

Vanderbilt Holdings

Collections and collectibles

Tools of the Trade

Vanderbilt's Garland Collection brings to life the nerdy glamour of 19th-century science. By MICHAEL SIMS

IF THE GARLAND COLLECTION OF Classical Physics Apparatus sounds like a quaint set of extinct artifacts—merely a dust-gathering historical footnote—consider a recent event. The scene is the Arthur J. Dyer Observatory, a small mountaintop haven operated by Vanderbilt astronomers and situated a few miles south of the University campus. The date is Wednesday, Oct. 29, 2003. On the deck of the observatory, under a sunny sky with only occasional clouds, sits a handsome glass box housing a brass implement that looks as if it has been borrowed from a museum. In a striking juxtaposition of past and present, a computerized camera is trained upon the instrument, streaming its image live on the Web. Viewers can interact with the camera and manipulate the zoom control for a virtual visit with a science instrument built in the mid-19th century, a seasoned professional tool that today is working alongside its 21st-century colleagues.

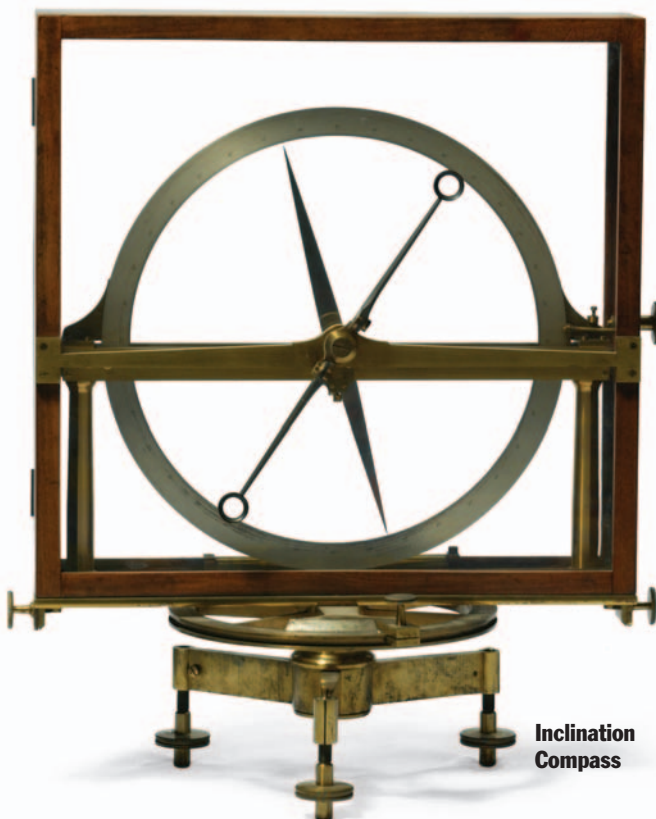
The instrument is an inclination compass, a large magnetic compass mounted on a brass tripod with adjustable legs. Its casing is a glass box about 16 inches square and 6 inches deep, in a beautiful walnut frame with tongue-and-groove corners and quaintly antique hook-and-eye closings on the sides. It is an elegant instrument

crafted for an elegant use. Because of variations in the Earth's magnetic field, magnetic force upon a compass needle will cause it to incline away from the horizontal to a varying extent depending upon location. This compass measures the amount of inclination.

The compass is in use today because Rocky Alvey, superintendent of the observatory, wants to know if this elderly instrument can successfully measure fluctuating magnetism. Also present are Rick Chappell, director of the observatory, and Arnold Heiser, emeritus

professor of astronomy. For several days solar flares have been disrupting the Earth's magnetic field. Only the day before, the sun flung into space one of the largest solar flares ever recorded. This morning Alvey took the inclination compass out of the display case and set it up outdoors to see if it would register disruptions of the magnetic field caused by the unusual solar activity. It turns out that the compass still works beautifully—as the video camera conveys to online kibitzers. Scientific instruments are always constructed with more care than household appliances, but it's a safe bet that not every instrument in use nowadays will function 13 decades from now.

This inclination compass, built in the mid-19th century, is one of 300-plus instruments in the Garland Collection of Classical Physics Apparatus at Vanderbilt University. As anyone who attended Vanderbilt knows, Landon C. Garland was the first chancellor of the University and its first professor of physics and astronomy. A walking advertisement for intellectual youthfulness, he had already reached retirement age before he launched his 20-year Vanderbilt tenure with the opening of the new school in 1875. Unlike most astronomers or physicists, Garland had the opportunity to design the curriculum for an entire newborn department. Immediately, he began



**Inclination
Compass**

acquisition of the diverse array of quality scientific instruments required to teach up-to-date courses in the hard sciences. Few first-class instrument makers existed in the U.S. at the time, and Garland journeyed to Europe to buy most of the equipment. He spent an astonishing \$40,000 (which would equal millions nowadays), and by the time his department held its first class, it was equipped with an arsenal of scientific instruments second to none in the nation.

Garland was an energetic teacher and administrator rather than a research scientist. In his youth he had written an article that declared astronomy to be not only the queen of the sciences but the only one that was already “perfect.” Other sciences, he maintained, still had some growing to do. But thanks to Newton’s law of gravitation, astronomy could already locate and predict the motion of every celestial object. All that remained, argued Garland, was to refine the calculations. Fortunately for his students and their intellectual descendants, like every other scientist who has ever predicted that his field had reached its zenith, Garland was wrong.

The collection’s name seems particularly apt. The word “garland” can refer not only to an adornment, but also (redundantly in this case) to a collection. And the Garland Collection very much adorns the history of science at Vanderbilt. It may be unscientific to phrase it this way, but the spirit of science, like the spirit of everything from Roman imperialism to Victorian repression, lurks in the artifacts of its era. Nothing brings to life the nerdy glamour of 19th-century science like the instruments with which its practitioners questioned the cosmos.

Thanks to the efforts of Robert T. Lagemann, we know a great deal about this collection of scientific instruments. Like Garland the century before, Lagemann, who retired as the Landon C. Garland Professor of Physics in 1977 (he died in 1994), was a man who found

the right job in life. Not only did he leave behind a record as an influential and affectionately remembered professor who created many of the texts he used in physics and astronomy, but he seemed to be enamored of every aspect of his profession.

He wrote the official history of physics and astronomy at Vanderbilt, *To Quarks and Quasars*. In 1983 he published *The Garland Collection of Classical Physics Apparatus at Vanderbilt University*, which he researched, wrote, designed and even typeset. The book is an impressive monument to human ingenuity—and to its author’s Herculean scholarship. In this exhaustive catalog, Lagemann explains the workings of everything from the inclination compass to Leyden jars

(a primitive electrical condenser). He describes antique wooden clamps and eyepieces for vanished microscopes. For each instrument or portion of an instrument, he denotes function, dimensions, gradations, even manufacturer’s information. The collection includes some prosaic implements, such as tuning forks and ear trumpets, prisms and balances, lodestones and voltmeters. But many sound exotic to the unschooled ear: a Cartesian Diver, a Hero’s Fountain, even a Jolly Balance. You can find a Phenakistoscope, which sounds like something Tom Swift would have invented but is actually a distant ancestor of the motion picture camera. Because its quick succession of images gives the illusion of movement, the name comes from Greek words meaning “to cheat the eye.” Many of the instruments carry the names of their inventors or improvers: Arago’s wheel, Quincke’s tube, Daniell’s hygrometer, Kater’s pendulum, Oersted’s piezometer. These names document one of science’s great virtues, and one reason why it is so successful: its multinational, cooperative approach (barring occasional rivalries, of course).

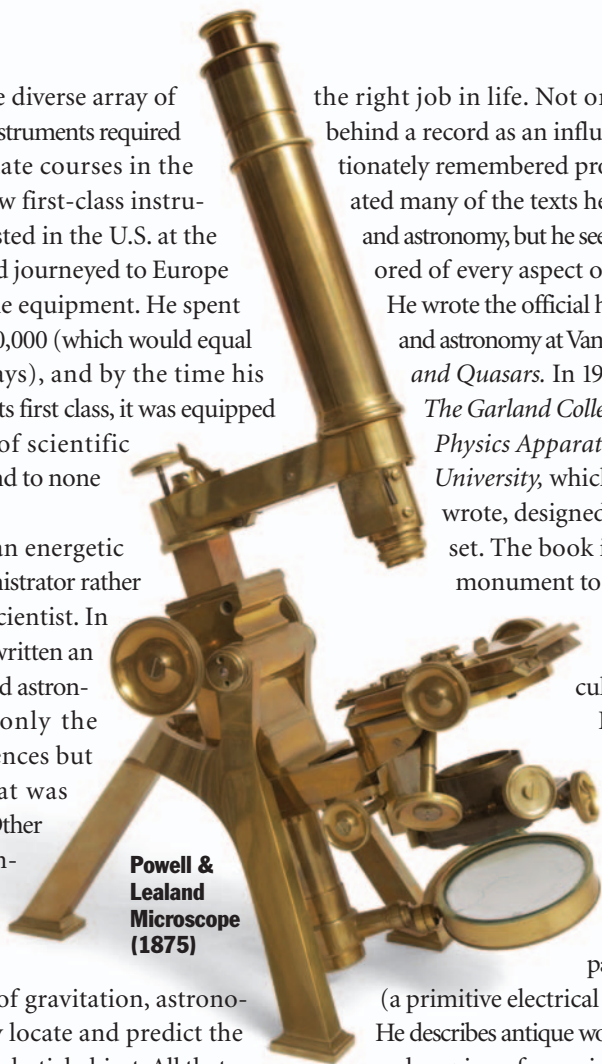
The Garland Collection remains a testament to the spirit of inquiry that defines a healthy university. Alumni and visitors will recall the many antique instruments on display in the halls of the science buildings over the last couple decades. Some of these instruments are now on display in the lobby and the library of the Dyer Observatory. Others are displayed in the departmental office, while some are currently in storage because of renovations. The display cases include other significant artifacts from the history of Vanderbilt astronomy: textbooks, a telescope and other materials used by Edward Emerson Barnard, who grew up in poverty during the Civil War to become the world’s most famous comet hunter.

The inclination compass, which performed so well alongside its newer colleagues, is not the only original Garland instrument still in use. On the 10th floor of the Stevenson Science Center, Vanderbilt astronomers continue to gaze through the 6-inch Cooke refracting telescope, although they call it the “Barnard telescope.” Like his reputation, Barnard’s name lingers on. It encourages his intellectual descendants to keep asking the universe to reveal its secrets. Fortunately for the human imagination, Landon C. Garland was wrong in his prediction about the future of astronomy. There is still plenty to learn.

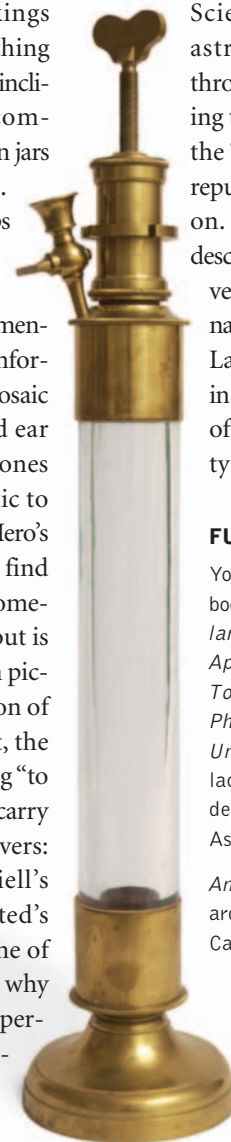
FURTHER READING

You will find more information in two books by Robert T. Lagemann: *The Garland Collection of Classical Physics Apparatus at Vanderbilt University* and *To Quarks and Quasars: A History of Physics and Astronomy at Vanderbilt University* (edited by Wendell G. Holaday), both available from the Vanderbilt Department of Physics and Astronomy.

Antique Scientific Instruments by Gerard L’E. Turner. Berkeley: University of California Press, 1980.



Powell & Lealand Microscope (1875)



Oersted's Piezometer