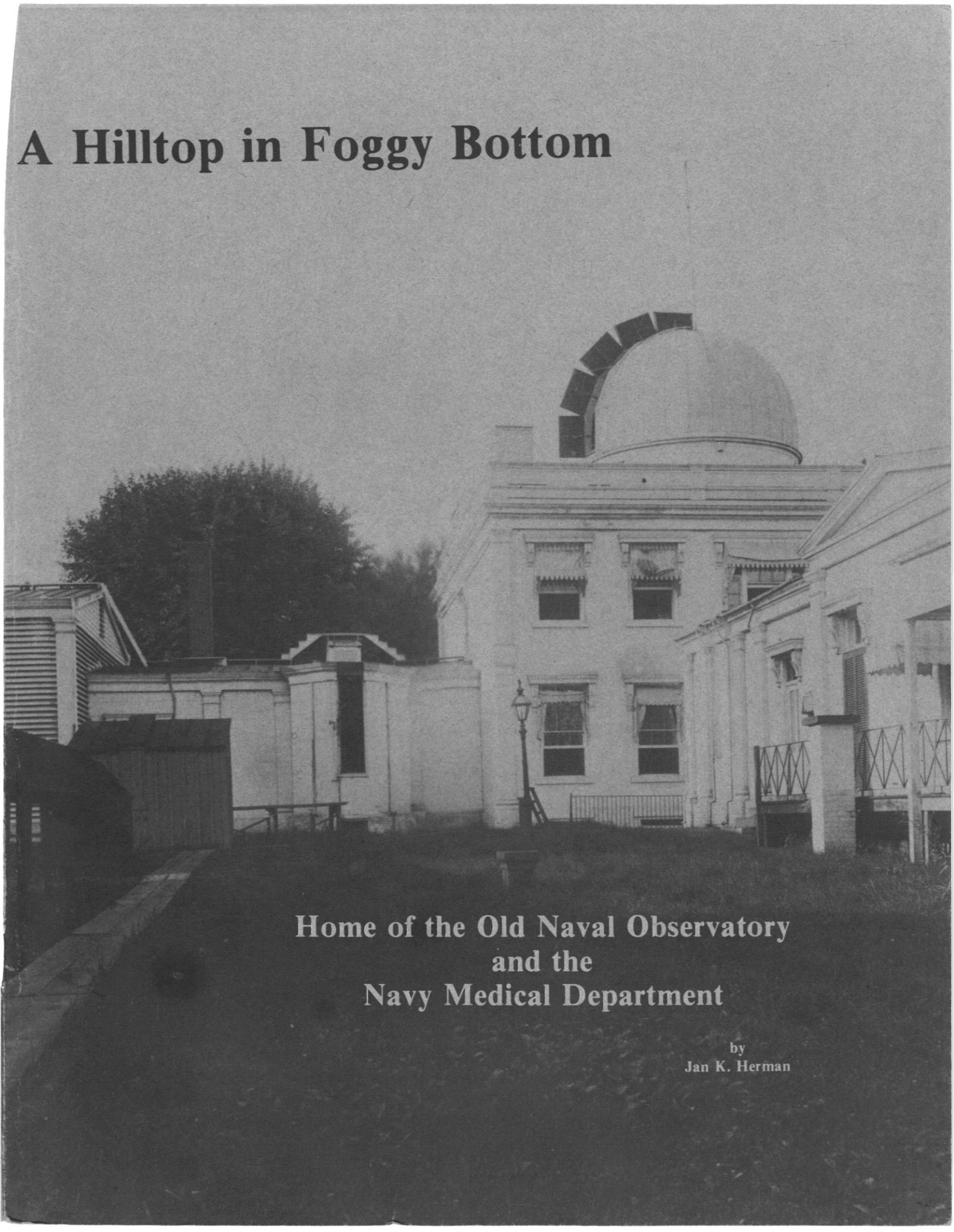
A Hilltop in Foggy Bottom



Home of the Old Naval Observatory and the Navy Medical Department

by
Jan K. Herman

COVER: The central dome of the U.S. Naval Observatory about 1885 with trapdoors of the 9.6-inch telescope observing shutter opened. Now Building Two of the Bureau of Medicine and Surgery headquarters in Washington, DC, this National Historic Landmark once was among the finest astronomical laboratories in the world.

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Navy Medical Department

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Jan K. Herman
Historian

Bureau of Medicine and Surgery
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Contents

Lighthouse of the Sky

The headquarters of the Bureau of Medicine and Surgery sits atop a prime parcel of Washington real estate overlooking the Potomac River and the city's marble monuments. At first glance, one could easily mistake the grounds for a venerable, old college campus—a quiet oasis plunked down in the middle of the bustling neighborhood called Foggy Bottom. Stately oaks that germinated in the mid-1800's shade a grouping of turn-of-the-century buildings and gardens.

The centerpiece is a two-story, cream-yellow brick structure crowned by a white dome that gleams in the afternoon sun. The bureaucracy has dubbed it Building Two and air conditioners now protrude from many of its aged windows. Yet there is a classical grandeur reflected in the Doric-style pilasters that decorate the front and rear facades.

The once three-chimneyed east wing is now minus its dark wooden shutters, and the finely turned railings that adorned the flat roofline are gone. But the wing still retains the look of the comfortable residence it once was.

Weathered, red, sandstone stairs, grooved by an endless procession of feet, and ornate wrought iron railings speak of a time when carriages rolled up the drive to pick up and discharge scientists and government dignitaries.

Building Two is indeed a relic from another age. From 1844 to 1893 this National Historic Landmark housed the U.S. Naval Observatory, the workplace of Navy scientists and mathematicians whose skill and perseverance made this institution one of the finest astronomical laboratories in the world.

Before the telescopes, transits, chronometers, and other instruments were moved to the Naval Observatory's present site on the heights above Georgetown, the men that labored here had left their marks.

As the Observatory's first Superintendent, LT Matthew Fontaine Maury, considered to be the father of modern oceanography, published among other works Wind and Current Chart of the North Atlantic, Abstract Log for the Use of American Navigators, *and* The Physical Geography of the Sea, *the first oceanography text. From his office on the first floor, he resigned in 1861 to join the Confederacy.*

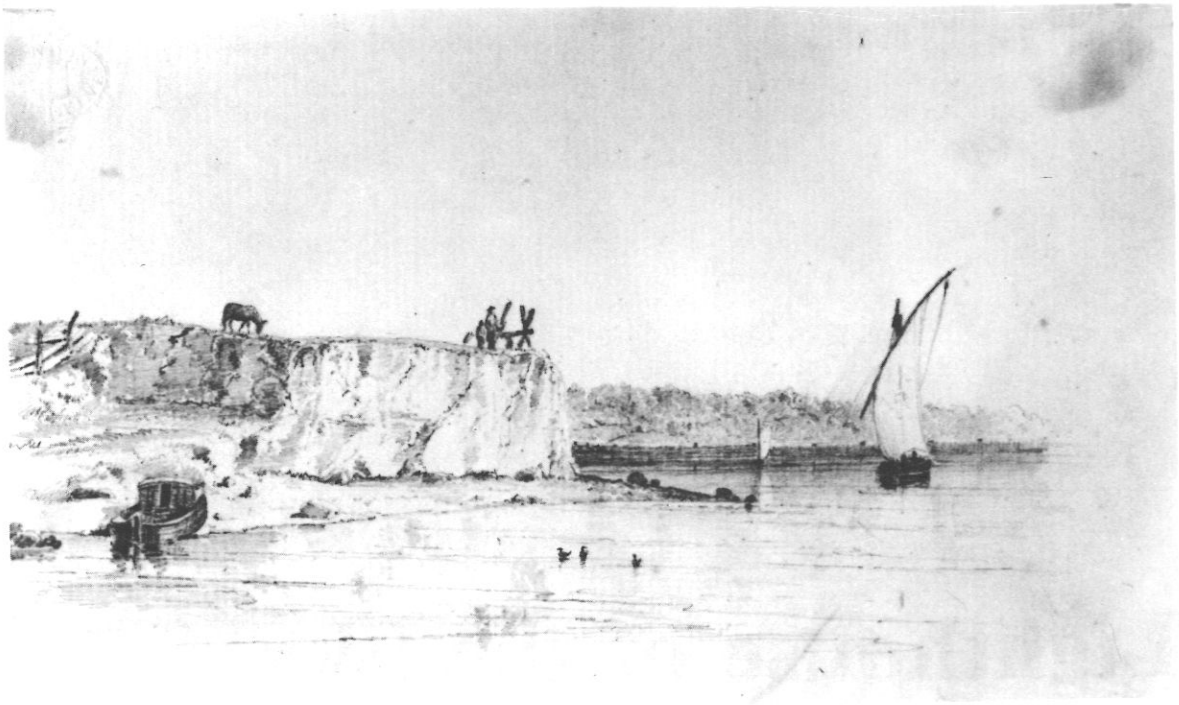
In the late 1840's Assistant Surgeon Alexander Y.P. Garnett attended the Observatory's officers. Dr. Garnett, like his patient, LT Maury, went South in 1861 and spent the Civil War years attending President Jefferson Davis as his personal physician.

Passed Midshipman John L. Worden, later skipper of USS Monitor, *began his naval career here learning the rudiments of astronomy and celestial navigation. A colleague of his, LT John M. Brooke, also saw duty at the Observatory. Later, as a Confederate officer, he would convert USS* Merrimack *into the famous rebel ironclad, CSS* Virginia.

There are the ghosts of tradition and the stories based on fact. One tells of a gaunt, melancholy, and war-weary Abraham Lincoln seeking a rare moment of solace studying the heavens through the Observatory's 9.6-inch telescope. And the story of another famous visitor—Emperor Dom Pedro of Brazil—whose royal wish was to observe the Moon through an impenetrable Foggy Bottom overcast.

There was the memorable August in 1877 when Professor Asaph Hall peered through the largest refracting telescope in the world at the time and discovered the two satellites of Mars.

Such stories and traditions are many and the significance and contributions of what John Quincy Adams termed "The Lighthouse of the Sky" are truly remarkable. Yet the history of Peter's Hill, Reservation Number 4, University Square, Camp Hill, and Observatory Hill, as this parcel has successively been called over the years, neither began when the Observatory was built nor ended when it moved 49 years later.



Boston Museum of Fine Arts

The bluff where Tiber Creek met the Potomac was seen on early maps as a likely site for a fort. When the Marines came to Washington in 1800, they bivouacked on Camp Hill while awaiting the construction of their barracks.

The Hill of Many Names

The hill upon which the Naval Medical Command sits today barely resembles the high point of ground that existed when the white men came to the Potomac Valley over 3 centuries ago. The river was wider then, unsilted and free-flowing as it passed the mouth of Rock Creek just below Georgetown.

It is likely that local Indians once came here to hunt and procure water; at least one spring was producing as late as the 1870's.

Humidity, the river's proximity, and the contour of the land all contributed to the frequent late night and early morning mists that not only gave the neighborhood its descriptive name —Foggy Bottom—but shaped the Hill's destiny as well.

The first evidence of ownership was a grant of 600 acres by King Charles II to John Longworth in 1664. The plot, known as the Widow's Mite, was later merged with another tract called the Vineyard and renamed Mexico. A town was planned for part of this holding by its owner, Jacob Funk, in 1768, to be called Hamburg, but Funkstown, as it became known, never materialized.

In March 1755 British troop transports sailed up the Potomac carrying two regiments of regulars. General Edward Braddock had come to America to do battle with the French and their Indian allies. His destination was the French-held Fort Duquesne in western Pennsylvania. On 12-13 April 1755, the Hill played a minor role in the unfolding drama as the redcoats and their arms were ferried the few hundred yards across the Potomac from Virginia to a rock on the riverbank.* Above it they bivouacked for the night. Three months later, General Braddock and half his men were to die in a forest ambush at the hands of their enemies.

Provincial LTCOL George Washington, one of Braddock's aides, escaped unharmed. Years later, President Washington, would have plans for the hill above "Braddock's Rock."

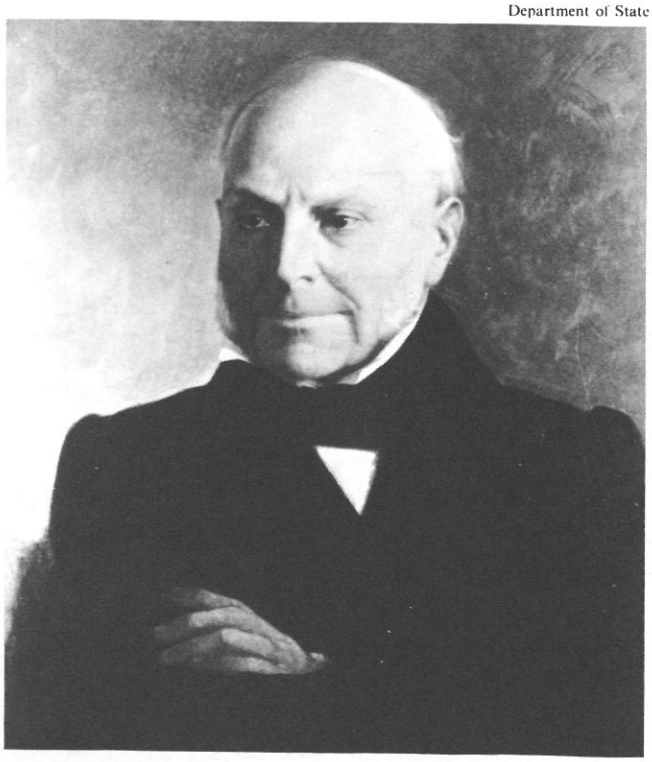
By 1790 the Hill belonged to Robert Peter, a Georgetown merchant with extensive property in the area proposed by George Washington to be the Federal City. Pierre Charles L'Enfant, French expatriate, Revolutionary War officer, and now master planner, began laying out the new national capital's wide boulevards, parks, and public buildings. Peter's Hill figured in these plans, for Peter and several other landowners deeded part of their holdings to the Federal Government "for the use of the United States forever." The area between 23rd and 25th Streets and between E Street and the Potomac River was designated Reservation Number 4.

How Reservation Number 4 would be used became a subject of controversy. Secretary of State Jefferson thought the high ground would be an

*There is no evidence that the British general ever set foot on this rock that now bears his name. All that remains today is a stone well on the eastern approach to the Theodore Roosevelt Bridge. Fifteen feet or so below the present grade is "Braddock's Rock" submerged beneath 20th century litter. That the river once reached this point illustrates how much of today's shore is filled land.

Three leading figures in the Observatory's early history

Department of State

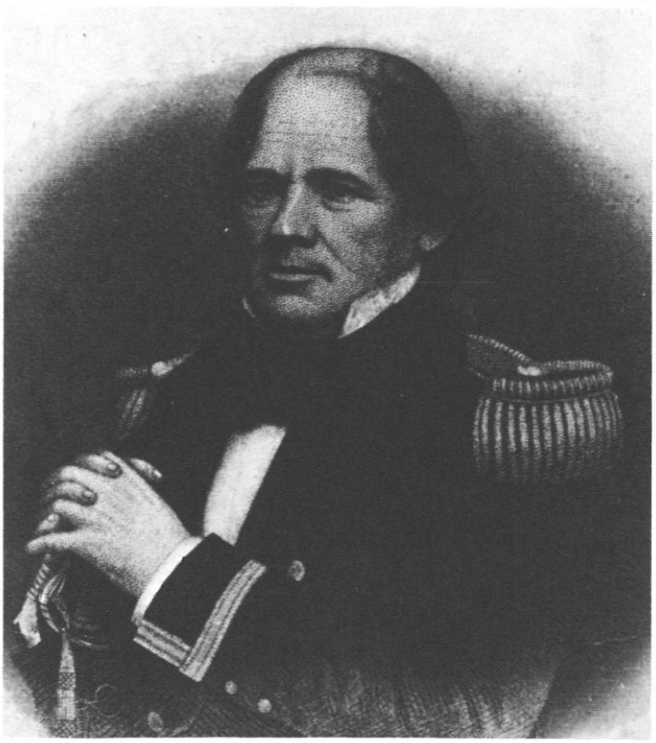


President John Quincy Adams, himself an amateur astronomer, lived to see his dream realized.

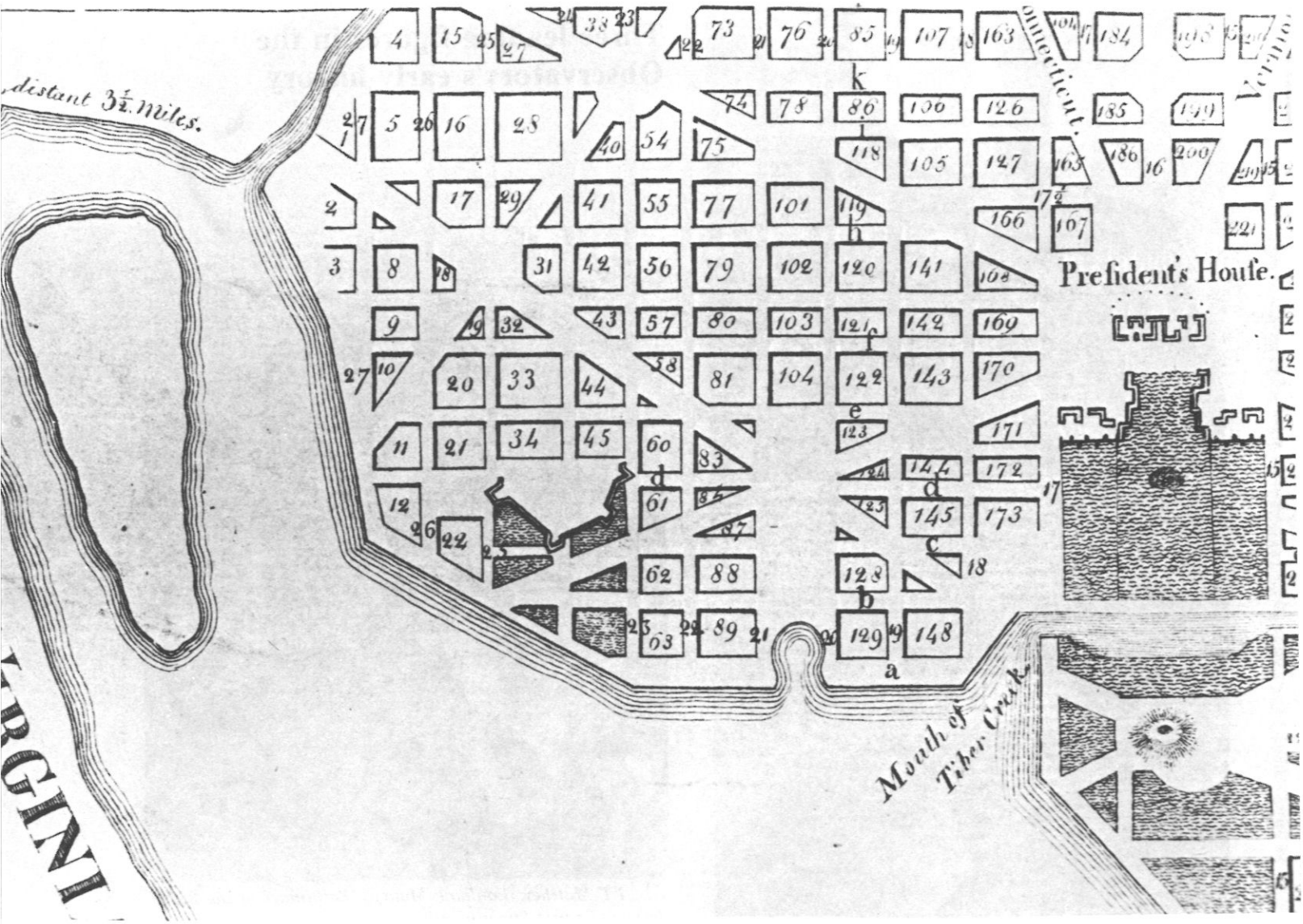
U.S. Naval Observatory

LT James M. Gilliss supervised the Observatory's construction, saw that it was furnished with modern instruments, and sadly watched as . . .

U.S. Naval Observatory



. . . LT Matthew Fontaine Maury, "Pathfinder of the Seas," became its first Superintendent.



This 1792 map shows battlements on the site of Reservation Number 4. L'Enfant had such an idea in mind when he laid out the District of Columbia, but there is no evidence that a fort was ever built.

ideal site for the National Capitol but L'Enfant had other ideas. Jenkins' Hill (Capitol Hill), the highest ground between the Potomac and Anacostia, was his choice and President Washington concurred. There were always foreign enemies to consider and Peter's Hill was not without value. Its position above the river gave it defensive possibilities. L'Enfant drew battlements on its summit.

On 18 Feb 1795 the Commissioners of the Federal City informed President Washington that they had chosen a site for what had been one of his favorite projects—the National University, a place he later wrote in his will "where the youth of our country may be able to free themselves from local prejudices and jealousies pregnant of mischievous consequences to our country."

Peter's Hill or University Square, as it was named on several maps, was the choice, but the dream never came true. By the turn of the 19th century, Reservation Number 4 reverted to what it had been before—a lightly wooded campground for soldiers and a trysting place for young lovers.

By the summer of 1800, the new, yet far from elegant Federal City was partially ready for business. From Philadelphia came the machinery of government and with it the Marines who landed at Tobias Lear's Wharf near the base of what was now called Camp Hill. There were no permanent quarters for the men and the Hill became their temporary home for 2 years until barracks were constructed in the southeast quadrant of the city. Their musicians entertained the populace on warm summer evenings. Anna Thornton wrote in her diary for 21 Aug 1800: "[we] . . . went on the Hill to hear the Band which was playing at the tents which are fixed on the Ground intended for an University."(*1*)

From 1811 to 1815 Captain Richard S. Briscoe's company 3rd Battalion, 1st Legion of Militia intermittently occupied the same ground and life there for a militiaman probably resembled the experience of most soldiers before and since. Tedium, mosquitoes, bad sanitation, disease, and poor discipline made life miserable both for the troops and their unfortunate civilian neighbors. Christian Hines, years later, recalled how he and his comrades eased their boredom by taking target practice on trees planted near the riverbank.(*2*)

In 1814, when the invaders L'Enfant had warned about were on their way to burn the President's House less than a mile away, Briscoe's citizen soldiers left Camp Hill to help head them off at what was a tragic American defeat near Bladensburg, MD.

The war ended, the soldiers went home, and Camp Hill/Reservation Number 4 again became an overgrown meadow on the western outskirts of a very desolate national Capital.

A Depot for Charts and Instruments

The quiet hilltop waited almost 30 more years before it claimed the U.S. Naval Observatory as a tenant. However, the establishment of that institution was never a foregone conclusion, having become mired in controversy and vicious partisan politics.

No one lobbied for an observatory longer or with more consistent fervor than John Quincy Adams. The former diplomat, Secretary of State, and now President was also a knowledgeable amateur astronomer. He recognized that the United States was years behind the European nations in astronomy and that the young nation's prestige was on the line. In his first State of the Union address to Congress in December 1825, Adams asked for an appropriation for the construction of an astronomical observatory. "It is with no feeling of pride as an American, that the remark may be made, that, on the comparatively small territorial surface of Europe, there are existing more than one hundred and thirty of these lighthouses of the skies; while throughout the whole American hemisphere there is not one."(*3*)

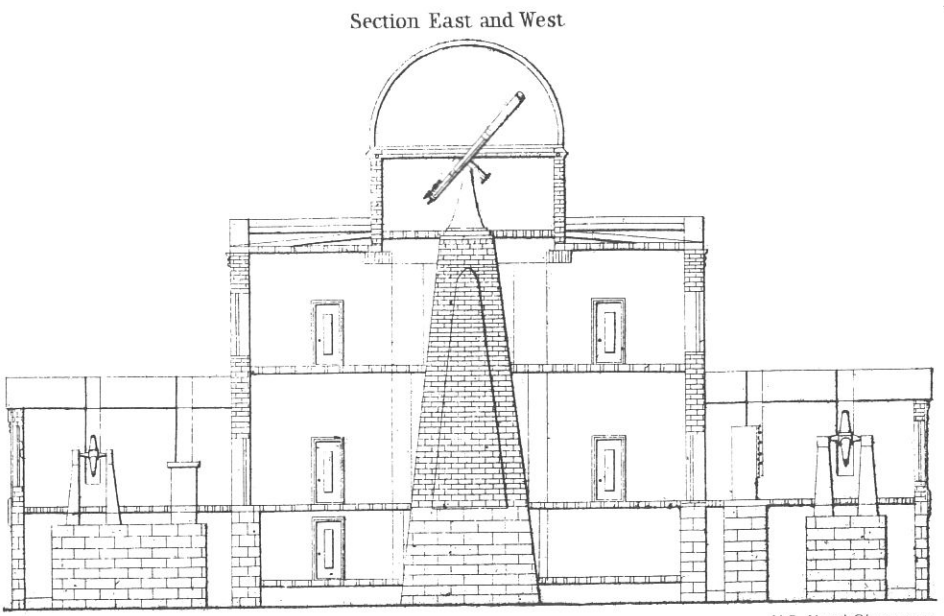
Repairing chronometers and measuring their rates of error was one of the principal missions of the Depot of Charts and Instruments. These highly accurate timepieces were used to determine longitude but few, if any, kept perfect time. A navigator had to know his chronometer's rate of error or his calculations could be miles off.

His request was repeatedly denied by a hostile Congress that insured a quick and certain death to any bill that even made a passing reference to an observatory. The President, however, was not alone. Others saw both the practical and the pure scientific rationale for an astronomical laboratory. U.S. ships required accurate chronometers for determining longitude and up-to-date charts and nautical almanacs. To provide them, some

Columbia Historical Society

Two early views:

The 1845 section of the newly completed Observatory shows the 9.6-inch refracting telescope and other instruments in place. Below: The telescope's massive brick pier, designed to dampen vibration, was removed many years ago, but portions of the pier in the east wing still remain.



U.S. Naval Observatory

kind of institute was needed, whether it was called an observatory or went by some other name.

It was the omission of the word observatory that finally provided the key. If Congress refused to appropriate funds for an observatory, perhaps it would not object to a depot for charts and instruments. That such a building might contain telescopes and other astronomical instruments seemed irrelevant.

Progress came quickly. LT Louis M. Goldsborough convinced the Board of Navy Commissioners that all naval instruments should be consolidated under one roof to be repaired and rated properly. This meant periodic and frequent celestial observations, for precise time could only be determined by observing the transit of a star across the local meridian.

By the beginning of 1831, the Depot was a reality, operating out of a rented building near the White House. When Goldsborough rotated to a new assignment 2 years later, LT Charles Wilkes succeeded him, moving the Depot to two successive sites on Capitol Hill. In 1838 Wilkes, noted more as an explorer than an astronomer, departed for his famous 4-year cruise.

LT James M. Gilliss took over the Depot. Hard work and a spate of favorable publicity following his spotting of Encke's comet resulted in the passage of a bill in 1842 authorizing "the Secretary of the Navy to contract for the building of a suitable house for a depot of charts and instruments of the Navy on a plan not exceeding in cost $25,000 . . . the Institution to be located in the District of Columbia which the President might deem suitable."(*4*) The 19-acre site chosen by President John Tyler was Reservation Number 4.

The 31-year-old lieutenant went to work with a vengeance. He traveled to Europe to procure both astronomical instruments and books for the Depot's library. He also supervised construction at home. The engineers and builders spared no effort in erecting a formidable structure upon the hill overlooking the Potomac. An 8-foot-deep trench was dug for both the foundation walls and the piers that would support the instruments. The excavation for the central pier, however, went 9 feet below the ground's surface.

Gilliss described the rest of the structure:

> The central building is 50 feet 8 inches square on the outside, from the foundation to a height of 2 feet 6 inches above the ground: all the foundations to the ground-line are of blue rock, 2 feet thick; the remainder of the outside walls are of brick, 18 inches thick, finished in the best manner; and the partition-walls are of brick, 14 inches thick . . . . (5)

There were four rooms on each floor of the two-story central building, crowned by a 23-foot diameter revolving dome made of wood and sheathed with copper. The dome, operated by rack and pinion, revolved upon six 32-pound cannonballs set in a grooved cast iron rail. The observing slit was opened by raising five trapdoors set in line.(*6*)

A massive stone and brick pier designed to dampen vibration rose through the building's center upon which rested the 9.6-inch German-made equatorial refracting telescope.

To reach the observing level, one ascended a spiral staircase to a landing at the edge of the dome and then out through a set of trapdoors.

The depot, library, and offices were housed in the central structure, and transit and other astronomical instruments in the east, west, and south wings that radiated from it.

By autumn 1844 the construction was finished just a year and a half after it began. The instruments were not yet operational, and before they would be, Gilliss found that the job of Superintendent he had labored so hard for had gone to someone else.

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The Maury Years

Art by Juanita Adams

LT Matthew F. Maury from a photograph taken in 1853.

Observatory Hill

To LT James M. Gilliss, the man who had built the new Observatory, LT Matthew Fontaine Maury did not seem the ideal choice for its new Superintendent. "If it is to be an observatory," wrote Gilliss to a civilian associate, "Maury is not the man to be at its head, unless he has an entirely different taste from that induced by his previous life and labours."(*1*)

Gilliss had good reason for his opinion. Maury's previous interest during his 20-year Navy career leaned heavily toward the study of winds and ocean currents, although he certainly was not without credentials in other fields such as geography and meteorology. He had served three extended tours at sea and had taught himself navigation and astronomy before writing *A New Theoretical and Practical Treatise on Navigation* in 1836, a work that met with instant success.

Setting his preoccupation with oceanography aside for the moment, Maury vigorously launched himself into his new job on the morning of 8 Oct 1844. There was much to be done. The building needed paint, and gutters and downspouts were yet to be installed. New furniture and instruments had to be purchased, and there was the matter of supplies, i.e., coal for the furnace, oilcloth,* carpeting, pens, inkstands, washstands and pitchers, brooms, candlesticks, doormats, oil lamps, and spittoons. The new Superintendent looked after every detail himself.

Maury also supervised the remounting of instruments that had been installed improperly and, on every clear night he could, began mastering each one in turn. And there were many to master: the 9.6-inch equatorial refracting telescope in the dome, and transit instruments, a mural circle, and a prime vertical instrument.

Even the lieutenant's most skeptical critics were impressed by an apparent shift in interest, a shift that occasionally unlocked the emotions of a man moved by the complexity of the celestial order.(*2*)

> At the dead hour of the night, when the world is hushed in sleep and all is still; when there is not a sound to be heard save the dead beat escapement of the clock, counting with hollow voice the footsteps of time in his ceaseless round, I turn to the Ephemeris** and find there, by calculation made years ago, that when that clock tells a certain hour, a star which I never saw will be in the field of the telescope for a moment, flit through and then disappear. The instrument is set;—the star mute with eloquence that gathers sublimity from the silence of the night, comes smiling and dancing into the field, and at the instant predicted even to the fraction of a second, it makes its transit and is gone! With emotions too deep for the organs of speech, the heart swells out with unutterable anthems; we then see that there *is* harmony in the heavens above; and though we cannot hear, we feel the "music of the spheres."(*3*)

Such musings notwithstanding, the prematurely balding, 38-year-old officer was still a scientist intent on gathering data. He proposed to the Secretary of the Navy a most ambitious project—the cataloging of "every star, cluster, nebula or object that should pass through the field of

*The oilcloth-covered floors in the instrument rooms were never swept but rather wetmopped to prevent dust.

**An astronomical almanac with tables giving the computed positions of a heavenly body for every day of a given period.

Library of Congress

The port of Georgetown from the top of Observatory Hill about 1850.

view."(4) The catalog was never finished but some of the observations enabled Sears Walker, one of the Observatory's astronomers, to determine the orbit of the newly discovered planet Neptune.

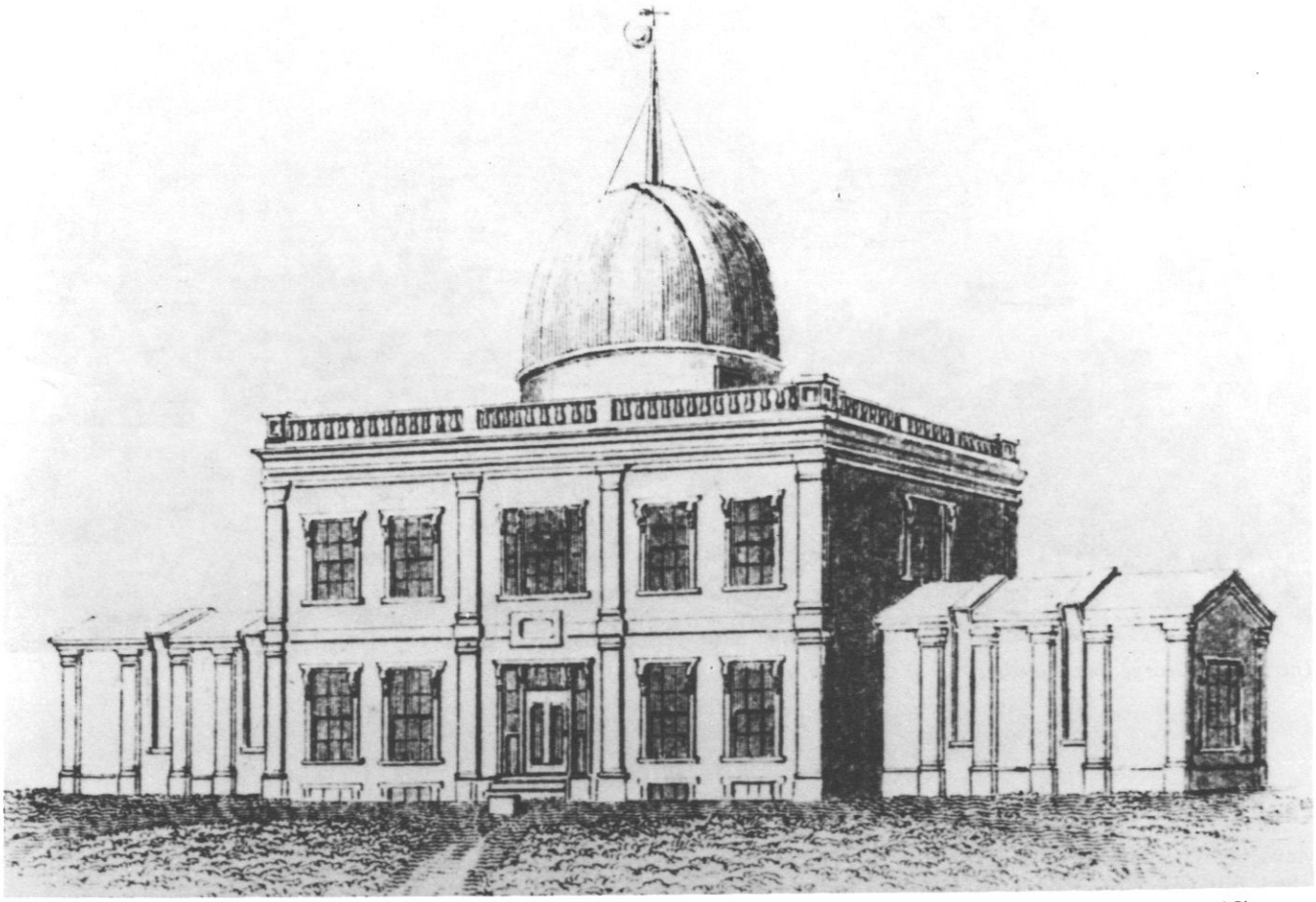
But the Depot of Charts and Instruments, as the Observatory was still officially called, had other pressing functions to perform such as the purchase and distribution of navigational charts, books, and instruments. "Before a chronometer is purchased here for the Government," wrote Maury, "it is taken on trial for a year, during which time it is carefully compared with a standard clock, that a record may be kept of its performances, which record is required with the utmost nicety, and embraces the hundredth part of a second."(5) In November 1847 there were some 60 to 80 chronometers on hand requiring attention as well as thermometers, barometers, and other navigational instruments.(6)

The Depot came under the jurisdiction of the newly created Bureau of Ordnance and Hydrography and, as such, Maury saw its mission to include the preparation of wind and current charts "of the three grand oceans, viz: the Atlantic, the Pacific, and Indian."(7) The Observatory had a good collection of weather instruments and meteorological observations were performed regularly. In the newly constructed magnetic observatory, scientists studied the earth's magnetic field.* By request of the Secretary of the Navy, a local time service was added in 1845. From a flagstaff mounted on the Observatory's dome, a black canvas time ball 2½ feet in diameter was hoisted each day at 10 minutes before 12. At the instant of noon, an officer in the chronometer room released the ball by means of an electric telegraph key, enabling ships on the river and the local citizens to set their timepieces. With many of these projects proceeding simultaneously, the new institution soon was up to its dome in more work than Maury could handle.

Even as the Observatory opened for business, it had scarcely enough employees to man its instruments. The Secretary of the Navy helped solve the problem by hiring civilian "professors of mathematics" to act as observers. They would make the necessary astronomical sightings and reduce the data to usable reference tables.

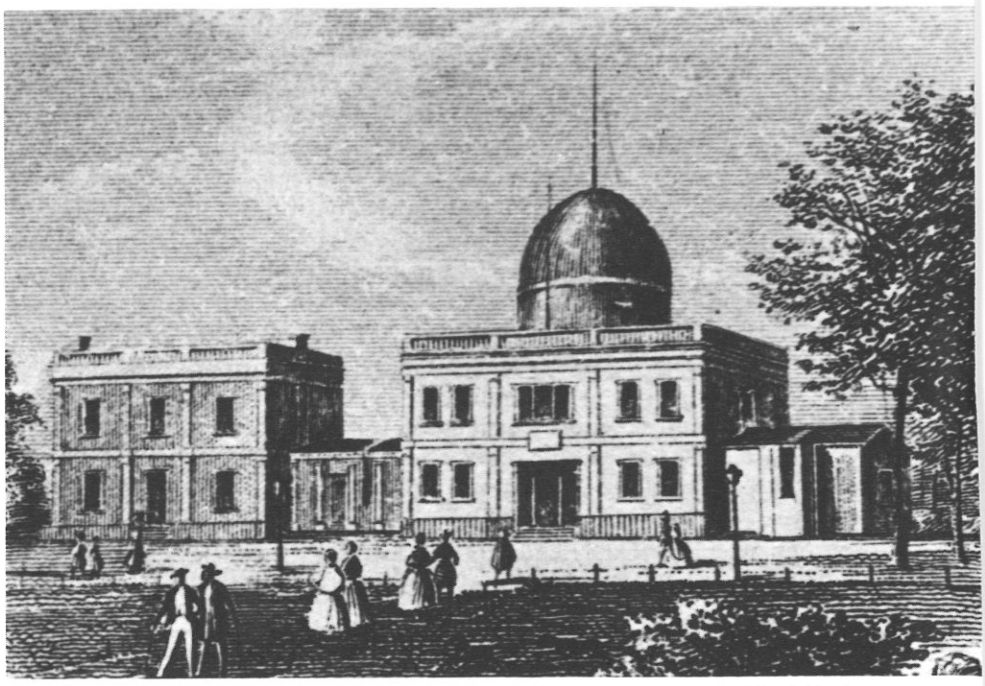
Selected passed midshipmen from the Naval Academy and junior officers were also assigned to duty. The former were given astronomical and meteorological data to reduce and, occasionally, they took a turn at the instruments. In their off-duty hours, they had access to spare telescopes and transits with which to practice. It was all good experience for the young men who someday would skipper their own vessels.

*See page 18



U.S. Naval Observatory

Above: For many years, Washington's citizens relied on the Observatory's time ball, shown in this 1845 engraving, to set their watches. Right: The Observatory and its newly completed Superintendent's residence is depicted in this engraving from about 1850.



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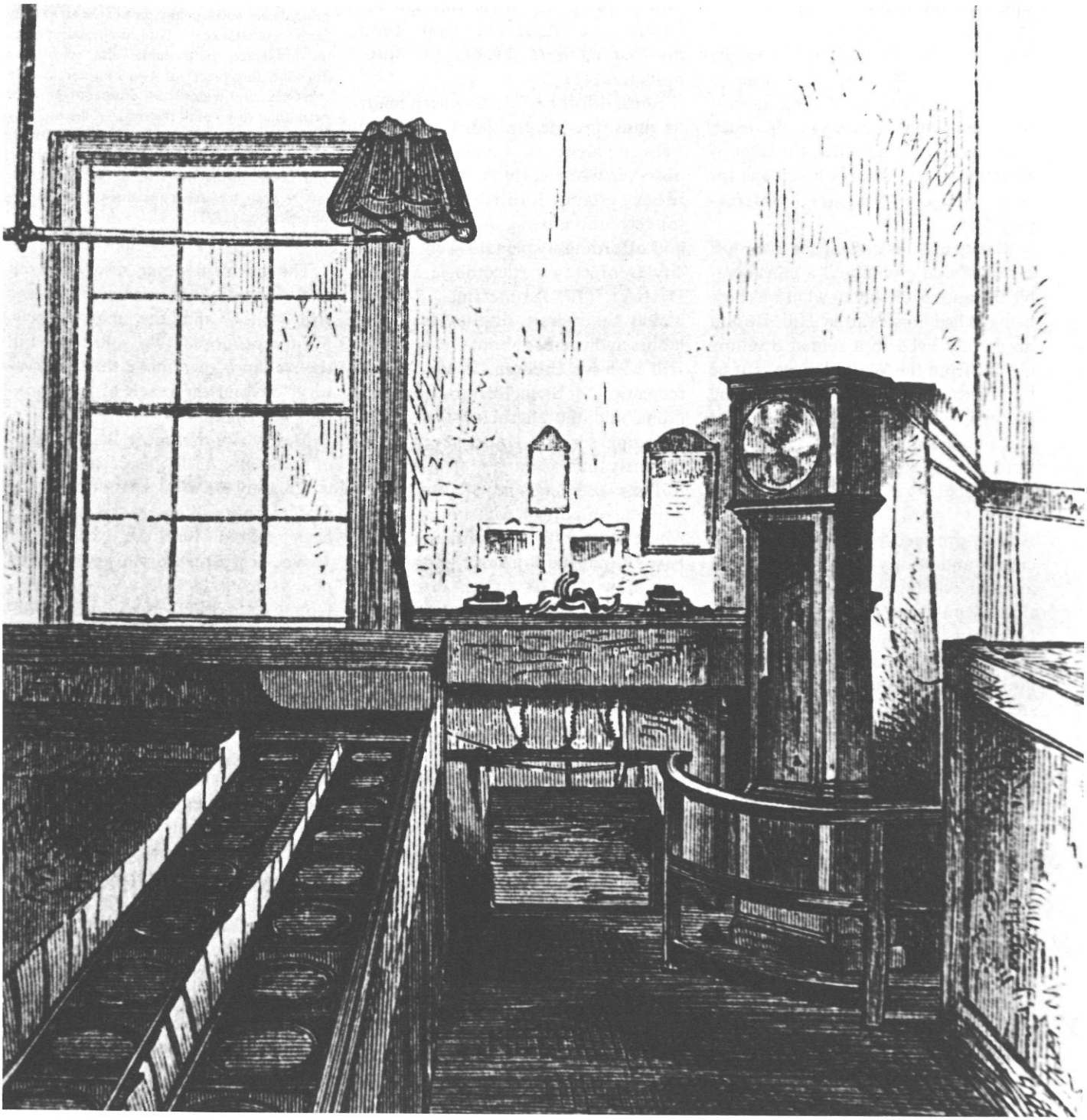
Harpers New Monthly Magazine, March 1874.



The Chronometer Room in the Observatory's east wing.

The Mexican War came and siphoned off many of Maury's officers. Nevertheless, the Superintendent had 21 employees working for him by the end of 1846 and was close to achieving his goal of having at least two competent observers for each instrument "so that when the night is clear there may always be an eye for every telescope in the Observatory."(*8*)

Maury and his colleagues lived "off campus" and commuted a considerable distance each day to what was now being called Observatory Hill. He and his family lived in a rented dwelling not far from the White House, but he longed to build a residence adjoining his new office both for convenience and to entertain the many guests that were coming to see the new scientific showplace.

On 1 April 1845 John Quincy Adams dropped by, but the sky was cloudy and Maury suggested he return another evening when viewing conditions would be better. Three days later, after a hectic day in Congress, the 78-year-old man got his promised look at the nebula in the Orion constellation, ". . . at the cluster of spangles in Auriga, at the double stars, orange and blue, in Andromeda."(*9*) It was truly a memorable evening for the man who had for so long been deprived of his "lighthouse of the sky."

One thing Adams had noted was the absence of suitable quarters and garden for the Superintendent. His influence with the Secretary of the Navy and Maury's pleas finally bore fruit. Several weeks after Adams' second visit, Maury was authorized to seek bids from Washington contractors for the construction of a two-story, slate-roofed house with a basement and a "back building" and "wash house."(*10*) The cost was not to exceed $5,000.* In late 1847 the family moved in, and a year later the Observatory's east wing was extended 24 feet to join the house. Maury could now walk to his office through the connecting structure that soon doubled as a storeroom for chronometers.(*11*)

Some effort had already been made to landscape the grounds by planting trees and laying out walks. An outside observer wrote early in 1846 that the site "will soon afford a delightful place for recreation, being on an eminence, and affording a splendid view of this city, Georgetown, Alexandria, and the District."(*12*) Sometimes Maury would take short respites from his labors and wander about Observatory Hill with his children. It was not all recreation for them; learning flora and fauna and the characteristics of the changing seasons could never begin too early for a scientist's offspring.(*13*)

These seemingly idyllic and park-like surroundings did not tell the whole story. Just beneath the Hill's base flowed the Potomac, more sluggish now that its current had been broken by new riverbank businesses like Easby's shipyard. A substantial grass-covered marsh had developed with accompanying summer mosquitoes and humidity. Maury, his family, and the other employees soon began to suffer frequent bouts of fever and chills probably malarial in origin.

The Superintendent himself was stricken periodically and sent his ailing wife and children to the Virginia countryside during the worst of the summer months. By 1855 his disenchantment with the site and the night fogs that severely hampered the observations began showing up in official communications.

> The observers, the watchmen, and all whose duties expose them to the night air, suffer every summer and fall from the attacks of bilious and intermittent fevers. Those who reside on the grounds are never in any part of the air exempt from these attacks. . . . I am compelled, at much inconvenience, both public and private, to abandon this place for two or three months every year, but seldom do the duties of the office permit me to go until the seeds of disease have taken root . . . I have already been laboring under attacks of fever and ague this summer; and never during the last ten years, has the family been free from the disease and its insidious effects.(*14*)

The problem never resolved itself and eventually got much worse as the river silted and the marsh grew. Maury proposed two solutions: Fill the wetlands or remove the Observatory "beyond the reach of their noxious influences."(*14*)

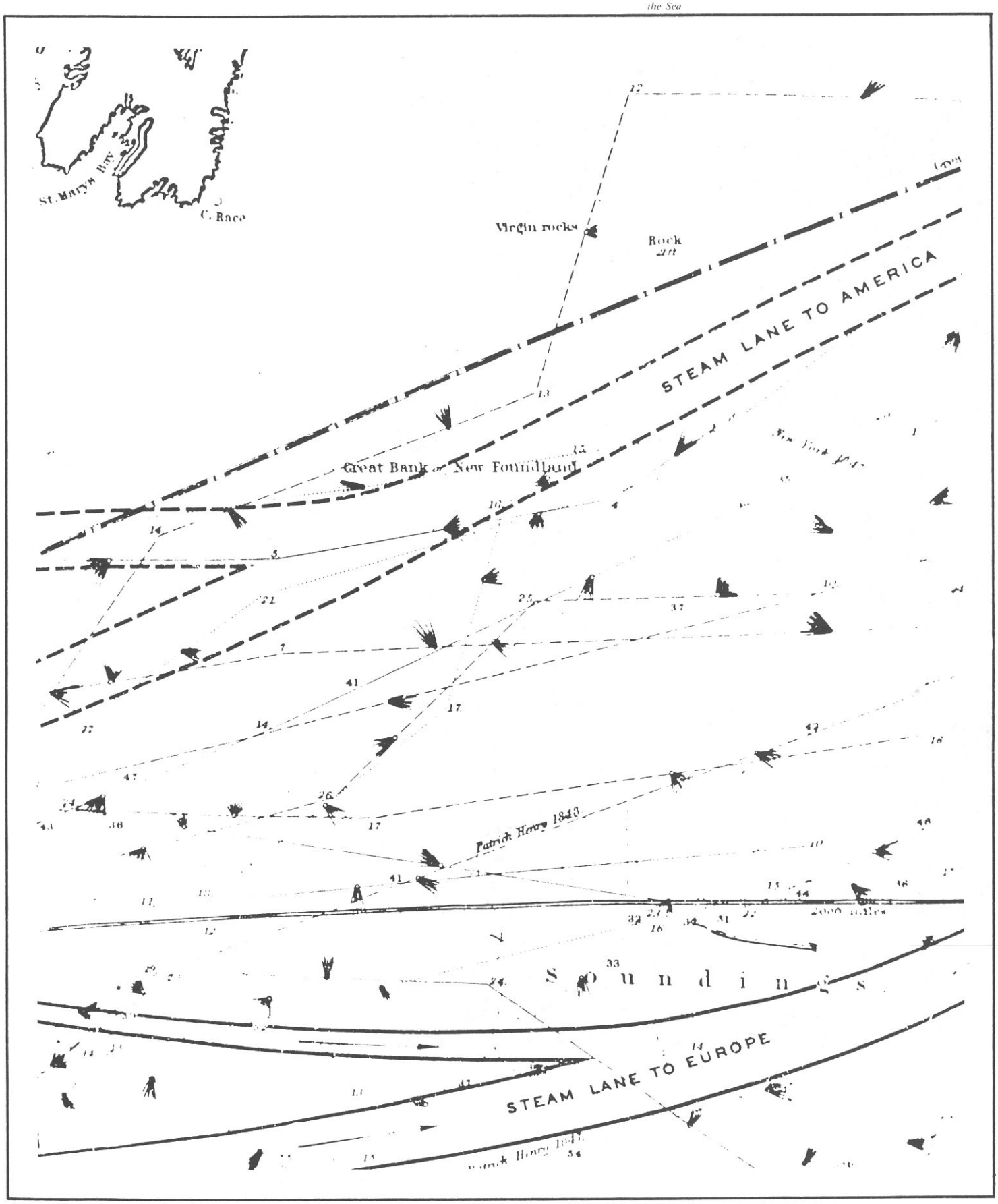
Maury suffered more than relapses of fever. By the 1850's oceanography had largely replaced astronomy at the Observatory. Gilliss' worst fears had been realized. With the exception of James Ferguson's discovery of three new asteroids with the 9.6-inch telescope few other astronomical developments were publicized. The preparation of wind and current charts dominated the work schedule. The star catalog had been abandoned after the reductions of thousands of star observations fell hopelessly behind. From 1850 to 1861 the Observatory produced no further publications on astronomy.

Frictions developed between some of the civilian mathematicians and a skipper they perceived was running a very loose ship. There seemed to be little guidance from the top, as far as the astronomers were concerned. As they became more independently involved with their own research, Maury grew more addicted to his own.

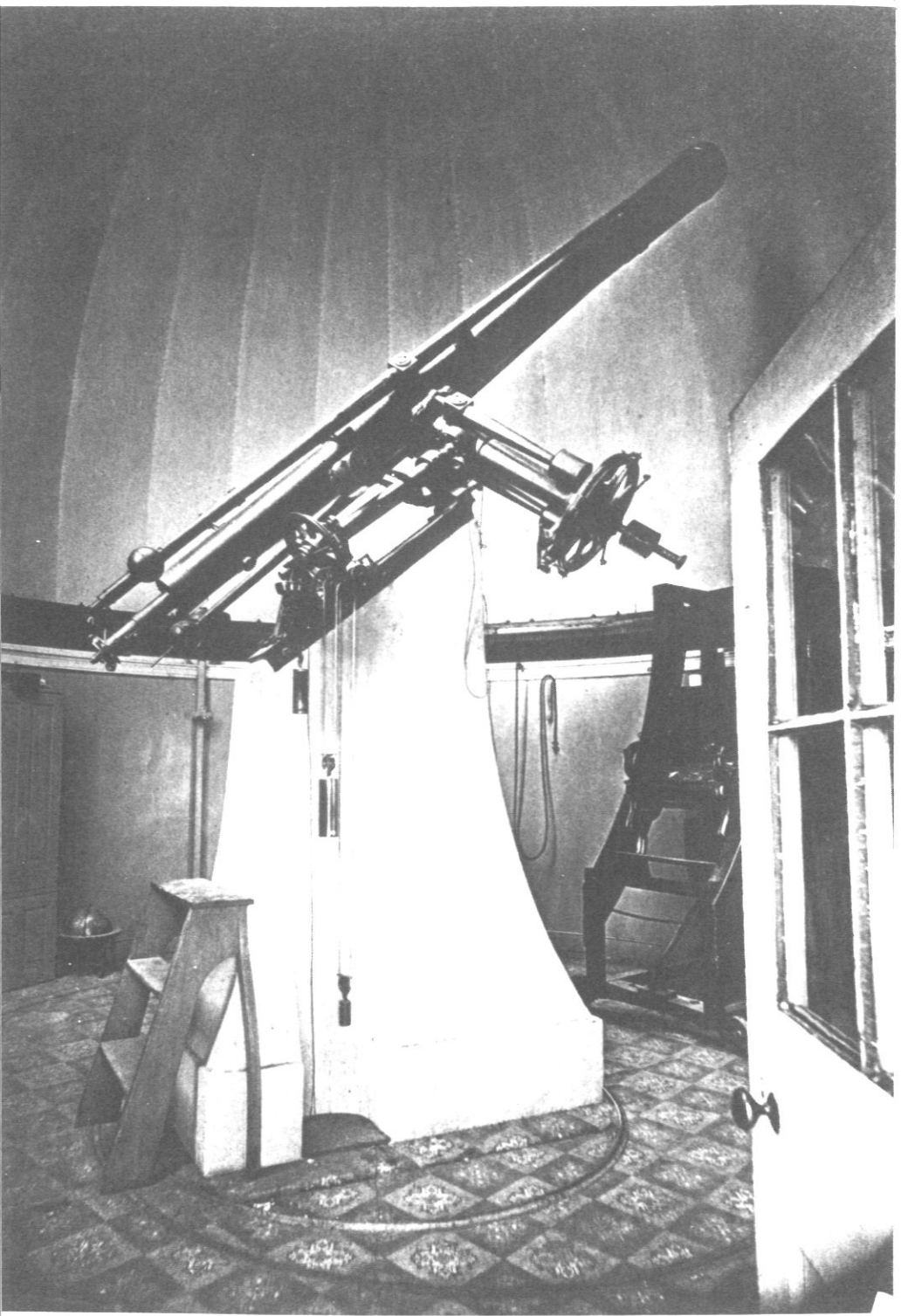
Portion of Wind and Current Chart No. 6, Series A of the Grand Banks, prepared under Maury's supervision at the U.S. Naval Observatory and Hydrographical Office. The Superintendent devised the brush-tailed symbols to indicate wind speed, and direction and variation of wind direction during the day. The heads of the brushes face the wind source and their width represents the degree of variation of wind direction during the day. Numerals represent water current strength.

*The final cost, as stipulated in the building contract of 12 Feb 1847, was $7,399.

Frances Leigh Williams, *Matthew Fontaine Maury, Scientist of the Sea*



U.S. Naval Observatory



The 9.6-inch Merz and Mahler refractor, housed in the central dome, was the workhorse of the Observatory for many years.

Pathfinder of the Seas

On 12 Dec 1854 the Depot of Charts and Instruments officially became the United States Naval Observatory and Hydrographical Office.* The emphasis was, as expected, on the hydrographical. Volumes of oceanographic materials were published beginning with the *Abstract Log for the Use of American Navigators* in 1848, followed by eight more volumes of sailing instructions. This work brought much interest on the part of mariners, many of whom offered to record oceanographic data on their voyages.

In 1853 Maury left for Brussels as the U.S. representative to an international congress that adopted his uniform system of recording oceanographic data. When he returned to Washington he occupied almost all his time writing and overseeing the processing of the new data that suddenly deluged the Observatory.

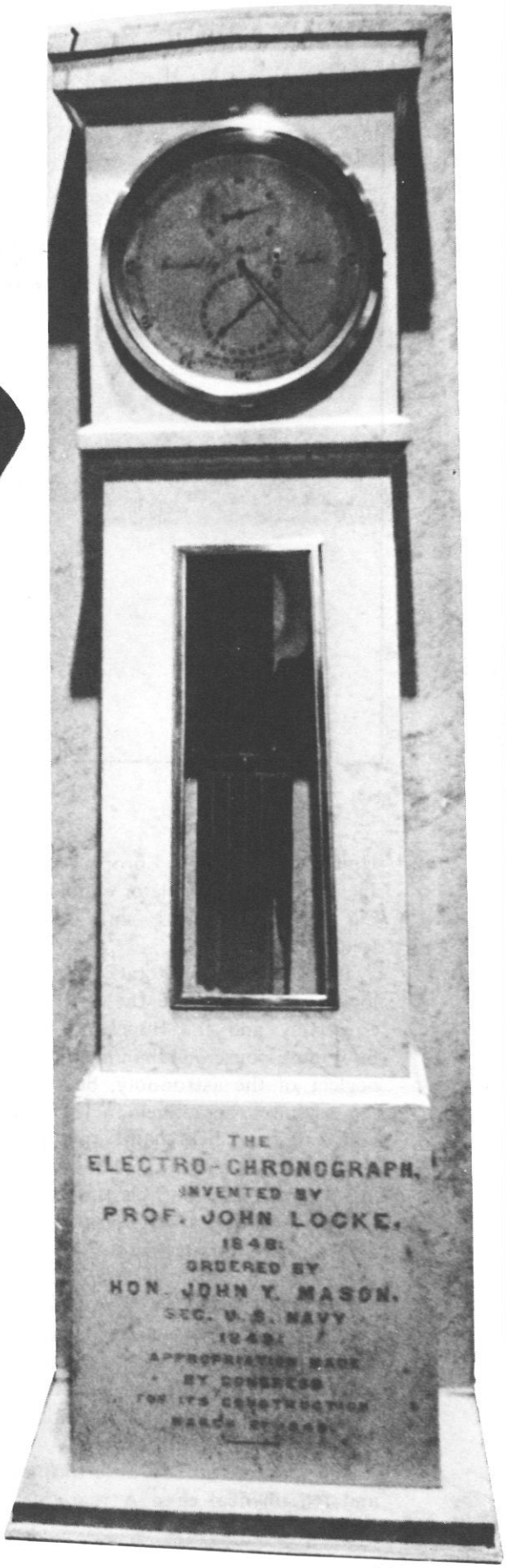
The new charts made an immediate impact on ocean commerce. Using them, clipper captains were able to shave 47 days off the passage from New York to San Francisco, resulting in a savings of millions of dollars annually.(*16*)

In 1855 Maury published *The Physical Geography of the Sea,* the first textbook of oceanography, a science that had just come into its own. The Superintendent of the Observatory and Hydrographical Office was now universally acclaimed as the "Pathfinder of the Seas." He was also a man running in many directions at once. Talk of a trans-Atlantic cable intrigued him and he prepared an undersea profile of the ocean between the

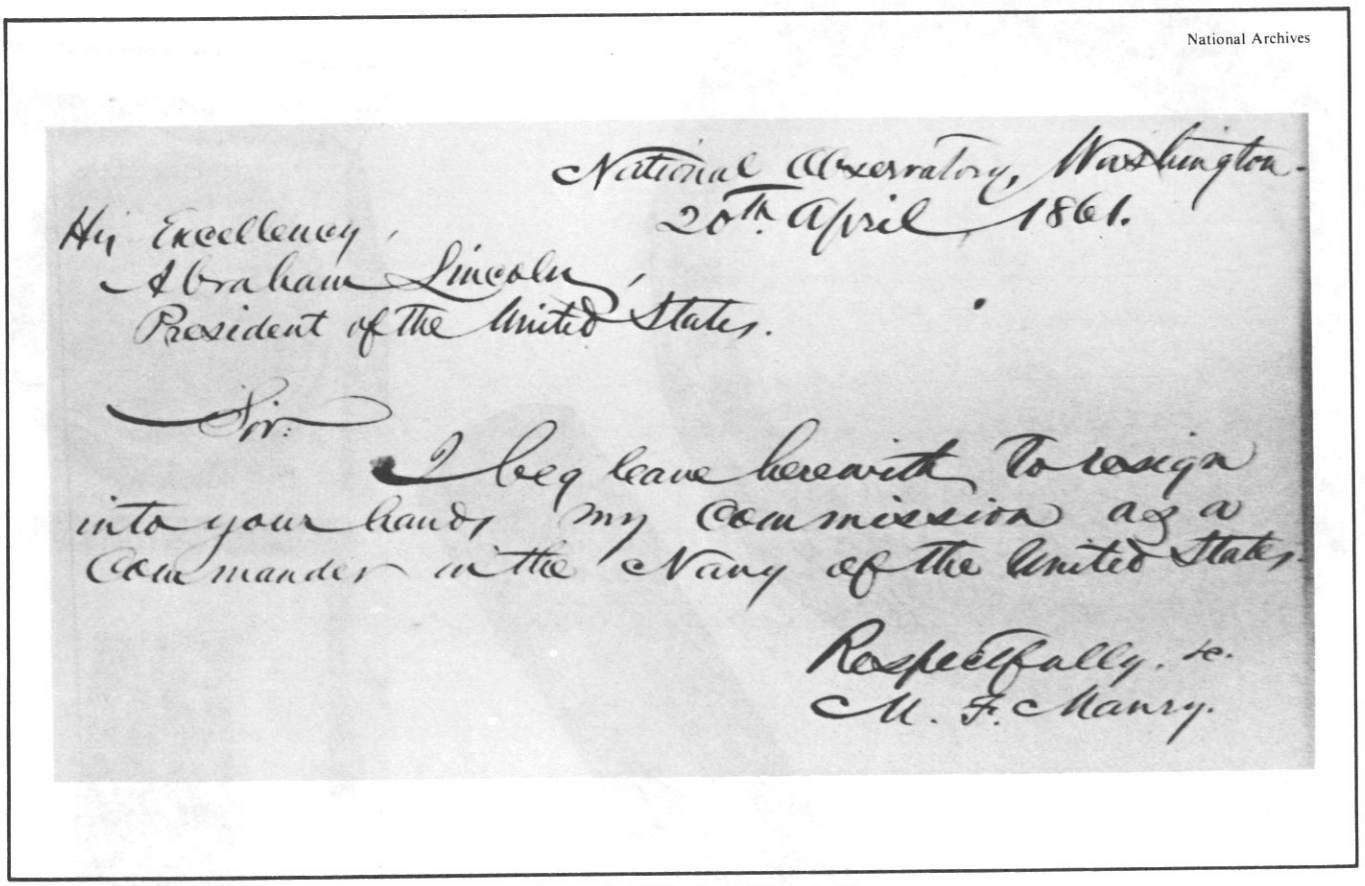
*For the first 10 years of its existence the institution had also been called the National Observatory.

Few artifacts survive from the Observatory's early years. These exceptions are in the Smithsonian Institution collection: Above: The objective lens from the 9.6-inch refracting telescope.

Left: A portable comet-seeker telescope that could be mounted on the roof. Right: This electrochronograph was one of the Observatory's most accurate timepieces.



National Archives



National Observatory, Washington
20th April 1861.

His Excellency,
Abraham Lincoln,
President of the United States.

Sir:

I beg leave herewith to resign into your hands my Commission as a Commander in the Navy of the United States.

Respectfully, &c.
M. F. Maury.

The letter that ended Matthew Maury's Navy career.

United States and Europe. Cyrus Field, the man who later engineered the cable, consulted with Maury frequently.

The Observatory staff was no longer able to tackle the workload effectively and the Superintendent, now more conscious than ever of his neglect of the astronomy, began to request more personnel. In 1858 the staff had seven lieutenants, four professors of mathematics, one assistant astronomer, and one clerk. To the Chief of the Bureau of Ordnance and Hydrography Maury wrote: ". . . I would urge, with the earnestness admissible, the importance of bringing up this back work, and of giving to the Observatory a force sufficient to work up to their capacity the admirable set of astronomical instruments with which it is equipped."(*17*)

The request was too little too late and fell on deaf ears. A year later, Maury's astronomical computers fell from seven to three. "Those who were formerly here are either so broken down in health as to be unable for work, or other duty has been assigned them."(*18*)

As the decade closed and the Observatory passed its 16th birthday, the nation it served also showed signs that it too was broken down in health.

Choosing Up Sides

New Year's 1861 opened on what was a very unfinished-looking Nation's Capital. The Washington Monument, only a third completed, seemed as though it would remain that way. Cranes and the yet-to-be installed 9 million-pound cast iron dome littered the grounds of the Capitol. At the other end of the wide and alternately dusty and muddy boulevard called Pennsylvania Avenue, stood the President's House. This southern styled mansion, like the Observatory, less than a mile away, was uncomfortably close to the Potomac and its seasonal hordes of malaria-carrying mosquitoes.

Following the route of present-day Constitution Avenue was an open sewer known as the Washington City Canal, a garbage-clogged waterway that had fallen into disuse. When the wind was wrong the fetid odor of decaying offal and dead animals blew equally over the White House and Observatory Hill.

Such appearances aside, there was a somber, foreboding mood that permeated Washington that January 1st. How could the Capital be finished in form or spirit when civil war loomed on the horizon? Would the United States see another year as an undivided nation?

It certainly did not seem so as one event piled precipitously upon

another. South Carolina had just seceded in December and its authorities were already seizing federal property. One by one the Southern States were leaving the Union. On 13 April Fort Sumter fell. Two days later President Lincoln called for 75,000 volunteers. The Civil War had begun and with it came uncounted and excruciatingly painful and personal decisions. The time had come to choose sides. Who would remain loyal to the Union and who would go with his State?

Such a dilemma faced the Observatory's Superintendent. Like COL Robert E. Lee, who paced the floor of his stately mansion across the river, CDR Maury, a Virginian also, was sick at heart, hoping the inevitable would not happen, that his State would not adopt an ordinance of secession. "Civil war is like a conflagration," he wrote to a cousin. "There is no telling when or where it will stop, as long as there is fuel to feed it."(*19*)

On the 19th the *Evening Star* reported that Virginia had indeed seceded. That night was Maury's last at his Observatory. He stayed up late, walking the corridors, alone with his memories. The following day he tied up loose ends, dispatching navigational instruments to the New York Navy Yard, dictating letters, and cleaning out his desk. At 3 o'clock that Saturday afternoon, the Superintendent finished his work and turned over his sword to a fellow officer. He then asked his secretary to take dictation for a letter of resignation, but the distraught man could not bring himself to comply. Maury's daughter later recalled the incident: "[The secretary] presenting the unfinished paper with one hand . . . covered his eyes with the other and exclaimed, with a choking voice and gathering tears, 'I cannot write it, Sir!' "(*20*) Maury picked up the pen and himself wrote to his Commander in Chief: "I beg leave herewith to resign into your hands my commission as a Commander in the Navy of the United States."

He then changed into a black broadcloth suit and sadly looked across the Potomac at Arlington Heights in what was now the Confederate States of America. A hack awaited him in the drive outside the Observatory residence. Maury climbed aboard with his belongings. He was leaving behind his sword, his uniform, and an illustrious 36-year career that had seen him become a world-renowned scientist. Tears flowed freely and unashamedly down his face as he descended Observatory Hill to 23rd Street for the last time.

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The Magnetic Observatory

The Naval Observatory's appearance on Camp Hill coincided with a worldwide interest in terrestrial magnetism. There was a common belief among seafaring nations that an understanding of the Earth's magnetic field could aid navigation. Britain, France, Russia, and several other nations in northern Europe were actually conducting seaborne surveys and establishing fixed magnetic observation stations all over Europe.

By nature the experiments were international in scope, requiring scientific cooperation on a grand scale. Moreover, any nation worth its scientific salt was compelled to participate.

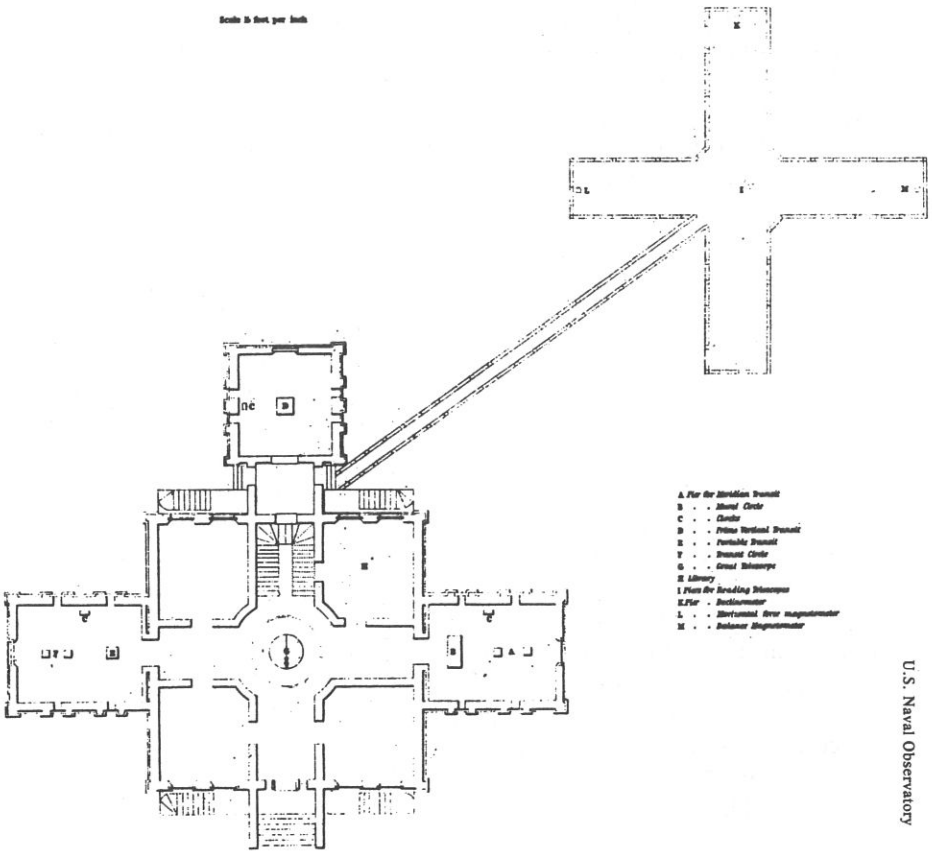
Just starting out in the government-sponsored astronomical business, the United States joined the world scientific community. Even as the Naval Observatory's telescope and transit instruments were being mounted and calibrated, an underground room behind the main building was being equipped with sensitive magnetometers to read the Earth's magnetism.

The cross-shaped magnetic observatory and its 52-foot-long stone and brick connecting tunnel were completely subterranean so as to insulate the instruments from outside disturbances. The chamber was 10 feet wide, 10 feet high, some 70 feet long in each direction, and 18 feet beneath ground level. At the cross' intersection was an 8-foot diameter skylight.

The magnetometers sat on stone piers at the extremities of the cross, with the horizontal force magnetometer at the east end. The west end contained the magnetometer to measure vertical force. At the cross' southern foot was the declination magnetometer. The piers in the center of the cross carried scales and reading telescopes so that the magnetometers could be read remotely.

The engineers encountered difficulty from the beginning. Because of cost, they cut corners. In place of stone and brick, they built the room's walls and roof of timber and then backfilled the excavation with earth. On his visit to the Observatory on 1 April 1845, John Quincy Adams spotted the fatal flaw. "[The room] leaks, either from springy ground or from rain. They have been obliged to suspend the observations; and the instruments which are there, if suffered to remain there long, will perish by the dampness of the atmosphere.* Maury had already solicited bids to replace the wood with brick and line the

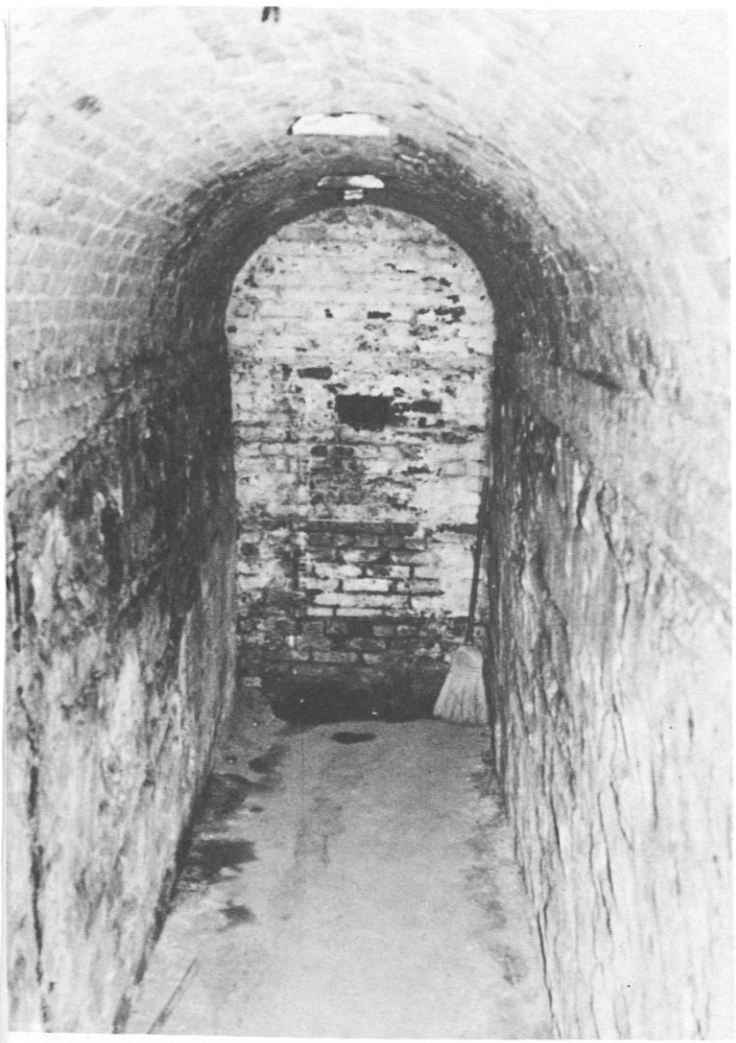
*Adams CF (ed): *Memoirs of John Quincy Adams 1795-1848,* p 189.



U.S. Naval Observatory

Floor plan of the main building and the cross-shaped magnetic observatory and its connecting tunnel.

Photos by HM3 Brian T. Carey



Portion of the connecting tunnel today shows the brick wall that sealed the magnetic observatory.

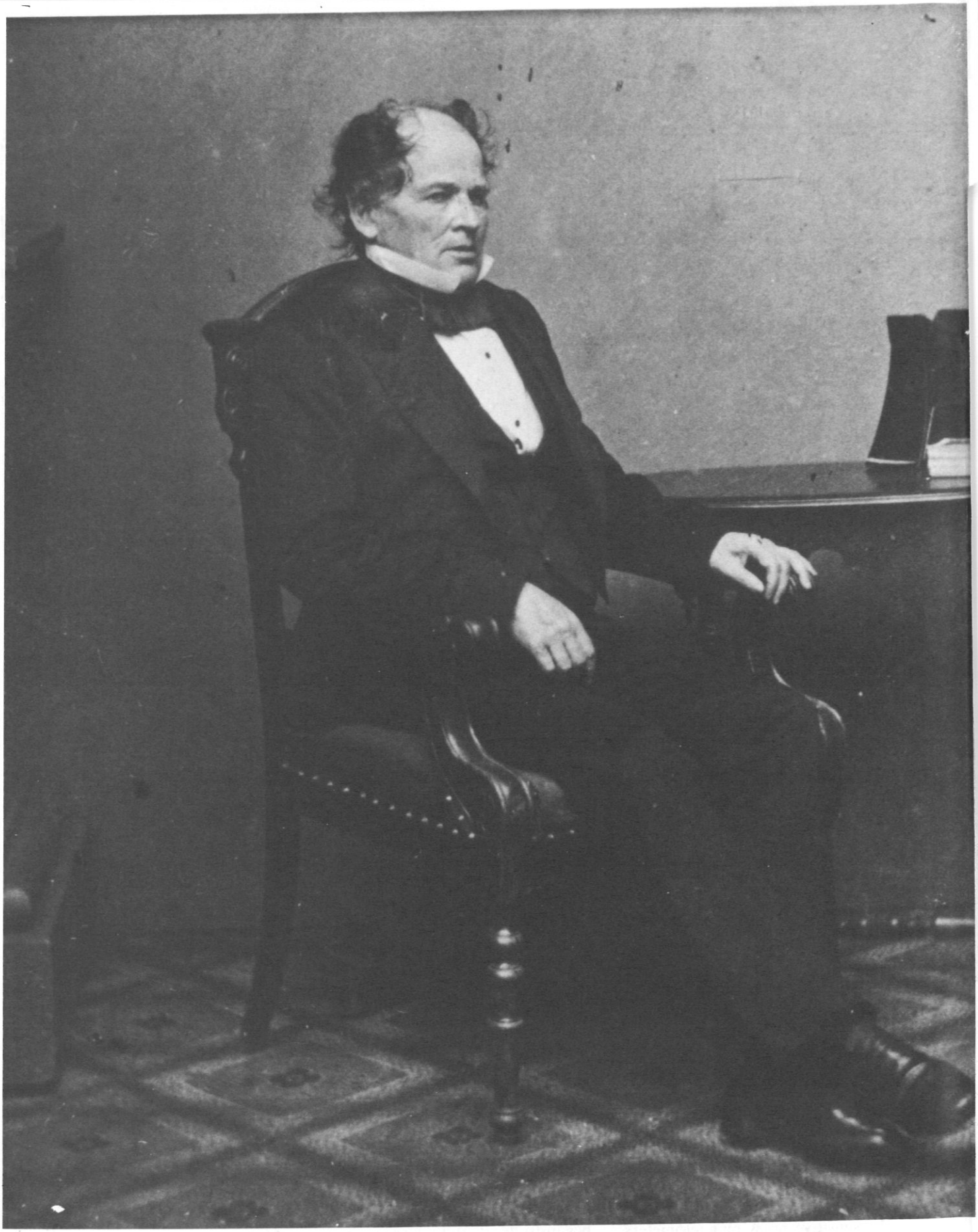
Rubble fills the tunnel beyond the wall.

chamber with plaster and slate, but learned the job would cost nearly $3,000.

Adams was greatly disturbed. To suspend the magnetic observations for any reason would critically damage the fledgling institution's credibility, especially during the Observatory's first year of operation. The magnetic observatory would have to be waterproofed and the sensitive brass magnetometers cleaned and put into use. In a meeting with the Secretary of the Navy 10 days after the visit, the outspoken Adams recommended the immediate resumption of the experiments. His intervention made little difference; the flooding persisted, and by the time the fall rains began, water that had percolated through the ceiling was "more than shoe deep" according to LT Maury's recollection. The wood began to decay and a large section of roof gave way.

The Superintendent removed the instruments and sometime since, the access tunnel to the magnetic observatory was sealed.

On 30 Jan 1982 a team of volunteers led by the author breached the brick seal, entered the chamber, and found some of the tunnel network intact. A project is now underway to remove debris and open the magnetic observatory to study.



Author's collection

Superintendent Matthew F. Maury posed for this portrait in Mathew Brady's Washington studio just a few months before the Civil War ended Maury's U.S. Navy career.

The Gilliss Legacy

A warm and steady summer rain could not wash away the fear and uncertainty that gripped Washington the July morning after Bull Run. The muddy streets and grimy alleys seemed even more so as beaten and exhausted men drifted back across the Potomac from Virginia. They were no longer soldiers, having abandoned their units and their weapons in the wild flight from the battlefield less than 25 miles away.

What had begun as a lark had ended in disaster. The powder-stained faces with the glazed expressions told the story. War had come to Washington and before it would end 4 years later, the Capital would become a garrison town, never but a few miles from the front. Its homes and government buildings would first become barracks and then makeshift hospitals to accommodate thousands of sick and wounded. And the population would swell, not only with the unruly soldiers who clogged its streets and bars, but with hundreds of new bureaucrats to help run the war machine, and gamblers, doctors, nurses, lobbyists, sutlers, contractors, prostitutes, spies, and profiteers—the inevitable and disparate masses that only war seems to bring together.

At the Naval Observatory, things were not quite as they had been. Maury "the traitor" was gone and LT James M. Gilliss, the understudy, who arrived 3 days after Maury left for Richmond, was now in command. A full 17 years had passed since he built the Observatory and was passed over for the superintendency.

The outbreak of war depleted the staff as officers were reassigned to a Navy greatly increased in size. Those who remained were busy enough trying to keep up with the punishing workload. President Lincoln's call for a blockade of the South meant that hundreds of current navigation charts depicting the shoreline from Galveston to Norfolk had to be printed and disseminated. Countless steering compasses, liquid boat compasses, artificial horizons, barometers, thermometers, spyglasses, sextants, and chronometers had to be purchased, checked for accuracy, and logged in before being assigned to the fleet.

By the fall of 1861 Gilliss had one lieutenant, an assistant observer, four professors of mathematics, an "acting master," one clerk, an instrument maker, two watchmen, a groundkeeper, one porter, and a messenger on the staff.(*1*)

The wholly professional and eager astronomer saw the irony of his situation. He had waited so many years to become chief of one of the world's premier astronomical laboratories and now it seemed as though circumstances would allow little time for astronomy.

But Gilliss was not to be deterred. Despite the Observatory's wartime commitments, he launched an ambitious new program of observations, hiring several new employees to help with the work.(*2*) In addition he decided to do something with the backlog of thousands of unreduced star and planet observations left over from his predecessor's tenure; some dated back over 14 years. Gilliss lobbied for their publication and Secretary of the Navy Gideon Welles authorized the hiring of copyists to prepare the raw data sheets. The computations and final preparation would be left to private contract computers working under Professor B.A. Gould.

Gilliss, like his predecessor, also had other duties. Security for the compound was important, but the new chief believed the Army could handle the rebels. An attack on Observatory

Hill seemed quite unlikely. Several weeks after Bull Run he returned to the Washington Navy Yard the 10 rifled muskets and three boxes of ammunition Maury had stockpiled. Gilliss felt that two muskets, 80 cartridges, and 100 musket caps would be sufficient to defend the grounds.(3)

It was not the Confederates he was worried about, but rather his Foggy Bottom neighbors. Even before the war, a picket fence that protected the compound's northern exposure was the object of firewood-gathering expeditions believed by Maury to have been led by local inhabitants. On the east side, part of the perimeter brick wall had fallen down and required immediate repair. And now there were many more neighbors to cause worry. The barracks of Camp Fry lined both sides of 23rd Street near Washington Circle. Soldiers drilled on the rutted thoroughfare by day and caroused near it after dark.

Even what was not the troops' domain was somehow connected with the war effort. Foggy Bottom now had warehouses for Army equipment and harness and blacksmith shops. Storage corrals filled with cavalry mounts and beef cattle made their noisy contributions.

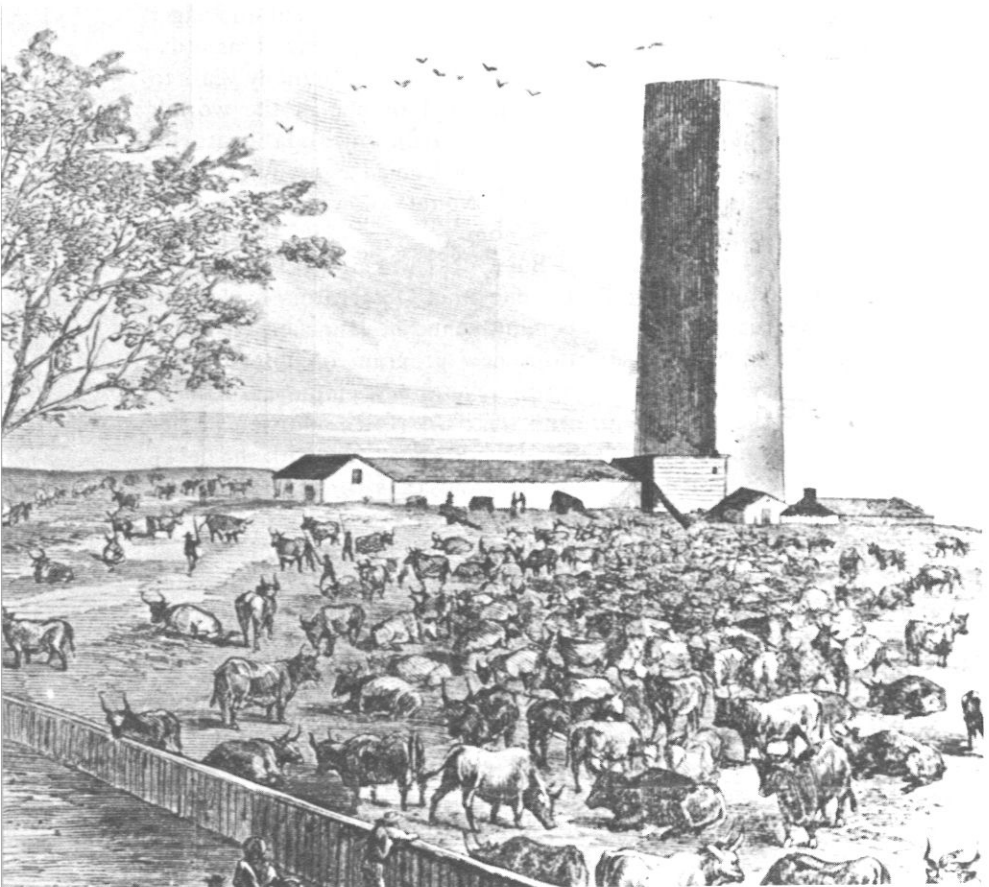
"Across the Potomac," wrote Simon Newcomb, the Observatory's new Professor of Mathematics, "Arlington Heights were whitened by the tents of soldiers from which the discharges of artillery or the sound of fife and drum became so familiar that the dweller almost ceased to notice it."(4) The Nova Scotia-born Newcomb, who had joined the staff that first autumn of the war, did not live in the neighborhood. Neither did most of his colleagues. He walked some 2 miles to and from work. The intervening years did not dim his recollection of what he found along the way. "After a rain, especially during winter and spring, some of the streets were much like shallow canals. Under the attrition of the iron-bound wheels the water and clay were ground into mud, which was at first almost liquid. It grew thicker as it dried up, until perhaps another rainstorm reduced it once more to a liquid condition."(5)

Professor Newcomb was not the only new employee. By the summer of 1862 several new jobs were created. The new employees would aid those who were engaged in astronomical observations. Asaph Hall, a 33-year-old astronomer from Connecticut, after sending an inquiry to Gilliss, was advised that "the aides who will be appointed for the Observatory . . . will be required to give evidence of theoretical intelligence of the construction and adjustment of instruments and such mathematical knowledge as will enable them promptly to apply formulae used in the reduction of every class of astronomical observations."(6)

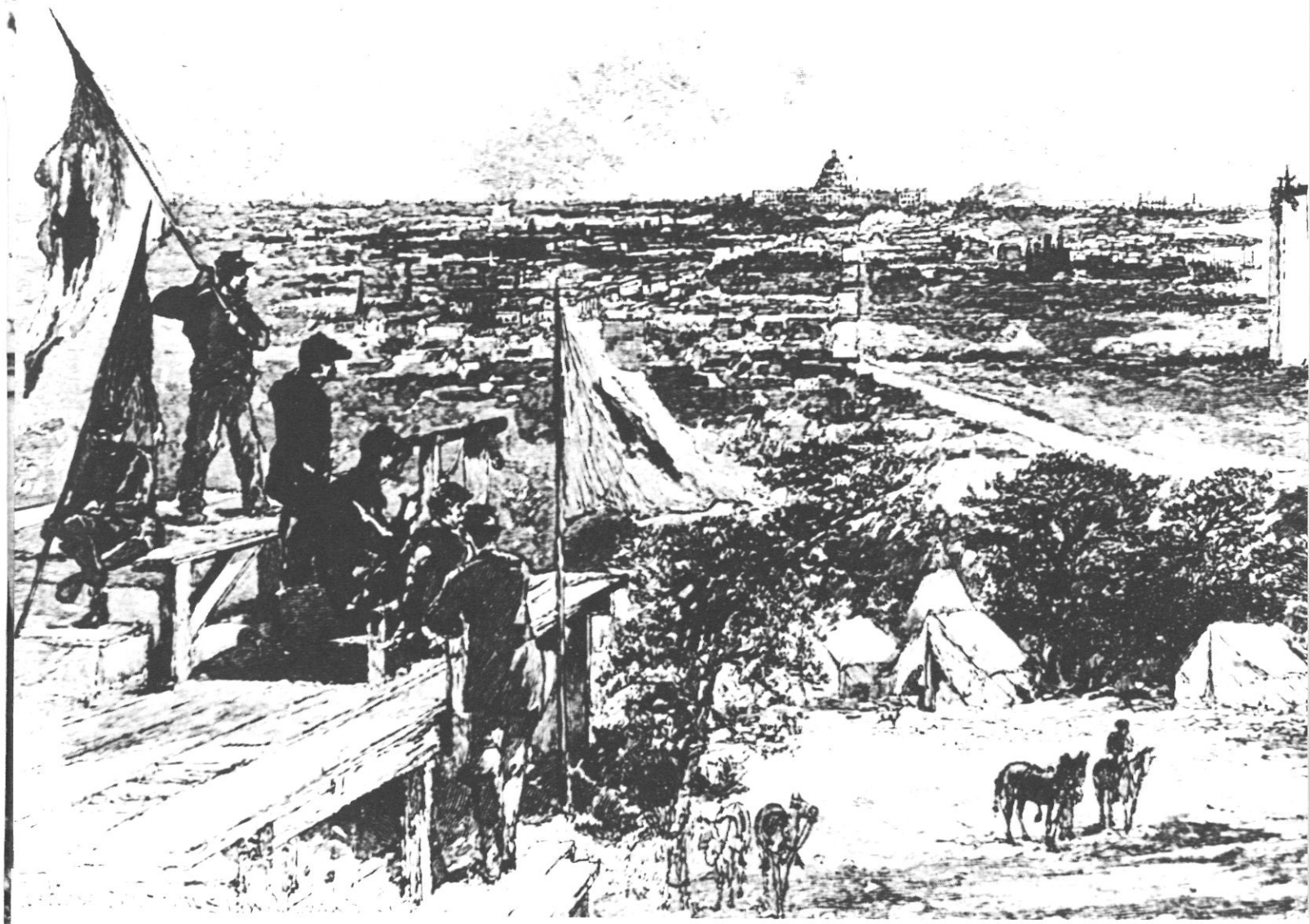
Eight days later Hall was hired after giving such evidence in an examination conducted at the Observatory. His first weeks on the job were not happy ones. He had to find suitable lodging in the city, no small task. Moreover, his disillusionment with government service came almost too quickly. To his wife he wrote: "When I see the slack, shilly-shally, expensive way the Government has of doing everything, it appears impossible that it should ever succeed in beating the Rebels."(7) He wrote contemptuously of the "American astronomy" practiced at the Observatory, a reference, no doubt, to loose discipline and the secondary role given to his science.

Simon Newcomb had already come to the same conclusions. He had seen Gilliss following at least one of Matthew Maury's policies, that of letting the professors of mathematics choose their own work. Moreover, because of war priorities, the quality of astro-

Columbia Historical Society



The grounds of the unfinished Washington Monument saw duty both as a drill field and a beef depot for the Army.



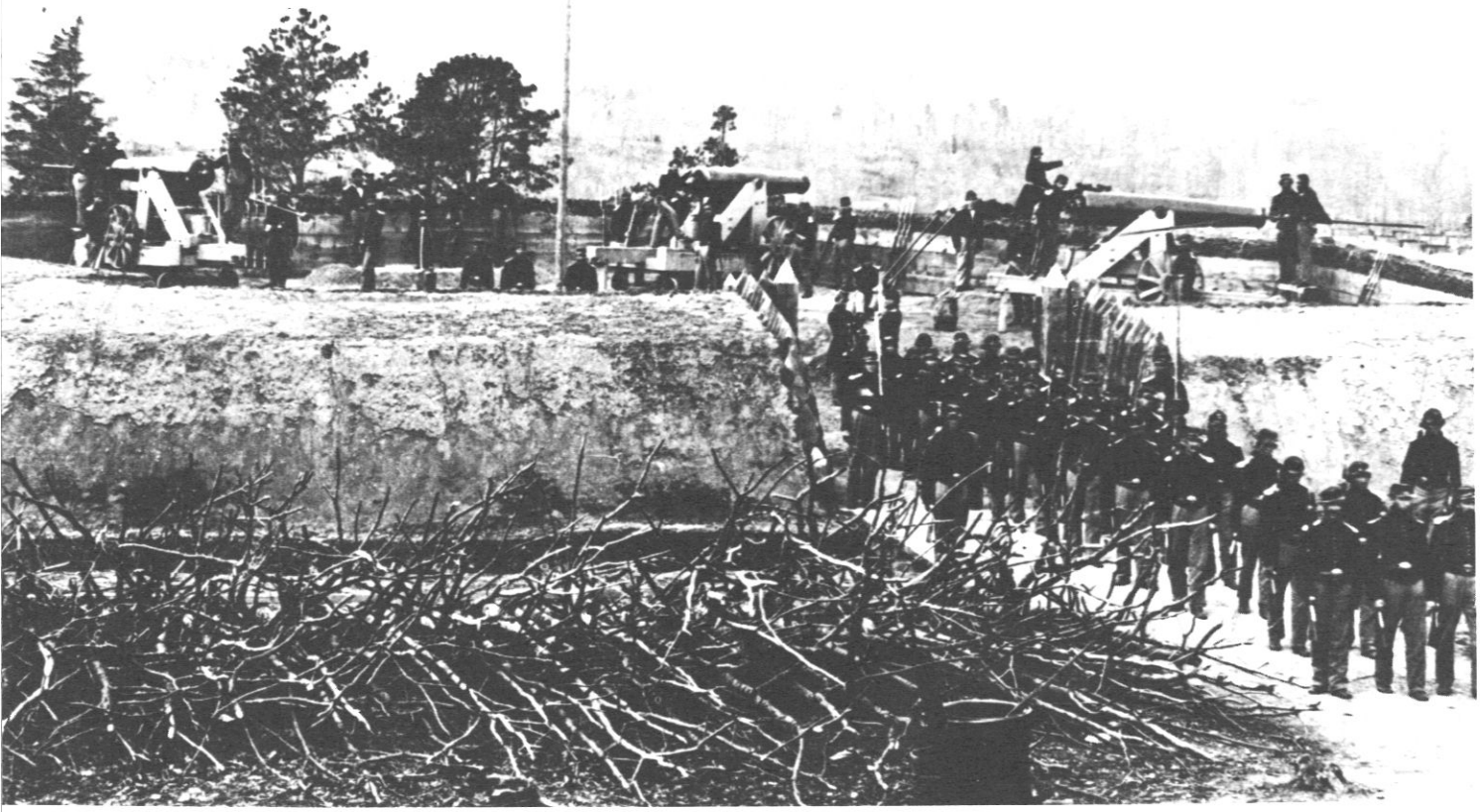
Wartime Washington from an Army Signal Corps station in Georgetown.

nomical instruments had not kept up with the times. "The clocks, perfection in which is almost at the bottom of good work, were quite unfit for use. The astronomical clock with which . . . [we] . . . made our observations kept worse time than a high-class watch does to-day," recalled Newcomb years later.(*8*)

But even as Hall and Newcomb attacked the loose discipline, the latter admitted that the unregimented atmosphere had something to recommend it. Before he came aboard he had a preconceived view of what life would be like as a Navy astronomer—a strict schedule and late-night observations. Instead, he delighted in the flexible arrangements. He would arrive at the Observatory on a clear evening, make observations, and return home when he desired. When he or his colleagues got tired "we would 'vote it cloudy' and go out for a plate of oysters at a neighborhood restaurant."(*9*)

But such diversions aside, Newcomb and the others put in their share of productive nights. "It was not considered safe to take an hour's sleep at the observatory. [The miasmic fogs were suspected of making several employees ill.] The result was that, if it happened to clear off after a cloudy evening, I frequently arose from my bed at any hour of the night or morning and walked two miles to the observatory to make some observation."(*10*)

Asaph Hall's miseries that sticky summer of 1862 were not all job-related and they somewhat coincided with the bad times the Union armies were suffering. The city was in an uproar. On the same field near Bull Run, the rebels again vanquished the bluecoats. This time Hall and his fellow employees could plainly hear cannon fire when the action came close to Fairfax Court House, not 15 miles to the west. Ambulances again streamed



Too close for comfort: The earthworks and some of the defenders of Fort Stevens on Washington's northern defense line. In the cleared fields just beyond the guns, Confederate skirmishers came as near as they ever would to the Nation's Capital.

across the Potomac bridges, filling already crowded hospitals to overflowing. Hall asked for time off to search them for wounded relatives or friends of the family. He brought several to the house in which he and wife Angeline were residing and there they nursed them.

In September, not a month after the second Bull Run defeat, more wounded from the Antietam battlefield arrived. It was too much for Hall. The enervating heat, the all-night observations, and his part-time role as nurse took their toll. He came down with a case of jaundice, the effects of which lasted nearly 2 years.

The following spring smallpox broke out in the vicinity and, when 40 cases of the dread disease were reported at one time, Hall sent his wife and son back to New England.

Even under such conditions Hall did credible work making observations with the 9.6-inch refractor. When Professor of Mathematics F.G. Hesse resigned in the spring of 1863, Hall applied for the position and got a little unsolicited help from his strong, self-reliant wife, who wrote her husband's boss: "If the question is one of ability, I should be more than willing that he with all the other competitors should have a thorough and impartial examination. I know I should be proud of the result. . . . I, more than any one, know of all his long, patient and faithful study."*(11)*

Not long afterward, CAPT Gilliss invited the applicant to his office to give him the good news. Smiling, he told Asaph that from then on Mrs.

Hall might address him as Professor Hall.(*12*)

Occasionally, Hall's late-night observations were interrupted by visitors. On 22 Aug 1863 President Lincoln showed up with his secretary, John Hay, and the astronomer, alone on duty, showed the Commander in Chief the Moon and Arcturus through the 9.6-inch refractor. Several nights later, says one account written years later by Hall's son, his father "heard a knock at the trap door. He leisurely completed his observation, then went to lift the door, when up through the floor the tall President raised his head."(*13*) Lincoln had come unattended through the dark streets to inquire why the Moon had appeared inverted in the telescope. Surveyor's telescopes he had once used showed objects in their true positions. Hall explained the celestial telescope's optics. He and Lincoln then chatted about astronomy for a while, and the President returned to the White House satisfied.

* * *

In July 1864 Washington had its biggest scare since the beginning of the war. Confederate General Jubal Early's troops had pushed aside a Union force near Frederick, MD, and were now at the northern approaches to the city. Only Fort Stevens, on the 7th Street Road (now Georgia Avenue) stood in their way. Able-bodied citizens, bureaucrats from government agencies, and invalid soldiers were scraped up and sent to the northern suburbs. All personnel of the War and Navy Departments were ordered out including the younger professors of the Observatory. Simon Newcomb and Asaph Hall became members of a naval brigade, the rank and file being workmen from the Navy Yard. When Angeline and son came by the Observatory on 12 July, they found a note on Professor Hall's desk explaining his absence: "I am going out to Fort Lincoln; don't know how long I shall stay; am to be under Admiral Goldsborough. We all go. Keep Cool."(*14*)

Professor Newcomb found being a soldier an enlightening experience:

> I was surprised to find how quickly one could acquire the stolidity of the soldier. During the march from the Navy Yard to the fort I felt extremely depressed, as one can well imagine, in view of the suddenness with which I had to take leave of my family and the uncertainty of the situation, as well as its extreme gravity. But this depression wore off the next day, and I do not think I ever had a sounder night's sleep in my life than when I lay down on the grass with only a blanket between myself and the sky, with the expectation of being awakened by the rattle of musketry at daybreak.(*15*)

Hearing gunfire was the closest Hall and Newcomb ever got to combat. The real clash took place at Fort Stevens. The Confederates withdrew and the Observatory professors and their momentary comrades in arms were relieved by regular troops.

The war never came so close to Washington again. By the winter of 1864-65 the siege of Petersburg was grinding to its inevitable conclusion just south of Richmond where Lee's starving army was about to make its final retreat.

National Archives

Rec'd Feb 9. 1865 N.O.M.

Bureau of Navigation,
Navy Department
Washington Feb. 9. 1865.

Sir:

In reply to your letter of this date conveying the painful intelligence of Capt. Gillis's sudden death the Bureau directs that the flag of the Observatory be hoisted at half mast.

Very respectfully,
Your obed't servt.
C. H. Davis
Chief of Bureau.

Commander
W. B. Whiting, U.S.N.
Senior Officer in charge
U.S. N. Observatory,
Washington.

9 Feb 1865: CDR William B. Whiting, senior officer in charge of the Naval Observatory, receives permission to fly the flag at half staff in respect for his late commanding officer.

James M. Gilliss

In Washington on 8 February the *Daily National Intelligencer* publicized Superintendent Gilliss' submission of a scientific report to the Secretary of the Navy. The report itself detailed a study of solar parallax Gilliss had begun years before while heading an expedition to Chile.(*16*) That evening he welcomed home his eldest son, recently freed from a rebel prison. By noon the next day CAPT James Gilliss was dead of a stroke at age 54.*

Two months later, on 7 April 1865, news reached Foggy Bottom of the fall of Richmond and the final pursuit of the Confederates. From the barracks on 23rd Street came round after round of cheers. "We thought it must be Petersburg or Richmond but hardly dared to hope which," recollected Newcomb. "I went down to the city. All the bedlams in creation broken loose could not have made such a scene. . . . I never felt prouder of my country than then. . . ."(*18*) Lee surrendered 2 days later.

The Naval Observatory and the Nation it served had survived the worst of times. James Gilliss had not. But during the 4 years he served as its Superintendent, his wise and vigorous leadership seemed to have turned things around. He took over a facility in which astronomy had seemed an afterthought and, even with the distractions of war, was able to inject both the science and the institution with new life. Years of unpublished observations were now in print, an experienced and capable staff was in place, and with peace at hand, the Observatory's golden age was about to begin.

*The death certificate listed "serious apoplexy," but the attending Navy surgeon attributed the underlying cause to the Observatory's site, "a locality noted for its insalubrity."(*17*)

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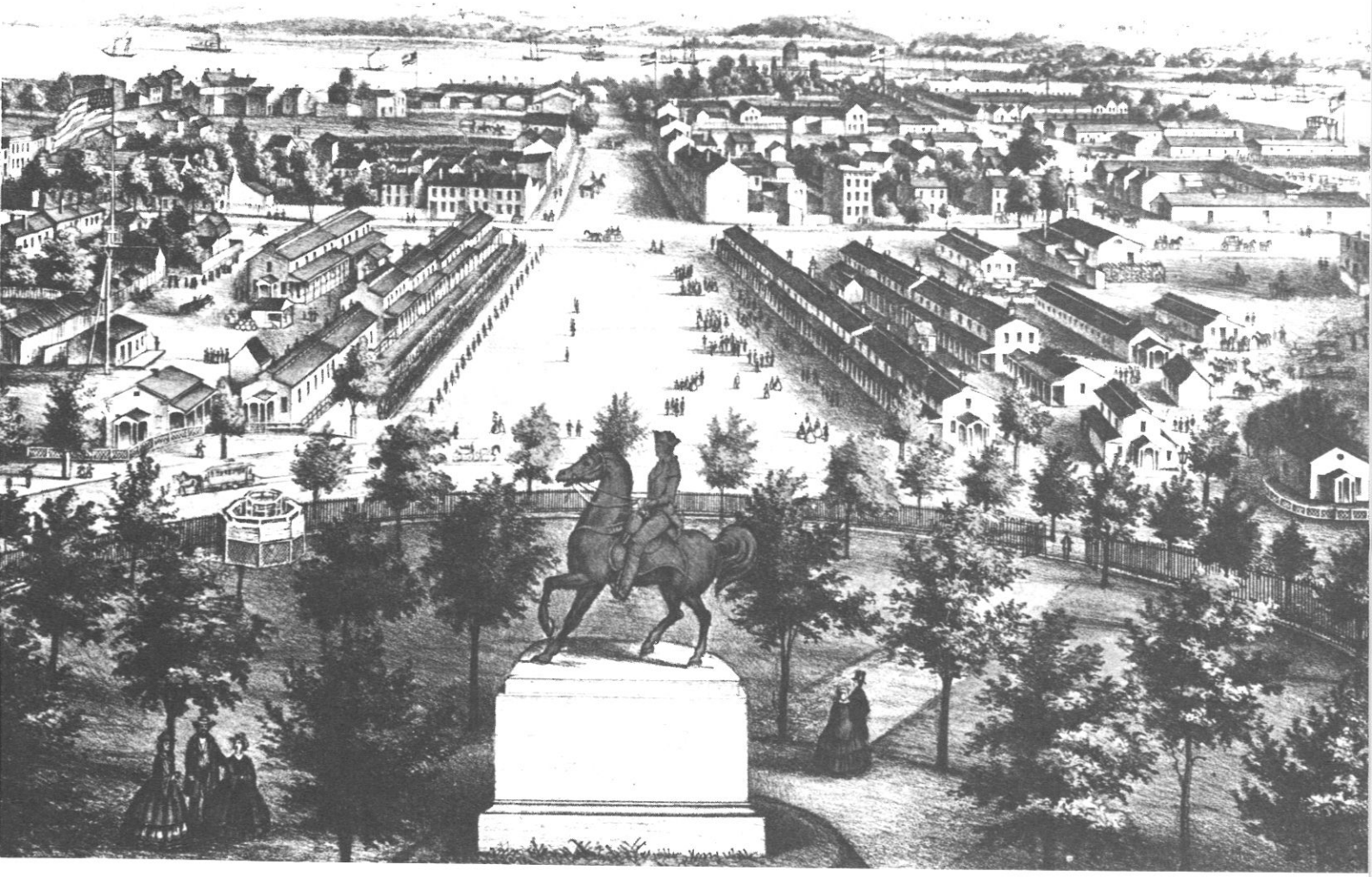


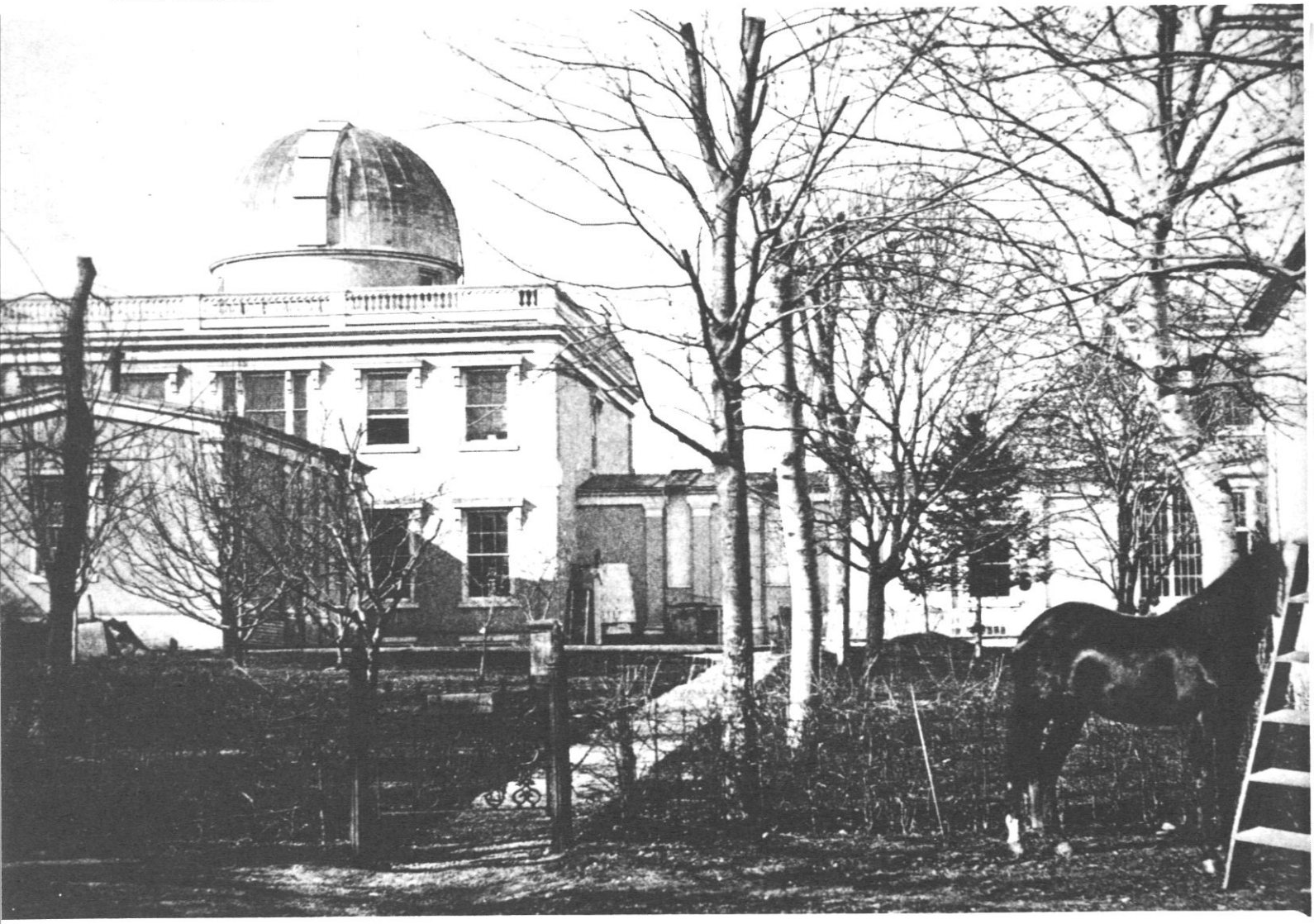
Foggy Bottom in 1865 looking down 23rd Street from Washington Circle. The Observatory dome is in the right background.

Columbia Historical Society

Some of the Observatory's wartime neighbors: Troops of the 9th Veterans Reserve Corps in formation outside their Camp Fry barracks near Washington Circle.

Columbia Historical Society

Columbia Historical Society



The Observatory as it looked at the end of the Civil War.

The Golden Age (Part I)

The Civil War was over. Under a covered pavilion in front of the White House, President Johnson and GEN Grant reviewed the victorious armies as they passed in a last grand parade.

It was May 1865. Abraham Lincoln was dead and the plotters of his assassination were on trial for their lives at Washington's old Penitentiary.

On Observatory Hill, the Superintendent's residence had just received a new tenant, RADM Charles H. Davis. He, like his predecessors Maury and Gilliss, was a man of science. Although not an astronomer, he had published several articles concerning the relationship of geology on tides and currents. Before the Civil War, he served as Superintendent of the American Ephemeris *and the* Nautical Almanac, *key publications for navigators.*

During the next 12 years, under Davis' guidance and that of his successor, Commodore and later RADM B.F. Sands, the Observatory became renowned throughout the world. Many of its astronomers became active members of the National Academy of Sciences, an organization Davis helped found in 1863.

As an internationally recognized institution, the Observatory dispatched its scientists to Europe, Siberia, Gibraltar, Sicily, and remote locations in the United States to observe solar eclipses.

To record the transit of Venus across the face of the Sun 4 years later, eight well-trained and -equipped teams journeyed to Peking, Nagasaki, Vladivostok, Tasmania, New Zealand, Chatham Island in the South Pacific, and a remote whaling station, Kerguelen Island, in the South Indian Ocean.

In 1876 the Observatory helped the United States celebrate its 100th birthday in Philadelphia, proudly displaying evidence of its scientific achievements alongside those of the young Nation it represented.

The Observatory's correspondents, project co-sponsors, and visitors constituted a who's who of the world scientific community—Joseph Henry, Secretary of the Smithsonian Institution and President of the National Academy of Sciences; Henry Draper, innovator in celestial photography; U.J.J. Leverrier, discoverer of the planet Neptune; Samuel P. Langley, solar investigator and pioneer in manned flight; Louis Agassiz, Swiss-born naturalist and Harvard College professor; John Wesley Powell, explorer of the Colorado River and first head of the U.S. Geological Survey.

Accurate timepieces calibrated from periodic astronomical observations made by its astronomers marked standard time for the Nation's railroads and many of its cities.

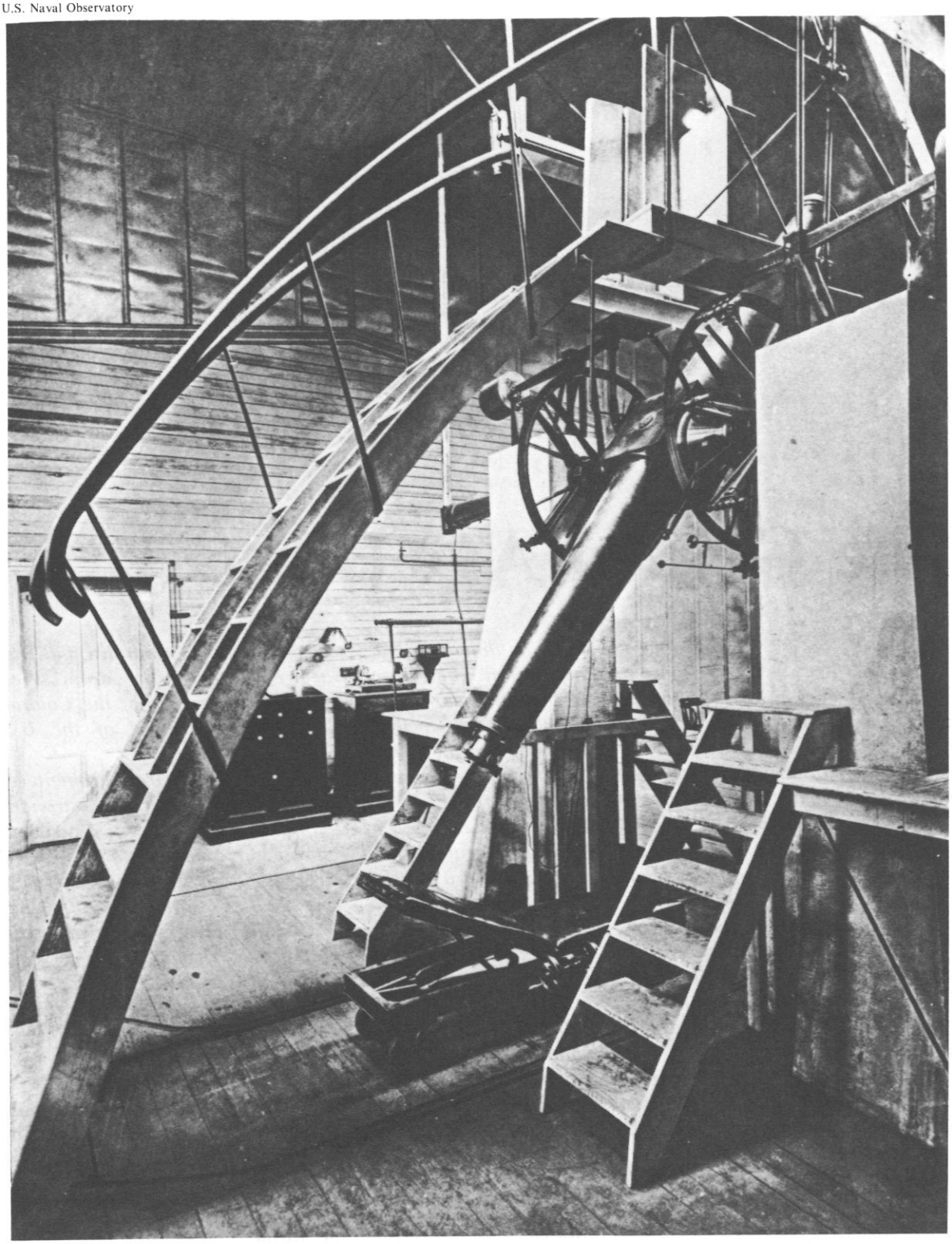
Surmounted by the Washington Time Ball, the Observatory's 9.6-inch telescope dome served as the central reference point by which were determined the longitudes of Havana, Cuba, Princeton, NJ, Bethlehem, PA, Detroit, MI, St. Louis, MO, Ogden, UT, and Carlin, NV.

The next two chapters detail the Observatory's golden age—a glorious era of achievement for American science in which Observatory Hill played a central role.

The New Superintendent

When James Gilliss died suddenly in February 1865, Charles Davis was already a rear admiral, Chief of the Bureau of Navigation, and Gilliss' supervisor. Even though he saw action during the war in the blockade fleet and with David Farragut at Vicksburg, he was a scientist first and fore-

U.S. Naval Observatory



Simon Newcomb saw the installation of the new Transit Circle as the greatest event in the history of the Observatory.

U.S. Naval Observatory

RADM Davis

most. In May 1865 Davis appointed himself Superintendent of the Observatory.

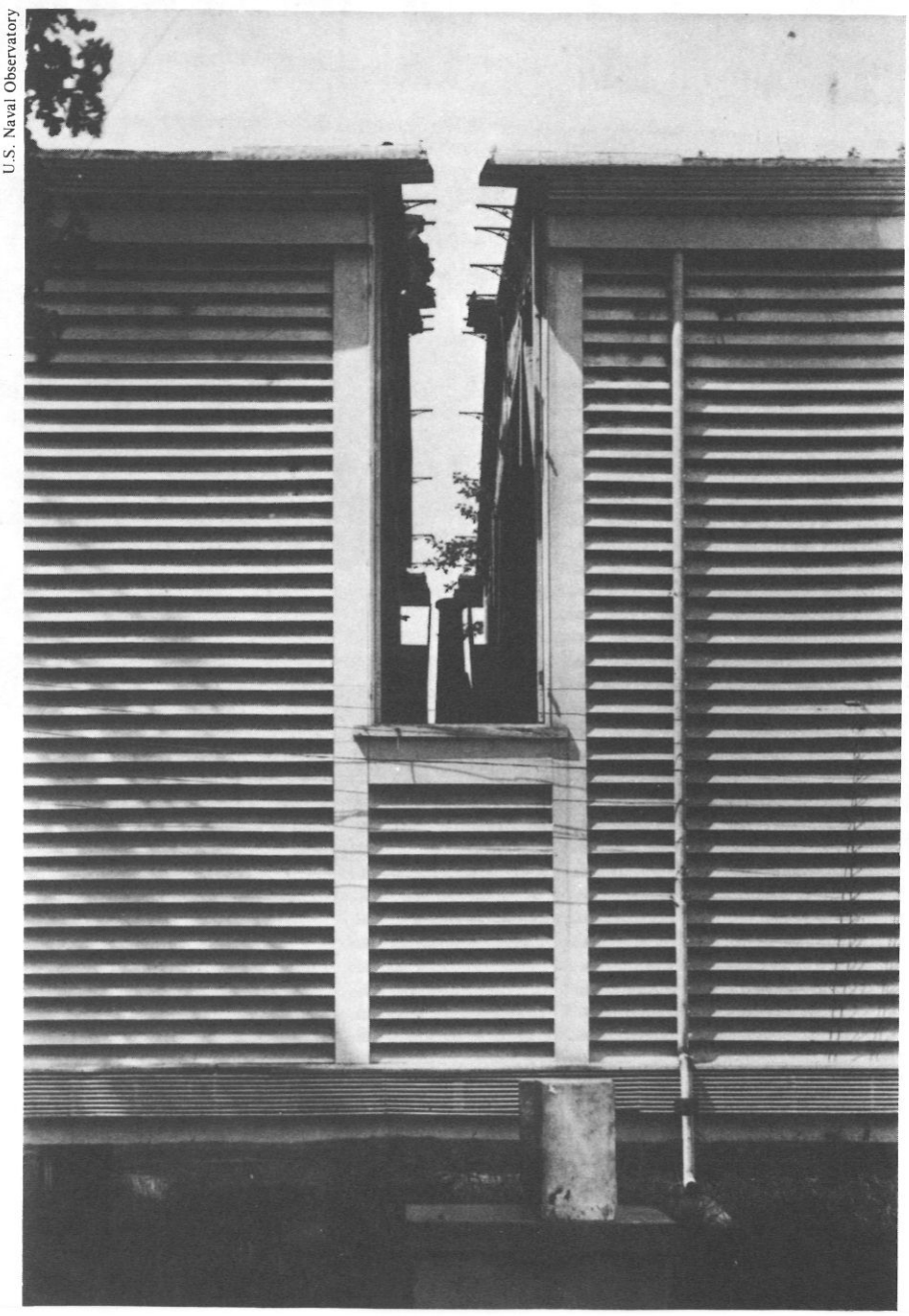
With the end of the war, the institution's role was to change. As early as August 1862, the Navy's scientific departments related to hydrography, astronomy, navigation, and surveying had been consolidated under the Bureau of Navigation. In 1866 the Hydrographic Office was formally separated from the Observatory and moved elsewhere in the city. Naval chronometers continued to be rated, and meteorological observations continued, but astronomy would never again be eclipsed by the creation and dissemination of sailing directions, wind and current charts, and other aids to navigation.

The dour-looking, bewhiskered Davis saw himself as the administrator of a full-time scientific establishment. He quickly passed out new assignments. Although Professor James Ferguson was in charge of the 9.6-inch refracting telescope, Professors Asaph Hall and John R. Eastman spent much of their time alternating in the observer's chair studying newly discovered asteroids.

Professor Mordechai Yarnall took charge of the east wing transit and mural circle. In the adjacent room LCDR Andrew W. Johnson, in addition to his routine duty of winding and rating chronometers, maintained the history of each instrument from the date of its manufacture and purchase by the Navy. Because the Observatory's time-keeping function had expanded, Johnson was responsible for insuring the accuracy of the mean-time standard clock based on periodic celestial observations, and overseeing the Observatory's growing timekeeping and time distribution functions. And each day at noon, Johnson activated the time ball.

When Professor Eastman was not observing with the 9.6-inch telescope, he was a meteorologist. This meant observing the mercury barometer; dry, wet-bulb, and Sun thermometers; wind vane; and rain gauge. These instruments, but for the latter, had to be observed every 3 hours beginning at midnight. Eastman read them himself or assigned the duty to subordinates.

U.S. Naval Observatory

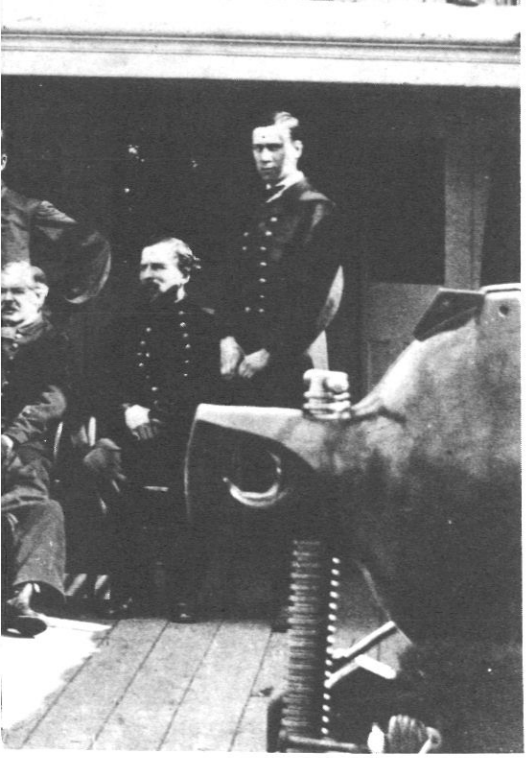


The louvered exterior of the new Transit Circle annex with its observing slit open. The instrument is visible in the center.

Transit Circle

The celestial instruments, although serviceable, had not kept up with the

U.S. Naval Observatory



Off to Siberia: Officers of USS Mohican *and their guest, Professor Asaph Hall (in chair, second from left), depart for Plover Bay on the Bering Sea, where Hall would observe the solar eclipse of 1869.*

Right: From this improvised observatory at Des Moines, IA, Simon Newcomb, William Harkness, and John Eastman observed the same eclipse.

times. Gilliss knew this back in 1863 when he contracted with the German optical firm of Pistor and Martins for a transit or meridian circle, a versatile instrument that could determine precisely the fundamental positions of stars and planets.

Now it had arrived and the staff eagerly uncrated its components. Workmen had already removed the old meridian transit in the west wing and enlarged the structure by adding two large bays on the north and south sides. Under close supervision, they began mounting the new instrument on 23 Oct 1865, finishing the job 16 days later.

Professor Simon Newcomb could scarcely contain his excitement. He saw the mounting as the greatest event in the Observatory's history. American astronomers never again would have to rely on fundamental star positions established in Europe. By the beginning of 1866 the Observatory was truly on a par with the observatories in Greenwich and Paris.

Less than 2 years later, the brick transit circle room had become inadequate and a larger structure was therefore added to the west wing. It was a peculiar looking annex, its walls being made of tinned sheet iron only one fifteen-thousandth of an inch thick and covered on the outside by wooden slats to shade it from the Sun and help maintain equal inside-outside temperatures.(*1*)

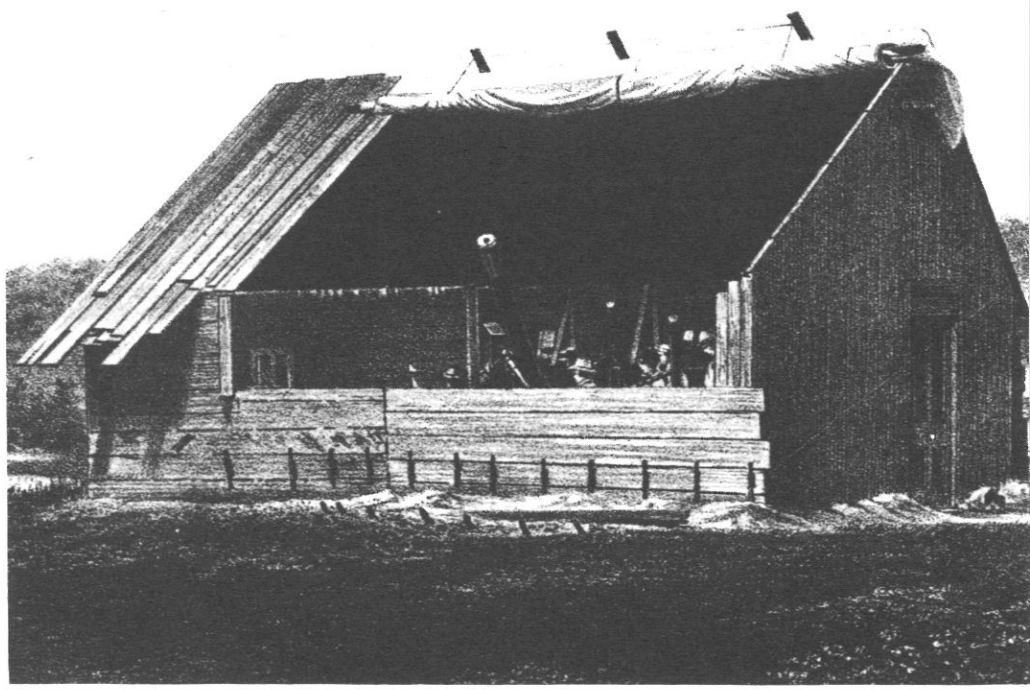
The old west wing became the new library and Professor Joseph E. Nourse its part-time librarian. From the original core of books purchased by Gilliss in Europe years before, the collection had grown to nearly 5,000 volumes. Many came from Gilliss' personal library and were donated by his widow.

Commodore B.F. Sands

Overseeing the institution's expanded operations was Commodore Benjamin F. Sands; RADM Davis had been recalled to sea duty in May 1867. The Observatory was not new to the 55-year-old Navy veteran. He had served there under Maury for 3 years before getting a sea command. Sands was neither an astronomer nor a true scientist, but had a sincere interest in oceanography that led to his invention of a deep-sea sounding instrument.

His Civil War career was an active one. In April 1861 he led the party that set fire to the Gosport Navy Yard at Norfolk. During the operation USS *Merrimack* was burned to the water-

U.S. Naval Observatory



line. He served in the Atlantic blockade squadron and participated in the final assault on Fort Fisher, NC, in December 1864. When the last Confederates surrendered on the Texas Gulf Coast on 2 June 1865 they did so aboard CAPT Sands' ship.(*2*)

A kindly, Merlinesque man in appearance, Sands prided himself on giving credit to his scientists when it was due. He supported both his military and civilian colleagues equally and pleaded their cause whenever he could.

The ambitious publication program begun under Gilliss and promoted by Davis continued under Sands. By 1876, when Davis was again Superintendent, the Observatory had published over 60 volumes of astronomical and meteorological observations, sailing directions, fundamental star positions, expedition reports, and longitude determinations.(*3*)

Eclipse Expeditions

To be a truly effective scientific laboratory, the Observatory's work could not be confined to its Washington headquarters. Studying astronomical phenomena such as lunar and solar eclipses and planet transits meant that well-equipped teams had to travel to wherever those events could best be observed. A rare opportunity to witness a total solar eclipse was to occur on 7 Aug 1869. Commodore Sands lobbied for and obtained a special appropriation to equip and dispatch two teams to observe the phenomenon.

Asaph Hall and an assistant proceeded to Panama, crossed the isthmus by train, then sailed aboard a waiting naval vessel. They arrived at their destination, Plover Bay, on the east coast of Siberia on 30 July, set up their instruments, and waited for the weather to clear.

August 7th dawned cloudy and the disappointed astronomers got but a glimpse of what they had traveled half the world to see. Hall, normally the detached scientist, was moved by what he did see.

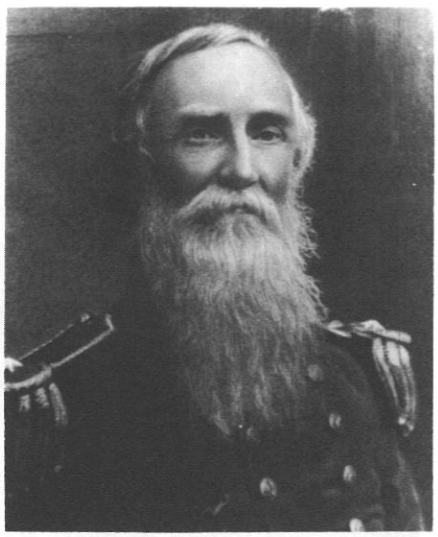
> About an hour before the beginning of the eclipse low cumulus clouds drifted rapidly from the west over the sky. As the clouds passed toward the east the partial eclipse was occasionally seen through the openings. On the approach of the total eclipse everything became hushed and still; the sea birds stopped their flights and the Indians huddled together in awe. As the shadow passed over the mountain the effect was startling. In the stillness and darkness of the moment it seemed as though all life had been swept from the earth. The fearful gloom of total eclipse was increased by the desolate appearance of the country, without tree or shrub, or anything pleasant to the eye.(*4*)

The other solar eclipse team of Professors Simon Newcomb, William Harkness, and John Eastman was more successful. After practicing for their expedition in a temporary wooden structure set up on Observatory Hill, they traveled by train to Des Moines, IA, and were treated to a clear August 7th. They observed and photographed the eclipse and brought back much useful data.

Mr. F.W. Bardwell, an Observatory aide, observed the eclipse from Bristol, TN.

As soon as the teams returned to Washington they began preparing for the total solar eclipse of 22 Dec 1870. This time the expedition took them to Europe. Newcomb made his observations near Gibraltar. Hall, Harkness, Eastman, and Professor Benjamin

U.S. Naval Observatory



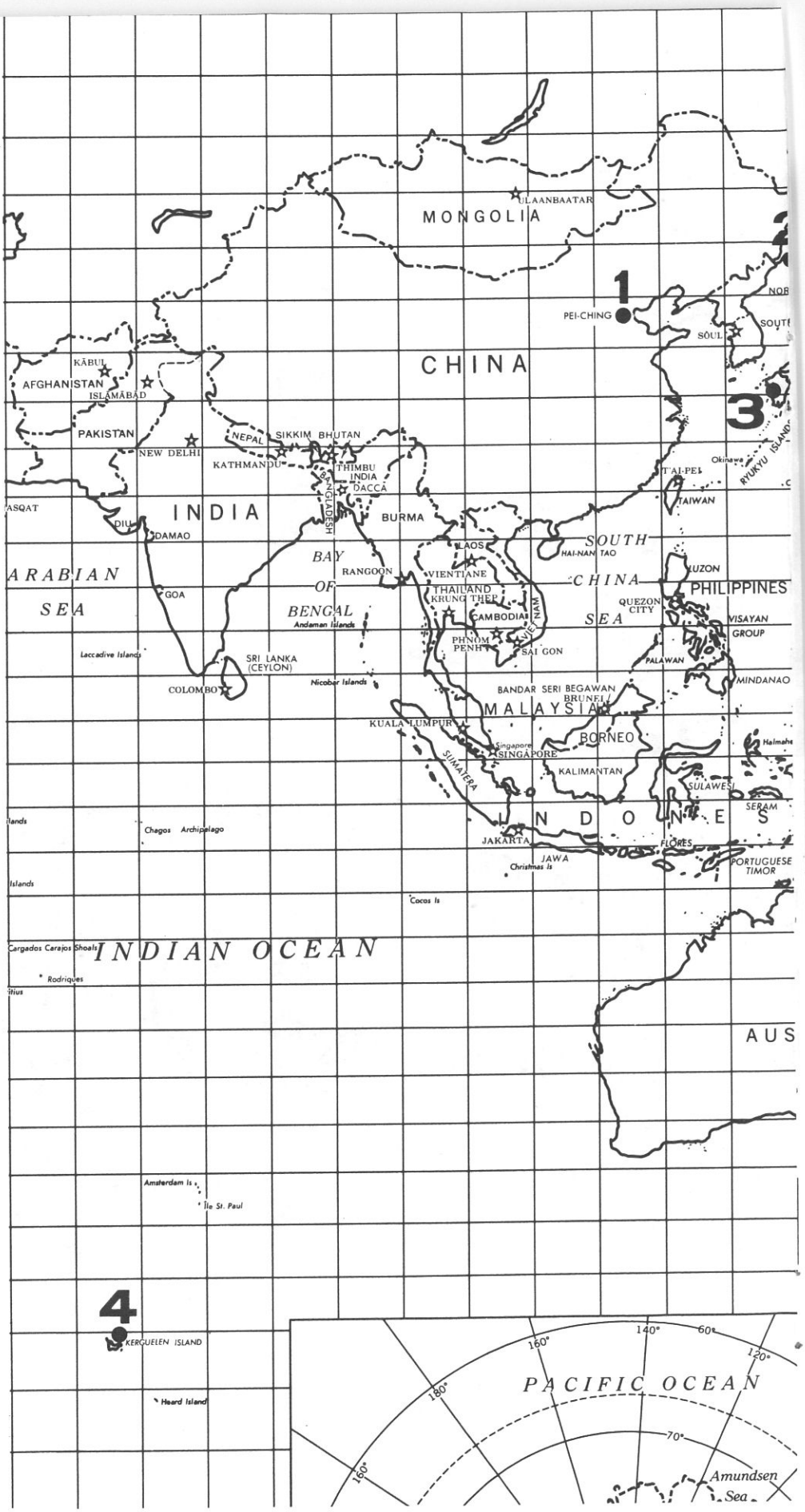
Commodore Sands

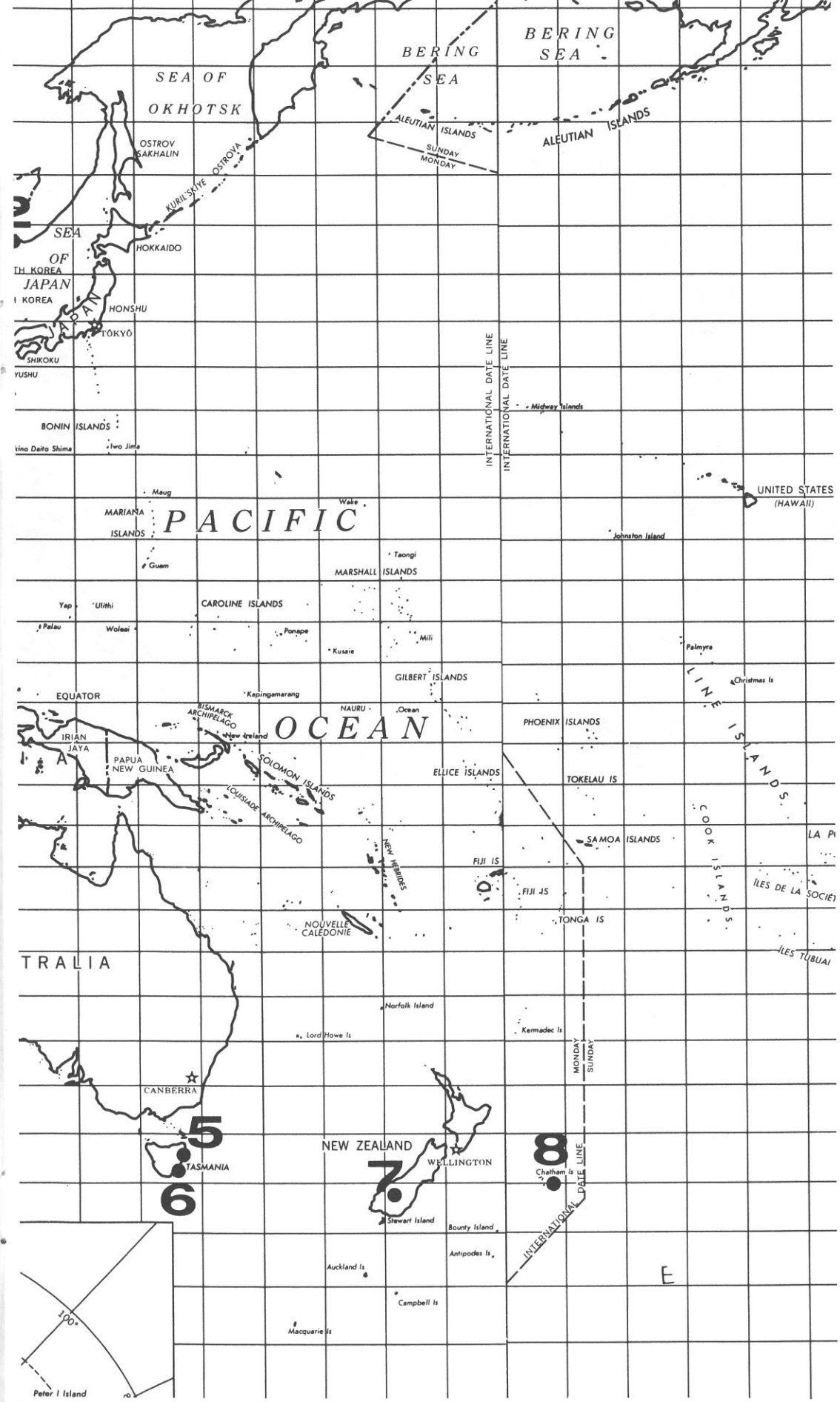
Spring 1874: The Transit of Venus Commission and field expedition members take time from their training for a group portrait near the dome of the newly built 26-inch refractor dome. RADM Davis stands near the heliograph at left; Professor Newcomb, in hat, is seated on stool nearby.

U.S. Naval Observatory

Transit of Venus Teams
8 Dec 1874

1. *Peking*
2. *Vladivostok*
3. *Nagasaki*
4. *Kerguelen Island*
5. *Campbell Town*
6. *Hobart Town*
7. *Queenstown*
8. *Chatham Island*




BERING SEA
BERING SEA
SEA OF OKHOTSK
ALEUTIAN ISLANDS
ALEUTIAN ISLANDS
SUNDAY
MONDAY
OSTROV SAKHALIN
KURIL'SKIYE OSTROVA
SEA OF JAPAN
HOKKAIDO
HONSHU
TOKYO
SHIKOKU
BONIN ISLANDS
Iwo Jima
INTERNATIONAL DATE LINE
INTERNATIONAL DATE LINE
Midway Islands
UNITED STATES (HAWAII)
MARIANA ISLANDS
PACIFIC
Maug
Wake
Johnston Island
Guam
Taongi
MARSHALL ISLANDS
Yap
Ulithi
CAROLINE ISLANDS
Palau
Woleai
Ponape
Kusaie
Mili
Palmyra
GILBERT ISLANDS
Christmas Is
EQUATOR
Kapingamarang
NAURU
Ocean
OCEAN
PHOENIX ISLANDS
LINE ISLANDS
IRIAN JAYA
BISMARCK ARCHIPELAGO
New Ireland
PAPUA NEW GUINEA
SOLOMON ISLANDS
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TOKELAU IS
LOUISIADE ARCHIPELAGO
SAMOA ISLANDS
COOK ISLANDS
NEW HEBRIDES
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FIJI IS
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NOUVELLE CALEDONIE
TONGA IS
ÎLES TUBUAI
Norfolk Island
Lord Howe Is
Kermadec Is
MONDAY
SUNDAY
CANBERRA
5
NEW ZEALAND
WELLINGTON
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TASMANIA
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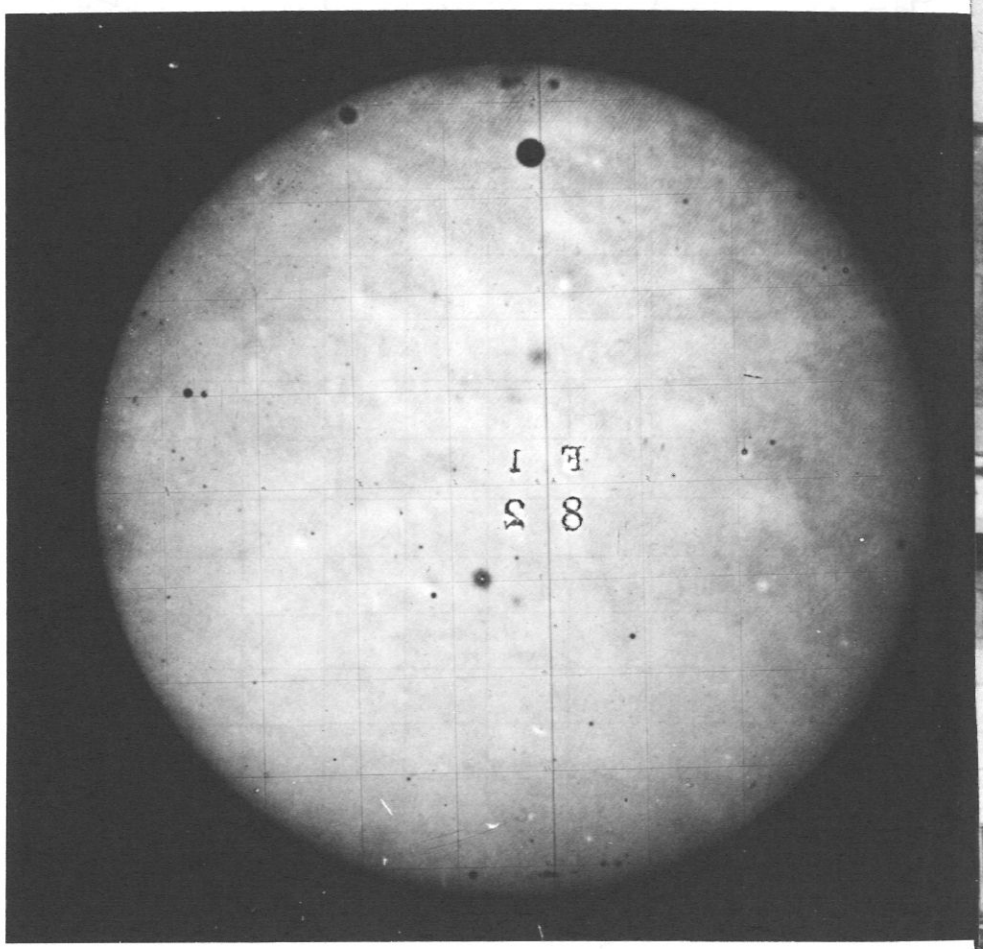
Auckland Is
Campbell Is
Macquarie Is
180°
Peter I Island



U.S. Naval Observatory

The eight Transit of Venus teams recorded the event, taking over 200 photographs by the wet plate process. None are known to have survived. These two, probably taken during the Transit of 1882, show tiny Venus crossing the Sun.

Peirce of the Coast Survey made theirs at Syracuse, Sicily.

Weather again played the spoiler. Newcomb had only limited success. An hour before the event "the southern heavens were covered with clouds, mist, and fog, which came in from the Atlantic."(5) Then came the drizzle, followed by partial clearing when the Sun and the Moon's shadow flitted in and out of view.(6)

The main object in studying the eclipse was to observe and record the structure of the Sun's corona and determine the path of the Sun's shadow across the Earth. As with the previous year's eclipse the Observatory's astronomers met with limited success.

Transit of Venus

A year later preparations began for a celestial event that had not occurred in 105 years; the planet Venus was to transit the Sun on 8 Dec 1874. Eight nations planned either to conduct local observations or to send expeditions to where the transit could best be witnessed.

The Observatory's scientists hoped to measure accurately the distance from the Earth to the Sun by timing Venus' trip across the solar disk at several scattered locations in the far Pacific.

A Transit of Venus Commission was established made up of RADM Sands; Joseph Henry, Secretary of the Smithsonian Institution and President of the National Academy of Sciences; Professor Benjamin Peirce, Superintendent of the Coast Survey; and Professors of Mathematics Newcomb and Harkness from the Observatory.

Eight teams had to be recruited and trained to use instruments especially designed to photograph and measure the transit.

The equipment was ready by the spring of 1874. The eight parties, each consisting of a chief, an assistant astronomer, and three or four photographers, gathered on the Observatory grounds, where they learned to use the eight portable Transit of Venus stations.

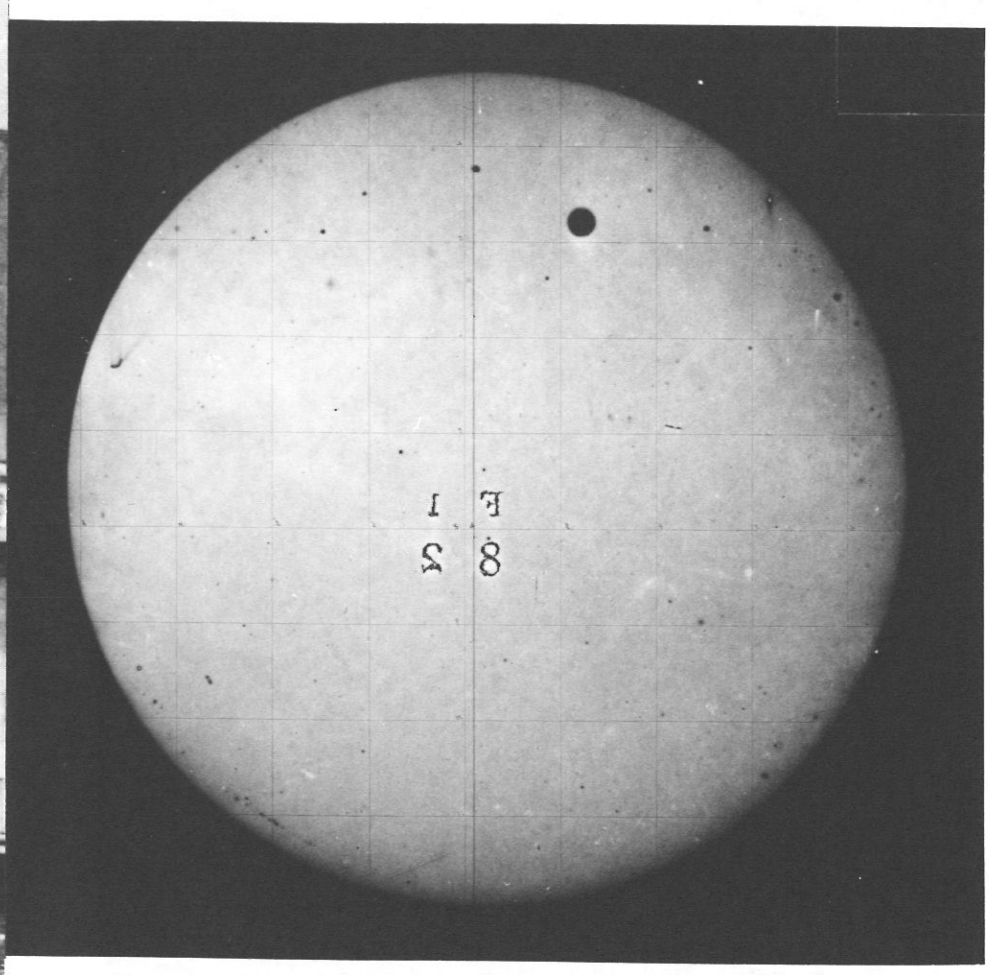
In June the expeditions embarked. The five southern hemisphere parties left for their final destinations—Kerguelen Island in the South Indian Ocean; Campbell Town and Hobart Town, Tasmania; Queenstown, New Zealand; and Chatham Island, 550 miles east of New Zealand.

The northern hemisphere parties left from San Francisco for Nagasaki, Peking, and Vladivostok.

By December, all teams were in place but weather again spoiled the results. On the day of the transit clouds and rain greeted some of the southern hemisphere teams. Those in the northern hemisphere were somewhat luckier, observing the transit both visually and photographically.

The expeditions returned with their data almost a year after setting out, but because additional money had not been appropriated, the Transit of Venus results were never published.*

*Another Transit of Venus visible on the east coast of the United States occurred in 1882 but, by then, more accurate means had been developed to determine the Sun's true distance.



U.S. Naval Observatory

The Observatory's scientists had literally traveled to the ends of the Earth to observe celestial phenomena, often with disappointing results. Now they would not always have to go so far to make dramatic, new discoveries. The largest and most powerful telescope in the world had just been installed on Observatory Hill.

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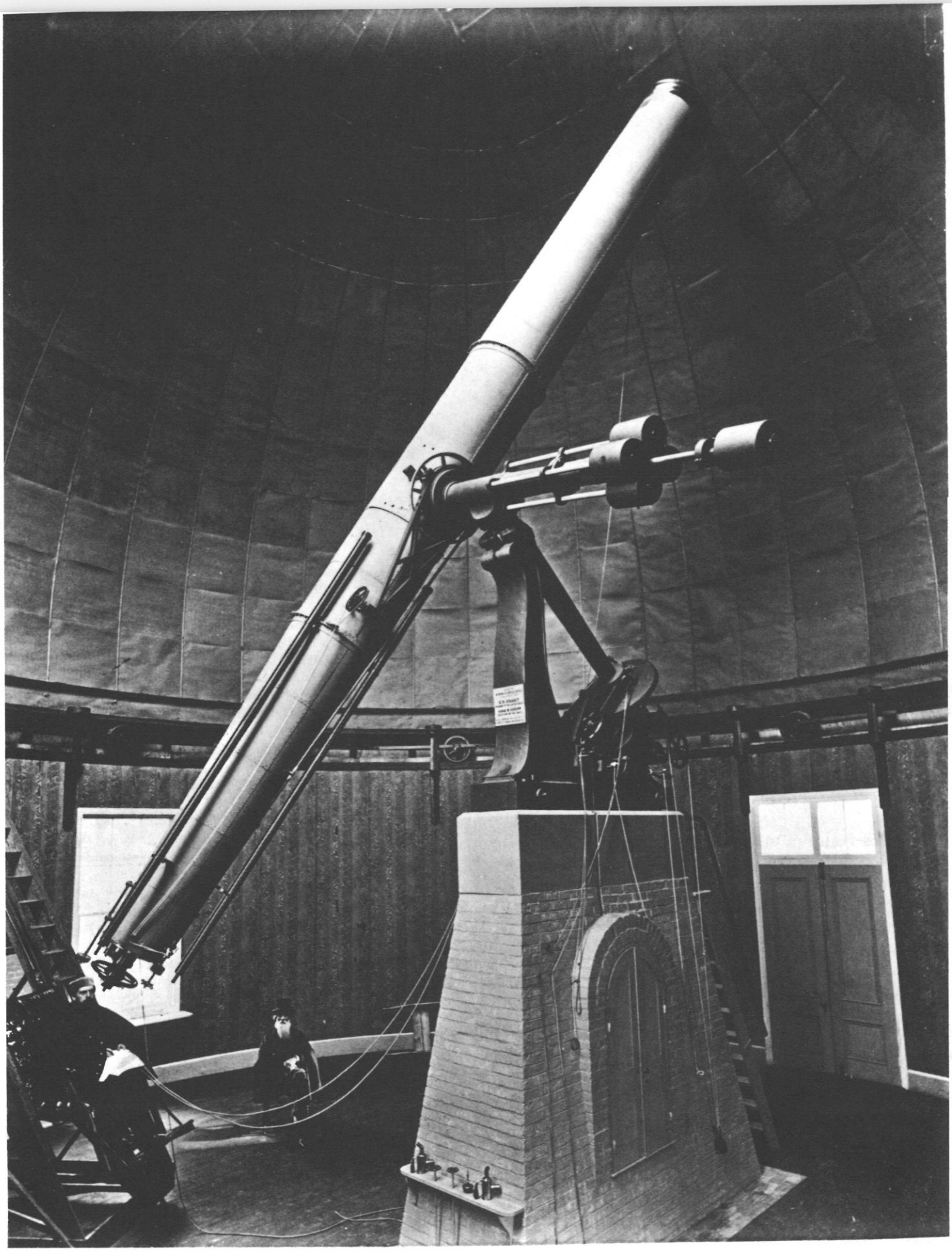


U.S. Naval Observatory

The 26-inch Great Equatorial soon after its installation in November 1873. RADM Sands is seated to the left of the pier. Professor Newcomb is at the eyepiece.

The Golden Age (Part II)

A soft midsummer night, we stood upon the roof of the United States Observatory . . . . To our right was Georgetown; beyond Arlington Heights, and House; before us the Potomac, winding on to Alexandria; above us the fathomless heavens, the waxing moon and silent stars. Professor Harkness moved an axle; the great revolving dome turned round and parted; the great telescope was pointed to the opening, and the broad seam of sky visible between. We mounted the perch, and there were the mountains in the moon! their jagged edges, their yawning craters, yet only for a moment; for earth and moon are swift travellers. In a moment Madame Moon had outstripped our point of vision, and we had to pursue her.

Just before us was the unfinished dome of another observatory, wherein will soon be placed the largest telescope in the world.(*1*)

Such was the vivid nighttime experience of Mary Clemmer Ames, one of the Observatory's many visitors. Even as she marveled over the Moon's stark topography, the large telescope she spoke of—the "Great Equatorial"—was being completed in the workshop of Alvan Clark & Sons of Cambridgeport, MA.

The Great Equatorial

The story of how the Observatory acquired the largest refracting telescope in the world begins with Simon Newcomb. In 1868 Newcomb insisted that the Observatory's 9.6-inch refractor, already 25 years old, was obsolescent; its small-diameter objective lens simply could not discern many distant celestial objects. Superintendent Sands concurred. In fact, many colleges, observatories, and even private individuals owned telescopes far superior in optics and power. "This will seem the more remarkable," wrote the Superintendent in the Observatory's Annual Report of 1868, "since the most successful living constructor of telescopes is an American—Alvan Clark, of Cambridge, Massachusetts."(*2*)

Sands had not overstated his case. Clark and his two sons were among the most skilled makers of optical instruments on any continent. They had ground objective lenses for telescopes in both Europe and America and, before the century would close, the Clarks were to manufacture objectives for the world's largest refractors five separate times.(*3*) The last—the 40-inch Yerkes—has never been surpassed.

The new telescope would not be inexpensive. The $40,000 in gold the Clarks asked was more than the Navy could afford. Sands set forth on an intensive lobbying campaign with "the proper committees in Congress through the scientific associations throughout the country, and secured the necessary sanction, and in time the appropriations therefor."(*4*)

By June 1870 powerful Capitol Hill friends of the Observatory had engineered a special appropriation through Congress calling upon their colleagues' patriotism to insure that American scientists would have the finest—and largest—telescope ever produced.

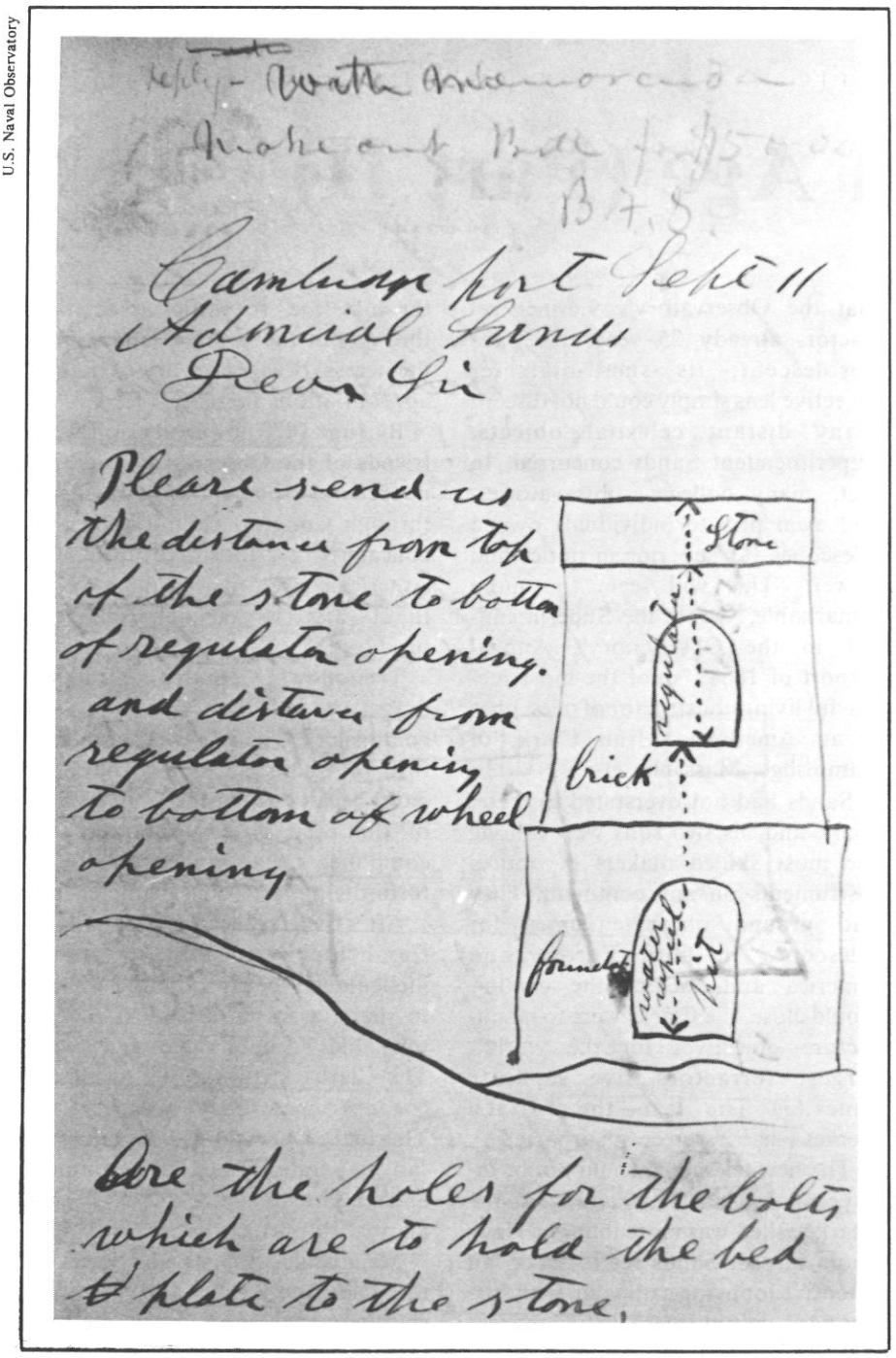
The following month a contract was drawn up with the Clarks and work commenced. The English glassmaking firm of Chance Brothers and Company began casting the rough blanks of flint and crown glass, the two components that would be mated to form the huge 26-inch diameter lens.

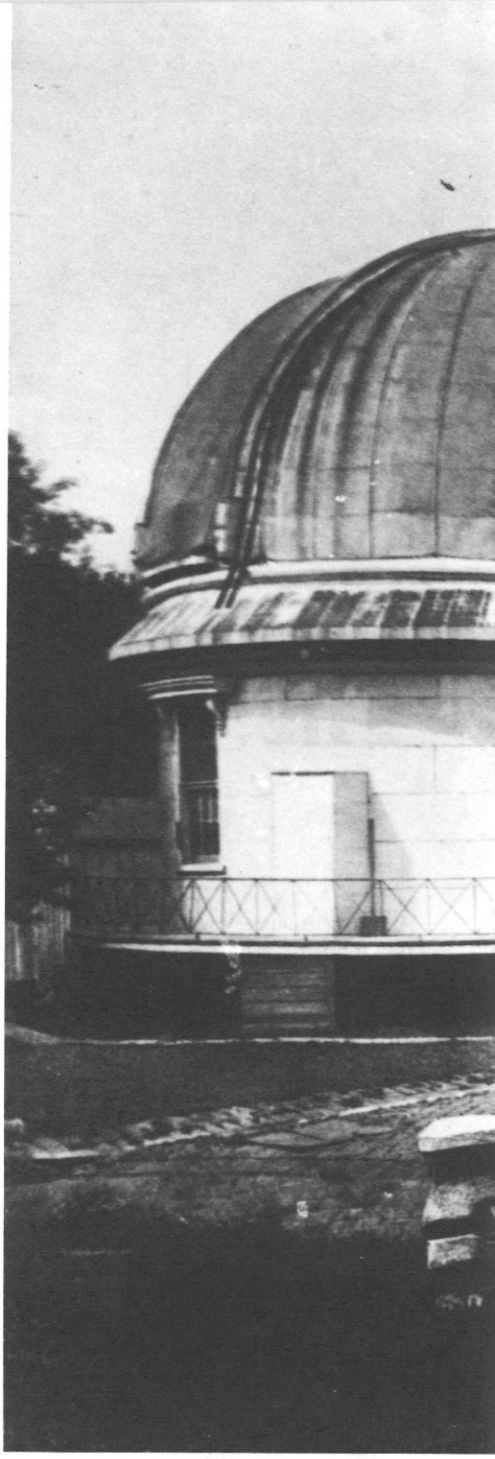
After the glass arrived at the Clarks' Cambridgeport shop, craftsmen meticulously began grinding the lens to shape at steam-driven, horizontal turntables resembling potter's wheels. The Clarks knew the significance of the instrument they were creating. They built a new shop and a vault with "an elaborate system of telegraphic and automatic fire and burglar alarms" to protect the treasure.(*5*)

Meanwhile, designs and ideas for the telescope's tube and mounting shuttled back and forth between

Below: The Clarks ask Superintendent Sands for the dimensions of the pier that will support the Great Equatorial. Right: This round building, dome, and extension were added to the south wing to house the instrument.

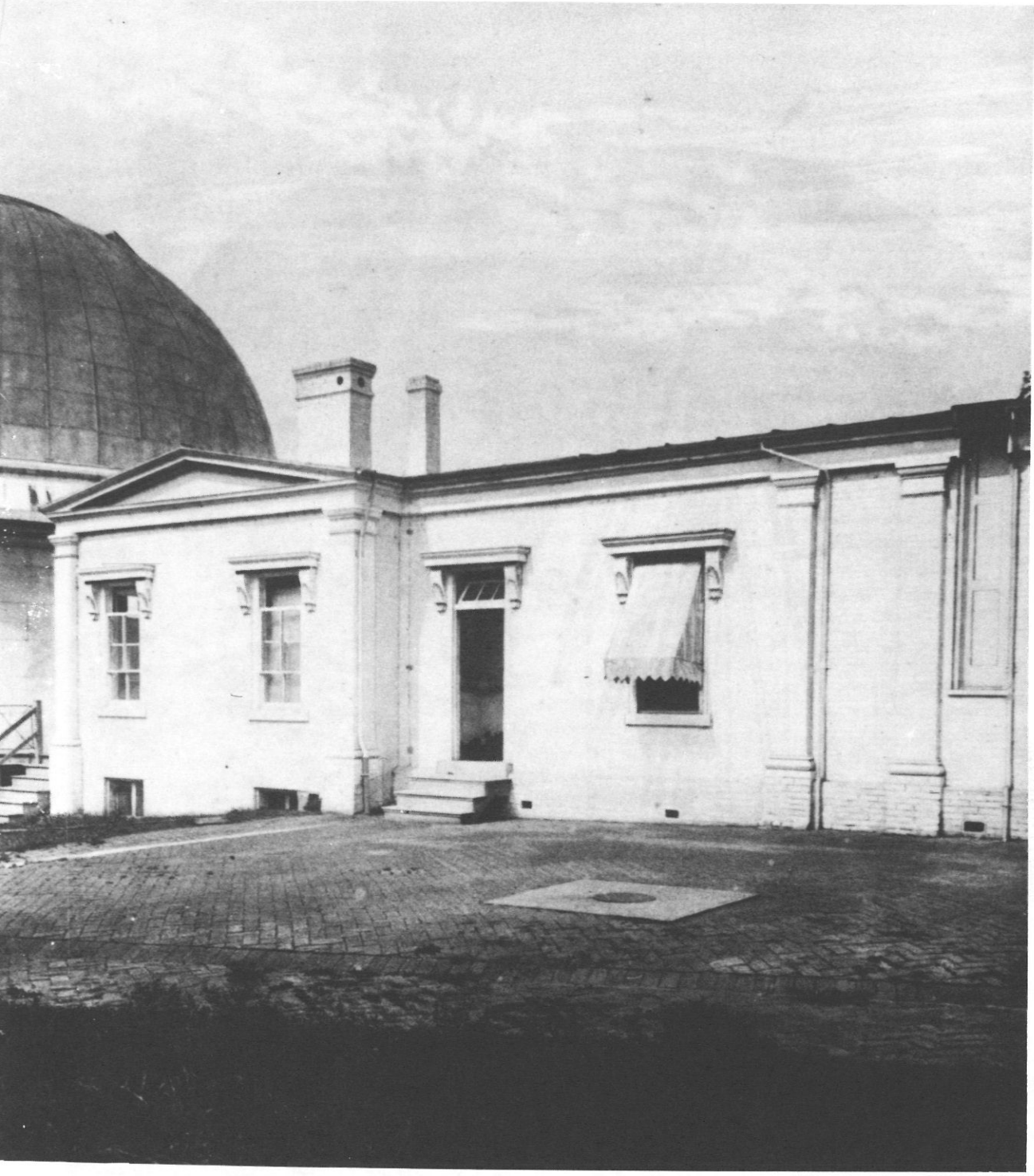
U.S. Naval Observatory





Cambridgeport and Washington. Even as Newcomb went to Massachusetts to inspect the instrument, workmen at the Observatory were building an extension and dome off the south wing to house it.

The foundation for the new dome, made of rubble stone, was 43 feet in diameter; its walls were 2 feet thick. The dome, itself 41 feet in diameter inside, had a wooden framework covered on the outside by sheets of galvanized iron and on the inside by

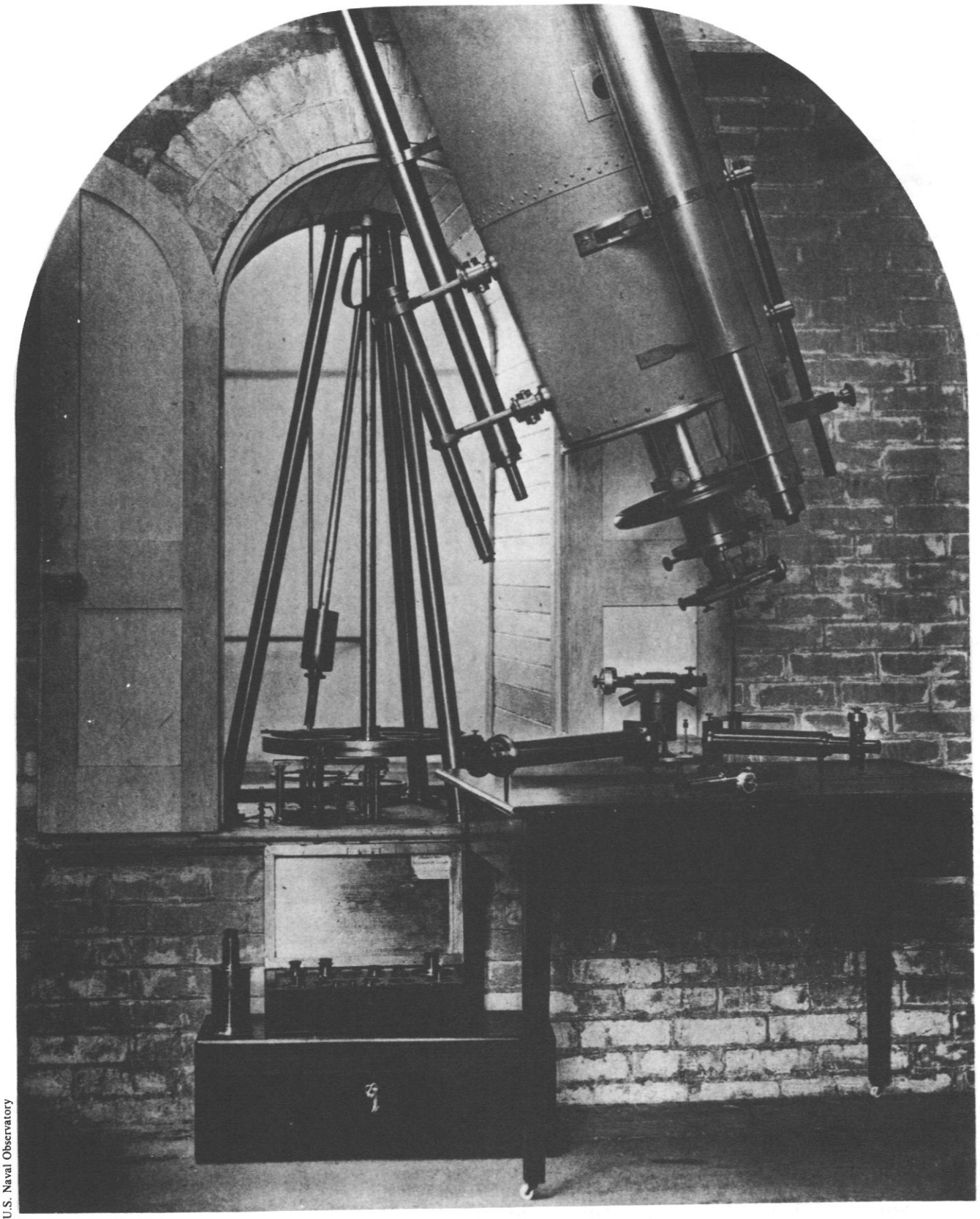


U.S. Naval Observatory

canvas soaked with several coats of soluble glass to act as a flame retardant. The whole rested and revolved upon 16 rollers moving on iron rails.(*6*) The 6.5-foot-wide observing slit was closed to the weather by a canvas shutter 43 feet long and made of surplus canvas sailcloth waterproofed with linseed oil.(*7*)

In November 1873 the Clarks delivered their masterpiece a full 2 years ahead of schedule and the Observatory marked the final assembly and mounting with a celebration attended by many distinguished civilian and military guests.

The new acquisition was appropriately dubbed the Great Equatorial. A stone and brick pier surmounted by a single sandstone block weighing about 2 tons extended 18 feet below ground level. This sturdy foundation supported the 32-foot-long telescope and its 1¼-ton, harp-shaped, cast iron mount.(*8*) The clock drive, invented by Newcomb, allowed



U.S. Naval Observatory

Details of the Great Equatorial's clock drive: The equatorial mounting and sophisticated drive enabled astronomers to track a star or planet across the sky with ease.

the telescope to track automatically the movement of a star or planet across the sky. The driving power came from a uniquely designed turbine actuated by water drawn from the city water pipes.(*9*)

The telescope's size and ability to penetrate the heavens made it an object of wonder not only for Newcomb and his colleagues but for the general public as well. Almost immediately, letters from the curious began pouring in, most begging for just a few moments at the eyepiece. With the exception of government officials and visiting dignitaries, the Superintendent politely discouraged evening visits in order to limit interruptions to his observers.*

The Observatory's reputation, now enhanced by the Great Equatorial, grew steadily and was such that the first reigning monarch ever to visit the United States put that institution at the top of his Washington itinerary.

Centennial Expo 1876

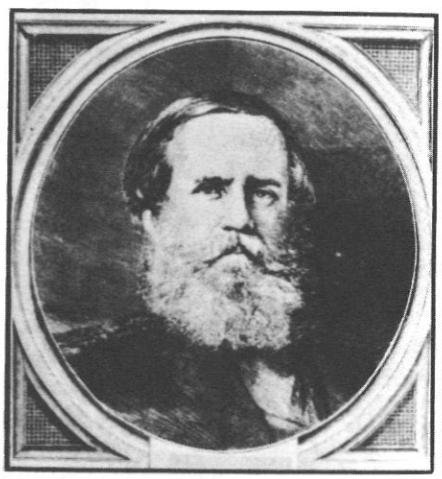
Emperor Dom Pedro II of Brazil chose America's 100th birthday to visit the United States and take part in the Centennial Exposition being held in Philadelphia. A tall, dignified man with a keen intellect, Dom Pedro had a passion for science. He arrived in Washington on 7 May 1876 and visited Observatory Hill that very night. Simon Newcomb remembered the event:

> The carriage drove up at the appropriate hour, and its occupant was welcomed by the admiral [Davis]** at the door with courtly dignity. The visitor had no time to spend in preliminaries; he wished to look through the establishment immediately . . . .
>
> The only evidence of the imperial will came out when he reached the giant telescope. The moon, near first quarter, was then shining, but the night was more than half cloudy, and there was no hope of obtaining more than a chance glance at it through the clouds. But he wished to see the moon through the telescope. I replied that the sky was now covered, and it was very doubtful whether we should get a view of the moon. But he required that the telescope should be at once pointed at it. This was done, and at that moment a clear space appeared between the clouds. I remarked upon the fact, but he seemed to take it as a matter of course that the cloud would get out of the way when he wanted to look . . . . (*10*)

President Grant and the Emperor opened the Centennial Exposition 3 days later in Philadelphia, and His Majesty had another chance to witness America's contribution to

Mrs. Simon Newcomb Whitney

Professor Newcomb and family pose outside the Observatory in the spring of 1874.



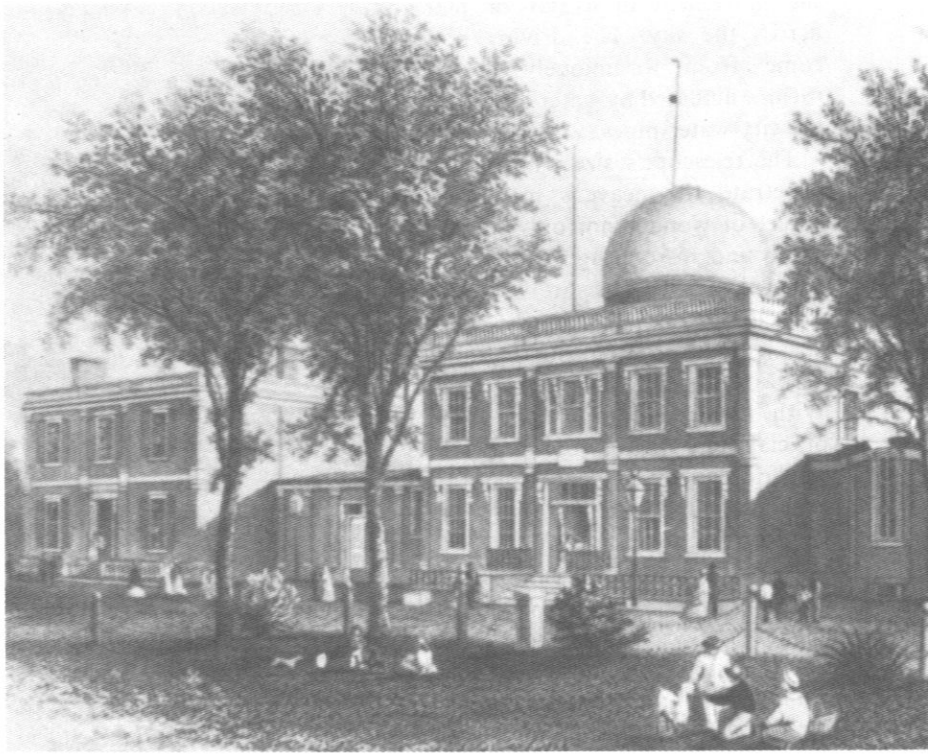
Smithsonian Institution

To Dom Pedro II, Emperor of Brazil, a visit to the Observatory was essential.

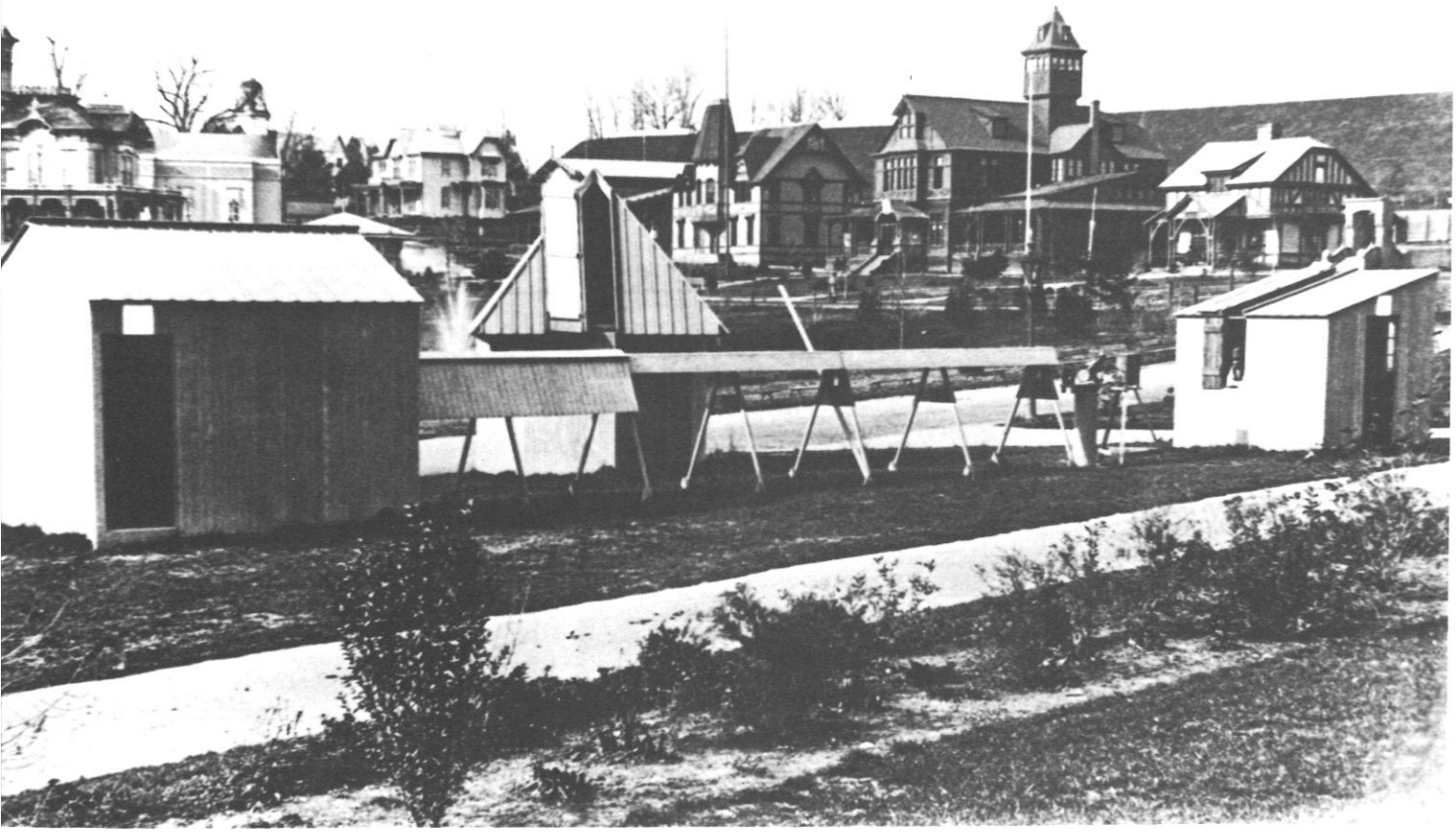
*The Observatory was open for daytime tours during regular business hours and the Superintendent often permitted local schools and other organizations to hold picnics on the well-manicured grounds.

**Sands retired in July 1874 and Davis had reassumed the Superintendency.

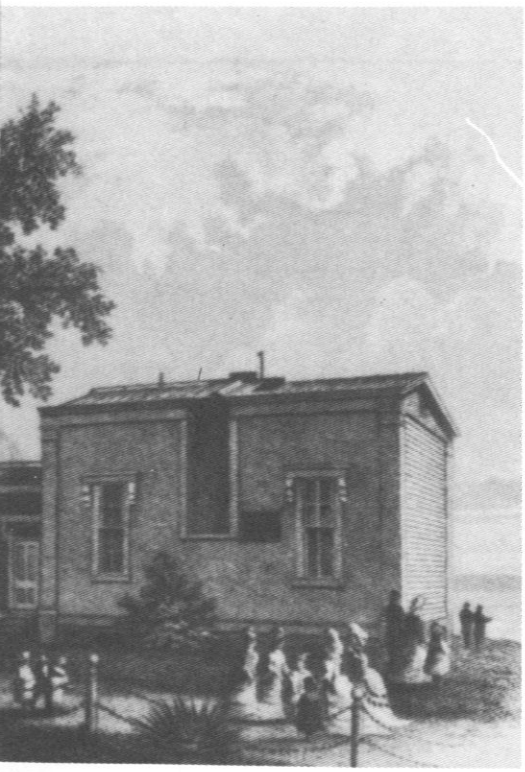
astronomy. One section of the U.S. Navy exhibit was devoted to the Observatory. Displayed in appropriate exhibit cases were copies of each volume of astronomical and meteorological observations issued since 1845, and a selection of American-made chronometers, thermometers, transits, chronographs, heliostats, clocks, and telescopes employed either at the Observatory or during the institution's field expeditions. Outside the hall, visitors could examine a portable



Right: This print of the Observatory about 1876 shows the time ball and the dome of the Great Equatorial behind the tree at right. The park-like setting was a popular picnic ground for Washington residents. Below: The Observatory's Centennial exhibit at Philadelphia included a fully equipped Transit of Venus station.



U.S. Naval Observatory



Transit of Venus station and instruments used in observing and recording the transit 2 years before.

If the Centennial Exposition was the young Nation's opportunity to show the world it had truly arrived, the Observatory's exhibit of over 30 years of its own accomplishments was itself a testimony to the advance of American science. There was much to be proud of.

Setting the Time Standard

Establishing precise time by means of timing the transit of stars across the local meridian had been the *raison d'être* of the Observatory since the days it was called the Depot of Charts and Instruments. Regulating the accuracy of the Navy's chronometers depended on precise time, and after Maury installed the time ball above the central dome in 1845, Washington's citizens relied upon the canvas sphere to set their timepieces. Although this time-keeping function never changed, the Observatory's role in distributing time increased dramatically after the Civil War.

These were the days before the Nation benefited from the convenience of standard time zones. Time varied so much with location that adjacent towns could celebrate noon by a difference of many minutes to an hour. If a railroad was to run on schedule, by whose clock was that schedule to be determined?

With the introduction of modern time zones, this confusion has largely disappeared. Noon in New York City is noon in Washington, DC. Midnight in the Nation's Capital is midnight in Pittsburgh.

Yet dividing the country into standard time zones can be misleading. Time is a transient thing. Because the Earth rotates 15 degrees on its axis every hour, local time changes accordingly. True local time, therefore, is relative, varying as a function of east-west position. New York City lies about 3 degrees longitude east of Washington, DC. Local noon there occurs 12 minutes, 12 seconds earlier than it does in Washington.

What the United States clamored for in the late 1860's was a time standard to help dismiss the confusion. The Observatory began fulfilling that need. The time ball sufficed for those who could see it as it descended its mast. For those who could not, a naval officer depressing a telegraph key, or Observatory clocks wired to other distant clocks, began providing the signals electrically.

By 1869 three telegraph lines ran from the Observatory: one to the Navy Department; a second activated the Washington fire bells at 7 a.m., noon, and 6 p.m.; and a third, owned by the Western Union Telegraph Company, distributed time signals to nearly all railroads operating in the Southern States.

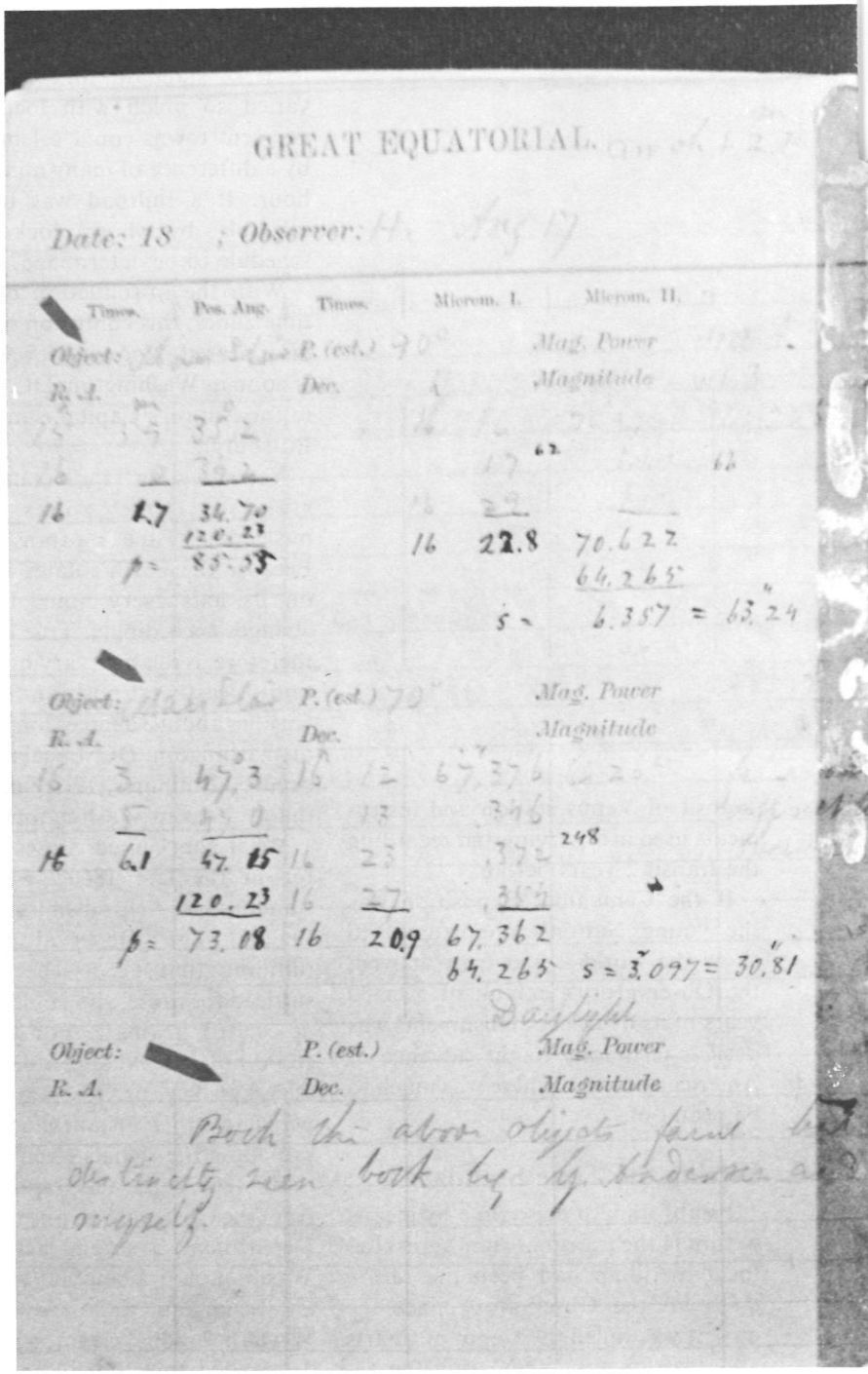
In 1872 the Observatory, cooperating with Western Union, agreed to telegraph Washington time to the Mutual Life Insurance Company in New York City, whereupon a time ball would be "dropped at noon from a staff erected from the top of their building at an elevation to be seen from all parts of the city and harbor, by which the time of the city and shipping can be accurately regulated."(*11*)

A year later the distribution of time signals extended from the Observatory to the main New York office of Western Union and from there to nearly every state in the Union. "The immediate object of these signals is to furnish accurate and uniform time to the railroads; and throughout the whole of the vast territory in question, there is scarcely a train whose movements are not regulated by the Observatory clocks."(*12*)

Since time is a function of the Earth's position on its axis in reference to the celestial bodies, the inverse is also true. Position is a function of time. Very early in its history, the Observatory's astronomers had determined that Washington's longitude was approximately 77 degrees west of the Prime Meridian (0 degrees) in Greenwich, England. By transmitted signals relayed from its highly accurate mean-time clock, and using the Observatory's 9.6-inch dome as a reference point, scientists could determine precisely the longitudes of other locations in the United States.

This is a simplified version of how the process worked. The Observatory and a remote location some distance west of Washington would be linked by telegraph. Observers at the remote site would determine their precise local time by taking transit observations and then setting a chronometer accordingly. By previous arrangement, a telegraph operator at the Observatory would depress a telegraph key at the precise instant of local Washington noon. An operator at the remote site would record the signal and then time the lag between Washington noon and the instant of local noon. If the difference was exactly 1 hour, the longitude of the site would be 15 degrees west of Washington. This would be 92 degrees or a longitude equal to that of Duluth, MN. In an actual instance, Ogden, UT, was determined to be 2 hours, 19 minutes, 47 and 41-hundredths of a second west of the 9.6-inch dome.

Asaph Hall's Great Equatorial log for 17 and 18 Aug 1877 records his observation of the satellites of Mars.


GREAT EQUATORIAL.

Date: 18 ; Observer:

Times. Pos. Ang. Times. Microm. I. Microm. II.

Object: P. (est.) Mag. Power

R. A. Dec. Magnitude

16 1.7 34.70
120.23
β = 85.53

16 22.8 70.622
64.265
s = 6.357 = 63.24

Object: P. (est.) Mag. Power

R. A. Dec. Magnitude

16 6.1 47.15
120.23
β = 73.08

16 20.9 67.362
64.265 s = 3.097 = 30.81

Daylight

Object: P. (est.) Mag. Power

R. A. Dec. Magnitude

Both the above objects faint but distinctly seen both by Mr. Anderson and myself.

U.S. Naval Observatory

By the mid-1870's the Observatory had established telegraphically the longitudes of Havana, Cuba, Key West, FL, Princeton, NJ, Bethlehem, PA, Detroit, MI, St. Louis, MO, Ogden, UT, Carlin and Austin, NV, and many other towns and cities in the United States. The commission charged with establishing permanent boundaries for several Western States based its judgments on longitudes measured from the Observatory's central dome.

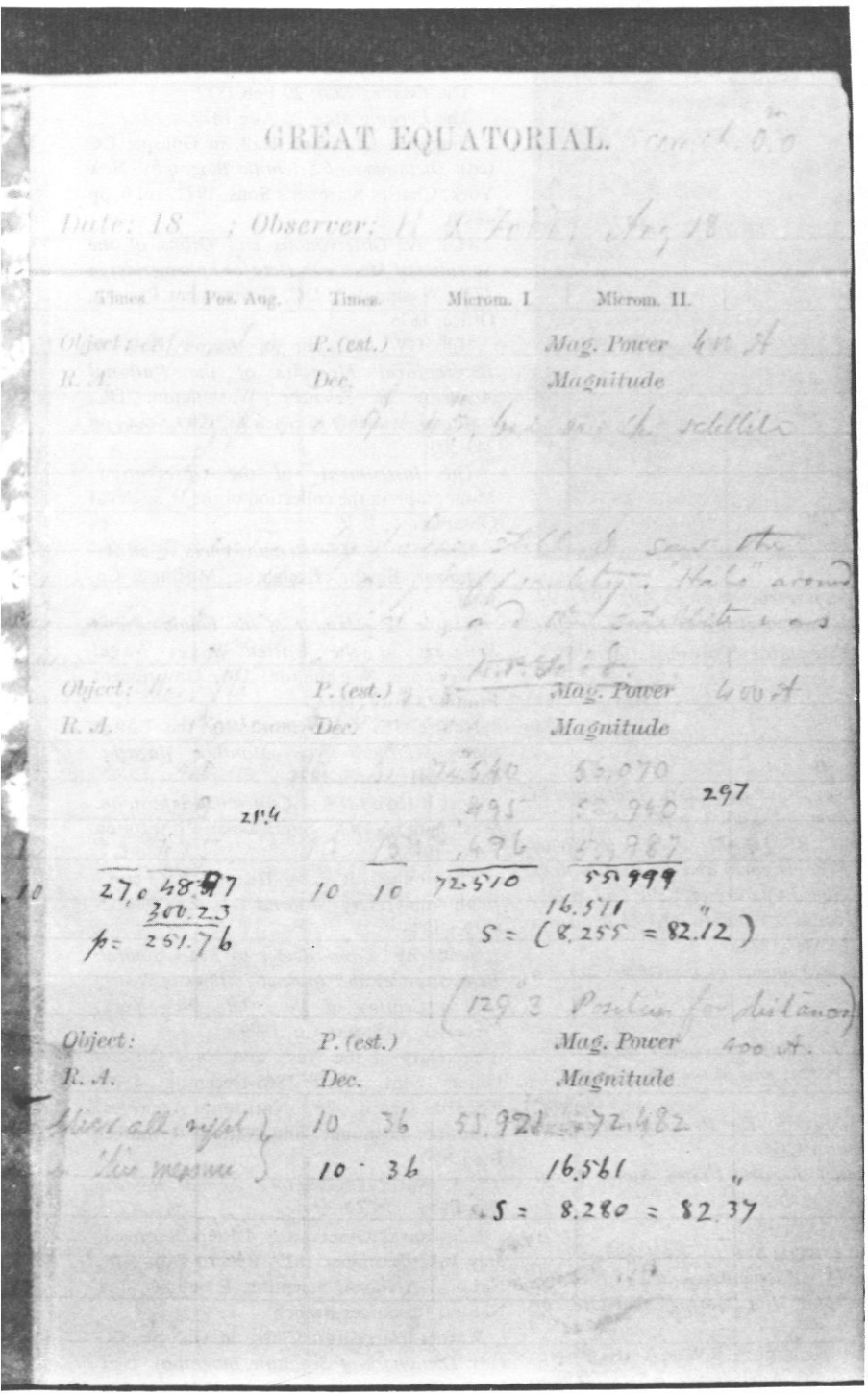
The Moons of Mars

At the Naval Observatory, about 11 o'clock Thursday night, Prof. Hall discovered through the large telescope a faint star near the planet Mars, which, after subsequent examinations, was decided to be a satellite. Mr. Hall also detected an object which passed over to the side of the planet and which may prove to be another satellite.(*13*)

This front-page paragraph in the *Evening Star* announced what was perhaps the most dramatic event in the Observatory's history—the discovery of Deimos and Phobos, the outer and inner moons of the red planet.

In the first days of August 1877, Asaph Hall, working against the odds, methodically began looking for what had always eluded astronomers before. Night after night, he sat in the observer's chair of the Great Equatorial examining "the region close to the planet, and within the glare of light that surrounded it. This was done by sliding the eye-piece so as to keep the planet just outside the field of view, and then turning the eye-piece in order to pass completely around the planet."(*14*)

At 2:30 on the morning of the 11th he found a faint object resembling a star close by Mars, but a fog rolled in


GREAT EQUATORIAL.

Date: 18 ; Observer:

Times. Pos. Ang. Times. Microm. I. Microm. II.

Object: P. (est.) Mag. Power

R. A. Dec. Magnitude

Object: P. (est.) Mag. Power

R. A. Dec. Magnitude

Object: P. (est.) Mag. Power

R. A. Dec. Magnitude

from the river before he could establish the object's position. On the 16th Hall again spotted the object and ascertained that it was moving with Mars and therefore could not be a star which would have appeared stationary relative to the quickly moving planet. The very next day he and his assistant, George Anderson, detected the inner moon, Phobos.(*15*)

On 18 Aug the Observatory telegraphed the news to the Clarks in Cambridgeport and asked them to confirm the sightings with the 26.25-inch telescope they were building for the University of Virginia. The Clarks had little trouble in doing so and, shortly thereafter, the Smithsonian Institution announced the discoveries to observatories in Europe and America.

U.S. Naval Observatory

Professor Asaph Hall

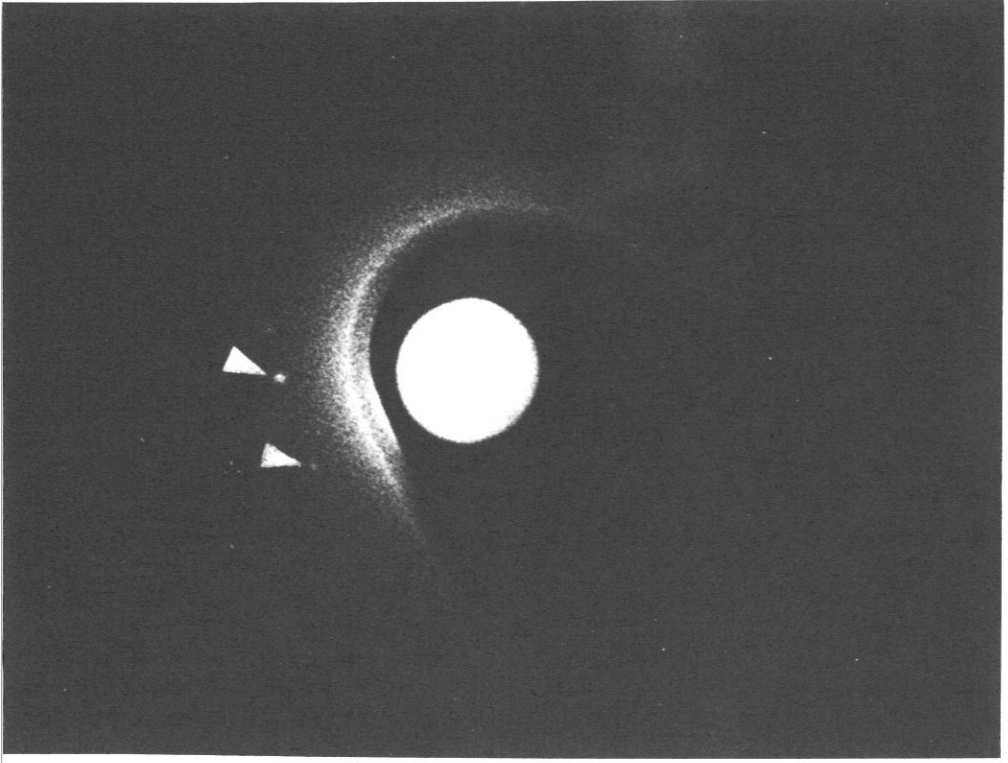


Photo by D. Pascu, U.S. Naval Observatory

Photo of the red planet and its moons taken with the 26-inch refractor on 25 Aug 1971, 94 years after Hall's discovery. The brighter satellite is Phobos. Deimos is seen here just below it. The 26-inch telescope was moved to the Naval Observatory's present site in 1893.

The news quickly spread. Once they knew how and where to look, other astronomers with far weaker telescopes began spotting Mars' satellites. Later in August Deimos was even seen through the Observatory's own 9.6-inch refractor.

With Asaph Hall's sensational discovery, the Observatory became a front-page topic for many American newspapers. Letters requesting coordinates for the satellites or announcing other sightings arrived in increasing numbers. It would be the task of Superintendent John Rodgers to answer them. The man who had done so much to bring the Observatory to its proudest day was gone. Six months before, Superintendent Charles Davis, weakened by recurring bouts of malaria brought on by the swamp at the foot of Observatory Hill, had died of heart failure in the family residence.

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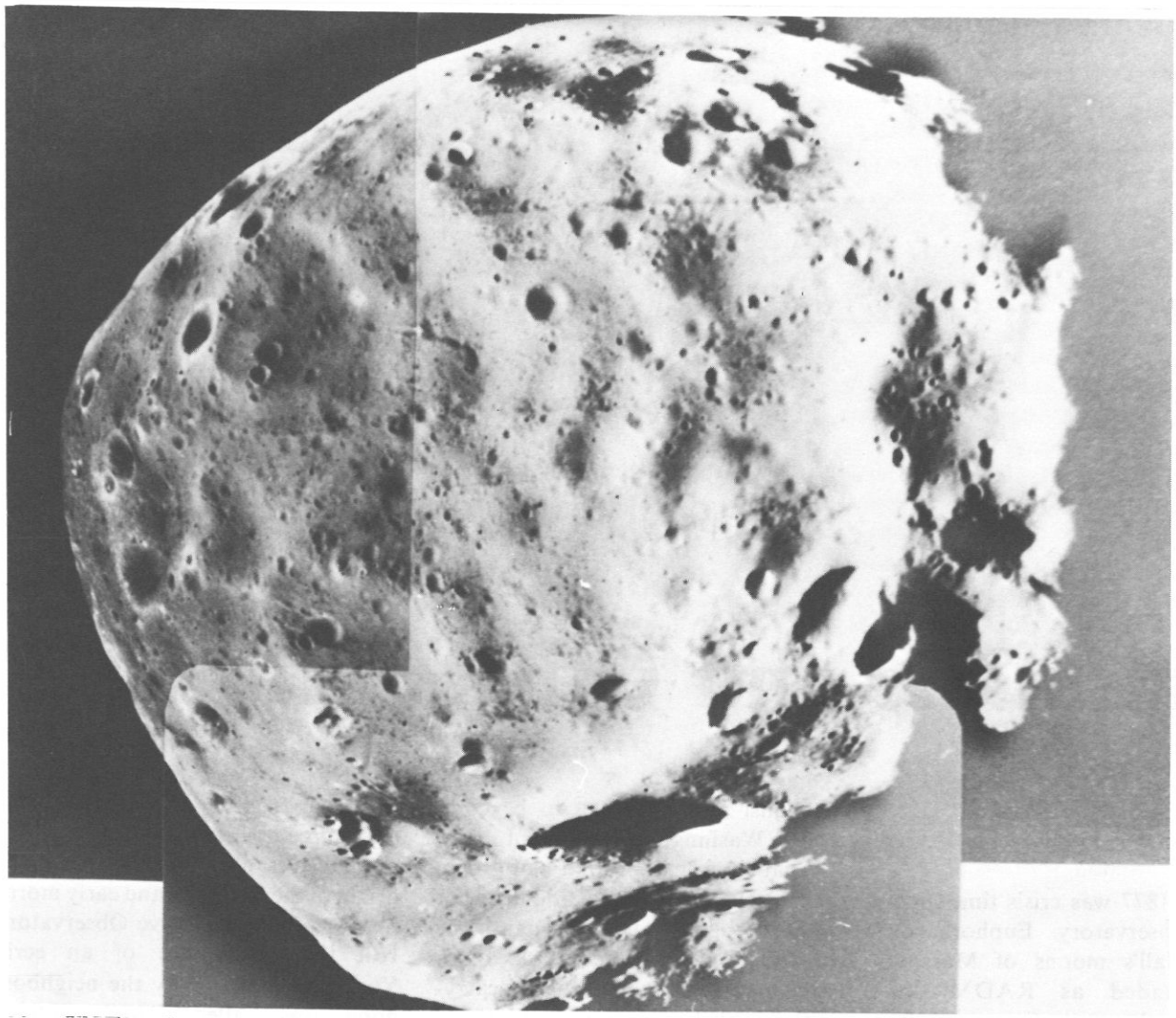
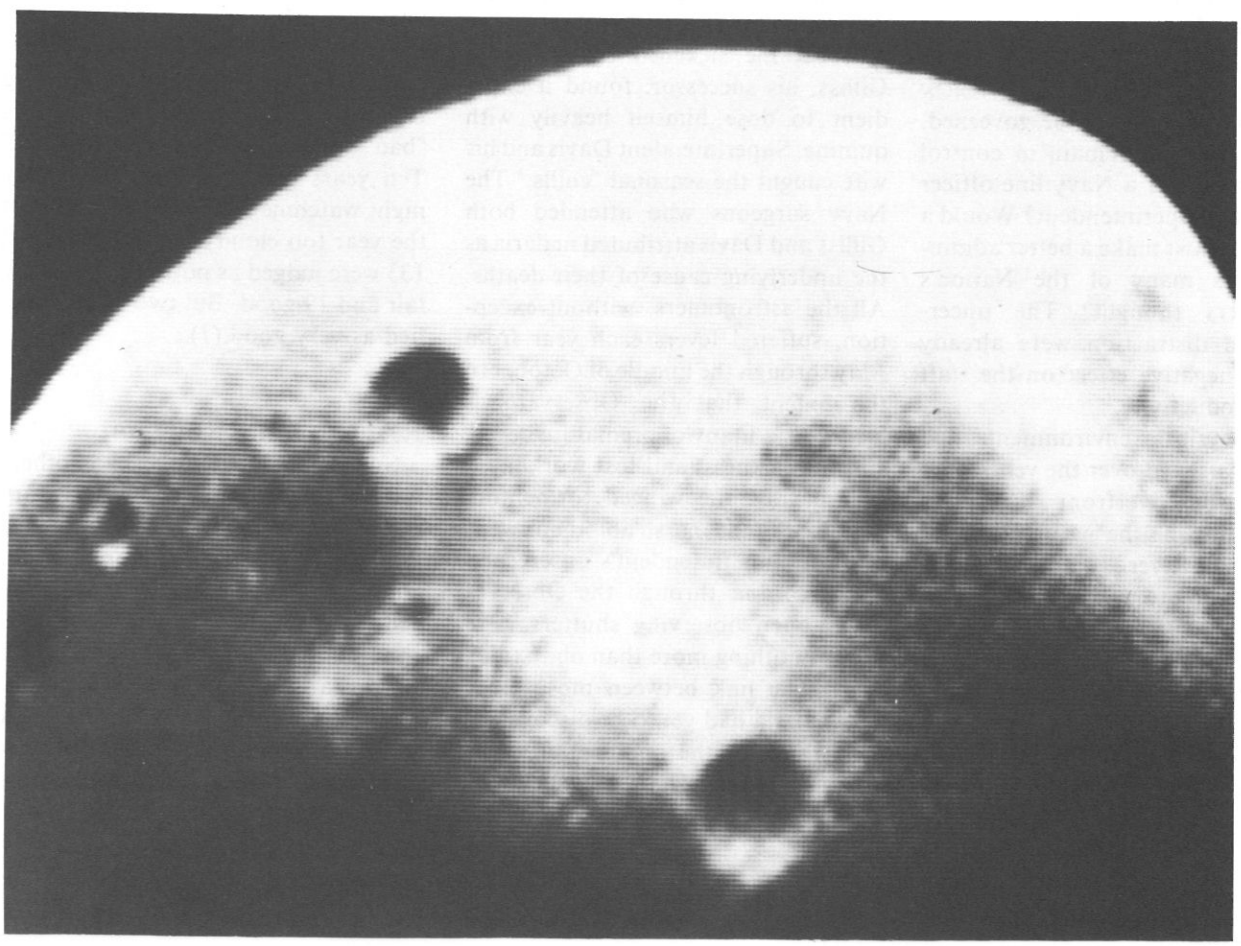


National Aeronautics and Space Administration

Phobos and Deimos as seen from the Viking Orbiter 1 spacecraft.



Miasmatic and Other Influences

Summer 1877 was crisis time for the Naval Observatory. Euphoria over Asaph Hall's moons of Mars discovery faded as RADM John Rodgers, the new Superintendent, presided over an institution that was becoming more and more a victim of ill health, both symbolically and literally.

A controversy simmered over how the Observatory should be governed. Was the Navy to remain in control and, if so, would a Navy line officer continue as Superintendent? Would a civilian scientist make a better administrator, as many of the Nation's astronomers thought? The uncertainty and distraction were already having a negative effect on the staff and its productivity.

The physical environment had steadily worsened over the years, ever since nearby riverfront businesses began to impede the natural flow of the Potomac River. The marsh at the foot of Observatory Hill was expanding and during low tide a large portion of it lay exposed as wet mud.

An open sewer ran along neighboring B Street (Constitution Avenue), depositing human waste into Tiber Creek and eventually onto the flats just above the yet to be completed Washington Monument.

That the neighborhood had grown unpleasant could not be denied, but what "progress" had wrought was compounded by the work of a voracious insect—the malaria-carrying Anopheles mosquito. Matthew Maury and his family had suffered the debilitating symptoms of malaria, and all who followed him to Observatory Hill became sickened by it. James Gilliss, his successor, found it expedient to dose himself heavily with quinine. Superintendent Davis and his wife caught the seasonal "chills." The Navy surgeons who attended both Gilliss and Davis attributed malaria as the underlying cause of their deaths. All the astronomers, without exception, suffered fevers each year from May through the middle of October to the extent that the Observatory's history is a litany of premature death, chronic sickness, and lost workdays.

Ironically, the winged tormentors that bred in the marsh and then swept into the Superintendent's unscreened residence and through the Observatory's open observing shutters were seen as nothing more than obnoxious pests. The link between mosquitoes and malaria had yet to be discovered. Nevertheless, the perception was indeed correct. The "miasma" that wafted up from the Potomac flats was the source of the pestilence.

The river also seemed to be the origin of the late night and early morning fogs that often gave Observatory Hill the appearance of an eerie Yorkshire moor. Why the neighborhood was called Foggy Bottom became apparent every time the astronomers had to suspend work when swirling mists obscured the heavens. Few nights were clear enough to operate the two refracting telescopes effectively. By 1877 the "bad" nights outweighed the "good." Ten years later records kept by the night watchmen showed 168 nights of the year too cloudy for observations; 133 were judged as poor. Only 63 were fair and 19 good. But two were classified as very good.(*1*)

RADM John Rodgers

Superintendent Rodgers and others saw the relocation of the Observatory as the only solution to its problems. But obtaining the new home would not be easy; the Secretary of the Navy had to be consulted. Congress had to appoint a commission to study the options and authorize the relocation. The commission would solicit and evaluate competitive bids for new property. Congress might then appro-

priate funds for its purchase, appoint another commission to study architectural plans for new buildings, and appropriate more funds to construct the new Observatory.

If anyone was up to this formidable challenge it was John Rodgers. Like Admirals Davis and Sands before him, his too had been a long, productive naval career enhanced by meritorious service as a commanding officer during the Civil War. He ended that chapter of his life a commodore and, now, 12 years later, was Superintendent of the Observatory. Although not a scientist, he nevertheless showed great promise as an able administrator of a scientific institution, fighting for its appropriations, insuring the publication of its astronomical observations, and insulating the astronomers from the interruptions that always seemed to plague their work.

Rodgers was an eminently fair and sagacious man, traits that earned him the respect and trust of his employees. Disputes and professional jealousies he handled with aplomb. Scientists, like artists, often possess fragile egos.

In September 1877 the Superintendent launched the first salvo in the campaign to find the Observatory a new home. Little did he know then that the fight would drag on for 15 years and that he, like the biblical Moses, would not live to move to the promised land.

His chief argument for the removal was the Observatory's less than ideal location. Rodgers had influential allies. Quartermaster-General of the Army Montgomery Meigs pointed out that the Hill had little value and its presence actually blocked the commercial growth of the Capital city. He had his own solution: "... high ground of Camp Hill, about the Observatory, should be spread over the surface, covering the mud of the flats . . . and the United States Naval Observatory should be removed to the high ground north of the city . . ."*(2)*

Rodgers agreed that the Observatory be moved north of town but not near factories or dwellings where chimney smoke "would obscure the clearness of vision, the traffic would shake the instruments, and some high structure if placed upon the meridian near our instruments might hide a useful part of the heavens."*(3)*

He also enlisted the professional opinions of six Navy surgeons who had cared for the employees over the years. All concurred with Surgeon George Clymer "that the location of the Observatory is unhealthful, caused, as I think, by the malaria from the shores of the Potomac, from which no artificial means will secure it."*(4)*

On 20 June 1878, after heavy lobbying by Rodgers and the Secretary of the Navy, Congress passed an act appointing a three-man commission to search for a new site and to ascertain the cost of moving the Observatory. The commission invited sealed proposals from Washington residents with land to sell. Seventy-eight proposals came in; all but five were eliminated.

Rodgers sent five of the Observatory's astronomers to examine the choices. After what they had suffered in the past it was no wonder that healthfulness headed their list of requirements for the new site.

A Most Dilapidated Condition

The Superintendent and his astronomers made their choice, the commissioners made theirs, but for Congress a new home for the Observatory was low priority. Another year and a half went by before that body appropriated money to purchase the Barber Estate north of Georgetown. However, that was as far as the legislators were prepared to go. No money was earmarked for construction of a new institution.

With plans to move the Observatory eventually, little money was set aside to maintain the old facility. It had indeed fallen on hard times. The west wing Transit Circle room was in terrible shape and required nothing short of an entire remodeling of the roof and shutters to make it safe. The 9.6-inch refractor needed a new driving clock, the 26-inch Great Equatorial dome had warped and was difficult to operate, and the rest of the instruments were "in a most dilapidated condition."*(5)*

Morale was equally dilapidated. There were rumors that Congress planned to reorganize the Observatory. This was due in part to a nationwide feeling among astronomers that the Naval Observatory should be run by a civilian scientist, one of their own, who understood the importance of astronomy and could bring prestige to the institution.

Another proposal would remove the Navy from the operation entirely. It could then truly become a National Observatory.

Rodgers canvassed his professionals for their opinions. All wanted the facility to remain under Navy control, and a minority wished to see a civilian director. The majority argued for the status quo. Rodgers, speaking for the majority, was of "the opinion that the present organization under

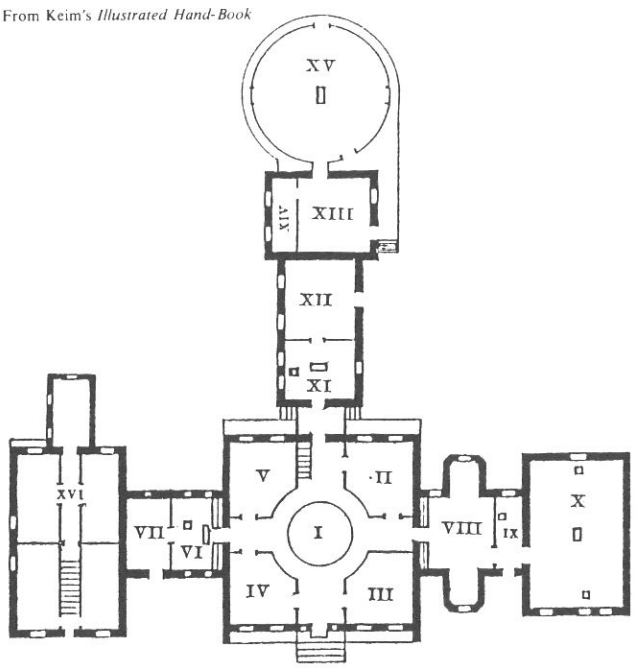
Author's collection

Superintendent John Rodgers launched the campaign that eventually found a new home for the Observatory.

Author's Collection

The Observatory as an artist saw it in 1884 . . .

From Keim's *Illustrated Hand-Book*



. . . and a floor plan of the same year.

I. Pier of 9.6-inch refractor
II. Superintendent's Office
III. General Office
IV. Office of naval officer in charge of chronometers
V. Packing room
VI. Mural Circle and Transit
VII. Chronometer Room
VIII. Library
IX. Siderial Clock used as the standard clock of the Observatory
X. Transit Circle
XI. Prime Vertical
XII. Machine Shop
XIII. Office of individual in charge of the 26-inch refractor (Great Equatorial)
XIV. Bedroom
XV. 26-inch refractor (Great Equatorial). When mounted in 1873, this was the largest refracting telescope in the world.
XVI. Superintendent's Residence

U.S. Naval Observatory

The solar eclipse of 1878 took the institution's astronomers to the roof of the Teller Hotel in Central City, CO. Below: Four years later the Transit of Venus found another team camped in Argentina's Patagonia region.

Courtesy of Ruth Stines

A photograph taken from atop the newly completed Washington Monument in 1885 puts Observatory Hill (left center) in the context of its Foggy Bottom environment. In the left foreground is B Street (Constitution Avenue) with its infamous open sewer. The Aqueduct Bridge connects the Virginia shore to Georgetown in the center background. Below: Closeup view of the same scene shows the two telescope domes. A dredge in the right background works to deepen the heavily silted river channel.

U.S. Naval Observatory Photos

which the Naval Observatory has in a short time attained so very high a place amongst the Observatories of the world, is the most eligible one. 'Let well alone,' is a safe motto . . ."(6)

Another rumor suggesting that the civilian astronomers would be replaced by line officers generated even more turmoil.(7) Rodgers' successors then recommended that a board of visitors be appointed to oversee the astronomers' work. Nothing immediate came out of any of this, but the embers of controversy continued to smolder into the 1900's.

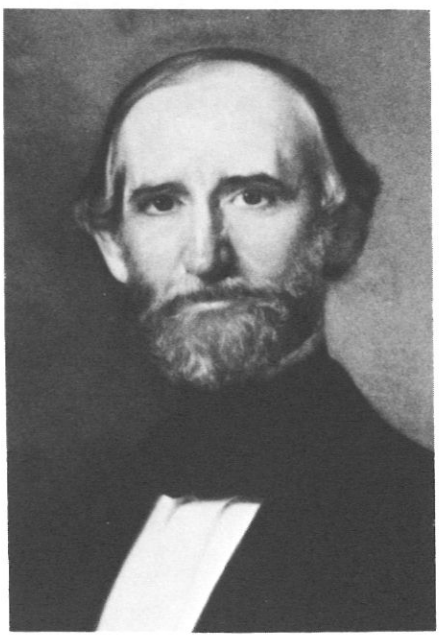
Eclipses, Transits, and Timekeeping

Despite the uncertain times, the Observatory continued its programs. Astronomers updated star catalogues. Professor Mordechai Yarnall was nearly finished with his, having worked on it for over 25 years. Asaph Hall still operated the 26-inch Great Equatorial, observing satellites, double stars, nebulae, and several comets. Other astronomers used the old 9.6-inch telescope to observe comets and minor planets.

The Observatory continued to aid in the telegraphic determination of longitude and the timekeeping function expanded. By 1884 its clocks remotely regulated two time balls, the fire alarm bells in Washington, DC, five bells in Government offices there, and 25 other clocks in the Capital and other cities. By 1888 the number of regulated clocks had risen to 347.

Its scientists studied celestial phenomena in Washington and by expedition. On 6 May 1878 Mercury transited the Sun as did Venus 4 years before. The event was observed in Washington and Austin, TX.

But the big event of that year was the solar eclipse of 29 July. Eight well-equipped teams went to stations on the line of totality stretching from Creston, WY, through the Colorado Rockies to Dallas, TX. This ambitious undertaking required the shipment of much equipment and the pro-



Professor of Mathematics Mordechai Yarnall had just finished his star catalogue when he became victim of Foggy Bottom's "malarial influences."

With several of its windows smashed by vandals, the vacant Observatory awaits a new future.

tection of the U.S. Army; there were rumors of Indian unrest.

The weather on the day of the eclipse was perfect and what photographs the astronomers took gave a very detailed picture of the solar corona, that mysterious band of light about the edge of the Sun.

Four years later Venus again transited the Sun. The Observatory broke out the old equipment, added some new instruments, and observed the event from Washington, the Cape of Good Hope, two stations in South America, New Zealand, Texas, New Mexico, and one of the Florida Keys.

Worn Threadbare

On 5 May 1882 Superintendent Rodgers died while staying in the Barber house at the newly acquired site. "I am of the opinion that R.ADM John Rodgers became effected [sic] with Bright's Disease of which he died . . . from exposure to Malarial poisoning at the 'Naval Observatory' while Superintendent of the Same."(*8*) According to Passed Assistant Surgeon Presley M. Rixey, attending physician, the Potomac flats had claimed yet another victim.*

In fact, the "malarial influences" had already taken Professor Yarnall 3 years before. Since then, health conditions had deteriorated further. Moreover, the buildings and grounds were more rundown than ever. By 1886, 250 feet of the perimeter wall had fallen down. Only enough money could be scraped together to buy temporary fencing to fill the gaps.(*9*)

Each year Rodgers pleaded for Congress to appropriate funds for construction to begin at the new site. They were ignored. The pleas seemed a monotonous routine for Superintendent George E. Belknap. "The disadvantages of the present location have been so often and so forcibly described that the subject is worn almost threadbare."(*10*)

*Dr. Rixey was later to become White House physician to Presidents McKinley and Roosevelt, and Surgeon General of the Navy.

By 1886 Congress acted. Architect Richard M. Hunt of New York City prepared plans and, 2 years later, construction finally began. But natural and manmade delays caused the work to fall behind schedule.

By spring 1890 excessive rains and the flooding of the Chesapeake and Ohio Canal brought work to a standstill. And then there were contractor and labor troubles, concrete that could not pass strength tests, and "procrastination in the delivery of marble."(*11*)

Yet by the fall of that year the main building at least was closed to the weather, the grounds were being graded, and plans for remounting the instruments were underway.

On 15 May 1893 the old building "was formally abandoned as an observatory and the new site on Georgetown Heights . . . officially occupied."(12) It was the end of an era. Forty-nine years before, the United States was struggling to achieve a scientific identity of its own. Now that independence was assured largely through the efforts of the men who had turned Reservation Number 4 into one of the world's leading scientific institutions.

The building where they had labored was empty now, instruments gone, windows broken, and weeds sprouting up where there once had been manicured lawns and flower gardens. But the vacancy would only be temporary. The high ground beside 23rd Street was not destined to become a gravel quarry, plundered in a wild scheme to fill the Potomac flats. The Navy had other plans for Observatory Hill and the domed edifice that had served the Nation so well.

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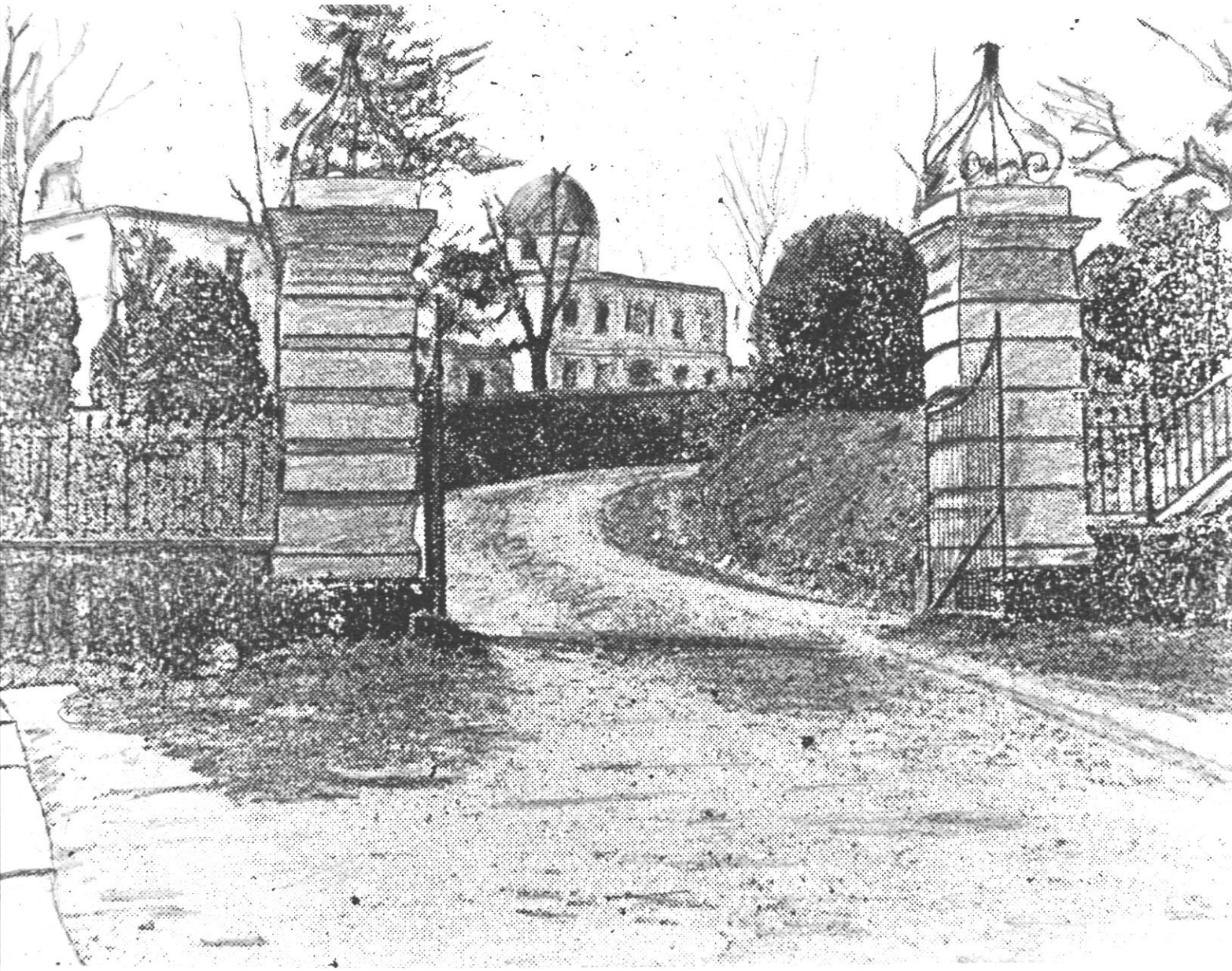
Columbia Historical Society



A new asphalt roadway led tourists and employees to the Museum's front gate.

The Naval Museum of Hygiene 1894-1902

There is a Naval Museum of Hygiene in Washington, established on the most historic spot in the city, containing objects of new and unique interest which have never yet come under the tourist's eye, and which are seldom inspected by the "Washington public." It is a white building, fashioned after the colonial style, with white wings on both sides, cut by arched windows and columned doors—that simple, majestic order of house framed long ago by the aristocracy of the South, but few examples of which remain around Washington to-day. It stands high on a northwest hill skirting the river near Georgetown, and a dome arising from its center above the silver poplars and maples marks it for miles in the distance as the old Naval Observatory.(*1*)

Thirteen months after being vacated Observatory Hill again had a tenant. The old building seemed to have changed little, yet outward appearances were deceiving. Transforming a laboratory designed for astronomy into a medical museum required more than cosmetic alterations.

The Naval Museum of Hygiene was already 12 years old when it came to Foggy Bottom. Its origin was a $7,700 congressional appropriation "for rent of quarters necessary for the preservation of objects already collected; transportation of contributions intended for exhibition; preparation of models and drawings to be used in the illustration of sanitary science and its progress. . ."(*2*)

As early as 1879 the Bureau of Medicine and Surgery (BUMED) had established a laboratory for investigating hygiene-related matters and began gathering the first items for what would become a museum collection. By 1882 this collection, together with a dispensary and laboratory, were housed in rented quarters at 18th and G Streets NW. The inventory grew, encouraged by the Navy Surgeon General who requested the cooperation of physicians, engineers, architects, builders, manufacturers, and others with interest in the sanitary sciences. That same year the Museum acquired the BUMED library of some 3,400 volumes. Five years later the institution moved to 1707 New York Avenue just down the street from the headquarters of the Navy Department near the White House.

As the Museum expanded and its functions as a laboratory and research center developed, BUMED lobbied for larger facilities. The old Naval Observatory seemed to fit the requirements.

Astronomical to Medical

On 20 Jan 1894 the Secretary of the Navy transferred the grounds and vacant buildings to BUMED. By the end of June the Museum had moved in.

The central structure and outbuildings received a fresh coat of paint. Workmen repaired fences and spruced up the main gate. Anticipating large numbers of visitors, the Navy asked the District of Columbia Commissioners to lay an asphalt roadway from 23rd and F Streets to the Museum entrance.

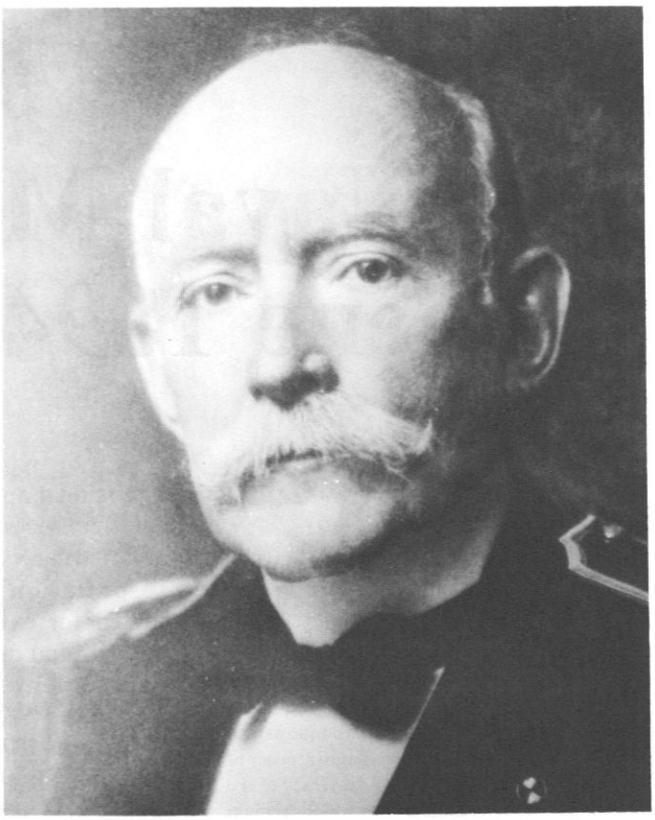
More drastic changes were taking place inside. Laborers demolished the circular brick pier that had supported the 9.6-inch telescope as well as the

Photos from the Naval Medical Command Archives

Philip S. Wales was Surgeon General of the Navy in 1882 when the Naval Museum of Hygiene occupied a rented Washington residence.

William K. Van Reypen carried out the Secretary of the Navy's General Order No. 89 that changed the institution's status in 1902.

Three Surgeons General



James R. Tryon oversaw the institution's move to Observatory Hill in 1894.

piers for the Mural Circle, east Transit instrument, and the Transit Circle that had been housed in the west wing.*

Construction crews cut archways throughout the building, rerouted stairways, reconfigured spaces to house exhibits, papered inside walls, and installed additional plumbing in those "rooms set apart for display of house drainage, filters, and [water] closets."(*3*)

By the close of 1895 the disinfection and ventilation exhibits were in place and the first floor had been relaid with 2,500 square feet of oak parquetry and 1,200 square feet of Georgia pine, all brought to a waxed finish.(*4*)

Three of the old Observatory's second-story rooms, formerly offices for astronomers, became laboratories for chemistry, bacteriology, and photography. The chemist occupied the fourth.

The wing connecting the residence to the main building now housed displays of modern water filters and plumbing. The west Transit Circle annex became a lecture hall for "subjects connected with hygiene, and for the exhibition of bacteriological and microscopical illustrations."(*5*)

Only one of these alterations could be seen from the outside. The Great Equatorial dome on the south wing was gone, replaced by a larger rotunda crowned by a windowed cupola. Inside, that skylight illuminated a parquetry floor, oak shelving for books, and numerous tables and other furniture. A new fireplace occupied the south wall of this new library-lecture hall. For those wont to daydream, the recently installed stamped metal ceiling of intricate geometric squares gave the illusion of a marvelous pattern of early American butter molds.

Outside, gardeners began restoring the grounds to their former grandeur, but the hurricane of 29-30 Sept 1896 interrupted their work and uprooted many of the older trees planted during the Observatory's early years.*

Almost as the rains and winds departed, workmen began clearing the ground in front and at the sides of the main building. Downed trees were removed and those that remained were trimmed back. The ground was plowed, graded, and planted in grass. Two years later there were more improvements, including a concrete sidewalk in front of the main building and 30 new ornamental trees.

Photo by the Author

Detail of the stamped metal ceiling in the Museum's library-lecture hall, formerly the Great Equatorial rotunda. The ceiling is now in the Naval Medical Command's Hospital Corps Division.

Specimens of Every Nature and Variety

The Museum was not merely to be a repository for exhibits and a clearing-house for medical and nonmedical artifacts. It was refining its character as a working institution. During the first year on Observatory Hill, the Museum conducted many analyses and began issuing detailed reports on:

- Pathological specimens of every nature and variety.
- Water from the Potomac, Port Royal, SC, and several places in New England.
- Medicines frequently used by the Navy.
- Specimens of sandstone and granite "made at the request of the Bureau of Yards and Docks to determine the fitness of the samples to be used in building dry docks."(*7*)

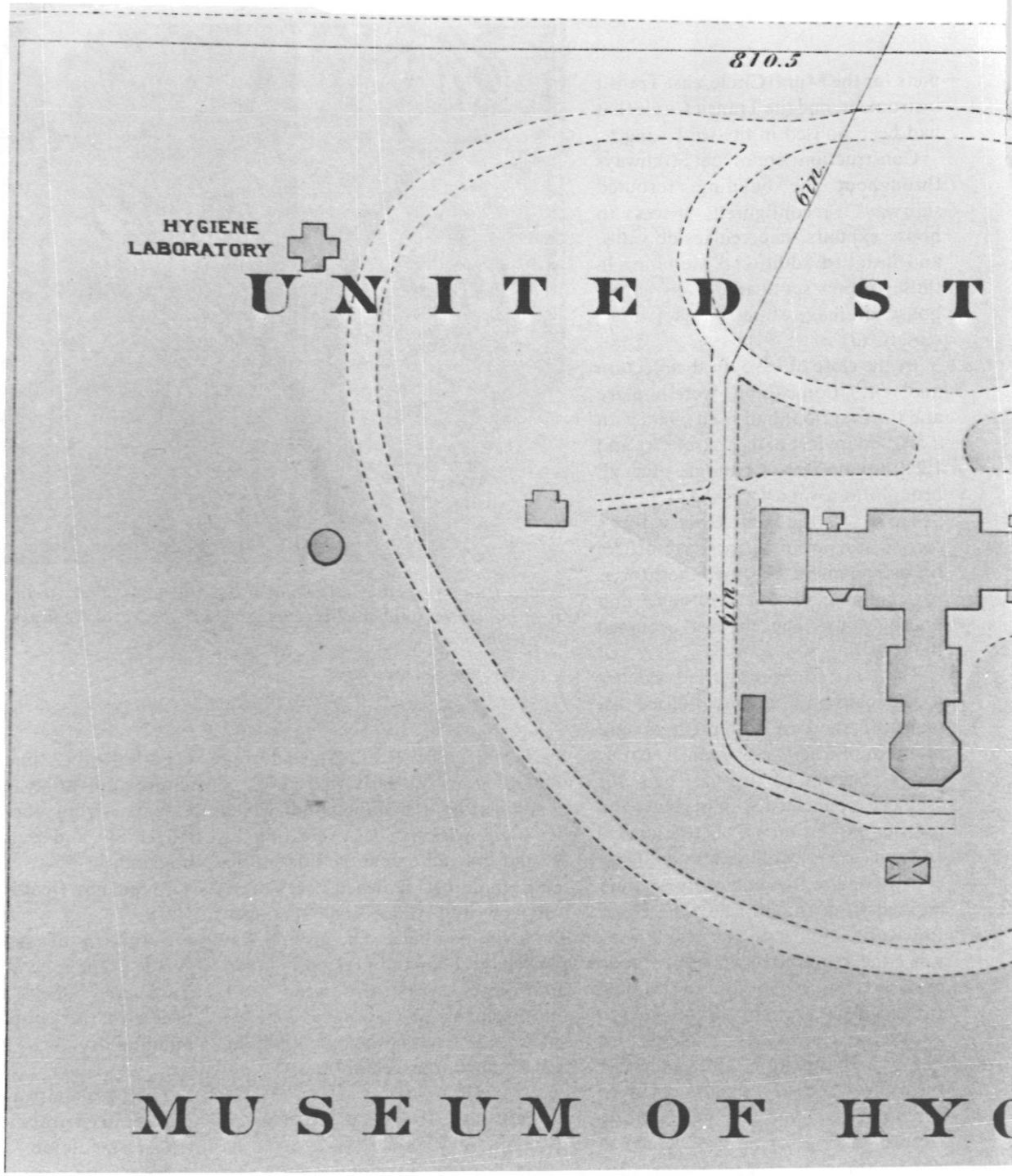
The Museum was fast becoming a pioneer in environmental and occupational medicine. In addition to checking the purity of water systems aboard naval vessels and at shore installations, its investigators conducted inspections of work spaces in government buildings. One such survey found the sub-basement of the State, War, and Navy building unfit for workers because of excessive temperatures and dangerous levels of carbonic acid and ammonia.(*8*)

Another investigation conducted for the Association of Official Agricultural Chemists sought to

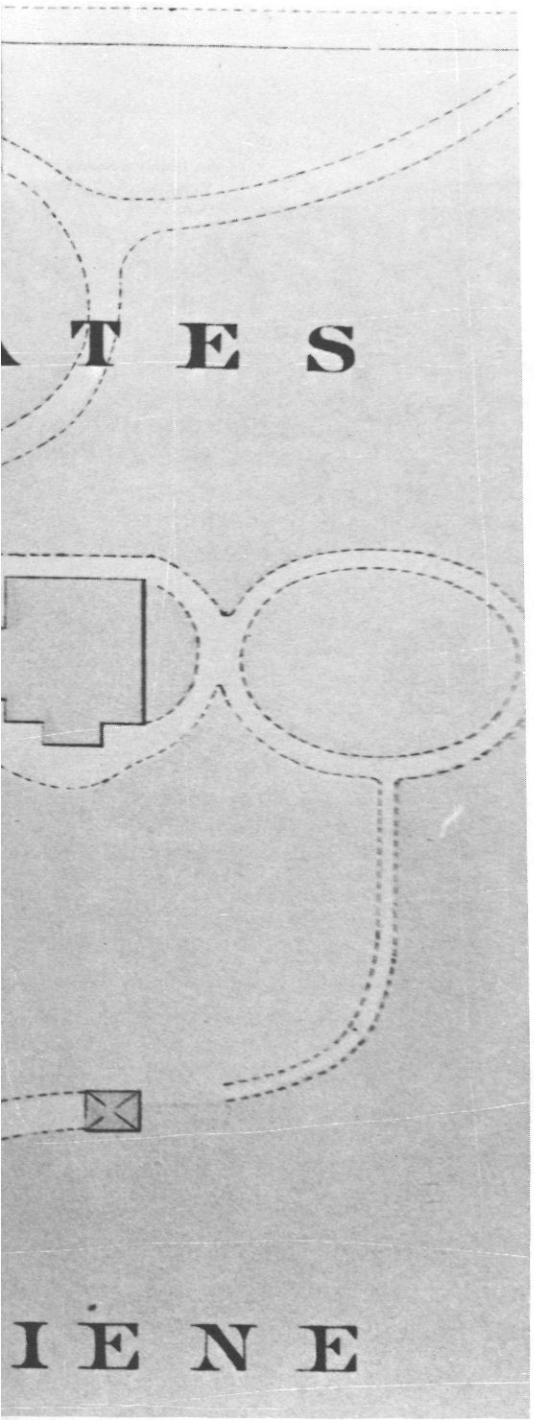
*Remnants of the Mural Circle and east Transit piers are still visible in the basement of Building Two—Naval Medical Command.

*The storm's fury destroyed thousands of the city's shade trees, collapsed buildings, downed telegraph lines, and wrecked boats, yachts, and steam launches along the riverfront. Damage was estimated at $1/2 million.(*6*)

Columbia Historical Society



In 1901 the Navy transferred 5 acres of the 19-acre reservation to the Department of the Treasury to be used by the Marine-Hospital Service for the erection of an experimental laboratory. The lab appears as a cross at the upper left.



analyze fusel oil, a component of distilled spirits.*

By 1898 the upstairs laboratories of the main building were testing disinfectants, vaccine virus quality, the purity of catgut suture material, and pathological specimens. A year later gum-elastic catheters were tested to determine their durability in the face of heat and disinfectant solutions. Technicians peered through microscopes at diphtheria and tuberculosis bacilli and malarial parasites. Tumors were sectioned and examined to determine their malignancy.(*9*) In 1900 alone 537 chemical, bacteriological, and microscopic examinations were performed for the purpose of clinical diagnosis. Other tests evaluated preserved eggs and beef purchased as ships' rations. Analyses of two commercial milk preservatives found 4 percent formaldehyde in each.(*10*)

As the Museum's testing expanded so did its collection. The inventory was beginning to take on a somewhat bizarre if not morbid quality exemplified by:

> . . . a rather miscellaneous assortment, from Belgian and Chinese shoes, Korean hats, Mexican sandals, down to all sorts and kinds of food, shells, cots, hospital ships, hospital camps, crematories, and water pipes.
>
> Under the head of architecture there are numbers of interesting exhibits, the models of barracks, wards, and a United States Army general hospital being of especial value. There are innumerable plans and models for the construction of schools, colleges, asylums, almshouses, reformatories, factories, laboratories, hospitals, and ships, and for their proper ventilation, drainage, and illumination.
>
> The exhibits of vaults, morgues, mortuaries, cremation, and all methods and customs for the burial of the dead are also unique and interesting, among them being an exact reproduction in miniature of the far-famed "Tower of Silence," just outside the city of Bombay, where the vultures flock by the thousands for their feast on death. A model of the picturesque crematory at Mount Olivet Cemetery, Williamsburg, [Brooklyn], N.Y., is also on exhibition, and that hideous engine, "Sieman's furnace," as well as burglar-proof vaults, metallic burial caskets, Alaskan Indian caskets, and old Roman cinerary urns.(*11*)

*Fusel oil is an acrid, oily, poisonous substance found in grain alcohol that has undergone inadequate distillation. Most authorities once thought alcohol's ill effect on the human body was due to the fusel oil it contained.

Transition

The turn of the century saw increasing emphasis on the Museum's scientific, testing, and educational functions. The collection continued to draw the curious and act as a focus for the many lectures and symposia held at the facility. The laboratories, among the best anywhere, were seen by some as the core of what soon would become a medical school to train Navy physicians in the ways of military medicine.

General Order No. 89 issued by the Secretary of the Navy on 27 May 1902 reflected what had already become a *fait accompli.* The Museum would now be known as the U.S. Naval Museum of Hygiene and Medical School.*

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*The Museum was disestablished in 1905 and the exhibit collection transferred to the National Museum (Smithsonian Institution).

Columbia Historical Society

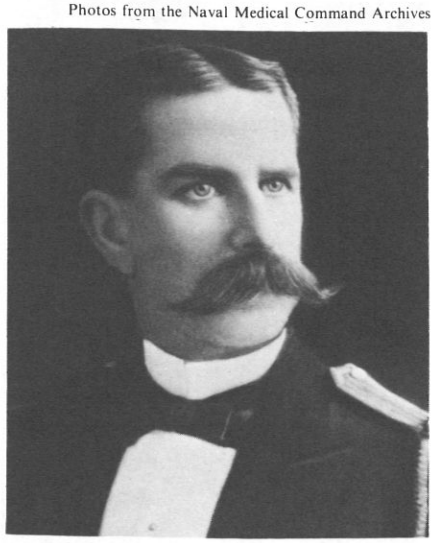
Observatory Hill as seen from atop the Washington Monument about 1900.

Where Medical College Left Off

The U.S. Naval Medical School and Naval Hospital 1902-1917

On 27 May 1902 the Navy Department established the U.S. Naval Medical School "for the instruction and training of newly appointed medical officers in professional branches peculiar to naval requirements."(*1*)

Photos from the Naval Medical Command Archives



Surgeon General Presley M. Rixey, once White House physician and friend of Theodore Roosevelt, supervised the establishment of the Naval Medical School.

The Medical School was the Navy's latest attempt to create an institution in which to train newly commissioned physicians in the ways of military medicine. There were precedents. Surgeon William P.C. Barton, who later became the first Chief of BUMED, recommended the establishment of a medical school as early as 1809. In 1829 Congress established the medical examining boards to determine professional fitness of those seeking admission to the Navy as physicians. Surgeon General of the Navy Joseph Beale revived the idea of a formal medical school again in 1873. His successor, William Grier, authorized formal instruction at the Naval Hospital, Brooklyn, NY. The 2-year curriculum stressed naval hygiene and military surgery.

Surgeon General J.R. Tryon inaugurated a 3-month course at the U.S. Naval Laboratory and Department of Instruction in Brooklyn in 1893. There, newly commissioned medical officers received postgraduate instruction in chemistry, hygiene, microbiology, microscopy, military and operative surgery, clinical medicine and hospital work, construction and ventilation of modern warships, examination of recruits, lifesaving methods, naval regulations, naval rations, and administration.(*2*) The graduates were then sent to sea or general duty. The school operated until the outbreak of the Spanish-American War in 1898.

The close of that short but controversial conflict heaped new responsibilities upon the United States. There were the spoils of war to administrate—Guam, the Philippines, Puerto Rico, and Cuba. The Nation was now a Pacific naval power with new ships, new stations, and enlarged hospitals. Medical officers had to be trained to staff the new facilities and handle an influx of recruits.

Naval Medical School

The plan envisioned by Surgeon General of the Navy Presley M. Rixey called for moving the moribund course from the U.S. Naval Laboratory in Brooklyn and consolidating it with the Naval Museum of Hygiene in Washington. At the same time, as part of the reorganization, the Naval Medical Examining Board, that body responsible for screening incoming physicians, would also move to Washington.

These plans seemed quite appropriate. The Museum, with its laboratories, classrooms, and fine library, was ideally suited. Moreover, the staff formed the nucleus for an excellent faculty and the city offered a seemingly endless supply of military and civilian medical specialists as guest lecturers. The officers assigned to the Medical Examining Board could also serve as instructors.

Further alterations of the old Observatory, now Museum of Hygiene, were necessary. By the end of 1902 an additional story had been added above the structure's two connecting wings to accommodate more laboratory space. With a reverence for tradition, the architect was lenient with the building's neoclassical design; only a trained eye could distinguish the new construction.

The east wing, long the residence of the Observatory's superintendents and now the Museum's medical officer in charge, was vacated to furnish office space for the Medical Examining Board.

The new labs for pathology, clinical microscopy, bacteriology, and medical zoology contained 26 working spaces, each with a plate glass-topped desk set on rubber matting and supplied with microscope and accessories, gas, electric light, and water. Outside the lab was a large, 37° C incubator with separate compartments for use by the students. Other incubators and ovens were also available for experiments.

The chemical laboratory contained 32 working spaces with equipment necessary to analyze milk, water, gases, etc.

The basement housed a specially constructed room for photography and photomicrography and a cold storage room kept just below 0° C.(*3*)

The consolidated Museum-Medical School library continued to grow in the south wing rotunda. The collection contained the leading foreign and domestic medical journals in addition to all the standard works on medicine and surgery.

Medical Director Robert A. Marmion became the School's commanding officer and presided over the first 12-member class. That first course of instruction was 5 months long with a curriculum covering microscopy, naval hygiene, military surgery, military medicine, duties of the naval medical officer ashore and afloat, military law, and a program of physical exercise and military drill akin to what any student might experience in a military school or service academy.

Because tropical disease had accounted for many of the casualties suffered in the recent war with Spain, it was a chief focus of attention. The School soon became the first important center for this specialty in the country. Physicians with clinical experience in tropical disease came to lecture, among them yellow fever pioneer COL William C. Gorgas, USA.

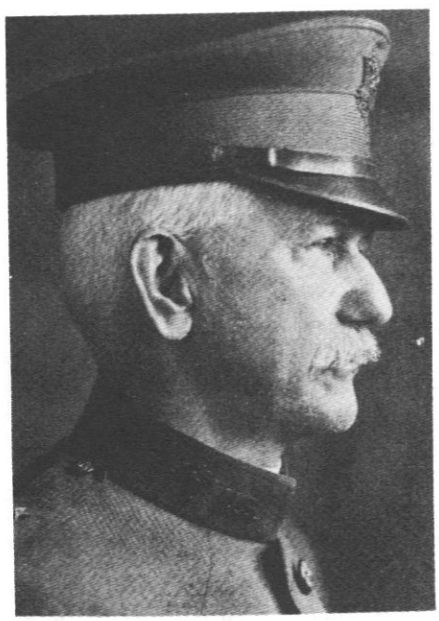
On 4 April 1903 the first class graduated. Surgeon General Rixey enthusiastically reported the event to the Secretary of the Navy. "The need of a preliminary course of instruction for the novitiate of the Medical Corps before taking up active duty was fully demonstrated in the class work, and already, in the few months since graduation that the members of the class have been actively employed, the value of this school training has been practically brought to the front."(*4*)

Even as the second class of 31 commissioned assistant surgeons convened in 1903, Observatory Hill was about to witness a building boom that would transform it into a medical complex.

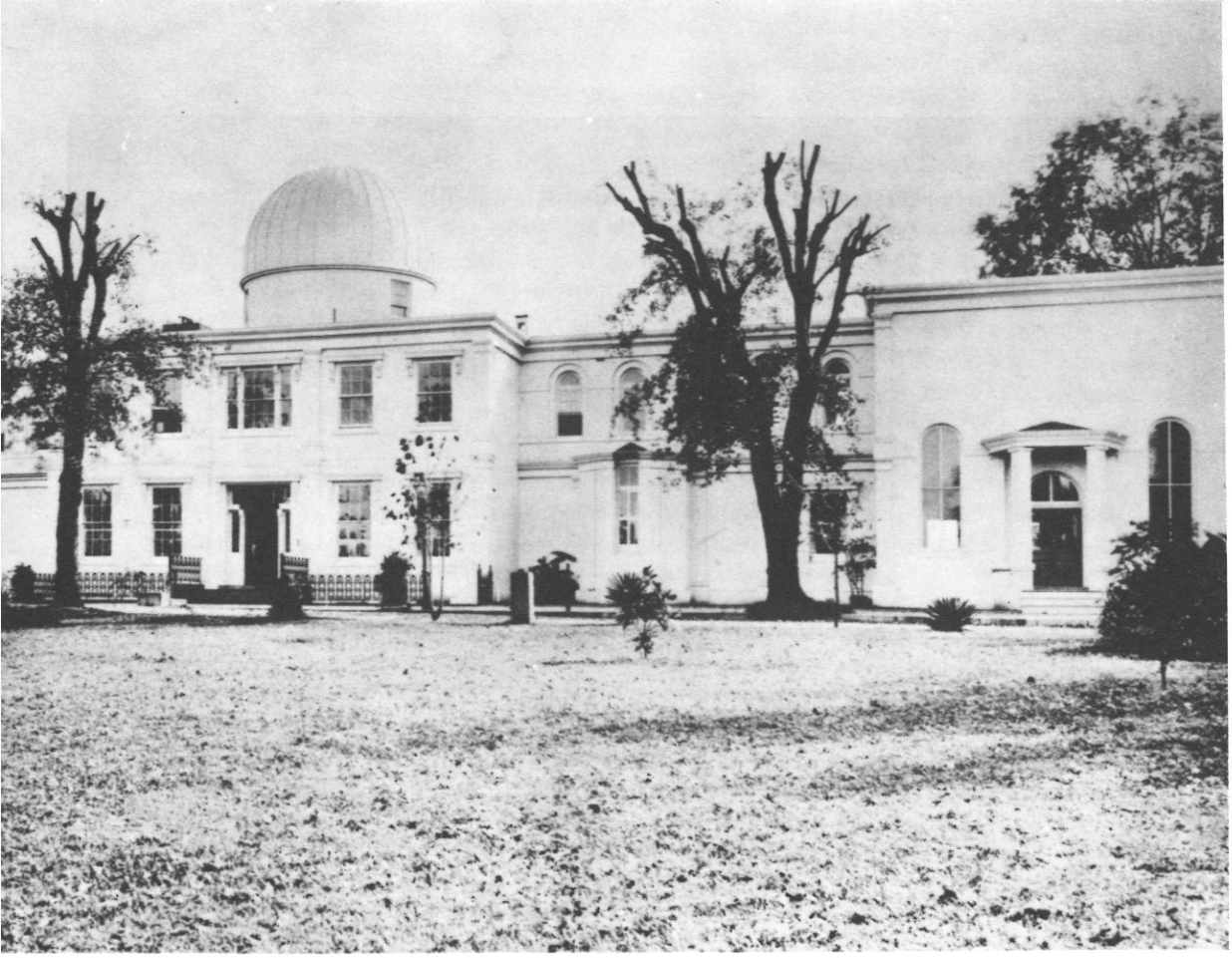
Naval Medical School Hospital

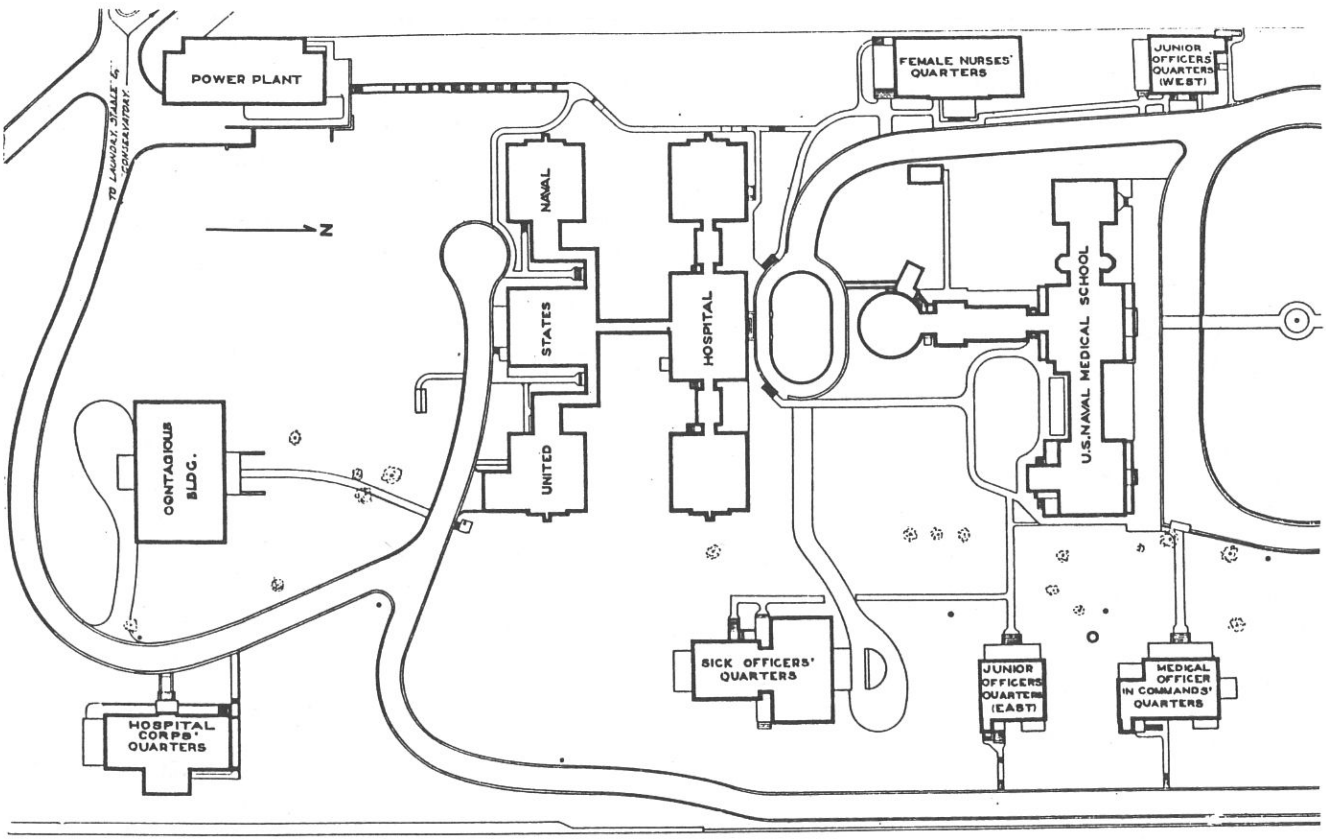
The Washington Naval Hospital, located on Pennsylvania Avenue and 10th Street SE had, for many years, been cramped, antiquated, and unable to house patients properly. There had been moves to construct a new hospital elsewhere in the city. On 3 March 1903 Congress appropriated $125,000 for construction of a new Washington Naval Hospital on Observatory Hill. The complex was to include a three-

The transformation complete: By the close of 1902 the connecting wings had an upper story to accommodate the Medical School's new laboratories. A somewhat radical tree-pruning operation had already taken place.



COL William C. Gorgas, the world's leading authority on yellow fever, lectured students and faculty.





Completed Naval Hospital and Medical School reservation.

[The class will report every week day, national holidays excepted, in time to be ready for instruction to begin at 9 o'clock a.m.]

Forenoon

Period	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Physical drill	9:00— 9:10	9:00— 9:10	9:00— 9:10	9:00— 9:10	9:00— 9:10	9:00— 9:10
Signals, tactics, etc.	9:15— 9:40	9:15— 9:40	9:15— 9:40	9:15— 9:40	9:15— 9:40	9:15— 9:40
Hospital corps drill	9:45—10:00	9:45—10:00	9:45—10:00	9:45—10:00	9:45—10:00	9:45—10:00
Section A: Bacteriological laboratory	10:00—12:30		10:00—12:30		10:00—12:30	
Section B: Chemical laboratory	10:00—12:00		10:00—12:30		10:00—12:30	
Both sections, lectures: Duties of naval medical officers		10:00—11:00				
Military diseases and tropical medicine		11:00—12:00				
Both sections, lecture: Hygiene				10:00—11:00		
Chemistry				11:00—12:00		
Both sections: Miscellaneous						10:00—12:00

Afternoon

Period	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Section A: Chemical laboratory	1:00— 3:30		1:00— 3:30		1:00— 2:30	
Section B: Bacteriological laboratory	1:00— 3:30		1:00— 3:30		1:00— 2:30	
Miscellaneous	3:30— 4:30	2:30— 3:30	3:30— 4:30			3:00— 4:30
Both sections: Military surgery		12:30— 1:30				
Bacteriology		1:30— 2:30				
Naval law		3:30— 4:30				
Both sections: Miscellaneous				1:00— 2:00		
Ophthalmology				2:00— 4:00		
X-ray work (Army Medical Museum)					3:00— 4:30	
Both sections: Laboratory						12:30— 3:00

Schedule of instructions and exercises at the Naval Medical School 1903-1904.

story administration building, a subsistence and operating building, four small one-story pavilion wards, and a power plant, laundry, and stable. The renowned architect Ernest Flagg* drew the plans, the contract was awarded, and construction began on 22 May 1904.

The hospital building was completed 1 year later but the money ran out before many of the fixtures were installed. It took another appropriation of $20,000 to build the southeast and southwest wards. On 1 Oct 1906 the yet to be completed hospital admitted its first patients.

The Bureau of Yards and Docks prepared plans for the hospital's other buildings. These included the contagious disease hospital, quarters for hospital corpsmen, sick officers' quarters, nurses' quarters, and three houses for junior and senior medical officers.

The new hospital buildings, faced with buff vitreous brick and uniform in appearance, had structural steel frames, concrete floors and ceilings, and were slate-roofed. Floors of yellow Georgia pine were laid on sleepers bedded in cinder concrete.

The central power plant supplied electricity and heat to the entire complex. The buildings had independent hot water or steam heating systems with thermostatically controlled radiators.

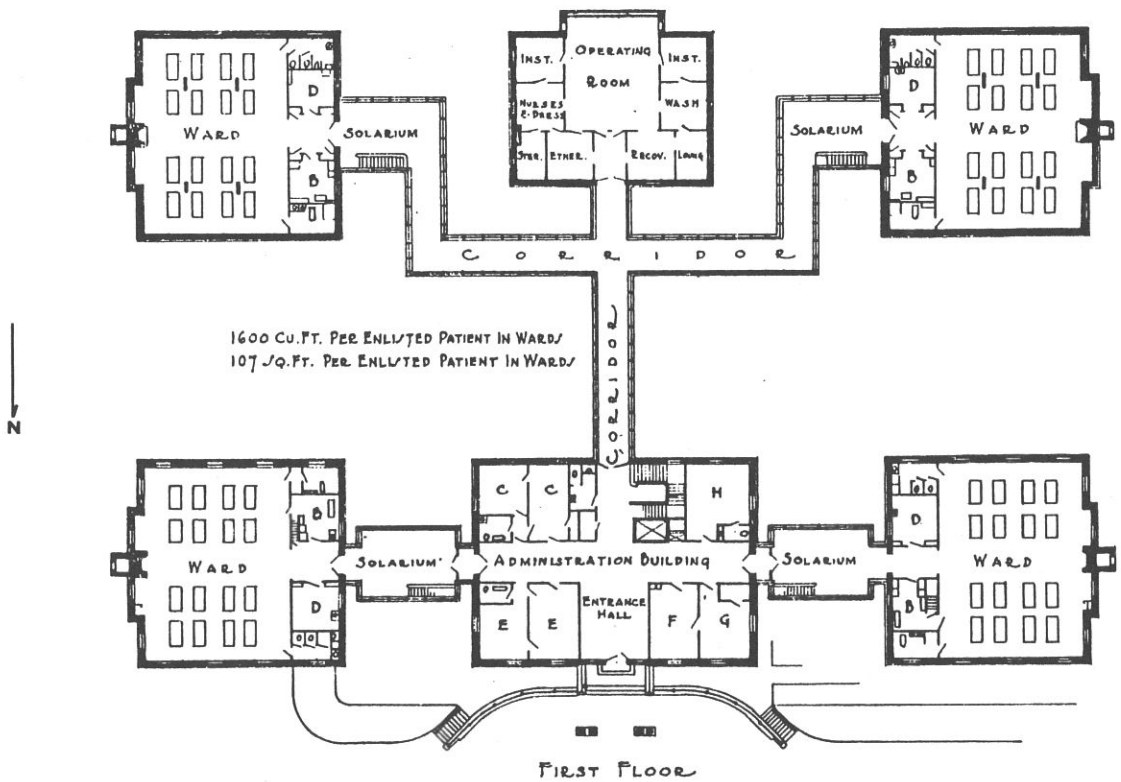
Both the main hospital and the contagious disease building had unique heating and ventilation systems. Gauze filters purified incoming air in the hospital and a water air-washer did likewise for the contagious disease building. Heating stacks warmed incoming air and a damper regulated temperature automatically by channeling incoming cold air through a bypass.

The main hospital (now Buildings Three and Four) consisted of a central three-story administration building, an operating room in the rear, and four one-story wards, one on either side of the buildings connected by solarium corridors.

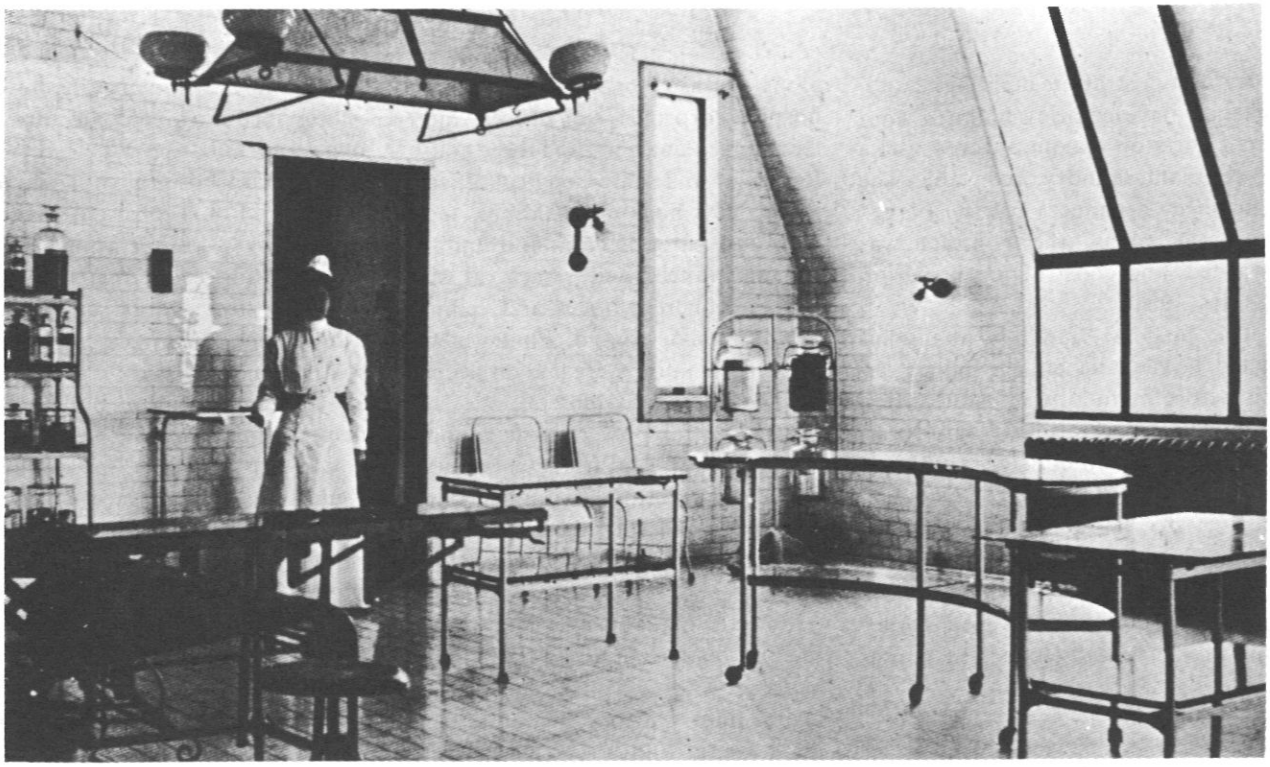
The administration building basement contained a space for hydrotherapy, a darkroom, X-ray room, and medical and dispensary storerooms. The main kitchen, pantry, patient and employee mess areas, and refrigerator room were housed beneath the operating room.

Below the wards were individual machinery rooms containing blowers, heaters, and serving and linen rooms. There was a suite of rooms for the outpatient clinics in the basement of the northwest ward, a messing area for corpsmen in the basement of the

*Among Flagg's other designs were the Singer Building in New York City, the Corcoran Gallery in Washington, DC, and several buildings and the hospital at the Naval Academy in Annapolis.



First floor plan of main hospital and wards.



The new hospital's white-tiled operating room.

southwest ward, and in the southeast ward, a garage, disinfector, and the mortuary and autopsy rooms.

A porte-cochère protected the hospital's main entrance on the north. Its roof served as a sunporch for second-floor patients. A hall led from the entrance vestibule to the rear and laterally to the ward corridors. The first floor housed the offices of the commanding officer, the executive surgeon, officer of the day, record clerks, toilets, and a telephone and orderly station.

The second floor had six rooms for sick officers, a dining room, and a pantry. Rooms for corpsmen were maintained on the third floor. The south side of the floor housed the operating department consisting of anesthesia and recovery rooms, a dressing and instrument room, and preparation rooms. The floors and wainscot were tiled, the walls finished in white enamel; the ceiling was of pressed sheet steel. Because it faced south, the operating room was extremely hot in summer. When the Sun bathed the room after midday, glare from the stark, white walls was so intense it was said to be dazzling.

Each of the four wards accommodated 18 patients, including 2 in a quiet room. The heavily glassed connecting corridors, widened near each ward, were used for solaria.

The quarters for sick officers (now Building Five) was a three-story building with a large portico supported by six wooden pillars at the front entrance extending to the third floor. Beneath this, on a level with the second floor, was a smaller portico immediately over the entrance. Both porticoes served as verandas for the corresponding floors. The first floor had an office, a reception room, library, a nurses' dressing and medicine room, diet kitchen, and five patient rooms. The second and third floors had 17 bedrooms and service rooms. Two spaces on the second floor were used for an operating room and dressing room.

The contagious disease hospital (now Building Six) accommodated four classes of communicable disease. The basement contained a receiving room for patients, a disinfecting plant, main kitchen, serving rooms, a dormitory and mess rooms for attendants, a mortuary, storerooms, and a machinery room. The other two floors were arranged similarly, each being bisected by a wide corridor running north-south and open at each end. This allowed for free circulation of air.

On either side of this corridor's south end on each floor was a six-bed ward and attached to each, a diet kitchen with an independent dumb waiter to the basement and serving room, a toilet and lavatory, and two quiet rooms. In addition to the four isolation units there were two rooms for nurses and an office and suite of rooms for a resident medical officer. The entrance to these wards from the open corridor was through a vestibule with a door at either end.

The nurses' quarters (now Building One) contained in the basement a kitchen, storerooms, and a bedroom for attendants. The first floor featured quarters and an office for the head

nurse, a reception room, lecture room, and dining room. The second and third floors had accommodations for 18 nurses.

The two-and-a-half-story corpsmen's quarters (now Building Seven) had accommodations for 57 men, an office, lecture room, recreation room, and mess areas.

Three coal-fired, 90 horsepower generators supplied power to all hospital buildings; the same boilers also generated steam and hot water for the entire complex.

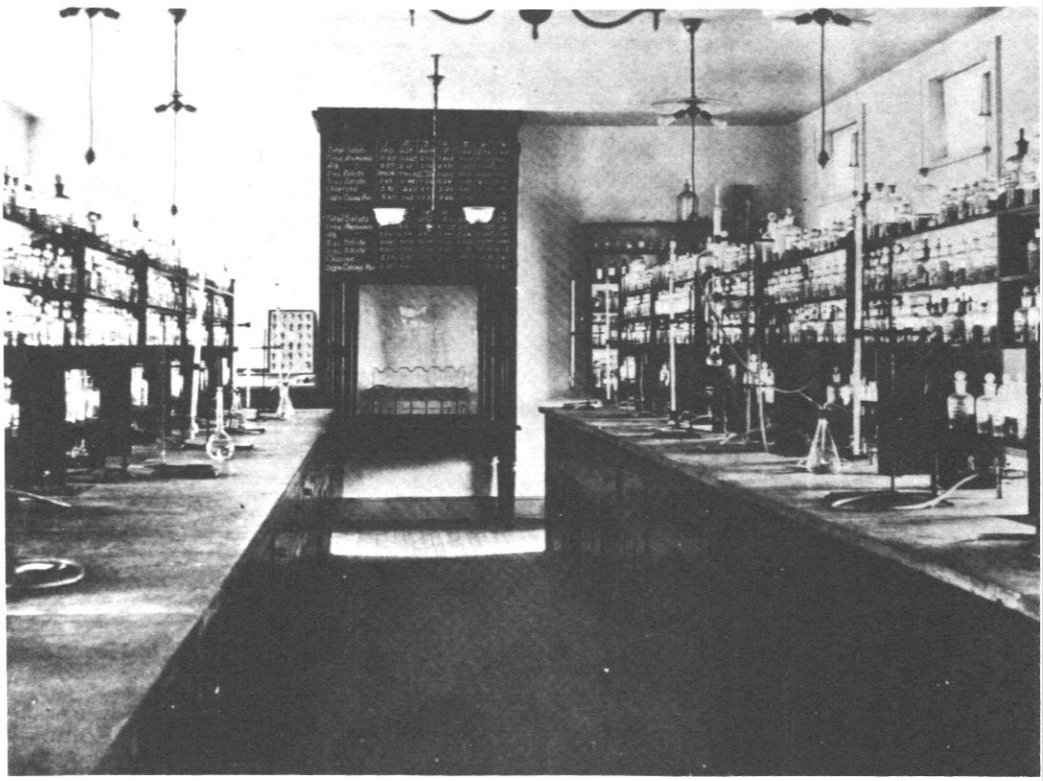
Total patient treatment capacity for the hospital was 130 beds—78 beds for the main hospital, 22 beds for the quarters for sick officers, and 30 beds for the contagious disease hospital. Expansion to 175 total beds was possible. By reconfiguring the corpsmen's quarters, capacity could total 240 beds.(5)

By the close of 1908 the complex was nearing completion. At the rear and southwest of the main hospital, a steam laundry, stable, and greenhouse took their places beside the existing power plant. Concrete walks now crisscrossed the compound.

Three years later, all remaining buildings were ready for occupancy including the quarters for sick officers, corpsmen's quarters, nurses' quarters, contagious disease hospital, and housing for the commanding officer and other assigned medical officers (now Quarters AA, BB, CC).

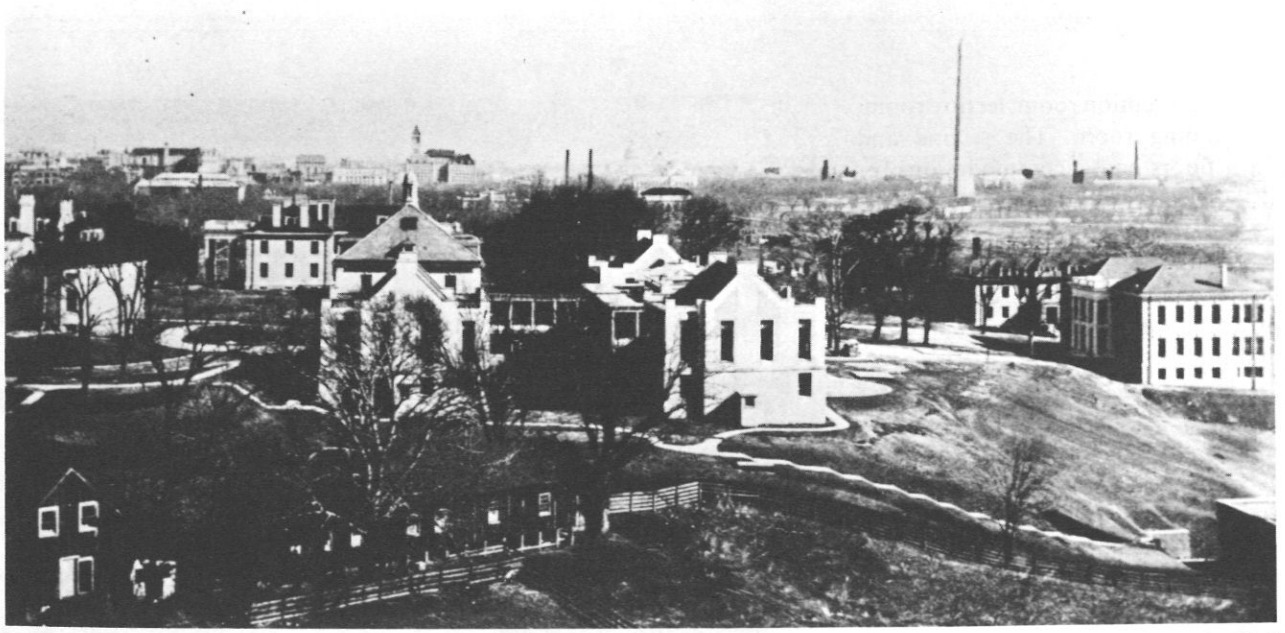
The New Curriculum

Observatory Hill had a new look. The Museum of Hygiene had been disestablished in 1905 and what had evolved in its place was a dual institution. Although the Naval Medical School and Washington Naval Hospital were housed in separate buildings, their relationship those early years was symbiotic. The hospital provided the School with instructors; the students gained clinical experience on the wards. Conversely, by 1910, almost all the School instructors were at least



Medical School chemical laboratory

Bacteriological laboratory



Observatory Hill looking east about 1910. The main hospital complex (center) is flanked by the Medical School library rotunda (left) and the contagious disease hospital (right). The stable appears in the foreground.

partially occupied with duty at the hospital.

That same year saw an expansion of the School's training program. Classes were instituted for hospital corpsmen, stewards, and nurses. But the addition of these new programs belied the fact that the School was being adversely affected by events beyond its control. In 1914 the United States responded to the revolution in Mexico with the occupation of Veracruz by the Marines. This event emptied the Naval Medical School of students. The regular winter term ended prematurely so those in attendance could be available for duty with the expeditionary force.

By 1917 the problem of maintaining a regular faculty had become critical. Because of other commitments, members of the teaching staff had little time to devote to teaching. The Surgeon General complained that "unlike the usual college instructors, [they] can give but a portion of their time to this work. They are on duty at the Naval Hospital, at the Naval Dispensary, at St. Elizabeths Hospital, and in the laboratory of the school. They serve as members of examining boards and are constantly burdened with varied additional duties."(*6*)

The number of students trained at the facility during those early years was never great. From September 1906 to the close of 1916 only 235 students graduated.(*7*) However, even with the lull caused by the Latin American interventions and the loss of faculty, 1917 was a banner year; 175 student officers received instruction, a number that nearly equaled the entire previous attendance.(*8*)

Within a year the student population and admissions to the hospital would swell perceptibly. American entry into World War I would see to that.

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"The Greatest Physician"

On Observatory Hill, shaded by a grove of oaks and a lone Norway maple, stands a bronze likeness of Benjamin Rush—physician, patriot, teacher, signer of the Declaration of Independence, Surgeon General of the Middle Department of the Continental Army, and humanitarian. Why the statue was created and how it found its permanent home is a fascinating story.

In the 1890's the War Department erected a statue on the grounds of the Army Medical Museum in Washington, DC, to the memory of Dr. Samuel D. Gross, a pioneer of modern surgical technique. There were those who felt strongly that if ever there was a representative American physician it was Benjamin Rush; he too, they argued, should have a suitable memorial in the Nation's capital.

COMO Albert L. Gihon, Medical Director, USN, spearheaded the drive to procure a statue of what he called "The greatest physician this country has ever produced . . ."* In a letter to the Secretary of the Navy, Gihon, as Chairman of the newly created Rush Monument Committee, justified a home for the statue: ". . . I trust you will find in Dr. Rush's pronounced advocacy of Hygiene as of fundamental importance in Medicine at a time when little consideration was given to it, sufficient reason for assigning a site to his statue at the approach to the great [Naval] Museum of Hygiene . . ."**

Secretary of the Navy Herbert approved the recommendation but reserved the right of his successor to choose the statue's final resting place.

Dr. Gihon died in 1901 and the Rush Monument Committee chose a civilian, Dr. James C. Wilson of Philadelphia, to carry on the necessary fundraising and procurement.

The American Medical Association, interested in the project from the start, was well represented on the Committee. Through that organization's efforts, individual AMA members contributed $15,000. No Federal money was ever appropriated. The Committee awarded the commission for the statue's design to Roland Hinton Perry, a sculptor of some note.† Architect Louis R. Metcalf designed the pedestal. The statue was cast in the foundry of the Henry-Bonnard Bronze Company of New York.

On 13 Jan 1904 a special commission headed by Surgeon General of the Navy Presley M. Rixey selected the final site in the general vicinity chosen by Albert Gihon.

The larger-than-life statue stood on a limestone pedestal set upon an octagonal granite base. Four panels featured the following legends: Front—"Benjamin Rush, Physician and Philanthropist, 1745, 1813;" Left—"Signer of the Declaration of Independence;" Right—"Studium sine calamo somnium;"†† and Rear—"The first American Alienist [psychiatrist]." On the base in front, cut into the stone, were the words "Erected by the American Medical Association, 1904."

On the bright, warm Saturday afternoon of 11 June 1904, the statue was unveiled and dedicated in the presence of 500 invited guests. Following musical entertainment by the Marine Corps Band, Dr. Wilson, Chairman of the Rush Monument Committee, eulogized Rush. President Theodore Roosevelt then accepted the monument as a gift from the medical profession to the Nation.

For over 60 years the Rush statue stood some 30 to 40 feet north of its present location. In the late 1960's the flagpole and statue traded places, and Benjamin Rush, who once greeted visitors who ascended a flight of stairs from E Street, now faces the front door of Building Two.

*Gihon AL: Letter to Hilary A. Herbert, Secretary of the Navy, 17 April 1896.
**Ibid.

†Perry's other work included the Fountain of Neptune and a series of bas-reliefs in the Library of Congress.

††This has been translated several ways: "Study without discipline is a dream," "Study without a pen is dreaming," and "Study of dreams without rod." The latter may allude to Rush's position on the humane treatment of the mentally ill.

Controversy and Transition 1917-1942

Entry of the United States into World War I on 6 April 1917 found the Washington Naval Hospital unprepared to receive the sick and wounded expected from the battlefields of France. By the end of the year a tent storage building had been erected as well as an addition to the Hospital's mess hall and kitchen. At the south end of the reservation carpenters hastily constructed eight temporary wooden structures to meet the wartime emergency.

The Medical School also took on a slightly different look. Both the east and west wings received additions to their southern exposures. The new space in the west wing was devoted to experiments related to submarines.(*1*)

Because of the war, the School found it necessary to add laboratory technician courses for enlisted personnel. One such course dealt with treating the victims of gas warfare. Others taught electrocardiography and analytic chemistry. Instruction increased in existing specialties and the Medical School became the headquarters for training epidemiological and sanitary units that would be deployed to the Western Front.

The war ended in 1918 and 2 years later courses for medical officers were increasingly geared toward specialization. The School sponsored cooperative programs in surgery at the Mayo Clinic; internal medicine at Phipps Institute and Pepper Laboratory at the University of Pennsylvania; ophthalmology and otology at the New York Eye and Ear Infirmary and Washington University, St. Louis; and general medicine at the Harvard Medical School.

On 3 Feb 1923 the dental school was established as a department of the Naval Medical School. It provided several postgraduate specialties and served as the Hospital's dental department.

By the following year an aviation department was instructing naval medical officers "as to the physical examination necessary preliminary to flying . . ."(*2*)

The war years saw a tremendous increase in the Hospital's patient load. In 1912 there had been 508 admissions. In 1918, at the height of U.S. involvement, 2,000 patients were admitted. The Armistice did not stem the flow. The great influenza epidemic and the admission of war veterans throughout the 20's under the auspices of the Veterans' Bureau strained resources to the limits. Hospital buildings designed near the turn of the century were not only showing their age but were unable to bear the unrelenting pressure.

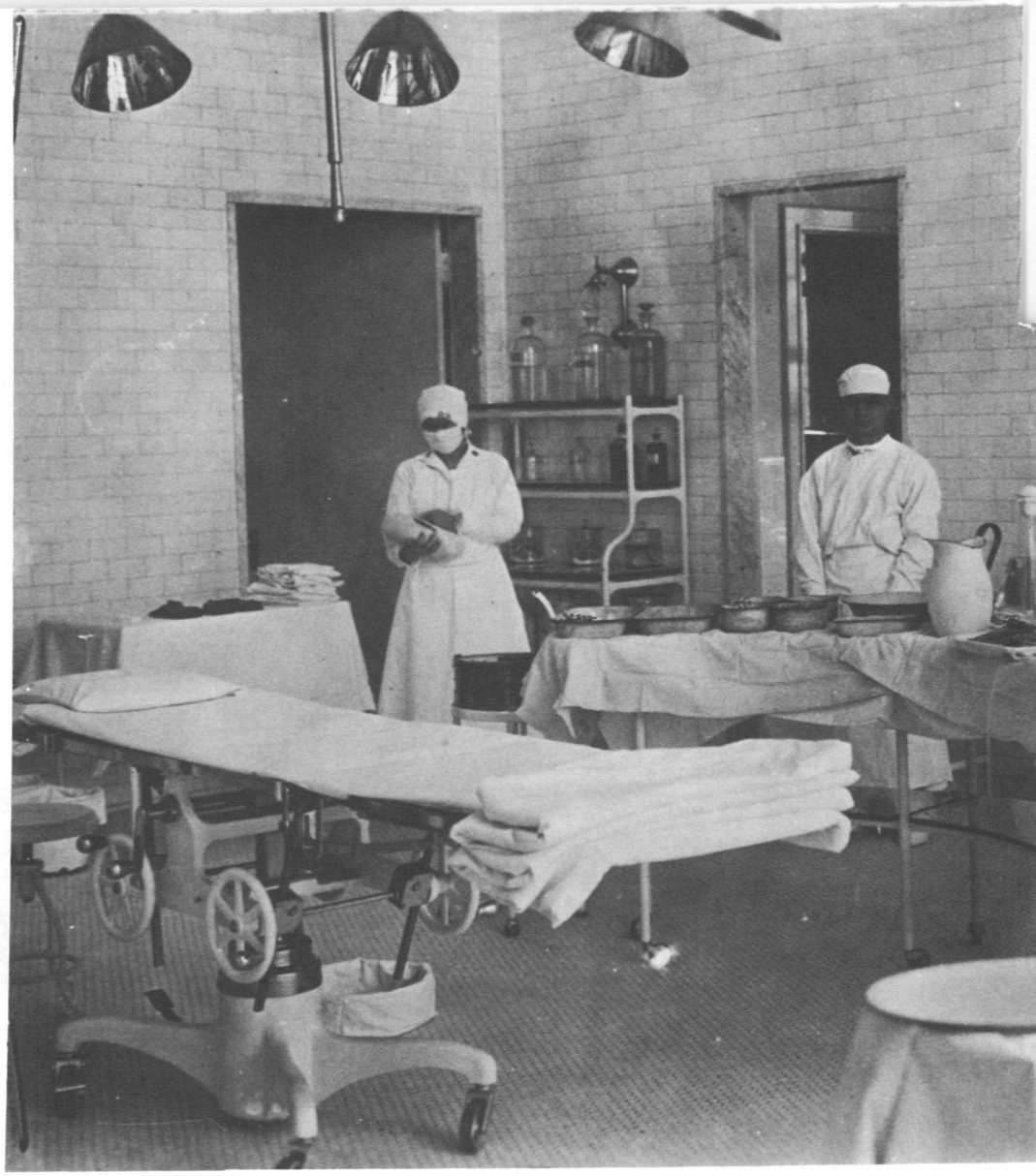
Fire Traps

By 1929 Navy planners were seriously discussing the possibility of replacing Observatory Hill's existing buildings with a new, modern medical center that would incorporate under one roof the Hospital and the Medical School with its labs, classrooms, library, and dental department.

In January 1930 the Surgeon General of the Navy, the Chief of the Bureau of Yards and Docks, and a representative of the Veterans' Bureau inspected the facilities. They found conditions deplorable and recommended that everything, including the

Nurses' quarters (Building One) in 1928. Below: The quarters had a downstairs dining room.

Photos from the Naval Medical Command Archives



old Observatory building, be razed. The team also attacked the compound's layout for its inefficiency. Food for the sick, prepared in kitchens of the main hospital building, had to be carried to the temporary wards at the bottom of the hill. Ambulatory patients in those wards were forced to walk up the hill for their meals in the main mess hall or be taken there by ambulance. Patients on the wards in the main hospital who required physiotherapy or occupational therapy had to walk or be driven downhill to the lightly constructed, two-story structures for treatment.

Of the 435 beds in the entire hospital complex, more than 50 percent were in these eight "tempos." Melvin J. Maas of the Veterans' Bureau was shocked by their rundown condition. "[I think it] a disgrace to house our men in shacks that would be condemned and discontinued by any municipality in this country. Those temporary buildings . . . are the worst set of fire traps imaginable. . . ."(3) Several days later, a somewhat more dispassionate naval inspector nevertheless came to a similar conclusion. "All temporary buildings are regarded as serious fire traps . . . At fire drill two lines of hose, attached to a fire plug . . . evidenced such feeble pressure as to be ineffective against fire . . ."(4)

Almost everyone found the main hospital hopelessly obsolete. Increasing demands had made it necessary to convert the basement of the main building into spaces for special treatment, examinations, and the eye, ear, nose, and throat department. These rooms, originally designed for storage, were poorly lighted, ventilated, and congested. More importantly, the main building had space for only 96 beds. The separate sick officers' quarters were constantly overcrowded and patients often had to wait for beds.

Half a Loaf

Based on recommendations of the inspectors, a bill was introduced in the House of Representatives authorizing

The operating room (second floor Building Four) in 1924. Below: Sick officers' quarters (Building Five).

the Secretary of the Navy "to replace, remodel, or extend existing structures and to construct additional buildings at the United States Naval Hospital and Naval Medical School, Washington, D.C., at a cost not to exceed $3,200,000."(5) The ultimate plan was to build a hospital center that would centralize all activities on Observatory Hill's high ground, where patients could be treated effectively and the management of the complex simplified. The new hospital would have a 524-bed capacity that could be expanded to 724 beds in an emergency.

The campaign for the new center could not have come at a worse time. The Nation had just been plunged into the Great Depression and government spending cuts were already being implemented. On 1 March 1930 the Bureau of the Budget advised the Navy that the original $3,200,000 would have to be more than halved to conform with President Hoover's austerity program. Only $1,500,000 would be authorized to build the new hospital and of that $250,000 would have to come from the Naval Hospital Fund, a reserve needed for other hospital projects. These new provisos were written into a modified version of the original bill.

As far as the Navy was concerned, half a loaf was really no loaf at all. A new facility simply could not be built on Observatory Hill for $1.5 million. The Navy, therefore, recommended against passage of the legislation, hoping the necessary appropriations would be forthcoming in a future budget. The Great Depression, it seemed, had momentarily saved the buildings on Observatory Hill from the wrecker's ball.*

Humanity Hill

Even with the open-ended postponement, both military and civilian

*Although an amendment to the original legislation exempted the old Observatory from destruction, the landmark was conspicuously absent from an artist's conception of the new medical center dated 25 Feb 1932 (see p 83).

planners saw the development of Observatory Hill as inevitable. Surgeon General of the Navy Charles E. Riggs referred to the grounds as "Humanity Hill," and predicted that the new medical center would be an impressive addition to the Washington skyline.

How a modern medical complex would fit into that skyline became a major subject of controversy. For years the neighborhood west of the White House, on the outer fringe of the Federal district, had been an industrial area, home to gasworks, breweries, and foundries. In stark contrast, the Lincoln Memorial, completed in 1922, and the Arlington Memorial Bridge, finished 10 years later, became the foci of what was supposed to become a district of new Federal buildings called the Northwest Triangle. Any redevelopment of Observatory Hill would have to fit within that context and satisfy the National Capital Park and Planning Commission (NCPPC) and the Commission of Fine Arts. The former had to pass upon the utilitarian and economic effects of projects as they affected the city. The latter made recommendations as to the harmony of design. By law, any plan was also subject to approval by the Public Building Commission.

What faced the Navy planners was the problem of space. The original tract had since dwindled with the transfer in 1901 of 5 acres of the western portion of the compound to the Marine-Hospital Service. The Public Health Service now administered the plot. Street encroachment took still more land until only 10 acres remained. How could the facilities be expanded and yet satisfy the NCPPC, Commission of Fine Arts, and the Public Building Commission? Any structure that overshadowed the Lincoln Memorial was unacceptable. This limitation quickly killed a 1929 plan calling for a seven- or eight-story tower. A year later the Bureau of Yards and Docks omitted the tower and limited the building height to five stories but that design was also rejected.

In November 1931 the Navy selected the Allied Architects of Washington, D.C., Inc. to draw up new plans for the site; yet even as the blueprints were completed, it was becoming more and more obvious that Observatory Hill was just too small to accommodate a center that would include the Medical School, dental school, technical schools for enlisted personnel, laboratories, a power plant, and quarters for corpsmen, nurses, and officers. Frederic Delano, Chairman of the NCPPC, argued that a new site, perhaps in the Washington suburbs, was really the answer. Any new buildings constructed on Observatory Hill should

The Hospital's Physiotherapy Department.

"be readily convertible into office buildings because of the future need of the present site for the executive departments of the Government."(6) Delano suggested a site for the medical center on land just south of the Walter Reed Army Hospital. Other schemes promoted the grounds of the new Naval Observatory or St. Elizabeths Hospital. Delano sought the support of selected congressmen and senators, but the Navy, which showed no eagerness to move, had its own allies on Capitol Hill.

Naval Medical Center

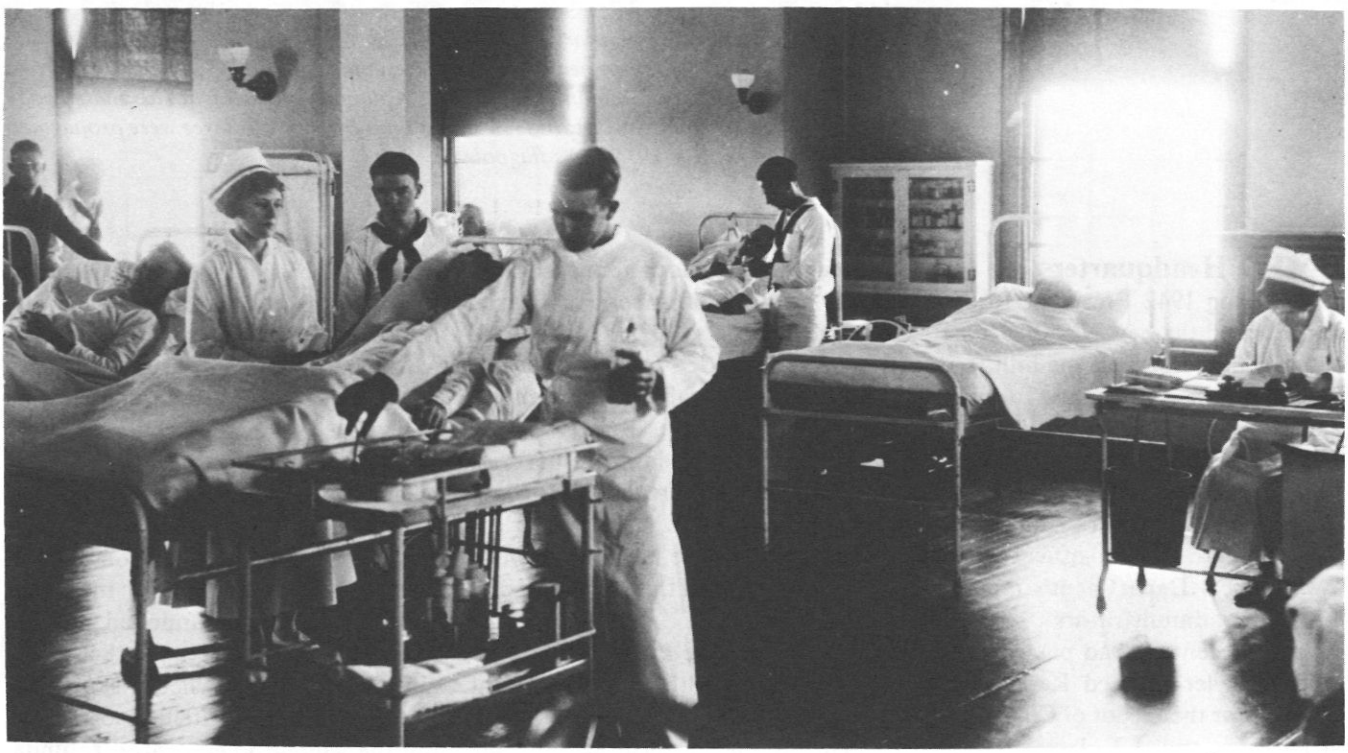
The controversy dragged on until 1937 when Surgeon General of the Navy P.S. Rossiter supported a transfer of the Hospital and Medical School. More importantly, the House Committee on Naval Affairs pointed out that "the facilities at the present naval hospital are entirely inadequate to fully and completely provide for the [necessary] activities and, too, the space for expansion is so limited that there is no room for the additional requirements that would be necessary in time of an emergency."(7)

The 1931 Naval Act was amended authorizing the Secretary of the Navy "to construct in the District of Columbia, or in the immediate vicinity thereof, on land already acquired or hereby authorized to be acquired . . . buildings to replace the present Naval Hospital and Naval Medical School . . . including facilities for the Naval Medical Center and Naval Dental School:* Provided, that the total cost of the land and of construction hereby authorized shall not exceed $4,850,000."(8)

*Department of the Navy General Order 70 of 20 June 1935 established the Naval Medical Center under the Bureau of Medicine and Surgery. On 1 Aug 1936 the Naval Dental School was established as an independent command under the Center.

There would be no further roadblocks. Acquisition of a 247-acre tract in nearby Bethesda, MD, and the construction of the Naval Medical Center became Franklin D. Roosevelt's personal crusade.

What would become of Observatory Hill now that the new Naval Medical Center was a *fait accompli?* There were those who recognized the historic significance of the old site. In 1939 Consulting Architect William T. Partridge suggested restoration for the old Observatory and a park for its surroundings. A year later plans were unveiled for the Northwest Rectangle, a 10-year project that would concentrate defense-related Federal agencies in the area west of the Mall. The NCPPC raised the possibility of turning the Naval Hospital grounds into a park and converting the old Observatory into a planetarium, but the outbreak of World War II ended these ambitious plans.(9)



A nurse instructor supervises corpsmen on the wards.

Cherry blossoms on Observatory Hill: In 1912 the Government of Japan gave 3,000 cherry trees to the American people. When it became necessary to thin out those trees planted along the Tidal Basin in 1922, 12 were replanted at the Naval Hospital. Today only one of the original survives. In 1990 six cuttings from this last tree were propagated and then planted near BUMED's flagpole.

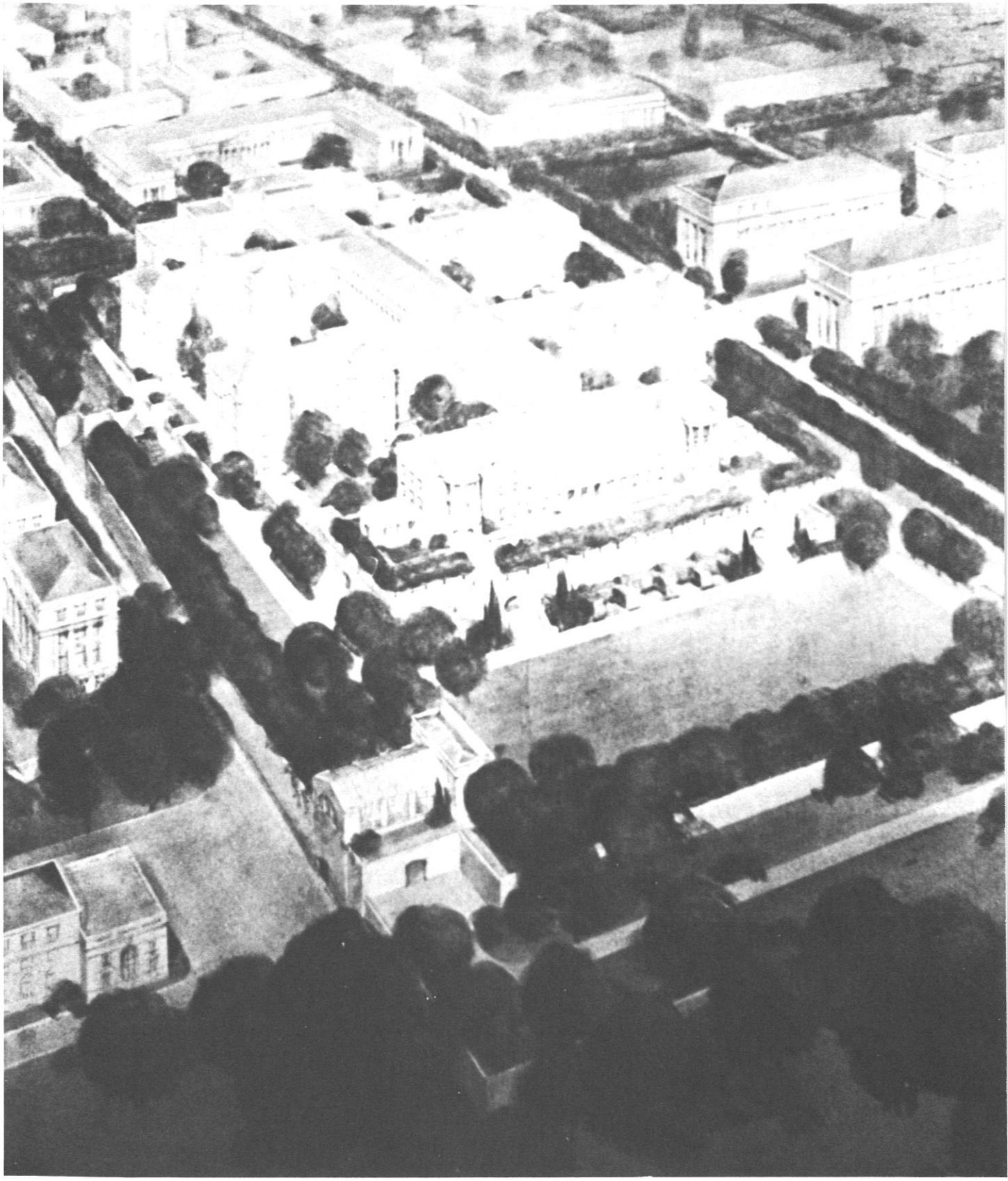
BUMED Headquarters

On 31 Aug 1942 President Roosevelt dedicated the new Naval Medical Center in Bethesda and the hilltop in Foggy Bottom received yet another tenant—the 100-year-old Bureau of Medicine and Surgery. Workmen quickly completed the transformation of classrooms, laboratories, and medical treatment rooms into offices for the Navy Medical Department's military and civilian administrators.

Exactly a century had passed since President Tyler selected Reservation Number 4 for the Depot of Charts and Instruments, and LT James Gilliss designed the structure that would house it. Each event that transpired on that compound added immeasurably to the histories of American science and medicine. In 1929 CAPT C.S. Butler, MC, USN, commanding officer of the Naval Medical School, wrote: "It is impossible [to note briefly] the many scientific discoveries . . . and developments that have come to be the heritage of the world's knowledge from the labors of men of science working on this historic spot." (*10*)

Alterations have erased almost all evidence of the 20th century hospital where thousands of patients were treated and the medical school that transformed civilian physicians into Navy medical officers. However, reminders of earlier days can be found in the Observatory if one knows where to look—observation shutters through which astronomers measured the passage of the stars, a diamond-shaped slab in the basement marking the foundation of the 9.6-inch telescope pier, the east wing residence where Matthew Maury wrote the first textbook on oceanography, a mysterious undergound passage designed for magnetic observations but abandoned shortly after it was completed in the 1840's, the south wing rotunda where Asaph Hall first observed the satellites of Mars, and the white-domed central rotunda itself, Observatory Hill's crowning jewel.

National Archives



Starting from scratch: A 1932 architect's rendering showed the new medical center replacing Observatory Hill's existing buildings.

This photo taken on 6 Dec 1928 shows the compound's fire equipment building shortly before it was demolished. The structure once housed astronomical instruments from the two Transit of Venus expeditions of 1874 and 1882. The plaque below the pediment reads: "Erected by the Transit of Venus Commission 1876."

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Photo by the Author

Above: The same scene today shows Building Three in the background. This was once the Naval Hospital's main administration building. Left: Past Surgeon General of the Navy RADM P.S. Rossiter with an artist's conception of the new Naval Medical Center at Bethesda, MD.