DOWNLOAD PDF HERSCHEL ON THE MOON

Chapter 1 : Herschel (lunar crater) - Wikipedia

Herschel is a lunar impact crater located just to the north of the walled plain Ptolemaeus. They are one of three named after a Herschel on the Moon and being one of three craters in the solar system named after the famed astronomer William Herschel.

In addition to intelligence, diligence, and acuity, he possessed substantial personal creativity and boundless energyâ€”as exemplified by his remarkable musical career. His wildly outre convictions about extraterrestrial life, however, would embarrass even a hardened UFO nut. As a scientist, Herschel could not prove his speculations about life beyond earthâ€”and therefore he did not publish such ideas in scientific journals. His philosophical essays and his personal correspondences the latter of which only fully came to light in , however show how keenly he believed in extraterrestrial life and civilization and how tirelessly he looked for aliens. William Herschel and his sister and collaborator Caroline Herschel Since the moon is the closest celestial body to earth and the most easily observed with a telescope, it was a natural place for Herschel to begin his search for extraterrestrials. Perhaps, then on the Moon every town is one very large Circus? By reflecting a little on the subject I am almost convinced that those numberless small Circuses we see on the Moon are the works of the Lunarians and may be called their Townsâ€¦. Now if we could discover any new erection it is evident an exact list of those Towns that are already built will be necessary. But this is no easy undertaking to make out, and will require the observation of many a careful Astronomer and the most capital Instruments that can be had. However this is what I will begin. Yet Herschel was so devoted to his Lunarians that he came perilously close to inventing findings. As he carefully scrutinized the moon for other living things night after night, imperfect optics and his yearning for alien life sometimes got the best of him. Here is a drawing of a shadow which he perceived might be a forest. Herschel did not believe that the moon was the only other sphere to support lifeâ€”he believed that life could be found on all heavenly bodies which are spherical from self-gravitation. And Herschel really meant all such bodies: Its similarity to the other globes of the solar system â€¦leads us to suppose that it is most probably inhabited â€¦by beings whose organs are adapted to the peculiar circumstances of that vast globe. Hershel thought that all of the stars in the universe were like the sunâ€”densely habited and supporting an orbiting network of habited worlds. Couched in boyish exuberance and 18th century idioms, they almost seem risible. Yet Herschel was right about exoplanets and about galaxies beyond our own. He seems to have been the only person of his time to begin to apprehend how vast the universe really is. However, even with our robot probes and our telescopes, the solar system is shockingly unknown. And beyond the solar system, the large exoplanets we currently know about are strange hot giants we did not expect. The preliminary results of the Kepler mission are beginning to trickle in, and they hint at a profusion of planets and other things much more heterogeneous and odd than cosmic uniformitarians might expect. If blogging has taught me one thing, it is not to underestimate Sir Frederick William Herschel a conclusion I hardly anticipated. So while I chuckle about the perfectly circular cities of the lunarians, I am also keeping an open mind about the immense number of unknown worlds. NGC , a spiral galaxy discovered by Herschel which he mistakenly believed was a nebula which he mistakenly thought were like galaxies Also as I suspect Sir William felt , I am sad about how many things are simply unknowable.

Chapter 2 : Sir William Herschelâ€™s Belief in Extraterrestrial Life | ferrebeekeeper

William Herschel and Mary had one child, John, born at Observatory House on 7 March William's personal background and rise as man of science had a profound impact on the upbringing of his son and grandchildren.

The ESA long-term policy-plan "Horizon ", produced in , called for a High Throughput Heterodyne Spectroscopy mission as one of its cornerstone missions. The mission concept was redesigned from Earth-orbit to the Lagrangian point L2, in light of experience gained from the Infrared Space Observatory [2. After being put out to tender in , industrial activities began in This figure includes spacecraft and payload, launch and mission expenses, and science operations. The supply of helium on board the spacecraft was a fundamental limit to the operational lifetime of the space observatory; [8] it was originally expected to be operational for at least three years. It operated as an integral field spectrograph , combining spatial and spectral resolution. The Herschel-SPIRE instrument was built by an international consortium comprising more than 18 institutes from eight countries, of which Cardiff University was the lead institute. NASA developed and built the mixers, local oscillator chains and power amplifiers for this instrument. Both SVMs are of octagonal shape and, for both, each panel is dedicated to accommodate a designated set of warm units, while taking into account the heat dissipation requirements of the different warm units, of the instruments, as well as the spacecraft. All spacecraft units on the SVM are redundant. Power subsystem[edit] On each spacecraft, the power subsystem consists of the solar array , employing triple-junction solar cells , a battery and the power control unit PCU. It is designed to interface with the 30 sections of each solar array, provide a regulated 28 V bus, distribute this power via protected outputs and to handle the battery charging and discharging. For Herschel, the solar array is fixed on the bottom part of the baffle designed to protect the cryostat from the Sun. The three-axis attitude control system maintains this baffle in direction of the Sun. It is designed to fulfil the pointing and slewing requirements of the Herschel and Planck payload. The Herschel spacecraft is three-axis stabilized. The absolute pointing error needs to be less than 3. The main sensor of the line of sight in both spacecraft is the star tracker. The lid had to remain closed until the telescope was well into space to prevent contamination. A formal handover of the overall responsibility of Herschel was declared from the programme manager Thomas Passvogel to the mission manager Johannes Riedinger. The initial confirmation and later verification via help from ground-based telescopes of a vast hole of empty space, previously believed to be a dark nebula , in the area of NGC shed new light in the way newly forming star regions discard the material which surround them. It had been previously reported by the Odin team. Unlike warm water vapor, previously detected near forming stars, cold water vapor would be capable of forming comets which then could bring water to inner planets, as is theorized for the origin of water on Earth. According to one of the scientists, "The lines are becoming more and more blurred between comets and asteroids. ESA managers considered two options: Place Herschel into a Heliocentric orbit where it would not encounter Earth for at least several hundred years. Guide Herschel on a course toward the Moon for a destructive high-speed collision that would help in the search for water at a lunar pole. Herschel would take about days to reach the Moon.

Chapter 3 : NASA - Examining Herschel Crater

Herschel Moon was born to John William Moon and Maude Moon (born Sanders). John was born on January 27 , in Indiana. Herschel had 12 siblings: Lerabelle Watson Ruggles (born Moon), Jerry Moon and 10 other siblings.

The Great Moon Hoax of Great Moon Hoax temples To say that we, as a human race, can be a gullible bunch may be met with rebuttal and dismissiveness. However when you take in to account some of the hoaxes that have been thrown upon us, and a large number of people who wholeheartedly believe without question, the argument stands. And there is no finer example than the Great Moon Hoax of Locke was working for another penny paper covering a sensational trial when Day approached him to cover the same for him. Realizing he could make good money from long stories re-published in pamphlets, Day set about getting Locke to write more serial articles, and around the same time, hired Locke as co-editor of The Sun. Locke wasted no time in coming up with the idea of an astronomical satire detailing the discovery of life on the moon. Herschel was a renowned British astronomer, and the article began with his discovery, through a super telescope, of planets in other solar systems, vast dimensions, and the claim that he had solved or corrected nearly every leading problem of mathematical astronomy. Then, as if a side note, the article proclaimed that Herschel had discovered life on the moon. Then the series took readers through many fanciful accounts, including the discovery of trees, oceans, and beaches. And of course, life on the moon, like Bison, goats, and even bat-like winged humanoids who built temples. The author credited for the articles was a fictitious Dr. It was written that Grant was now the traveling companion of John Herschel, and that the series was in conjunction with a more scientific account submitted by Herschel to the Royal Society. The story spread like wildfire, with other notable newspapers and magazines giving extensive coverage. It has been said that 60, of the pamphlets sold, but only 16 exist today as collectors items. While there were plenty of skeptics in the media, looking into accounts of people who lived at the time it is apparent that the majority of the public accepted the reality of life on the moonâ€¦ initially. That quickly changed however as more and more credible newspapers took the articles to task. In fact, The Sun would continue its successful publishing until Richard Adams Locke It was long debated who the true author of the series should be credited too, as Locke initially denied writing it. About a year later in , Locke left The Sun and started working at New Era, the latest penny paper. He would go on to write that the lunar narrative was intended to be a satire against the unchecked influence of religion upon science. Locke would leave journalism in for a job with the Customs Service. When he died in , his obituary ran on the front page of The Sun, which said in part: The story was told with a minuteness of detail and dexterous use of technical phrases that not only imposed upon the ordinary reader but deceived and puzzled men of science to an astonishing degree.

Chapter 4 : The Great Moon Hoax of â€“ Legends of America

W Herschel: XX. Thus, when we see, on the surface of the moon, a great number of elevations, from half a mile to a mile and an half in height, we are.

See Article History Alternative Title: He discovered the planet Uranus, hypothesized that nebulae are composed of stars, and developed a theory of stellar evolution. He was knighted in Following the same profession, the boy played in the band of the Hanoverian Guards. After the French occupation of Hanover in , he escaped to England , where at first he earned a living by copying music. But he steadily improved his position by becoming a music teacher, performer, and composer, until in he was appointed organist of a fashionable chapel in Bath , the well-known spa. Combining obstinacy with boundless energy, William was not content to observe the nearby Sun, Moon , and planets, as did nearly all astronomers of his day, but was determined to study the distant celestial bodies as well, and he realized he would need telescopes with large mirrors to collect enough light, larger, in fact, than opticians could supply at reasonable cost. He was soon forced to grind his own mirrors. They were ground from metal disks of copper, tin, and antimony in various proportions. In his ambitions outran the capacities of the local foundries, and so he prepared to cast molten metal into disks in the basement of his own home; but the first mirror cracked on cooling, and on the second attempt the metal ran out onto the flagstones, after which even he accepted temporary defeat. His later and more successful attempts produced ever-larger mirrors of superb qualityâ€”his telescopes proved far superior even to those used at the Greenwich Observatory. He also made his own eyepieces, the strongest with a magnifying power of 6, times. At Bath, he was helped in his researches by his brother Alexander, who had come from Hanover, and his sister, Caroline, who was his faithful assistant through much of his career. News of this extraordinary household began to spread in scientific circles. He made two preliminary telescopic surveys of the heavens. Then, in , during his third and most complete survey of the night sky, William came upon an object that he realized was not an ordinary star. It proved to be the planet Uranus , the first planet to be discovered since prehistoric times. William became famous almost overnight. He could thus give up music and devote himself exclusively to astronomy. Some astronomers thought they were nothing more than clusters of innumerable stars the light of which blends to form a milky appearance. Others held that some nebulae were composed of a luminous fluid. He was convinced that other nebulae would eventually be resolved into individual stars with more powerful instruments. This encouraged him to argue in and that all nebulae were formed of stars and that there was no need to postulate the existence of a mysterious luminous fluid to explain the observed facts. Nebulae that could not yet be resolved must be very distant systems, he maintained; and, since they seem large to the observer, their true size must indeed be vastâ€”possibly larger even than the star system of which the Sun is a member. Theory of the evolution of stars. In order to interpret the differences between these star clusters, it was natural for William to emphasize their relative densities, which he did by contrasting a cluster of tightly packed stars with others in which the stars were widely scattered. These formations showed that attractive forces were at work: In other words, a group of widely scattered stars was at an earlier stage of its development than one whose stars were tightly packed. Thus, William made change in time, or evolution, a fundamental explanatory concept in astronomy. In he developed a cosmogonyâ€”a theory concerning the origin of the universe: Turning then to the system of stars of which the Sun is part, he sought to determine its shape on the basis of two assumptions: Both of these assumptions he subsequently had to abandon. Other astronomers, cut off from the evidence by the modest size of their telescopes and unwilling to follow William in his bold theorizing, could only look on with varying degrees of sympathy or skepticism. In the Herschels moved to Old Windsor, and the following year to nearby Slough, where William spent the rest of his life. Night after night, whenever the Moon and weather permitted, he observed the sky in the company of Caroline, who recorded his observations. On overcast nights, William would post a watchman to summon him if the clouds should break. Often in the daytime, Caroline would summarize the results of their work while he directed the construction of telescopes, many of which he sold to supplement their income. His largest instrument, too cumbersome for regular use, had a mirror made of speculum metal, with a diameter of

centimetres 48 inches and a focal length of 12 metres 40 feet. Completed in , it became one of the technical wonders of the 18th century. He seems not to have considered the possibility of marriage until after the death in of a friend and neighbour, John Pitt, whose widow, Mary, was a charming and pleasant woman. Before long, William proposed marriage; he and Mary would live in the Pitt house, while Caroline would remain at Observatory House in Slough. Theory of the structure of nebulae. He was able, however, to adapt his earlier theory to this new evidence by concluding that the central star he had observed was condensing out of the surrounding cloud under the forces of gravity. In he extended his cosmogony backward in time to the stage when stars had not yet begun to form out of the fluid. For example, in dealing with the structural organization of the heavens, he assumed that all stars were equally bright, so that differences in apparent brightness are an index only of differences in distances. Throughout his career he stubbornly refused to acknowledge the accumulating evidence that contradicted this assumption. He also cataloged double stars â€”pairs of stars that appear close together in space, and measurements of the comparative brightness of stars. He observed that double stars did not occur by chance as a result of random scattering of stars in space but that they actually revolved about each other. His 70 published papers include not only studies of the motion of the solar system through space and the announcement in of the discovery of infrared rays but also a succession of detailed investigations of the planets and other members of the solar system. Learn More in these related Britannica articles:

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In his diary, under the date , Herschel has the following entries: He had from early years inherited from his father a taste for what might be called star-gazing, and along with this he had had from youth a bent towards mathematical as well as philosophical research. Even in his busiest years, he never ceased to read and study in his leisure hours. During the first years of his stay in England, his foremost care was to master the English language. Next he acquired Italian, which he believed to be essential to his profession. From this he passed on to the study of Latin and Greek. The latter language, however, he dropped, "as leading me too far from my other favourite studies by taking up too much of my leisure. The theory of music being connected with mathematics induced me very early to read in Germany all that had been written upon the subject of harmony; and when, not long after my arrival in England, the valuable book of Dr. So enthusiastic did he become that, in his own words, "I resolved to take nothing upon trust, but to see with my own eyes all that other men had seen before". Caroline Herschel , who at that time had no interest whatever in telescopic astronomy, tells us: At length, Herschel completed this instrument, 4 feet long, which magnified forty times. With this, he records, he observed Jupiter and its satellites. Afterwards he made other two refractorsâ€”15 and 30 feet long respectively. Herschel soon discovered for himself the great weakness of the refracting telescopeâ€”the long tubes which were then necessary in order to counteract the effect of chromatic aberration. Finding the long tubes almost "impossible to manage," he turned his attention to the reflecting telescope, and in September hired a two-foot Gregorian reflector, which he found much more convenient. He decided to acquire a mirror of his own, for a tube 5 or 6 feet long. On enquiry he found there were none in the market of so large a size. He became acquainted with a Quaker resident in Bath, who had in his leisure hours amused himself with efforts at the construction of mirrors. This individual had apparently failed in his endeavoursâ€""his knowledge," Herschel noted, in that indifferent English which characterised him throughout his lifetime, "being very confined"â€”and had decided to dispose of his tools and half-finished mirrors. Herschel accordingly purchased his stock, and plunged at once into the work of telescope-making. All through the winter and the following spring and summer, Herschel laboured at his new line of work, in the midst of his busy professional life. By 21st October, he had succeeded in casting mirrors for a two-foot reflector, and by the middle of December, "it became necessary to think of mounting these mirrors". The success of this instrument encouraged Herschel to construct other telescopes of the Newtonian form, and at length he succeeded in making a 7-foot telescope with "many different object mirrors". The memoirs of his sister give us some idea of his unflagging energy. A tube and stand were set up in a handsomely-furnished drawing room; while Alexander Herschel, the younger brother, who had now come to reside in Bath, erected a huge turning-machine in a bedroom, for turning eye-pieces and grinding glasses. This was once the case when, in order to finish a seven-foot mirror, he had not taken his hands from it for sixteen hours together. The work went on during the remainder of his stay in Bath. How he contrived to continue the construction of telescopes while making long-continued surveys of the heavensâ€”all in the spare time which he was able to snatch from his busy career as a professional musicianâ€”must always remain more or less of a mystery. His earliest observations were on the Moon and planets. In he made a number of examinations of the lunar surface, and three years later was engaged in measuring the heights of the lunar mountains. From onwards, he carefully observed Saturn, and in April, , he commenced to make sketches in pen and ink of the markings on the surface of Mars, and in the following year of those on Jupiter. His attention was not confined to the members of the Solar System, and in he commenced a series of observations on the variable star, Omicronâ€”or Miraâ€”Ceti. From this parallax, the distance of a star is determined. Herschel was particularly interested in the problem, and made several attempts to solve it, but was unsuccessful. It was not until that the first determinations of stellar parallax were made. At the same time he executed his first review of the heavens with his 7-foot Newtonian reflector. The review only extended to the first four magnitudes: Herschel soon became known to the cultured public of Bath, not only as a

prominent musician, but also as an amateur astronomer of considerable eminence. His introduction to literary and scientific circles in the town was a somewhat unconventional one. In his diary, under the date December, , there occurs the following entry: While I was looking into the telescope, a gentleman coming by the place where I was stationed stopped to look at the instrument. When I took my eye off the telescope, he very politely asked if he might be permitted to look in, and expressed great satisfaction at the view. Next morning, the gentleman, who proved to be Dr. Herschel not only attended these, but contributed a considerable number of papersâ€"thirty-one in allâ€"in the course of the next two years. One or two of these dealt with astronomical subjects, such as the height of the lunar mountains, and the variable star Mira Ceti; but most of them were on metaphysical and physical subjects, such as "The Utility of Speculative Enquiries," "On the Existence of Space," and "Experiments in Light". On 17th August, , he commenced his second review of the heavens. On Tuesday, 13th March, , in the course of this review, he jotted down in his journal the following note, in somewhat doubtful English: On Saturday, 17th March, he wrote, "I looked for the comet or nebulous star, and found that it is a comet, for it has changed its place". By Monday, the 19th, he found that the supposed comet "moves according to the order of the signs, and its orbit declines but little from the ecliptic". The discovery was soon communicated to the Observatories of Greenwich and Oxford. Maskelyne , the Astronomer-Royal, wrote to Dr. Watson on the 4th April that he had observed the strange object, "very different from any comet I ever read any description of or saw". On 23rd April he wrote to Herschel: Messier, the most famous observer of comets, commenced observations on 16th April, and his example was followed by Lalande , Lemonnier, and other astronomers in France and by Bode in Germany. Efforts were made to calculate its orbit, on the assumption that it actually was a cometary body. These efforts were fruitless. On 8th May De Saron announced that the "comet" was much more distant from the Sun than had been supposed. Laplace independently reached a similar conclusion. Meanwhile, Lexell, the St. Petersburg mathematician, who happened to be in England when the discovery was made, informed the St. Later it transpired that the planet had been observed no fewer than seventeen times between and by able observers such as Flamsteed, Bradley, Lemonnier, and Meyer, all of whom failed to differentiate it from an ordinary star, either in regard to its appearance or its motion. Lemonnier, indeed, had the discovery almost within his grasp, for he observed the planet on four consecutive days in January, , but his carelessness robbed him of the distinction of detecting a new celestial body. It was the first planetary discovery within the memory of manâ€"Mercury, Venus, Mars, Jupiter, and Saturn having been known from prehistoric times. More wonderful still, the discovery had been made, not by the leading astronomers of the day, but by an unknown amateur. At one bound Herschel leaped from obscurity to fame. The Royal Society of London awarded him the Copley Medal in November, , and elected him a Fellow in December, exempting him from payment of subscriptions, as a mark of esteem. The discovery had caused a stir in still higher circles, and on 10th May, , Herschel was informed that the Kingâ€" George III â€"expected to make his acquaintance. On 8th May he left Bath to join his friend, Dr. In a letter to his sister, dated 25th May, he stated that he had had an audience of the King, to whom he presented a drawing of the Solar System. On 2nd July Herschel noted in his diary: Herschel was now seriously considering the possibility of abandoning the profession of music and devoting himself to astronomy. There can be little doubt that after George III expressed interest in the discovery, Herschel indicated that he was anxious to be made "independent of music". The appointment is referred to by Herschel himself in his journal in the following terms: Watson, was informed as to the exact amount, he exclaimed, "Never bought monarch honour so cheap". Writing to her nephew, Sir John Herschel , in April, , Caroline attributed the "close bargains" made between George III and her brother to the "shabby, mean-spirited advisers" of the King. Undoubtedly Herschel made a pecuniary sacrifice in accepting the offer, but "the prospect of entering again on the toils of teaching, etc," his sister tells us, "which awaited my brother at home, appeared to him an intolerable waste of time". The meagreness of the allowance has been often commented upon, but it must be remembered, in justice to George III, that, firstly, the purchasing power of money was considerably greater then than now, and, secondly, the regular duties attached to the office were at that time very few. As one of his biographers has well said, "The astronomer of Slough was the gift to science of the poor mad king".

Chapter 6 : William Herschel - Wikipedia

Herschel told himself that he wasn't going to study the Sun and Moon like every other astronomer did. He instead, thought of trying to look for different celestial bodies. The problem was he would need.

In the Hanoverian Guards regiment, in whose band Wilhelm and his brother Jakob were engaged as oboists, was ordered to England. As the threat of war with France loomed, the Hanoverian Guards were recalled from England to defend Hanover. Although his older brother Jakob had received his dismissal from the Hanoverian Guards, Wilhelm was accused of desertion [8] for which he was pardoned by George III in In addition to the oboe, he played the violin and harpsichord and later the organ. Herschel moved to Sunderland in when Charles Avison immediately engaged him as first violin and soloist for his Newcastle orchestra, where he played for one season. In "Sunderland in the County of Durh: He was head of the Durham Militia band from to As the organ was still incomplete, he showed off his versatility by performing his own compositions including a violin concerto , an oboe concerto and a harpsichord sonata. He was well-positioned to engage with eighteenth-century "philosophical Gentleman" or philomaths , of wide-ranging logical and practical tastes. He would spend up to 16 hours a day grinding and polishing the speculum metal primary mirrors. He relied on the assistance of other family members, particularly his sister Caroline and his brother Alexander, a skilled mechanical craftsperson. Astronomers of the era expected that changes over time in the apparent separation and relative location of these stars would provide evidence for both the proper motion of stars and, by means of parallax shifts in their separation, for the distance of stars from the Earth. The latter was a method first suggested by Galileo Galilei. He soon discovered many more binary and multiple stars than expected, and compiled them with careful measurements of their relative positions in two catalogues presented to the Royal Society in London in double or multiple systems [27] and systems. John Michell of Thornhill published work in on the distribution of double stars, [31] and in on "dark stars" black holes , that may have influenced Herschel. He waited until in Catalogue of new Nebulae, nebulous Stars, planetary Nebulae, and Clusters of Stars; with Remarks on the Construction of the Heavens to announce the hypothesis that the two stars might be "binary sidereal systems" orbiting under mutual gravitational attraction , a hypothesis he confirmed in in his Account of the Changes that have happened, during the last Twenty-five Years, in the relative Situation of Double-stars; with an Investigation of the Cause to which they are owing. His theoretical and observational work provided the foundation for modern binary star astronomy; [16]: Herschel originally thought it was a comet or a stellar disc, which he believed he might actually resolve. There he continued his work as an astronomer and telescope maker. Excluding duplicated and "lost" entries, Herschel ultimately discovered over objects defined by him as nebulae. He arranged his discoveries under eight "classes": This catalogue was later edited by John Dreyer, supplemented with discoveries by many other 19th century astronomers, and published in as the New General Catalogue abbreviated NGC of deep sky objects. The NGC numbering is still the most commonly used identifying label for these celestial landmarks. Following the death of their father, William suggested that Caroline join him in Bath, England. In , Caroline was first introduced to astronomy by her brother. She also copied astronomical catalogues and other publications for William. During this time, William was attempting to observe and then record all of the observations. He had to run inside and let his eyes readjust to the artificial light before he could record anything, and then he would have to wait until his eyes were adjusted to the dark before he could observe again. Caroline became his recorder by sitting at a desk near an open window. William would shout out his observations and she would write them down along with any information he needed from a reference book. In , William built her a small Newtonian reflector telescope, with a handle to make a vertical sweep of the sky. Between and , she made an independent discovery of M NGC , which is the second companion of the Andromeda Galaxy. During the years â€”, she discovered or observed eight comets. Five of her comets were published in Philosophical Transactions of the Royal Society. Her appointment made her the first female in England to be honored with a government position. Caroline has been referred to as a bitter, jealous woman who worshipped her brother and resented her sister-in-law for invading her domestic life. With the arrival of Mary, Caroline lost her managerial and social responsibilities in

the household, and with them much of her status. Caroline destroyed her journals between the years to , so her feelings during this period are not entirely known. When her brother and his family were away from their home, she would often return to take care of it for them. In later life, Caroline and Lady Herschel exchanged affectionate letters. She worked to verify and confirm his findings as well as putting together catalogues of nebulae. Towards the end of her life, she arranged two-and-a-half thousand nebulae and star clusters into zones of similar polar distances. She did this so that her nephew, John, could re-examine them systematically. Eventually, this list was enlarged and renamed the New General Catalogue. This design was subject to chromatic aberration , a distortion of an image due to the failure of light of different component wavelengths to converge. Optician John Dollond tried to correct for this distortion by combining two separate lenses, but it was still difficult to achieve good resolution for far distant light sources. The concave mirror gathered more light than a lens, reflecting it onto a flat mirror at the end of the telescope for viewing. A smaller mirror could provide greater magnification and a larger field of view than a convex lens. This "front view" design has come to be called the Herschelian telescope. Any flaw would result in a blurred image. Because no one else was making mirrors of the size and magnification desired by Herschel, he determined to make his own. He was assisted by his sister Caroline and other family members. Caroline Herschel described the pouring of a ft focal length mirror: My poor brother fell, exhausted with heat and exertion, on a heap of brickbats. Before the second casting was attempted, everything which could ensure success had been attended to, and a very perfect metal was found in the mould, which had cracked in the cooling. This had to be done repeatedly, whenever the mirrors deformed or tarnished during use. The foot telescope was, at that time, the largest scientific instrument that had been built. It was hailed as a triumph of "human perseverance and zeal for the sublimest science". As it was, it took five years, and went over budget. The tube was large enough to walk through. Mirror blanks were poured from Speculum metal , a mix of copper and tin. They were almost 4 feet in diameter and weighed 1, pounds. When the first disk deformed due to its weight, a second thicker one was made with a higher content of copper. The mirrors had to be hand polished, a painstaking process. A mirror was repeatedly put into the telescope and removed again to ensure that it was properly formed. When a mirror deformed or tarnished, it had to be removed, repolished and replaced in the apparatus. A huge rotating platform was built to support the telescope, enabling it to be repositioned by assistants as a sweep progressed. A platform near the top of the tube enabled the viewer to look down into the tube and view the resulting image. Mimas , only miles in diameter. The foot would not be improved upon until the Victorians developed techniques for the precision engineering of large, high-quality mirrors. Nonetheless, the foot caught the public imagination. It inspired scientists and writers including Erasmus Darwin and William Blake , and impressed foreign tourists and French dignitaries. King George was pleased. It is to be considered a close modern approximation rather than an exact replica. A modern glass mirror was used, the frame uses metal scaffolding and the tube is a sewer pipe. The telescope was shown on the programme in January and stands on the Art, Design and Technology campus of the University of Derby where it will be used for educational purposes. Most of his observations took place in a period of low solar activity, the Dalton minimum , when sunspots were relatively few in number. This was one of the reasons why Herschel was not able to identify the standard year period in solar activity. According to one study, the influence of solar activity can actually be seen on the historical wheat market in England over ten solar cycles between and

Chapter 7 : Mimas (moon) - Simple English Wikipedia, the free encyclopedia

2. Herschel proposed the idea that the craters on the moon were artificially built by lunar inhabitants. This circular craters functioned as towns that could harness solar energy.

Crater Chains Crater chains are unusual features composed of linear rows of small craters. One of the best examples is Catena Davy , "Davy Chain" left C G9, which extends some 50 km and contains over 20 craterlets, most with diameters under 2 km. It was probably created by near simultaneous multiple impacts, similar to the Shoemaker-Levy-9 comet impact on Jupiter in Another nice example is Catena Abulfeda C J10 which extends for km. Double craters created by near simultaneous double impact are a related feature. Other crater chains appear to have been caused by secondary impacts of ejecta thrown out by large impacts. Vallis Capella E L9 cuts through crater Capella. There are a number of crater chain features associated with the Copernicus impact. Rays Prominent ray systems are associated with a number of the younger craters. Over great expanses of time, ray systems are obliterated by more recent impacts, continual micro-impacts and space weathering by solar radiation. Tycho S G13 has the most prominent ray system, with rays extending at least 1, km from the impact. The ray system associated with Copernicus W E7 is also substantial, extending some km from the crater. Proclus E M6 has a very asymmetric km ray system, indicative of a low angle of impact. An unusual linear km ray system is associated with Messier A E M8 on Mare Fecunditatis, resulting from an almost glancing impact. Mountains Unlike the picture scanned from my "How and Why Wonder Book of the Moon", lunar mountains have relatively gentle slopes. They are extremely old, most being formed billions of years ago by mechanisms very different to those on Earth. Lesser ranges are associated with other impact basins. The central mountains within larger craters were formed by the rebound from the crater-forming impact. Both single and multiple peaks occur and they are not always at the centre of the crater. They can rise to significant heights above the surrounding crater floor. There are no mountains resulting from plate techtonics. The long extinct lunar volcanoes are shallow domes rather than towering mountains. Volcanic Domes Volcanic domes are amongst my favourite lunar features. Most are located on Oceanus Procellarum. Due to their gentle slopes, they are only visible at local sunrise and sunset, and quickly vanish. They represent a nice imaging challenge. A number of small domes are associated with Vallis Schroteri NW D5, itself a dramatic volcanic feature. Several domes are located on other maria. Faults Lunar faults give rise to several types of lunar features: Wrinkle Ridges that occur on basaltic plains, a type of lunar valley or rille called Graben, and isolated faults. Rupes Recta left on Mare Nubium is an example of a "normal" isolated fault. It is km in length and has a width of 2. Other examples include Rupes Cauchy and Rupes Altai. Isolated faults are relatively rare. Lunar faults did not arise due to plate tectonics as in the case of many terrestrial faults. Rather they resulted from stresses in the lunar crust often associated with the cooling, shrinkage and subsidance of basaltic impact basins. Wrinkle Ridges Wrinkle ridges are a common feature on basaltic mare deposits, such is Mare Imbrium and Mare Tranquilitatis, and on a few basalt flooded craters such as Wargentin. They formed as the freshly filled basalt basins subsided under their own weight. Compression buckled the surface, resulting in long raised folds and ridges that often extend for long distances. Wrinkle ridges are thrust faults. Due to their low profile - they are usually only m in height, they can only be seen at local lunar sunrise and sunset. However the basaltic plain can be at quite different elevations on either side of the ridge as a consequence of the buckling process. Sometimes Wrinkle ridges follow the outline of ancient craters buried under basaltic plains, for example Lamont. Valleys and Rilles Superficial resemblance is the only thing the ancient lunar valleys have in common with terrestial valleys. A handful of larger depressions are called valleys "vallis" , whilst the more plentiful smaller examples are called rilles or rimae. There are several different types. The largest sinuous rille is Vallis Schroteri NW C5 right , which is km in length, up to 1 km in depth and 10 km across at its widest point. By any measure it is a large valley. For comparison, the Grand Canyon is km length, up to 29 km across and up to 1. Other sinuous rilles include Rima Birt and Rima Hadley Straight rilles are graben, flat valleys formed when the crust between two adjacent faults subsided right. Graben often occur at the edges of marie, where they have resulted from subsidance of the basalt causing faults to open up in long

tracks. They can also occur in older cratered terrain. The prominent km Vallis Alpes N H2 is probably a flooded graben. Vallis Alpes Alpine Valley right mentioned above is an example shaped by several processes. The large structure was formed between two parallel faults when the crust was pulled apart. The flat floor and narrow sinuous rille running down its length was formed by subsequent lava flooding from Mare Imbrium and Mare Frigoris. The sinuous rille is good observing challenge. A very different formation process is exemplified by Vallis Rheita SE L13, which probably resulted from a destructive rain of secondary impacts associated with the formation of the Mare Nubium impact. It is essentially a highly eroded crater chain. Vallis Capella mentioned in Crater Chains above is a less highly eroded example.

Chapter 8 : Robert Herschel Moon () - Find A Grave Memorial

The Herschel Space Observatory was a space observatory built and operated by the European Space Agency (ESA). It was active from to , and was the largest infrared telescope ever launched, carrying a metre (ft) mirror and instruments sensitive to the far infrared and submillimetre wavebands (Âµm).

Bright-walled craters, with floors and surroundings about 20 percent darker than the steep crater walls, are notable in this view. Herschel Crater kilometers, 80 miles wide and some of the smaller craters seen in this mosaic show relatively dark markings along the lower portion of their crater walls marked in green in the annotated version of the image. Cassini scientists interpret this darkening as evidence for the gradual concentration of impurities from evaporating icy materials in areas where the dark impurities slide slowly down the crater wall. There, bright ice is baked away by the sun and the vacuum of space. At Herschel, the edge where the darker regions contact the crater floor is interrupted by an extensive hummocky area. Scientists believe the hummocky texture came from the flow of melted ice that occurred during the impact that created the crater. That melt filled the bottom of the crater around the central peak. Dark streaks are seen making their way down the sides of some craters marked red in the annotated version , often originating from pockets of dark contaminants embedded just below the rim of the crater wall. The pockets themselves likely represent small, pre-existing, dark-floored craters that were buried by the blanket of material that was thrown out from the newer impact that created the crater rim. The material from a newly exposed dark layer eventually moves downslope and forms a streak. Streaks are sometimes seen starting from the floors of smaller, dark-floored craters perched along rims of larger craters. The interior of Herschel Crater is significantly less cratered than the continuous blanket of ejected material that extends radially outward from its rim. The violent meteor impact that excavated Herschel blasted pulverized debris, including massive chunks of ice, upward. The fallback of this ejected material over the crater rim created a thick debris blanket and dotted it with secondary craters. These are common processes that should occur on bodies without atmospheres throughout the solar system. Cassini scientists also continue to study a color anomaly on Mimas. Cassini came within about 9, kilometers 5, miles of Mimas during its flyby on Feb. An eighth image, taken with the wide-angle camera on the same flyby, is used to fill in the lower right of the mosaic. The images were re-projected into an orthographic map projection. This view looks toward the hemisphere of Mimas that leads in its orbit around Saturn. Mimas is kilometers miles across. This view is centered on terrain at 10 degrees south latitude, degrees west longitude. The view was obtained at a distance of approximately 30, kilometers 19, miles from Mimas and at a sun-Mimas-spacecraft, or phase, angle of 27 degrees. Image scale is meters feet per pixel. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. For more information about the Cassini-Huygens mission visit http: The Cassini imaging team homepage is at http:

Chapter 9 : Sir William Herschel and Life on the Moon | Astronomy at the Equator

The moon's large, distinguishing crater, Herschel, is seen on the map at left. The map is an equidistant (simple cylindrical) projection and has a scale of meters (feet) per pixel at the equator.