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CHRISTIAN HEINRICH FRIEDRICH PETERS

A Biographical Memoir by
WILLIAM SHEEHAN

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BY WILLIAM SHEEHAN

IN THE MID-NINETEENTH century the discovery of new asteroids was still far from routine. These objects had not yet grown so numerous as to earn for themselves the contemptuous label later applied, "vermin of the skies," and those who excelled in claiming the starlike wanderers from the camouflage of background stars were honored with renown. Hind, de Gasparis, Goldschmidt, Chacornac, Pogson, and Peters were foremost among the early discoverers. Even on this short list C. H. F. Peters stood out.

On May 29, 1861—just weeks after the American Civil War began at Fort Sumter—Peters discovered his first asteroid (72 Feronia). It was the fifth asteroid discovered in North America (others had been found by Ferguson and Searle). Feronia was the first of forty-eight such discoveries that made Peters the most prolific finder of minor planets of his generation, and even today he remains second only to Johann Palisa among visual discoverers of asteroids. During his colorful career, he also compiled meticulous star charts of the zodiac, collated observations from manuscripts of Ptolemy, and embroiled himself in a series of often bitter controversies with other astronomers, notably over the existence of an intra-Mercurial planet.

EARLY CAREER

The son of a clergyman, Peters was born on September 19, 1813, at Coldenbüttel in Schleswig (then a duchy of the Danish crown, now part of Schleswig-Holstein, Germany). He studied mathematics and astronomy under J. F. Encke at the University of Berlin, and received his doctorate at twenty-three. After unsuccessfully applying for work at the Copenhagen Observatory, he went to Göttingen, famous for its association with the mathematician Carl Friedrich Gauss. As a very young man, Gauss had devised methods for calculating the orbits of asteroids from observations covering only short arcs of their apparent motion, methods first applied to the recovery of the asteroid Ceres serendipitously discovered by a Sicilian priest, Guiseppe Piazzi, at Palermo on January 1, 1801. Piazzi's discovery would prove to be one of the great achievements of the century: Ceres was the first of the horde of small planets discovered between Mars and Jupiter.

Young Peters pursued his studies under Gauss, but his chief association at Göttingen was with a young geologist, Sartorius von Walterhausen, with whom he traveled to Sicily. There he and Walterhausen commenced a detailed exploration of Etna, the famous Sicilian volcano. They also laid out a meridian line in the great church of St. Nicolò l'Arena—it is very artistic, with mythological figures of the zodiacal constellations depicted in red stone.

As a result of these efforts, Peters was asked to take charge of a new observatory then being planned in Sicily. The observatory, however, received no support from the Bourbon government—in the end, it was not actually established until 1879, when the observatory on Etna was built. Instead, Peters went to work for the Geodetic Survey of Sicily. At the same time he became a regular observer at the observatory of Capodimonte, Naples, and used its 3 1/2-inch refractor for a careful series of sunspot observations. Also, on June 26, 1846, he picked up a faint comet (1846 VI). Unfortunately, the orbit he worked out for this object was widely in error, and with the exception of a single independent sighting by Francesco de Vico at Rome, it was not observed again until 1982, when it was recovered by Malcolm Hartley with the 122-cm Schmidt telescope at Siding Spring, Australia.

Sicily in the 1840s was a seething place, a cauldron of popular discontent and on the verge of revolt. Since 1821, when Piazzi's patron Ferdinand I, with the aid of foreign troops, had scrapped the constitution he had reluctantly agreed to a year earlier, it had been a state governed by the police—"the most brutal and reckless set of individuals," according to the Conservative Member of Parliament and future Prime Minister of England William Gladstone. The police were empowered to imprison a man without affording means of defense, to detain him year after year without trial, and even "to supervise all the actions and control of all the movements of those . . . who came under suspicion of being opposed to the regime."

In 1848 the fall of the Orléans monarchy in France and the declaration of the Second Republic stirred the spirit of liberation all over Italy; there were revolutions in Florence and Milan, the latter led by a guerrilla leader who had made a name for himself in South America, Guiseppe Garibaldi. In Sicily, where Ferdinand II proved to be no less illiberal than Ferdinand I had been, there were also uprisings, sporadic attempts to wrest the island from the Kingdom of Naples. One of Peters's colleagues, Ernesto Capocci, the director of the Capodimonte Observatory, was enthusiastic about the revolution and, according to Peters, was "joyful that his four oldest sons" had been willing to accept the dangers of the cause by taking arms for Garibaldi. Peters also sided with the rebels; however, in the end the protest was thoroughly crushed, bombed into submission by Ferdinand's gunners. Peters was abruptly relieved of his post at the Geodetic Survey and escaped by English ship to Malta, but later claimed he returned to Sicily to help General Ladislaw Mieroslawski, a Polish soldier of fortune who had led rebellions in Poland and Germany, to fortify the towns of Catania and Messina.

Peters's tumultuous Sicilian adventure came to an end in May 1849, when the Bourbon troops of General Filangieri occupied the island. Peters fled to France. After briefly recouping, he made his way to Constantinople (now Istanbul). On his arrival he had only enough money in his pocket to buy breakfast or a cigar—he chose the cigar!

Peters was a remarkable linguist, fluent in modern European languages and also in Greek, Latin, Hebrew, Arabic, Persian, and Turkish (he once published a scientific paper in Turkish, an achievement few European scientists could boast). In Constantinople he became scientific adviser to Reshid Pasha, Grand Vizier of Sultan Abdul-Mejid II. The sultan had recently acquired a fine 11-inch refractor, and Reshid Pasha was inclined to place it at Peters's disposal. However, according to a newspaper clipping from the time, "Reshid Pasha's power and protection were not sufficient to overcome the antagonistic influences within the palace, nor could astronomical science, which would not stoop to rule the planets, prevail against the astrologers." The sultan also discussed with Peters the possibility of his leading a scientific expedition to Syria and Palestine; but in 1854 the Crimean War broke out, and the plan was abandoned.

TO AMERICA

Acting on a suggestion by George Marsh, the American ambassador to Turkey, and armed with a letter of recommendation from Alexander von Humboldt, Peters set sail for America in 1854. He immediately paid a visit to the Harvard College Observatory, where he met W. C. and G. P. Bond, and made the acquaintance of other leading American astronomers at the 1855 meeting of the American Association for the Advancement of Science at Providence, Rhode Island. He spoke on the sunspot observations he had made at Naples. His remarks formed the basis of a paper, "Contributions to the Atmospherology of the Sun," which was published in the *Proceedings of the American Association for the Advancement of Science* (1855). Peters believed that the Sun was the scene of violent electrical storms, and cited various observations in support of this view. He also had been measuring for years the proper motions of sunspots. Since Galileo's time sunspots had held the key to the Sun's rotation, and Peters was well aware of the fact that sunspots always drifted toward the equator. He also noticed relative motions in longitude, far more considerable than those in latitude. "Whether there be a common motion," he wrote, "and in what direction, cannot be decided in the present state of our knowledge of the Sun."

DUDLEY OBSERVATORY

The AAAS meeting made Peters well known in America and won him a position on the staff of the U.S. Coast Survey in Washington, D.C. He became a protégé of the director of longitude determinations, Benjamin Apthorp Gould, Jr., and when Gould became scientific adviser of the Dudley Observatory in Albany, New York, Peters preceded him there as resident observer.

Dudley Observatory had been organized in the early 1850s when several prominent citizens of Albany, headed by Dr. J. H. Armsby and Thomas W. Olcott, approached Cincinnati astronomer Ormsby McKnight Mitchel for advice on founding an observatory in their city. Mitchel was as well known for his popular lectures and believed strongly in fostering a general interest in the subject among educated laymen—he even founded a short-lived popular journal, the first such journal published in America until the founding of the *Sidereal Messenger* in 1882. Mitchel suggested that a sum of $25,000 would be sufficient for the building and the instruments, in order "to lay the groundwork upon which immediate action and consequent success could be built." His pronouncement persuaded the citizens of Albany that the project was within their means; a subscription, of which the largest portion was donated by the widow of the late Charles E. Dudley, was raised, land was donated, and the actual construction of a turreted dome got underway.

At the AAAS meeting in 1854, Peters argued for the purchase of a heliometer, an instrument with a divided objective used to accurately measure apparent diameters of the Sun. At the time there was no heliometer at the Coast Survey, which was by Act of Congress prevented from establishing an observatory of its own. The superintendent of the Coast Survey, Alexander Dallas Bache, endorsed Peters's recommendation and further proposed that in exchange for the Coast Survey's use of the heliometer, he would place instruments and observers from his own corps of government employees at Dudley's disposal. Thus the Albany concern became inextricably entangled with the Coast Survey; Mitchel withdrew his name from consideration, and Gould became presumptive director of the new observatory.

A scientific council, consisting of Bache, Gould, Smithsonian physicist Joseph Henry, and Harvard mathematician Benjamin Pierce, was appointed to provide advice to the Dudley Board of Trustees. Gould set out for Europe "with full authority to purchase a heliometer, a meridian circle, a transit instrument, a clock, and such other instruments as he might think proper." He had been trained at Harvard and like Peters received a Göttingen Ph.D. He believed that science in America was in a backward condition, was ambitious to improve the situation, and intended for his observatory to become the leading American research institution of its time. However, the Dudley Observatory Board of Trustees had always envisaged a more public role for its observatory and had hoped for a facility that, in addition to producing results valuable to science, would serve as a means of "attracting, enlisting, and concentrating lovers and patrons of science." Inevitably, Gould and the board began to diverge sharply in their plans. As Simon Newcomb later observed, this "grew into a contest between the director and the trustees, exceeding in bitterness any I have ever known in the world of learning and even of politics."

In marked contrast to Gould, who when he was not in Europe was attempting to run the observatory by bulletins from his office in Cambridge, Peters arrived in Albany eager and ready to go to work, and impressed the trustees at once as a man of action. With one of the small instruments at the observatory he discovered, on July 25, 1857, a new comet, which he proposed to name for Olcott, the most prominent of the trustees. (The name was never officially adopted since by astronomical convention comets are named after their discoverers. Gould, however, at first wrote in support of Peters's initiative; "it is a very pretty idea," he wrote in a letter dated August 4.)

News of the discovery was "snapped up by the papers," and Peters, emerging as a hero who had produced results, immediately became the trustees' clear choice to run the observatory. Lines were drawn with Bache and Gould on one side, Peters and the trustees on the other. Bache, accusing Peters of "untrustworthiness," ordered his immediate recall. One of the trustees in turn protested this attempt to "decapitate" Peters, and added: "The summary dismissal of such a man from such a position without a shadow of just reason, seems to be unprecedented and unwarrantable. He is a foreigner; but science knows no nationality. He is without social support or governmental patronage, but neither of these will secure the practical service which the observatory just now so much needs . . . He has slept at the feet of his instruments. In his own expressive language, 'the skies knew him.'" Under pressure from Bache and Gould, Peters resigned his position at the Coast Survey—it had paid only $540 per year, too little to live on. However, at the trustees' behest, he stayed on briefly in an apartment of Dudley Observatory, waiting like Dickens's Micawber for something better to turn up. (He may have still been there when a colleague, George Searle, discovered an asteroid at Dudley; the name, Pandora, was suggested by Mrs. Dudley after the woman in Greek myth who opened the box whence issued the multitude of evils that continue to afflict the human race; at the bottom of the box, only hope remained. Gould later quipped that the "apt significance" of the name would be obvious to all, under the troubled circumstances at the observatory.)

TO HAMILTON COLLEGE

In 1859 Gould gave up his long and bitter fight with the trustees (forced out, he said, by "hired ruffians"). By then, Peters had moved from Albany to Hamilton College, a small men's college in Clinton, New York (near Utica), where he had been named professor of astronomy. The college had just built a new observatory consisting of a two-story building capped with a 20-foot cylindrical dome. It housed a fine instrument, a 13 1/2-inch refractor, one of the largest in America at the time, built by Charles A. Spencer of Canastota, New York. However, financially Peters continued for some time to live on the ragged edge of existence. American astronomy was not well funded at the time. Thus Harvard's director George P. Bond wrote to Peters: "What you say of the financial prospects with which you begin the new year, nearly completes the list of twenty-five observatories started (not founded) within the past twenty years in the United States and left to die of want." Peters's reply was dated February 1: "Lately for a day I was in Albany to speak with a lawyer about payment of my last year's salary. The trustees here, too, will find that there are 'fighting' astronomers." Already Peters had shown a marked attraction to the American propensity for litigiousness; his fighting instincts were aroused, and the rest of his career would be characterized by bitter controversies and legal proceedings.

At Hamilton College, Peters used the 13 1/2-inch refractor to plot sunspots by day and to search for new asteroids by night. His sunspot observations remained unpublished until long after his death (they eventually appeared as *Heliographic Positions of Sun Spots Observed at Hamilton College from 1869 to 1870* (1907). However, his asteroid discoveries won him immediate renown. His first discovery seems to have been inadvertent; he tracked down 72 Feronia while chasing another asteroid, 66 Maja, which had been found by H. P. Tuttle at Harvard. Peters added two more asteroids, 75 Eurydice and 77 Frigga, in 1862 and one each in 1865, 1866, and 1867. Impressed by this record, a Mr. Litchfield, a railroad magnate from nearby Delphi Falls guaranteed all the funds needed to cover the astronomer's modest yearly salary. The observatory was renamed the "Litchfield Observatory," and Peters enjoyed the title "Litchfield professor of astronomy" and a modicum of financial security.

VULCAN CONTROVERSY

Peters's work as an asteroid discoverer led him to project a series of star charts to be inclusive of all the stars of the zodiac visible with an ocular magnifying 80x on that telescope. (Eventually, he would make some 100,000 zone observations in preparation of these charts.) His work as an asteroid discoverer also brought him into conflict with a younger rival, James Craig Watson, who in 1868 piqued Peters's intense competitiveness by discovering six asteroids—at the time an unprecedented feat.

It is not clear just when Peters began to form his keen dislike of Watson; keen dislike, however, it undoubtedly was. Peters was a lifelong bachelor. He was a man of great learning, a cosmopolitan, a man of the world, and a connoisseur of good cigars. He could be gruff, and was often misunderstood. No doubt he felt isolated at Hamilton College, and complained of his "solitary life." There was little to distract him from his work. Though he never lost his strong distrust of the entrenched powers, he himself, ironically, became increasingly authoritarian and opinionated with age. He was also litigious in marked degree, intent both in astronomical journals and in the courts on defending his rights. Simon Newcomb, one of a number of astronomers who eventually fell out with Peters, wrote: "Of his personality it may be said that it was extremely agreeable so long as no important differences arose."

With Watson, suffice it to say, important differences arose. Watson, like Peters, had begun to prepare his own zodiac star maps to assist his asteroid discovery work, and Peters resented an intrusion into realms that he regarded as his prerogative. Probably after so many hard-bitten years, he was also jealous of the junior astronomer's astonishingly rapid progress. Whatever the cause, there came to be something intensely personal in Peters's dislike of his younger rival. Moreover, not only were the two men rivals in asteroid discovery, they ended up vociferously on opposite sides of one of the most noisy scientific issues of the day—the vexed question of the existence of one or more intra-Mercurial planets.

The possibility of such planets had been endorsed by the leading theoretical astronomer, Urbain Jean Joseph Le Verrier of France. Already hailed for the brilliant prediction that had led to the discovery of Neptune at the Berlin Observatory in 1846, Le Verrier a few years later had turned his attention to the errant motion of the innermost planet. Finding a minute discrepancy (i.e., the perihelion of the planet's orbit was advancing slightly faster than predicted by Newtonian law) but unable to discover a strategy within Newtonian dynamics that would eliminate it, he introduced the Trojan horse of an unseen planet (possibly a zone of debris) lying closer to the Sun than Mercury. He announced his conclusion in September 1859; it was enthusiastically greeted as a prophetic utterance pointing the way to another world. Almost immediately he received the curious account of a country doctor, Lescarbault, alleging that the planet had already been observed by him in transit across the Sun's disk the preceding March. Le Verrier was nonplused; nonetheless, he visited Lescarbault's village of Orgères and interviewed the doctor himself. Thus he convinced himself of the truth of Lescarbault's account, and for the rest of his life remained convinced of the existence of the putative planet, which was named Vulcan after the Roman god of fire.

Unfortunately, Vulcan failed to show itself at its next predicted transit in March 1860; nor did it register an appearance at the July 1860 total eclipse in Spain. The astronomical world became sharply divided. Watson, whose work on theoretical astronomy Le Verrier had praised, was a prominent supporter of his; Peters was a fierce opponent. Soon after he began work at the observatory in Naples, Peters had carried out an investigation of a colleague's claim of having seen a host of corpuscular bodies—they were presumed meteoric, possibly related to the May (Eta Aquarid) meteors—in quick passage across the Sun. After studying the "corpuscles," Peters was convinced that they were nothing more than flocks of migrating birds. Unimpressed by the records of Lescarbault and others who had reported fleeting objects upon the Sun's disk, most of which Peters believed were birds, he insisted on trusting only the records of experienced observers; Schwabe, the discoverer of the sunspot cycle, England's Richard Carrington, and, of course, himself, none of whom had ever seen a planetary object crossing the Sun.

Peters was present at an August 7, 1869, eclipse expedition to Des Moines, Iowa. Simon Newcomb suggested that Peters ought to join in the search for intra-Mercurial planets, but Peters replied he had come to observe the eclipse and added, with an allusion to his migrating-bird thesis, that he would "not go on a wild goose chase after Le Verrier's mythical birds."

THE TRANSIT TO VENUS

Peters again escaped provincial life at Hamilton College in 1874, when he traveled as chief of the U.S. expedition to New Zealand to observe the transit of Venus. The transit was the first since 1769, when Captain James Cook had sailed with the *Endeavour* to the South Seas, had observed the transit of Venus from Tahiti, and had gone on to map the coasts of New Zealand, Australia, and New Guinea. While Peters's ship was being loaded up in San Francisco for its long journey he wrote anxiously to make sure the expedition was being provisioned adequately: "Will you ask Lieutenant Bass, if it is not too much trouble, to do me the favor to buy on my account some 4 or 500 of your 'Meravillas' [cigars], and to stuff them in the outside boxes of the Equatorial, or Transit, where I think there might be plenty of room for a few cigar boxes? The New Zealand sun will drive out what dampness they may receive on the sea."

Peters's observing station was near Queensland in the mountains of the South Island of New Zealand, an elevated situation that required the transport of telescopes and other supplies (including cigars) through valleys and across rivers. "The English parties sneered a little at us," Peters confessed; but in the end Peters was at least partially vindicated—as he usually was during his long astronomical career—since most of New Zealand lay under heavy cloud cover on transit day, December 8, 1874. Peters, on the high ground, was favored with at least short intervals in which the Sun "shot out from between the clouds," and succeeded in getting a good timing of the first internal contact of the planet with the Sun's disk. Peters returned to the United States by way of Sydney and Brisbane, passed through the Torres Strait and along the coast of Java, then to Batavia, Singapore, Hong King, Yokohama, and finally back to San Francisco. He had spent, in all, a full year "tumbling about in distant countries."

Almost at once on returning to Hamilton College, he opened the dome of the 13 1/2-inch refractor and discovered his twenty-first and twenty-second asteroids—both on the same night, June 3, 1875. He displayed his learning in classical literature in naming them Vibilia and Adeona after the Roman goddesses of journeyings and homecomings. They are not alone among Peters's asteroids in having unusual names; though many of his asteroids have classical names (Eurydice, Io, Iphigenia, Cassandra, Alceste), he also chose many names from Norse mythology, and even one from the Bible: Miriam, the name of one of Moses's sisters, was the name he gave an asteroid he discovered in 1868, apparently for no other reason than to irritate a colleague. At the time it was a strict rule that asteroids were to be named only for mythological, not real, personages; Peters's sole motive in breaching the rule was so he could tell a theological professor, "whom he thought too pious," that Miriam was also a "mythological personage." Peters did ever delight in pricking the bubble of pretentious colleagues.

VULCAN AGAIN

Meanwhile, the intra-Mercurial planet question rose again to the fore. Le Verrier died on September 23, 1877—the exact anniversary of the Neptune discovery. To the very end, he had never recanted his belief in Vulcan's existence. Instead he had published new calculations of the planet's orbit and predictions of possible transits, which rekindled the interest of sympathetic astronomers and hardened the skepticism of the unsympathetic. Carefully watched for the world over, the predicted transits were again devoid of result; no Vulcan appeared against the disk of the Sun.

The total eclipse of the Sun of July 29, 1878, was now awaited by astronomers with an almost panicked sense of urgency. It would be, in some ways, the best chance to scour the sky around the Sun for the elusive interloper: Vulcan's last stand. In the United States the path of totality swept from Yellowstone National Park and the Wind River Range in Wyoming Territory, down the front range of the Rockies through Boulder, Denver, and Pikes Peak, then across Oklahoma Indian Territory into Texas and Louisiana. Peters was invited to accompany the party of Edward S. Holden, then of the U.S. Naval Observatory, later of Lick Observatory, who was planning to observe from Virginia City, Montana Territory. "It is a great temptation," Peters admitted, ". . .

but I ought not to go, unless the trustees [here] give me an assistant at the observatory—for which probably there is little hope. So, you go to Montana. Take care of not being scalped by the Indians."

Holden did change his plans, and observed the eclipse from Colorado. Simon Newcomb was dispatched to the railroad outpost of Separation, Wyoming, where he was joined by Watson. Peters's rival obtained the most spectacular results at the eclipse–he found a "ruddy star" between the Sun and *theta Cancri* that was not on the star maps, also another, even bright red star, farther to the east. Watson was convinced he had found one, possibly two Vulcans. The announcement electrified the astronomical world. Elsewhere only Lewis Swift, who had made a name for himself as a successful discoverer of comets and observer of nebulae, had seen anything unusual; from his station at Denver he too had made out two strange red stars. At first it seemed that his results agreed perfectly with Watson's. However, he had made a mistake, and on recalculation it turned out that Watson and Swift's positions could not be reconciled. If their reports were both accepted, there must be no less than four planets.

Into this territory of doubt, Peters rushed like an avenging angel. He had always regarded Vulcan as a "mythical bird"; now he was intent on demonstrating, once and for all, the insubstantiality of the ghost planet. (To his impartial interest in defining the truth was added the alluring motive of destroying his hated adversary Watson.) Fired with zeal for the project, he searched the byways of his retentive memory, drew deeply on a lifetime of reading in obscure and forgotten lore. His scholarly interests were wedded to the aggressive skills of a master prosecutor. Vulcan, that notorious fraud, stood in the dock, and must be convicted of imposing itself on the credulity of the astronomical world.

Peters's attack appeared in 1879 in *Astronomische Nachrichten*. It is, as Joseph Ashbrook noted, "a strange blend of sharp insight and utter tactlessness." Peters quickly disposed of Swift's claim and launched his main attack on Watson. He was convinced that the Ann Arbor astronomer had overestimated his ability to measure the positions of his stars under the necessarily rushed and nerve-wracking conditions of a total eclipse, and his conclusion—which has never been disproved—was that Watson's "Vulcans" were simply the field stars *theta* and *zeta Cancri*.

STAR CATALOGS AND LAWSUITS

By now Peters was in a race against time to complete work to which he had devoted decades of effort. There were his zodiacal star charts, which he had drawn up to aid the detection of his asteroids. He had planned 182 charts in all covering the whole ecliptic. It was a heroic enterprise. The first twenty charts were published as *Celestial Charts Made at the Litchfield Observatory of Hamilton College* in 1882; but he never published the rest, since by then the whole project had been superannuated. The potential of dry-plate photography for star mapping had been realized. In 1887 Peters was among 57 astronomers from 11 countries to meet in Paris to develop a program of cataloging and mapping the entire sky by means of photography. The plan led to the *Carte du Ciel*.

Peters was elected a member of the National Academy of Sciences on April 19, 1876. He was by then planning a revised edition of Ptolemy's star catalog in the *Almagest*, which would involve the collation of existing manuscripts in the libraries of Europe. At the same time, or a little later, he began work on another massive compilation: the gathering together into a single volume all published observations of the comparison stars he used in measuring asteroids.

Naturally, both projects were larger than any man could possibly accomplish alone, especially an increasingly aged and querulous man (Peters was now well into middle age). An assistant, Jermain G. Porter, later director of the Cincinnati Observatory, briefly joined in the comparison-star compilation, but for a number of years the scheme languished. Finally Peters hired a more willing assistant, Charles A. Borst (Hamilton College class of 1881). At first Borst was trusted only with miscellaneous reductions, but from May 1884 he was employed on the compilation itself. By early 1888, Borst, with the aid of his sisters who had helped him carry out many of the calculations at home, had finished and submitted the manuscript to Peters with a title page indicating that it had been performed by Charles A. Borst under the direction of Christian H. F. Peters. According to Borst, Peters immediately became enraged, tore up the title page, threw the fragments into the stove, and shouted, "Bring me the catalog!"

Borst refused to do so, and Peters immediately initiated a suit *in replevin.* Peters hired as his counsel one of the most prominent lawyers in New York, Elihu Root (Hamilton College class of 1867), the son of Peters's close friend, Hamilton mathematician Oren Root. Borst chose for his counsel the law firm of an ex-senator of the United States, the Messrs. Kernan of Utica. Several astronomers, including Newcomb, suggested that the matter would be better submitted to arbitration by astronomers. However, Peters refused to compromise. In 1889 *Peters v. Borst* was heard before the Supreme Court of New York, Oneida County, presided over by Judge Williams. The "Great Star-Catalog Case" became a *cause célèbre,* and received coverage in the local newspapers. The judge—obviously bewildered by many of the technical details—eventually decided for Peters; but the newspapers sided with Borst, and so did many astronomers, including

Newcomb. (Apparently Peters and Newcomb never spoke to one another again.)

Undoubtedly the legal proceedings were an enormous strain on Peters. Up to this time he had remained healthy, active, energetic—his last asteroid discovery, 287 Nephthys, was found on August 25, 1889, when he was almost seventy-six years old. However, when the legal proceedings got underway, he grew preoccupied and depressed. Oren Root recalled that though Peters was still "clear-headed as ever," he was able to accomplish little after his return from Europe in 1887. "The Borst difficulty nearly broke his heart . . . besides depriving him of an assistant. [It] so preyed upon his mind that he had no wish to do anything . . . at times his enthusiasm for work showed, but until after the trial and decision his thought was almost entirely upon that." Not only did he fail to finish his great revision of Ptolemy's star catalog, his observing routine suffered; so, perhaps, did his health. Death was around the corner. "It is painful to think," Newcomb wrote, "that his death may have been accelerated by the annoyances growing out of the suit." On the morning of July 19, 1890, Peters was found lying, a half-burned cigar at his fingertips, on the doorstep of the building where he lodged; observing cap on his head, he had fallen in the line of duty, on the way to the observatory the night before.

The mill of legal proceedings ground on after his death (Borst's appeal to the New York Supreme Court was heard in September 1892; by a verdict of two to one, the Supreme Court in *Root v. Borst* upheld the earlier decision in favor of Peters. However, in April 1894, the Court of Appeals of New York reversed the judgment, upon deciding that improper evidence had been admitted, and granted a new trial. It never took place.)

More important was the fate of Peters's miscellaneous observations and compilations, especially his great work, the Ptolemy star catalog. It was finished by the English amateur E. B. Knobel. In this case, death forced collaboration.

Peters's death brought a sudden interruption to the routine of the Litchfield Observatory. His assistant Borst had of course been banished. Someone else would have to succeed Peters as director of the observatory. However, Oren Root noted, "the salary our trustees can offer is too meager to bring any but a younger man here and I've not yet found a young man in whom we can agree." In the end, Peters's position remained unfilled; the deserted Litchfield Observatory was allowed to crumble and fall into disrepair; the instruments were packed and placed in storage, including the objective of the 13 1/2-inch refractor, and during World War I the building was finally torn down, only the granite pier on which the noble telescope being left to mark the place.

In other respects, Peters's legacy did not long survive him. The *Carte du Ciel* and other photographic surveys superseded his and all other visual observers' maps of the sky. Beginning with Max Wolf's discovery of 323 Brucia in 1891, the application of mass-production photographic methods to the search for minor planets trivialized the labor on which Peters had worn out his middle and late age. His forty-eight asteroids—including eight in one year, 1879–were quickly overwhelmed in the ensuing blizzard of discoveries.

Peters was severe and harsh as a teacher, and fostered no disciples. There is little doubt he possessed a violent temper. He was most in his element when censuring or pointing out the mistakes of other astronomers, who were seldom thankful for the correction. As a result, he made many enemies. By temperament he was an astronomical Jeremiah, "a man of strife and contention."

He was also an astronomical pack rat, a hoarder of much curious, strange, and forgotten lore. His mind was well stocked with a lifetime of collecting, ransacking, rummaging, until it became an "olde curiositie shoppe," a flea market or astronomical rag-and-bone shop. But it all died with him. Had he been more generous with the knowledge he possessed, he might have contributed much more to astronomy than he did. Certainly he would have been more fondly remembered. Guilty of extreme jealousy and possessiveness that made him deem each fact that passed through his hands, each idea or hint of an idea, his and his alone, he sometimes forgot that facts have little value in themselves but only as they are made available for use and brought into relation with each other. Unfortunately, the data one hoards with diligence may not survive the attic that stores it; and so it may pass into neglect, or be recovered, perhaps, when no longer needed or of interest. There are treasures hidden in the deep blue sea, and flowers that waste their fragrance on the desert air.

For all his faults, Peters was undoubtedly a man of great dedication to his craft. He knew much, and was a rapid and highly accurate mathematical computer and a tireless seeker after the truth as he saw it. He died as he lived, intense, single-minded, engaged in his business, with his observing cap on head, cigar in hand—an enthusiast heading out under the stars.

AFTER PETERS'S DEATH Robert Simpson Woodward, Benjamin Boss, and Curtis L. Hemenway were assigned to his memoir, according to the Academy file forwarded to me by William Press. In finally completing it, I warmly acknowledge the help of Press, Donald E. Osterbrock, and Dorothy Schaumberg of the Shane archives of the Lick Observatory, Richard Baum, and Luigi Prestinenza.

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Most of Peters's publications are orbit calculations, observations, and positions of comets and asteroids, including the forty-eight asteroids he discovered, which appear mainly in the *Astronomische Nachrichten.* A list of his asteroid discoveries appears at the end of this memoir. In addition, his works include the following of more general interest.

1847

Memoria sopra la nuova cometa periodica di 13 anni. Napoli: Nel Gabinetto Bibliografico e Tipografico.

1856

Contributions to the atmospherology of the Sun. *Acad. Sci.* 9:85-97.

1869

Beitrag zur Kenntnis gewisser, an der Sonne voruberfligender. Korper. *Astron. Nach.* 74:29.

1877

Uber die Fehler des Ptolemaischen Sternverzeichnisses. *Vierteljahrsschrift Astronomische Gesellschaft.* Berlin: Astronomische Gesellschaft.

1879

Investigation of the evidence of a supposed trans-Neptunian planet in the Washington observations of 1850. *Astron. Nach.* 94:113-16.

Bemerkung zu Oppolzer's "Elemente des Vulcan." *Astron. Nach.* 94:303.

Some critical remarks on so-called intra-Mercurial planet observations. *Astron. Nach.* 94:321-40.

1882

Celestial Charts Made at the Litchfield Observatory of Hamilton College. Clinton, N.Y.

1886

Corrigenda in various star catalogues. Memoir XI. In *Memoirs of the National Academy of Sciences,* vol. 3, pp. 87-97. Washington, D.C.: U.S. Government Printing Office.

Flamsteed's stars. Memoir X. In *Memoirs of the National Academy of*

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1907

Heliographic Positions of Sun Spots Observed at Hamilton College from 1860 to 1870. Ed. E. B. Frost. Washington, D.C.: Carnegie Institution of Washington.

1915

With E. B. Knobel. *Ptolemy's Catalogue of Stars: A Revision of the Almagest.* Washington, D.C.: Carnegie Institution of Washington.

ASTEROIDS DISCOVERED BY C. H. F. PETERS

72	Feronia	May 29, 1861
75	Eurydice	September 22, 1862
77	Frigga	November 12, 1862
85	Io	September 19, 1865
88	Thisbe	June 15, 1866
92	Undina	July 7, 1867
98	Ianthe	April 18, 1868
102	Miriam	August 22, 1868
109	Felicitas	October 9, 1869
111	Ate	August 14, 1870
112	Iphigenia	September 9, 1870
114	Cassandra	July 23, 1871
116	Sirona	September 8, 1871
122	Gerda	July 31, 1872
123	Brunhild	July 31, 1872
124	Alceste	August 23, 1872
129	Antigone	February 5, 1873
130	Electra	February 17, 1873
131	Vala	May 24, 1873
135	Hertha	February 18, 1874
144	Vibilia	June 3, 1875
145	Adeona	June 3, 1875

160	Una	February 20, 1876
165	Loreley	August 9, 1876
166	Rhodope	August 15, 1876
167	Urda	August 28, 1876
176	Iduna	October 14, 1877
185	Eunice	March 1, 1878
188	Menippe	June 18, 1878
189	Phthia	September 9, 1878
190	Ismena	September 22, 1878
191	Kolga	September 30, 1878
194	Procne	March 21, 1879
196	Philomena	May 14, 1879
199	Byblis	July 9, 1879
200	Dynamene	July 27, 1879
202	Chryseis	September 11, 1879
203	Pompeia	September 25, 1879
206	Hersilia	October 13, 1879
209	Dido	October 22, 1879
213	Lilaea	February 17, 1880
234	Barbara	August 12, 1880
249	Ilse	August 16, 1883
259	Aletheia	June 28, 1886
261	Prymno	October 31, 1886
264	Libussa	December 17, 1886
270	Anahita	October 8, 1887
287	Nephthys	August 25, 1889