An 18th-century astronomical hub in west Cornwall

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From 1775 to 1809 the village of St Hilary in Cornwall was the home to the head comparer of *The Nautical Almanac*, Malachy Hitchins (1741–1809). Hitchins was responsible for supervising and checking the complex calculations made by a team of human computers. He not only employed local men as computers but also instructed them in mathematics and astronomy. These men would go on to have valuable scientific careers. Hitchins's influence as a tutor and enabler has long been overlooked. This paper looks at his life and the long-standing effect it had on the English scientific community.

1. Introduction

In the late 18th century an astronomical hub sprang up in an unlikely location: five miles from the town of Penzance in Cornwall. Scientific work of national and international importance was being undertaken not in a university or a city, but in the far southwest of England in and around a small village called St Hilary Churchtown.

St Hilary lies half a mile off an old ridgeway, once the main arterial link to London before the A30 superseded it. The village nestles down a quiet back lane, a couple of miles from Mount's Bay. There is today a collection of about dozen houses, an old school house (now a heritage centre), and the 13th-century parish church. All the buildings are constructed from large granite blocks, typical of the style and materials used in the area in that period. Many have commanding views across open countryside towards St Ives Bay and the north coast of Cornwall.

What is an idyllic and peaceful location today would have been very different during the late 1700s. This was once a bustling area of tin and copper mines with a population of 996 people in 1801, a population which was expanding rapidly due to the mining opportunities.[1]

In 1775 the position of vicar of St Hilary became available and was offered to 34-year-old Malachy Hitchins, a Cornishman from just outside Redruth. It would be Hitchins who transformed this location into a centre of employment for the astronomical community.

2. Early life of Malachy Hitchins

Malachy Hitchins was born in 1741 at Little Trevince in Gwennap, a village about three miles southeast of Redruth, Cornwall, and was baptized on May 18 that same year. His father was Thomas Hitchins (1697–1746), a local miner, and his mother, Grace Martyn (1698–?), was the sister of Thomas Martyn, a local cartographer.[2]

Malachy was the youngest of a fairly large family, with six brothers and two sisters. Although his schooling in these early years was probably only basic, his uncle Thomas Martyn, who had produced in 1748 a very accurate map of Cornwall, would have been on hand to play a part in his education. By an early age he was expected to follow other members of his family and go into the mines at Gwennap.

Work in the mines is described in the memoirs of the Reverend Henry Martyn (1781–1812), a relative on his mother's side of the family, who noted a trend for self-education: 'The miners, it appears, are in the habit of working and resting alternately every four hours; and these seasons of relaxation from manual labour, they frequently devote to the improvement of their minds.'[3]

Malachy's cousin John Martyn worked alongside him in the mine and used the down-time similarly to improve his mathematics. John's mathematics never improved to the same extent as Malachy's, although a knowledge of basic arithmetic enabled him to gain a position in Truro as a merchant's clerk.[4]

2.1. *Survey of Devon*

Malachy did not spend long as a miner. Most probably due to his family connections as well as his mathematical ability he was offered a job assisting the mathematician Benjamin Donn (1729–98) on surveying for a map of the county of Devon.[5]

Working with Donn would have given Malachy hands-on experience in the surveying techniques of the time. During this period Malachy seems to have moved to Devon, as records show him residing in Bideford in 1762.[6] The ensuing map of Devon was published in

1765, although Malachy's contribution is not credited on it.

Unfortunately the survey was far inferior to that of the prior one of Cornwall completed by Malachy's uncle, Thomas Martyn. Perhaps it was Donn's abilities rather than Malachy's inexperience that was to blame, for Donn was known as a drinker. It is said that one night he was found staggering homewards claiming that he was directing his course by the light of the planet Jupiter.[7] Whatever the case, it did not harm Malachy's career – he was later employed by the Bishop of Exeter, Fredrick Keppel (1728–77), to survey the manor of Cargol in the parish of Newlyn, Cornwall.[8]

2.2. *Mathematics and the Devon Fireball*

While working on the survey of Devon, Malachy had begun answering mathematical questions submitted by readers of *The Ladies' Diary*.[9] But it was his description of a large fireball published in *The Gentleman's Magazine* in 1762, when he was aged 21, that showed the beginnings of his astronomical interest:

> Bideford, December 21
>
> Happening to be walking on Sunday the 5th instant, about 8 h 50 m *Post Merid.* I instantly saw the streets so illuminated as could not be equalled by a meridian Sun. I immediately cast my eyes upwards, and to my very great surprize [sic] saw a luminous body, or flaming meteor, equal in magnitude to the Moon, falling in the direction under specified. This meteor, when it first appeared to me, was in a right-line with the bright star in *Hircus* [i.e. Capella]; that is, E. by N. altitude 57 degrees, which I imagine was near the place of its commencement; since the sudden blazing which it occasioned, must instantaneously attract an amazed eye. It performed its descent gradually, so as to fall about 10 degrees in 4 or 5 seconds; leaving behind it a long tail, or seeming liquid flame, which subtended from one extreme to the other, an angle of about 10 degrees; that part of the tail next to the body seemed to blaze like the meteor itself, but the other extreme turned blue and smoky, bearing the form in the figure [below].
>
> 
>
> The body diminished, or burnt out by degrees to support the tail, the extremity of which continued to vanish into smoke, till the whole body was dissolved, which happened to be in a line with the bright star in Orion's right shoulder [Betelgeuse], altitude about 23 deg. and azimuth E.S.E.½E, from whence the direction of its path is known. The tail continued to burn bright for about a minute afterwards, and the fire seemed to vanish last of all at that end where it first had its being; but the serpentine form remained for 5 or 6 minutes, tho' only as a bright cloud. The atmosphere, at the beginning of this extraordinary phænomenon, was very clear, and inclinable to freeze; but after the body's dissolution, a thick smoke descended from its path to the horizon; which disappeared in about a quarter of an hour.
>
> This meteor, which was, I believe, by far the greatest observed for forty years past, must have kindled very near the Earth's surface, otherwise the blazing would not be great enough to dazzle the strongest eye.[10]

What he describes is certainly an exceptionally bright fireball, with a trail lasting five or six minutes, distorted by high-altitude winds. His report contains accurate altitudes and azimuths befitting his background as a surveyor and reveals an accurate knowledge of the positions of bright stars.

There was also a report of the same meteor from Lulworth Castle in Dorset, 120 miles away, which closely matches his own description.[11] These two reports are the only ones known for this brilliant fireball, whereas previous fireballs in 1719 March and 1758 November were widely seen.[12] Perhaps the night of the 1762 event was cloudy elsewhere. Malachy's suggestion that it was the largest known fireball for 40 years seems to be nothing more than the attempt of a young man to impress the reader.

2.3. *Higher education and marriage*

While awaiting the publication of the map of Devon by Donn, Malachy matriculated at Exeter College, Oxford, in 1763, where he continued his correspondence with the magazines of the day. For example, on 1763 October 10 he wrote from Exeter College to *The London Magazine* with his calculations of the start, middle, and end of a partial eclipse of the Moon that was due the following March.[13]

On 1764 January 10, soon after joining Exeter College, he married Joanna Hawkin (1739–1815) at the village of Buckland Brewer in Devon, a few miles from Bideford.[14] They were to have four sons and a daughter (see Section 7.1).

Evidently Joanna was better-off than Malachy, for he reported to his biographer Richard Polwhele (1760–1838) that his wife paid his college fees. Even so, he left the college to work on *The Nautical Almanac* before finishing his degree and did not graduate as BA until 1781 February 27. In 1785 Malachy was incorporated into St John's College, Cambridge, where he graduated with his MA in the same year.

During his time at Exeter College in Oxford, Malachy undertook two positions as a curate. The first was held briefly in 1765 at Norton Fitzwarren in Somerset. He was ordained a priest in September that same year.[15] The second curacy was much longer, from 1766 to 1771, at Merton in Devon, relatively local to his wife's family in Shebbear. His wife resided at Merton in the cottage which came with the job and a number of his children were born there.

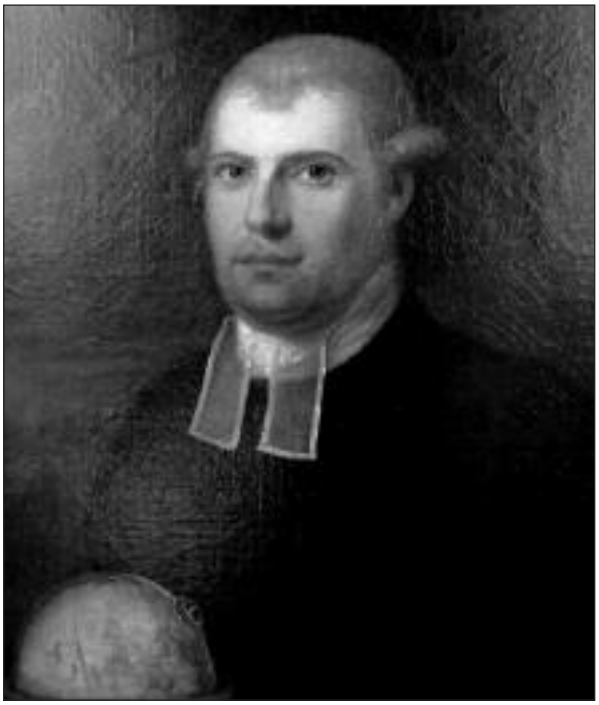

Fig. 1: Malachy Hitchins (1741–1809) seen in an oil painting by the Cornish portrait painter John Opie. (Private collection.)

3. Malachy Hitchins at Greenwich

While at Oxford, Malachy had made a favourable impression on Thomas Hornsby, the Savilian Professor of Astronomy.[16] Hornsby sat on the Board of Longitude and regularly met Nevil Maskelyne, the Astronomer Royal, at board meetings. Hornsby recommended Hitchins as a computer for *The Nautical Almanac*. He was appointed by Maskelyne at the end of 1767 and took up the post in 1768.[17] It was a relationship that would last a lifetime.

3.1. *The Nautical Almanac*

The Nautical Almanac and Astronomical Ephemeris, to give the publication its full title, was first issued in 1766 for the year 1767.[18] Its aim was to simplify the complex calculations needed for determining longitude at sea by the lunar distance method.

Previously, the calculation of longitude at sea had been virtually impossible. Parliament pushed through a longitude act in 1714, offering a prize of £20,000 to anyone who could find a way of calculating longitude at sea to within half a degree. By 1767 the solution to the longitude problem had not been found, although a number of ideas were close and had already received part-payments. These included John Harrison's chronometers as well as the lunar method as devised by Tobias Mayer which involved measuring the angular distance between the Moon and certain reference stars.

Nevile Maskelyne was particularly keen on the lunar method, as he had himself tested it successfully on a voyage to Barbados in 1763–4, but he knew that the calculations involved were too difficult and time-consuming for normal seafarers. He hoped to make the method more practical by having many of the calculations completed in advance and published in book form. That book was *The Nautical Almanac*. It included tables of the daily position of the Moon at noon and midnight, along with its angular separation from the Sun and bright navigation stars at three-hourly intervals (Figs. 2 and 3).[19,20]

The job of making these calculations fell to a number of computers employed by Maskelyne. To calculate each entry, the computer had to look up as many as twelve figures in various tables and then perform up to fourteen arithmetic operations. As many as 1365 entries were needed for each month's tables in *The Nautical Almanac*. The volume of work was immense, tedious, and open to human error.[21]

Maskelyne employed two computers to make each set of calculations independently, following the detailed instructions he had issued, and he would then check the results in person. Malachy must have impressed Maskelyne in his accuracy as a computer because in 1769, after one year in the job, he was promoted to the role of a comparer, in which he would cross-check the work of two other computers. By 1778 he had taken on Maskleyne's role as the main comparer, a role which he retained until his death in 1809.[22]

3.2. *Assistant to the Astronomer Royal*

A transit of Venus was due to occur in 1769 which, it was hoped, would enable astronomers to measure the distance between the Earth and the Sun with far greater accuracy than had previously been possible. To make the most of the opportunity, astronomers were being sent around the world to observe the transit, in one of the most important scientific ventures of the eighteenth century.

By the time Hitchins started work on *The Nautical Almanac* in 1768, preparations for the transit were well underway. William Bayly (1737/8–1810), the existing assistant to Maskelyne, had been selected to travel to North Cape in Norway to observe the transit. This left Maskelyne without help at Greenwich, so he turned to Malachy as a temporary stand-in.

Why did Maskelyne choose Hitchins to replace Bayly? It seems that Malachy by now had advanced his studies under Hornsby at Oxford and knew more than just mathematics. Maskelyne described Malachy as 'a gentleman well acquainted with astronomy and astronomical calculations, who has made and examined many belonging to the Nautical Almanac, and has been so obliging as to come here and assist me in making astronomical observations, during the absence of my assistant'.[23]

As Bayly readied to leave Greenwich, Hitchins moved into the Royal Observatory to take over his role for nearly four months. From 1769 April 24 until August 10 Hitchins assisted Maskelyne in the Observatory's

PREFACE.

THE Commiſſioners of Longitude, in purſuance of the Powers veſted in them by a late Act of Parliament, preſent the Publick with the NAUTICAL ALMANAC and ASTRONOMICAL EPHEMERIS for the Year 1767, to be continued annually; a Work which muſt greatly contribute to the Improvement of Aſtronomy, Geography, and Navigation. This EPHEMERIS contains every Thing eſſential to general Uſe that is to be found in any Ephemeris hitherto publiſhed, with many other uſeful and intereſting Particulars never yet offered to the Publick in any Work of this Kind. The Tables of the Moon had been brought by the late Profeſſor MAYER of Gottingen to a ſufficient

Fig. 2: Nevile Maskelyne's preface to the first edition of The Nautical Almanac, published in 1766 for the year 1767. Malachy Hitchins joined the staff two years later, in 1768.

JANUARY 1767. [9]

Diſtances of ☽'s Center from Stars, and from ☉ east of her.

Days	Stars Names.	Noon. ° ′ ″	3 Hours. ° ′ ″	6 Hours. ° ′ ″	9 Hours. ° ′ ″
1					
2	α Pegaſi.	46. 41. 15	44. 57. 51	43. 14. 53	41. 32. 32
3		33. 15. 35	32. 40. 26	30. 6. 42	28. 35. 2
4	α Arietis.	57. 55. 16	56. 6. 21	54. 17. 44	52. 29. 25
5		43. 32. 47	41. 46. 31	[illegible]	38. 15. 2
6	Aldeba-ran.	62. 4. 49	60. 22. 21	58. 40. 15	56. 58. 37
7		48. 36. 32	46. 57. 23	45. 18. 45	43. 40. 35
8		35. 37. 28	34. 2. 38	32. 28. 29	30. 55. 5
9		23. 22. 20	21. 55. 18	20. 30. 0	19. 7. 3
10	Pollux.	51. 3. 14	49. 27. 59	47. 52. 57	46. 18. 9
11		38. 27. 43	36. 54. 20	35. 21. 12	33. 48. 17

Fig. 3: Part of the tables for January in the first Nautical Almanac, giving the Moon's distance from certain prominent stars at three-hourly intervals for navigators using the lunar-distance method.

routine work of observing meridian transits of stars and planets with the 8-ft transit instrument originally installed by James Bradley.[24] Hitchins also observed the transit of Venus from Greenwich on June 3.

3.3. *Transit and eclipse*

Seven people gathered at the observatory to observe the all-important transit on the evening of 1769 June 3. The evening was described by Maskelyne as clear and very serene 'which afforded as favourable an observation of the transit here as could well be expected, considering that the Sun was only 7° 3′ high at the external, and 4° 33′ at the internal contact'.

Malachy was placed in the eastern summer house with a reflector of 6 feet focal length magnifying 90 times, alongside Reverend William Hirst, a veteran of the 1761 transit, who observed with a 2-foot reflector that magnified 55 times.[25] Hirst had brought with him Henry Vansittart (1732–70), the former governor of Bengal, who had agreed to take timings. Hirst has left a good description of the happenings that evening in the

Fig. 4: Timings of the transit of Venus as observed at Greenwich on the evening of 1769 June 3 by Nevil Maskelyne, Malachy Hitchins, and five others. The timings of the first and second contacts differ by almost a minute between the observers. (Philosophical Transactions of the Royal Society)

	External contact. h ′ ″	[illegible] in contact. h ′ ″	Thread of light completed, or the internal contact. h ′ ″	Teleſcope made uſe of.	Magnifying power.
N. Maſkelyne	7 10 58	7 28 31	7 29 23	2 feet reflector.	140
M. Hitchins	7 10 54	7 28 47	7 28 57	6 f. reflector.	90
W. Hirſt	7 11 11	— — —	7 29 18	2 f. reflector.	55
J. Horſley	7 10 44	7 28 15	7 29 28	10 f. achromatic.	50
S. Dunn	7 10 37	7 29 22	7 29 48	3½ f. achromatic.	140
P. Dollond	7 11 19	— — —	7 29 20	3½ f. achromatic.	150
E. Nairne	7 11 30	— — —	7 29 20	2 f. reflector.	120

eastern summer house, with him shouting out to Vansittart as the planet touched the limb so the time could be read off Halley's sidereal clock.[26]

Unfortunately the results were less accurate than hoped as it was difficult to time the exact moment when Venus reached the edge of the Sun. Hirst and Hitchins recorded times of first contact that differed by 17 seconds (Fig. 4). Similar discrepancies occurred at second contact, as Venus moved fully on to the face of the Sun. This was a result of what later came to be known as the black drop effect, clearly visible in the diagram published by Hirst.[27]

Maskelyne summed up the general disappointment in his report published by the Royal Society: 'The differences between the different observations seem pretty considerable, and greater than I expected, considering that all the telescopes may be reckoned pretty nearly equal, excepting the 6 feet reflector, which is much superior to them all; and to its greater excellence and distinctness I principally attribute the difference of 26″ by which Mr. Hitchins saw the internal contact before me; as I can depend on his observations.' [28]

Malachy continued observing stars into the early hours with the transit instrument, and was still there the following morning to join Maskleyne and others in observing a partial eclipse of the Sun.[29] In Cornwall John Bradley, nephew of the former Astronomer Royal James Bradley, was simultaneously timing the transit and eclipse to establish the longitude difference between the Lizard Point and Greenwich.[30]

Hitchins continued as Maskelyne's assistant at Greenwich until the return of Bayly on August 3. The two assistants worked alongside each other for another week, until August 10, when Malachy's final observation is dated.[31] After this spell as a practical astronomer, Hitchins went back to his home in Merton and resumed his work on *The Nautical Almanac*.

4. Return to Cornwall

Malachy was soon to move on from Merton. After a period from 1772 to 1775 as vicar in Hennock, about eight miles southwest of Exeter, he returned to Cornwall. In 1775 the Bishop of Exeter, Frederick Keppel (the same man who had previously employed Malachy as a surveyor), offered him the position of parish vicar at St Hilary. He moved with his family into the vicarage there in November 1775. In 1785 he also became vicar of the parish of Gwinear. He retained both livings until his death, mixing his parish duties with those of his work on *The Nautical Almanac*.[32]

4.1. *Work as a comparer*

As mentioned above, the calculations for the *Almanac* were divided between pairs of computers to help guard against error. All computations were duplicated, apart from those of the Moon's position in which one of the pair would calculate the Moon's position at noon each day for a given month, while the other would calculate the midnight position. Results were sent to the comparer to be checked for accuracy and then collated for printing. All communications were by post, and queries from the comparer to the computers regarding discrepancies could go unanswered for weeks or even months. Records show that Hitchins was writing to each computer several times a month.[33]

Not all the computers were honest, as Hitchins discovered in 1770. Joseph Keech and Reuben Robbins lived near each other in London and had decided to cut down the work involved by sharing results. Hitchins, though, realized that their results were too similar to have been done independently. They were summarily dismissed, and asked to pay Hitchins compensation for his time in redoing their work.[34] It was at this point that Maskelyne decided that they should employ computers who lived at different locations, so cheating could be eradicated. Hence a computer hub forming in Cornwall seems all the more remarkable, although this did not arise until later (see Section 5) and care was taken to ensure that close neighbours were assigned calculations for different months.

4.2. *A change of schedule*

As the efficiency of the computing system improved, the calculations were being published ever-further in advance, at first for three years and eventually for ten years. In 1793 the Board of Longitude began to consider suspending calculations beyond 1804, to allow improvements in the solar and lunar tables to be incorporated in future computations. Scientifically this made sense, but for the computers and comparers it was a threat to their livelihoods.

Malachy presented his case to the Board of Longitude in 1793: 'Having been employed for twenty-six years past by the Hon. Board of Longitude in computing and revising the Nautical Almanac … he is sorry to find that he is now suddenly and unexpectedly to lose his appointment for seven or eight years to come, and perhaps for ever.' He noted that he had 'discharged some private pupils for whose education he was liberally paid, and refused others that were offered him, that he might give his whole time to the computation of the ephemeris'.[35]

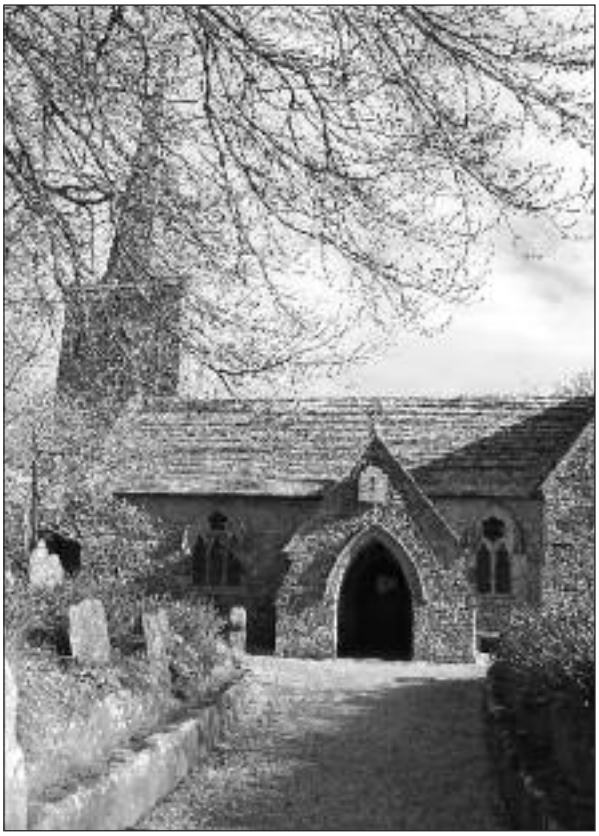

Fig. 5: The Church at St Hilary Churchtown. (Carolyn Kennett)
any more to say about this?

In the end, the Board decided to suspend computations for five years and to employ the computers on other work in the meantime. After this hiatus, publication of *The Nautical Almanac* was resumed for five years ahead, with the improved accuracy that had been hoped for.[36]

4.3. *Chronometer work*

Adding to the astronomical activities in west Cornwall, Malachy's family was also involved in testing the expensive and sought-after chronometers. After John Harrison's invention of the chronometer, a number of watchmakers were employed by the Board of Longitude to make copies and develop the design. An initial number of these replicas were made by the London watchmaker Larcum Kendall (1719–90).

Fig. 6 is a receipt showing that Malachy's 16-year-old son William was paid not only to look after one of these valuable replicas but keep it wound up and calculate its errors.[37] The receipt states that it was Kendall's first watch, K1; this had broken down on an earlier voyage and been returned to the maker for repair. The

watch was in the care of the young Hitchins between 1786 November and 1787 April before travelling with the First Fleet out to Australia in 1787 May. On board it was kept under the watchful eye of William Dawes (1762–1836)[38] and would not return to the UK until 1792. This priceless timepiece is now housed at the National Maritime Museum in Greenwich.

5. Computers in Cornwall

Twenty-nine years after finding cheating by computers in London, Malachy was able to persuade Maskelyne to let him assemble a local group of men to participate in the work. This considerably speeded up communications between him and the computers.

5.1. *The James family*

Among the first people Malachy would have met when he moved into St Hilary were the James family, who were a large and longstanding family in the parish. It was a member of this family, Nicholas James, who was first of the locals to be taken on by Malachy as a computer on *The Nautical Almanac*. He was recruited at short notice in 1799 to replace another computer appointed by Maskelyne, Francis Simmonds from Hampshire, who had proved to be not good enough. James worked on the *Almanac* until 1828, becoming one of the longest-serving and most trusted of the computers.[39,40]

Born in 1773, Nicholas James was only a toddler when Malachy moved to the parish. By 1799, when he was 26, he was listed as a schoolmaster on the village census. The original school house, between the vicarage and the parish church, was rebuilt in the 1860s, but the original site and footprint was used so the modern building probably looks very similar (Fig. 7). The most likely original setup was a stables on the ground floor with a vestry and schoolroom upstairs.

James married on 1800 November 11 and went on to have numerous children, one of whom he named after Malachy.[41] This propitiously named child continued the mathematical tradition by taking on the role of head clerk at the large mining company works in Hayle. Nicholas James died on 1844 January 31, still living in St Hilary, and was buried at the parish church.

5.2. *The Dunkin family*

William Dunkin was born in either St Erth or St Hilary in 1781 and attended Penzance Grammar School along with a young Humphrey Davy, where the two formed a friendship over a common interest in science. He had also become friends with a former pupil from Penzance Grammar, Davies Giddy, who lived in neighbouring St Erth (see Section 5.6).[42]

As was the Cornish tradition William was expected to work as a miner but instead he spent evenings in the library at the Giddy family home. In an attempt to put Dunkin's mathematical talents to best use, Davies Giddy

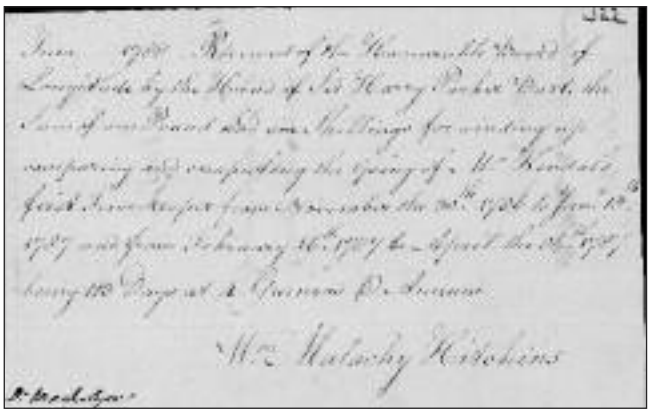

Fig. 6: A receipt signed by Malachy's son William acknowledges payment of £1 6s 'for winding up comparing and computing the Going of Mr. Kendal's first Time-keeper' from 1786 November 30 to 1787 January 13 and 1787 February 16 to 1787 April 24. (Cambridge University Digital Library, Papers of the Board of Longitude, RGO 14/17 p. 322r)

introduced him to Hitchins and suggested he work as a computer.[43] As a result, in 1804 William Dunkin started work on *The Nautical Almanac*.

Around this time Hitchins suffered from bouts of gout and would take to his bed for periods of rest and recuperation.[44] It seems in later years that William Dunkin acted as a general assistant to Hitchins at the vicarage in St Hilary. When Hitchins died in 1809 Dunkin temporarily took over his role of comparer until an official successor was appointed, who was Thomas Brown of Tideswell, Derbyshire. Dunkin continued to reside in St Hilary until 1814 when he moved to Truro.

The era of computing at home came to an end in 1832 when an official Nautical Almanac Office was set up in London. William Dunkin was the only one of the existing computers who moved to London to join the permanent staff there.[45]

Dunkin's two sons Edwin and Richard both later joined the Royal Observatory. Edwin rose to become the Chief Assistant to the Astronomer Royal, William H. M. Christie. Edwin became a Fellow of the Royal

Fig. 7: The Old School House at St Hilary Churchtown, seen in 2016. (Carolyn Kennett)

Society in 1876, President of the Royal Astronomical Society in 1884, and President of the Royal Institution of Cornwall in 1890.

5.3. *Richard Martyn*

Richard Martyn (*c*.1790–1850) was not yet 20 when he was taken on as a computer in 1809 to replace John Pascoe, a Devon surveyor who had resigned his role the previous year. Martyn lived in St Mabyn, about three miles east of Wadebridge in Cornwall. He was Hitchins's nephew and still new in the role when Hitchins died. His initial workings lacked the accuracy required for the job as his training had been cut short on Hitchins's death. But he was fortunate to have both William Dunkin and Nicholas James to help.[46] His work improved and Martyn continued as a paid computer for several more years.

5.4. *John Hellins*

John Hellins (*c*.1749–1827) worked on *The Nautical Almanac* under the careful watch of Hitchins while he was a teacher at a small school at Bishop's Tawton in Devon. He had an interest in science and mathematics but was self-taught, having come from a poor family of labourers. He had a chance introduction with Hitchins, who recognized his exceptional abilities.[47] Hitchins introduced Hellins to Maskelyne from which he gained not only a position of computer but also briefly became Maskelyne's assistant at Greenwich in 1773. Although Hellins never resided at St Hilary, he did become curate at Constantine in Cornwall for 1779–83. He was made a Fellow of the Royal Society in 1796 and was awarded its Copley Medal in 1799 for his work on computing planetary perturbations.

5.5. *Other protégés farther afield*

Hitchins was also in communication with a number of other young astronomers, giving advice about astronomical techniques and calculations. One of these was Joshua Moore (dates unknown), an astronomer who emigrated to America in 1793 after being Maskelyne's assistant at Greenwich for a short time in 1787–8. It seems that during his time at Greenwich he was working more on calculations than observations, as there are no records of him observing when he was there. What is known is that he moved to Cambridge where he worked on *The Nautical Almanac* until the 1790s and communicated with Malachy about mathematical techniques.

Other letters from Hitchins that still exist are those he sent to a young John Crosley (1762–1817).[48] Crosley was one of Maskelyne's assistants from 1789 to 1792 and again in 1798, and he also worked briefly on *The Nautical Almanac*. In 1799 and 1800 Malachy wrote to Crosley outlining mistakes he had made in his calculations, along with advice to ensure that such mistakes did not occur again (Fig. 8). Crosley was a talented mathematician who was later to become president of the London Mathematical Society which met in Spitalfields, London; no doubt the mentoring he received from Malachy helped develop his abilities.

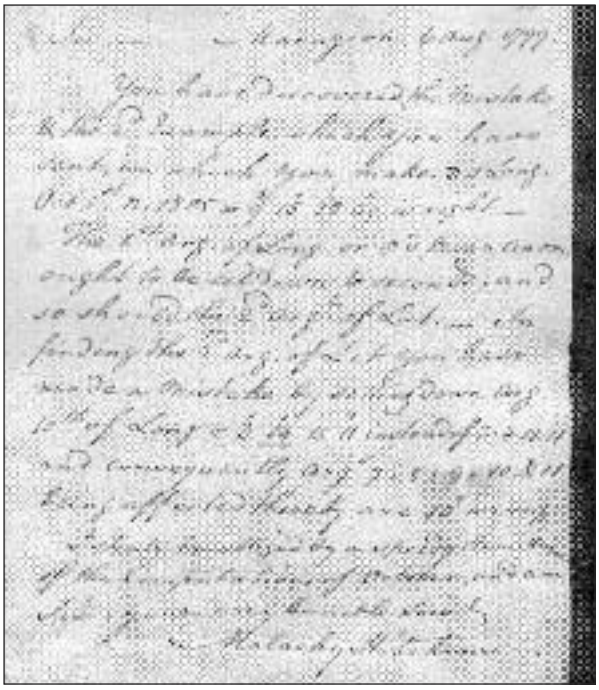

Fig. 8: Letter from Malachy Hitchins to John Crosley datelined 'Marazion 6 Aug. 1799' tells him 'You have discovered the mistake', goes on to point out another mistake, and ends by asking for 'a speedy remittance of the computations of October'. (British Library)

5.6. *The Giddy family*

Among other scientific friendships Hitchins struck up in Cornwall was with the Giddy family from the neighbouring parish of St Erth, about three miles north of St Hilary. Edward Giddy was curate of the church, and his son, Davies, was born in the village in 1767. Davies Giddy was educated at Penzance Grammar School, and this education was extended under the careful watch of Malachy, who took the young man under his wing as a private student.[49]

Davies did not become a computer on *The Nautical Almanac*, but was destined for greater things. In 1784 Malachy recommended the 17-year-old to the Mathematical Academy in Bristol of Benjamin Donn, the same man Malachy had worked for on the production of the map of Devon.[50] When he married, Davies Giddy changed his name to Davies Gilbert (the maiden name of his wife, the agronomist Mary Ann Gilbert) and it was under this name that he became president of the Royal Society from 1827 to 1830.

6. Other scientific endeavours

Part of Malachy's role as a vicar was to keep the parish records and census. He did this, as with everything, to an exceptionally high standard. Unusually, he also peppered the accounts with the occasional scientific note,

such as the following which appeared on Saturday 1796 August 20 in the marriage register: 'At 20 mins past 2 o clock P.M. a slight shock of an earthquake was felt at St Hilary, which lasted about 2 or 3 seconds being in the middle space of a rumbling noise which attended it, and which lasted 6 or 7 seconds. The motion was from east to west. The air was still. The thermometer at 70.' [51]

By 1801 he had returned to his mining roots as part of a group of local men keen on exploiting the existence of silver in Herland copper mine in Gwinear. He outlined the discovery of silver ore in the mine in the *Philosophical Transactions* of the Royal Society.[52] Unfortunately, the mine did not produce enough silver to cover the cost of extracting it and the mining activity halted at a very early stage.

Finally Malachy used his influence to have a discovery of three Roman urns in west Cornwall presented at the Society of Antiquaries. A short account of the discoveries that he sent to Sir Joseph Banks was read at the Society of Antiquaries twice, on 1802 March 11 and March 18.[53] The urns, discovered in three different locations in 1779, 1789, and 1793, all contained coins and were of great interest due to their location far west of previously known Roman settlements. Malachy suggested that the Romans could have used various locations such as Chûn Castle, an Iron Age hill fort, as military stations.[54]

It is also worth mentioning Samuel Vince, Plumian Professor of Astronomy at Cambridge, who in his 1797 book *A Complete System of Astronomy* credits Hitchins as having produced and supplied for publication a table for calculating lunar occultations. Vince in his book describes Hitchins as 'a gentleman well conversant in the theory and practice of astronomy, who had the goodness to communicate it to me, with permission to publish it'.[55] Following this is an explanation and then an example of how to calculate the time of the occultation of Aldebaran at Greenwich on 1795 January 2.

7. Family matters

Malachy Hitchins married Joanna (or Johanna) Hawkin on 1764 January 10 at Buckland Brewer in Devon. She had been born in Shebbear, Devon, in 1739 and was a member of the well-off Fortescue family of that area. This put her in a position to pay for Malachy's college fees.[56] Their first child, Richard Hawkin Hitchins, was born in late 1764 in Bideford. Another four children would follow, three while they resided in Merton[57] and the final one in St Hilary. Joanna was buried in the church grounds at St Hilary on 1815 July 18.

7.1. *Children of Malachy and Joanna Hitchins*

Richard Hawkin Hitchins, their first child, was baptized on 1764 October 21 in Bideford. He was to follow his father to Exeter College, Oxford, where he gained his MA in 1789 and BD in 1799.[58] He became vicar at Baverstock in Wiltshire in 1804 July. A sale after his death in 1827 included a valuable library consisting of over 2000 volumes.[59]

Thomas Martyn Hitchins was baptized on 1766 May 20 in Merton. In 1782 he worked as the Reversionary Patentee for the diocese of Exeter, before attending Exeter College, Oxford, in 1785–8. He became curate at Stoke, a suburb of Plymouth, in 1797–9 and then minister of St John the Baptist Chapel of Ease, Devonport (1799–1830). He married Emma Granville on 1799 March 28 at St Hilary. The Grenville family resided in Marazion, Cornwall. Emma's sister Lydia was to have a well-documented love affair with Henry Martyn, a missionary with the East India company and Thomas's cousin. Thomas died in 1830.

Josepha Hitchins, Malachy's only daughter, was born 1768 June 2 in Merton. She married William Millett (1762–1821) on 1800 March 1 at St Hilary and lived at Gurlyn in the parish of St Erth.

William Malachy Hitchins was born on 1770 August 19 in Merton but spent most of his formative years at St Hilary. At the age of 16 he travelled to Greenwich, where he worked as an assistant to Nevile Maskelyne, the Astronomer Royal, between 1787 February 10 and June 23. He followed a number of assistants who had left in rapid succession. Although still very young, he would have got the job through his father's working relationship with Maskelyne.

Another possible reason for his employment is that Kendall's watch had been residing at St Hilary since 1786 November, so perhaps it made its return journey to London with William. There is a break in the payments for managing the watch between 1787 January 13 and February 16 during which time it could have been transferred to London. Payments then resumed until April 26, so this second period of measurements must have been made while William was at Greenwich.

After four and a half months working with Maskelyne, William returned to Cornwall where he became a solicitor in Marazion. He died the age of 32 in 1802.

Their final child, Fortescue Hitchins, was born at St Hilary on 1784 February 22. Fortescue followed his brother William into law and also became a solicitor in St Ives. He was also an author and poet. His compilation *The Sea Shore, with Other Poems* (1810) had a list of subscribers that included Maskelyne and Sir Joseph Banks.[60] Fortescue died in Marazion on 1814 April 1, aged 30. His material on the history of Cornwall was edited and published after his death by Samuel Drew.[61]

7.2. *Death of Malachy Hitchins*

Malachy Hitchins died in St Hilary on 1809 March 28.[62] He was buried within the church at St Hilary but unfortunately the grave is no longer marked. *The Complete Parochial History of Cornwall*, vol. 2, 1868, contains the only known record of the location:

> The Rev. Malachi Hitchens [sic] and his wife were interred in the church, in one grave, near the west

> window of the north aisle. Their two sons, Malachi and Fortescue, were interred in the chancel; a plain stone bearing the name of Malachi only, covered their grave.[63]

A fire destroyed the church on Good Friday 1853, but reports in the local newspaper suggest that Malachy's grave survived the inferno:

> With the mass of fire and debris on the floor a vault fell in, and being in an angle under the windows a quantity of snow was thrown into it to extinguish the fire ... The walled graves of the Rev. Malachi Hitchens and family are not fallen as first thought, being covered with stone. Our elder parishioners cherish a lively recollection of the former Pastor.[64]

A new church was built on the site of the original. A raised floor was laid so the graves were not disturbed. Malachy's grave is to be found in its original position, about a foot and a half below the current chancel floor.

8. Legacy of Malachy Hitchins

Malachy Hitchins will primarily be remembered for his painstaking work which established the national and international reputation of *The Nautical Almanac* for accuracy and reliability. He proved very difficult to replace, as the Astronomer Royal Maskelyne acknowledged:

> Since the death of the late Mr. Hitchins, the able and faithful comparer of the Nautical Almanac ... I have found it necessary to bestow an extraordinary degree of attention, in directing the operation of the computers and comparers of the Nautical Almanac – As no person immediately occurred to fill the place of Mr. Hitchins.' [65]

His successor, Rev. Thomas Brown (1755–1836), vicar of Tideswell in Derbyshire and brother-in-law of William Lax, a member of the Board of Longitude, was not regarded as of the same standard.

I like to think that Malachy's high standards were in part driven by the need to produce an accessible solution to the problem of finding longitude at sea, very likely having seen the impact on local families of loss of life among seafarers. *The Nautical Almanac* was deliberately priced by Maskelyne to be afforable to sailors, whereas a chronometer was beyond their means. *The Nautical Almanac* is still in production today, but the calculations are now done by non-human computers.[66]

Hitchins should be acknowledged for a large and long-lasting influence on a number of local people, introducing them into the field of science and astronomy. Most famously this includes the Giddy and Dunkin families. His influence stretches far beyond the small region of St Hilary into the lives of many budding and hopeful jobbing astronomers who looked to him for help and personal advancement. His efforts enabled this small and remote corner of England to become central to the advancement and sharing of astronomical knowledge and techniques in the late 18th century.

I will leave the last words to an obituary which was published in the *Weekly Entertainer* (a popular west country magazine) and quoted in Charles Gilbert's *Historical Survey of the County of Cornwall*:

> To all who knew him as a man, a clergyman, or an author, he is the subject of pleasure and of sorrow; of pleasure from the recollection of integrity, Christian simplicity and genuine benevolence – his pastoral assiduity and sincerity – his genius and learning; of sorrow, from the sad consideration that all his good qualities and virtues and talents are now no more, and can hardly be replaced. [67]

References and notes

1. Hitchins, Malachy, (1801), Parish Census St Hilary, LDS Film #1595569, Item 5, p. 145.
2. Kingsford, C. L., and Howse, Derek, 'Malachy Hitchins', in *Oxford Dictionary of National Biography*, (Oxford: OUP, 2004).
3. Sargent, John, *A Memoir of the Rev. Henry Martyn*, (London: J. Hatchard, 1819), p. 3.
4. Polwhele, Richard, *Biographical Sketches in Cornwall*, vol. 1, (Truro: 1831), p. 90.
5. Ibid.
6. Ibid.
7. Ibid.
8. Ibid.
9. *The Ladies' Diary* was an annual publication containing problems and puzzles in mathematics, posed one year and answered the next. See Perl, T., *Historia Mathematica*, 6 (1979), 36–53.
10. Hitchins, Malachy, 'The Devon Fireball', *Gentleman's Magazine*, 32 (1762), p. 562.
11. Maclean, A., 'Eighteenth-century meteors', *Journal of the British Astronomical Association*, 93 (1983), p. 232.
12. Ibid.
13. Hitchins, Malachy, 'Eclipse calculations', *The London Magazine or, Gentleman's Monthly Intelligencer*, 32 (1763), p. 579.
14. Buckland Brewer Marriage book 1754–1812, Family History Library film #916765.
15. Clergy of the Church of England database, Person ID 43367 http://db.theclergydatabase.org.uk/jsp/persons/DisplayCcePerson.jsp?PersonID=43367
16. Polwhele (1831), p. 90.
17. Kingsford and Howse (2004).
18. Sadler, D. H., 'The Bicentenary of the Nautical Almanac', *QJRAS*, 8 (1967), p. 161.
19. Dunkin, Edwin, 'Notes on some points connected with the early history of the Nautical Almanac', in *Journal of the Royal Institution of Cornwall*, 9 (1886), p. 9.
20. Dolan, Graham, 'The Nautical Almanac and associated publications', self-published, http://www.royalobservatorygreenwich.org/articles.php?article=935
21. Croarken, Mary, 'Human computers in eighteenth

and nineteenth century Britain', in Robson, Eleanor, and Stedall, Jacqueline, (eds), *The Oxford Handbook of The History of Mathematics* (Oxford: OUP, 2009), 375–403.

22. Croarken, Mary, 'Providing longitude for all', *Journal for Maritime Research*, 4 (2002), p. 115.
23. Maskelyne, Nevil, *Philosophical Transactions of the Royal Society*, 58 (1769), p. 360.
24. Maskelyne, Nevil, *Astronomical observations made at the Royal Observatory at Greenwich*, vol. 1 (London: 1776), p. i.
25. Ibid., p. 155.
26. Hirst, William, 'Account of several phenomena observed during the ingress of the transit of Venus into the solar disc', *Philosophical Transactions of the Royal Society*, 59 (1769), 228–35.
27. Ibid.
28. Maskelyne, Nevil, *Philosophical Transactions of the Royal Society*, 58 (1769), p. 362.
29. Maskelyne (1776), p. 156.
30. Kennett, Carolyn, *The Antiquarian Astronomer*, 9 (2015), 2–11.
31. Maskelyne (1776), p. 162.
32. Kingsford and Howse (2004).
33. Croarken (2002), p. 116.
34. Croarken (2009), p. 381.
35. Hitchins, Malachy, (1793) 'Petition to the Board of Longitude', Papers of the Board of Longitude, RGO 14/22, p. 463.
36. Dunkin, Edwin, 'Notes on some points connected with the early history of the Nautical Almanac', *The Observatory*, 21 (1898), 125–6.
37. Payment to William Malachy Hitchins from the Board of Longitude (1788). Cambridge Digital Library, Papers of the Board of Longitude, RGO 14/17, p. 322r.
38. William Dawes was a naval officer and astronomer, later to become father of William Rutter Dawes.
39. Croarken (2002), p. 121.
40. Payment to Nicholas James for computer work (1787). Cambridge Digital Library, Cambridge Digital Library, Papers of the Board of Longitude, RGO 14/17, p. 368r.
41. Hitchins, Malachy, (1800). St Hilary Parish Register, Cornwall.
42. Dunkin, Edwin, (Hingley, P. D., and Daniel, T. C., eds), *A Far Off Vision: a Cornishman at Greenwich Observatory*, (Royal Institute of Cornwall, 1999).
43. Ibid.
44. Hitchins, Malachy, letter to unnamed recipient dated 'St Hilary 12 July 1805', Historical Autographs http://www.historicalautographs.co.uk/images/main12394.jpg
45. Dunkin (1999).
46. Ibid.
47. Polwhele, Richard, *The History of Cornwall*, (London: Law and Whittaker, 1816), p. 107.
48. Hitchins, Malachy, (1799). Letters to John Crosley, British Library, Add MS 16947: 1671–1841 ff. 25–27.
49. *West Briton* newspaper, issue dated 3 January 1840, Death of Davies Gilbert Esq. 'His preliminary education was conducted at home; and at a very early age he contracted an intimacy, which continued until death, with the Rev. Malachy Hitchens.'
50. Obituary, Davies Gilbert, *Memoirs of the Royal Astronomical Society*, 11 (1840), 317–21.
51. Hitchins, Malachy, (1796) St Hilary Parish Register. Cornwall.
52. Hitchins, Malachy, 'Account of the discovery of silver in Herland copper mine', *Philosophical Transactions of the Royal Society*, 91 (1801), 159–64.
53. Hitchins, Malachy, 'Account of Roman urns discovered in Cornwall', *Archaeologia*, 14 (1803), 224–30.
54. Ibid.
55. Vince, Samuel, *A complete system of Astronomy*, vol. 1, (Cambridge, 1797) p. 383.
56. Polwhele (1816), p. 107.
57. Merton Parish records http://www.barometerworld.co.uk/mertonhistory/baptisms.html
58. Clergy of the Church of England Database, Person ID 31261 http://db.theclergydatabase.org.uk/jsp/persons/DisplayPerson.jsp?PersonID=31261
59. Sale of Rev. Richard Hawkins Hitchins' effects, *Salisbury and Winchester Journal*, issue dated 1827 March 19. The sale took place on March 19 and 20.
60. *Royal Cornwall Gazette*, 1810 March 10.
61. Hitchens, Fortescue, and Drew, Samuel, *The History of Cornwall*, (Helston: William Penaluna, 1824).
62. Kingsford and Howse (2004).
63. *A Complete Parochial History of the County of Cornwall*, vol. 2, (Truro: William Lake, 1868), p. 187.
64. *Royal Cornwall Gazette*, 1853 April 8.
65. Minutes of the Board of Longitude 1809 December 7, Papers of the Board of Longitude, Cambridge Digital Library, RGO 14/7, p. 2:134.
66. HM Nautical Almanac Office http://astro.ukho.gov.uk/nao/publicat/na.html
67. Gilbert, Charles Sandoe, *An Historical Survey of the County of Cornwall* (Plymouth: J. Congdon, 1817), p. 157.

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