Attendance has been high, due in part to Flagstaff's warm and dry winter thus far. The Saturday evening lectures have frequently sold out, and the solar telescopic viewing, carried out daily on the plaza on the campus side of the Steele Visitors center, has been a popular event during a time when the concrete would normally be too slippery to set up a scope. Although, viewing our hot, blazing sun does brighten up a chilly day.

Behind the scenes, Rusty Tweed, senior supervisor for outreach program development, has been working on a set of traveling exhibits that will accompany Lowell's popular Starlab traveling planetarium. Funded by a generous contribution from the Arizona Public Service (APS) Foundation, the exhibits will encompass such diverse topics as the interior structure of our Sun (something close to my heart!), the true spatial characteristics of the constellations, and the response of the human eye to differing levels of light. The exhibits are expected to be ready by the latter part of the current academic year when demand for Starlab peaks.

Lowell's tour guides have expanded their roles at the observatory as well. In addition to giving the daily lectures and tours, a number of the guides are working with the scientific staff on projects ranging from astronomical observing to analysis of images obtained with the Galileo spacecraft. The guides have a wide range of talents besides giving excellent and entertaining daily presentations. Bringing them into the scientific activities of Lowell Observatory is a win-win situation for everyone; the guides gain real-life experience in modern astronomy and can increase the effectiveness with the public because of this. And, the astronomers benefit from the work they do to keep the various research programs moving along. As the new director of public programs and an astronomer, I can say firsthand that this effort is an important step toward unifying the research and outreach sides of the observatory.

The public program has also taken on a new volunteer, Northern Arizona University student Bob McArthur, who has been an enormous help on the busy Saturday night programs. Bob and Flagstaff high school student volunteer Jennifer Winse are becoming a vital part of Lowell's public program, which we anticipate will strengthen as the busy summer months of 1999 approach. Who knows, maybe that's when we'll see a little winter! ★

Jeffrey Hall

MEMBERSHIP & DEVELOPMENT

Thank you Friends!

Thank you for supporting Lowell Observatory in 1998. You helped make it a very successful year, raising over $321,000 for Observatory operations, research, and education programs!

The Friends of Lowell Observatory are supporting our second Lowell Fellow, Dr. Sally Hunsberger (see newsletter article from Summer '98), who is pursuing her lifelong interest in astronomy after many years as a programmer and systems analyst. She adds an intriguing area of research to the Observatory, investigating dwarf galaxies.

Your contributions also supported our creative education programs, including the Lowell Observatory Outreach Program to Navajo and Hopi Schools. This program, along with our other award-winning public education programs, seeks to bring educational science activities back into the classrooms and encourage an interest in astronomy among young people.

Our membership grew by 18% and we are well on our way to our goal of reaching 2,000 members by the year 2000. As always, if you have comments or questions, please contact me at 520/774-3358, extension 213 or e-mail me at ferris@lowell.edu.

Thank you again for your loyal support! ★

Alice Ferris

Mark Your Calendar

Lowell Observatory Advisory Board Annual Meeting
Thursday-Saturday, May 20-22, 1999

Friends Dinner for Pluto Society, Lowell Associate, Trustee Circle and Corporate members
Saturday, June 5, 1999

Friends of Lowell Observatory Annual Open House for members at the $100 level and above
Sunday, June 13, 1999

Coming up...

VIP Mesa Tour
for Lowell Associate, Trustee Circle and Corporate members
Saturday, August 28, 1999

Friends of Lowell Observatory Colloquium Series
Fall 1999

Friends of Lowell Observatory Star Party (Phoenix area)
Fall 1999

Membership Coupon ~ Be a Friend!

Lowell Observatory, 1400 W. Mars Hill Road, Flagstaff, AZ 86001

Please send my friend membership information:

Friend's name:________________
Friend's address:________________
Friend's city, state, & zip:________________

My name:________________
My address:________________
My city, state, & zip:________________

Please upgrade my membership to the following level:

- ☐ $35
- ☐ $50
- ☐ $100
- ☐ $250
- ☐ $500
- ☐ $1,000
- ☐ $2,500
- ☐ other________

Help us keep you informed...

Many members are now relying on e-mail for quick and timely communication with the observatory. Please help us keep you informed by letting us know if you have a change of address, whether regular mail or e-mail.

If you would like to join our e-mail list, please contact Alice Ferris.

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Cinnamon White, pictured here in 1994.

Observatory Loses a Furry Friend

Cinnamon White, a cherished member of the Nat White family, made her first appearance on Mars Hill as a very young, scared puppy in 1983. She and her brother were discovered in the White's driveway hiding underneath the car. Following a brief period of consideration, Cinnamon became a member of the White and observatory family. (Her brother, meanwhile, caught the eye of a pet store owner and was traded for a bag of dog food!)

After sixteen years of chasing (and catching) squirrels, collecting sticks, and generally keeping a close watch over Observatory activities, Cinnamon was put to rest February 19, 1999.

Cinnamon is survived by canine friends Dottie and Lady McGlothlin, Hugo Spencer, and understudy BJ White. ★

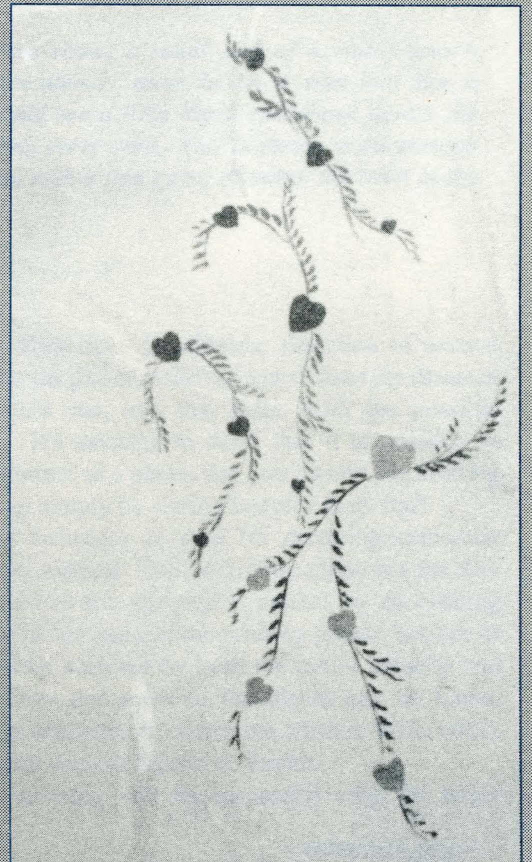
Charlie White

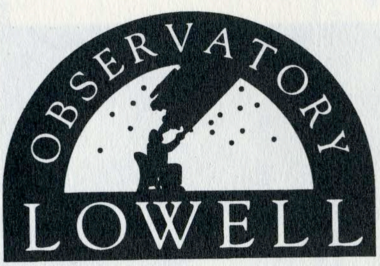
A Discovery on the Walls of Lowell

In 1950, a young couple moved into the apartment on the second floor of the Slipher building at Lowell Observatory. The couple, Ralph and Sylvia Shapiro of New York, shared this space with their first child and were known to keep water boiling in every room to help fend off the dryness of Flagstaff, which made it difficult for locals to visit for very long. Henry Giclas, a retired astronomer who was here at the time (and still is!), writes about the couple in his memoirs and mentions something special that was lost to time.

While Ralph, a meteorologist, was busy working on the atmospheric circulation theory and long-range weather forecasting, his wife, Sylvia, was exporting her talent as an artist to the walls of Lowell. Upon moving into the apartment, Sylvia quickly went to work on beautifying the cracks in the walls, adorning them with painted tree limbs, vines, leaves, flowers, and hearts. In his memoirs, Henry writes, "It has been painted over now, but it was quite artistic." The apartment, occupied this year by Jim Elliot, astronomer and MIT professor, recently showed its historic side when a furnace was removed after many years, revealing a little of what was thought to have been lost. The vines and hearts painted in the corner almost fifty years ago is the signature of someone who made Lowell her life for awhile. Although she did not continue her career as an artist due to the work of motherhood, Sylvia did leave a little behind for us all to enjoy. Now the corner – Sylvia's corner – is preserved. Thanks to the furnace – and now to those who care about what once was – this little bit of history at Lowell Observatory will not be painted over. ★

Cynthia Webster





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