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JEREMIAH HORROCKS

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THE 24th of November, 1939, marks the three-hundredth anniversary of an outstanding event in the history of astronomy and calls to memory a remarkable young man of extraordinary genius who died, his life's work completed, at the early age of twenty-two. The event was the first observation of the transit of the star Venus; the young man was Jeremiah Horrocks, whose memorial tablet can be seen in Westminster Abbey close to that commemorating Sir Isaac Newton.

The life of Jeremiah Horrocks is involved in a certain measure of obscurity. It seems clear that he was born in 1618, certainly at Toxteth Park, now part of Liverpool. The Park had been disafforested in 1592 by Sir Richard Molyneux and divided into about twenty small farms. The new tenants came from Bolton, which, according to Royalists was "abhorred by all good churchmen as a nest of vile Puritans." These tenants were Puritans, hardy folk, simple and pious. To the Horrocks family was assigned Jericho Farm, Lower Lodge, on the site of the present Grassendale Station. In 1611 the tenants brought from Winwick, as their schoolmaster, and later their pastor, Richard Mather,¹ father of the famous Increase and grandfather of the equally famous Cotton Mather. To the little school in the centre of the park, to be taught by Mather, went young Jeremiah Horrocks who soon displayed extraordinary mathematical capacity. At the age of 14 he proceeded to Cambridge as a sizar of Emmanuel College, a distinctly Puritan college which attracted Lancashire men in large numbers. Against what difficulties the mathematical student of the day had to contend may be judged from the experience of Seth Ward, afterwards Savillan Professor and Bishop of Salisbury, who entered Sidney College in the same year (1632). Ward related that he found in the college library books wholly new to him but when he enquired for "a guide to instruct him" none was to be found. The books were Greek to all the fellows. The only thing to do was to puzzle through the books himself. Undoubtedly Horrocks experienced similar difficulties. Text-books in English hardly existed.² In Horrocks' own library at his death was not a single English text-book. It was probably at Cambridge that he conceived a taste for astronomy and he must have made great strides in his mathematical knowledge. For some reason he came down from Cambridge without a degree.

¹ Said to have been appointed Master of Winwick School at the age of 15.

² Trinity College, Cambridge, library possesses Horrocks' own copy of Lensberg's Tables which he purchased at the University in 1635. On one side of the last sheet is an alphabetical list of writers on astronomy available for students. The only English name in its list is John of Halifax.

The probability is that he was summoned back to Toxteth to take the place of Richard Mather, who had grown increasingly uncomfortable in his relations with the Archbishop of York, who had silenced him in 1633. In 1635 Mather left England to join the Pilgrim Fathers in New England, and Horrocks took his place at Toxteth where for the next four years he taught in the school and preached, as a layman, in the chapel, the "ancient chapel" of Toxteth. Those years were marked by significant events. Early in their passing (1636) Horrocks was introduced to William Crabtree, a keen student of astronomy living at Broughton, Manchester, with whom he corresponded to the end of his life. It was during these years that he prepared himself for his greatest achievement. His first astronomical observation took place in June, 1635. In May, 1638, he communicated to Crabtree that he had purchased a rather more efficient telescope at the cost of half-a-crown. Undoubtedly too, it was at Toxteth, that he made his first careful observations of the tide for the purpose of philosophic investigation. In these years he probably suggested the correct theory of the moon and reduced the sun's parallax to 14'. All was accomplished in the face of discouragement and disabilities. In the preface to his *Astronomia Vepleriana*, in which he showed that Lensberg's mathematical hypotheses and tables were unreliable, he wrote of his many difficulties: "The inadequacy of my gifts oppressed my aspiring mind. There was no one who could give me instruction; none of my friends could help me. Languor and lassitude were ever present. What could I do? I could not facilitate the labour of study nor increase my resources. But to cease study because of difficulties would have been weak and unworthy. I determined therefore to overcome the tediousness of study by industry, my poverty by patience, and that for a master I would use astronomical books." It was after this period of which he writes that he lighted by chance upon a tract of Professor Gellibrand that was of great help and that he met William Crabtree who was able to assist considerably with calculations and observations. They both discovered that the recognized mathematical tables upon which they had been relying were faulty and proceeded to make their own corrections.

In 1639, at the age of 21, Horrocks was ordained and appointed to work at Hoole, a few miles south of Preston. Hoole was a chapel of ease to Croston. The 15th century chapel had been rebuilt in 1628 by John Stones, of Carr House, Hoole, who had endowed it to the extent of £40 a year. The vicar of Croston was James Hyett, a very unbending Puritan who later took part in the establishment of Presbyterian discipline and signed the Harmonious Consent. The curate of Hoole in the returns of 1631 and 1639 is given as Robert Fagg, so sturdy a Puritan that he flatly refused to assist in contributions in aid of the war against the Scotch. It was probably his place which Horrocks temporarily supplied. There is reason to believe that Horrocks had rooms in Carr House, about a mile from the church. His first letter to Crabtree from Hoole was dated June, 1639. He entered upon his ministerial duties with devout enthusiasm. His religious faith was simple but sure. Astronomy attracted him partly because he found it "beautiful to contemplate the manifold wisdom of my Creator

in His wonderful operations." To him there was a real music of the heavenly spheres, with the universe as the strings and the finger of God as the striking force that brought out the hidden harmony. He had an answer for those who suggested that the speculations of astronomers tended to undermine the Word of God. His certainly brought him close to the heart of the Creator.

In the course of his correspondence from Hoole he warned William Crabtree that the conjunction of the sun and Venus would take place on November 24th, that no one had ever beheld the transit of the star and that it would not again be possible during the 17th century. He pointed out that according to Kepler November 24th was the date and 8.8 a.m. (in Manchester) the hour. According to Horrocks' own calculations the hour would be 5.57 p.m. He advised Crabtree to watch the whole day and, indeed, on the previous afternoon, to allow for possible miscalculations.

Horrocks made his own preparations. In his darkened room at Carr House the telescope was so arranged as to project the object on to a screen. Horrocks tells how he began his watch on Saturday (November 23rd) but the sun itself was not visible. The next day was a little clearer. He watched from dawn till 9 a.m., and again from a little before 10 a.m. until 1 p.m. at varying intervals. His watch was again interrupted by the afternoon service in the little church. It is worth noting the exact words in which Horrocks records the interruption: "I was called away to things of greater importance which it did not become me to neglect for these by-studies (*parerga*)."
That he was a Christian minister before he was an astronomer, is more fully comprehended when it is realized that this was the only chance for 130 years to see the transit of Venus. The great moment came at 3.15 p.m. when Horrocks had returned to his room. He tells the story: "At fifteen minutes past three, when I first had leisure to repeat my observations, the clouds were entirely dispersed and invited my willing self to make use of the opportunity afforded as if by heaven itself. When behold! the most pleasing spectacle, the matter of so many prayers! I saw a new spot of unaccustomed magnitude, perfectly circular in shape, so completely entering the left limit of the sun that the limits of the sun and the spot precisely coincided. I immediately set to work to observe it sedulously." The only other person to make the observation was his friend, William Crabtree.

There the story of Horrocks almost ends. For some reason, possibly ill-health, he returned to Toxteth in June or July, 1640. He remained in correspondence with Crabtree and was working upon his scientific account of the transit. Again and again he made plans to visit Crabtree in Manchester, but generally something occurred to make the visit impossible. Finally he made a definite engagement to be in Manchester on January 4th, 1641. He failed to keep that appointment; God had called him.

On the back of that last letter of Horrocks, kept with the rest, Crabtree wrote: "D. Jeremiae Horrox ii ad me literae, anniis 1638, 1639, 1640 usque ad mortis suae diem, Jan. 3rd, mane, valde subitanæ; pridie quam statuerat ad me venire. Sic Deus finem imponit rebus

subsolanis omnibus. Hic amisi (proh dolor) Charissimum mihi Horroxium. Hinc illae lachrimae! Incestimabile damnum!"

A few years later Crabtree himself was dead.

Unfortunately many of Horrocks' papers were lost. His brother Jonas of Liverpool took many of them to Ireland and there they disappeared. Crabtree, happily, had the M.S.S. copy of *Venus in Sole Visa*, upon which both of them had been working. It was published by Hevelius in Danzig in 1662, as an appendix to his own *Mercurius in Sole visus*. On Crabtree's death the papers of Horrocks fell into the hands of Crabtree's representative and were rescued by Dr. John Worthington. Other papers came into the hands of Jeremiah Shakerley and were used by him for his *Tabulae Britanniae*. He left the papers with Nathaniel Brooks (*Bibliopolan*), London, and they were destroyed in the Great Fire of London.

Possibly because his lines were cast in times when England was passing through civil disturbance and deciding great issues, the work of Horrocks was practically unnoticed. Until the fact was suggested by Professor Rigaud it was not even known that Horrocks had been ordained. His own county ignored him for nearly two hundred years. It was not until 1826 that an amateur astronomer provided a commemorative tablet for St. Michael's, Toxteth (not a very suitable place for the first memorial). In 1857 the vicar of Hoole appealed publicly for a memorial in Hoole of one whom Sir John Herschell described as "the pride and boast of British astronomy." As a result of his appeal the church was enlarged by the addition of a chancel aisle with seats free to the poor for ever and by an east window which portrayed Horrocks observing the transit. Still later, through the instrumentality of Dean Stanley, a tablet was placed in Westminster Abbey.

There is a curious connection between Horrocks and Australia. One hundred and thirty years after the observation made by Horrocks there was due, according to him and his successors, another transit of Venus. In order that the transit might be observed under the best possible conditions, the Royal Society petitioned the Government to fit out an expedition to the Southern Seas, and invited Captain Cook to lead it. He sailed with scientific experts to Otaheite and there the transit was observed under ideal atmospheric conditions. The historian of that expedition comments: "The pomp, state and results (of later observations) cannot draw us away from a sympathizing memory of the young lonely Lancashire clergyman and the revelation for which he waited so anxiously, yet confidently, in the humble chamber in the village of Hoole." From Otaheite, Captain Cook proceeded to the islands of New Zealand, but found the natives emphatically hostile. From there he made his way to New Holland (Australia) and came in sight of Botany Bay. Here, despite the hostility of the aborigines, he landed, taking possession in the name of Great Britain, giving to the new possession the name of New South Wales. It requires not a very great imagination to see accompanying Captain Cook, as he landed, the shade of the delicate young curate of Hoole, whose work had, even though indirectly, led Captain Cook's steps to that spot.