

## ABRAHAM SHARP, 1653-1742

BY ELIZABETH CONNOR

The year 1942 is "notable for its centenaries, bicentenaries, and tercentenaries in astronomy," according to an article in the May number of *The Observatory*, which gives a list of the astronomers the anniversary of whose birth or death occurs this year, with a short sketch of each. With one exception, they need no introduction; but the name of Abraham Sharp, although he was living and working in England in the time of Newton, Flamsteed, and Halley, is barely mentioned in histories of astronomy and the biographies of his contemporaries. In 1889, however, William Cudworth, of the town of Bradford, in Sharp's native Yorkshire, into whose hands had come abundant material for an adequate biography and who had long felt that justice had never been done to Sharp, published a handsome volume, *The Life and Correspondence of Abraham Sharp*, which gives an account of the "inventive and mechanical genius" and the "ability and industry" of the man without whose help Flamsteed's great *Historia Coelestis Britannica* might never have been produced.

Abraham Sharp was born June 1, 1653, at Little Horton, near Bradford, on land that had been in his family for more than five hundred years. His father, John Sharp, a well-to-do yeoman and clothier, did not confine his activities to running his farm at Little Horton and manufacturing woollens in Bradford, but, taking the side of Parliament in the Civil War and being a "shrewd man of business" and an experienced accountant, became the financial secretary of General Fairfax, the Commander of the Parliamentary Forces. So it was into a world of strife that Abraham Sharp was born—all England was divided into Puritans and Royalists, and even Bradford, a stronghold of Puritans, went through two sieges by the Royalists. In the Sharp family the same division existed, for John Sharp's uncle was distinguished for his loyalty to Charles I, and his cousin was Archbishop of York. Abraham Sharp's eldest brother, twenty years his senior, had been sent to Cambridge to prepare for the

ministry, but when he had taken holy orders and been appointed Rector of Adel, he was ejected for being a nonconformer.

In spite of war, young Abraham Sharp was sent to school, first in Little Horton, later to the Grammar School at Bradford, where he evidently applied himself diligently to his mathematics. When he was sixteen, however, his father, a practical man, took him from school and apprenticed him to a mercer of York, to learn the “trade or misterie” (in the words of his articles) of being a dry-goods merchant. Although he was to receive sixpence yearly “in the name of his stipend or salary” and his father had paid £20 to have his son taught the trade, the prospect of eight years of such uncongenial work was too much for the boy and he soon ran away—not, however, home to his family, but to Liverpool, where he opened a day school to teach writing and accounts. While in Liverpool, in the years between 1670, when he left York, and 1684, when he first went to Greenwich, he studied hard on navigation and mathematics and somehow managed to perfect himself as an instrument maker.

Just what Sharp’s duties were during his first years at Greenwich is not quite clear. At that time Flamsteed was receiving a mere pittance from the government for his salary as Astronomer Royal; consequently those working under him were paid practically nothing—so little in fact that Sharp had money sent him by his family. In 1688 Flamsteed inherited a large estate from his father and in his comparative affluence set about providing himself out of his own means with the instruments he required. In 1689 he engaged Abraham Sharp (in Flamsteed’s own words, “a man much experienced in mechanics and equally skilled in mathematics”) to make the mural arc with which most of the observations for the *Historia Coelestis* were made; “he strengthened the rim of the limb with screws, carved the degrees upon it, affixed an index, and made all and each of its parts so skilfully that it was a source of admiration to every experienced workman who beheld it.” John Smeaton, engineer for the third Eddystone Lighthouse (1756), wrote of him: “I look upon Mr. Sharp to have been the first person that cut accurate and delicate divisions upon astronomical instruments. . . . I have seen a great variety of [his] scales and instruments . . . both

in wood and brass, the divisions of which are so exquisite as would not discredit the first artists of the present times."

The reasons why Sharp left Greenwich were probably financial, for his relations with Flamsteed were entirely friendly. His carefully kept notebooks show that he spent the years 1691–1693 in Portsmouth, teaching navigation and making mathematical and nautical instruments. In 1693, his eldest brother, who held the family estates, died, and their management devolved on Abraham Sharp. So he returned to Little Horton, with seven boxes and two trunks and sufficient funds to spend nine days at the White Horse, Cripplegate, in London, on his way home and to invest £20 in a lottery while there. His years of wandering were over and he never left Yorkshire again except possibly for a brief vacation or two.

A few years later, through the death of his nephew, he inherited Horton Hall, where he had been born, and all the other family property. The Hall (in Sharp's youth, an old half-timbered house) had been remodeled by his brother so that it had a fine central tower with a parapet—a good place to observe with the telescope which Sharp soon made for himself. A small enclosed stairway led down to his study—a little room containing his library, quite extensive for the time, and the oak desk, which, it was said, had cavities worn in it by his elbows as he studied. To this room he admitted only an occasional friend—not even a servant was allowed to enter with his meals, which were placed in a slide-arrangement in the wall, where he could get them when he was ready. A passage-way connected the study with his bedroom, which was next to the wing at the rear containing his workshop. After his niece's marriage he was left alone in the house except for the faithful old servants who cared for him, and there was little to hinder him in following for almost forty years the quiet busy course he set for himself.

His account books show that he turned out an enormous number of instruments—sun dials, armillary spheres, micrometers, quadrants and sextants, lathes for turning ovals and roses, watchmaker's tools, telescopes, for which he ground and figured the lenses—not only for himself, but also as orders. He even ingeniously worked out a "way-wiser" to attach to a coach to

measure mileages up to a hundred miles and made a telescope cleverly fitted into a walking stick. If as an instrument maker Sharp was precise in his own workmanship, he was equally exacting in having his own specifications carried out by others. Once in 1705 he wrote to John Yarwell, a London "glass grinder," to protest about some lenses he had ordered. It was an outspoken and forthright age, and Yarwell, after explaining at length why the lenses had not come up to Sharp's requirements, defended himself plainly and bluntly :

You may be sure I should be glad to please both you and all men, but I must confess *I have had more complaint from you than from all the rest of mankind*, with the least profit, for the last you had, which I worked hard upon for the very journeyman wages, cost me thirty shillings. So you may see I shall get no estate by them . . . . I hope you will excuse this long letter, which I take noe grate pleasure in writing nor you in reading, but as you are my friend I would set the matter in a wright light, and leave the rest to your better judgment.

Your assured friend,

JOHN YARWELL

P.S.—This is the longest letter I ever writ concerning my bisness, and I hope I shall never wright one so long agane in all my life to come, which if it had not been to you I should never have writ, for very little do I love it.

All these years he was also working on mathematical problems. In 1705, Henry Sherwin compiled a volume of *Mathematical Tables*, in which he included, along with works by Briggs, Wallis, and Halley, all of whom had been Savilian Professors of Geometry at Oxford, several sections by Sharp: "A method of computing the natural sines, tangents, or secants of any arch immediately, from the length of the arch being given" and "Mr. Briggs, his Logarithms for all numbers, from 1 to 100, and for all prime numbers from 100 to 200; calculated [to 61 places] by that ingenious gentleman and indefatigable mathematician, Mr. Abraham Sharp" (also characterized in the dedication as "the wonder of the past and present age for industry of this kind"). In 1718, under the name A. S. Philomath, Sharp published a work called *Geometry Improved*.

Although in 1695 Sharp had declined the offers of Halley and other London friends to help him obtain the Mathematical Mastership at Christ's Hospital, the "Bluecoat School," in 1702 he embarked on another activity, which occupied all his "leisure" time for years to come. When making his astronomical observations at Horton Hall, he found he needed something more exact than the "catalogue of maps of the fixed stars" by Hevelius, which he already owned, and wrote to Flamsteed to inquire when his catalogue and charts would be published, as he had heard it would be soon. With this first letter a correspondence started which continued until Flamsteed's death in December, 1719. Along with the correspondence, Sharp was drawn into observations and computations for Flamsteed—such work as preparing tables of positions of the moon and planets and checking the figures for the great *Historia Coelestis Britannica* which Flamsteed was making at Greenwich.

Fortunately, most of Flamsteed's letters were preserved at Horton Hall and Sharp's at Greenwich, so that the sequence is almost complete. Aside from the discussion of the work Sharp was doing for Flamsteed, the subjects of the letters are such things as the scientific books of the day, the problem of finding the longitude, the Aurora Borealis, optical instruments, but for the great part astronomical questions; above all, the vexing matter of the *Historia Britannica*. In letter after letter Flamsteed poured out his painful experiences with Halley and Newton, the unhappy meetings, the criticisms on both sides, and the delays in printing—no details were spared of the childishness with which both sides met the situation. Newton and Halley were all for printing immediately to supply the data so much needed; Flamsteed wished publication withheld until the material could be perfected so that the catalogue would be entirely reliable. Abraham Sharp's replies were kind and calm and full of good advice: "I am sorry you meet with so many rubs in the prosecution of your business. I hope all will be cleared in a little time. Printing the Catalogue without maps and constellations is to make the work lame and imperfect . . . ." Finally, in 1716, it appeared, published without Flamsteed's consent or approval; "my catalogue of the fixed stars, as it is corrupted and spoyled

by Dr. Halley," Flamsteed wrote to Sharp. Of the four hundred copies printed, Flamsteed managed to get hold of three hundred, and "I committed them to the fire about a fortnight ago; if Sir Isaac Newton would be sensible of it, I have done him and Dr. Halley a very great kindness."

Immediately Flamsteed began preparing copy for the printer of another edition which would represent his own finished work: but when the first volume had been completed, death came to the Astronomer Royal. In his last letter to Abraham Sharp he wrote: "I am sensible of your kindnesses, and every letter I ever saw from you makes me forget something of the pains caused by my distemper."

For some years Flamsteed had had as his assistant at Greenwich a "Cumberland youth" named Joseph Crosthwait. Upon him, with the assistance of Sharp, fell the task of finishing the *Historia Coelestis Britannica*. In spite of the fact that they were two hundred miles apart and subject to every inconvenience in sending copy and proofs back and forth, they somehow managed to complete the other two volumes, checking and rechecking, until they were satisfied with the results. The three fine volumes appeared in 1725, dedicated by Flamsteed's widow to King George I and complete with a portrait of Flamsteed and a Latin preface, but in no place was reference made to Crosthwait and Sharp and the important part they had had in bringing the work to publication.

Undaunted, however, they began work on the *Atlas*, which was advertised to contain twenty-five large charts of the constellations and two general plates of the northern and southern hemispheres but which had barely been started in Flamsteed's lifetime. The maps, showing the co-ordinates and the stars in their proper positions, were made by Sharp, while Sir James Thornhill, English painter and father-in-law of Hogarth, drew in the figures. Because of the expense involved, great difficulties were encountered in getting the charts engraved, Crosthwait going over to Holland to confer with Dutch engravers. Finally, in 1729, the *Atlas* was completed and published, not long before the death of Mrs. Flamsteed. Shortly after that event Crosthwait wrote to Sharp: "You and I have labored for Mrs. Flam-

steed for above ten years, and our reward, so often promised, is at last befallen us. Mrs. Flamsteed died the 29th ultimo, and has given . . . . to you nor I not one farthing . . . . Could Mr. Flamsteed have foreseen her ingratitude, I am confident he would not have left it in her power." Of Flamsteed's purposes they felt certain, for in one of his letters to Sharp he had told of the preface he had himself prepared for the *Historia Britannica* and the full credit he had given Sharp for his share in the work. And in spite of Sharp's repeated protests that he desired no recompense for his labors, Flamsteed had in 1705 sent him fifty guineas. For Sharp the pleasure of the work itself seemed sufficient reward.

In spite of his desire for seclusion when studying, Abraham Sharp was no crotchety recluse. He was always interested in the welfare of those about him, and, having a much larger income than he cared to spend, was known for his generosity to others. A very methodical man, he entered all his alms in his accounts, which contain some curious items: "Given to a poor sick man that told me he knew navigation . . . . £1.11.0." But on another day he paid five shillings, sixpence for gloves and a cravat and nineteen shillings for a new wig for himself.

Belonging as he did to a nonconformist family, he attended the Presbyterian chapel from the time it was established near his home. He was buried, however, in the Bradford Parish Church, the following words being engraved on his tombstone: ". . . . When he had spent as a bachelor a peaceful and useful life in these studies, distinguished for his piety towards God, by his kindness towards the poor, and benevolence towards all, at length in the [ninetieth] year of his age, sated with human affairs, he passed to heaven on the [18th day of July,] 1742."

CARNEGIE INSTITUTION OF WASHINGTON  
MOUNT WILSON OBSERVATORY  
November 1942