{{NoteTA|zh:千米;zh-hans:千米;zh-hant:公里|zh-hans:米;zh-hant:公尺|zh-hans:千克;zh-hant:公斤|zh-hans:哈勃空间望远镜; zh-hant:哈柏太空望遠鏡; zh-hk:哈勃太空望遠鏡}}

{{Minor Planet |

| chinesename=谷神星

| name=Ceres

| image=Ceres a cores.jpg

| caption=

| discoverer=[[皮亞齊]]

| discovery\_date=[[1801年]][[1月1日]]

| designations=A899 OF; 1943 XB

| category=[[矮行星]]

| epoch=[[2006年]][[3月6日]]

| jd=2453200.5

| semimajor=2.765 [[天文單位|AU]]

| perihelion=2.544 AU

| aphelion=2.988 AU

| eccentricity=0.080

| period=1681.243 [[日]] (4.60 [[儒略年|a]])

| inclination=10.587°

| asc\_node=80.409°

| arg\_peri=73.231°

| mean\_anomaly=129.983°

| speed=17.91 km/s

| dimensions=959.2×932.6 km

| mass=9.445{{e|20}} [[千克]]

| density=2.05 克/立方厘米

| gravity=0.26 米/秒²

| escape\_velocity=0.51 km/s

| rotation=0.3781日

| spectral\_class=[[小行星|G型小行星]]

| abs\_mag=3.34

| albedo=0.113

| temperature=約 230 K}}

'''穀神星'''（Ceres）或'''小行星1'''是[[太陽系]]中最小的、也是唯一一顆位於[[小行星帶]]的[[矮行星]]。由[[意大利]]人[[朱塞普•皮亞齊|皮亞齊]]發現，並於[[1801年]][[1月1日]]公佈。<ref name="hoskin"/>

穀神星的直徑約有950公里，是[[小行星帶]]之中最大最重的物體，並佔了小行星帶的三分之一質量。<ref name=Michalak2000/>近期的發現表明它是近球體的，並不像[[重力]]更小的物體有著不規則形狀。<ref name=Li2006/>穀神星表面可能由冰和各種含[[氫]]礦物如[[粘土]]。<ref name=Rivkin2006/>Ceres appears to be differentiated into a [[Rock (geology)|rock]]y [[core (geology)|core]] and ice [[mantle (geology)|mantle]].<ref name=Thomas2005/>它可能會擁有一個液態水[[海洋]]，使它成爲一個尋找[[地外生物]]的重要目標。<ref name=Moomaw/>穀神星也有可能存在著一層包含水氣的稀薄大氣層。<ref name=Ahearn1992/>

Ceres' [[apparent magnitude]] ranges from 6.7 to 9.3, hence at its brightest is still too dim to be seen with the naked eye.<ref name="Pasachoff1983"/> On [[September 27]], [[2007]], [[NASA]] launched the [[Dawn Mission]] space probe to explore [[4 Vesta|Vesta]] (2011-2012) and Ceres (2015).<ref name=Russel2006/>

==發現==

在[[火星]]和[[木星]]之間可能有一顆未知行星的理論最先由[[Johann Elert Bode]]於1768年提出。<ref name="hoskin"/>他主要是根據[[提丟斯-波得定則]]做出論點，提丟斯-波得定則現在已不被使用，原先由[[戴維·提丟斯]]於1766年提出。<ref name=Hogg1948>{{cite journal|last=Hogg|first=Helen Sawyer|title=The Titius-Bode Law and the Discovery of Ceres|journal=Journal of the Royal Astronomical Society of Canada|volume=242|pages=241-246|year=1948| url=http://adsabs.harvard.edu/abs/1948JRASC..42..241S|accessdate=2007-12-09}}</ref><ref name="hoskin"/>根據定則，這顆行星的軸心應該接近2.8 [[天文單位|AU]]。<ref name=Hogg1948/>[[威廉·赫歇爾]]在1781年發現了[[天王星]]<ref name="hoskin"/>使人們更加相信這個定則。而在1800年，24位有經驗的天文學家一同合作，並對未知行星作出有條理的搜尋工作。<ref name="hoskin"/><ref name=Hogg1948/>這個團隊由[[Franz Xaver, Baron von Zach|Franz Xaver von Zach]]領導。雖然他們並沒有發現穀神星，但是他們後來發現了另外幾個大[[小行星]]。<ref name=Hogg1948/>

[[Image:Piazzi Cerere.jpg|thumb|left|200px|Piazzi's Book ''"Della scoperta del nuovo pianeta Cerere Ferdinandea"'' outlining the discovery of Ceres]]

穀神星終於在[[1801年]][[1月1日]]被[[朱塞普·皮亞齊]]發現，當時他正在搜尋一顆由[[Francis Wollaston (1737-1815)|Francis Wollaston]]列爲Mayer 87的恆星，因爲這顆恆星並不在[[Tobias Mayer|Mayer's]]的恆星列表中所述的位置上。<ref name="hoskin">{{cite web|last=Hoskin|first=Michael|date=June 26, 1992|url=http://www.astropa.unipa.it/HISTORY/hoskin.html|title=Bodes' Law and the Discovery of Ceres|publisher=Observatorio Astronomico di Palermo "Giuseppe S. Vaiana"|accessdate=2007-07-05 }}</ref>他並沒有發現恆星，而是一顆移動的星體，他當初還以爲是一顆[[彗星]]。<ref name=Forbes1971>{{cite journal|last=Forbes|first=Eric G.|title=Gauss and the Discovery of Ceres|journal=Journal for the History of Astronomy|volume=2|pages=195-199|year=1971| url=http://adsabs.harvard.edu/abs/1971JHA.....2..195F|accessdate= 2007-12-08}}</ref>皮亞齊總共觀測了穀神星24次， 直到[[2月11日]]，他患了病而暫停了他的觀測。他把發現於[[1801年]][[1月24日]]在他寫給和他一起合作的天文學家們（其中包括[[米蘭]]的[[Barnaba Oriani]]）的信裏面發佈。他描述穀神星為一顆彗星但是“由於它的行動如此緩慢和規則，我曾經數次覺得它應該是一些比彗星要好的東西”（Since its movement is so slow and rather uniform, it has occurred to me several times that it might be something better than a comet）。<ref name="hoskin" />在4月，皮亞齊在[[巴黎]]把所有觀測記錄寄給了Oriani、[[Johann Elert Bode|Bode]]和[[Jérôme Lalande|Lalande]]。這些資料發佈於1801年9月的''Monatliche Correspondenz''中。<ref name=Forbes1971/>

不久後，穀神星的位置明顯地發生了變化，主要由於地球的軌道運動。然後，它又運行得太接近太陽光輝，因此一直到年尾其他的天文學家都不能確認皮亞齊的觀測結果。不過經過這麽長的時間，人們已經很難預測它的準確位置。爲了找回穀神星，當時只有24歲的[[高斯]]研究出了一種有效率的方法預計它的軌道。<ref name=Forbes1971/>在短短的幾個星期以内，他準確地預測了它的路徑，並把結果寄給了[[Franz Xaver, Baron von Zach]]，''Monatliche Correspondenz''的編輯。在[[1801年]][[12月31日]]，von Zach和[[奧伯斯]]在預測位置的附近成功找回了穀神星。<ref name=Forbes1971/>

==命名==

皮亞齊最初建議命名為''Ceres Ferdinandea''，來源於[[羅馬神話]]中的穀物女神[[刻瑞斯]]及[[西西里]]王國的斐迪南國王。<ref name="hoskin"/><ref name=Forbes1971/>但“Ferdinandea”不為其他國家接受，因此沒再使用。另外，該天體在[[德國]]曾被稱為「[[赫拉]]」，但為時不長。<ref>{{cite book|author=Foderà Serio, G.; Manara, A.; Sicoli, P.|editor=W.F. Bottke Jr., A. Cellino, P. Paolicchi, and R.P. Binzel|year=2002 |chapter=Giuseppe Piazzi and the Discovery of Ceres|title=Asteroids III|publisher=University of Arizona Press|pages=17-24|location=Tucson, Arizona| url=http://www.lpi.usra.edu/books/AsteroidsIII/pdf/3027.pdf|format=PDF }}</ref>在希臘，它被稱爲Δήμητρα（[[Demeter]]），是Ceres同等意思的希臘文。在英文裏，Demeter是另一顆小行星（[[小行星1108]]）的名字。由於這個名字並不常用，there is no consensus as to the proper adjectival form of the name, although the [[Nonce word|nonce forms]] ''Cerian'' and ''Cerean''<ref name=Moomaw>{{cite web|author=Bruce Moomaw|title=Ceres As An Abode Of Life| date= [[July 2]], [[2007]]|url=http://www.spaceblogger.com/reports/Ceres\_As\_An\_Abode\_Of\_Life\_999.html|accessdate=2007-11-06|publisher=spaceblooger.com|date=2007-07-02}}</ref> have been used in fiction。在語法上，''Cererean''會是正確的，來源於它的[[拉丁文]][[genitive]]''Cereris''。<ref>{{cite book | last = Simpson | first = D.P. | title = Cassell's Latin Dictionary | publisher = Cassell Ltd. | date = 1979 | edition = 5 | location = London | pages = 883 | id = ISBN 0-304-52257-0|accessdate=2007-12-08}}</ref>穀神星的[[天文學符號|符號]]是一個[[鐮刀]]，（[[Image:Ceres symbol.svg|20px|Sickle variant symbol of Ceres]]），相似於[[金星]]的符號（[[Image:Venus symbol.svg|22px|金星的天文符號]]）which is the female gender symbol and Venus' hand mirror。<ref name=Forbes1971/><ref>{{cite journal|last=Gould|first=B.A.|title=On the symbolic notation of the asteroids|journal=Astronomical Journal|year=1852|volume=2|issue=34|pages=80| url=http://adsabs.harvard.edu/abs/1852AJ......2...80G| accessdate=2007-07-05}}</ref>[[元素]][[鈰]]的拉丁名稱Cerium是以穀神星命名的。<ref>{{cite web|author=Staff|url=http://www.webelements.com/webelements/elements/text/Ce/hist.html|title =Cerium: historical information|publisher=Adaptive Optics| accessdate = 2007-04-27}}</ref>元素[[鈀]]本來也以穀神星命名，可是它的發現者在鈰被命名後將之改以[[智神星]]命名。<ref>{{cite web| url=http://alchemy.chem.uwm.edu/amalgamator/features/feat2003/features.html#yag|date=[[October 30]], [[2003]]|title=Amalgamator Features 2003: 200 Years Ago|accessdate=2006-08-21}}</ref>

==地位==

[[Image:Ceres Earth Moon Comparison.png|200px|thumb|left|Ceres, the Moon and the Earth.]]

穀神星的歸類已經被變更過很多次，並且都是一些天文學家們的意見不和造成的。[[Johann Elert Bode]]相信穀神星就是那顆在[[火星]]和[[木星]]之間、距離太陽4.19億公里（2.8 [[天文單位|AU]]）的“失蹤的[[行星]]”<ref name="hoskin"/>穀神星被賦予一個行星的符號，在更多小行星被發現之前，穀神星（還有[[智神星]]、[[婚神星]]和[[灶神星]]）有將近半個世紀都以行星之名列在天文學書表之中。<ref name="hoskin"/><ref name=Forbes1971/>

然而當其他的天體陸續在同一範圍内被發現，人們慢慢了解到穀神星只是許許多多相似類型天體的第一位而已。<ref name="hoskin"/>Sir [[William Herschel]] coined in 1802 the term ''asteroid'' ("star-like") for such bodies, <ref name=Hilton>{{cite web| url=http://aa.usno.navy.mil/faq/docs/minorplanets.php|first=Dr.J.L.|last=Hilton|authorlink=James L. Hilton|title=When Did the Asteroids Become Minor Planets?|year=[[September 17]] [[2001]]|accessdate=2006-08-16}}</ref> writing "they resemble small stars so much as hardly to be distinguished from them, even by very good telescopes"。<ref>{{cite web| url=http://links.jstor.org/sici?sici=0261-0523%281802%2992%3C213%3AOOTTLD%3E2.0.CO%3B2-R|first=William|last=Herschel| title=''Observations on the two lately discovered celestial Bodies.''|year=[[May 6]] [[1802]]}}</ref>作爲第一顆被發現的小行星，它以現代[[小行星編號]]系統被列爲小行星1穀神星<ref name=Hilton/>

在2006年關於[[冥王星]]到底是不是“行星”的辯論引發了穀神星是否應被歸進行星類別的問題。<ref>{{cite web|last=Battersby|first=Stephen|date=[[August 16]], [[2006]]|url=http://space.newscientist.com/article/dn9762|title =Planet debate: Proposed new definitions|publisher=New Scientist|accessdate = 2007-04-27}}</ref><ref>{{cite news|first=Steve| last=Connor|title=Solar system to welcome three new planets|publisher=NZ Herald|date=[[August 16]], [[2006]]

|url=http://www.nzherald.co.nz/section/story.cfm?c\_id=5&ObjectID=10396493|accessdate=2007-04-27}}</ref>在[[國際天文學聯盟]][[行星定義|定義行星]]之前，一個行星會被定義為“一個天體符合：(a) 有足夠的質量，能以自身的重力克服剛體力，因此能呈現[[流體靜力平衡]]的形狀（接近圓球體）；(b)在軌道上圍繞一顆[[恆星]]公轉，而且不是一顆恆星或[[衛星]]。“<ref>{{cite web|author=Owen Gingerich ''et al''.|date =[[August 16]], [[2006]]|url=http://www.iau.org/iau0601.424.0.html|title =The IAU draft definition of "Planet" and "Plutons"|publisher =IAU|accessdate = 2007-04-27}}</ref>若然依照這種定義，穀神星將會是從太陽按次序的第五顆行星。<ref>{{cite web|author=Staff Writers|date =[[August 16]], [[2006]]| url=http://www.spacedaily.com/reports/The\_IAU\_Draft\_Definition\_Of\_Planets\_And\_Plutons\_999.html|title= The IAU Draft Definition Of Planets And Plutons|publisher= SpaceDaily|accessdate=2007-04-27}}</ref>但是，這並沒有被承認，並且同時一個新定義於[[2006年]][[8月24日]]生效：一顆行星符合"(a)和(b)，而且必須將鄰近軌道上的天體清除。”根據這樣的定義，穀神星就不是一顆行星（因爲它在[[小行星帶]]上的軌道佈滿了千千萬萬個小行星），並且現在歸為“[[矮行星]]”（同時還有冥王星和[[鬩神星]]）。它是否還是小行星並未説明。<ref>{{cite web |url=http://www.iau.org/Q\_A2.415.0.html|title=Question and answers 2|publisher=IAU|accessdate=2008-01-31}} — Q: What is Ceres? "Ceres is (or now we can say it was)" - but note it then talks about "other asteroids" crossing Ceres' path.</ref>天文學裏存在著[[小行星帶彗星]]等的雙重身份天體，而且屬於一顆矮行星也不代表不能擁有雙重身份。<ref>{{cite web |url=http://cfa-www.harvard.edu/mpec/K06/K06R19.html |title=MPEC 2006-R19 : EDITORIAL NOTICE |author=T. B. Spahr |publisher=Minor Planet Center |date=[[2006-09-07]] |quote=the numbering of "dwarf planets" does not preclude their having dual designations in possible separate catalogues of such bodies. |accessdate=2008-01-31}}</ref>

==物理特性==

[[Image:Moon and Asteroids 1 to 10.svg|thumb|left|Size comparison: the first 10 minor planets profiled against Earth's [[Moon]]. Ceres is far left.]]

[[Image:Ceres Rotation.jpg|thumb|200px|[[Hubble Space Telescope]] images of Ceres, taken in 2003/4 with a resolution of about 30&nbsp;km. The nature of the bright spot is uncertain.]]

穀神星是迄今[[小行星帶]]中最大的天體。<ref name=Rivkin2006/>[[古柏帶]]中包含著更大的天體，包括[[冥王星]]、[[創神星]]和[[厄耳枯斯]]，而在[[黃道離散天體]]中的[[鬩神星]]是所有小行星中最大的。<ref name="Stansberry 2007">{{cite journal|last=Stansberry|first=J.| coauthors=Grundy, W.; Brown, M.; et.al.|title=Physical Properties of Kuiper Belt and Centaur Objects: Constraints from Spitzer Space Telescope|url=http://arxiv.org/abs/astro-ph/0702538v1|date=[[5 November]] [[2007]]|accessdate=2007-12-08}}</ref>

穀神星的質量的測量可以由觀測它對其它小行星的影響得知。<ref name=Michalak2000/>不同觀測者的不同結果會有少許的差異。<ref name=Kovacevic2007>{{cite journal|last= Kovacevic|first=A.|coauthors=Kuzmanoski, M.|title=A New Determination of the Mass of (1) Ceres|journal=Earth, Moon, and Planets|volume=100|pages=117-123|year=2007|doi=10.1007/s11038-006-9124-4|url=http://adsabs.harvard.edu/abs/2007EM&P..100..117K|accessdate=2007-12-08}}</ref>而2008年最近三次數據的平均數為9.4{{e|20}}公斤。<ref name="Carry2007"/>以這樣的質量，穀神星會佔據太陽系所有小行星估計總共3.0 ± 0.2 {{e|21}}公斤的三分之一，<ref name="Pitjeva2005" />並是[[月球]]質量的4%。它的大小和質量使它能保持一個接近球體的形狀，<ref name="Thomas2005"/>近似於流體靜力平衡。在對比下，其他大型的小行星如[[智神星]]、<ref name=Carry2007>{{cite web|last=Carry|first=B.|coauthors=Kaasalainen, M.; Dumas, C.; et.al.|title=Asteroid 2 Pallas Physical Properties from Near-Infrared High-Angular Resolution Imagery|journal=ISO|accessdate=2007-11-05|year=2007|publisher= ESO Planetary Group: Journal Club|url= http://www.sc.eso.org/santiago/science/PlanetaryGroup/journal\_club/slides/ESO.JournalClub-2007.08.14-BenoitCARRY.pdf| format=pdf}}</ref>[[婚神星]]<ref name=Kaasalainen2002>{{cite journal|last=Kaasalainen|first=M.|coauthors=Torppa, J.; Piironen, J.|title=Models of Twenty Asteroids from Photometric Data|journal=Icarus|volume=159|pages=369-395|year=2002|doi=10.1006/icar.2002.6907| url=http://www.rni.helsinki.fi/~mjk/IcarPIII.pdf|format=pdf}}</ref>和[[灶神星]]<ref name=Thomas1997>{{cite journal|last=Thomas|first=Peter C.|coauthors=Binzel, Richard P.; Gaffey, Michael J.; et.al.|title=Impact Excavation on Asteroid 4 Vesta: Hubble Space Telescope Results|journal=Science|volume=277|pages=1492-1495|year=1997| doi=10.1126/science.277.5331.1492|url=http://www.sciencemag.org/cgi/content/abstract/277/5331/1492|accessdate=2007-12-08}}</ref>的形狀則較爲不規則。

穀神星的表面成分和[[C-型小行星]]差不多，<ref name=Rivkin2006/>但是仍然存在著一些差別。它[[IR]][[光譜]]中一些主要的礦物也存在於水化礦物中，顯示出它内部存在著客觀數量的水。其他可能的表面成分包括富含[[鐵]]的[[粘土]]（[[cronstedtite]]）和[[碳化物]]（[[dolomite]]和[[siderite]]），它們都是[[carbonaceous chondrite]]隕石中常見的礦物。<ref name=Rivkin2006/>碳化物和粘土的光譜特徵在其他C型小行星裏並不會出現。<ref name=Rivkin2006>{{cite journal|last=Rivkin|first=A.S.|coauthors=Volquardsen, E.L.; Clark, B.E.|title=The surface composition of Ceres:Discovery of carbonates and iron-rich clays|journal=Icarus|volume=185|pages=563-567|year=2006|doi=10.1016/j.icarus.2006.08.022| url=http://irtfweb.ifa.hawaii.edu/~elv/icarus185.563.pdf|format=pdf|accessdate=2007-12-08}}</ref>有時穀神星也會被歸類於[[G-型小行星]]。<ref name=Parker2002/>

{{TransH}}

穀神星的表面相對地較暖。它面向[[太陽]]的一面在[[1991年]][[5月5日]]的測量中估計出有235[[熱力學溫標|K]]（約-38°[[攝氏度|C]]）。<ref name="Saint-Pe1993"/>Taking into account also the [[heliocentric]] distance at the time, this gives an estimated maximum of about 239&nbsp;K at [[perihelion]]. There are some indications that Ceres may have a tenuous [[Celestial body atmosphere|atmosphere]] and water [[frost]] on the surface.<ref name=Ahearn1992>{{cite journal|last=A’Hearn|first=Michael F.|coauthors=Feldman, Paul D.|title=Water vaporization on Ceres|journal=Icarus|volume=98|pages=54-60|year=1992| doi=10.1016/0019-1035(92)90206-M|url= http://adsabs.harvard.edu/abs/1992Icar...98...54A|accessdate=2007-12-08}}</ref> [[Ultraviolet]] observations by [[IUE]] spacecraft detected statistically significant [[hydroxide]] water vapour near the Cererean north pole.<ref name=Ahearn1992/>

[[Image:Ceres Cutaway.jpg|left|thumb|250px|Diagram showing internal structure of Ceres]]

Peter Thomas of [[Cornell University]] has proposed that Ceres has a differentiated interior;<ref name="Thomas2005">{{cite journal|first=P.C|last=Thomas|coauthors=Parker J.Wm.; McFadden, L.A.; et.al.|title=Differentiation of the asteroid Ceres as revealed by its shape|year=2005|journal=Nature|volume=437|pages=224-226|doi=10.1038/nature03938| url=http://adsabs.harvard.edu/abs/2005Natur.437..224T|accessdate=2007-12-09}}</ref> its [[oblateness]] appears too small for an undifferentiated body, which indicates that it consists of a rocky core overlain with an icy [[Mantle (geology)|mantle]].<ref name=Thomas2005/> This mantle of thickness from 120 to 60&nbsp;km could contain 200 million cubic kilometres of water (16&ndash;26% of Ceres by mass; 30&ndash;60% by volume), which is more than the amount of [[fresh water]] on the Earth.<ref>{{cite news|url=http://space.com/scienceastronomy/050907\_ceres\_planet.html| title=Largest Asteroid Might Contain More Fresh Water than Earth|first=Bjorn|last=Carey| publisher=SPACE.com|date=[[7 September]], [[2005]]|accessdate=2006-08-16}}</ref>

There has been some ambiguity regarding surface features on Ceres. High resolution [[ultraviolet]] [[Hubble Space Telescope]] images taken in 1995 showed a dark spot on its surface which was nicknamed "Piazzi" in honour of the discoverer of Ceres.<ref name="Parker2002"/> This was thought to be a crater. Later [[near-infrared]] images with a higher resolution taken over a whole rotation with the [[Keck telescope]] using [[adaptive optics]] showed no sign of "Piazzi".<ref name=Keck/> However, two dark features were seen to move with the dwarf planet's rotation, one with a bright central region. These are presumably craters. More recent visible light [[Hubble Space Telescope]] images of a full rotation taken in 2003 and 2004 showed eleven recognizable surface features, the nature of which is currently unknown.<ref name=Li2006>{{cite journal|last=Li|first=Jian-Yang|coauthors=McFadden, Lucy A.; Parker, Joel Wm.|title=Photometric analysis of 1 Ceres and surface mapping from HST observations|journal=Icarus|volume=182|pages=143-160|year=2006|doi=10.1016/j.icarus.2005.12.012| url=http://www.astro.umd.edu/~jyli/publications/2006.Icar.182.143.pdf|format=pdf|accessdate=2007-12-08}}</ref><ref name="Hubbl12003-4">{{cite news| url=http://hubblesite.org/newscenter/newsdesk/archive/releases/2005/27/|title=Largest Asteroid May Be 'Mini Planet' with Water Ice|date=[[September 7]] [[2005]]|accessdate=2006-08-16|publisher=HubbleSite}}</ref> One of these features corresponds to the "Piazzi" feature observed earlier.<ref name=Li2006/> The dark albedo features seen with Keck are, however, not immediately recognizable in these images.<ref name=Keck/>

These last observations also determined that Ceres' north pole points in the direction of [[right ascension]] 19&nbsp;h 24&nbsp;min (291°), [[declination]] +59°, in the [[constellation]] [[Draco (constellation)|Draco]]. This means that Ceres' [[axial tilt]] is very small&mdash;about 3°.<ref name="Thomas2005"/><ref name=Li2006/>

==軌道==

[[Image:Ceres Orbit.svg|thumb|left|300px|Orbit of Ceres]]

Ceres follows an orbit between Mars and Jupiter, within the main [[asteroid belt]], with a period of 4.6 Earth years. The orbit is moderately inclined (''i'' = 10.6° compared to 7° for Mercury and 17° for Pluto) and moderately [[Orbital eccentricity|eccentric]] (''e'' = 0.08 compared to 0.09 for Mars).<ref name=Bowell/>

The diagram illustrates the orbits of Ceres (blue) and several planets (white/grey). The segments of orbits below the ecliptic are plotted in darker colours, and the orange plus sign is the Sun's location. The top left diagram is a polar view that shows the location of Ceres in the gap between Mars and Jupiter. The top right is a close-up demonstrating the locations of the [[pericenter|perihelia]] (q) and [[apocenter|aphelia]] (Q) of Ceres and Mars. The perihelion of Mars is on the opposite side of the Sun from those of Ceres and several of the large main belt asteroids, including [[2 Pallas]] and [[10 Hygiea]]. The bottom diagram is a perspective view showing the inclination of the orbit of Ceres compared to the orbits of Mars and Jupiter.

In the past, Ceres had been considered to be the largest member of an [[asteroid family]].<ref name=Cellino>A. Cellino ''et al''. "Spectroscopic Properties of Asteroid Families", in ''Asteroids III'', p. 633-643, University of Arizona Press (2002). (Table on page 636, in particular).</ref> These groupings of asteroids share similar orbital elements, which may indicate a common origin through an asteroid collision some time in the past. Ceres, however, was found to have spectral properties different from other members of the family, and so this grouping is now called the [[Gefion family]], named after the lowest-numbered family member, [[1272 Gefion]].<ref name=Cellino/> Ceres appears to be merely an interloper in its own family, coincidentally having similar orbital elements but not a common origin.<ref name=Kelley>{{cite journal|author=Kelley, M. S.; Gaffey, M. J.|title=A Genetic Study of the Ceres (Williams #67) Asteroid Family|journal=Bulletin of the American Astronomical Society|year=1996|volume=28|pages=1097| url=http://adsabs.harvard.edu/abs/1996BAAS...28R1097K|accessdate=2007-04-27 }}</ref>

Self rotation period of Ceres is 9 hours and 4 minutes.<ref name=NSSDC>{{cite journal|author=Dr. David R. Williams|title=Asteroid Fact Sheet|year=2004|url=http://nssdc.gsfc.nasa.gov/planetary/factsheet/asteroidfact.html}}</ref>

==Origin and evolution==

The observations imply that Ceres is a remaining [[protoplanet]] – planetary embryo, which formed 4.57 billion years ago in the [[asteroid belt]].<ref name=Petit2001>{{cite journal|last=Petit|first=Jean-Marc.|coauthors=Morbidelli, Alessandro|title=The Primordial Excitation and Clearing of the Asteroid Belt|journal=Icarus|volume=153|pages=338-347|year=2001| doi=10.1006/icar.2001.6702|url=http://www.gps.caltech.edu/classes/ge133/reading/asteroids.pdf|format=pdf}}</ref> While the majority of embryos (including all lunar- to Mars-sized bodies) were ejected from the [[Solar System]] by [[Jupiter (planet)|Jupiter]] or merged with other embryos to form [[terrestrial planet]]s,<ref name=Petit2001/> Ceres survived relatively intact.<ref name=Li2006/> Two other possible remaining [[protoplanet]]s are [[2 Pallas|Pallas]] and [[4 Vesta|Vesta]],<ref name=Russel2006/> but they do not have relaxed shapes, in the case of Vesta perhaps only because it suffered a catastrophic impact after solidifying.<ref name=Thomas1997/>

Further [[Evolution (disambiguation)|evolution]] of Ceres was relatively simple. Heated by the energy of [[accretion (astrophysics)|accretion]] and, possibly, by decay of the short-lived [[radionuclide]]s like Al<sup>26</sup>, Ceres differentiated into a rocky [[core (geology)|core]] and icy [[mantle (geology)|mantle]] soon after its formation.<ref name=Li2006/><ref name=Castillo-Rogez2007>{{cite journal|last=Castillo-Rogez|first=J.C.|coauthors=McCord, T.B.; and A.G. Davis|title=Ceres: evolution and present state|journal=Lunar and Planetary Science|volume=XXXVIII|pages=2006-2007|year=2007|url= http://www.lpi.usra.edu/meetings/lpsc2007/pdf/2006.pdf|format=pdf }}</ref> This event caused resurfacing by the water [[volcanism]] and [[tectonics]] erasing many geological features. However due to the fast depletion of heat sources Ceres cooled down quickly.<ref name=Castillo-Rogez2007/> The ice on the surface gradually [[sublimation (chemistry)|sublimated]] leaving behind various hydrated minerals like [[clay]]s and [[Carbonate minerals|carbonate]]s. Now Ceres is a geologically dead body, whose surface is being sculptured only by [[impact crater|impact]]s.<ref name=Li2006/>

The existence of significant amounts of water ice in Ceres<ref name=Thomas2005/> raises a possibility that it has or had a layer of liquid water in the interior.<ref name=Castillo-Rogez2007/> This hypothetical layer is often called an [[ocean]].<ref name=Rivkin2006/> The water layer is (or was) probably located between the rocky core and ice mantle like in [[Europa (moon)|Europa]].<ref name=Castillo-Rogez2007/> The existence of the ocean is more likely if [[ammonia]] or other [[antifreeze]] is dissolved in water. The possible existence of liquid water inside Ceres makes it a target in the search for [[extraterrestrial life]].<ref name=Moomaw/>

==觀測==

When Ceres has an opposition near the perihelion, it can reach a visual magnitude of +6.7.<ref name="Pasachoff1983">{{cite book|author=Donald H. Menzel and Jay M. Pasachoff|year=1983|title=A Field Guide to the Stars and Planets|edition=2nd edition|publisher=Houghton Mifflin|pages=391|location=Boston, MA|id=ISBN 0395348358}}</ref> This is generally regarded as being just barely too dim to be seen with the [[naked eye]], but under exceptional viewing conditions a very sharp-sighted person may be able to see this [[dwarf planet]]. The only asteroids that can reach so bright a magnitude are [[4 Vesta#Visibility|4 Vesta]], and, during rare oppositions near perihelion, [[2 Pallas#Characteristics|2 Pallas]] and [[7 Iris]].<ref>Martinez, Patrick, ''The Observer's Guide to Astronomy'', page 298. Published 1994 by Cambridge University Press</ref> At a [[astronomical conjunction|conjunction]] Ceres has a magnitude of around +9.3, which corresponds to the faintest objects visible with 10×50 [[binoculars]]. It can thus be seen with binoculars whenever it is above the horizon of a fully dark sky.

Some notable observation milestones for Ceres include:

\*An [[occultation]] of a [[star]] by Ceres observed in [[Mexico]], [[Florida]] and across the [[Caribbean]] on [[November 13]] [[1984]].<ref name=Millis1987>{{cite journal|last=Millis|first=L.R.|coauthors=Wasserman, L.H.; Franz, O.Z.; et.al.|title=The size, shape, density, and albedo of Ceres from its occultation of BD+8 deg 471|journal=Icarus|volume=72|pages=507-518|year=1987|doi=10.1016/0019-1035(87)90048-0|url= http://adsabs.harvard.edu/abs/1987Icar...72..507M|accessdate=2007-12-08}}</ref>

\* [[Ultraviolet]] [[Hubble Space Telescope]] images with 50&nbsp;km resolution taken in 1995.<ref>{{cite web| url=http://www.swri.org/press/ceres.htm| title=Observations reveal curiosities on the surface of asteroid Ceres| accessdate = 2006-08-16}}</ref><ref name="Parker2002">{{cite journal|last=Parker|first=J.W.|coauthors=Stern, Alan S.; Thomas Peter C.;et.al.|title=Analysis of the first disk-resolved images of Ceres from ultraviolet observations with the Hubble Space Telescope|year=2002|journal=The Astrophysiscal Journal|volume=123|pages=549-557| url=http://adsabs.harvard.edu/abs/2002AJ....123..549P|doi=10.1086/338093|accessdate=2007-12-08}}</ref>

\* [[Infrared]] images with 30&nbsp;km resolution taken with the [[Keck telescope]] in 2002 using [[adaptive optics]].<ref name=Keck>{{cite web|author=Staff|date=[[October 11]], [[2006]]|url=http://www.adaptiveoptics.org/News\_1006\_2.html|title=Keck Adaptive Optics Images the Dwarf Planet Ceres|publisher=Adaptive Optics|accessdate=2007-04-27}}</ref>

\* Visible light images with 30&nbsp;km resolution (the best to date) taken using [[Hubble Space Telescope|Hubble]] in 2003 and 2004.<ref name="Hubbl12003-4"/><ref name=Li2006/>

==探索==

[[Image:Dawn Flight Configuration 2.jpg|thumb|right|250px|Artist's conception of Dawn visiting Ceres and Vesta]]

To date, no space probe has visited Ceres. However, [[NASA]] launched the [[Dawn Mission]] on [[27 September]] [[2007]], which will explore the asteroid [[4 Vesta]] in 2011 before arriving at Ceres in 2015.<ref name=Russel2006/>

The mission profile calls for the Dawn Spacecraft to enter orbit around Ceres at an altitude of 5,900&nbsp;km. After five months of study, the spacecraft will reduce the orbital

distance to 1,300&nbsp;km, then down to 700&nbsp;km

after another five months.<ref>{{cite web|first=Marc|last=Rayman|date=[[13 July]], [[2006]]|url=http://www-ssc.igpp.ucla.edu/dawn/mission.html

|title=Dawn: mission description|publisher = UCLA &mdash; IGPP Space Physics Center|accessdate=2007-04-27}}</ref> The spacecraft instrumentation includes a framing camera, a visual and infrared [[spectrometer]], and a [[gamma-ray]] and [[neutron]] detector. These will be used to examine the dwarf planet's shape and element abundance.<ref name=Russel2006>{{cite journal|last=Russel|first=C.T.|coauthors=Capaccioni, F.; Coradini, A.; et.al.|title=Dawn Discovery mission to Vesta and Ceres: Present status|journal=Advances in Space Research|volume=38|pages=2043-2048|year=2006|doi=10.1016/j.asr.2004.12.041| url=http://adsabs.harvard.edu/abs/2006AdSpR..38.2043R|accessdate=2007-12-08}}</ref>

Radio signals from spacecraft in orbit around [[Mars]] and on its surface have been used to estimate the mass of Ceres from the perturbations induced by it onto the motion of Mars.<ref>{{cite journal|last=Pitjeva|first=E.V.|authorlink=Elena V. Pitjeva|title= High-Precision Ephemerides of Planets — EPM and Determination of Some Astronomical Constants |journal=Solar System Research|year= 2005|volume=39|issue=3|pages=176|url=http://iau-comm4.jpl.nasa.gov/EPM2004.pdf|format=[[PDF]]|doi= 10.1007/s11208-005-0033-2|accessdate=2007-12-09}}</ref>

{{TransF}}

==參見==

\* [[小説中的穀神星]]

\* [[曾被列爲行星的太陽系天體]]

\* [[Colonization of Ceres]]

\* [[Planets in astrology#Ceres|Ceres in astrology]]

\* [[Asteroids in astrology]]

{{portal|太陽系|Solar system.jpg}}

==參考資料==

{{reflist|2}}

<div class="references-small">

===Ephemerides===

\* [[James L. Hilton]], [http://aa.usno.navy.mil/publications/reports/asteroid\_ephemerides.html ''U.S. Naval Observatory Ephemerides of the Largest Asteroids''] The Astronomical Journal, Vol. 117 pp. 1077 (1999). <!-- not an accurate mass determination, but interesting reading, and online -->

\* {{cite web | last = Yeomans | first =Donald K. | url = http://ssd.jpl.nasa.gov/?horizons | title = Horizons system | publisher = NASA JPL | accessdate = 2007-03-20 }} &mdash; Horizons can be used to obtain a current ephemeris

</div>

==外部鏈接==

\* [http://anon.nasa-global.speedera.net/anon.nasa-global/HST\_ceres/640.mov Movie of one Ceres rotation (processed Hubble images)]

\* [http://www.keplersdiscovery.com/Asteroid.html How Gauss determined the orbit of Ceres] from keplersdiscovery.com

\* [http://planetary.org/explore/topics/asteroids\_and\_comets/ceres.html An up-to-date summary of knowledge about Ceres, plus an Earth-Ceres size comparison (the Planetary Society)]

\* [http://orbitsimulator.com/gravity/articles/ceres.html A simulation of the orbit of Ceres]

\* [http://home.comcast.net/~eliws/ceres/ A website dedicated entirely to 1 Ceres]

{{穀神星}}{{太阳系}}

{{Minor\_Planet\_Number|-|(2)[[智神星]]}}

[[category:小行星带天体]]

[[Category:矮行星]]

{{Link FA|pt}}

{{Link FA|fr}}

{{Link FA|en}}

==發現==

在發現小行星之前，[[朱塞普•皮亞齊|皮亞齊]]原是找尋Francis Wollaston的恆星列表中所記載的Mayer 87星，但他在表中所述的位置找不到該星。之後他找到一顆會移動的星，最初他認為這是顆[[彗星]]。

皮亞齊持續觀測至[[2月11日]]，但他的發現卻未受注意，之後該小行星已公轉至太陽背面而無法觀測。及後德國[[數學家]][[高斯]]憑著皮亞齊的三次觀測結果去估計其軌道，並於翌年由Franz Xaver, Baron von Zach和[[奧伯斯]]成功尋回該天體。

==歸類==

自1801年發現谷神星後，天文學家根據與「[[提丟斯-波得定則]]」軌道相若的關係判別其為一直失蹤的[[行星]]之一，但其後數年分別發現另外三顆[[小行星]]後，四顆天體曾一併並列為行星之列，但其後再發現5號小行星[[義神星]]後，天文學家相信火星與木星之間散佈著十分零碎而且數量不菲的[[小行星]]，因此英國天文學家[[威廉•赫歇爾]]把這類天體稱為「[[小行星]]」（asteroid），穀神星則為「四大小行星」之首。

而在2006年8月24日，於布拉格舉行之「第26屆國際天文學大會」上，由2500多位天文學家表決，開設並定義[[矮行星]]這一名詞，而把穀神星劃入其中。

==特徵==

[[Image:Ceres Rotation.jpg|thumb|由[[哈勃太空望遠鏡]]拍攝的谷神星影像，解像度達每[[像素]]30[[千米]]。當中亮點的性質不詳。[http://www.astronomy.com/asy/default.aspx?c=a&id=3478 動畫][http://www.astronomy.com/asy/default.aspx?c=a&id=3478]</sup>]]

其平均直徑為952公里，但隨著[[凱柏帶]]及其天體的發現，比穀神星大的天體也隨之被找到，包括[[小行星28978]]（伊克西翁）、[[小行星50000]]（誇歐爾）、[[小行星90482]]（厄耳枯斯）以及矮行星[[鬩神星]]等，而新發現的最遠天體[[小行星90377]]（塞德娜）也可能比穀神星大，它可能來自[[奧特雲]]內層。[[冥王星]]有時也會被認為是[[柯伊伯带|-{zh-hans:柯伊伯带;zh-hant:凱柏帶}-]]天體。

[[2003年]]底及[[2004年]]初，[[哈勃太空望遠鏡]]首度攝得穀神星的外貌，發現它相當接近球形，而且表面具有不同的反照率，相信擁有複雜的地形，有天文學家甚至推測穀神星的具有冰質的幔及金屬的核心。

[[美國太空總署]]在[[2007年]][[9月]]發射[[黎明號]]（Dawn）探測器前往穀神星，預計於[[2015年]][[2月]]到達。

==附加資料==

[[af:Ceres (dwergplaneet)]]

[[als:(1) Ceres]]

[[ar:سيريس (كوكب قزم)]]

[[ast:1 Ceres]]

[[be-x-old:Цэрэра (карлікавая плянэта)]]

[[bg:1 Церера]]

[[bn:সেরেস]]

[[br:Keres (planedenn-gorr)]]

[[ca:(1) Ceres]]

[[co:Cerere (astrunumia)]]

[[cs:Ceres (trpasličí planeta)]]

[[cy:Ceres (planed gorrach)]]

[[da:Ceres (dværgplanet)]]

[[de:Ceres (Zwergplanet)]]

[[el:1 Δήμητρα]]

[[en:Ceres (dwarf planet)]]

[[eo:Cereso]]

[[es:1 Ceres]]

[[et:Ceres (kääbusplaneet)]]

[[eu:1 Ceres]]

[[fa:سرس]]

[[fi:Ceres]]

[[fr:(1) Cérès]]

[[gl:1 Ceres]]

[[he:קרס (כוכב לכת ננסי)]]

[[hr:1 Ceres]]

[[hu:Ceresz]]

[[ia:Ceres (planeta nano)]]

[[id:1 Ceres]]

[[io:Ceres]]

[[is:Seres (dvergreikistjarna)]]

[[it:Cerere (astronomia)]]

[[ja:ケレス (準惑星)]]

[[jv:Ceres]]

[[kk:Серера (шағын ғаламшар)]]

[[ko:1 세레스]]

[[kw:Ceres (planet còr)]]

[[la:Ceres (planetula)]]

[[li:Ceres (dwergplaneet)]]

[[lt:Cerera (nykštukinė planeta)]]

[[ml:സീറീസ്]]

[[ms:1 Ceres]]

[[nds:Ceres (Dwargplanet)]]

[[nl:Ceres (dwergplaneet)]]

[[nn:1 Ceres]]

[[no:Ceres (dvergplanet)]]

[[pl:1 Ceres]]

[[pt:Ceres (planeta anão)]]

[[qu:Siris (tuna puriq quyllur)]]

[[ro:Ceres (planetă pitică)]]

[[ru:Церера (карликовая планета)]]

[[scn:Cèriri]]

[[simple:Ceres (dwarf planet)]]

[[sk:1 Ceres]]

[[sl:Cerera (pritlikavi planet)]]

[[sr:Церера (патуљаста планета)]]

[[sv:1 Ceres]]

[[tg:Серера]]

[[th:ซีรีส]]

[[tl:Seres (astronomiya)]]

[[tr:Ceres (cüce gezegen)]]

[[uk:Церера (карликова планета)]]

[[vi:Ceres (hành tinh lùn)]]

[[zh-min-nan:1 Ceres]]