

# THE FATHER OF AMATEUR ASTRONOMY: REV T. W. WEBB



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## 1) Introduction:

Good afternoon.

Today we are going to review the life of one of the greatest amateur astronomers from the 'Victorian' era, the Reverend Thomas William Webb, who lived from 1806 to 1885, and came to be known as the "**the father of amateur astronomy**". We'll cover his greatest astronomical contribution – Webb's handbook - *Celestial Objects for Common Telescopes*, an observing guide for which he is best known today. Along the way, we'll discuss my personal observations of objects from his handbook.

Early Years:

Life as a Clergyman and Amateur Astronomer:

Astronomy as a Hobby:

Webb's Telescopes

Webb's Observing Log Books

Webb's Observations:

The Handbook: "Celestial Objects for Common Telescopes"

A: How to use a telescope

B: Observing the Solar System

C: The Starry Heavens

Constellation examples

Webb's Legacy

A: Staying power of "Celestial Objects for Common Telescopes"

B: The Webb Society (founding and mission, current activities)

Conclusion

## 2) Early Years

### A: Childhood

Thomas William Webb was born on December 14<sup>th</sup> 1806 in the county of Hereford, England in a little village called Ross-on-Wye. He was the only son to his parents Sarah and John Webb, but had an older sister named Anne born in 1801. Unfortunately, sister Anne passed-away at the age of eight, leaving her 3 year-old brother an only child. Thomas's father, John Webb came from the upper-middle-class, which gave him access to Oxford University, which he graduated from with a master degree and was ordained in the Anglican Church. His mother, Sarah Webb's family from her side was also well off, owning property in London. This allowed the Webb family to live comfortably off John's earning as an Anglican minister.



John was also well known locally as an expert authority in Norman French and a historical academic researcher of the English Civil War period, and he dabbled in music, writing several works that were performed at the Birmingham Music Festival. Finally, John kept a small home library containing his various historical research and other natural philosophy books.

All this set the stage for Thomas's early home education from his parents.

### B: Early Education.

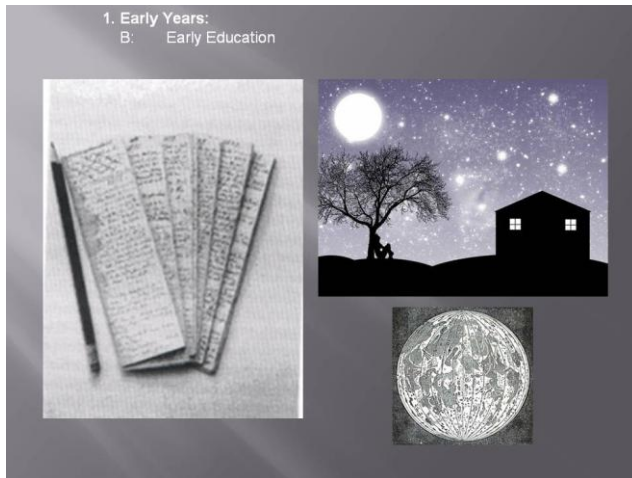
With the educational resources available at home to the Webb family, Thomas was never sent off to a boarding school which was the 'standard' of the day, but instead was kept home, where he was educated by his father, along with a couple of other children from the local gentry.

While Thomas was still a young child, his mother, Sarah, became mentally and physically frail of health, leaving his upbringing to his father who devoted himself to the boy's education. John Webb's instructions focused on classical philosophy, mathematics, and French and German languages.

Thomas became very a studious companion of his father, showing great interest in the natural world, keeping detailed notebooks with descriptions of size and shape, along with drawings, of every type of creature he would see. For the first few years he focused on earthly things, such as spiders, rabbits, and insects and other animals to be found in the country, along with seasonal changes in plants.

But as Thomas grew older, he began recording daily observations of the weather such as the types of clouds, how windy it was, or the amount of precipitation in rain or snow.

Finally, Thomas began looking up at the night sky and recording observations of stars, bright meteors or naked-eye lunar surface features. In later years, he went on to record notes on speculum mirror grinding and telescope making and observations made with the telescope.



Thomas even kept a separate small personal diary where he recorded more informal activities of his daily life, such as horse riding or dinner at the neighbors. This devotion to recording life around him, along with access to his father's library helped prepare Thomas for the next phase of his life - University.

### **C: Higher Education (Oxford)**

In 1826, at the age of 20, Thomas was able to enroll at Oxford University where he studied divinity, Greek Classics, and mathematics. Thomas also picked up additional course work in his favorite subject – astronomy! While there, Thomas suffered thru a number of ailments, and while not necessarily in bad health, he was never considered to be athletically strong. Partly because of this, Thomas focused on his scholarship, spending nearly every waking hour in the Oxford libraries when not in class.

But Thomas did take time out to socialize with the small group of friends in the hall where he stayed, holding the occasional tea and wine party, particularly when a 'care' package would arrive from home loaded with bottles of wine from his fathers parish.

Thomas would later record in his notebooks that during these parties, his university friends would have long discussions about life, death, the universe, and everything.

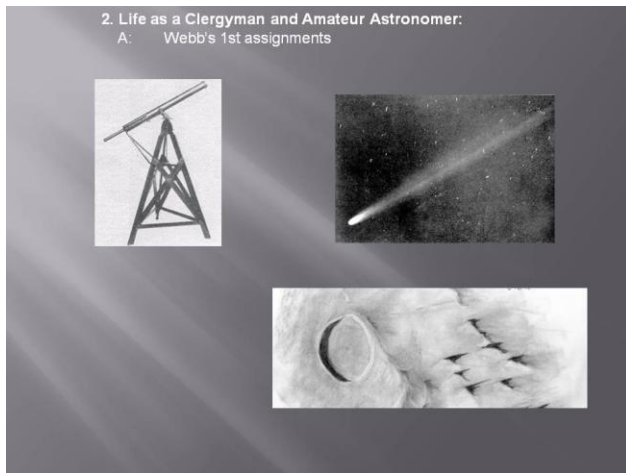
After three years, in 1829, he earned his degree and was ordained as a minister.

### **3) Life as a clergyman and amateur astronomer**

#### **A: Webb's 1st clerical assignments**

After leaving Oxford, Webb's first clerical assignment was a curate at Pencoed in Wales, which lasted for two years. He then moved on in 1831 to Gloucester Cathedral where he spent the next 10 years, moving up the clerical ranks. Thomas was noted as a very caring minister, and took a keen interest in the health of his parishioners, delivering medicines or wine to the ill or helping vaccinate local children.

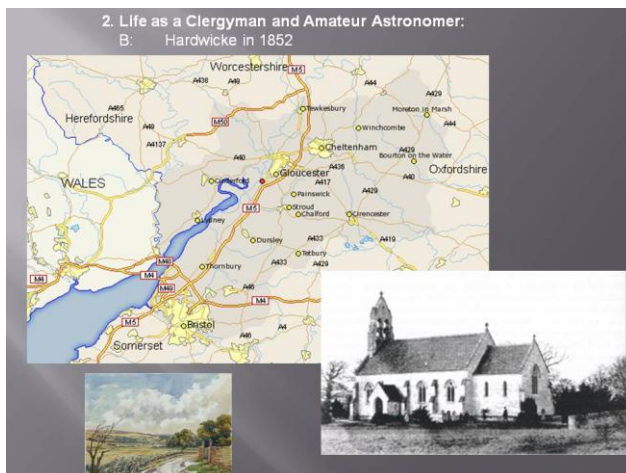
During this time, in 1834, his father purchased a 3.7" refractor for Thomas, which he used in his free time and filled his notebooks with observations made with it. In 1835, he began writing astronomy oriented articles for various magazines on observing Halley's Comet or Lunar Volcanoes (*craters*). Thomas was also invited to give lectures on comets and meteors to several local literary societies.



In 1841, Thomas was assigned back to his father's home district where he assisted John Webb for the next 20 years. While there, in 1843, he married Henrietta Montague of the local landed gentry. In 1850, Thomas was elected a Fellow of the Royal Astronomical Society, which gave him access to borrow professional books and papers from the society's library. Thomas also began sending in articles to the Society on observing comets, zodiacal light, and Lunar features.

### B: Hardwicke in 1852

Finally in 1852, Webb was assigned to head a small rural parish at Hardwicke in Herefordshire, back near the border with Wales. The parish consisted of about 30 farms with around 250 people. Very rural. In addition to Sunday services, Thomas's pastoral duties consisted mainly of visiting the surrounding farms during the week and checking in on the local gentry. He would load up a knapsack with spare food and medicine from the rectory, and spend the day hiking to some distant parishioner's cottage where he would spend the afternoon with the family, handing out the small edible treats that he brought, and seeing that the children received any needed medication. Thomas became active at the local school, encouraging the students to report to him any natural phenomena that they might have seen. He also helped set up a free soup program for the poorest children in the district.



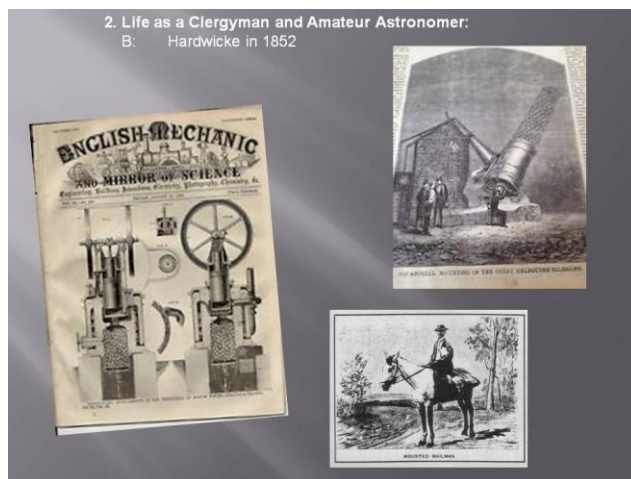
There at Hardwicke, after a settling in period, he finally had the ability to fully focus on his personal love of astronomy. On the church grounds, just outside the minister's home, Thomas would setup his telescope in his garden and observe. Over the years, the garden was home to a number of telescopes, starting off with his small 3.7" refractor, and then to progressively larger refractors and reflectors.



The largest telescope was a 9-1/3" Newtonian reflector with a silvered glass mirror on an equatorial mount inside an observatory building, used from 1866 to 1885.

During this time, Thomas continued his recording nearly daily astronomical observations, including detailed sketches and specifics on using his telescope equipment and observatory.

He also continued to contribute astronomy articles to various publications and became sort of a regular columnist with one magazine titled "English Mechanic". From the publicity of these articles, Thomas began receiving correspondence from beginners and other amateur astronomers looking for help on how to use their own equipment or what telescope to buy, or what objects they should observe and how to go about doing that. Thomas would write back to each one with detailed answers to their questions, which for many would soon turn into years-long correspondences back-n-forth on such topics as how to care for eyepieces, to observations of Saturn. The volume of letters became so great that the main post-office in Hereford began delivering a private mailbag directly to the church. Some of the amateurs who lived close enough and had the means to travel, would make the journey thru the rural countryside to visit Webb and his observatory, and would stay a few days with him to learn observing techniques. In addition to all the writing Thomas was doing, he would also travel around the region, giving lectures on astronomy and optics to local philosophical societies and colleges.



Thomas soon became widely known for his knowledge of telescopes and stargazing, and also for his charm and witty humor. An example of this was when after returning from doing a starparty at a ladies college, he remarked to a friend that the sights were very pretty and sharp. He then clarified that he was referring to the stars and planets that they observed,,,

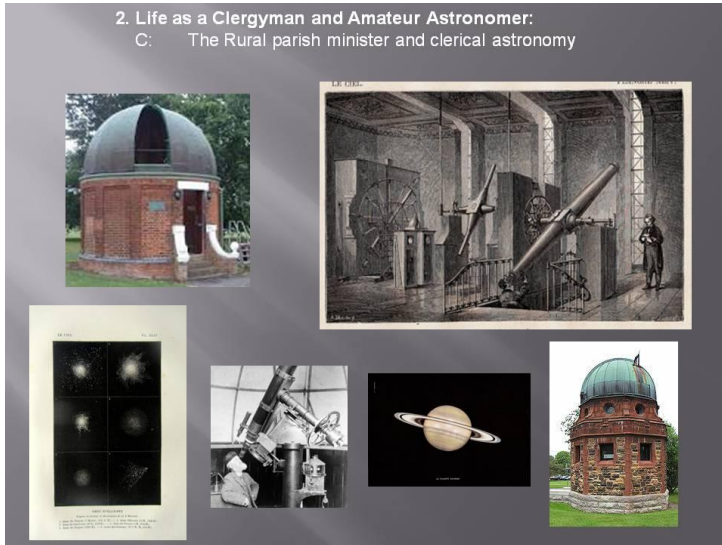
Given his reputation and popularity Thomas could have easily moved up further within the church society, but he preferred to stay a rural minister, finding his fulfillment in tending to his parish and in astronomy.

### **C: The Rural parish minister and clerical astronomy**

As a minister, Thomas Webb was part of a profession that contributed a good number of advanced amateur and professional astronomers during the Victorian era in England. These men were able to put aside their natural denominational rivalries to work together in promoting the science and hobby of astronomy. Some of these included Congregationalist Rev William Dawes and Rev William Lassell, Methodist Rev John Couch Adams, Scottish Presbyterian Rev Thomas Dick, Father Stephen Perry of the Jesuit run Stonyhurst College Observatory, Rev Romney Robison of the Episcopalian Armagh Observatory in Ireland, and Anglicans Rev Thomas Espin, Rev William Pearson, Rev Charles Pritchard, Rev Henry Key, and Rev Edward Berthon.

## 2. Life as a Clergyman and Amateur Astronomer:

C: The Rural parish minister and clerical astronomy



They were part of the “Grand Amateur Astronomers”: a group of well-to-do gentlemen scientist, many from religious backgrounds, who took it upon themselves to help fill in the gaps from the poorly funded professional observatories of the period. They focused on either cutting-edge astronomical private research or like Thomas Webb, focused on popularizing the hobby of observational astronomy with the general public. Many of their astronomical works and publications were not only aimed toward advancing astronomy, but to also give a sense that God’s glory of creation could be seen in the celestial sky, which in turn helped elevate and religiously inspire people to learn more about how God had put together his universe. Webb felt that being an amateur astronomer and studying the skies was an extension of his clerical duties on earth. The primary purpose of observing the night sky was to bring the astronomer closer to divine creation and God. His popular low-key writing style encouraged his readers to engage directly with the divine by studying the stars.

## 4) Astronomy as a Hobby

### A: Webb’s Telescopes

Thomas Webb built or purchased a number of telescopes during his life. In his younger days, when only very small expensive refractors or Gregorian reflectors were generally available, he constructed several telescopes of his own using speculum metal mirrors that were the standard of the day. (Speculum metal is an alloy of tin and copper with a reflectivity of only about 70%, and would tarnish quickly, and require frequent re-polishing).

Webb’s early home-built telescopes include a 1.3” refractor and several 3” Newtonian reflectors, with his last being a 6” reflector that he finished in 1827. Webb also experimented with making his own eyepiece lenses, including using fluids such as turpentine or oil extracted from plant seeds in-between the lenses to help correct aberrations in the object glass. While Thomas was partly successful, he soon abandoned these attempts as better quality optical glass for eyepieces became more commonly available.

Webb lived in an era of dramatic changes in the quality, size, and design of telescopes and optical components available to the amateur astronomer. Ready-made telescopes that he could only dream of owning in his youth became more common and cheaper, allowing them to be purchased outright. The first of these was the earlier mentioned alt-az mounted 3.7” f5 Tulley refractor purchased by Thomas’s father for him in 1834. This became Thomas’s primary telescope for the next 24 years, and was used by him for the majority of the observations that he eventually created his handbook with. This telescope was actually the ‘common telescope’ that he referred to in the book’s title.

3. Astronomy as a Hobby:  
A: Webb's Telescopes

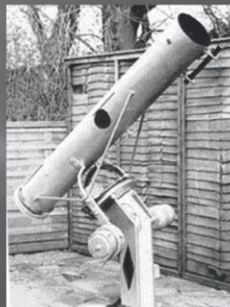


Then in January 1858, with his observations for his handbook mostly completed, Thomas sold the 3.7" and purchased a high quality American made 5 1/2" f7 Alvan Clark refractor objective, for which he had an optical tube and mount constructed locally. Unfortunately due to poor workmanship, he could never get the mount to work as he wanted, and even had to resort to using string to help hold the mount stable. Finally Webb became so annoyed with the mount and trying to get it fixed that in 1865 he just stopped using the telescope.

By then, in 1863, Webb had moved on to another idea. The technique of silvering glass mirrors had finally been perfected during this time, allowing for cheap highly reflective larger mirrors to be made, replacing the heavy poor performing speculum metal mirrors. By 1863 there were a number of telescope makers selling silver-on-glass mirror instruments with all types of mounts, including equatorials with setting circles that were clock driven. Webb borrowed an 8" silver glass mirror telescope and used that until 1866 when Webb's 90 year old father purchased Thomas a new 9 1/3" f6 silver glass Newtonian reflector on a professionally built equatorial mount. This would become Thomas's largest telescope that he ever owned, and he used it extensively.

To house the new reflector, which was too heavy to be portable, Thomas built a small observatory on church grounds made with a wood base and canvas top. The observatory was a 'Romsey' type, which was a twelve-sided shed with a conical rotating roof made from canvas that was very popular with amateurs at the time. For the next twenty years it was home to the large 9-1/3" Newtonian reflector, used from 1866 to 1885.

3. Astronomy as a Hobby:  
A: Webb's Telescopes



After Webb's death in 1885, the 5 ½" Clark refractor telescope was donated to Stonyhurst College where they remounted the optical tube and it became a useful instrument. The 9 1/3" reflector eventually made its way to the British Astronomical Association.

### **B: Webb's Observing log books.**

Webb always encouraged amateur astronomers who he met or corresponded with to keep a written record of their observations. Webb's own log books were filled with neat even scripts of his near daily observations, including small 1.5" circle eyepiece drawings of deep-sky objects, along with larger sized sketches of comets, lunar craters, and various telescopes and equipment Webb had owned over the years. For planetary detail, Webb kept most of his drawings small; with the planetary disk generally only about ½" in diameter. Lunar craters were usually not very detailed, as Webb felt it was near impossible to accurately render them using his instruments.

These log book notes were usually transcribed the next day from rough notes that Webb took in the field during that night's observation. Using these rough notes and visual drawings, he would then sit down during the day and carefully write the full report in the log book using a fine pen.

The sketches were sometimes done in pencil, colored crayons, or even as a watercolor painting. These log book records included every type of object that Webb observed either naked-eye or thru a telescope. Moon phases, meteors, naked eye comets, double stars & their colors, variables, lunar craters, star clusters and nebula. Webb recorded the state of the sky conditions during the night, what if any telescope equipment used, including the eyepieces & powers, and any useful observing technique. Webb would also include in the log books, folded up letters or newspaper articles that related to a specific object that he observed.

Depending on the type of observation, Webb had log books for general observations and books with sections divided between the various planets, each having their own range of pages to record observations in. Whenever Webb ran out of page space for a given object class, he would start a new log book for that planet or object, while continuing to fill the previous log book for the other objects that still had room in their sections. Webb would also keep a section at the end of the log book where he physically reversed the book to record research that he had made into other historical observations of a particular object by prior astronomers such as Herschel, Messier, Admiral Smyth, and others. He would later use all this information, his personal observations, observations from other historical observers, and his own experience with telescopes to write his handbook. Upon Thomas Webb's death in 1885, per his will, most of his log books were given to his good friend the Rev T.H. Espin, who kept them until he passed away in 1934. The log books came close to being thrown out, but for the keen eye of an assistant who saved them. They were then given to the Institute of Astronomy at Cambridge and eventually donated to the Royal Astronomical Society in 1978 where they are preserved today.

### **C: Webb's observations.**

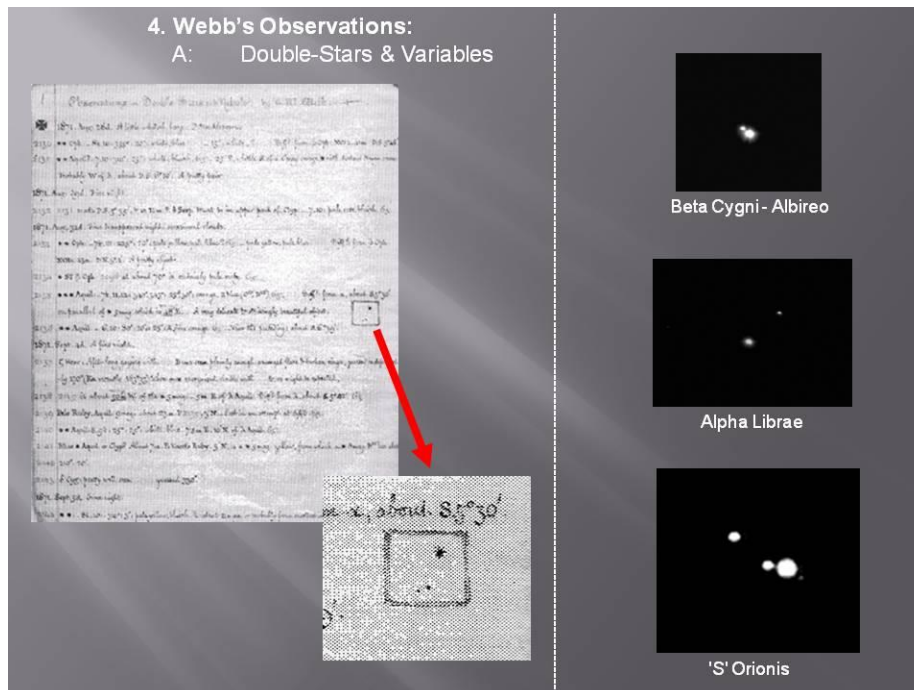
#### **I. Double-Stars & Variables**

Like most amateur astronomers of the Victorian era, Thomas Webb throughout his life was an enthusiastic observer of double-stars. He felt that if all an amateur astronomer ever did was to observe doubles, it would be time well spent at the telescope. Thomas's log books are filled with page after page of double and variable star observations. Along the way, Webb re-observe the 680 doubles listed in the Bedford Catalog by Admiral Smyth and many other doubles found by the other prominent double-star observers of the day that he corresponded with such as Dawes and Burnham.

Thomas eventually discovered 10 new double-stars of his own, with his most favorite being the multiple variable star 'S Orionis' in 1869.



Interestingly though, Webb was not his usual precise self when it came to recording his double-star observations. Rather than use an eyepiece micrometer, which he had the funds to obtain, Webb would just give what he would call an ‘eye estimate’ of the double’s position angle and separation. He would use various descriptions to indicate that the fainter star would be ‘well separated’ or ‘little elongated’ and its position was ‘SP’ (south preceding), or ‘NF’ (north following) the brighter star. He also used his own unique method of identifying the location of the double, by referring it’s coordinates in offsets from the RA and Dec of the nearest bright star. Webb generally used his copy of the Jamieson Star Atlas of 29 charts containing 112 constellations, (of which only 67 made it into the modern list) published in 1820. When using the atlas, Webb would sometimes make use of the various labels or titles printed on the charts, such as referring to a star’s position as being to the north of the first letter ‘S’ in the word ‘Sagittarius’ on that particular chart.

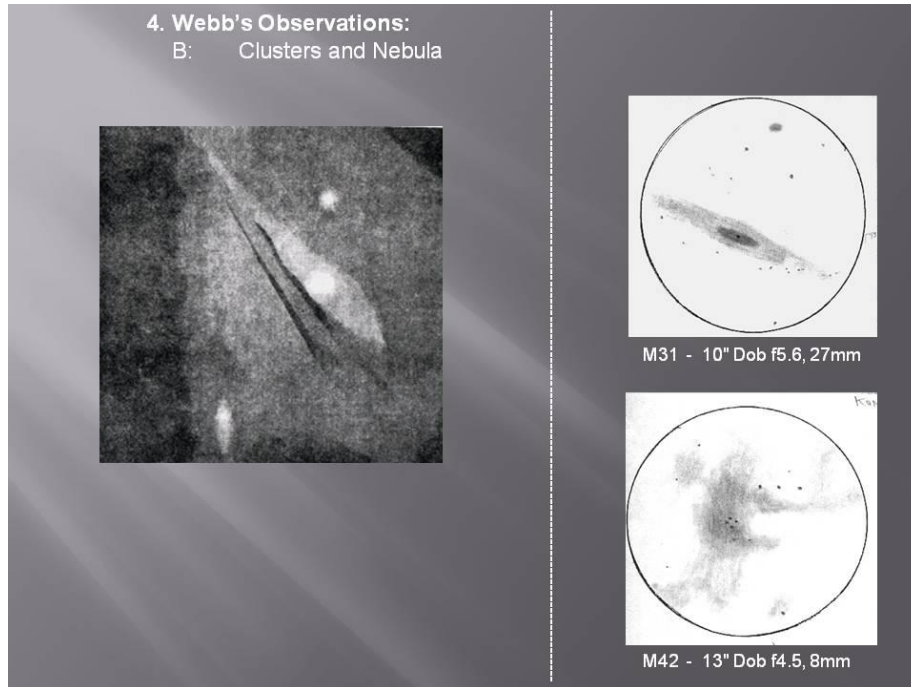


While Webb enjoyed observing double-stars, he wasn’t particularly interested in variable stars, though he did record regular observations of some of the brighter long-period variables such as Mira. But in all his observations, he liked to note the stars color. He used a shorthand notation of two to three characters to indicate color, a letter or two to indicate the primary color along with a number from 1 – 4 to indicate the shade. Thus a ‘Y2’ would indicate a bold yellow star, with a ‘Y4’ indicating a pale yellow, or a ‘OR4’ meaning a pale orange ruby star. Thomas was particularly fond of red stars. He would make special sweeps thru the dense Milky-Way star fields looking for new red & orange stars. Webb eventually discovered 32 new ‘red’ stars, and is also listed as a co-discoverer of another 55 stars.

## II. Clusters and Nebula

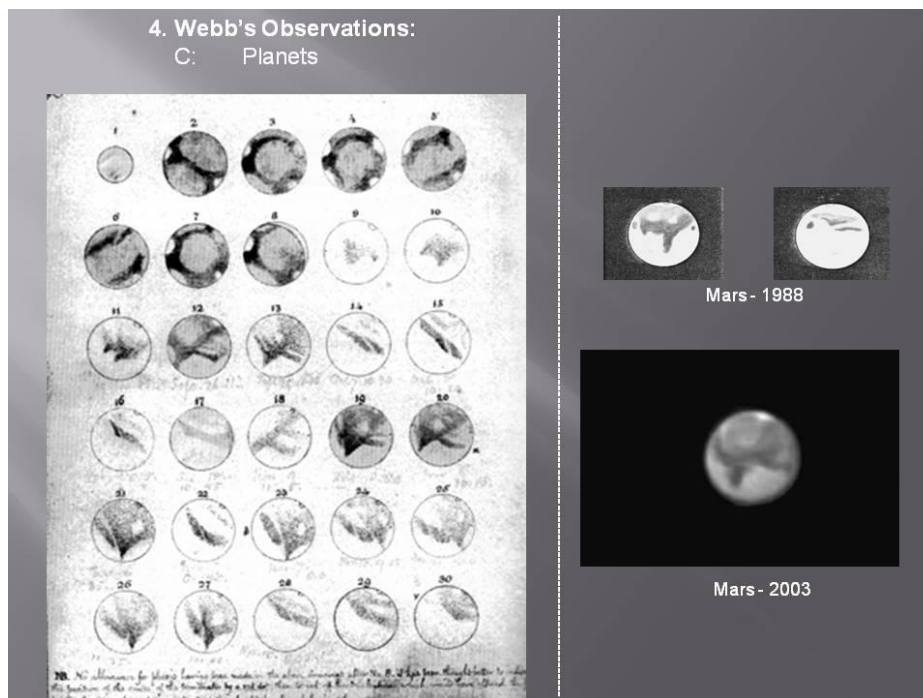
A fair number of deep-sky observations and sketches of star clusters and nebula can be found embedded among Webb’s various other observations. (a total of 3,463 over all deep-sky observations). All of the Messier objects and many of the brighter Herschel objects that Thomas’s 3.7” refractor would show are listed. While Webb enjoyed observing the bright open clusters for their star pairings and colors, like many in his era working with small telescopes, he wasn’t much interested in the generally faint, formless nebula, which included a large number of what we know today as galaxies. Thomas did keep observing the large brighter nebulas such as the Orion Nebula, also including some galaxies such as M31, in hopes of detecting changes in their shapes.

Webb is credited with discovering the planetary nebula NGC7027 in the constellation of Cygnus, his only deep-sky discovery.

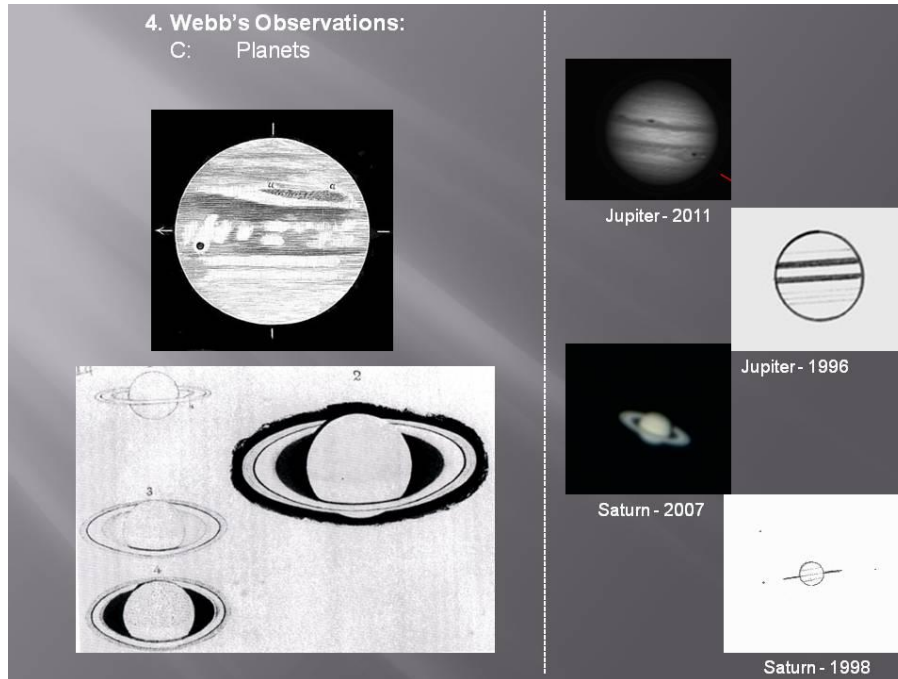


### III. Planets

In addition to the Deep-Sky, Thomas Webb was also a dedicated observer of the solar system. His style of sketching planets at a very small scale allowed him to accurately portray what a modest or 'Common' telescope would reasonably show to the observer. An example of this is a series of sketches he made of Mars during its opposition in 1830. The tightly drawn disks show accurately the shapes and positions of the Martian surface landscape that were visible, including features such as the dark markings of Syrtis Major, or Sinus Sabaeus, and brighter regions such as Hellas.



Webb also closely followed the gas giants Jupiter and Saturn, and especially in later years using the 9 1/3" observatory reflector, he would devote long runs of nightly observations that lasted many weeks. One such of Jupiter went from Nov 15<sup>th</sup> 1870 thru April 15<sup>th</sup> 1871 for a total of 49 nights. Webb was one of the first to come up with the names of Jupiter's different features that we use today: bright stripes are called 'zones', the dark bands were called 'belts', further broken down into north & south 'temperate', 'torrid', and 'polar'. Webb was considered one of the best amateur sketchers of planetary detail during his time.



#### IV. Sun

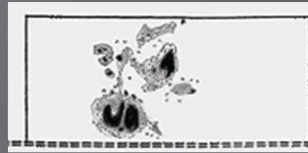
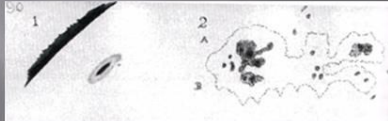
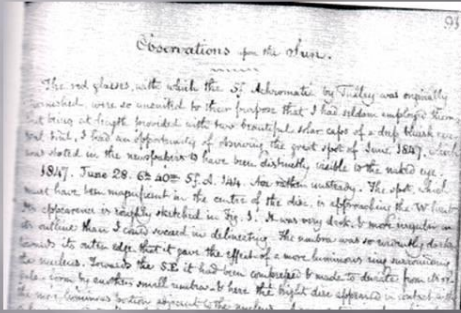
While solar observing didn't appeal much to Thomas Webb, he did spend time recording observations of the Sun, such that he ended up with a whole section regarding the Sun in his handbook, and even published a small textbook on the Sun in 1885. Like his planetary observations, Webb's solar sketches and descriptions were very precise and accurately detailed the various solar features that could be observed in white-light. He recorded a number of giant sunspots transiting the Sun, describing their large umbral structures, light bridges, and extensive branching facula.

On large sunspots near the solar limb, he would note his impression of it having a shallow depression in the surface, recording what would be known later as the Wilson Effect. Experimenting with using color filters, he also would observe that the Sun had an overall mottled or granular appearance.

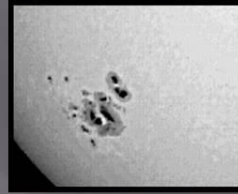
And like most of us modern solar observers, Webb was also frustrated by clouds on the few occasions of rare solar events such as the transit of Mercury in 1861 and a partial solar eclipse in 1870.

4. Webb's Observations:

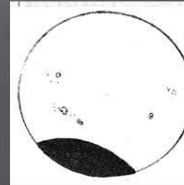
D: the Sun



Sunspots - 2003



Sunspots - 2003



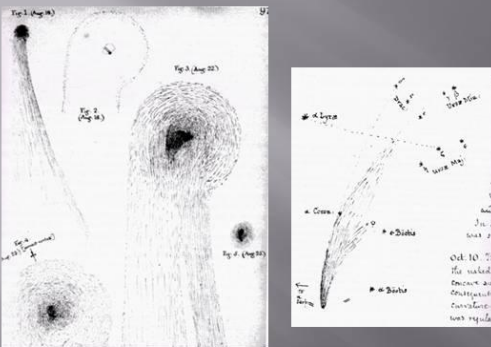
Partial Eclipse - 1991

V. Comets

Webb also lived in a century that saw a number of great comets that have only been recently rivaled by comets Hale-Bopp and Hyakutake. Webb made numerous observations of these comets with both his naked-eyes and his current telescope of the time. These include the Great Comet of 1811 which Thomas remembers being shown by his father when he was a small child, to the Great Comets of 1819 and 1823 when he was a teenager, to the Great Comets of his adult life, such as Comet Halley in 1835, Comet Biela in early spring of 1845 with its double nucleus, and later in the year, the Great June Comet of 1845. There was another comet in 1847, and two in 1849, one in 1850, and Comet Biela back again in 1852. More comets in 1854, 1857, Donati's Comet in 1858, and others in 1860, and 1861, 1862, 1863, Encke's Comet in 1871, and the great comets of 1881 and 1882.

4. Webb's Observations:

E: Comets



Comet Hale-Bopp  
March & April 1997





One particularly interesting entry from Webb's observing notes concerns the Great Comet of 1861, which passed close to the Earth. On the evening of June 30<sup>th</sup>, 1861, Webb was out observing the comet in his garden just after dusk. While viewing it with the naked-eye, he noticed a number of faint cirrus clouds streaming across the sky. As he looked at the cirrus, he realized they converged on the visible nucleus of the comet. As he watched, the bands of cirrus slowly closed up like a fan, centered on the comet's nucleus. Webb detailed his observation and reported it to the Royal Astronomical Society. Webb's report was collaborated by several other observers, and it was determined that Webb had actually observed the passage of the Earth through the comet's tail!

## VI. Moon

While Webb's observation of the planets and comets took up a large section of his log book records, he focused even more on detailed observations of the lunar surface.

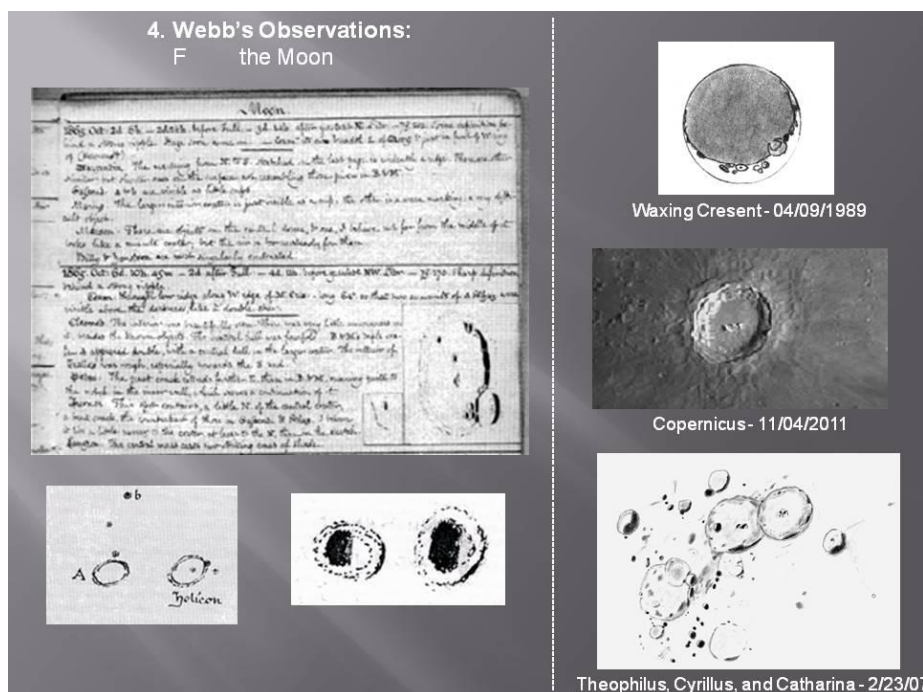
Webb felt that the current theories of his day that the Moon was a geologically dead world were incorrect. That like the Earth, processes still occurred that could change the Moon.

Webb considered himself a type of 'backyard prospector', a field geologist with a telescope.

He felt that close, careful observational study of selected Lunar features would show changes occurring over the passage of time.

Thomas spent many evenings recording the visual details of individual craters: for example "Nov 1<sup>st</sup>, 1855 - Maginus with a very remarkable serpentine terraces in the inside of its W. wall, and a number of craters which have reduced the E. wall to the condition of a gigantic ruin."

Webb particularly thought that volcanoes were still active on the Moon, and that the craters were the remains of molten lakes. He spent many hours recording multiple observations of promising lunar locations, such as Schroter's crater, or the area around the twin Messier craters, a small pit named 'Helicon A' near Le Verrier, along with the south-eastern slopes of Copernicus.



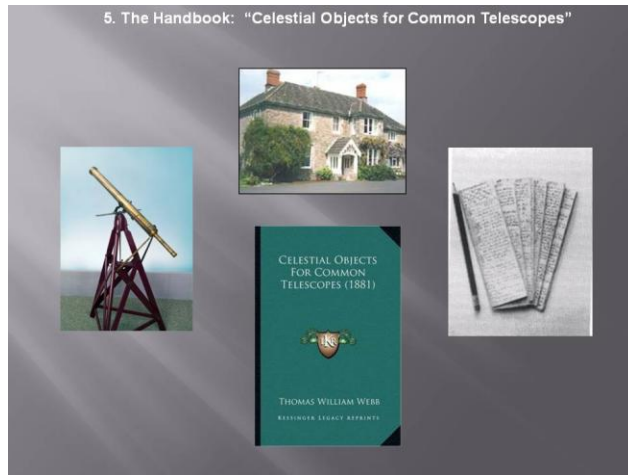
Webb even participated in the 'Committee for Mapping the Surface of the Moon', whose goal was creating a new highly detailed photographic and visual map of the lunar surface. It was sort of a Holy Grail quest for proof of the Moon's changeability. Others who participated in this great mapping project included Sir John Herschel, Warren De La Rue, and Lord Rosse. Unfortunately they never succeeded in their quest, but even today, the idea of transient lunar phenomena still keeps many amateurs interested.



## 5) The 'Handbook': Celestial Objects for Common Telescopes

In 1844, Thomas purchased a copy of Admiral W. Smyth's 'A Cycle of Celestial Objects', and decided after reading the second volume called the "Bedford Catalogue", (which was a survey of deep-sky objects made with the Admirals much larger telescope), to compile his own observations using his smaller 3.7" refractor. Small telescopes were finally becoming affordable to the educated middle-class amateur astronomer of the day, but the biggest problem they faced was their own inexperience.

Thomas resolved to create a handbook for the owners of more ordinary 'common' telescopes that would list clear basic instructions on how to use those scopes and what objects to observe with them. So Thomas spent the next 15 years adding to his existing observations, and also putting to paper the knowledge and skills learned in using his telescope equipment, recording everything in his log books.



It was at Hardwick in 1859, that Thomas finally pulled together his observing and telescope usage notes from over the years and wrote his astronomical observing guide "*Celestial Objects for Common Telescopes*". Within his book, Thomas broke his information into several sections, containing instructions on the use of a telescope as well as detailed descriptions of what could be observed with it. This work was written as a guide for the amateur astronomer, and became the standard worldwide observing guide, and remained so for many decades until well into the 20th Century. (In 1917, during revisions for the sixth edition by Reverend T.E. Espin, the book was split into two separate volumes)

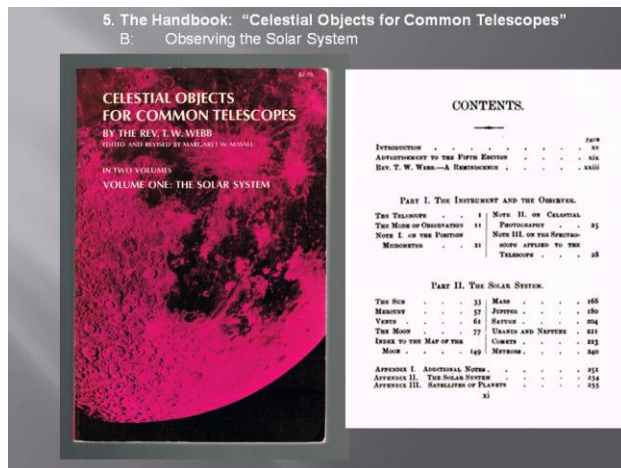
The 'common telescopes' referenced in the book's title are three to four inch refractors and larger silver-glass reflectors in the six to eight inch range that were becoming popular and more commonly available to the average amateur observers of the day. Webb realized there was a need for a simple, clear guide to these telescopes, how to use them, and what to observe with them. His personal notes on observing and telescope usage went a long ways toward filling that need, and provided Webb with the core of his handbook.

### A: How to use a telescope

Webb's first volume covers the use of the telescope and starts off the observing with the brighter objects of the Sun, Moon and Planets. The section on equipment usage takes up about 20 pages, and while most of it is dated, there are a number of useful comments that are still valid for today. To paraphrase a few – don't try using your telescope by pointing it out the window of a warm room, (but if you must, no fires in the fireplace), Observing on a wood floor is a bad idea as every movement by the observer will produce a tremor, and while an observatory is not essential, it has its advantages in comfort and setup time. And remember, your telescope's brass-work should not be rubbed with polishing powder, as it might scratch the finish. 😊

Webb goes on discussing various useful accessories such as dew caps and how to make them, along with observing advice on eyepiece usage, such as don't overdo your magnification – use low powers to help find the object. He then touches on when it's best to observe certain types of objects and not to waste time trying to observe when the sky conditions don't allow.

But, if you catch a really favorable night, you should really make the most of it, as you will not find too many of them, Webb advises to try not to observe objects near the horizon, nor over a house unless you want to study the effects of a current of heated air. And he encourages you to record every observing session no matter how unimportant it may seem, and to write everything down and trust nothing to memory.



Webb offers these encouraging words from an 1828 Royal Astronomical Society report:

*“Every one who possesses an instrument, whose claims rise even not above a humble mediocrity, has it in his power to chalk out for himself a useful and honourable line of occupation for leisure hours, in which his labor shall be really valuable, if duly registered,, those who posses ‘good’ instruments, have a field absolutely boundless for their exertions”.*

## B: Observing the Solar System

Webb starts off the section on observing the Sun by suggesting that the student had best not begin there, and they should first acquire observing experience elsewhere, if they are not careful, they could end up like Galileo and ‘suffer from that piercing blaze’. Then he goes on and describes how to make various solar filters, (which I don’t recommend at all trying), and the various solar features that could be observed, along with the scientific reasoning of the day. While some of the descriptions are interesting, most of this section is very, very dated, and it’s best to get your information elsewhere.

Webb then has individual sections on the planets, with only a page or two on Mercury or the outer gas giants Uranus and Neptune, which he feels “may be reached (observed), but to no great purpose,,” Webb barely gives poor Neptune a full paragraph and states: “Neptune may be found,,, but will hardly repay the search’,,, and he goes on to describe the view as “but dull and ill-defined”.

But Venus fares better, with over 14 pages, along with Mars 12 pages on observing both planets phases and other transient surface features. With Venus, he discusses observing the ‘Mountainous Surface’ and the mysterious ground ‘Spots’, which we know today are non-existent. The section on Mars is a bit more accurate on the surface features that can be observed, including what Webb was able to see and other observers of the day such as Percival Lowell. But again the general information is a little quaintly dated.

Jupiter and Saturn each have big sections, with plenty of detail observations and sketches from Webb's contemporaries of the day and historical observers. And there are nice sections on Comets and Meteors. Finally, as might be expected from Webb's log books, it is the Moon that takes up a good chunk of the book – 90 some pages. While the general scientific thoughts of the day regarding the Moon, and Webb's ideas of lunar volcanoes, are only interesting from a historical perspective, the bulk of the section deals with observations of the many lunar features visible with a 'common telescope', and includes a nice lunar map broken into four quadrants, along with a index to the features that can be still useful.

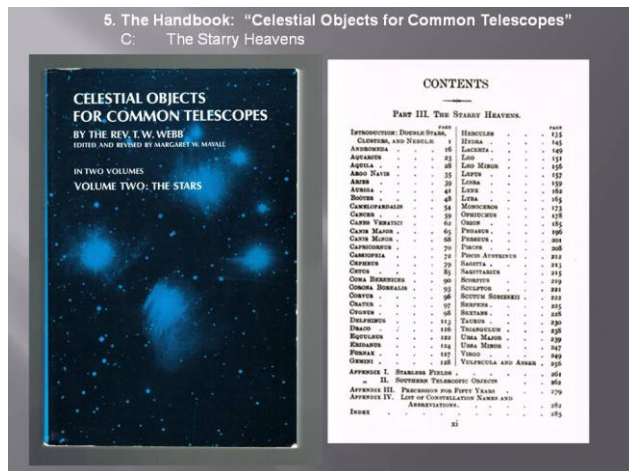
### C: The Starry Heavens

The second volume is a guide to the stars, clusters, and nebulae ordered by constellation.

Webb starts off with a lofty screed to the reader that *"leaving our Sun and his attendants in the background... we are now approaching more amazing regions... with scenes of inexpressible and awful grandeur. We are now to contemplate not one Sun, but thousands and myriads... pairs, groups, galaxies of Suns – the Hosts of Heaven... in unborrowed splendor"*.

After about 15 pages of additional general info on such things as determining a stars magnitude to measuring the position-angle of a double, Webb dives into the bulk of the book, individual chapters of the constellations of his era, which includes a number of outdated constellations, such as Anser 'the Goose', which is now just part of Vulpecua, or Argo Navis 'the great ship of Jason and the Argonauts', which has been broken into smaller constellations of Puppis, Vela, and Pyxis.

Here Webb focuses much more on double and variable stars which he favored, than to the nebulae. This really is not surprising given that these types of stars were the priority of astronomy at the time, and were very suitable for the 'common telescopes' available, as opposed to the deeper sky objects. A typical constellation in Webb's handbook may list over 100 descriptions, some lengthy, of interesting double or variable stars to be found within its borders, but then only list a handful of cluster and nebulae, that we today know contains far more. His descriptions of the deep sky objects range anywhere from a terse single word 'Nebula' to poetic descriptions over a page long quoting from scripture or other prior observers descriptions, such as from William Herschel.





**Aquila:**

In this Constellation with its bright star Altair, Webb states that it “has a very sensible p.m. (rising).

And goes on to say that “All the Galaxy here is strewed with pairs and groups of stars”.

After listing 89 double and variable stars, Webb then gives a list of only 4 deep-sky objects, with the main one being the open cluster M11 which has a “Noble fan-shaped,,, at the upper edge of the broad luminous cloud which marks the shield of Sobieski,,, Ad Smyth compares it to a flight of wild ducks”.


Webb also notes another observer having seen “dark structures plainly visible”. While Webb includes M11 in Aquila, he does note that it is “Sometimes placed in Scutum Sobieski”, which is the correct modern constellation location.

The planetary NGC6781 merits a short mention of “Large round faint neb,,, E of Rosse ring or spiral”.


Also of note are several brief descriptions of other curious items, such as star chains, or wide group, (clusters), and long narrow trapezium.

5. The Handbook: “Celestial Objects for Common Telescopes”

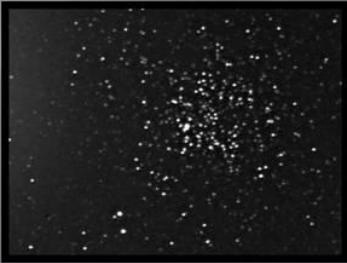
*Aquila:*



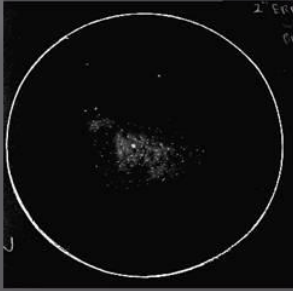
StellaCam II 8mm CCTV lens, 8 seconds



NGC 6781 (planetary nebula)  
8" SCT f6.3, StellaCam-II 8 seconds



M11 - 8" SCT f6.3, StellaCam-Ex 2.5 seconds



13" Dob f4.5, 32mm



**Canes Venatici:**

For this constellation Webb states: "The nebula here are fine"

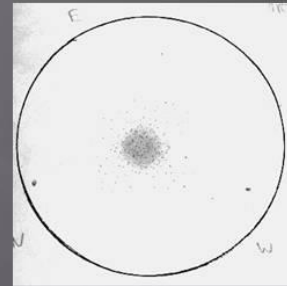
After listing only 30 double and variables, He then lists 10 deep-sky objects of which M51, the Whirlpool Galaxy, and the globular cluster M3 are most noted. For M51 – "E of Rosse's wonderful spiral, its wreaths are beyond all but the 1<sup>st</sup> telescopes, common ones will only show two very unequal neb nearly in contact, both brightening in the centre, traces of halo encompassing the larger may perhaps be caught,,,". For M3, "a brilliant and beautiful globular congregation of not less than 1000 small stars, blazing splendidly,, running up into a confused brilliancy towards the centre,,,'.

5. The Handbook: "Celestial Objects for Common Telescopes"

*Canes Venatici:*

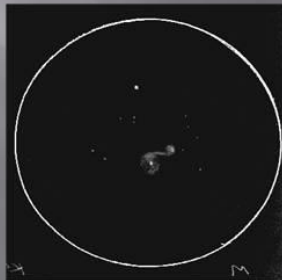


M51 - 6" RC f5, StellaCam-3 90 seconds



13" Dob f4.5, 12.5mm

M3



8" Dob f4.5, 16mm



6" RC f9, StellaCam-3 25 seconds

**Canis Major:**


For this constellation Webb declares about its bright star Sirius – “This is the leader of the host of heaven, a glorious object,,,”. Webb then goes on to mention various other historical naked-eye observations of the Dog Star, along with telescopic discovery of it being double.

He then lists 36 double and variables, and two deep-sky objects, both open clusters.

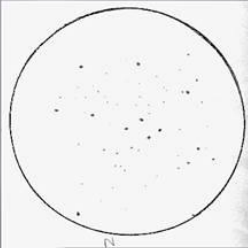
The first is M41, where Webb states: “Superb group, visible to the naked eye beneath ‘Alpha’,,,” Larger stars in curves with ruddy star near centre”. Then for the second cluster NGC2362 – “Beautiful, melting into a very rich neighborhood, as though the Galaxy were approaching us”.

5. The Handbook: “Celestial Objects for Common Telescopes”

*Canis Major:*




M41 - 80mm Refractor f6.3, StellaCam-II @ 8 seconds




10" Dob f5.6, 28mm

NGC-2362



10" Reflector & 12 mm EP.




8" SCT f6.3 (SC-3 @ 8 seconds)

**Cassiopeia:**


“Here lie a multitude of superb Galaxy fields,,,” starts off Webb’s description of Cassiopeia. He then lists 70 double and variable stars, and six deep-sky objects, all open clusters. NGC457 – “a very elegant group”, and NGC7789 – “Beautiful large faint cloud of minute stars,,, in a vast region of inexpressible splendor”. Finally M103 – which he calls a “Beautiful field”.

5. The Handbook: “Celestial Objects for Common Telescopes”

*Cassiopeia:*




(StellaCam-EX & 50mm Canon CCTV lens, @ 8 seconds)

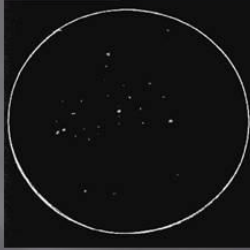


8" SCT f6.3 (SC-3 @ 8 seconds)

M103




6" RC f5, StellaCam-3 @ 8 seconds



13.1" Dob f4.5, 12.5mm

NGC457



13" Reflector & 28 mm

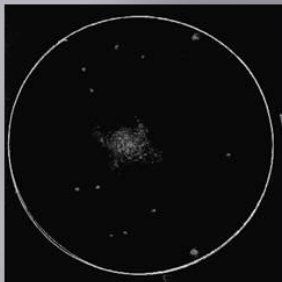
**Hercules:**

Webb notes that “Some very noteworthy telescopic objects mark this constellation, and there is very fine sweeping,,,”. Webb then lists 137 double and variable stars! After that is a short list of 4 deep-sky objects, along with several interesting star-chain asterisms.

The highlight of the chapter is M13 – the Great Hercules Cluster. “Superb globular cluster,,, finest of its class, just visible to the naked eye,,, spangled with glittering points,,, Ad Smyth describes it as “extensive and magnificent mass of stars with the most compressed part densely compacted and wedged together under unknown laws of aggregation,,, Herschel detected “hairy-looking curvilinear branches”, also noted by E of Rosse who “noticed this spiral tendency, detected also three dark lanes or rifts in its interior”. Also noted is M92 – “very fine cluster, though not the equal to M13, less resolvable, intensely bright in centre”.

And planetary nebula NGC6210 – “Very bright, small, not sharply defined.

5. The Handbook: “Celestial Objects for Common Telescopes”



M13 - 10" Dob f5.6, 18mm

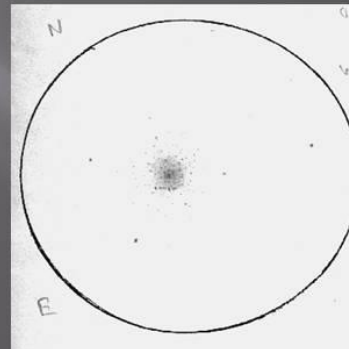
*Hercules:*



M92 - 8" SCT f10, StellaCam-Ex 2.5 seconds



6" RC f9, StellaCam-3 25 seconds



13" Dob f4.5, 12mm

**Lyra:**

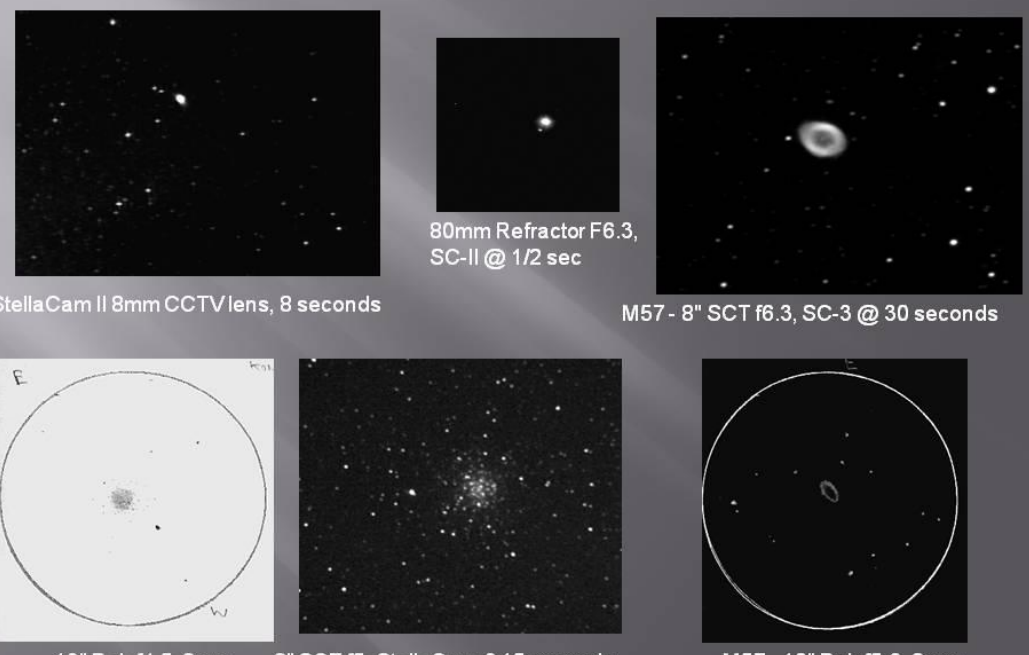
Webb calls it “one of the most remarkable constellations, full of beautiful fields adorned by one of the great leaders of the firmament”, of course referring to the star Vega, which is “inferior to Sirius only”. Next Webb listed 61 double and variable stars, with special mention of doubles Beta Lyrae and Epsilon Lyrae the ‘Double-Double’. For nebulas and clusters, Webb states “Sweeping between Lyra and Cygnus exceedingly fine”, but then he only lists two deep-sky objects!

The globular cluster M56: “Faintish, perhaps resolvable, in a fine field and rich region”.

And the Ring Nebula M57: “ The only annular nebula accessible by common telescopes,,, easily found,,, somewhat oval and bears magnifying well”.

5. The Handbook: “Celestial Objects for Common Telescopes”

Lyra:



StellaCam II 8mm CCTV lens, 8 seconds

80mm Refractor F6.3, SC-II @ 1/2 sec

M57 - 8" SCT f6.3, SC-3 @ 30 seconds

13" Dob f4.5, 8mm

8" SCT f5, StellaCam-3 15 seconds

M57 - 10" Dob f5.6, 8mm



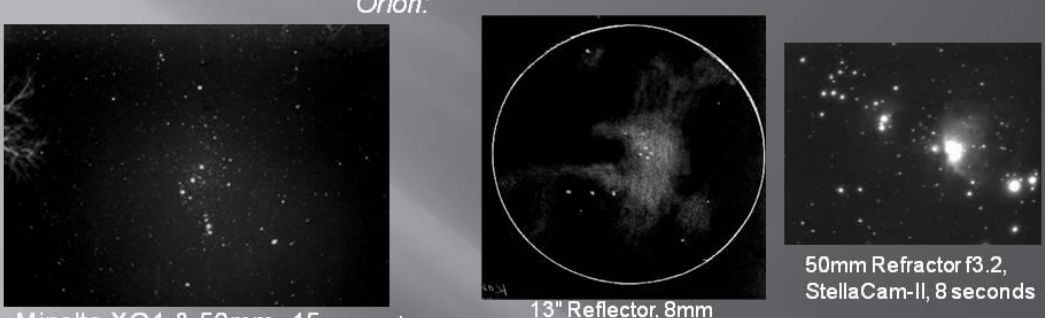
**Orion:**

Webb describes Orion as “The finest constellation in the heavens,,, its position is very suitable for English observers,, Sweeping in many parts most beautiful”. He notes its two bright stars Rigel and Betelgeuse, which he quotes Lassell saying “A most beautiful and brilliant gem! ,, a rich topaz,,,”. After listing 71 double and variable stars, there are 5 deep-sky objects notes, with M42, the Great Orion Nebula taking up three pages of notes. “One of the most wonderful objects in the heavens, readily visible to the naked eye,,, The telescope shows an irregular branching mass of greenish haze, in some directions moderately well defined where the dark sky penetrates it in deep openings, in others melting imperceptibly away,,, in the densest part, four stars form a trapezium,,,”.

Webb also quotes Herschel as seeing “a curdling liquid, or surface strewed over with flocks of wool, or the breaking up of a mackerel sky”. Webb goes on to discuss how all the “strange discrepancies in the drawings of the best observers hands” may indicate the “most curious nebula in the heavens” was in a state of change.

5. The Handbook: “Celestial Objects for Common Telescopes”

Orion:

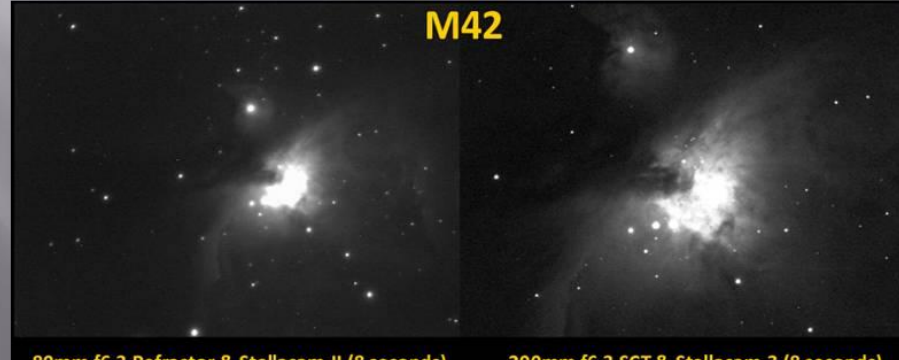


Minolta XG1 & 50mm, 15 seconds

13" Reflector, 8mm

50mm Refractor f3.2, StellaCam-II, 8 seconds

**M42**



80mm f6.3 Refractor & StellaCam-II (8 seconds)

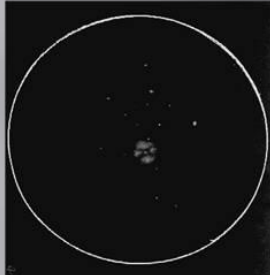
200mm f6.3 SCT & StellaCam-3 (8 seconds)

**Sagittarius:**


For Webb, Sagittarius was almost too low on the horizon: “The stars of this constellation have a beautiful effect about the Southern horizon near the place where the Galaxy passes from sight in our latitude, but they are apt to be obscured by haze”. But even with the difficulties of observing such a low altitude constellation, Webb lists off 53 doubles and variables, along with nine deep-sky objects. There’s the Trifid Nebula, M20 – “Very curious object, where three ways meet, dark rifts through nebulosity,,, a Grand region.” Then the Lagoon Nebula, M8 – “Splendid Galaxy object, visible to the naked eye,,, a bright coarse triple star, followed by a resolvable luminous mass including two starry centres and a loose bright cluster, a very fine combination”. Finally, the globular cluster M22 – “Beautiful bright cluster, very interesting,,, a valuable object for common telescopes”.

5. The Handbook: “Celestial Objects for Common Telescopes”


*Sagittarius:*



M20 - 8" Reflector & 16 mm EP.

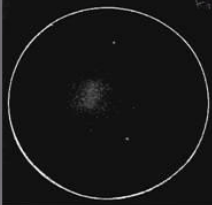


StellaCam II 8mm CCTV Lens, 8 seconds




6" RC f5 (SC-3 @ 30 seconds)

M22



8" Dob f4.5, 8mm




M8 - 6" RC f5, StellaCam-3 90 seconds

**Taurus:**

“An interesting constellation containing two beautiful groups familiar to the first beginner in stellar astronomy – the Pleiades and Hyades”. After a discussion by Webb on how many individual stars various observers have seen in the Pleiades, he goes on to list 102 double and variable stars, including the bright gold star Aldebaran. Four deep-sky objects are listed. Webb continues the discussion on the Pleiades, M45 showing diffused nebulosity – “a faint, extended, somewhat triangular haze, involving Merope,,,”, that was debated as being an illusion, but confirmed by recent photography. Also mentioned is the Crab Nebula, M1, and how “its accidental re-discovery by Messier while following a comet in 1758 led to the formation of the earliest catalogue of nebula”. Webb describes it as “granular, not resolved”.


5. The Handbook: “Celestial Objects for Common Telescopes”

*Taurus:*

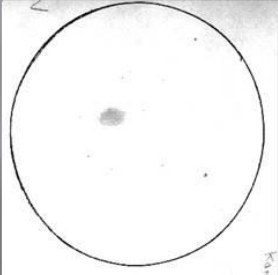


M1 - 6" RC f5, StellaCam-345 seconds


*Pleiades*




M45 - StellaCam-II & 24mm CCTV lens, 8 seconds



8" Dob f4.5, 16mm



6" RC f5, SC-3 25 seconds



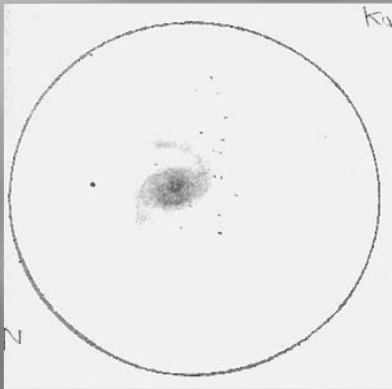
50mm Refractor f3.2, StellaCam-II 8 seconds

**Triangulum:**

Webb describes Triangulum with a single sentence – “An ancient constellation, including several good objects”. After only 19 double and variable stars, Webb describes the only deep-sky object, M33, the Pinwheel Galaxy, “Very large, faint, ill-defined, visible from its great size. A very curious object, only fit for low powers, being actually imperceptible from want of contrast,,, E of Rosse saw it full of knots, found spiral arrangements,,,”.

5. The Handbook: “Celestial Objects for Common Telescopes”

*Triangulum:*



8" Reflector & 16 mm EP



M33 - 6" RC f5 (SC-3 @ 45 seconds)

**Ursa Major:**


Webb notes this “familiar constellation offers a large field to the persevering observer,,, extends far beyond the region occupied by the seven stars,,” Webb goes on to mention how curious it was that the North American Indians also seen a bear in these stars long before European contact.

Webb then lists 62 variable and double stars, calling out the naked-eye pair of Mizar and Alcor, along with a dozen deep-sky objects. He lumps the two galaxies M81 and M82 together with “81 bright, with a vivid nucleus,,, and “82 (Bodes Nebula), a curious narrow curved ray, two nuclei and sparkling,,,”.

Also listed is the Owl nebula, M97 – “Large pale planetary nebula, very remarkable object,,, softened edge, faintly bicentral”, and quotes the E of Rosse - “two large perforations, and an indistinct spiral structure”, where the ‘Owl’ name comes from.

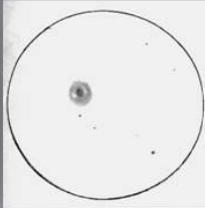
5. The Handbook: “Celestial Objects for Common Telescopes”

*Ursa Major:*

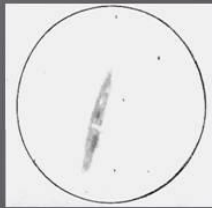


M81 & M82 - 50mm Refractor & SC-II 8 seconds

M81




M82




13.1" Dob f4.5, 12mm


M81



M82



M97



6" RC f9, StellaCam-3 30 seconds

6" RC f5, SC-3 90 seconds

6" RC f5, SC-3 60 seconds



**Vulpecula**

Webb calls this region – “Grand sweeping”. After listing 42 double and variable stars, Webb closes out his tour of the constellations with one final nebula that he feels “,,will not be found disappointing” – the Dumbbell Nebula, M27. “in a rich field we find two oval hazy masses in contact,,,”, seen by Herschel containing “dark notches filled in and made protuberant by faint luminosity, converting the whole figure into an ellipse”.

5. The Handbook: “Celestial Objects for Common Telescopes”

*Vulpecula:*



8" SCT f6.3, StellaCam-3 60 seconds



10" Dob f5.4, 27mm

## 6) Webb's Legacy

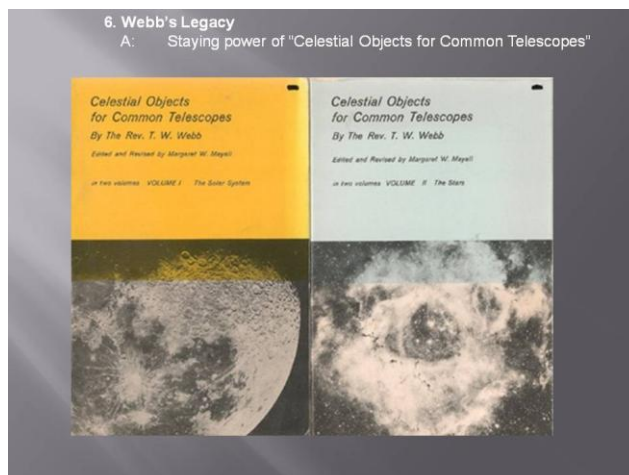
### A: Staying power of "Celestial Objects for Common Telescopes".

T.W. Webb's observing guide book is regarded as the first popular astronomy book of its type that was geared toward the common amateur using small telescopes of the time that were affordable.

(the earlier observing book that it superseded – Admiral Smyth's "Cycle of Celestial Objects" was aimed toward the more well-to-do semi-professional astronomer of the day). First published in 1859, Webb's "Celestial Objects for Common Telescopes" has gone thru six revised editions, with the last major in 1917.

Then in 1962, it was republished by Dover Publications. Volume 1 on the solar system and telescope instruments was left unchanged from the 1917 edition, (except for the inclusion of two appendices containing 1962 planetary data), and is mostly of historical interest only.

Volume 2 which focuses on the constellations listed in alphabetical order and their nearly 4000 deep-sky objects, is also mostly unchanged except for additions of new appendices for precession from 1920 to year 2000, with individual tables for double-stars, variable stars, and clusters and nebula for Epoch 2000. Also, there's a list of modern constellation names, along with new photographic illustrations from the late 1950's up to 1962.



Webb's book continued to be the 'go-to' manual for amateurs, and was only finally dethroned by Robert Burnham's three volume "Celestial Handbook" published in 1966. Burnham's guidebook focused exclusively on observing deep-sky objects, with the constellations listed by alphabetical order, split among the three books. Embedded within each constellation were numerous historical tidbits on its origins, along with various observational descriptions and discussions on state-of-the-art astronomical knowledge of various deep-sky objects. Burnham's, with its modern style of writing and large lists of new deep-objects to observe greatly appealed to the amateur astronomer of the early 1970's who now had much larger 'common telescopes' available to use, and it soon replaced Webb's handbook both on the bookcase and in the field. (Burnham's was later replaced in the late 1990's by the "Night Sky Observers Guide" by George Kepple and Glen Saner).

For us in the 21<sup>st</sup> century, what keeps Webb's guidebook relevant are the interesting visual observations made by Webb and various other observers of the different types of deep-sky objects.

## B: The Webb Society (founding and mission, current activities)

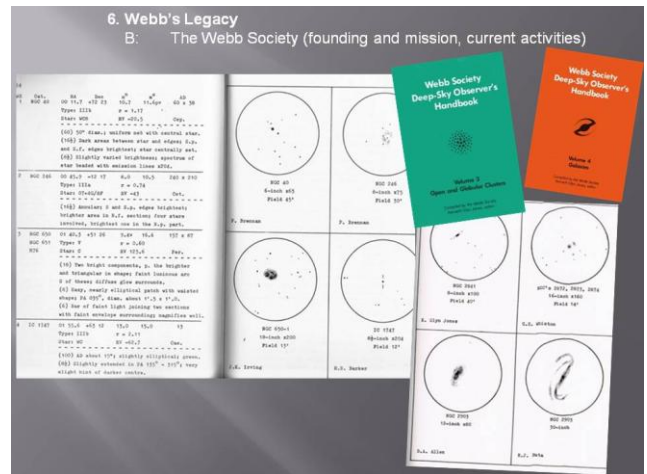
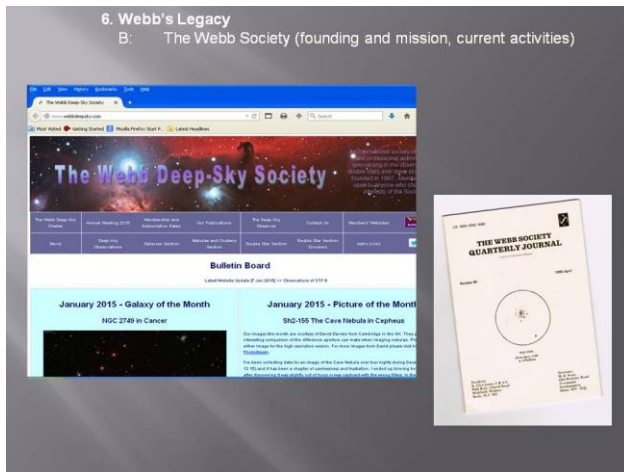
The Webb Society was founded in 1967 and named in honor of the Reverend Thomas William Webb, an eminent amateur astronomer who has been an inspiration to generations of amateur astronomers. The main purpose of the Society is to advance education in the science of astronomy by encouraging amateur observations of double stars, nebulae, star clusters and other astronomical objects. And also, to provide a forum where amateur astronomers can communicate and publish the results of their work. The Society's motto is "Caeli scrutamur plagas" - we sweep the regions of the heavens.

Observational activities of the Society are coordinated in various sections each under the control of a director with wide experience in the particular field.

Currently the sections are:

- Double Stars
- Nebulae and Clusters
- Galaxies
- Southern Sky.

Results of the Society's work are published quarterly in the 'Deep Sky Observer/ Quarterly Journal'. Members are encouraged to contribute to the publications and are given guidance on how to present their work. Membership in the society is open to any person anywhere in the world.



In the late 1970's, the Society began publishing a series of observer's manuals as an update and extension of Rev Webb's original work for the amateur telescope equipment that is available today.

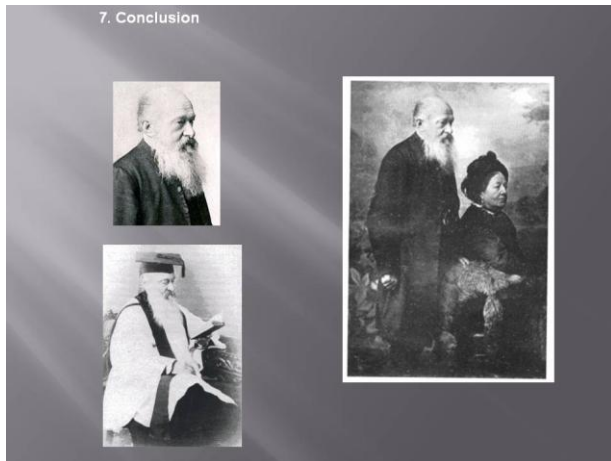
- Volume 1 - Double Stars (1975)
- Volume 2 - Planetary and Gaseous Nebulae (1978)
- Volume 3 - Open and Globular Clusters (1980)
- Volume 4 - Galaxies (1981)
- Volume 5 - Clusters of Galaxies (1982)
- Volume 6 - Anonymous Galaxies (1987)
- Volume 7 - The Southern Sky (1987)
- Volume 8 - Variable Stars (1990)
- Volume 9 - Webb Society Star Atlas

Each handbook contains observing methods and updated theoretical information on the class of objects covered by the individual handbook. The core of each handbook is a catalogue of the deep sky objects that can be observed by the amateur astronomer, which included detailed eyepiece sketches and observing descriptions that are more representative of what experienced amateurs see in their telescopes. Over the years, as newer guidebooks became available, both in print and online, the Webb Society books have joined the list of older out-of-date publications, but they are still useful to amateurs looking for new observing ideas.

## 7) Conclusion

Thomas's longtime companion and wife, Henrietta, (who he had married in 1843) passed away from a stroke on Sept 7<sup>th</sup> 1884. Eight months later, in declining health and still in grief for his wife, Thomas William Webb passed away on May 19<sup>th</sup> 1885 in Hardwick at the age of 79. He was known locally as a genial parish priest, who faithfully served the members of his church, but was also internationally acclaimed for his astronomical observing skills.

During the period of Webb's adult life in the mid-to-late nineteenth century, with the availability of inexpensive books, charts, and 'competently built' telescopes, there was an explosion of interest in popular sciences among the educated public, and Thomas Webb filled a much needed role as a promoter of astronomical observing for the serious amateur astronomers.



T.W. Webb wrote numerous astronomical articles for various magazines of the day, (around 194), which helped popularized the hobby of astronomy among the general public. He also privately corresponded with a large number of amateur astronomers, giving them advice regarding their instruments and observing techniques, with the letters frequently containing illustrated technical equipment drawings or sketches of astronomical objects.

His handbook, "Celestial Objects for Common Telescopes" had become famous among multiple generations of amateur astronomers around the world in providing them with information as to what to look for with the small telescopes of the time, and how to use those telescopes to find those objects up in the 'heavens' above. Even after 155 years, this Victorian era observational information is still enjoyable today! And the books give an interesting glimpse into the scientific understanding of the universe in the late 19th century.

It's this lasting legacy of the Rev Thomas W Webb, as to why he is known today as: 'The Father of Amateur Astronomy'.

## Credits

"Nature" – June 1885.

"Report of the Council" – Royal Astronomical Society: 66<sup>th</sup> Annual General Meeting, February 1886.

"Celestial Objects for Common Telescopes" by Rev Thomas W Webb.

"The Stargazer of Hardwicke" by Janet & Mark Robinson.

"Webb Society Deep-Sky Handbook – Volume 1: Double Stars", by Kenneth Glyn Jones.

Google and Wikipedia.