

Astronomy education

A famous telescope turns 40

Bart Bok was a proponent of educating students about astronomy. He'd be happy to know that the telescope that bears his name is now used for both research and education.

by **Don McCarthy** and **David H. Levy**

In June 1969, after inspecting a photographic plate of globular cluster M13, then director of the University of Arizona's Steward Observatory Bart Bok enthusiastically announced, "Well, gentlemen, we have a telescope!" His statement declared the seventh-largest telescope in the world (at that time) operational. Forty years later, in 2009, the late Bok would have been thrilled to see teenagers from around the world using the same 90-inch instrument — now named the Bok Telescope — during the International Year of Astronomy.

Bok (1906–1983) taught at Harvard University for 28 years, but had to leave during the anti-communist purge of the 1950s. He went halfway around the world to build a great observatory in Australia; some years later he returned to the United States to repeat the achievement with Steward Observatory. There, a planned 60-inch scope became a 90-inch. When Bok spoke with Lee Hayworth, then head of the National Science Foun-

dation, regarding a proposal for a new telescope at Kitt Peak, Hayworth responded: "Bart, you know how to build observatories. You know how to run observatories. I'm going to turn the '6' upside down to a '9' and give Steward Observatory a 90-inch."

Despite Bok's international reputation as a researcher of the Milky Way and as a proponent of new technologies, he believed strongly in teamwork and in inspiring young people to reach for the stars. In the latter, he was ahead of his time and would have encouraged the use of his telescope for science education. This is precisely what the annual teenager Astronomy Camp programs do. Last summer, the camp brought some 50 students to live and work on Kitt Peak.

Educate the future

Since 1988, Astronomy Camp has engaged students ages 11 to 85 in the process of hands-on observation and research using modern observatory facilities. While most programs use the equipment at Mount Lemmon, near Tucson, Arizona, the teen camps in 2009 used facilities at the Kitt Peak. Many of the camp's staff members were once campers themselves and enjoy returning annually to inspire new students.

In 2009, during the weeklong Beginning and Advanced Teen Camps, 27 boys and 23 girls attended from 16 states, Spain, India, and Honduras. A few students were from the Tohono O'odham Nation of Native Americans, which has leased the Kitt Peak summit to the United States government for astronomy and education since 1958.

Bok was passionate about inspiring future astronomers. "Astronomers have responsibilities to attract promising young students into the profession," he



Bart Jan Bok, a prominent astronomer in the mid-1900s, would likely be happy to see the telescope with his namesake being used for astronomy education and outreach.

said, "and we should make special efforts to show them the fine opportunities that lie ahead." An experience like Astronomy Camp highlights authentic inquiry with a youth-centered, personal approach, and treats youth as colleagues rather than children. So, it's fitting that the Advanced Campers used the Bok Telescope throughout the week for astronomical research. The students used the original spectrometer, now equipped with a CCD detector, to research topics relating to comets, star formation, planetary nebulae, and galaxies.

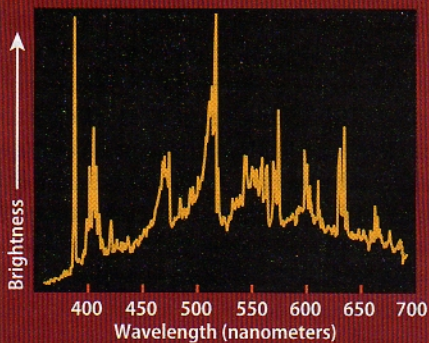
A night's observations

Bok had a special approach to observing that kept him focused and levelheaded: "When you are in an observatory at three o'clock in the morning, stop your photograph. Stop your photometer. Walk away from the telescope. Walk down the stairs. Walk out the front door. Now walk 20 paces — no more, no less. Then stop — and look up at the sky — just to make sure you are making bloody sense." So, during the camp on June 23, 2009, participants took a break from pure research for some eyepiece observing and to commemorate the 40th anniversary of the telescope's dedication.

Don McCarthy is an astronomer at the University of Arizona and the director of Astronomy Camp.

David H. Levy is an Astronomy columnist.

A comet's analysis



Advanced Astronomy Camp students analyze the characteristic light that an astronomical object emits, called a spectrum. The students obtained this spectrum of Comet C/2009 P1 Garrard June 23, 2009.

Astronomy: Kellie Jaeger after Anonymous

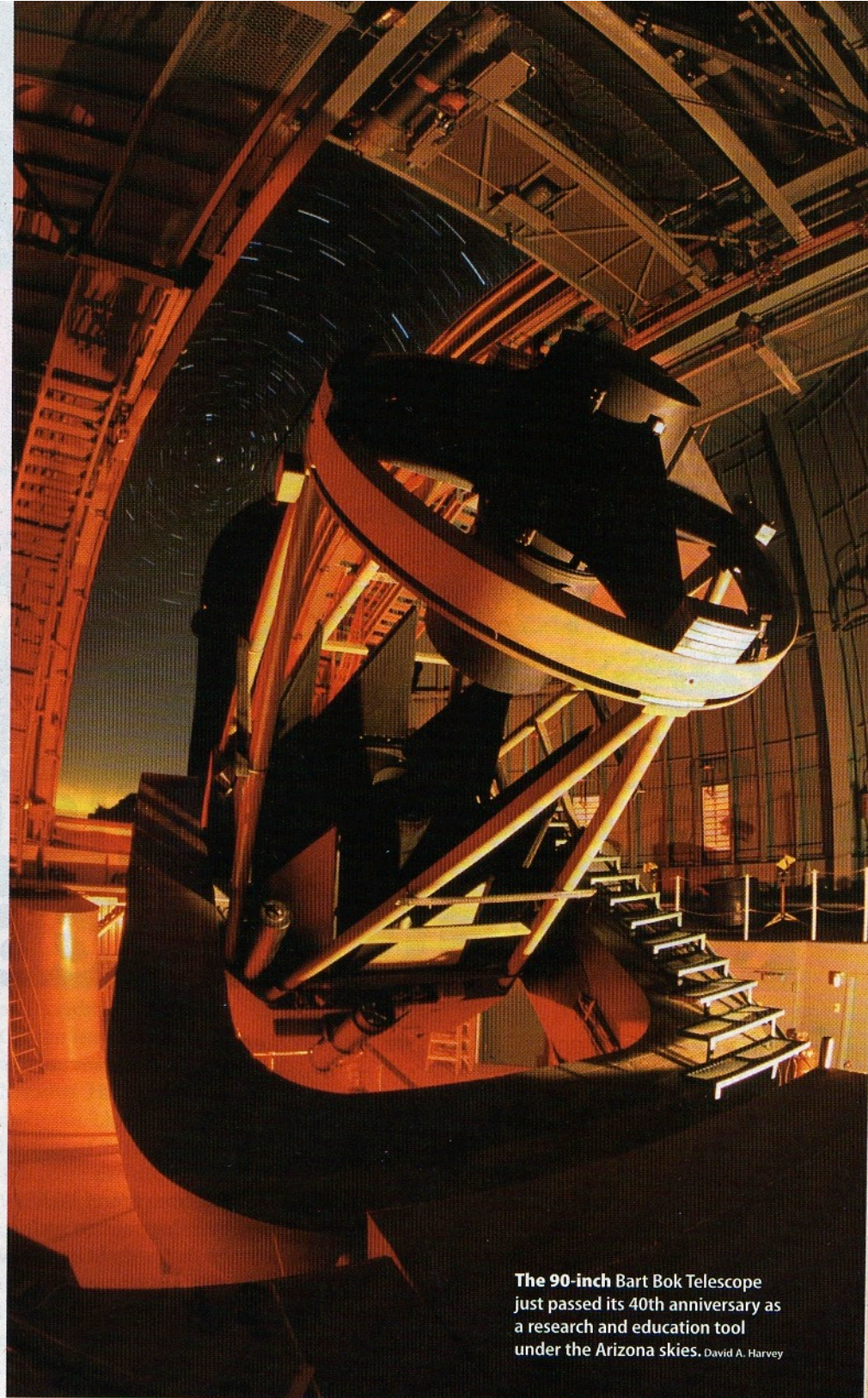
That night, David and Wendee Levy led the celebration. As Bok's biographer, David recounted stories of the telescope's "first light." For the observation of the M13 star cluster back then, researchers had to point it in declination by hand using ropes. Now, 40 years later, the entire group observed M13 again (but with computerized equipment), as well as Saturn.

While waiting for their turns at the eyepiece, campers assembled a few meters away on the outdoor "Bok Walk." In the words of camper Bobby Shely: "... the night was just an aspiring astronomer's dream come true — spending the night looking through a gigantic telescope at whatever we decided to point it at. When I wasn't looking through the 90-inch, I was on the Bok Walk, doing exactly what Bart Bok intended it for — taking a moment to just look up at the sky with your own two eyes and admire the sheer beauty of the stars."

At 9:21 P.M., screams and loud cheering erupted as a magnificent fireball meteor crossed the sky over the McMath-Pierce solar telescope to the southeast and cast shadows on the other domes as it exploded in the eastern sky about 70 miles away near Wilcox, Arizona. Student Ian Godwin recalls: "I saw it start from the corner of my eye, white, around 65–70 degrees at south-southeast. I turned to see it. By this time, it had turned kind of greenish-blue and was about 50° south-east. It exploded about 40° east-southeast, and about 6 pieces continued to fall until they faded out around 20° above the horizon, just south of the edge of Tucson. I do remember a kind of crackling sound, which I thought was impossible. ..."

This fireball produced the first known "falls" of meteoritic material in Arizona since 1912. To date, researchers have recovered about 10 pieces of chondritic stones. After analyzing numerous eyewitness reports, Carl Hergenrother of the University of Arizona's Lunar and Planetary Laboratory has suggested that this event might have been part of a previously suspected meteor shower (the "Corvids") moving at slow speed, about 7 to 11 miles/second (11 to 17 kilometers/second). Campers certainly will look for more meteors in the summer of 2010.

Still under the influence of the spectacular fireball, campers returned to the "Bok computer" to continue their CCD



The 90-inch Bart Bok Telescope just passed its 40th anniversary as a research and education tool under the Arizona skies. David A. Harvey

spectroscopy projects. They interrupted their work on extragalactic objects to observe Comet C/2009 P1 Garradd, whose spectrum revealed a complexity of interesting emission lines.

No doubt, Bok would be very happy and proud of the campers' observations

and research projects. Were he to gaze upon the teenage students he never met, he would indeed have said, "We still have a telescope." ☛

A+ Read how Bart Bok became interested in astronomy at www.Astronomy.com/toc.