<!-- Additional parameters for this template are available at [[Template:Infobox Planet]]. -->{{Infobox Planet | discovery=yes | physical\_characteristics = yes | bgcolour=#FFFFC0 | minorplanet = yes

| name=艾女星

| image=[[File:243 ida crop.jpg|250px]]

| caption=艾女星（左）及其衛星Dacty1（右）

| discovery\_ref=

| discoverer=[[约翰·帕利扎]]

| discovery\_site = [[维也纳]]

| discovered=[[1884年]][[9月29日]]

| mp\_category=主[[小行星帶]]（[[鴉女星族]]）

| orbit\_ref=<ref name="JPL2008">{{harvnb|JPL|2008}}</ref>

| epoch=[[Julian day|JD]] 2454800.5 (2008-Nov-30.0)

| semimajor={{convert|2.862|AU|m|abbr=on}}

| perihelion={{convert|2.732|AU|m|abbr=on}}

| aphelion={{convert|2.991|AU|m|abbr=on}}

| eccentricity=0.0452

| period=1768.136天

| inclination=1.138[[degree (angle)|°]]

| asc\_node=324.218°

| arg\_peri=108.754°

| mean\_anomaly=191.869°

| avg\_speed=0.2036 [[degree (angle)|°]]/s

| satellites=Dactyl

| dimensions=53.6 × 24.0 × 15.2&nbsp;km

| mean\_radius=15.7&nbsp;km{{harvnb|Britt|Yeomans|Housen|Consolmagno|2002|p=486}}</ref>

| mass=4.2 ± 0.6 ×10<sup>16</sup>&nbsp;kg

| density=2.6 ± 0.5&nbsp;g/cm<sup>3</sup>

| surface\_grav=0.3–1.1&nbsp;cm/s<sup>2</sup>

| rotation=4.63小时

| spectral\_type=[[S-type asteroid|S]]

| abs\_magnitude=9.94<ref name="JPL2008"/>

| albedo=0.2383<ref name="JPL2008"/>

|right\_asc\_north\_pole = 168.76°

|declination = −2.88°

|single\_temperature = 200K}}

'''艾女星'''（小行星243）是一顆位于主[[小行星帶]]的[[鴉女星族]][[小行星]]，于[[1884年]][[9月29日]]由[[约翰·帕利扎]]發現。其名來源於[[希臘神話]]中的一位[[寧芙]]。通過天文望遠鏡對它的觀測，艾女星被歸類于[[S-型小行星]]，内小行星帶中成員最多的一類。[[1993年]][[8月28日]]，正觀測[[木星]]的[[伽利略號探測器]]接近艾女星。它是第二顆有太空探測器接近的小行星，也是第一顆被發現擁有[[小行星衛星|衛星]]。

就如其他主帶小行星，艾女星的軌道位于[[火星]]及木星的軌道之間。其[[公轉周期]]為4.84年，[[自轉周期]]為4.63小時。艾女星的平均直徑為{{convert|31.4|km|mi|abbr=on}}。它擁有不規則的、橢長形的形狀，明顯由兩個大物體連接而成，形如[[牛角麵包]]。它是[[太陽系]]中表面隕石坑最多的星體之一，擁有不同大小及年齡的隕石坑。

艾女星的衛星Dactyl，是由任務成員從伽利略號發回的圖片中發現的，其名取自希臘神話中居住在伊達山上的[[達克堤利]]。Dactyl的直徑只有{{convert|1.4|km|ft}}，是艾女星的20分之一。它圍繞艾女星的軌道數據不能被準確定出。不過，幾條可能的軌道允許我們粗略計算出艾女星的密度，結果表明艾女星沒有金屬[[礦物]]。艾女星及其衛星有許多共同點，意味它們有共同的來源。

伽利略號發回的照片，加上之後對艾女星質量的測量，使人們對S-型小行星的地質有更深的認識。在伽利略號掠過艾女星之前，存在許多不同的理論來解釋這些小行星的礦物成分。知道了它們的成分，我們能找出掉落[[地球]]的[[隕石]]與小行星帶天體的關係。傳回的數據顯示，S-型小行星是[[普通球粒隕石]]的源頭。普通球粒隕石是地球表面最常見的隕石種類。

==發現及觀測==

# 艾女星[[1884年]][[9月29日]]于[[維也納天文臺]]由[[奧地利]]人[[约翰·帕利扎]]發現。<ref name="Ridpath1897p206">{{harvnb|Ridpath|1897|p=206}}</ref>這是他發現的第45顆小行星。<ref name="Raab2002">{{harvnb|Raab|2002}}</ref>艾女星由維也納釀酒者兼業餘天文學家[[Moriz von Kuffner]][[小行星列表#編號和命名規定|命名]]<ref name="Schmadel2003p36">{{harvnb|Schmadel|2003|p=36}}</ref><ref name="Berger2003p241">{{harvnb|Berger|2003|p=241}}</ref>[[希臘神話]]中，伊達（Ida）是[[克里特]]島[[伊達山]]上一位養大[[宙斯]]的[[寧芙]]。<ref name="NASA2005">{{harvnb|NASA|2005}}</ref>[[平山清次]]將艾女星歸類于[[鴉女星族]]，他此前于[[1918年]]提出[[鴉女星族]]是一顆之前分裂了的星體的餘駭。<ref name="Chapman1996p700"/>

# 在進行八色小行星巡天（ECAS）時，David J. Tholen和Edward F. Tedesco于[[1980年]][[9月16日]]測量了艾女星的[[天文光譜學|反射光譜]]。<ref name="ZellnerTholenTedesco1985p357p373">{{harvnb|Zellner|Tholen|Tedesco|1985|pp=357, 373}}</ref>其光譜分析與S-型小行星的相符。<ref>{{harvnb|Zellner|Tholen|Tedesco|1985|p=404}} {{quote|The Eos and Koronis families&nbsp;... are entirely of type S, which is rare at their heliocentric distances ...}}</ref><ref name="ZellnerTholenTedesco1985p410">{{harvnb|Zellner|Tholen|Tedesco|1985|p=410}}</ref>[[美國海軍天文臺]][[弗拉格斯塔夫 (亚利桑那州)|弗拉格斯塔夫]]站及[[橡樹嶺天文臺]]在[[1993年]]初對艾女星作了許多觀測，進一步確定艾女星繞太陽的公轉軌道，並減少了伽利略號掠過時其位置的誤差：從{{convert|78|km|mi}}至{{convert|60|km|mi}}.<ref name="OwenYeomans1994p2295">{{harvnb|Owen|Yeomans|1994|p=2295}}</ref>

# ==探測==

# [[File:Galileo trajectory Ida.svg|thumb|伽利略號從發射至木星軌道的路徑]]

===伽利略號掠過===

1993年，預定訪問[[木星]]的[[伽利略號]]探測器掠過艾女星。伽利略號對[[小行星951]]和艾女星的探測在對木星的任務中屬次要。這兩顆被選中的小行星是為響應[[美國太空總署]]的新任務策略：所有計劃穿過小行星帶的探測器都應考慮近距離掠過其中的小行星。<ref name="D'AmarioBrightWolf1992p26">{{harvnb|D'Amario|Bright|Wolf|1992|p=26}}</ref>之前從未有任務嘗試掠過小行星。<ref name="Chapman1996p699">{{harvnb|Chapman|1996|p=699}}</ref>[[亞特蘭大號]][[太空穿梭機]]于[[1989年]][[10月18日]]任務[[STS-34]]中將伽利略號送進軌道。<ref name="D'AmarioBrightWolf1992p24">{{harvnb|D'Amario|Bright|Wolf|1992|p=24}}</ref>要改變伽利略號的軌跡以接近艾女星需要消耗{{convert|34|kg|lb}}[[推進劑]]。<ref name="D'AmarioBrightWolf1992p72">{{harvnb|D'Amario|Bright|Wolf|1992|p=72}}</ref>任務的計劃人員押后決定掠過艾女星，直到他們能確定餘下的推進劑足夠完成整個木星任務。<ref name="D'AmarioBrightWolf1992p36">{{harvnb|D'Amario|Bright|Wolf|1992|p=36}}</ref>

[[File:Ida-approach.gif|thumb|left|掠過時拍的照片，顯示艾女星的自轉，從最接近以前5.4小時起。]]

伽利略號的運行軌跡兩次進入小行星帶。1993年8月28日，它第二次進入小行星帶並掠過艾女星，當時速度相對艾女星為{{convert|12400|m:s|ft:s}}。<ref name="D'AmarioBrightWolf1992p36" />探測器上的照相機以離艾女星{{convert|240350|km|mi|5}}至最接近時的{{convert|2390|km|mi|3}}對其拍照。<ref name="NASA2005" /><ref name="SullivanGreeleyPappalardoAsphaug1996p120">{{harvnb|Sullivan|Greeley|Pappalardo|Asphaug|1996|p=120}}</ref>艾女星是繼小行星951后航天器訪問並拍照的第二顆小行星。<ref name="Cowen1993p215">{{harvnb|Cowen|1993|p=215}} {{quote|Nearly a month after a successful photo session, the Galileo spacecraft last week finished radioing to Earth a high-resolution portrait of the second asteroid ever to be imaged from space. Known as 243 Ida, the asteroid was photographed from an average distance of just 3,400 kilometers some 3.5 minutes before Galileo's closest approach on Aug. 28.}}</ref>探測器觀測到了艾女星約95%。<ref name="ThomasBeltonCarcichChapman1996">{{harvnb|Thomas|Belton|Carcich|Chapman|1996}}</ref>

探測器上[[高增益天線]]的永久故障導致許多圖片未能及時傳回。<ref name="Chapman1994p358">{{harvnb|Chapman|1994|p=358}}</ref>首5張照片于1993年9月收到，<ref name="Chapman1996p707">{{harvnb|Chapman|1996|p=707}}</ref>並拼接成一張31–38 m/px的高解像度圖片<ref name="ChapmanBeltonVeverkaNeukum1994p237">{{harvnb|Chapman|Belton|Veverka|Neukum|1994|p=237}}</ref><ref name="GreeleySullivanPappalardoVeverka1994p469">{{harvnb|Greeley|Sullivan|Pappalardo|Veverka|1994|p=469}}</ref>其餘的圖片于翌年春季當探測器接近地球時傳回。<ref name="Chapman1996p707" /><ref name="MonetStoneMonetDahn1994p2293">{{harvnb|Monet|Stone|Monet|Dahn|1994|p=2293}}</ref>

===發現===

自從伽利略號掠過小行星951和艾女星，及[[會合-舒梅克號]]的小行星任務，人們得以對小行星的[[地質]]有更深入的了解。<ref name="GeisslerPetitGreenberg1996p57">{{harvnb|Geissler|Petit|Greenberg|1996|p=57}}</ref>艾女星相對較大的表面展示了各種類型的地表特徵。<ref name="ChapmanBeltonVeverkaNeukum1994p238">{{harvnb|Chapman|Belton|Veverka|Neukum|1994|p=238}}</ref>通過研究艾女星的衛星、第一顆被證實的小行星衛星，Dactyl，人們能間接知道艾女星的組成成分。<ref name="Chapman1996p709">{{harvnb|Chapman|1996|p=709}}</ref>

根據從地球觀測的[[光譜學|光譜測量]]結果，艾女星歸類于[[S-型小行星]]。<ref name="ByrnesD'Amario1994">{{harvnb|Byrnes|D'Amario|1994}}</ref>S-型小行星的成分直到伽利略號任務之前都不爲人知，此前人們猜測它們與掉落在地球的[[普通球粒隕石]]或[[石鐵隕石]]中之礦物成分相同。<ref name="WilsonKeilLove1999p479">{{harvnb|Wilson|Keil|Love|1999|p=479}}</ref>由於Dactyl的軌道長期處於穩定，因此估計艾女星的密度小於3.2 g/cm<sup>3</sup><ref name="ByrnesD'Amario1994" />這樣便可剔除由石鐵組成的可能性，因爲要是其主要成分為鐵和鎳，艾女星便有40%的空間是空無一物的。<ref name="Chapman1996p709" />

從伽利略號所拍的照片可以看出，艾女星正在太空中經歷風化，使較老的區域隨時間而顯得越來越紅。<ref name="Chapman1996p700">{{harvnb|Chapman|1996|p=700}}</ref><ref name="Chapman1996p710">{{harvnb|Chapman|1996|p=710}}</ref>其衛星Dactyl也經歷一樣的風化，但變化較不明顯。<ref name="Chapman1995p496">{{harvnb|Chapman|1995|p=496}}</ref>艾女星表面的風化揭示了另一項有關其成分的細節：其較年輕的外露部分的反射光譜與普通球粒隕石相符，但較老的區域則與S-型小行星相符。<ref name="Chapman1996p699" />

[[File:NWA869Meteorite.jpg|thumb|普通球粒隕石經過抛光的部分]]

太空風化效應及艾女星的低密度，使人們能更了解S-型小行星與普通球粒隕石之間的關係。S-型小行星是内小行星帶中最多的一類。<ref name="Chapman1996p699" />相似地，普通球粒隕石也是地球表面上最普遍的隕石種類。<ref name="Chapman1996p699" />然而遠距離對S-型小行星觀測的反射光譜卻與普通球粒隕石不符。伽利略號掠過艾女星后發現，某些S-型小行星，特別是鴉女星族，可能是這些隕石的源頭。<ref name="Chapman1995p496" />

==物理特性==

[[File:Asteroid size comparison.jpg|thumb|left|艾女星、其他幾顆小行星、[[穀神星]]和[[火星]]體積比較]]

艾女星的質量介乎3.65和4.99;&times; 10<sup>16</sup> kg。<ref name="PetitDurdaGreenbergHurford1997p179t180">{{harvnb|Petit|Durda|Greenberg|Hurford|1997|pp=179–180}}</ref>其表面[[引力加速度]]約為0.3至1.1 cm/s<sup>2</sup>。<ref name="ThomasBeltonCarcichChapman1996" />其引力場之弱，太空人能從艾女星的一端跳到另一端，而任何速度超過{{convert|20|m:s|ft:s|1}}的物體均可[[逃逸速度|逃逸]]出它的引力範圍。<ref name="GeisslerPetitDurdaGreenberg1996p142">{{harvnb|Geissler|Petit|Durda|Greenberg|1996|p=142}}</ref><ref name="LeeVeverkaThomasHelfenstein1996p99">{{harvnb|Lee|Veverka|Thomas|Helfenstein|1996|p=99}}</ref>

[[File:243 Ida rotation.jpg|thumb|right|旋轉中艾女星的連續影像]]

艾女星有清晰的橢長外形、<ref name="GeisslerPetitGreenberg1996p58">{{harvnb|Geissler|Petit|Greenberg|1996|p=58}}</ref>不規則的表面<ref name="Chapman1994p363">{{harvnb|Chapman|1994|p=363}}</ref><ref name="BottkeCellinoPaolicchiBinzel2002p10">{{harvnb|Bottke|Cellino|Paolicchi|Binzel|2002|p=10}}</ref>和猶如[[牛角包]]的形狀。<ref name="Chapman1996p707"/>艾女星的長度是其闊度的2.35倍，<ref name="GeisslerPetitGreenberg1996p58"/>它的中部將它分爲成分不同的兩半。<ref name="Chapman1996p707"/>艾女星由兩個大型部分組成，中間由鬆散的碎片連接，符合于這種壓縮的形狀。不過，伽利略號拍攝的高清晰度照片中並沒有見到這些碎片。<ref name="BottkeCellinoPaolicchiBinzel2002p10"/>艾女星上有一些斜坡達到50°的斜度，但斜坡普遍不超過35°。<ref name="ThomasBeltonCarcichChapman1996"/>艾女星有不規則的形狀，是因爲它高度不規則的引力場。<ref name="Cowen1995">{{harvnb|Cowen|1995}}</ref>由於自轉，其引力加速度在兩端最弱；又由於它的質量都集中在兩端，中部的引力也很弱。<ref name="ThomasBeltonCarcichChapman1996"/>

==表面特徵==

[[Image:243 Ida large.jpg|thumb|left|拼接成的照片，拍攝于伽利略號最接近艾女星前3.5分鐘]]

艾女星的表面佈滿了主要是灰色的[[撞擊坑]]，一些較近期的撞擊坑則顯示一些不同的顔色。<ref name="NASA2005" />除了撞擊坑外，一些其它特徵如溝槽、山脊和突出物也能觀測到。艾女星的表面有一層厚[[表岩屑]]，覆蓋著下面的岩石層。最大的的碎石稱爲噴射物，在艾女星表面可以找到幾個。

===表岩屑===

艾女星的表面被一層稱爲“[[表岩屑]]”碎石覆蓋，其厚度約為{{convert|50|m|ft}}至{{convert|100|m|ft}}。<ref name="Chapman1996p707" />這些物質是在與其它天體撞擊時產生的，並由地質過程重新分佈至表面各處。<ref name="LeeVeverkaThomasHelfenstein1996p96">{{harvnb|Lee|Veverka|Thomas|Helfenstein|1996|p=96}}</ref>伽利略號觀測到表岩屑[[崩壞作用|土石流]]的證據，<ref name="GreeleySullivanPappalardoVeverka1994p470">{{harvnb|Greeley|Sullivan|Pappalardo|Veverka|1994|p=470}}</ref>

艾女星的表岩屑是由[[硅酸鹽]]礦物[[橄欖石]]和[[輝石]]。<ref name="Holm1994">{{harvnb|Holm|1994}}</ref><ref name="Chapman1996p701">{{harvnb|Chapman|1996|p=701}}</ref>其外觀透過[[太空風化]]作用隨著時間改變。<ref name="Chapman1995p496" />因此較老的表岩屑比較新的物質看起來更紅。<ref name="Chapman1996p710" />

[[Image:Ejecta block on 243 Ida.svg|thumb|right|伽利略號拍攝到的一片位于24.8°S, 2.8°E的 {{convert|150|m|ft}}大小土地<ref name="LeeVeverkaThomasHelfenstein1996p90">{{harvnb|Lee|Veverka|Thomas|Helfenstein|1996|p=90}}</ref>]]

已有約20片嵌入表岩屑的噴射物（{{convert|40|m|ft}}至{{convert|150|m|ft}}寬）被確認。<ref name="Chapman1996p707" /><ref name="GeisslerPetitDurdaGreenberg1996p141" />最大塊的表岩屑由這些噴射物組成。<ref name="SullivanGreeleyPappalardoAsphaug1996p132">{{harvnb|Sullivan|Greeley|Pappalardo|Asphaug|1996|p=132}}</ref>由於噴射物會很快被撞擊分解，所以推論這些表面的部分是最近產生的，或是由撞擊而帶到表面。<ref name="Cowen1995" /><ref name="LeeVeverkaThomasHelfenstein1996p97">{{harvnb|Lee|Veverka|Thomas|Helfenstein|1996|p=97}}</ref>大部分噴射物位于撞擊坑Lascaux和Mammoth中，但不一定在那裏產生。<ref name="LeeVeverkaThomasHelfenstein1996p97" />因爲艾女星不規則的引力場，這兩個地點最容易吸引並積聚碎石。<ref name="Cowen1995" />某些物質可能是從在星體的另一面新形成的撞擊坑Azzura噴射出來。<ref name="Stooke1997p1385" />

===結構===

幾項主要結構塑造了艾女星的表面。艾女星顯得是由兩個部分組成，以下稱之爲“區域一”和“區域二”，中間由一凹陷的部分“腰部”連接起。<ref name="Chapman1996p707" />這項特徵可能是由碎石填出，或是被撞擊出來。<ref name="Chapman1996p707" /><ref name="Stooke1997p1385">{{harvnb|Stooke|1997|p=1385}}</ref>

區域一有兩項主要結構。其一為一條明顯的山脊，長{{convert|40|km|mi}}，名為“Townsend Dorsum”，在艾女星表面跨越150度。<ref name="SárneczkyKereszturi2002">{{harvnb|Sárneczky|Kereszturi|2002}}</ref>另一項為一個凹進的缺口，名為“Vienna Regio”。<ref name="Chapman1996p707" />

區域二有幾組溝槽，大部分寬{{convert|100|m|ft}}以下，長{{convert|4|km|mi}}。<ref name="Chapman1996p707" /><ref name="SullivanGreeleyPappalardoAsphaug1996p131">{{harvnb|Sullivan|Greeley|Pappalardo|Asphaug|1996|p=131}}</ref>它們接近撞擊坑Mammoth、Lascaux和Kartchner，但不與其相連。<ref name="SullivanGreeleyPappalardoAsphaug1996p132" />一些溝槽于撞擊有關，如一組與Vienna Regio相對的溝槽。<ref name="ThomasProckter2004">{{harvnb|Thomas|Prockter|2004}}</ref>

===撞擊坑===

艾女星是太陽系中撞擊坑最多的星體之一，<ref name="ChapmanBeltonVeverkaNeukum1994p237" /><ref name="Chapman1994p363"/>撞擊事件也是塑造其表面形態的主因。<ref>{{harvnb|Geissler|Petit|Greenberg|1996|pp=57–58}}</ref>撞擊坑已經達到飽和的狀態，就是新的產生會抹去舊的坑，使其總數大致不變。<ref name="Chapman1996p707p708">{{harvnb|Chapman|1996|pp=707–708}}</ref>其表面佈滿了各類大小、處於不同剝蝕階段的撞擊坑，<ref name="Chapman1994p363"/>有的與艾女星本身一樣古老，也有的是新產生的。<ref name="Chapman1996p707"/>最古老的可能是于[[鴉女星族]]主星崩潰時產生。<ref name="Chapman1995p496" />Lascaux是最大的坑，直徑幾乎有{{convert|12|km|mi}}。<ref name="BottkeCellinoPaolicchiBinzel2002p10" /><ref name="USGS">{{harvnb|USGS}}</ref>區域二的撞擊坑幾乎直徑都大於{{convert|6|km|mi}}，但區域一根本沒有大坑。<ref name="Chapman1996p707"/>一些撞擊坑成串地排列。<ref name="GreeleySullivanPappalardoVeverka1994p469"/>

[[File:Fingal on 243 Ida.jpg|thumb|left|位于13.2°S, 39.9°E的不對稱撞擊坑Fingal，寬{{convert|1.5|km|mi}}<ref name="USGS" />]]

艾女星上的主要撞擊坑都以地球上的洞穴和[[溶岩洞]]命名。以撞擊坑Azzurra為例，其名來自於[[卡普里島]]一個水下洞穴，亦稱“藍洞”。<ref name="GreeleyBatson2001p393">{{harvnb|Greeley|Batson|2001|p=393}}</ref>Azzurra的外表顯示它是艾女星上最近期撞擊出來的。<ref name="GeisslerPetitDurdaGreenberg1996p141">{{harvnb|Geissler|Petit|Durda|Greenberg|1996|p=141}}</ref>這次撞擊的噴射物間斷地分佈于艾女星表面，<ref name="Chapman1996p710" />並解釋了其表面大規模顔色及[[反照率]]的差異。<ref>{{harvnb|Bottke|Cellino|Paolicchi|Binzel|2002|p=9}}</ref>與普遍撞擊坑形態不同的，有不對稱的Fingal。它在一邊的底部和壁部間有清晰的邊界。<ref name="pappalardo124"/>另一個重要的撞擊坑是Afon，它標誌了艾女星的[[本初子午線]]。<ref name="SeidelmannArchinalA'HearnConrad2007p171">{{harvnb|Seidelmann|Archinal|A’hearn|Conrad|2007|p=171}}</ref>

艾女星上的撞擊坑在結構上十分簡單：盆形，沒有平底，中部不凸起。<ref name="pappalardo124">{{harvnb|Sullivan|Greeley|Pappalardo|Asphaug|1996|p=124}}</ref>它們平均地佈滿在艾女星的表面，除位于周口店撞擊坑北面的一處突出地帶，這裡較光滑，又較少的撞擊坑。<ref>{{harvnb|Sullivan|Greeley|Pappalardo|Asphaug|1996|p=128}}</ref>被撞擊帶到表面的噴射物在艾女星上的積澱與行星上的不同，因爲艾女星有著高速的自轉、低引力和不規則的形狀。<ref name="GeisslerPetitGreenberg1996p58" />散落的[[噴射物蓋層]]不對稱地圍繞撞擊坑，而高速的噴射物則永久地流失到太空中。<ref>{{harvnb|Geissler|Petit|Durda|Greenberg|1996|p=155}}</ref>

==成分==

根據其反射光譜，艾女星被歸類為[[S-型小行星]]。<ref name="WilsonKeilLove1999p479" />這些小行星可能與[[石鐵隕石]]或[[普通球粒隕石]]有相同的成分。<ref name="WilsonKeilLove1999p479" />其内部成分則仍未被直接分析過，只是根據表面顔色的變化和艾女星2.27至3.10 g/cm<sup>3</sup>的整體密度估計與普通球粒隕石相近。<ref name="WilsonKeilLove1999p480">{{harvnb|Wilson|Keil|Love|1999|p=480}}</ref><ref name="Chapman1995p496" />普通球粒隕石的成分包括：含不同份量硅酸鹽的[[橄欖石]]和[[輝石]]、[[鐵]]和[[長石]]。<ref name="Lewis1996p89">{{harvnb|Lewis|1996|p=89}} {{quote|The chondrites fall naturally into five composition classes, of which three have very similar mineral contents, but different proportions of metal and silicates. All three contain abundant iron in three different forms (ferrous iron oxide in silicates, metallic iron, and ferrous sulfide), usually with all three abundant enough to be classified as potential ores. all three contain feldspar (an aluminosilicate of calcium, sodium, and potassium), pyroxene (silicates with one silicon atom for each atom of magnesium, iron, or calcium), olivine (silicates with two iron or magnesium atoms per silicon atom), metallic iron, and iron sulfide (the mineral triolite). These three classes, referred to collectively as the ordinary chondrites, contain quite different amounts of metal.}}</ref>伽利略號在艾女星上發現了橄欖石和輝石。<ref name="Holm1994" />其整個表面有著相同的礦物成分。伽利略號觀測到它表面變化極少，其自轉也顯示出它有均勻的密度。<ref name="ThomasProckter2004p21">{{harvnb|Thomas|Prockter|2004|p=21}}</ref><ref name="SullivanGreeleyPappalardoAsphaug1996p135">{{harvnb|Sullivan|Greeley|Pappalardo|Asphaug|1996|p=135}}</ref>普通球粒隕石的密度為3.48至3.64 g/cm<sup>3</sup>，若果假設艾女星是由普通球粒隕石組成的，其[[孔隙率]]為11%到42%。<ref name="WilsonKeilLove1999p480" />

艾女星的内部可能存在一定份量的megaregolith，就是因撞擊而碎裂的石層。這層megaregolith從艾女星表面向下延伸幾百米至幾公里。在艾女星的核心，可能存在碎裂的石層，位于撞擊坑Mammoth、Lascaux和Undara底下。<ref name="SullivanGreeleyPappalardoAsphaug1996p135" />

==公轉及自轉==

[[Image:Ida orbit.svg|thumb|right|[[2009年]][[3月9日]]，艾女星和5顆行星的軌道及位置。]]

艾女星是主[[小行星帶]]中[[鴉女星族]]的一員。<ref name="Chapman1996p700"/>艾女星繞太陽的軌道平均距離太陽{{convert|2.862|AU|Gm}}，于[[火星]]與[[木星]]之間。<ref name="Holm1994"/><ref name="JPL2008" />艾女星完成一次公轉需時4.84089年<ref name="JPL2008" />

艾女星的[[自轉周期]]為4.63小時，<ref name="VokrouhlickyNesvornyBottke2003p147">{{harvnb|Vokrouhlicky|Nesvorny|Bottke|2003|p=147}}</ref><ref name="GeisslerPetitGreenberg1996p58"/>是已知轉速最快的小行星之一。<ref name="GreenbergBottkeNolanGeissler1996p107">{{harvnb|Greenberg|Bottke|Nolan|Geissler|1996|p=107}}</ref>經過計算，一個與艾女星形狀一樣、密度均勻的物體在[[轉動慣量]]最大時的自轉軸與艾女星的相符。這表明，艾女星内部的密度分佈在不同區域沒有太大的變化。<ref name="ThomasProckter2004" />由於太陽艾女星不規則的形狀受太陽引力影響，其自轉軸有[[進動]]，周期為7萬7千年。<ref name="Slivan1995p134">{{harvnb|Slivan|1995|p=134}}</ref>

==來源==

艾女星來源於[[鴉女星族]]原主星瓦解后的殘骸，該星直徑估計約有{{convert|120|km|mi|2}}。<ref name="VokrouhlickyNesvornyBottke2003p147" />原星部分分化，使較重的金屬移至核心。<ref name="GreenbergBottkeNolanGeissler1996p117">{{harvnb|Greenberg|Bottke|Nolan|Geissler|1996|p=117}}</ref>艾女星帶走了極少量這些核心物質。<ref name="GreenbergBottkeNolanGeissler1996p117"/>人們並不知道那次分裂何時發生。根據對艾女星撞擊坑的分析，其表面的年齡超過十億年。<ref name="GreenbergBottkeNolanGeissler1996p117"/>但艾女星衛星系統估計年齡小於一億年，與此不符。<ref name="HurfordGreenberg2000p1595">{{harvnb|Hurford|Greenberg|2000|p=1595}}</ref>若其衛星系統在此前已經存在，則由於它體積之小，早就應被大型的撞擊摧毀了。兩項年齡估計偏差如此大，可能是因爲艾女星受鴉女星族原星碎片的撞擊率升高。<ref name="CarrollOstlie1996p878">{{harvnb|Carroll|Ostlie|1996|p=878}}</ref>

==衛星==

[[Image:Dactyl-HiRes.jpg|thumb|最高解像度的Dactyl照片，于伽利略號距其約3,900 km時拍攝]]

一顆細小的[[小行星衛星|衛星]]繞艾女星公轉，名Dactyl。其正式編號為'''(243) Ida I Dactyl'''，是從伽利略號太空船于1993年掠過時拍攝的照片中發現的。這批照片第一次直接證實了[[小行星衛星]]的存在。<ref name="Chapman1996p709"/>當時它距離艾女星{{convert|90|km|mi}}，以[[順行]]軌道公轉。Dactyl的表面和艾女星一樣由許多撞擊坑覆蓋，並且成份相近。其來源並不確定，但從太空船的觀測顯示它是鴉女星族原星碎片之一。

===發現===

Dactyl在[[1994年]][[2月17日]]由伽利略號任務成員Ann Harch發現，當時他正檢視從太空船傳回的照片。<ref name="Holm1994"/>伽利略號在1993年8月對Dactyl觀察了5.5小時，拍攝了47張照片。<ref name="PetitDurdaGreenbergHurford1997p177">{{harvnb|Petit|Durda|Greenberg|Hurford|1997|p=177}}</ref>拍攝第一張照片時，太空船距離艾女星{{convert|10760|km|mi}}<ref name="BeltonCarlson1994">{{harvnb|Belton|Carlson|1994}}</ref>，並與Dactyl相距{{convert|10870|km|mi}}，14分鐘后它最接近艾女星。<ref name="Mason1994p108">{{harvnb|Mason|1994|p=108}}</ref>

Dactyl的[[小行星#小行星的命名|編號]]為1993 (243) 1。<ref name="BeltonCarlson1994"/><ref name="Green1994">{{harvnb|Green|1994}}</ref>[[國際天文聯會]]在1994年將其命名為Dactyl，<ref name="Green1994"/>住在[[克里特]]島[[伊達山]]上的[[達克堤里]]（Dactyl）。<ref name="Schmadel2003p37">{{harvnb|Schmadel|2003|p=37}}</ref><ref name="Pausanias576">{{harvnb|Pausanias|5.7.6}} {{quote|When Zeus was born, Rhea entrusted the guardianship of her son to the Dactyls of Ida, who are the same as those called Curetes. They came from Cretan Ida&nbsp;– Heracles, Paeonaeus, Epimedes, Iasius and Idas.}}</ref>

===物理特性===

Dactyl是一顆蛋形<ref name="Chapman1996p709"/>但極爲近似球體<ref name="Schmadel2003p37"/>的天體，尺寸為1.6乘1.4乘1.2公里。<ref name="Chapman1996p709"/>它以它最長的一條軸朝向艾女星。<ref name="Chapman1996p709"/>就如艾女星，Dactyl的表面也佈滿了飽和了的撞擊坑。<ref name="Chapman1996p709"/>有超過12個坑直徑大於{{convert|80|m|ft}}，表示它過去受到許多撞擊。<ref name="NASA2005"/>至少有6個坑排成直線鏈狀，表示這是近距離形成的碎片造成的，這些碎片很可能來自艾女星的噴射物。<ref name="Chapman1996p709"/>但與艾女星上的不同，Dactyl上的撞擊坑中央有突出物。<ref name="AsphaugRyanZuber2003p463">{{harvnb|Asphaug|Ryan|Zuber|2003|p=463}}</ref>以上的特徵，加上它的橢球形，顯示Dactyl是有一定的自身引力，儘管它的體積如此之小。<ref name="AsphaugRyanZuber2003p463"/>與艾女星一樣，其表面溫度約為200K。<ref name="Holm1994"/>

Dactyl和艾女星有許多共同特徵。它們的[[反照率]]和[[反射光譜]]非常相像。<ref name="ChapmanKlaasenBeltonVeverka1994p455">{{harvnb|Chapman|Klaasen|Belton|Veverka|1994|p=455}}</ref>其中的細小分別顯示，相對Dactyl，艾女星經歷的太空風化作用較強。<ref name="Chapman1995p496" />它的體積太小，使[[表岩屑]]不可能生成；<ref name="Chapman1995p496" /><ref name="BeltonCarlson1994" />艾女星則被厚厚一層表岩屑覆蓋。

===軌道===

[[Image:Dactyl potential orbits.svg|thumb|right|可能的Dactyl軌道]]

Dactyl繞艾女星的軌道並不確定。拍攝Dactyl的大部分照片時，伽利略號正處於它的[[軌道平面]]，很難推斷其準確軌道。<ref name="ByrnesD'Amario1994"/>Dactyl以[[順行]]軌道公轉，<ref name="PetitDurdaGreenbergHurford1997p179">{{harvnb|Petit|Durda|Greenberg|Hurford|1997|p=179}}</ref>軌道傾斜于艾女星赤道8°。<ref name="PetitDurdaGreenbergHurford1997p177"/>根據電腦模擬，Dactyl的[[近心點]]必須與艾女星距離至少約{{convert|65|km|mi}}，才能保持穩定的軌道。<ref name="PetitDurdaGreenbergHurford1997p195">{{harvnb|Petit|Durda|Greenberg|Hurford|1997|p=195}}</ref>在這電腦模擬中，軌道的可能性範圍縮窄了，因爲伽利略號在1993年8月28日16:52:05 UT觀測到它位于艾女星經度85°上空{{convert|90|km|mi}}處，模擬中Dactyl必須經過這一點。<ref name="PetitDurdaGreenbergHurford1997p188">{{harvnb|Petit|Durda|Greenberg|Hurford|1997|p=188}}</ref><ref name="PetitDurdaGreenbergHurford1997p193">{{harvnb|Petit|Durda|Greenberg|Hurford|1997|p=193}}</ref>1994年4月26日，[[哈勃太空望遠鏡]]觀測艾女星8小時，但並未看到Dactyl。Dactyl要距離艾女星超過約{{convert|700|km|mi|abbr=on}}才能被觀測到。<ref name="ByrnesD'Amario1994"/>

假設Dactyl的軌道為圓形，其公轉周期約為20小時；<ref name="ChapmanKlaasenBeltonVeverka1994p455" />其公轉速度為大約{{convert|10|m:s|ft:s}}，相同于人類快跑的速度。<ref name="ByrnesD'Amario1994"/>

===年齡及來源===

Dactyl估計與艾女星年齡相近，<ref name="GreenbergBottkeNolanGeissler1996p116">{{harvnb|Greenberg|Bottke|Nolan|Geissler|1996|p=116}}</ref>都是從鴉女星族原星殘骸中分離出來的。<ref name="LeeVeverkaThomasHelfenstein1996p97" />然而，它也有可能在更爲近期形成，是艾女星一次巨大撞擊的噴射物。<ref name="PetitDurdaGreenbergHurford1997p182">{{harvnb|Petit|Durda|Greenberg|Hurford|1997|p=182}}</ref>它是由艾女星捕捉來的可能性很低。<ref name="Mason1994p108"/>Dactyl在1億年前可能遭受過一次大型隕石撞擊，使它的體積減少。<ref name="GreenbergBottkeNolanGeissler1996p117"/>

==參見==

\*[[小行星列表]]

==備註==

{{Reflist|colwidth=30em}}

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