Asteroids

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Asteroids overview

Asteroid

Asteroids are minor planets (small Solar System bodies and dwarf planets) that are not comets, especially those of the inner Solar System. They have also been called **planetoids**, especially the larger ones. These terms have historically been applied to any astronomical object orbiting the Sun that did not show the disk of a planet and was not observed to have the characteristics of an active comet, but as small objects in the outer Solar System were discovered, their volatile-based surfaces were found to more closely resemble comets, and so were often distinguished from traditional asteroids.[1] Thus the term *asteroid* has come increasingly to refer specifically to the small bodies of the inner Solar System out to the orbit of Jupiter. They are grouped with the outer bodies—centaurs, Neptune trojans, and trans-Neptunian objects—as minor planets, which is the term preferred in astronomical circles.[2] In this article the term "asteroid" refers to the minor planets of the inner Solar System.

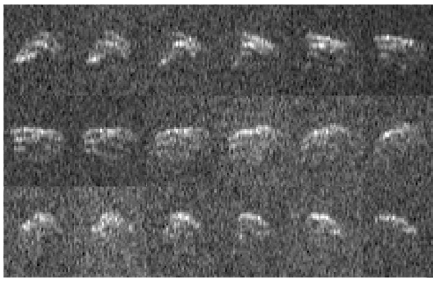
Animation of asteroid 433 Eros in rotation.

There are millions of asteroids, many thought to be the shattered remnants of planetesimals, bodies within the young Sun's solar nebula that never grew large enough to become planets.[3] The large majority of known asteroids orbit in the asteroid belt between the orbits of Mars and Jupiter or co-orbital with Jupiter (the Jupiter Trojans). However, other orbital families exist with significant populations, including the near-Earth asteroids. Individual asteroids are classified by their characteristic spectra, with the majority falling into three main groups: C-type, S-type, and M-type. These were named after and are generally identified with carbon-rich, stony, and metallic compositions, respectively.

Only one asteroid, 4 Vesta, which has a relatively reflective surface, is normally visible to the naked eye, and this only in very dark skies when it is favorably positioned. Rarely, small asteroids passing close to Earth may be naked-eye visible for a short time.[4]

Naming

A newly discovered asteroid is given a provisional designation (such as 2002 AT_4) consisting of the year of discovery and an alphanumeric code indicating the half-month of discovery and the sequence within that half-month. Once an asteroid's orbit has been confirmed, it is given a number, and later may also be given a name (e.g. 433 Eros). The formal naming convention uses parentheses around the number (e.g. (433) Eros), but dropping the parentheses is quite common. Informally, it is common to drop the number altogether, or to drop it after the first mention when a name is repeated in running text.



2013 EC, shown here in radar images, has a provisional designation

Symbols

The first asteroids to be discovered were assigned iconic symbols like the ones traditionally used to designate the planets. By 1855 there were two dozen asteroid symbols, which often occurred in multiple variants.[5]

Asteroid	Symbol		Year
Ceres		Ceres' scythe, reversed to double as the letter *C*	1801
2 Pallas		Athena's (Pallas') spear	1801
3 Juno		A star mounted on a scepter, for Juno, the Queen of Heaven	1804
4 Vesta		The altar and sacred fire of Vesta	1807
5 Astraea		A scale, or an inverted anchor, symbols of justice	1845
6 Hebe		Hebe's cup	1847
7 Iris		A rainbow (*iris*) and a star	1847
8 Flora		A flower (*flora*) (specifically the Rose of England)	1847
9 Metis		The eye of wisdom and a star	1848
10 Hygiea		Hygiea's serpent and a star, or the Rod of Asclepius	1849
11 Parthenope		A harp, or a fish and a star; symbols of the sirens	1850
12 Victoria		The laurels of victory and a star	1850
13 Egeria		A shield, symbol of Egeria's protection, and a star	1850
14 Irene		A dove carrying an olive branch (symbol of *irene* 'peace') with a star on its head,[6] or an olive branch, a flag of truce, and a star	1851
15 Eunomia		A heart, symbol of good order (*eunomia*), and a star	1851
16 Psyche		A butterfly's wing, symbol of the soul (*psyche*), and a star	1852
17 Thetis		A dolphin, symbol of Thetis, and a star	1852
18 Melpomene		The dagger of Melpomene, and a star	1852
19 Fortuna		The wheel of fortune and a star	1852
26 Proserpina		Proserpina's pomegranate	1853

28 Bellona		Bellona's whip and lance[7]	1854
29 Amphitrite		The shell of Amphitrite and a star	1854
35 Leukothea		A lighthouse beacon, symbol of Leucothea[8]	1855
37 Fides	†	The cross of faith (*fides*)[9]	1855

In 1851,[10] after the fifteenth asteroid (Eunomia) had been discovered, Johann Franz Encke made a major change in the upcoming 1854 edition of the *Berliner Astronomisches Jahrbuch* (BAJ, *Berlin Astronomical Yearbook*). He introduced a disk (circle), a traditional symbol for a star, as the generic symbol for an asteroid. The circle was then numbered in order of discovery to indicate a specific asteroid (although he assigned ① to the fifth, Astraea, while continuing to designate the first four only with their existing iconic symbols). The numbered-circle convention was quickly adopted by astronomers, and the next asteroid to be discovered (16 Psyche, in 1852) was the first to be designated in that way at the time of its discovery. However, Psyche was also given an iconic symbol, as were a few other asteroids discovered over the next few years (see chart above). 20 Massalia was the first asteroid that was not assigned a symbol, and no additional iconic symbols were created after the 1855 discovery of 37 Fides.[11] That year Astraea's number was increased to ⑤, but the first four asteroid, Ceres to Vesta, were not listed by their numbers until the 1867 edition. The circle became a pair of parentheses, and the parentheses were sometimes omitted altogether over the next few decades, leading to the modern convention.[6]

Discovery

243 Ida and its moon Dactyl. Dactyl is the first satellite of an asteroid to be discovered.

The first asteroid to be discovered, Ceres, was found in 1801 by Giuseppe Piazzi, and was originally considered to be a new planet.[12] This was followed by the discovery of other similar bodies, which, with the equipment of the time, appeared to be points of light, like stars, showing little or no planetary disc, though readily distinguishable from stars due to their apparent motions. This prompted the astronomer Sir William Herschel to propose the term "asteroid", coined in Greek as ἀστεροειδής *asteroeidēs* 'star-like, star-shaped', from Ancient Greek ἀστήρ *astēr* 'star, planet'. In the early second half of the nineteenth century, the terms "asteroid" and "planet" (not always qualified as "minor") were still used interchangeably; for example, the *Annual of Scientific Discovery for 1871* [13], page 316, reads "Professor J. Watson has been awarded by the Paris Academy of Sciences, the astronomical prize, Lalande foundation, for the discovery of eight new asteroids in one year. The planet Lydia (No. 110), discovered by M. Borelly at the Marseilles Observatory [...] M. Borelly had previously discovered two planets bearing the numbers 91 and 99 in the system of asteroids revolving between Mars and Jupiter".

Historical methods

Asteroid discovery methods have dramatically improved over the past two centuries.

In the last years of the 18th century, Baron Franz Xaver von Zach organized a group of 24 astronomers to search the sky for the missing planet predicted at about 2.8 AU from the Sun by the Titius-Bode law, partly because of the discovery, by Sir William Herschel in 1781, of the planet Uranus at the distance predicted by the law. This task required that hand-drawn sky charts be prepared for all stars in the zodiacal band down to an agreed-upon limit of faintness. On subsequent nights, the sky would be charted again and any moving object would, hopefully, be spotted. The expected motion of the missing planet was about 30 seconds of arc per hour, readily discernible by observers.

The first object, Ceres, was not discovered by a member of the group, but rather by accident in 1801 by Giuseppe Piazzi, director of the observatory of Palermo in Sicily. He discovered a new star-like object in Taurus and followed the displacement of this object during several nights. His colleague, Carl Friedrich Gauss, used these observations to find the exact distance from this unknown object to the Earth. Gauss' calculations placed the object between the planets Mars and Jupiter. Piazzi named it after Ceres, the Roman goddess of agriculture.

Three other asteroids (2 Pallas, 3 Juno, and 4 Vesta) were discovered over the next few years, with Vesta found in 1807. After eight more years of fruitless searches, most astronomers assumed that there were no more and abandoned any further searches.

However, Karl Ludwig Hencke persisted, and began searching for more asteroids in 1830. Fifteen years later, he found 5 Astraea, the first new asteroid in 38 years. He also found 6 Hebe less than two years later. After this, other astronomers joined in the search and at least one new asteroid was discovered every year after that (except the wartime year 1945). Notable asteroid hunters of this early era were J. R. Hind, Annibale de Gasparis, Robert Luther, H. M. S. Goldschmidt, Jean Chacornac, James Ferguson, Norman Robert Pogson, E. W. Tempel, J. C. Watson, C. H. F. Peters, A. Borrelly, J. Palisa, the Henry brothers and Auguste Charlois.

In 1891, Max Wolf pioneered the use of astrophotography to detect asteroids, which appeared as short streaks on long-exposure photographic plates. This dramatically increased the rate of detection compared with earlier visual methods: Wolf alone discovered 248 asteroids, beginning with 323 Brucia, whereas only slightly more than 300 had been discovered up to that point. It was known that there were many more, but most astronomers did not bother with them[*citation needed*], calling them "vermin of the skies", a phrase variously attributed to Eduard Suess[14] and Edmund Weiss.[15] Even a century later, only a few thousand asteroids were identified, numbered and named.

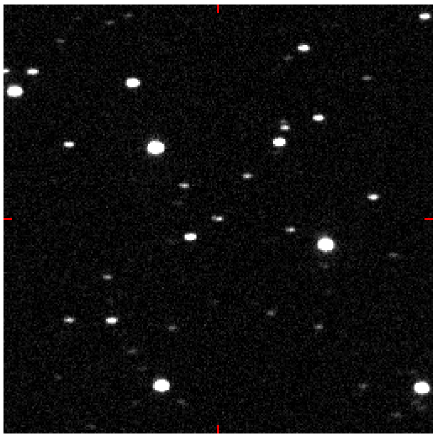
Manual methods of the 1900s and modern reporting

Until 1998, asteroids were discovered by a four-step process. First, a region of the sky was photographed by a wide-field telescope, or Astrograph. Pairs of photographs were taken, typically one hour apart. Multiple pairs could be taken over a series of days. Second, the two films or plates of the same region were viewed under a stereoscope. Any body in orbit around the Sun would move slightly between the pair of films. Under the stereoscope, the image of the body would seem to float slightly above the background of stars. Third, once a moving body was identified, its location would be measured precisely using a digitizing microscope. The location would be measured relative to known star locations.[16]

These first three steps do not constitute asteroid discovery: the observer has only found an apparition, which gets a provisional designation, made up of the year of discovery, a letter representing the half-month of discovery, and finally a letter and a number indicating the discovery's sequential number (example: 1998 FJ_{74}).

The last step of discovery is to send the locations and time of observations to the Minor Planet Center, where computer programs determine whether an apparition ties together earlier apparitions into a single orbit. If so, the object receives a catalogue number and the observer of the first apparition with a calculated orbit is declared the discoverer, and granted the honor of naming the object subject to the approval of the International Astronomical Union.

Computerized methods



2004 FH is the center dot being followed by the sequence; the object that flashes by during the clip is an artificial satellite.

There is increasing interest in identifying asteroids whose orbits cross Earth's, and that could, given enough time, collide with Earth (see Earth-crosser asteroids). The three most important groups of near-Earth asteroids are the Apollos, Amors, and Atens. Various asteroid deflection strategies have been proposed, as early as the 1960s.

The near-Earth asteroid 433 Eros had been discovered as long ago as 1898, and the 1930s brought a flurry of similar objects. In order of discovery, these were: 1221 Amor, 1862 Apollo, 2101 Adonis, and finally 69230 Hermes, which approached within 0.005 AU of the Earth in 1937. Astronomers began to realize the possibilities of Earth impact.

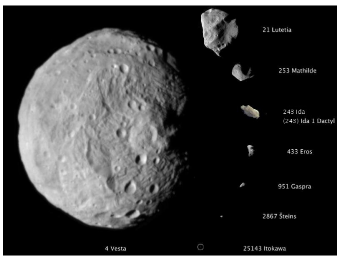
Two events in later decades increased the alarm: the increasing acceptance of Walter Alvarez' hypothesis that an impact event resulted in the Cretaceous–Paleogene extinction, and the 1994 observation of Comet Shoemaker-Levy 9 crashing into Jupiter. The U.S. military also declassified the information that its military satellites, built to detect nuclear explosions, had detected hundreds of upper-atmosphere impacts by objects ranging from one to 10 metres across.

All these considerations helped spur the launch of highly efficient automated systems that consist of Charge-Coupled Device (CCD) cameras and computers directly connected to telescopes. Since 1998, a large majority of the asteroids have been discovered by such automated systems. A list of teams using such automated systems includes:[17]

- The Lincoln Near-Earth Asteroid Research (LINEAR) team
- The Near-Earth Asteroid Tracking (NEAT) team
- Spacewatch
- The Lowell Observatory Near-Earth-Object Search (LONEOS) team
- The Catalina Sky Survey (CSS)
- The Campo Imperatore Near-Earth Objects Survey (CINEOS) team
- The Japanese Spaceguard Association
- The Asiago-DLR Asteroid Survey (ADAS)

The LINEAR system alone has discovered 121,346 asteroids, as of March, 2011.[18] Among all the automated systems, 4711 near-Earth asteroids have been discovered[19] including over 600 more than 1 km (0.6 mi) in diameter.

Terminology



A composite image, to scale, of the asteroids which have been imaged at high resolution. As of 2011 they are, from largest to smallest: 4 Vesta, 21 Lutetia, 253 Mathilde, 243 Ida and its moon Dactyl, 433 Eros, 951 Gaspra, 2867 Šteins, 25143 Itokawa.

The largest asteroid in the previous image, Vesta (left), with Ceres (center) and Earth's Moon (right) shown to scale.

Traditionally, small bodies orbiting the Sun were classified as asteroids, comets or meteoroids, with anything smaller than ten metres across being called a meteoroid.[20] The term "asteroid" is ill-defined. It never had a formal definition, with the broader term minor planet being preferred by the International Astronomical Union from 1853 on. In 2006, the term "small Solar System body" was introduced to cover both most minor planets and comets.[21] Other languages prefer "planetoid" (Greek for "planet-like"), and this term is occasionally used in English for larger minor planets such as the dwarf planets. The word "planetesimal" has a similar meaning, but refers specifically to the small building blocks of the planets that existed when the Solar System was forming. The term "planetule" was coined by the geologist William Daniel Conybeare to describe minor planets,[22] but is not in common use. The three largest objects in the asteroid belt, Ceres, 2 Pallas, and 4 Vesta, grew to the stage of protoplanets. Ceres is a dwarf planet, the only one in the inner Solar System.

When found, asteroids were seen as a class of objects distinct from comets, and there was no unified term for the two until "small Solar System body" was coined in 2006. The main difference between an asteroid and a comet is that a comet shows a coma due to sublimation of near surface ices by solar radiation. A few objects have ended up being dual-listed because they were first classified as minor planets but later showed evidence of cometary activity. Conversely, some (perhaps all) comets are eventually depleted of their surface volatile ices and become asteroids. A further distinction is that comets typically have more eccentric orbits than most asteroids; most "asteroids" with notably eccentric orbits are probably dormant or extinct comets.[23]

For almost two centuries, from the discovery of Ceres in 1801 until the discovery of the first centaur, 2060 Chiron, in 1977, all known asteroids spent most of their time at or within the orbit of Jupiter, though a few such as 944 Hidalgo ventured far beyond Jupiter for part of their orbit. When astronomers started finding more small bodies that permanently resided further out than Jupiter, now called centaurs, they numbered them among the traditional asteroids, though there was debate over whether they should be considered as asteroids or as a new type of object. Then, when the first trans-Neptunian object, 1992 QB1, was discovered in 1992, and especially when large numbers of similar objects started turning up, new terms were invented to sidestep the issue: Kuiper-belt object, trans-Neptunian object, scattered-disc object, and so on. These inhabit the cold outer reaches of the Solar System where ices remain solid and comet-like bodies are not expected to exhibit much cometary activity; if centaurs or trans-Neptunian objects were to venture close to the Sun, their volatile ices would sublimate, and traditional approaches would classify them as comets and not asteroids.

The innermost of these are the Kuiper-belt objects, called "objects" partly to avoid the need to classify them as asteroids or comets.[24] They are believed to be predominantly comet-like in composition, though some may be more akin to asteroids.[25] Furthermore, most do not have the highly eccentric orbits associated with comets, and the ones so far discovered are larger than traditional comet nuclei. (The much more distant Oort cloud is hypothesized to be the main reservoir of dormant comets.) Other recent observations, such as the analysis of the cometary dust collected by the Stardust probe, are increasingly blurring the distinction between comets and asteroids,[26] suggesting "a continuum between asteroids and comets" rather than a sharp dividing line.[27]

The minor planets beyond Jupiter's orbit are sometimes also called "asteroids", especially in popular presentations.[28] However, it is becoming increasingly common for the term "asteroid" to be restricted to minor planets of the inner Solar System.[24] Therefore, this article will restrict itself for the most part to the classical asteroids: objects of the asteroid belt, Jupiter trojans, and near-Earth objects.

When the IAU introduced the class small Solar System bodies in 2006 to include most objects previously classified as minor planets and comets, they created the class of dwarf planets for the largest minor planets—those that have enough mass to have become ellipsoidal under their own gravity. According to the IAU, "the term 'minor planet' may still be used, but generally the term 'Small Solar System Body' will be preferred."[29] Currently only the largest object in the asteroid belt, Ceres, at about 950 km (590 mi) across, has been placed in the dwarf planet category, although there are several large asteroids (Vesta, Pallas, and Hygiea) that may be classified as dwarf planets when their shapes are better known.[30]

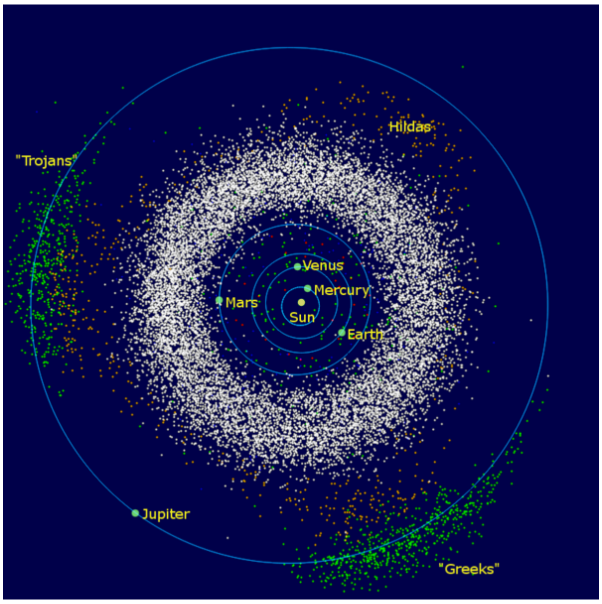
Formation

It is believed that planetesimals in the asteroid belt evolved much like the rest of the solar nebula until Jupiter neared its current mass, at which point excitation from orbital resonances with Jupiter ejected over 99% of planetesimals in the belt. Simulations and a discontinuity in spin rate and spectral properties suggest that asteroids larger than approximately 120 km (75 mi) in diameter accreted during that early era, whereas smaller bodies are fragments from collisions between asteroids during or after the Jovian disruption.[31] Ceres and Vesta grew large enough to melt and differentiate, with heavy metallic elements sinking to the core, leaving rocky minerals in the crust.[]

In the Nice model, many Kuiper-belt objects are captured in the outer asteroid belt, at distances greater than 2.6 AU. Most were later ejected by Jupiter, but those that remained may be the D-type asteroids, and possibly include Ceres.[32]

Distribution within the Solar System

Various dynamical groups of asteroids have been discovered orbiting in the inner Solar System. Their orbits are perturbed by the gravity of other bodies in the Solar System and by the Yarkovsky effect. Significant populations include:



The asteroid belt (white) and the Trojan asteroids (green)

Asteroid belt

The majority of known asteroids orbit within the asteroid belt between the orbits of Mars and Jupiter, generally in relatively low-eccentricity (i.e. not very elongated) orbits. This belt is now estimated to contain between 1.1 and 1.9 million asteroids larger than 1 km (0.6 mi) in diameter,[33] and millions of smaller ones. These asteroids may be remnants of the protoplanetary disk, and in this region the accretion of planetesimals into planets during the formative period of the Solar System was prevented by large gravitational perturbations by Jupiter.

Trojans

Trojan asteroids are a population that share an orbit with a larger planet or moon, but do not collide with it because they orbit in one of the two Lagrangian points of stability, L4 and L5, which lie 60° ahead of and behind the larger body.

The most significant population of Trojan asteroids are the Jupiter Trojans. Although fewer Jupiter Trojans have been discovered as of 2010, it is thought that they are as numerous as the asteroids in the asteroid belt.

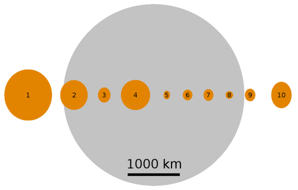
A couple of trojans have also been found orbiting with Mars.[34]

Near-Earth asteroids

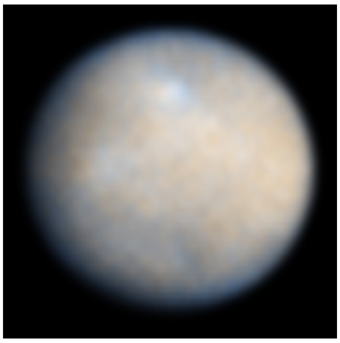
Near-Earth asteroids, or NEAs, are asteroids that have orbits that pass close to that of Earth. Asteroids that actually cross the Earth's orbital path are known as *Earth-crossers*. As of May 2010, 7,075 near-Earth asteroids are known and the number over one kilometre in diameter is estimated to be 500–1,000.

Characteristics

Size distribution



Sizes of the first ten asteroids to be discovered, compared to the Earth's Moon



HST image of the dwarf planet Ceres

Asteroids vary greatly in size, from almost 1,000 km for the largest down to rocks just tens of metres across.[35] The three largest are very much like miniature planets: they are roughly spherical, have at least partly differentiated interiors,[] and are thought to be surviving protoplanets. The vast majority, however, are much smaller and are irregularly shaped; they are thought to be either surviving planetesimals or fragments of larger bodies.

The dwarf planet Ceres is by far the largest asteroid, with a diameter of 975 km (610 mi). The next largest are 2 Pallas and 4 Vesta, both with diameters of just over 500 km (300 mi). Vesta is the only main-belt asteroid that can, on occasion, be visible to the naked eye. On some rare occasions, a near-Earth asteroid may briefly become visible without technical aid; see 99942 Apophis.

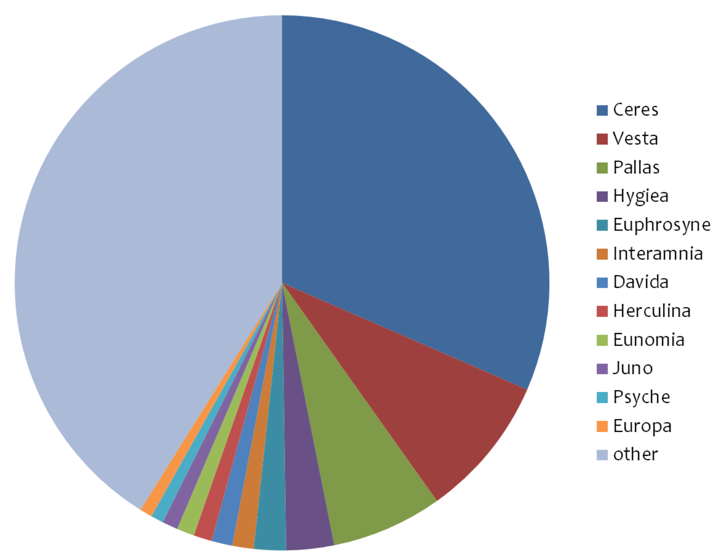
The mass of all the objects of the asteroid belt, lying between the orbits of Mars and Jupiter, is estimated to be about 2.8–3.2×10^{21} kg, or about 4 percent of the mass of the Moon. Of this, Ceres comprises 0.95×10^{21} kg, a third of the total.[36] Adding in the next three most massive objects, Vesta (9%), Pallas (7%), and Hygiea (3%), brings this figure up to 51%; whereas the three after that, 511 Davida (1.2%), 704 Interamnia (1.0%), and 52 Europa (0.9%), only add another 3% to the total mass. The number of asteroids then increases rapidly as their individual masses decrease.

The number of asteroids decreases markedly with size. Although this generally follows a power law, there are 'bumps' at 5 km and , where more asteroids than expected from a logarithmic distribution are found.[37]

Approximate number of asteroids N larger than diameter D

D	100 m	300 m	500 m	1 km	3 km	5 km	10 km	30 km	50 km	100 km	200 km	300 km	500 km	900 km
N	~25,000,000	4,000,000	2,000,000	750,000	200,000	90,000	10,000	1,100	600	200	30	5	3	1

Largest asteroids



The relative masses of the twelve List of notable asteroids#Largest by masslargest asteroids known, "Recent Asteroid Mass Determinations". Maintained by Jim Baer. Last updated 2010-12-12. Access date 2011-09-02. The values of Juno and Herculina may be off by as much as 16%, and Euphrosyne by a third. The order of the lower eight may change as better data is acquired, but the values do not overlap with any known asteroid outside these twelve. compared to the remaining mass of the asteroid belt.

Although their location in the asteroid belt excludes them from planet status, the four largest objects, Ceres, Vesta, Pallas, and Hygiea, are remnant protoplanets that share many characteristics common to planets, and are atypical compared to the majority of "potato"-shaped asteroids.

Ceres is the only asteroid with a fully ellipsoidal shape and hence dwarf planet.[39] Vesta has—aside from the large crater at its southern pole, Rheasilvia—an ellipsoidal shape. Ceres has a much higher absolute magnitude than the other asteroids, of around 3.32,[40] and may possess a surface layer of ice.[] Like the planets, Ceres is differentiated: it has a crust, a mantle and a core.[] Vesta, too, has a differentiated interior, though it formed inside the Solar System's frost line, and so is devoid of water;[41] its composition is mainly of basaltic rock such as olivine.[42] Pallas is unusual in that, like Uranus, it rotates on its side, with its axis of rotation tilted at high angles to its orbital plane.[] Its composition is similar to that of Ceres: high in carbon and silicon, and perhaps partially differentiated.[43] Hygiea is a carbonaceous asteroid and, unlike the other largest asteroids, lies relatively close to the plane of the ecliptic.[44]

Attributes of protoplanetary asteroids

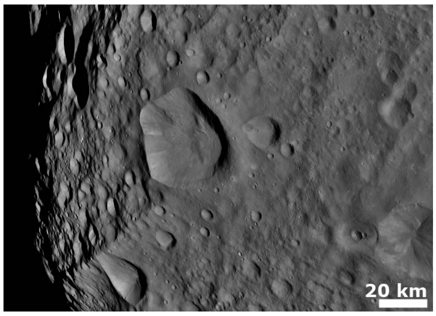
Name	Orbital radius (AU)	Orbital period (years)	Inclination to ecliptic	Orbital eccentricity	Diameter (km)	Diameter (% of Moon)	Mass ($\times 10^{18}$ kg)	Mass (% of Ceres)	Density[45] g/cm^3	Rotation period (hr)	Axial tilt	Surface temperature
Vesta	2.36	3.63	7.1°	0.089	573×557×446 (mean 525)	15%	260	28%	3.44 ± 0.12	5.34	29°	85–270 K
Ceres	2.77	4.60	10.6°	0.079	975×975×909 (mean 952)	28%	940	100%	2.12 ± 0.04	9.07	≈ 3°	167 K
Pallas	2.77	4.62	34.8°	0.231	580×555×500 (mean 545)	16%	210	22%	2.71 ± 0.11	7.81	≈ 80°	164 K
Hygiea	3.14	5.56	3.8°	0.117	530×407×370 (mean 430)	12%	87	9%	2.76 ± 1.2	27.6	≈ 60°	164 K

Rotation

Measurements of the rotation rates of large asteroids in the asteroid belt show that there is an upper limit. No asteroid with a diameter larger than 100 meters has a rotation period smaller than 2.2 hours. For asteroids rotating faster than approximately this rate, the inertia at the surface is greater than the gravitational force, so any loose surface material would be flung out. However, a solid object should be able to rotate much more rapidly. This suggests that most asteroids with a diameter over 100 meters are rubble piles formed through accumulation of debris after collisions between asteroids.[46]

Composition

The physical composition of asteroids is varied and in most cases poorly understood. Ceres appears to be composed of a rocky core covered by an icy mantle, where Vesta is thought to have a nickel-iron core, olivine mantle, and basaltic crust.[47] 10 Hygiea, however, which appears to have a uniformly primitive composition of carbonaceous chondrite, is thought to be the largest undifferentiated asteroid. Most of the smaller asteroids are thought to be piles of rubble held together loosely by gravity, though the largest are probably solid. Some asteroids have moons or are co-orbiting binaries: Rubble piles, moons, binaries, and scattered asteroid families are believed to be the results of collisions that disrupted a parent asteroid.



Cratered terrain on 4 Vesta

Asteroids contain traces of amino acids and other organic compounds, and some speculate that asteroid impacts may have seeded the early Earth with the chemicals necessary to initiate life, or may have even brought life itself to Earth. (See also panspermia.)[48] In August 2011, a report, based on NASA studies with meteorites found on Earth, was published suggesting DNA and RNA components (adenine, guanine and related organic molecules) may have been formed on asteroids and comets in outer space.[][][]

Composition is calculated from three primary sources: albedo, surface spectrum, and density. The last can only be determined accurately by observing the orbits of moons the asteroid might have. So far, every asteroid with moons has turned out to be a rubble pile, a loose conglomeration of rock and metal that may be half empty space by volume. The investigated asteroids are as large as 280 km in diameter, and include 121 Hermione (268×186×183 km), and 87 Sylvia (384×262×232 km). Only half a dozen asteroids are larger than 87 Sylvia, though none of them have moons; however, some smaller asteroids are thought to be more massive, suggesting they may not have been disrupted, and indeed 511 Davida, the same size as Sylvia to within measurement error, is estimated to be two and a half times as massive, though this is highly uncertain. The fact that such large asteroids as Sylvia can be rubble piles, presumably due to disruptive impacts, has important consequences for the formation of the Solar system: Computer simulations of collisions involving solid bodies show them destroying each other as often as merging, but colliding rubble piles are more likely to merge. This means that the cores of the planets could have formed relatively quickly.[49]

On October 7, 2009, the presence of water ice was confirmed on the surface of 24 Themis using NASA's Infrared Telescope Facility. The surface of the asteroid appears completely covered in ice. As this ice layer is sublimated, it may be getting replenished by a reservoir of ice under the surface. Organic compounds were also detected on the surface.[50][51][][52] Scientists hypothesize that some of the first water brought to Earth was delivered by asteroid impacts after the collision that produced the Moon. The presence of ice on 24 Themis supports this theory.[]

Surface features

253 Mathilde, a C-type asteroid measuring about 50 kilometres (30 mi) across, covered in craters half that size. Photograph taken in 1997 by the NEAR Shoemaker probe.

Most asteroids outside the big four (Ceres, Pallas, Vesta, and Hygiea) are likely to be broadly similar in appearance, if irregular in shape. 50-km 253 Mathilde (shown at right) is a rubble pile saturated with craters with diameters the size of the asteroid's radius, and Earth-based observations of 300-km 511 Davida, one of the largest asteroids after the big four, reveal a similarly angular profile, suggesting it is also saturated with radius-size craters.[53] Medium-sized asteroids such as Mathilde and 243 Ida that have been observed up close also reveal a deep regolith covering the surface. Of the big four, Pallas and Hygiea are practically unknown. Vesta has compression fractures encircling a radius-size crater at its south pole but is otherwise a spheroid. Ceres seems quite different in the glimpses Hubble has provided, with surface features that are unlikely to be due to simple craters and impact basins, but details will not be known until *Dawn* arrives in 2015.

Color

Asteroids become darker and redder with age due to space weathering.[54] However evidence suggests most of the color change occurs rapidly, in the first hundred thousands years, limiting the usefulness of spectral measurement for determining the age of asteroids.[55]

Classification

Asteroids are commonly classified according to two criteria: the characteristics of their orbits, and features of their reflectance spectrum.

Orbital classification

Many asteroids have been placed in groups and families based on their orbital characteristics. Apart from the broadest divisions, it is customary to name a group of asteroids after the first member of that group to be discovered. Groups are relatively loose dynamical associations, whereas families are tighter and result from the catastrophic break-up of a large parent asteroid sometime in the past.[56] Families have only been recognized within the asteroid belt. They were first recognized by Kiyotsugu Hirayama in 1918 and are often called Hirayama families in his honor.

About 30–35% of the bodies in the asteroid belt belong to dynamical families each thought to have a common origin in a past collision between asteroids. A family has also been associated with the plutoid dwarf planet Haumea.

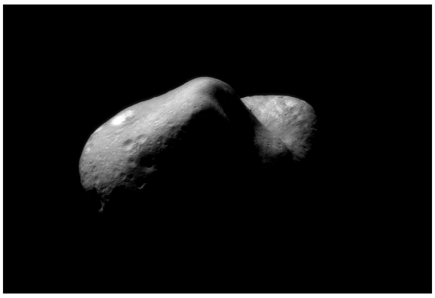
Quasi-satellites and horseshoe objects

Some asteroids have unusual horseshoe orbits that are co-orbital with the Earth or some other planet. Examples are 3753 Cruithne and 2002 AA_{29}. The first instance of this type of orbital arrangement was discovered between Saturn's moons Epimetheus and Janus.

Sometimes these horseshoe objects temporarily become quasi-satellites for a few decades or a few hundred years, before returning to their earlier status. Both Earth and Venus are known to have quasi-satellites.

Such objects, if associated with Earth or Venus or even hypothetically Mercury, are a special class of Aten asteroids. However, such objects could be associated with outer planets as well.

Spectral classification



This picture of 433 Eros shows the view looking from one end of the asteroid across the gouge on its underside and toward the opposite end. Features as small as 35 m (115 ft) across can be seen.

In 1975, an asteroid taxonomic system based on color, albedo, and spectral shape was developed by Clark R. Chapman, David Morrison, and Ben Zellner.[57] These properties are thought to correspond to the composition of the asteroid's surface material. The original classification system had three categories: C-types for dark carbonaceous objects (75% of known asteroids), S-types for stony (silicaceous) objects (17% of known asteroids) and U for those that did not fit into either C or S. This classification has since been expanded to include many other asteroid types. The number of types continues to grow as more asteroids are studied.

The two most widely used taxonomies now used are the Tholen classification and SMASS classification. The former was proposed in 1984 by David J. Tholen, and was based on data collected from an eight-color asteroid survey performed in the 1980s. This resulted in 14 asteroid categories.[58] In 2002, the Small Main-Belt Asteroid Spectroscopic Survey resulted in a modified version of the Tholen taxonomy with 24 different types. Both systems have three broad categories of C, S, and X asteroids, where X consists of mostly metallic asteroids, such as the M-type. There are also several smaller classes.[59]

Note that the proportion of known asteroids falling into the various spectral types does not necessarily reflect the proportion of all asteroids that are of that type; some types are easier to detect than others, biasing the totals.

Problems

Originally, spectral designations were based on inferences of an asteroid's composition.[60] However, the correspondence between spectral class and composition is not always very good, and a variety of classifications are in use. This has led to significant confusion. Although asteroids of different spectral classifications are likely to be composed of different materials, there are no assurances that asteroids within the same taxonomic class are composed of similar materials.

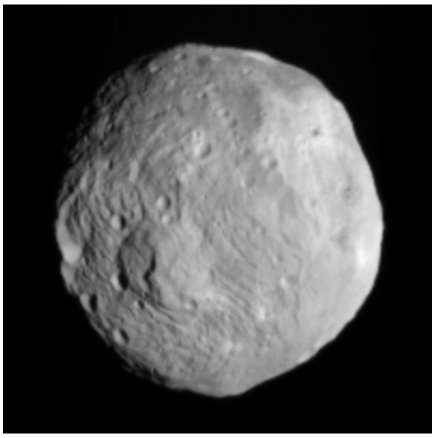
At present, the spectral classification based on several coarse resolution spectroscopic surveys in the 1990s is still the standard. Scientists cannot agree on a better taxonomic system,[*citation needed*] largely due to the difficulty of obtaining detailed measurements consistently for a large sample of asteroids (e.g. finer resolution spectra, or non-spectral data such as densities would be very useful).

Exploration

Until the age of space travel, objects in the asteroid belt were merely pinpricks of light in even the largest telescopes and their shapes and terrain remained a mystery. The best modern ground-based telescopes and the Earth-orbiting Hubble Space Telescope can resolve a small amount of detail on the surfaces of the largest asteroids, but even these mostly remain little more than fuzzy blobs. Limited information about the shapes and compositions of asteroids can be inferred from their light curves (their variation in brightness as they rotate) and their spectral properties, and asteroid sizes can be estimated by timing the lengths of star occulations (when an asteroid passes directly in front of a star). Radar imaging can yield good information about asteroid shapes and orbital and rotational parameters, especially for near-Earth asteroids. In terms of delta-v and propellant requirements, NEOs are more easily accessible than the Moon.[61]

951 Gaspra is the first asteroid to be imaged in close-up (enhanced color).

The first close-up photographs of asteroid-like objects were taken in 1971 when the Mariner 9 probe imaged Phobos and Deimos, the two small moons of Mars, which are probably captured asteroids. These images revealed the irregular, potato-like shapes of most asteroids, as did later images from the Voyager probes of the small moons of the gas giants.



Vesta, imaged by the Dawn spacecraft

The first true asteroid to be photographed in close-up was 951 Gaspra in 1991, followed in 1993 by 243 Ida and its moon Dactyl, all of which were imaged by the Galileo probe en route to Jupiter.

The first dedicated asteroid probe was NEAR Shoemaker, which photographed 253 Mathilde in 1997, before entering into orbit around 433 Eros, finally landing on its surface in 2001.

Several views of 433 Eros in natural colour

Other asteroids briefly visited by spacecraft en route to other destinations include 9969 Braille (by Deep Space 1 in 1999), and 5535 Annefrank (by Stardust in 2002).

In September 2005, the Japanese Hayabusa probe started studying 25143 Itokawa in detail and was plagued with difficulties, but returned samples of its surface to earth on June 13, 2010.

The European Rosetta probe (launched in 2004) flew by 2867 Šteins in 2008 and 21 Lutetia, the second-largest asteroid visited to date, in 2010.

In September 2007, NASA launched the Dawn Mission, which orbited the protoplanet 4 Vesta from July 2011 to September 2012, and is planned to orbit 1 Ceres in 2015. 4 Vesta is the largest asteroid visited to date.

On 13 December 2012, China's lunar orbiter Chang'e 2 flew within 2 miles (3 km) of the asteroid 4179 Toutatis on an extended mission.

The Japan Aerospace Exploration Agency (JAXA) plans to launch around 2015 the improved Hayabusa 2 space probe and to return asteroid samples by 2020. Current target for the mission is the C-type asteroid (162173) 1999 JU_3.

In May 2011, NASA announced the OSIRIS-REx sample return mission to asteroid 1999 RQ36, and is expected to launch in 2016.

It has been suggested that asteroids might be used as a source of materials that may be rare or exhausted on earth (asteroid mining), or materials for constructing space habitats (see Colonization of the asteroids). Materials that are heavy and expensive to launch from earth may someday be mined from asteroids and used for space manufacturing and construction.

Fiction

Asteroids and the asteroid belt are a staple of science fiction stories. Asteroids play several potential roles in science fiction: as places human beings might colonize, resources for extracting minerals, hazards encountered by spaceships traveling between two other points, and as a threat to life on Earth by potential impact.

Notes

[2] Asimov, Isaac, and Dole, Stephen H. *Planets for Man* (New York: Random House, 1964), p.43.

[4] Closest Flyby of Large Asteroid to be Naked-Eye Visible (http://www.space.com/spacewatch/050204_2004_mn4.html), Space.com, 4 February 2005

[11] Except for Pluto and, in the astrological community, for a few outer bodies such as 2060 Chiron

[12] Ceres is the largest asteroid and is now classified as a dwarf planet. All other asteroids are now classified as small Solar System bodies along with comets, centaurs, and the smaller trans-Neptunian objects.

[13] http://books.google.ca/books?id=NAMAAAAAMAAJ&pg=PA316&dq=%22planets%22+asteroids

[21] The definition of "small Solar System bodies" says that they "include most of the Solar System asteroids, most trans-Neptunian objects, comets, and other small bodies". *The Final IAU Resolution on the definition of "planet" ready for voting* (http://www.iau2006.org/mirror/www.iau.org/iau0602/index.html) (IAU)

[23] Weissman, Paul R., William F. Bottke, Jr., and Harold F. Levinson. "Evolution of Comets into Asteroids." *Southwest Research Institute, Planetary Science Directorate.* 2002. Web Retrieved 3 Aug. 2010 (http://www.boulder.swri.edu/~hal/PDF/asteroids3.pdf)

[24] "Are Kuiper Belt Objects asteroids?" (http://curious.astro.cornell.edu/question.php?number=601), "Ask an astronomer", Cornell University

[25] "Asteroids and Comets" (http://rst.gsfc.nasa.gov/Sect19/Sect19_22.html), NASA website

[26] "Comet Dust Seems More Asteroidy" (http://www.sciam.com/podcast/episode.cfm?id=ADD0878B-D6C3-3B70-7B5BC373545BB82D) *Scientific American*, January 25, 2008

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[28] For instance, a joint NASA–JPL public-outreach website states: <http://ssd.jpl.nasa.gov/?asteroids>

[29] Questions and Answers on Planets (http://www.iau.org/public_press/news/release/iau0603/questions_answers/), IAU

[30] "Three new planets may join solar system" (http://space.newscientist.com/article.ns?id=dn9761&feedId=online-news_rss20F53), *New Scientist*, 16 August 2006

[32] William B. McKinnon, 2008, "On The Possibility Of Large KBOs Being Injected Into The Outer Asteroid Belt". (http://adsabs.harvard.edu/abs/2008DPS....40.3803M) *American Astronomical Society,* DPS meeting #40, #38.03

[34] Neptune also has a few known trojans, and these are thought to actually be much more numerous than the Jovian trojans. However, they are often included in the trans-Neptunian population rather than counted with the asteroids.

[35] Below , these rocks are by convention considered to be meteoroids.

[37] Davis 2002, "Asteroids III", cited by Željko Ivezić (http://www.astro.washington.edu/users/ivezic/Astr598/lecture4.pdf)

[38] "Recent Asteroid Mass Determinations" (http://home.earthlink.net/~jimbaer1/astmass.txt). Maintained by Jim Baer. Last updated 2010-12-12. Access date 2011-09-02. The values of Juno and Herculina may be off by as much as 16%, and Euphrosyne by a third. The order of the lower eight may change as better data is acquired, but the values do not overlap with any known asteroid outside these twelve.

[47] HubbleSite – NewsCenter – Asteroid or Mini-Planet? Hubble Maps the Ancient Surface of Vesta (04/19/1995) – Release Images (http://hubblesite.org/newscenter/archive/releases/1995/20/image/)

[48] Life is Sweet: Sugar-Packing Asteroids May Have Seeded Life on Earth (http://www.space.com/scienceastronomy/planetearth/meteor_sugar_011219.html) , Space.com, 19 December 2001

[49] Marchis, Descamps, et al. *Icarus*, Feb. 2011

[53] A.R. Conrad *et al.* 2007. " Direct measurement of the size, shape, and pole of 511 Davida with Keck AO in a single night (http://www2.keck.hawaii.edu/inst/people/conrad/research/pub/d511.pdf)", *Icarus,*

[61] A Piloted Orion Flight to a Near-Earth Object: A Feasibility Study (http://ti.arc.nasa.gov/m/project/neo/pdf/NEO_feasibility.pdf)

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External links

- Asteroids@home (http://asteroidsathome.net/boinc/) (BOINC distributed computing project)
- Rocks from the Main Belt asteroids (http://rocksfromspace.open.ac.uk/asteroid_belt_detail.htm)
- Alphabetical list of minor planet names (ASCII) (http://www.minorplanetcenter.org/iau/lists/MPNames.html) (Minor Planet Center)
- Near Earth Asteroid Tracking (NEAT) (http://neat.jpl.nasa.gov/)
- Asteroids Page (http://solarsystem.nasa.gov/planets/profile.cfm?Object=Asteroids) at NASA's Solar System Exploration (http://solarsystem.nasa.gov/)
- Asteroid Simulator with Moon and Earth (http://www.colorado.edu/physics/2000/applets/satellites.html)
- Alphabetical and numerical lists of minor planet names (Unicode) (http://www.ipa.nw.ru/PAGE/DEPFUND/LSBSS/englenam.htm) (Institute of Applied Astronomy)
- Future Asteroid Interception Research (http://www.fair-society.org/)
- Near Earth Objects Dynamic Site (http://newton.dm.unipi.it/cgi-bin/neodys/neoibo)
- Asteroids Dynamic Site (http://hamilton.dm.unipi.it/astdys/) Up-to-date osculating orbital elements and proper orbital elements University of Pisa, Italy.
- JPL small bodies database (http://ssd.jpl.nasa.gov/?sb_elem) Current down-loadable ASCII table of orbit data and absolute mags H for over 200000 asteroids, sorted by number. Caltech/JPL.
- Asteroid naming statistics (http://quasar.ipa.nw.ru/PAGE/DEPFUND/LSBSS/statmpn.htm)
- Spaceguard UK (http://www.spaceguarduk.com/)
- Committee on Small Body Nomenclature (http://www.ss.astro.umd.edu/IAU/csbn/)
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- Asteroid articles in Planetary Science Research Discoveries (http://www.psrd.hawaii.edu/Archive/Archive-Asteroids.html)
- Catalogue of the Solar System Small Bodies Orbital Evolution (http://smallbodies.ru/en/)
- TECA Table of next close approaches to the Earth (http://www.brera.mi.astro.it/sormano/teca.html)
- SAEL Small Asteroids Encounter List (http://www.brera.mi.astro.it/sormano/sael.html)
- MBPL Minor Body Priority List (http://www.brera.mi.astro.it/sormano/mbpl.html)
- PCEL Planetary Close Encounter List (http://www.brera.mi.astro.it/sormano/pcel.html)
- NEO MAP (http://szyzyg.arm.ac.uk/~spm/neo_map.html) (Armagh Observatory)

Spectral Types

Asteroid spectral types

Asteroids are assigned a type based on spectral shape, color, and sometimes albedo. These types are thought to correspond to an asteroid's surface composition. For small bodies that are not internally differentiated, the surface and internal compositions are presumably similar, while large bodies such as 1 Ceres and 4 Vesta are known to have internal structure.

A list of types can be found at asteroid spectral classes.

Present-day classifications

The present-day classification was initiated by Clark R. Chapman, David Morrison, and Ben Zellner in 1975 with three categories:[] C for dark carbonaceous objects, S for stony (silicaceous) objects, and U for those that did not fit into either C or S. This classification has since been expanded and clarified.

A number of classification schemes are currently in existence,[] and while they strive to retain some mutual consistency, quite a few asteroids are sorted into different classes depending on the particular scheme. This is due to the use of different criteria for each approach. The two most widely used classifications are described below:

Tholen classification

The most widely used taxonomy for over a decade has been that of David J. Tholen, first proposed in 1984. This classification was developed from broad band spectra (between 0.31 μm and 1.06 μm) obtained during the Eight-Color Asteroid Survey (ECAS) in the 1980s, in combination with albedo measurements.[] The original formulation was based on 978 asteroids.

This scheme includes 14 types with the majority of asteroids falling into one of three broad categories, and several smaller types. They are, with their largest exemplars:[*citation needed*]

- **C-group** dark carbonaceous objects.
  - B-type (2 Pallas)
  - F-type (704 Interamnia)
  - G-type (1 Ceres)
  - C-type (10 Hygiea) the remaining majority of 'standard' C-type asteroids.
- **S-type** (15 Eunomia, 3 Juno) silicaceous (or "stony") objects.
- **X-group**
  - **M-type** (16 Psyche) metallic objects, the third most populous group.
  - E-type (44 Nysa, 55 Pandora) differ from M-type mostly by high albedo
  - P-type (259 Aletheia, 190 Ismene; CP: 324 Bamberga) differ from M-type mostly by low albedo

and the small classes:

- A-type (446 Aeternitas)
- D-type (624 Hektor)
- T-type (96 Aegle)
- Q-type (1862 Apollo)
- R-type (349 Dembowska)

- V-type (4 Vesta)

Objects were sometimes assigned a combined type such as *e.g.* CG when their properties were a combination of those typical for several types.[*citation needed*]

SMASS classification

This is a more recent taxonomy introduced by Schelte J. Bus and Richard P. Binzel in 2002, based on the *Small Main-Belt Asteroid Spectroscopic Survey* (**SMASS**) of 1447 asteroids.[] This survey produced spectra of a far higher resolution than ECAS, and was able to resolve a variety of narrow spectral features. However, a somewhat smaller range of wavelengths (0.44μm to 0.92μm) was observed. Also, albedos were not considered. While attempting to keep to the Tholen taxonomy as much as possible given the differing data, asteroids were sorted into the 24 types given below. The majority of bodies fall again into the three broad C, S, and X categories, with a few unusual bodies categorized into several smaller types:

- C-group of carbonaceous objects including:[*citation needed*]
  - B-type largely overlapping with the Tholen B and F types.
  - C-type the most 'standard' of the non-B carbonaceous objects
  - Cg Ch Cgh somewhat related to the Tholen G type
  - Cb transition objects between plain C and B types.
- S-group of silicaceous (stony) objects including:
  - A-type
  - Q-type
  - R-type
  - K-type a new category (181 Eucharis, 221 Eos)
  - L-type a new category (83 Beatrix)
  - S-type the most 'standard' of the S group
  - Sa, Sq, Sr, Sk, and Sl transition objects between plain S and the other types in the group.
- X-group of mostly metallic objects including:
  - X-type the most 'standard' of the X group including objects classified by Tholen as M, E, or P-type.
  - Xe, Xc, and Xk transition types between plain X and the appropriately lettered types.
- T-type
- D-type
- Ld-type: a new type with more extreme spectral features than the L-type
- O-type a small category (3628 Božněmcová)
- V-type (4 Vesta)

A significant number of small asteroids were found to fall in the Q, R, and V types, which were represented by only a single body in the Tholen scheme. In this Bus and Binzel SMASS scheme only a single type was assigned to any particular asteroid.

A few near-Earth objects have spectra that differ strongly from any of the SMASS classes. This is presumably because these bodies are much smaller than those detected in the asteroid belt, and as such may have younger less-altered surfaces or be composed of a less varied mix of minerals.[*citation needed*]

Appraisal

These classification schemes are expected to be refined and/or replaced as further research progresses. However for now the spectral classification based on the two above coarse resolution spectroscopic surveys from the 1990s is still the standard. Scientists have been unable to agree on a better taxonomic system, largely due to the difficulty of obtaining detailed measurements consistently for a large sample of asteroids (e.g. finer resolution spectra, or non-spectral data such as densities would be very useful).

Some groupings of asteroids have been correlated with meteorite types:

- C-type - Carbonaceous chondrite meteorites
- S-type - Stony meteorites
- M-type - Iron meteorites
- V-type - HED meteorites

References

Asteroids in Fiction

Asteroids in fiction

Asteroids and asteroid belts are a staple of science fiction stories. Asteroids play several potential roles in science fiction: as places which human beings might colonize; as resources for extracting minerals; as a hazard encountered by spaceships traveling between two other points; and as a threat to life on Earth due to potential impacts.

Overview

When the theme of interplanetary colonization first entered science fiction, the Asteroid Belt was quite low on the list of desirable real estate, far behind such planets as Mars and Venus (often conceived as a kind of paradise planet, until probes in the 1960s revealed the appalling temperatures and conditions under its clouds). Thus, in many stories and books the Asteroid Belt, if not a positive hazard, is still a rarely visited backwater in a colonized Solar System.[1]

The prospects of colonizing the Solar System planets dimmed as they became known to be not very hospitable to life. However, the asteroids came to be imagined as a vast accumulation of mineral wealth, accessible in conditions of minimal gravity, and supplementing Earth's presumably dwindling resources—though the value of such minerals would have to be very high indeed to make such enterprises economically viable. Stories of asteroid mining multiplied after the late 1940s, accompanied by descriptions of a society living in caves or domes on asteroids, or (unscientifically) providing the asteroid with an atmosphere held in place by an "artificial gravity".

The idea of such isolated settlements, coupled with existing stereotypes of American mineral prospectors in the 19th century "Wild West", gave rise to the stock character of a "Belter" or "Rock Rat" – a rugged and independent-minded individual, resentful of state or corporate authority.[2] Among such works is Ben Bova's *Asteroid Wars* series.

Another way in which asteroids could be considered a source of danger is by depicting them as a hazard to navigation, especially threatening to ships traveling from Earth to the outer parts of the Solar System and thus needing to pass the Asteroid Belt (or make a time- and fuel-consuming detour around it). In this context, asteroids serve the same role in space travel stories as reefs and underwater rocks in the older genre of seafaring adventure stories.[3] And like such hazards, asteroids could also be used by bold outlaws to avoid pursuit. Representations of the Asteroid Belt in film tend to make it unrealistically cluttered with dangerous rocks, so dense that adventurous measures must be taken to avoid an impact, giving dramatic visual images which the true nearly empty space would not provide. One of the best-known examples of this is the Hoth system in *Star Wars Episode V: The Empire Strikes Back*.

In reality asteroids, even in the main belt, are spaced extremely far apart. Proto-planets in the process of formation and planetary rings may look like that, but the Sun's asteroid belt does not. (The asteroid belt in the HD 69830 system may, however.) The asteroids are spread over such a high volume that it would be highly improbable even to pass close to a random asteroid. For example, the numerous space probes sent to the outer solar system, just across the main asteroid belt, have never had any problems, and asteroid rendezvous missions have elaborate targeting procedures. The movie *2001: A Space Odyssey* is unusual in that it does portray realistically the ship's "encounter" with a lone asteroid pair.

A common depiction of asteroids and comets in fiction is as a threat, whose impact on Earth could result with incalculable damage and loss of life.[4][5] This has a basis in scientific hypotheses regarding such impacts in the distant past as responsible for the extinction of the dinosaurs and other past catastrophes —though, as they seem to occur within tens of millions of years of each other, there is no special reason (other than creating a dramatic story line) to expect a new such impact at any close millennium.

In earlier works, asteroids provided grist for theories as to their origin – specifically, the theory that the asteroids are remnants of an exploded planet. This naturally leads to SF plot-lines dealing with the possibility that the planet had been inhabited, and if so – that the inhabitants caused its destruction themselves, by war or gross environmental mismanagement. A further extension is from the past of the existing asteroids to the possible future destruction of Earth or other planets and their rendering into new asteroids.[6][7]

Early examples

The earliest explicit references to asteroids date from the late nineteenth century:

- *Hector Servadac, Voyages et ADVENTURES à travers le Monde Solaire* (*Off on a Comet*, 1877), novel by Jules Verne. A Victorian vision of touring the solar system *via* handy "comet Gallia", the comet captures the "recently discovered asteroid *Nerina*" as it traverses the asteroid belt. Nerina was fictional at the time, but 1318 Nerina would be discovered and named by Cyril V. Jackson nearly sixty years later.
- *Edison's Conquest of Mars* (1898), serial by Garrett P. Serviss. A fleet of spaceships from Earth on its way to attack Mars halts at an asteroid that is being mined for gold by the Martians.
- *La Chasse au météore* ("Hunt for the Meteor", or "Chase of the Golden Meteor", 1908), by Jules and Michel Verne. This posthumously published Jules Verne novel was extensively edited and modified by his son Michel. The attribution of plot elements between father and son was long debated, until Verne's original version was unearthed. The book begins with the rivalry between two amateur astronomers who both claim discovery of a new asteroid. Originally an in-crowd issue among astronomers, it becomes a major worldwide problem when it is found that the asteroid is about to fall on Earth (to be exact, in Greenland). One of *The Adventures of Tintin* has a similar premise: *The Shooting Star*. Unlike later asteroid books, the main problem is not the damage which its fall may cause, but the fact that it is made of solid gold, which could upset the economy of the world. Thus, the asteroid's eventual fall into the Atlantic and its disappearance beneath the waves is presented as a satisfactory aversion of the economic danger, and there are none of the huge and highly destructive tsunami which in later stories (and in reality) would have followed.[8] Fred Hoyle's *Element 79* (1967) exploits essentially the same plot device: an asteroid with significant amount of gold wreaks havoc with the Earth's economy.
- *The Valley of Fear* (1914), short story by Sir Arthur Conan Doyle. Professor Moriarty, Sherlock Holmes's arch-enemy, "is the celebrated author of *'The Dynamics of an Asteroid'* , a book which ascends to such rarefied heights of pure mathematics that it is said that there was no man in the scientific press capable of criticizing it" Though the Holmes stories were published at the same time as those by H. G. Wells, Holmes regards astronomical studies as an issue of pure abstract science, which would never have practical applications or provide the scene of future adventures.
- "Asterite Invaders" (1932–33), a storyline in the *Buck Rogers* comic strip, featuring miniature humanoids living on the asteroids.
- *Le Petit Prince* (*The Little Prince*, 1943), novel by Antoine de Saint-Exupéry. The title character lives on an asteroid named "B-612". He then travels among various asteroids, each inhabited by a single person: a lamp-lighter, a king, a businessman, a geographer . . . . Saint-Exupéry made no effort at scientific accuracy, since he was mainly writing social and political commentary and satire. (For example, his reference to "Baobab trees which, if not uprooted in time, might take root and break an asteroid to pieces" is commonly understood as an allegory of Fascism). The asteroid moon Petit-Prince was named after the character, and 46610 Bésixdouze after his asteroid.

Real asteroids in fiction

Although the asteroids are commonly dealt with *en masse*, a few Main Belt asteroids have become well enough known to be named in fictional treatments.

Ceres

Dwarf planet Ceres is the largest and first discovered planetoid of the main-belt asteroids.

Eros

After Ceres, Asteroid 433 Eros is perhaps the most-commonly mentioned asteroid, probably because it is one of the largest near-Earth asteroids.

- “Our Distant Cousins” (1929), short story by Lord Dunsany. An enterprising aviator flies to Mars, but ends up on Eros on his return trip due to a navigation error. Everything on Eros is tiny due to its small size and gravity; the aviator brings a tiny elephant back to Earth in a matchbox, but it escapes.[9]
- "On the Planetoid Eros" (1931), a storyline in the *Buck Rogers* comic strip.
- *Dig Allen Space Explorer* (1959–1962) series of juvenile novels by Joseph Greene. Eros turns out to be a disguised alien spaceship.
- *Space Angel* (1962–1964) Cambria Productions TV series. In the episode 'The Visitor from Outer Space,' Scott McCloud and his crew are forced to destroy Eros by deflecting it into the Sun, when it becomes a hazard to spaceship navigation.
- *Captive Universe* (1969), novel by Harry Harrison. Eros has been converted into a vast hollow generation ship, the interior of which provides the setting for the story.
- *Ender's Game* (1985), novel by Orson Scott Card. Eros was formerly an outpost for the aliens known as Formics who installed artificial gravity but was taken over by humans and a Command School was built there. This is where Ender was sent after he graduated from Battle School.
- *Superman vs The Flash LCE* (Oct–Nov 1976) by DC Comics. Rokk and Sorban, rulers of the Gamblers' planet Ventura apparently blow up the asteroid Eros, which was due to collide with Earth in the year 8819. Of course this was an illusion set up by Professor Zoom and Abra Kadabra.
- *Vacuum Flowers* (1987), a novel by Michael Swanwick, is set partly in "Eros Kluster", a slum of jerry-rigged space stations orbiting 433 Eros.
- *Asteroid* (1997), NBC's two-part miniseries features a series of asteroids heading towards Earth. Eros, the larger of the two asteroids is shattered into small fragments by the Air Force's ABL in an attempt to divert it from a certain impact on Earth. Eros still proceeds to rain over Dallas, Texas.
- *Justice League of America* #26 (February 1999) by DC Comics. The JLA uses Eros as an inescapable prison for their unkillable foe, the General. He is simply deposited on the asteroid's flatter end. He later escapes with the aid of alien forces.
- *Evolution* (2003), novel by Stephen Baxter. Eros plays an important role in the future evolution of life on Earth. Millions of years after being perturbed into a new orbit, the asteroid collides with Earth, bringing about another mass extinction. The micrometeoroid-ravaged shell of NEAR Shoemaker still stands on the surface of Eros until seconds before the impact.
- *Leviathan Wakes* (2011), novel by Daniel Abraham writing as James S.A. Corey. Supporting "a population of one and a half million", Eros is "a port of call in the first generation of humanity's expansion" into the outer solar system and is the setting for a large part of this science fiction series opener.

Pallas

Asteroid 2 Pallas is the third-largest main belt asteroid.

- "Palladian Space Pirates" (1936), a storyline in the *Buck Rogers* comic strip.
- "The Shrinking Spaceman", episode of *Space Patrol* (1962), puppet television series. When the Galasphere crew are sent to repair the sonar beam transmitter on the asteroid Pallas. Husky succumbs to a mysterious shrinking disease after cutting his hand on a rock. Keeping him in suspended animation Professor Heggerty attempts to find a cure.
- *Pallas* (1993), novel by L. Neil Smith. Emerson Ngu, a boy who lives in a dystopian socialist commune in a crater on the terraformed asteroid Pallas, creates a crystal radio and is astonished to learn of the world outside the commune. Escaping, he discovers that the rest of Pallas is a libertarian utopia. Unable to forget his semi-enslaved family—whose "workers' paradise" is starving to death—he innovates a cheap but durable gun (because the Libertarians on Pallas, to their shame, did not have a domestic firearms industry), and sets about liberating his former commune. The book was partly inspired by the 1987 article "The Worst Mistake in the History of the Human Race" written by Jared Diamond. The book also includes a brief description of a way to encapsulate the entire surface of a small body such as an asteroid to enable creating an Earthlike environment.

Juno

Asteroid 3 Juno is one of the largest main belt asteroids, being the second heaviest of the stony S-type.

- *Mobile Suit Gundam* (1979), a Real Robot anime directed by Yoshiyuki Tomino. The asteroid Juno, renamed Luna 2, has been placed into Lunar orbit, opposite the moon for the purpose of supplying materials for space colony construction. It is later retrofitted into a military base for the Earth Federation.
- *Eon* (1985), science fiction novel by Greg Bear. Juno appears as a hollowed out asteroid/starship from the future, called the *Thistledown*.

Vesta

Asteroid 4 Vesta is the second largest of the asteroids.

- "Marooned Off Vesta" (1939), short story by Isaac Asimov. The surviving passengers of a wrecked spaceship are stranded in orbit around the asteroid Vesta. This was Asimov's first published work.
- *Lucky Starr and the Rings of Saturn*, 1958 novel by Isaac Asimov. Vesta is the site of an interstellar peace conference.
- *Known Space* series (1964 onward) by Larry Niven. Vesta is the site of one of the larger bases in the belt. It is a media center for the belt, and home of the *Vesta Beam*.
- Portions of Christopher L. Bennett's upcoming first original novel *Only Superhuman* (due for release in October 2012) take place on asteroid habitats in orbit of Vesta.

Icarus

Asteroid 1566 Icarus is best known for its close approach to Earth and the Sun.

- "Summertime on Icarus" (aka 'Icarus Ascending', 1960), short story by Arthur C. Clarke. An astronaut is stranded on Icarus as it approaches perihelion.
- *In the Ocean of Night* (1977), novel by Gregory Benford. An asteroid named Icarus plays a major role.
- *Lucifer's Hammer* (1977), novel by Larry Niven and Jerry Pournelle. The 1968 passing of Icarus is mentioned several times. However, the actual impactor is a comet, perturbed by a passage of the hypothetical dwarf star Nemesis.
- *The Memory of Whiteness* (1985), novel by Kim Stanley Robinson. Icarus is inhabited by a religious cult that worships its close approaches to the Sun.

- *Icarus's Way* (a.k.a. *The Trip of Icarus*) (1974), novel by Lyuben Dilov. Icarus is equipped with engines and turned into a large spaceship travelling for generations through the Universe.[10]
- Alley Oop, newspaper comic strip. During Icarus' 1968 passage the character Doc Wonmug electrostatically deflects it away from a collision with Earth.

Other asteroids

- *On a marché sur la Lune* (*Explorers on the Moon*, 1952), comic book in the *Tintin* series by Hergé. As Tintin and his friends are en route to the moon, **2101 Adonis** unexpectedly comes perilously close to the spacecraft. During a spacewalk, Captain Haddock inadvertently goes into orbit around the asteroid and has to be rescued.
- *Space Apprentice* (1962), novel by Arkady and Boris Strugatsky. A scientific station on **15 Eunomia** is annihilating large fragments of the asteroid in its advanced experiments, and a mine on **324 Bamberga** produces "space pearls".
- **15 Eunomia** is mentioned in the science-fiction novel *Rendezvous With Rama* (1973), by Arthur C. Clarke, as one of the five largest asteroids.
- "The Fubar Suit" (1997), short story by Stephen Baxter. An astronaut explores **624 Hektor**. Sample from 'The Baxterium' website [11].
- *Manifold: Time* (1999), novel by Stephen Baxter. **3753 Cruithne**. Humans send a pregnant genetically enhanced squid to operate equipment on the asteroid. The intelligent squids descended from the original colonist exploit Cruithne's mineral resources.
- *Dead Hand* (2001), novel by Harold Coyle. The asteroid Nereus 1991 HWC impacts Siberia triggering a desperate struggle to prevent a renegade Russian general from using the Perimetr system to overthrow the Russian government.[12]

Common themes

Colonization

When the theme of interplanetary colonization first entered SF, the Asteroid Belt was quite low on the list of desirable real estate, far behind such planets as Mars and Venus (often conceived as a kind of paradise planet, until probes in the 1960s revealed uninhabitable temperatures with a deadly carbon dioxide and sulfur atmosphere under its clouds). Thus, in many stories and books the Asteroid Belt, if not a positive hazard, is still a rarely visited backwater in a colonized Solar System.

- *Seetee Shock* (1949) and *Seetee Ship* (1951), novels by Jack Williamson featured terraformed and antimatter asteroids.
- *Dumb Martian* (1952), short story by John Wyndham. A ruthless Earth man buys a young Martian woman (Martians, in this story, being a humanoid race subject to Earth-human colonialism and exploitation). She is to serve as a companion in his five-year lonely tour of duty on an asteroid orbiting Jupiter. The power struggle between the two of them, isolated on the asteroid, forms the main plot, and the arrogant and chauvinistic Earth man finds the hard way that his "Dumb Martian" is not as dumb as he thought she was.
- *Lucky Starr and the Pirates of the Asteroids* (1953), juvenile novel by Isaac Asimov. The Asteroid Belt is the haunt of dangerous pirates. The hero, an agent of The Terran Empire, has not only his job but also a private score to settle with pirates who had killed his parents. In the end, however, the enlightened Empire gives former Pirate strongholds in terraformed asteroids a chance to stay on as law-abiding communities.[13]
- "The Lonely" (1959), episode of *The Twilight Zone*, television series. A convict, living in exile on an asteroid for 40 years, is clandestinely given a robot woman as a companion.
- "Island in the Sky" (*Uncle $crooge* #29, Mar. 1960), comic by Carl Barks. Scrooge McDuck scouted the asteroid belt to find a safe location for his money. The story depicts the asteroid belt as being much denser than it actually

is. There are also many very large asteroids, some having atmospheres and inhabitants. At least one is a virtual paradise, replete with lush vegetation including bananas, papayas, apples, nuts, wild rice and melons.
- "The Small Planets" (ca. 1960-62), episode of *Gumby* animation. Gumby searches for an asteroid to settle, but finds each one already inhabited by a reclusive and unfriendly child.
- *X-Men*, comic book. The villain Magneto has used an asteroid called Asteroid M (*X-men* #5, May 1964) as his base of operations, complete with an observation deck, hangar bays and medical facilities. The various facilities had technology that kept it concealed from standard detection technology.
- "Tales of the Flying Mountains" (1970), short stories first published 1962–65 by Poul Anderson. Collection of short stories on the colonization of the asteroids.[]
- *Protector* (1973), novel, and other short stories by Larry Niven. These stories explore the psychology of the "Belters", people born and raised in asteroid colonies. A similar society in the "Serpent Swarm" of asteroids in the Alpha Centauri system, are featured in some stories of the *Man-Kzin Wars* series.
- *Gundam*, anime and novel series by Yoshiyuki Tomino. Asteroids are utilized for a variety of purposes. In *Mobile Suit Gundam* (1979), Several asteroids have been moved from the asteroid belt to positions in Earth's Lagrange points. The most prominent of these are Solomon and A Baoa Qu, major space fortresses of the Principality of Zeon. Juno, formerly a mining asteroid, is renamed *Luna II* and moved to the *L3* Lagrangian point opposite to the Moon. It becomes the Earth Federation's main space military base during and after the story. . Solomon and A Baoa Qu eventually fall into the Federation's hands, and are renamed Konpei Island and Gate of Zedan, respectively. In *Mobile Suit Zeta Gundam* (1985), Axis is a former asteroid mining colony that has become the stronghold of the Axis Zeon faction. Originally located in the asteroid belt, Axis is equipped with thermonuclear pulse thrusters in order to travel to Earth. Axis arrives in the Earth Sphere late in the Gryps Conflict, and the alliances Axis forms drastically alter the balance of power.
- *The Venus Belt* (1981), novel in the *North American Confederation* series by L. Neil Smith. A social system of total free enterprise on asteroids.
- *Ender's Game* (1985) and *Ender's Shadow* novels by Orson Scott Card. The Asteroid Belt is mainly a military zone, housing the bases and institutions dedicated to the war against Earth's insectoid invaders. A major part of both books takes place at Command School on 433 Eros where gifted children are kept in complete isolation and ruthlessly turned into tough fleet commanders, losing their childhood in the process.
- *The Way* (1985–1996), series of novels by Greg Bear. There is a colony inside a hollowed-out asteroid.
- *Wing Commander: Privateer* (1993), computer game. Several space stations are inside asteroids.
- *The Orion Conspiracy* (1995), computer game. The Cerberus colony is on an asteroid.
- *Blue Mars* (1996), novel by Kim Stanley Robinson. The colonization of asteroids and how new technology affects their development.
- "Futurama" (1999–2003, 2008–). Humans have inhabited asteroids with single homes in the asteroid belt.
- *Freelancer* (2003), computer game. Several space stations are inside asteroids.
- *Asteroid Wars* (2001–2007), novels by Ben Bova. Warfare by corporations for control of the asteroid belt.

Mineral extraction

The prospects of colonizing the Solar System planets became more dim with increasing discoveries about conditions on them. Conversely, the potential value of the asteroids increased, as a vast accumulation of mineral wealth, accessible in conditions of minimal gravity, and supplementing Earth's dwindling resources. Stories of asteroid mining became more and more numerous since the late 1940s, with the next logical step being depictions of a society on terraformed asteroids — in some cases dug under the surface, in others having dome colonies and in still others provided with an atmosphere which is kept in place by an artificial gravity.

An image developed and was carried from writer to writer, of "Belters" or "Rock Rats" as rugged and independent-minded individuals, resentful of all authority (in some books and stories of the military and political power of Earth-bound nation states, in others of the corporate power of huge companies). As such, this sub-genre proved naturally attractive to writers with Libertarian tendencies. Moreover, depictions of the Asteroid Belt as The New Frontier clearly draw (sometimes explicitly) on the considerable literature of the Nineteenth-Century Frontier and the Wild West. And since (in nearly all stories) the asteroids are completely lifeless until the arrival of the humans, it is a New Frontier completely free of the moral taint of the brutal dispossession of the Native Americans in the original.

- *Seetee Ship* (1951) and *Seetee Shock* (1949) by Jack Williamson. Earth, Mars, Venus and the Jovian Moons are all dominated by competing tyrannical political systems (a Communist one, a Fascist one, and a Capitalist "democracy" totally dominated by a single vast, all-owning and all-controlling corporation). The scattered, despised and numerically inferior asteroid miners are left as the sole remaining champions of individual liberty. The "Rock Rats" neatly turn the tables by finding out how to produce energy from the collision of matter and anti-matter asteroids (anti-matter or "Contraterrene" is the "Seetee" (C-T) of the title). Virtually unlimited energy is broadcast from the Asteroid Belt all over the Solar System, for everybody to tap and use completely free of charge — and all the oppressive systems go crashing down.
- *Beyond Mars* (1952–1955), comic strip in *The New York Sunday News* by Jack Williamson. Loosely based on the novel *Seetee Ship*.
- *Catch That Rabbit*, short story by Isaac Asimov in the collection *I, Robot* (1950). A lonely asteroid mining station is the location for an intractable robot mystery and tangle.
- *The Rolling Stones* (1952), novel by Robert A. Heinlein. The family Stone travels to the Asteroid Belt, where the twins of the family hope to sell food and luxury items to the miners extracting radioactive ores.
- *The Rogue* (1963), short story by Poul Anderson. A tense love affair takes place between an asterite entrepreneur, who represents a kind of reversion to 19th Century Capitalism, and a woman officer in a space warship sent by the Social Justice Party (in power at Washington D.C.) to clip that entrepreneur's wings. The encounter is the first skirmish in what eventually develops into a full-scale Asterite War of Independence (consciously modelled on the American one), told of in further stories. Anderson's asteroid stories were eventually collected in *Tales of the Flying Mountains*, where the flourishing Asteroid Republic makes of a terraformed asteroid the first interstellar ship, which in the course of generations would reach other stellar systems. The veterans who go along tell, for the edification of the young generation, their memoirs of the pioneering days.[]
- *Known Space* (1964 onward) series of stories by Larry Niven. The Solar System is divided between the U.N.-dominated Earth and the Asteroid Belt, two competing political and cultural entities whose rivalry might at any moment descend into a destructive war — forming the background to several books and the main theme of *World of Ptavvs*. In this universe, it is planets such as Mars which are the neglected backwaters, Belters spurning them and their gravity wells as fit only for "Flatlanders".
- *The Men in the Jungle* (1967), novel by Norman Spinrad. The Asteroid Belt is originally colonized by Afrikaners who hog its mineral wealth and lord it over later-arrived immigrants from Third World countries — in effect recreating Apartheid all over again. A revolution culminates with the creation of the Belt Free State, a republic far less stable than Anderson's which is headed by the likeable though thoroughly corrupt Bart Fraden. The intervention of the Big Powers from Earth, seeking to control the same mineral wealth, leads to Fraden's overthrow and his escape out of the Solar System — setting the stage to further (quite grisly) adventures which are the book's main plot line.
- "Tinker" (1975), short story in the collection *High Justice*, vol. 1 of the Future History series by Jerry Pournelle. The Asteroid Belt is dominated by a consortium of multinational corporations (upgraded to multi-planetary corporations by this time). Pournelle deliberately turns upside down the well-established rules of this sub-genre by making the corporations and their field agent into the Good Guys of the story. The Bad Guys are the rugged miners of Jefferson Asteroid, who use assorted dirty tricks in their effort to get free of the corporations' rule — an aspiration which a character describes as "an atavistic nationalism for which there is no room in the Belt".
- *Heechee* (1976–2004) series of stories by Frederik Pohl. Explorers discover an asteroid orbiting perpendicular to the solar plane, filled with hundreds of small spaceships left aeons ago by a mysterious alien race which humans

call "Heechee". Named *Gateway* by the discovers, the powerful nations of the world occupy the asteroid and subsequently form the Gateway Corporation to administer the object. Under their open eye, there develops a culture of adventurers and prospectors rather similar to that portrayed in other asteroid books. Here, however, the prospecting is not for mineral wealth but rather for interstellar discovery, to which the adventurers set out blindly in the hardly understood alien ships, in trips which can end with riches or death.

- *Millennium 2.2* (1989), computer game. Asteroids are presented as both a mining opportunity (many minerals are only available to the player at first by mining asteroids) and as a shipping hazard.
- *Red Dwarf* (1988–1999), television series. Asteroids have presumably been mined for at least several decades, as Dave Lister is once heard singing a futuristic version of "Clementine" – "*On an asteroid / Evacuating for a mine / Lived an old plutonium miner / And his daughter Clementine...*". The Jupiter Mining Corporation, which operates the ship Red Dwarf, presumably mines on asteroids (Red Dwarf itself mined the Neptunian moon Triton, according to the novels).
- *The Stone Dogs* (1990), novel in the Draka series by S. M. Stirling. The Asteroid Belt is a major arena of the decades-long struggle between "The Domination of the Draka", a political and military entity bent on conquering everybody else and reducing them to literal slavery, and its arch-enemy "The Alliance for Democracy". Following "The Final War" of that history's 1998, the tough Asteroid miners are the last holdout against the victorious Draka. Though they, too, are eventually overwhelmed, they are able to launch "New America", a huge starship carrying some 40,000 colonists to the stars, to keep the cause alive and fight again another day.
- *Heavy Time* (1991), novel by C. J. Cherryh. Mining of the asteroid belt of Earth's solar system is a critical part of the economy in the 24th century. A dispute over mining rights to a particularly large asteroid rich with valuable minerals involves ASTEX, a giant mining corporation, and the book describes in detail ASTEX's mining operations in the asteroid belt.
- *K240* (1994), computer game for the Amiga. Very similar in terms of game play and plot to the game's 1997 successor *Fragile Allegiance*.
- *2038; Tycoons of the Asteroid Belt* (1995), game by James Hlavaty and Tom Lehmann. Transposes the highly successful "18xx" series of railroad board games into the asteroid belt.
- *Descent* (1995), computer game. Three secret levels take place on the asteroids Ceres, Eunomia and another unidentified one.
- *Fragile Allegiance* (1997), computer game. Is a 4X real-time strategy game and spiritual successor to K240 that revolves around the colonization of asteroids in a far away asteroid belt so as to mine rare minerals whilst fighting off or taking over the settled asteroids of other mining companies.
- *Descent 3* (1999), computer game. A mission takes place on Ceres.
- *Terminus* (2000), computer game. The Asteroid Belt offers possibilities for mining, as well as several missions in "story mode".
- *Asteroid Wars* (2001–2007), series of novels by Ben Bova. A trade war over the mining of the Belt develops into a shooting war.
- *Eve Online* (2003–present), Massively multiplayer online role-playing game. Mining the asteroid belts in the games numerous solar systems for minerals and fuel is a very important part of the game's economy.
- "Collision Course" (2003–present), novel by Susan Nichols Ferrara. A world-renowned astronomer, Dr. Selena Hartmann, spins toward the precipice of world destruction with scientific knowledge that could simultaneously save the world and destroy her family. Dr. Hartmann believes the consequences of launching a Star Wars-type defense program against asteroids could be disastrous for our planet. Her visible enemies are the combined forces of big business and politics — the military-industrial complex. But it is the hidden agenda of a supposed ally that proves far more sinister. In "Collision Course", real-time science dovetails with a highly charged plot, a cast of extraordinary characters, and break-neck pacing. From a mountaintop in the French Alps to the beaches of Hawaii and “King Keck,” the world’s greatest observatory, the excitement culminates at the site of a billion-dollar, super-colliding superconductor in Chile where a visionary developer plans a mission so treacherous that Carl

Sagan warned against it in his book, "Pale Blue Dot".
- *Live Free or Die* (2010), novel by John Ringo. Asteroids are melted by sunlight concentrated by a distributed network of orbital mirrors, allowing the centripetal force of the asteroid's own rotation to separate it into concentric layers of its component materials, which are then peeled off one-by-one. One asteroid, known as Troy, is drilled into, stuffed with ice, and then melted, inflating it into a hollow metal shell nine miles in diameter and over a mile thick, which is then developed into a space station used to defend the solar system from invading aliens.

Navigational hazard

Another way in which asteroids could be considered a source of danger is by depicting them as a hazard to navigation, especially threatening to ships travelling from Earth to the outer parts of the Solar System and thus needing to pass the Asteroid Belt (or make a time- and fuel-consuming detour around it). Asteroids in this context provide to space travel stories a space equivalent of reefs and underwater rocks in the older genre of seafaring adventures stories. And like reefs and rocks in the ocean, asteroids as navigation hazards can also be used by bold outlaws to avoid pursuit.

Representations of the Asteroid Belt in film tend to make it unrealistically cluttered with dangerous rocks. In reality, even in the main belt, asteroids are spaced extremely far apart (even so, they can still be a risk to ships travelling at high speeds).

- *2001: A Space Odyssey* (1968), film. *2001* accurately (and, for a work of fiction, atypically) depicts a "close approach" between the *Discovery One* and a binary asteroid while en route to Jupiter. The scene simply cuts briefly to two lone rocks passing by the ship, with tens of thousands of kilometres to spare.
- *Asteroids* (1979), arcade video game by Atari. Collision is an ever-present hazard in a dense asteroid field.
- *2061: Odyssey Three* (1986), novel by Arthur C. Clarke. Clarke dispenses with the relative monotony of the journey from the first book, and instead applies ominous parallels to the journey of the RMS *Titanic*. During writing the novel, the *Titanic*'s wreck had just been found.
- *The Wreck of The River of Stars* (2003), novel by Michael Flynn. Themes of nautical adventure novels are transferred to an Asteroid Belt environment, with a dramatic account of cumulative accidents, mismatched good intentions and power struggles among crew members in a former space luxury liner turned tramp freighter (the "River of Stars" of the title) which culminate in a disastrous collision with an asteroid.
- *Space Odyssey: Voyage To The Planets* (2004), television drama documentary by the BBC . The *Pegasus* encounters a binary asteroid from much closer than expected, and dubs the rocks "Hubris" and "Catastrophe" as a result.

Collisions with planets

A common depiction of asteroids (and less often, of comets) in fiction is as a threat, whose impact on Earth could result with incalculable damage and loss of life. This scenario is based on such past events as the impact event responsible for the extinction of the dinosaurs. Such events are, however, sufficiently rare that there is no special reason to expect such an impact in the near future.

- "The Wandering Asteroid", episode of *Space Patrol* (1962), puppet television series. The Space Patrol crew accept a dangerous mission to destroy an asteroid deflected from its orbit by a cometary collision and heading directly for the Martian capital Wotan.
- *The Green Slime* (1968), film. A rogue asteroid hurtles toward Earth. The astronauts leave Space Station Gamma 3 and place bombs on the asteroid, finding it inhabited by strange blobs of glowing slime that are drawn to the equipment. Unfortunately for everyone, some of the slime is carried back on a space suit and soon evolves into tentacled creatures. The movie inspired the classic board game *The Awful Green Things From Outer Space*.

- *Rendezvous with Rama* (1972), novel by Arthur C. Clarke. An asteroid impacts in Northern Italy destroys Padua, Verona and Venice. In the aftermath of that disaster, a regular Spaceguard against rogue asteroids is formed, whose members are the protagonists in the main story line — a meeting with a mysterious alien space artifact.
- *Protector* (1973), novel by Larry Niven. Jack Brennan, a human turned into a "Pak Protector", commits genocide by causing an ice asteroid to collide with Mars, thereby causing a rise in the water content of its atmosphere and exterminating the native Martians to whom water is a deadly poison.
- *Lucifer's Hammer* (1977), novel by Jerry Pournelle and Larry Niven. Earth's population falls into panic at hearing of an impending collision with a space object, is falsely reassured when hearing that the object is not an asteroid but a comet "with the density of sundae", then finds out the hard way that at the speed of collision this still causes enormous damage and throws the world into total chaos.
- *The Hermes Fall* (1978), novel by John Baxter. NASA discovers the asteroid Hermes is on a collision course with Earth and initiates a desperate attempt to deflect it.[14]
- *Meteor* (1979), film. The asteroid Orpheus hurtles toward Earth after its orbit is deflected by a comet. The movie was inspired in part by a M.I.T. student report. Project Icarus [15] (1968).
- *Impact!* (1979), novel by R. V. Fodor & G. J. Taylor. A series of asteroid collisions trigger World War III.[16]
- *Shiva Descending* (1980), novel by Gregory Benford and William Rotsler,[17][18]
- *Footfall* (1985), novel by Jerry Pournelle and Larry Niven. Elephant-like aliens launch an asteroid which lands in the Indian Ocean, causing a huge tsunami which almost completely wipes out life in India and causes enormous damage to all countries which have shores on that ocean.
- *Metal Armor Dragonar* (1987), anime. The Lunar-based Giganos Empire uses a mass driver to fire asteroids at the Earth and space colonies.
- *The Oxygen Barons* (1990), novel by Gregory Feeley. In one of the plot threads of this novel, Galvanix, a citizen of the Lunar Republic, prepares to plant a small fusion bomb on an asteroid which threatens to smash into the terraformed Moon, causing untold devastation. He succeeds, but there are complications which take a whole book to resolve.[19]
- *The Hammer of God* (1993), novel by Arthur C. Clarke. Mankind tries to stop an asteroid named Kali from hitting the Earth.
- *Outpost* (1994), computer game. The Earth is threatened by an asteroid named Vulcan's Hammer. A plan is made to stop the asteroid, with a nuclear warhead. This however fails and splits the asteroid into two pieces, which collide with the Earth. With the Earth destroyed, a group of selected colonists head off into space, in search of new home.
- *Sliders* Episode 4, "The Last Days" (1995), television. The sliders team must invent the atom bomb to deflect an asteroid that is on target to destroy the Earth.
- *The Dig* (1995), computer game by LucasArts and novelization by Alan Dean Foster. The impact-threatening asteroid Attila turns out to be an alien probe.
- *Starship Troopers* (1997), film, based on the 1959 novel by Robert A. Heinlein. Aliens launch an asteroid at Earth, completely wiping out Buenos Aires. This is the opening move in the war.
- *Titan* (1997), novel by Stephen Baxter. China tries to deflect an asteroid into Earth orbit to use as a weapons base, but instead causes it to hit Earth, presumably destroying all human life.
- *Deep Impact* (1998). film. Based on Arthur C. Clarke's novel *The Hammer of God*, although the asteroid becomes a comet (see.[20] An unsuccessful attempt to alter the course of the asteroid by detonating nuclear devices on its surface, after which the astronauts involved pilot their ship into the asteroid's path to prevent it hitting Earth.
- *Armageddon* (1998), film. An asteroid is prevented from impacting the Earth by drilling into its core and planting nuclear bombs which split the asteroid in half. The two halves move in different directions and miss the Earth.
- *Cold Fusion* (1999), novel by Windsor Chorlton. A thriller set on a world suffering from the global winter triggered by an asteroid impacting the Greenland icecap.,[21][22]

- "Asteroid (2001), an episode of the radio drama series Radio Tales on National Public Radio. Based on the short story "The Star" by H. G. Wells, the drama chronicles the events surrounding the approach of an asteroid which is predicted to impact the earth and instead passes in a "near miss" that causes cataclysmic damage.
- *Terraforming Earth* (2001), novel by Jack Williamson. An asteroid impact wipes out most life on Earth. The only remaining humans are a small group of clones on an automated moon base, tasked with rebuilding civilization.
- "Fail Safe" (2002), episode of *Stargate SG-1* television series. A Goa'uld surreptitiously diverts an asteroid to a collision course with Earth.
- "Collision Course" (2003–present), novel by Susan Nichols Ferrara. A world-renowned astronomer, Dr. Selena Hartmann, spins toward the precipice of world destruction with scientific knowledge that could simultaneously save the world and destroy her family. Dr. Hartmann believes the consequences of launching a Star Wars-type defense program against asteroids could be disastrous for our planet. Her visible enemies are the combined forces of big business and politics — the military-industrial complex. But it is the hidden agenda of a supposed ally that proves far more sinister. In "Collision Course", real-time science dovetails with a highly charged plot, a cast of extraordinary characters, and break-neck pacing. From a mountaintop in the French Alps to the beaches of Hawaii and “King Keck,” the world’s greatest observatory, the excitement culminates at the site of a billion-dollar, super-colliding superconductor in Chile where a visionary developer plans a mission so treacherous that Carl Sagan warned against it in his book, "Pale Blue Dot".
- "Impact Winter" (2004), episode of *The West Wing*, television series. The White House staff prepare for a possible asteroid impact on the Earth.
- *Sunstorm* (2005), novel by Stephen Baxter and Arthur C. Clarke. Extraterrestrials attempt to cause Earth's destruction by way of a "cosmic bullet" projectile sent into the Sun.
- "Phantom Planet", the series finale of *Danny Phantom* (2004), features a giant asteroid originating from Saturn (nicknamed the "disasteroid" because of its enormous size) hurtling towards the Earth, with people helpless to stop it.
- "Wizards vs. Asteroid" (2011), episode of *Wizards of Waverly Place*, has the Russo family hearing of a giant asteroid hurtling towards Earth, and they go into space to activate the missile that got stuck in it and failed to detonate.

As weapons

John Ringo has two novels, *Live Free or Die* and its sequel *Citadel*, in which asteroids are melted, inflated, and turned into unstoppable battleships of space.

Fifth planet

Before colonization of the asteroids became an attractive possibility, a main interest in them was theories as to their origin – specifically, the theory that the asteroids are remnants of an exploded planet. This naturally leads to SF plot lines dealing with the possibility that the planet had been inhabited, and if so – that the inhabitants caused its destruction themselves, by war or gross environmental mismanagement. A further extension is from the past of the existing asteroids to the possible future destruction of Earth or other planets and their rendering into new asteroids.

For a list of "fifth planets" in fiction, see *Fictional planets of the Solar System*

New asteroid belts

A theme related to that of the Fifth Planet is the generation of a new asteroid belt, via the demolition of a planet, sometimes the Earth. It should be noted that the energy required to reduce a planet such as Earth to loose rubble is truly enormous: about 2×10^{32} J, equivalent to the Sun's entire luminous energy output for about a week![*citation needed*]

- *Facing the Flag* (1896), novel by Jules Verne. A mad genius invents an enormously powerful new explosive, of which a few grams suffice to blow a passable tunnel through many metres of tough volcanic rock. One of the story's villains remarks that several thousand tons might be enough to blow up the entire Earth and render it into a new asteroid belt – which (though no character in the story has any desire to actually try it) seems to be the first time that such a suggestion was made in science fiction.
- *Worlds of the Imperium* (1962), novel by Keith Laumer. The hero, travelling in a vehicle capable of traversing parallel worlds, passes many where Earth had been shattered in a cataclysmic war and was rendered into a scattered collection of asteroids. He gets a brief and horrifying glimpse of an asteroid on which a section of road is still visible. Later, he learns that our own Earth narrowly avoided a similar fate.
- *The Corridors of Time* (1965), novel by Poul Anderson. Two groups, the Wardens and the Rangers, wage a relentless struggle for control of Earth and the Solar System. As a result, Mars is blown up and its remnants become a new Asteroid Belt. The two fighting sides tacitly agree to use more subtle forms of fighting, involving mainly time-travel.
- *The Venus Belt* (1980), novel by L. Neil Smith. The "useless" planet Venus is deliberately blown up to create a new asteroid belt. It is part of a genre of asteroid SF in which asteroids are rated as more valuable than planets.

Spacecraft

- The 1987 Teenage Mutant Ninja Turtles cartoon episode "Poor Little Rich Turtle" includes Krang and Shredder trying to turn an asteroid into a spacecraft.

Extrasolar asteroids

Some works of fiction take place on, or in, asteroid-like bodies or fields outside the Solar System:

- *Miners in The Sky* (1967), novel by Murray Leinster. The ring system around Thotmess, a gas giant in the system of the star Niletus where planets are called for Ancient Egyptian gods, is a completely lawless place where "claim jumping" is frequent. Miners, riding small "donkey ships", need to contend with both the harsh natural environment and with fierce human competitors. They must be ready at any moment to take up a gun or a bazooka to defend their finds of "grey matrix in which abyssal crystals occur". (The reader is not told what this may be, except that it is evidently valuable enough to kill for.) The extra-solar environment is chosen by Leinster in order to convey the feeling of an ever-expanding frontier – Sol's own Asteroid Belt has become "tame", as did the rings of Saturn, and the rough adventurous types move further on. (The historical model is obviously the recurring Gold Rush of the Nineteenth Century, drawing adventurers in 1840s from the settled East Coast to wild California, and in 1890s from settled California to the wild Klondike).
- *Star Trek: The Original Series* episode *For the World is Hollow and I Have Touched the Sky* (1968). A generational ship called the Yonada is shaped like an asteroid.
- *The Mote in God's Eye* (1974), novel by Jerry Pournelle and Larry Niven. The novel features the examination of evidence indicating the use of asteroids in planetary bombardment as the final strategy of a war that almost wipes out the warring species.
- *Star Wars Episode IV: A New Hope* (1977), film by George Lucas. In demonstrating the ability of the newly constructed Death Star to destroy planets, Grand Moff Tarkin destroys the planet Alderaan, thereby creating an asteroid field that the Millennium Falcon haplessly stumbles into when attempting to visit the planet.

- *The Empire Strikes Back* (1980), film. Han Solo enters an asteroid field to flee from the fleet of the evil Empire, and C-3PO thinks it is a bad idea. Han then hides his ship, the *Millennium Falcon* inside a giant asteroid; the ship then finds itself inside a colossal animal that lives within the asteroid.
- *Buck Rogers in the 25th Century* episode "Golden Man" (1981, season 2). The spaceship Searcher enters the asteroid belt of the Alpha Centauri system and becomes trapped against an asteroid by a powerful magnetic storm while responding to a distress radiobeacon signal, the plot involves the crew visiting an Earth-like planet Iris VII that exists within the belt so that they can escape the asteroid's gravity and destruction of the Searcher.[23][24]
- *Gap Cycle* (1991–1996), series of novels by Stephen R. Donaldson's. Numerous human asteroid colonies, albeit not in the Solar System's Asteroid Belt.
- *Night's Dawn Trilogy* (1996–1999), novel trilogy by Peter F. Hamilton. Worlds colonized by humans use asteroids as their main source of minerals and location of their industries. The asteroids are either in orbit around a colonized world, are moved into orbit to be used as a base for the industry, or are in an asteroid belt.
- *Homeworld* 1999, game. In Mission 06: Diamond Shoals, the Kushan fleet must pass through a turbulent asteroid field, destroying asteroids before they impact the Mothership.
- *Halo: The Fall of Reach*, novel by Eric Nylund (2001). Describes an assault by Spartans on a hidden rebel base located within a hollowed-out asteroid. A large hangar/airlock protects the internal atmosphere of the facility from vacuum.
- *Star Trek: Voyager* episode *Homestead* (2001). A group of Talaxians are living in an asteroid field which another race is trying to mine.
- *The Saga of Seven Suns* (2003–present), series of novels by Kevin J. Anderson. A faction of humanity, "The Roamers", lives on asteroids.
- *Star Wars Episode III: Revenge of the Sith* (2005), film. Padmé gives birth to Luke and Leia in an asteroid colony on Polis Massa.
- "Scar" (2006), episode of *Battlestar Galactica* television series. Raw materials are mined from an asteroid to gather resources vital to the fleet.
- *Halo: The Cole Protocol*, novel by Tobias Buckell (2008). Describes a massive linked cloud of asteroids trailing the orbit of a gas giant. The links contain mass transit systems.
- The *Dead Space* video game series (2008–), produced by EA's Visceral Games. Features the strip mining of entire asteroids and even terrestrial planets to fuel 26th century humanity's resource consumption.

References

[8] Jacques Crovisier (http://wwwusr.obspm.fr/~crovisie/JV/verne_gene_eng.html)

[9] Lord Dunsany, “Our Distant Cousins,” *The Saturday Evening Post*, November 23, 1929; collected in *In the Land of Time and Other Fantasy Tales*, S. T. Joshi, ed., Penguin Classics, 2004.

[11] http://homepage.mac.com/sjbradshaw/baxterium/fubar.html

[13] Review of Lucky Starr and the Pirates of the Asteroids (http://homepage.mac.com/jhjenkins/Asimov/Books/Book010.html)

[15] http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=6840

[19] http://sf.www.lysator.liu.se/sf_archive/sf-texts/Otherrealms/OR.28

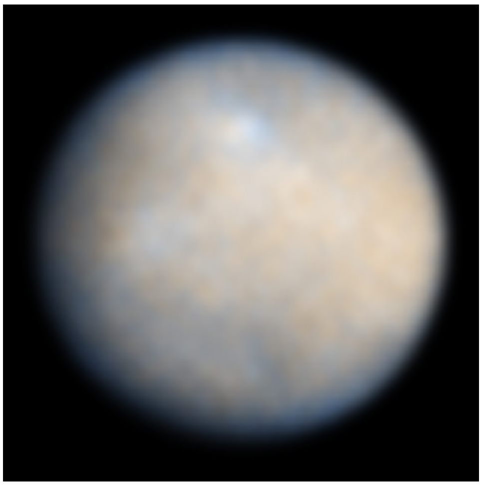
[20] http://www.space-frontier.org/PROJECTS/ASTEROIDS/aclarke_address_may26-98.html

External links

- Asteroids in Science Fiction (http://web.archive.org/web/20070929120438/http://www.infoshop.org/sf/index.php/Asteroid)

Ceres in fiction

As the largest body in the asteroid belt, the dwarf planet Ceres (formally "1 Ceres") frequently appears in science fiction:



Ceres

Literature

- In Garrett P. Serviss' *Edison's Conquest of Mars*, published in 1898, the Martians from *The War of the Worlds* are engaged in a war with giant beings from Ceres.
- "Mummies of Ceres" is a 1936 storyline in the *Buck Rogers* comic strip.
- Ceres is mentioned in some of the stories of Isaac Asimov, who usually situates an observatory on Ceres, as for example in the juvenile novel *Lucky Starr and the Pirates of the Asteroids* (1953) and the Wendell Urth mystery "The Dying Night".
- In Alfred Bester's book *The Stars My Destination* (1956), the main character claims to be a wealthy lord from Ceres.
- Mentioned in passing in Robert A. Heinlein's *The Cat Who Walks Through Walls*, *Podkayne of Mars*, *Red Planet*, *Time for the Stars* and *The Rolling Stones*.[1]
- In Larry Niven's Known Space stories (1964 onward), the asteroid belt has a government based on Ceres. It is also the site of the narrow but deciding victory against the Kzin Fourth Fleet during the First Man-Kzin War.
- In *The Killing Star* by Charles R. Pellegrino and George Zebrowski, some of the few humans who survive the initial alien attempt to exterminate the species hide out inside of Ceres.
- In Jerry Pournelle's *Exiles to Glory* (1974, republished 2007) Ceres is the site of an interplanetary mystery involving the theft of asteroid-mined super-heavy metals.
- In L. Neil Smith's novel *The Venus Belt* (1981), Ceres contains a large underground city and several small settlements and stations, connected by a network of inverted highways. It is also the focus of his novel *Ceres*.
- In Bob Shaw's book *The Ceres Solution* (1981), extraterrestrials attempt to use Ceres to destroy Earth's moon thereby removing the effect of "third-order forces" that have been stunting human development since the dawn of civilization.
- In *The Dune Encyclopedia* (1984), Ceres becomes the "Seat of the Empire" (i.e. capital) after Earth is hit by an asteroid.
- In Bruce Sterling's novel *Schismatrix* (1985), Ceres Datacom News is a quasi-national entity nerworking the communications of the cybernetically enhanced inhabitants of the asteroids.
- In *The Doomsday Effect* (1986) by Thomas Wren, Ceres is used to capture a small black hole which was slowly devouring the Earth.
- In Joe Haldeman's novel *Buying Time* (1989; U.K. title *The Long Habit of Living*), Ceres is the home of a stateless society, which becomes important because of a secret research project to reinvent the Stileman rejuvenation process.
- In S. M. Stirling's Draka novel *The Stone Dogs* (1990), the Alliance for Democracy has a large base on Ceres.
- In the *Sailor Moon* metaseries (1995), a subset of villains called the "Amazoness Quartet" appear in the fourth arc of the manga and its anime counterpart, *Sailor Moon SuperS*. The leader of the Amazoness Quartet is CereCere, who is later revealed to be a Sailor Senshi named Sailor Ceres.
- In Ben Bova's series *Asteroid Wars* (2001–2007), a small mining base is established on Ceres.

- In Sandy Sandfort's, Scott Bieser's and Lee Oaks's Webcomic *Escape from Terra*, Terran forces attempt to conquer the free human colony on Ceres.[2]
- In *The Unincorporated War* (2010) by Dani & Eytan Kollin, Ceres is the capital and command base of the newly formed Alliance headed by Justin Cord.
- In James S.A. Corey's Leviathan Wakes, it is the largest colony in the asteroid belt, housing six million people. Inhabitants of Ceres, and the asteroid belt in general, are referred to as "Belters" and are much taller and thinner than the inhabitants of the inner planets due to the low gravity.
- Mundus Cerialis (2012), a novella in the second series of *Space 1889 & Beyond* is set on and within Ceres, in an alternative history in which mankind are in space during the Victorian Era.

Film and television

- In the movie *The American Astronaut* (2001) Ceres has a bar called the *Ceres Crossroads*, where a dance contest is held.
- In the TV series *Exosquad* (1993–5), Ceres is the assumed location of the first Neo Mega breeding facility.
- In the episode "The Lonely" of *The Twilight Zone*, Ceres is used as a prison colony.

Games

- In the *SNES* video game *Super Metroid*, a Space colony named "Ceres" appears as the first playable area. It is unknown if it is related to the actual dwarf planet, though it appears to be surrounded by asteroids, implying that it too is in an asteroid belt.
- In the computer game *Zone of the Enders*, there is a space colony on Ceres.[3]
- In the PC role-playing game *Countdown to Doomsday* (1990), Ceres is the location of an abandoned RAM (enemy) research base.
- In the PC Star Control series, Ceres Base is the place where formal contact with an alien species (the Chenjesu) is first made. Following the Ur-Quan war, the destruction of Ceres Station by the invading Ur-Quan fleet signifies the defeat of the human race, leading to their subsequent enslavement.
- In the PC Game *Descent* (1995), one of the secret levels takes place on Ceres.
- In the PC Game *Descent 3* (1999), one of the missions requires the player to extract virus data samples from an underground research laboratory.
- In the PC game *Terminal Velocity* (1995), one of the missions involves the player destroying a machine that would cause Ceres to crash into Earth.
- In the fictional *Warhammer 40,000* universe, the Adeptus Mechanicus renews its alliance with the Imperium of Man with the Treaty of Ceres, following the Age of Apostasy.
- In the tabletop card-and-dice game *Champions of the Galaxy*, Ceres is home to futuristic wrestling superstars Massif and Earthquake (later known as Chopper Mattock and Powerhouse).
- In the RPG *Mutant Chronicles*, Ceres is the homeworld of Cybertronic Megacorporation.
- In the RPG *Transhuman Space*, it is the largest colony in the asteroid belt and is an independent state living in functional anarchy.
- In the PC Game *Warframe*, Ceres is a space system and planet controlled by the Grineer Empire, a race of cloned humans.

Notes

[1] C - Heinlein Concordance (http://www.heinleinsociety.org/concordance/C_HC.htm#ceres) at www.heinleinsociety.org
[2] (http://www.escapefromterra.com/)
[3] Zone of the Enders The 2nd Runner (http://www.konami.jp/gs/game/zoe2/english/story_between_02.html) at www.konami.jp

Lists

List of minor planets named after people

This is a **list of minor planets named after people**, both real and fictional.

Science

Astronomers

Amateur

- 340 Eduarda (Heinrich Eduard von Lade, German)
- 792 Metcalfia (Joel Hastings Metcalf, American)
- 828 Lindemannia (Adolph Friedrich Lindemann, German-British)
- 2602 Moore (Sir Patrick Moore)
- 9121 Stefanovalentini (Stefano Valentini, Italian)
- 12787 Abetadashi (Tadashi Abe, Japanese)
- 13624 Abeosamu (Osamu Abe, Japanese)
- 24898 Alanholmes (Alan W. Holmes, American)
- 29483 Boeker (Karolin Kleemann-Boeker and Andreas Boeker, German)
- 37729 Akiratakao (Akira Takao, Japanese)
- 49109 Agnesraab (Agnes Raab, Austrian)
- 60406 Albertosuci (Alberto Suci, Italian)
- 103422 Laurisirén (Lauri Sirén, Finnish)
- 260235 Attwood (Randy Attwood, Canadian)

Professional

- 107 Camilla (Camille Flammarion; also Camilla, mythological Volscian queen)
- 162 Laurentia (A. Laurent)
- 238 Hypatia (Hypatia)
- 281 Lucretia (Caroline Lucretia Herschel)
- 339 Dorothea (Dorothea Klumpke)
- 349 Dembowska (Ercole Dembowski)
- 366 Vincentina (Vincenzo Cerulli)
- 511 Davida (David Peck Todd)
- 676 Melitta (Philibert Jacques Melotte)
- 729 Watsonia (James Craig Watson)
- 761 Brendelia (Martin Brendel)
- 767 Bondia (William Cranch Bond and George Phillips Bond)
- 768 Struveana (Otto Wilhelm von Struve, Friedrich Georg Wilhelm von Struve and Karl Hermann Struve)
- 784 Pickeringia (Edward Charles Pickering and William Henry Pickering)
- 786 Bredichina (Fyodor Aleksandrovich Bredikhin)
- 806 Gyldenia (Hugo Gyldén)
- 818 Kapteynia (Jacobus Kapteyn)

- 819 Barnardiana (Edward Emerson Barnard)
- 827 Wolfiana (Max Wolf)
- 834 Burnhamia (Sherburne Wesley Burnham)
- 854 Frostia (Edwin Brant Frost)
- 855 Newcombia (Simon Newcomb)
- 856 Backlunda (Oskar Backlund)
- 857 Glasenappia (Sergey Glazenap)
- 872 Holda (Edward S. Holden)
- 892 Seeligeria (Hugo von Seeliger)
- 914 Palisana (Johann Palisa)
- 993 Moultona (Forest Ray Moulton)
- 995 Sternberga (Pavel Shternberg)
- 999 Zachia (Franz Xaver, Baron von Zach)
- 1000 Piazzia (Giuseppe Piazzi, discoverer of the asteroid 1 Ceres)
- 1002 Olbersia (Heinrich Wilhelm Matthäus Olbers)
- 1004 Belopolskya (Aristarkh Belopolsky)
- 1021 Flammario (Camille Flammarion)
- 1024 Hale (George Ellery Hale)
- 1040 Klumpkea (Dorothea Klumpke)
- 1111 Reinmuthia (Karl Wilhelm Reinmuth)
- 1120 Cannonia (Annie Jump Cannon)
- 1123 Shapleya (Harlow Shapley)
- 1129 Neujmina (Grigory Neujmin)
- 1134 Kepler (Johannes Kepler)
- 1186 Turnera (Herbert Hall Turner)
- 1215 Boyer (Louis Boyer)
- 1239 Queteleta (Adolphe Quetelet)
- 1241 Dysona (Sir Frank Watson Dyson)
- 1303 Luthera (Karl Theodor Robert Luther)
- 1412 Lagrula (Joanny-Philippe Lagrula)
- 1455 Mitchella (Maria Mitchell)
- 1501 Baade (Walter Baade)
- 1510 Charlois (Auguste Charlois)
- 1529 Oterma (Liisi Oterma)
- 1539 Borrelly (Alphonse Louis Nicolas Borrelly)
- 1551 Argelander (Friedrich Wilhelm Argelander)
- 1573 Väisälä (Yrjö Väisälä)
- 1578 Kirkwood (Daniel Kirkwood)
- 1591 Baize (Paul Baize)
- 1594 Danjon (André-Louis Danjon)
- 1600 Vyssotsky (Emma T. R. Williams Vyssotsky)
- 1601 Patry (André Patry)
- 1614 Goldschmidt (Hermann Mayer Salomon Goldschmidt)
- 1622 Chacornac (Jean Chacornac)
- 1637 Swings (Pol Swings)
- 1642 Hill (George William Hill)
- 1655 Comas Solá (Josep Comas Solá)

- 1686 De Sitter (Willem de Sitter)
- 1677 Tycho Brahe (Tycho Brahe)
- 1691 Oort (Jan Oort)
- 1693 Hertzsprung (Ejnar Hertzsprung)
- 1714 Sy (Frédéric Sy)
- 1741 Giclas (Henry L. Giclas)
- 1743 Schmidt (Bernhard Schmidt)
- 1745 Ferguson (James Ferguson)
- 1761 Edmondson (Frank K. Edmondson)
- 1766 Slipher (V. M. Slipher and E. C. Slipher)
- 1776 Kuiper (Gerard Kuiper)
- 1778 Alfvén (Hannes Olof Gösta Alfvén)
- 1780 Kippes (Otto Kippes)
- 1803 Zwicky (Fritz Zwicky)
- 1830 Pogson (Norman Robert Pogson)
- 1831 Nicholson (Seth Barnes Nicholson)
- 1832 Mrkos (Antonín Mrkos)
- 1846 Bengt (Bengt Strömgren)
- 1850 Kohoutek (Luboš Kohoutek)
- 1877 Marsden (Brian G. Marsden)
- 1886 Lowell (Percival Lowell)
- 1896 Beer (Wilhelm Beer)
- 1913 Sekanina (Zdeněk Sekanina)
- 1940 Whipple (Fred Lawrence Whipple)
- 1965 van de Kamp (Peter van de Kamp)
- 1983 Bok (Bart Bok)
- 1995 Hajek (Tadeáš Hájek)
- 1998 Titius (Johann Daniel Titius)
- 1999 Hirayama (Kiyotsugu Hirayama)
- 2000 Herschel (William Herschel)
- 2003 Harding (Karl Ludwig Harding)
- 2005 Hencke (Karl Ludwig Hencke)
- 2012 Guo Shou-Jing (Guo Shoujing)
- 2018 Schuster (Hans-Emil Schuster)
- 2069 Hubble (Edwin Hubble)
- 2074 Shoemaker (Eugene Shoemaker)
- 2097 Galle (Johann Gottfried Galle)
- 2099 Öpik (Ernst Julius Öpik)
- 2126 Gerasimovich (Boris Gerasimovich)
- 2136 Jugta (Jay U. Gunter)
- 2165 Young (Charles Augustus Young)
- 2198 Ceplecha (Zdeněk Ceplecha)
- 2227 Otto Struve (Otto Struve)
- 2234 Schmadel (Lutz Schmadel)
- 2281 Biela (Wilhelm von Biela)
- 2308 Schilt (Jan Schilt)
- 2325 Chernykh (Lyudmila Ivanovna Chernykh and Nikolai Stepanovich Chernykh)

- 2383 Bradley (James Bradley)
- 2439 Ulugbek (Ulugh Beg)
- 2635 Huggins (William Huggins)
- 2646 Abetti (Antonio Abetti and Giorgio Abetti)
- 2688 Halley (Edmond Halley)
- 2709 Sagan (Carl Sagan)
- 2751 Campbell (William Wallace Campbell)
- 2772 Dugan (Raymond Smith Dugan)
- 2780 Monnig (Oscar Monnig)
- 2801 Huygens (Christiaan Huygens)
- 2813 Zappalà (Vincenzo Zappalà)
- 2842 Unsöld (Albrecht Unsöld)
- 2849 Shklovskij (Iosif Shklovsky)
- 2874 Jim Young (James Whitney Young)
- 2875 Lagerkvist (Claes-Ingvar Lagerkvist)
- 2897 Ole Römer (Ole Rømer)
- 2900 Luboš Perek (Luboš Perek)
- 2917 Sawyer Hogg (Helen Battles Sawyer Hogg)
- 2996 Bowman (Fred N. Bowman)
- 3070 Aitken (Robert Grant Aitken)
- 3078 Horrocks (Jeremiah Horrocks)
- 3095 Omarkhayyam (Omar Khayyám)
- 3115 Baily (Francis Baily)
- 3116 Goodricke (John Goodricke)
- 3123 Dunham (David Waring Dunham)
- 3169 Ostro (Steven J. Ostro)
- 3174 Alcock (George Alcock)
- 3216 Harrington (Robert Sutton Harrington)
- 3236 Strand (Kaj Aage Gunnar Strand)
- 3255 Tholen (David J Tholen)
- 3267 Glo (Eleanor "Glo" Helin)
- 3277 Aaronson (Marc Aaronson)
- 3282 Spencer Jones (Harold Spencer Jones)
- 3299 Hall (Asaph Hall)
- 3337 Miloš (Miloš Tichý)
- 3449 Abell (George O. Abell)
- 3467 Bernheim (Robert Burnham, Jr.)
- 3487 Edgeworth (Kenneth Edgeworth)
- 3549 Hapke (Bruce William Hapke)
- 3594 Scotti (James V. Scotti)
- 3673 Levy (David H. Levy)
- 3722 Urata (Takeshi Urata)
- 3808 Tempel (Ernst Wilhelm Leberecht Tempel)
- 3847 Šindel (Jan Šindel)
- 3866 Langley (Samuel Pierpont Langley)
- 3936 Elst (Eric Walter Elst)
- 3999 Aristarchus (Aristarchus of Samos)

- 4000 Hipparchus (Hipparchus)
- 4001 Ptolemaeus (Ptolemy)
- 4037 Ikeya (Kaoru Ikeya)
- 4062 Schiaparelli (Giovanni Schiaparelli)
- 4169 Celsius (Anders Celsius)
- 4279 De Gasparis (Annibale de Gasparis)
- 4364 Shkodrov (Vladimir Georgiev Shkodrov)
- 4549 Burkhardt (Gernot Burkhardt)
- 4567 Bečvář (Antonín Bečvář)
- 4587 Rees (Martin Rees, Baron Rees of Ludlow)
- 4593 Reipurth (Bo Reipurth, Danish astronomer)
- 4790 Petrpravec (Petr Pravec)
- 4866 Badillo (Fr. Victor L. Badillo, Jesuit astronomer and former director of the Manila Observatory)
- 5080 Oja (Tarmo Oja)
- 5704 Schumacher (Heinrich Christian Schumacher)
- 5035 Swift (Lewis Swift)
- 5036 Tuttle (Horace Parnell Tuttle)
- 5392 Parker (Donald C. Parker)
- 5430 Luu (Jane Luu)
- 5655 Barney (Ida Barney)
- 5726 Rubin (Vera Rubin)
- 5757 Tichá (Jana Tichá)
- 5943 Lovi (George Lovi, astronomical columnist and planetarium educator)
- 6006 Anaximandros (Anaximander)
- 6075 Zajtsev (Alexander L. Zaitsev)
- 6076 Plavec (Miroslav Plavec)
- 6391 Africano (John L. Africano)
- 6398 Timhunter (Tim Hunter)
- 6696 Eubanks (Marshall Eubanks)
- 6779 Perrine (Charles Dillon Perrine)
- 7086 Bopp (Thomas Bopp)
- 7291 Hyakutake (Yuji Hyakutake)
- 7359 Messier (Charles Messier)
- 7948 Whitaker (Ewen A. Whitaker)
- 8216 Melosh (H. Jay Melosh)
- 8391 Kring (David A. Kring)
- 8408 Strom (Robert G. Strom)
- 8690 Swindle (Timothy D. Swindle)
- 8785 Boltwood (Paul Boltwood)
- 9122 Hunten (Donald M. Hunten)
- 9133 d'Arrest (Heinrich Louis d'Arrest)
- 9134 Encke (Johann Franz Encke)
- 9207 Petersmith (Peter H. Smith)
- 9494 Donici (Nicolae Donici, Romanian astronomer)
- 10633 Akimasa (Akimasa Nakamura, Japanese astronomer)
- 10950 Albertjansen (Albert Jansen, German astronomer)
- 11156 Al-Khwarismi (Muḥammad ibn Mūsā al-Khwārizmī, Persian astronomer)

- 11577 Einasto (Jaan Einasto)
- 11695 Mattei (Janet Akyüz Mattei, Turkish-American astronomer)
- 11755 Paczynski (Bohdan Paczyński, Polish astronomer)
- 11762 Vogel (Hermann Carl Vogel)
- 12742 Delisle (Joseph-Nicolas Delisle)
- 14124 Kamil (Kamil Hornoch)
- 14120 Espenak (Fred Espenak)
- 14322 Shakura (Nikolai Ivanovich Shakura)
- 14335 Alexosipov and 152217 Akosipov (Alexandr Kuzmich Osipov, Russian-Ukrainian astronomer)
- 15395 Rükl (Antonín Rükl)
- 15420 Aedouglass (Andrew Ellicott Douglass, American astronomer)
- 15467 Aflorsch (Alphonse Florsch, French astronomer)
- 15955 Johannesgmunden (John of Gmunden)
- 16682 Donati (Giovanni Battista Donati)
- 18150 López Moreno (José Juan López Moreno, Spanish astronomer)
- 19139 Apian (Peter Apian)
- 24988 Alainmilsztajn (Alain Milsztajn, French astronomer)
- 36445 Smalley (Kyle E. Smalley)
- 68730 Straizys (Vytautas Straižys, Lithuanian astronomer, the founder of Vilnius photometric system)
- 72021 Yisunji (Yi, Sunji, Korean astronomer in 15th century)
- 92893 Michaelperson (Michael Person, American astronomer)
- 95593 Azusienis (Algimantas Ažusienis, Lithuanian astronomer)
- 99503 Leewonchul (Lee, Wonchul, Korean astronomer)
- 106817 Yubangtaek (Yu, Bangtaek, Korean astronomer in 13th century)
- 165347 Philplait (Phil Plait, American astronomer)
- 234750 Amymainzer (Amy Mainzer, American astronomer)

Planetarium directors

- 4897 Tomhamilton (Thomas William Hamilton, American astronomer and planetarium director)
- 9108 Toruyusa (Toru Yusa, Japanese planetarium director and comet chaser)
- 13123 Tyson (Neil deGrasse Tyson, American astronomer and planetarium director)
- 14345 Mousen (Mousen Saeed, Pakistani Astronomer and Planetarium Director)
- 17601 sheldonschafer (Sheldon Schafer, Professor of astronomy and Director of the Riverview Museum Planetarium, Peoria, IL

Relatives of astronomers

- 42 Isis (Elizabeth Isis Pogson, daughter of the astronomer Norman Robert Pogson; also Ancient Egyptian goddess Isis)
- 87 Sylvia (Sylvie Petiaux-Hugo Flammarion, first wife of the astronomer Camille Flammarion; also Rhea Sylvia, the mythical mother of the twins Romulus and Remus)
- 153 Hilda (Hilda von Oppolzer, daughter of the astronomer Theodor von Oppolzer)
- 154 Bertha (Berthe Martin-Flammarion, sister of the astronomer Camille Flammarion)
- 1280 Baillauda (Jules Baillaud, son of the astronomer Benjamin Baillaud)
- 1563 Noël (Emanuel Arend, son of the astronomer Sylvain Julien Victor Arend)
- 3664 Anneres (Anna Theresia ("Anneres") Schmadel, the wife of astronomer Lutz Schmadel)
- 68109 Naomipasachoff Naomi Pasachoff, a science writer and educator, and wife of astronomer Jay Pasachoff of Williams College [5100 Pasachoff])

Biologists

- 2496 Fernandus (Fernandus Payne, zoologist)
- 2766 Leeuwenhoek (Anton van Leeuwenhoek, pioneering cell biologist)
- 8357 O'Connor (J. Dennis O'Connor, biological scientist and provost at the Smithsonian Institution)
- 9364 Clusius (Carolus Clusius, botanist)
- 15565 Benjaminsteele (Benjamin Steele, biologist)

Cartographers

- 4798 Mercator (Gerardus Mercator)
- 19139 Apian (Peter Apian)

Chemists

- 1449 Virtanen (Artturi Ilmari Virtanen)
- 3069 Heyrovský (Jaroslav Heyrovský)
- 3676 Hahn (Otto Hahn), father of nuclear chemistry
- 3899 Wichterle (Otto Wichterle)
- 4564 Clayton (Robert Clayton)
- 4716 Urey (Harold Urey)
- 5697 Arrhenius (Svante Arrhenius)
- 6032 Nobel (Alfred Nobel)
- 6826 Lavoisier (Antoine Lavoisier)
- 9680 Molina (Mario Molina)

Computer scientists and programmers

- 9121 Stefanovalentini (Stefano Valentini)
- 9793 Torvalds (Linus Torvalds)
- 9882 Stallman (Richard M. Stallman)
- 21656 Knuth (Donald Knuth)
- 132718 Kemény (John George Kemeny)

Mathematicians

- 187 Lamberta (Johann Heinrich Lambert)
- 843 Nicolaia (Thorvald Nicolai Thiele)
- 1001 Gaussia (Carl Friedrich Gauss)
- 1005 Arago (François Arago)
- 1006 Lagrangea (Joseph Louis Lagrange)
- 1552 Bessel (Friedrich Bessel)
- 1858 Lobachevskij (Nikolai Lobachevsky)
- 1859 Kovalevskaya (Sofia Kovalevskaya)
- 1888 Zu Chong-Zhi (Zu Chongzhi)
- 1996 Adams (John Couch Adams)
- 1997 Leverrier (Urbain Le Verrier)
- 2002 Euler (Leonhard Euler)
- 2010 Chebyshev (Pafnuti Chebyshev)
- 2587 Gardner (Martin Gardner)
- 3251 Eratosthenes (Eratosthenes)

- 3600 Archimedes (Archimedes)
- 4283 Stöffler (Johannes Stöffler)
- 4354 Euclides (Euclid)
- 4628 Laplace (Pierre-Simon Laplace)
- 5956 d'Alembert (Jean le Rond d'Alembert)
- 6765 Fibonacci (Leonardo Fibonacci of Pisa)
- 6143 Pythagoras (Pythagoras)
- 9999 Wiles (Andrew Wiles)
- 11156 Al-Khwarismi (Muḥammad ibn Mūsā al-Khwārizmī, Persian mathematician)
- 12493 Minkowski (Hermann Minkowski)
- 14100 Weierstrass (Karl Weierstrass)
- 16765 Agnesi (Maria Gaetana Agnesi)
- 16856 Banach (Stefan Banach)
- 19139 Apian (Peter Apian)
- 27500 Mandelbrot (Benoît Mandelbrot)
- 27947 Emilemathieu (Émile Léonard Mathieu)
- 28516 Möbius (August Ferdinand Möbius)
- 29552 Chern (Shiing-Shen Chern)
- 38237 Roche (Édouard Roche)
- 50033 Perelman (Grigori Perelman)

Physicists

- 697 Galilea (Galileo Galilei)
- 837 Schwarzschilda (Karl Schwarzschild)
- 1069 Planckia (Max Planck)
- 1565 Lemaitre (Georges Lemaître)
- 1979 Sakharov (Andrei Sakharov)
- 2001 Einstein (Albert Einstein)
- 2244 Tesla (Nikola Tesla)
- 2352 Kurchatov (Igor Kurchatov)
- 3069 Heyrovský (Jaroslav Heyrovský)
- 3905 Doppler (Christian Doppler)
- 3949 Mach (Ernst Mach)
- 4065 Meinel (Aden Meinel)
- 4530 Smoluchowski (Roman Smoluchowski, Polish born physicist and astrophysicist)
- 5103 Diviš (Prokop Václav Diviš)
- 5224 Abbe (Ernst Abbe)
- 5668 Foucault (Léon Foucault)
- 7000 Curie (Maria Skłodowska-Curie)
- 7279 Hagfors (Tor Hagfors)
- 7495 Feynman (Richard Feynman)
- 7672 Hawking (Stephen Hawking)
- 8000 Isaac Newton (Isaac Newton)
- 8103 Fermi (Enrico Fermi)
- 9253 Oberth (Hermann Oberth)
- 10506 Rydberg (Johannes Rydberg)
- 10979 Fristephenson (Professor F. Richard Stephenson)

- 11451 Aarongolden (Aaron Golden, Irish astrophysicist)
- 11577 Einasto (Jaan Einasto)
- 12320 Loschmidt (Johann Josef Loschmidt)
- 12628 Ackworthorr (Mary Ackworth Orr, solar physicist)
- 13092 Schrödinger (Erwin Schrödinger)
- 13149 Heisenberg (Werner Heisenberg)
- 19126 Ottohahn (Otto Hahn), father of nuclear fission
- 20081 Occhialini (Giuseppe Occhialini)
- 24988 Alainmilsztajn (Alain Milsztajn, French particle physicist)
- 29137 Alanboss, (Alan Boss, American astrophysicist)
- 30828 Bethe (Hans Bethe)
- 37582 Faraday (Michael Faraday)
- 48798 Penghuanwu (Peng Huanwu)
- 52337 Compton (Arthur Compton)
- 55753 Raman (C. V. Raman)
- 58215 von Klitzing (Klaus von Klitzing)
- 67085 Oppenheimer (J. Robert Oppenheimer)

Physiologists

- 1007 Pawlowia (Ivan Pavlov)
- 15262 Abderhalden (Emil Abderhalden)
- 117413 Ramonycajal (Santiago Ramón y Cajal)

Space exploration

- Astrobiologists
  - 2410 Morrison (David Morrison)
  - 9826 Ehrenfreund (Pascale Ehrenfreund)
  - 12859 Marlamoore (Marla Moore)
- Planetary scientists
  - 2710 Veverka (Joseph Veverka)
  - 4815 Anders (Edward Anders)
  - 7231 Porco (Carolyn Porco)
  - 8356 Wadhwa (Meenakshi Wadhwa, meteorite analyst)
  - 13358 Revelle (Douglas ReVelle)
  - 21774 O'Brien (David P. O'Brien)
- Rocket scientists
  - 1590 Tsiolkovskaja (Konstantin Tsiolkovsky)
  - 1855 Korolev (Sergei Korolev)
  - 8062 Okhotsymskij (Dmitry Okhotsimsky)
  - 9252 Goddard (Robert Goddard)
  - 25143 Itokawa (Hideo Itokawa)
- Soyuz 11 crew members:
  - 1789 Dobrovolsky (Georgi Dobrovolski)
  - 1790 Volkov (Vladislav Volkov)
  - 1791 Patsayev (Viktor Patsayev)
- Other USSR/Russian cosmonauts

  - 1772 Gagarin (Yuri Gagarin, the first human in space)
  - 1836 Komarov (Vladimir Komarov)
- Apollo 11 crew members:
  - 6469 Armstrong (Neil Armstrong)
  - 6470 Aldrin ("Buzz" Aldrin)
  - 6471 Collins (Michael Collins)
- STS-51-L crew members:
  - 3350 Scobee (Francis "Dick" Scobee)
  - 3351 Smith (Michael J. Smith)
  - 3352 McAuliffe (Christa McAuliffe)
  - 3353 Jarvis (Gregory Jarvis)
  - 3354 McNair (Ronald McNair)
  - 3355 Onizuka (Ellison Onizuka)
  - 3356 Resnik (Judith Resnik)
- STS-107 crew members:
  - 51823 Rickhusband (Rick Husband)
  - 51824 Mikeanderson (Michael P. Anderson)
  - 51825 Davidbrown (David M. Brown)
  - 51826 Kalpanachawla (Kalpana Chawla)
  - 51827 Laurelclark (Laurel B. Clark)
  - 51828 Ilanramon (Ilan Ramon, first Israeli astronaut)
  - 51829 Williemccool (William C. McCool)
- Other American astronauts:
  - 4763 Ride (Sally Ride)
  - 7749 Jackschmitt (Harrison H. Schmitt)
  - 12790 Cernan (Eugene Cernan)
  - 13606 Bean (Alan Bean)
  - 22442 Blaha (John E. Blaha)
- Chinese astronauts:
  - 9512 Feijunlong (Fei Junlong)
  - 9517 Niehaisheng (Nie Haisheng)
  - 21064 Yangliwei (Yang Liwei)
- Other astronauts:
  - 2552 Remek (Vladimír Remek, Czechoslovak cosmonaut)
  - 9496 Ockels (Wubbo Ockels, Dutch astronaut)
  - 22901 Ivanbella (Ivan Bella, Slovak cosmonaut)

Other scientists, engineers and inventors

- 335 Roberta (Carl Robert Osten-Sacken, entomologist)
- 635 Vundtia (Wilhelm Wundt, pioneer psychologist)
- 742 Edisona (Thomas Edison, inventor)
- 775 Lumière (Auguste and Louis Lumière, cinematic pioneers)
- 777 Gutemberga (Johannes Gutenberg, pioneer printer)
- 2177 Oliver (Bernard M. Oliver, research scientist)
- 2243 Lönnrot (Elias Lönnrot, physician, philologist, botanist, compiler of *Kalevala*)
- 2784 Domeyko (Ignacy Domeyko, mineralogist)
- 2809 Vernadskij (Vladimir Vernadsky, mineralogist, pioneer geochemist)
- 3256 Daguerre (Louis Daguerre, photographic pioneer)
- 3313 Mendel (Gregor Mendel, father of genetics)
- 3701 Purkyně (Jan Evangelista Purkyně, physiologist)
- 4217 Engelhardt (Wolf von Engelhardt, geologist)
- 4342 Freud (Sigmund Freud, father of psychoanalysis)
- 4565 Grossman (Lawrence Grossman, geochemist)
- 5102 Benfranklin (Benjamin Franklin, scientist)
- 5864 Montgolfier (Montgolfier brothers, hot air balloon pioneers)
- 5958 Barrande (Joachim Barrande, geologist and paleontologist)
- 6175 Cori (Carl Ferdinand Cori and Gerty Theresa Cori, biochemists)
- 7552 Sephton (Mark Sephton, geochemist)
- 8373 Stephengould (Stephen Jay Gould, evolutionist and essayist)
- 11519 Adler (Alfred Adler, psychologist)
- 13609 Lewicki (Chris Lewicki), spacecraft systems engineer
- 15465 Buchroeder (Richard A. Buchroeder, optical engineer)
- 16518 Akihikoito (Akihiko Ito, Japanese CCD astrophotographer)
- 20259 Alanhoffman (Alan Hoffman, pioneer in infrared detectors)
- 29227 Wegener (Alfred Wegener, geologist and meteorologist)
- 61404 Ocenásek (Ludvík Ocenásek, handyman who constructed a monoplane, a radial engine for airplanes, and two-stage rockets)
- 73079 Davidbaltimore (David Baltimore, Nobel Prize in Physiology or Medicine Laureate)

Monarchs and royalty

- 12 Victoria (officially named after the Roman goddess of victory, but also honours Queen Victoria)
- 45 Eugenia (Empress Eugénie), with its moon Petit-Prince in part for her son Napoléon Eugène, Prince Imperial
- 115 Thyra (Thyra, consort of King Gorm the Old of Denmark)
- 216 Kleopatra (Cleopatra VII of Egypt)
- 220 Stephania (Princess Stéphanie of Belgium)
- 295 Theresia (Maria Theresa Walburga Amalia Christina Empress consort of the Holy Roman Empire and Queen consort of Germany)
- 326 Tamara (Queen Tamar of Georgia)
- 344 Desiderata (Queen Desideria of Sweden and Norway)
- 359 Georgia (King George II of Great Britain)
- 392 Wilhelmina (Queen Wilhelmina of the Netherlands)
- 525 Adelaide (Queen Adelaide, consort of William IV of the United Kingdom)
- 545 Messalina (Messalina, Roman empress)

- 546 Herodias (Herodias, wife of Herod II and mother of Salome)
- 562 Salome (Salome, daughter of Herod II and Herodias)
- 598 Octavia (Claudia Octavia, Roman empress)
- 650 Amalasuntha (Amalasuntha, queen of the Ostrogoths)
- 653 Berenike (Berenice II, Egyptian queen)
- 689 Zita (Empress Zita of Bourbon-Parma)
- 816 Juliana (Queen Juliana of the Netherlands)
- 823 Sisigambis (Sisygambis, mother of Darius III of Persia)
- 831 Stateira (Stateira, wife of Artaxerxes II of Persia)
- 832 Karin (Karin Månsdotter, wife of Eric XIV of Sweden)
- 888 Parysatis (Parysatis, wife of Darius II of Persia)
- 911 Agamemnon (Agamemnon)
- 1068 Nofretete (Nefertiti)
- 1128 Astrid (Astrid of Sweden)
- 2436 Hatshepsut (Pharaoh Hatshepsut)
- 3362 Khufu (Pharaoh Khufu)
- 4414 Sesostris (Greek version of Senusret, name of three pharaohs)
- 4415 Echnaton (Pharaoh Akhenaten; German spelling of his name)
- 4416 Ramses (pharaoh Ramses II)
- 4568 Menkaure (Pharaoh Menkaure)
- 4721 Atahualpa (Atahuallpa)
- 4846 Tuthmosis (Thutmose, name of four pharaohs)
- 4847 Amenhotep (pharaoh Amenhotep IV)
- 4848 Tutenchamun (pharaoh Tutankhamun)
- 4906 Seneferu (Pharaoh Sneferu)
- 5009 Sethos (Greek version of Seti, name of two pharaohs)
- 5010 Amenemhet (Amenemhet, name of four pharaohs)
- 5242 Kenreimonin (Empress Dowager Kenrei)
- 7117 Claudius (Emperor Claudius)
- 7207 Hammurabi (Hammurabi)
- 7208 Ashurbanipal (Ashurbanipal)
- 7209 Cyrus (Cyrus II of Persia)
- 7210 Darius (Darius I of Persia)
- 7211 Xerxes (Xerxes I of Persia)
- 7212 Artaxerxes (Artaxerxes II of Persia)
- 8740 Václav (Václav I, Duke of Bohemia)
- 10293 Pribina (Pribina, ruler of Nitrian Principality)
- 11014 Svätopluk (Svätopluk, ruler of Great Moravia)
- 16951 Carolus Quartus (Charles IV, Holy Roman Emperor and King of Bohemia)
- 18349 Dafydd (Dafydd ap Llywelyn, prince of Wales)
- 20969 Samo (Samo, ruler of Samo’s Empire)
- 25340 Segoves (Segoves, Celtic duke)
- 44613 Rudolf (Rudolph II, Holy Roman Emperor, king of Bohemia and Hungary)
- 48844 Belloves (Belloves, Celtic duke)
- 53285 Mojmír (Mojmír I, ruler of Great Moravia)

Nobility

- 17702 Kryštofharant (Kryštof Harant)

Politicians and Statesmen

- 712 Boliviana (Simon Bolivar)
- 852 Wladilena (Vladimir Lenin)
- 886 Washingtonia (George Washington)
- 932 Hooveria and 1363 Herberta (Herbert Hoover)
- 944 Hidalgo (Miguel Hidalgo)
- 1841 Masaryk (Tomáš Garrigue Masaryk, 1st Czechoslovak president)
- 2351 O'Higgins (Bernardo O'Higgins, Chilean independence leader)
- 3571 Milanštefánik (Milan Rastislav Štefánik)
- 4317 Garibaldi (Giuseppe Garibaldi)
- 4927 O'Connell (Daniel O'Connell)
- 5102 Benfranklin (Benjamin Franklin)
- 9275 Persson (Jöran Persson)
- 11830 Jessenius (Jan Jessenius)

Teachers

High school/technical school teachers

- 3352 McAuliffe (Christa McAuliffe, high school teacher from New Hampshire, U.S.A.)
- 12787 Abetadashi (Tadashi Abe, high school teacher from Japan)
- 13241 Biyo (Josette Biyo, high school teacher from Iloilo, Philippines)
- 13928 Aaronrogers (Aaron Rogers, mathematics teacher from London, U.K.)
- 14158 Alananderson (Alan Anderson, middle school teacher from Florida, U.S.A.)
- 14684 Reyes (Cynthia L. Reyes, middle school teacher from Florida, U.S.A.)
- 16265 Lemay (Ron LeMay, high school teacher from Wisconsin, U.S.A.)
- 17225 Alanschorn (Alan Schorn, high school teacher from New York, U.S.A.)
- 20341 Alanstack (Alan Stack, high school teacher from New York, U.S.A.)
- 20342 Trinh (Jonathan Trinh, high school teacher from Texas, U.S.A.)
- 20574 Ochinero (Marcia Collin Ochinero, middle school teacher from Florida, U.S.A.)
- 21395 Albertofilho (Alberto Filho, a technical school teacher from Rio Grande Do Sul, Brasil)
- 21435 Aharon (Terri Aharon, high school teacher from New York, U.S.A.)
- 22619 Ajscheetz (A. J. Scheetz, high school teacher from Connecticut, U.S.A.)
- 22993 Aferrari (Andrew Ferrari, high school teacher from North Carolina, U.S.A.)
- 23017 Advincula (Rigoberto Advincula, high school teacher from Texas, U.S.A.)
- 23975 Akran (Erkan Akran, middle school teacher from Arkansas, U.S.A.)
- 24032 Aimeemcarthy (Aimee McCarthy, middle school teacher from Florida, U.S.A.)
- 24052 Nguyen (Thuy-Anh Nguyen, teacher at Challenger School in Sunnyvale, California, U.S.A.)
- 24238 Adkerson (Timothy Adkerson, high school teacher from Missouri, U.S.A.)
- 27286 Adedmondson (Adam Edmondson, high school teacher from Pennsylvania, U.S.A.)
- 27740 Obatomoyuki (Tomoyuki Oba, junior high school teacher and presenter at Geisei Observatory, Japan)

College/University professors

- 6669 Obi (Shinya Obi, professor emeritus at the University of Tokyo and retired president of the University of the Air)
- 10051 Albee (Arden L. Albee, professor of geology and planetary sciences and dean of graduate studies at the California Institute of Technology)
- 15870 Oburka (Oto Oburka, professor at Brno University of Technology and founder of the Nicholas Copernicus Observatory)

War heroes and veterans

World War II heroes and veterans

- 1793 Zoya (Zoya Kosmodemyanskaya)
- 1907 Rudneva (Evgeniya Rudneva)
- 2009 Voloshina (Vera Danilovna Voloshina, Russian partisan)
- 2132 Zhukov (Georgy Zhukov)
- 3348 Pokryshkin (Aleksandr Ivanovich Pokryshkin)
- 11572 Schindler (Oskar Schindler, rescuer of 1,200 Jewish people)
- 19384 Winton (Nicholas Winton, rescuer of 669 Jewish children)
- 99949 Miepgies (Miep Gies, hid Anne Frank during World War II and discovered and preserved Anne's diary after her arrest and deportation.

Other war heroes

- 1834 Palach (Jan Palach, Czech student who self-immolated in protest against Soviet occupation of his country)
- 20164 Janzajíc (Jan Zajíc, Czech student who self-immolated in protest against Soviet occupation of his country)

Children died in war

- 2127 Tanya (Tanya Savicheva)
- 5535 Annefrank (Anne Frank)
- 50413 Petrginz (Petr Ginz, Jewish boy who died in Auschwitz concentration camp)

Religion

- 89 Julia (Julia of Corsica, martyr and patron saint, 5th century)
- 127 Johanna (believed to be named after Joan of Arc)
- 873 Mechthild (Mechthild of Magdeburg, medieval mystic)
- 898 Hildegard (Hildegard of Bingen, abbess, composer and polymath)
- 1840 Hus (John Huss, Czech Jan Hus, religious reformer)
- 5275 Zdislava (Zdislava Berka, in Czech Zdislava z Lemberka)
- 7100 Martin Luther (Martin Luther)
- 7256 Bonhoeffer (Dietrich Bonhoeffer)
- 8661 Ratzinger (Joseph Alois Ratzinger – Pope Benedict XVI)
- 20006 Albertus Magnus (Albertus Magnus, German theologian, philosopher and naturalist)

Explorers

- 54 Alexandra (Alexander von Humboldt, naturalist and explorer)
- 327 Columbia (Christopher Columbus)
- 853 Nansenia (Fridtjof Nansen, polar explorer)
- 876 Scott (Robert Falcon Scott, polar explorer)
- 1065 Amundsenia (Roald Amundsen, polar explorer)
- 2473 Heyerdahl (Thor Heyerdahl, explorer and writer)
- 2785 Sedov (Georgy Sedov, Arctic explorer)
- 3130 Hillary (Edmund Hillary, mountaineer [see Tenzing, below])
- 3357 Tolstikov (Yevgeny Tolstikov, polar explorer)
- 4055 Magellan (Ferdinand Magellan, circumnavigator)
- 6481 Tenzing (Tenzing Norgay, Sherpa [see Hillary, above])
- 6542 Jacquescousteau (Jacques-Yves Cousteau, marine explorer)
- 8291 Bingham (Hiram Bingham III, explorer)
- 15425 Welzl (Jan Welzl, Arctic explorer)
- 43806 Augustepiccard (Auguste Piccard, explorer)

Historians

- 879 Ricarda (Ricarda Huch)
- 3092 Herodotus (Herodotus)
- 3097 Tacitus (Tacitus)
- 5946 Hrozný (Bedřich Hrozný, archaeologist, orientalist and linguist)
- 6174 Polybius (Polybius)
- 6304 Josephus Flavius (Josephus)
- 16413 Abulghazi (Abulghazi Bahadur)
- 40444 Palacký (František Palacký)

Other social scientists

- 1861 Komenský (Jan Amos Komenský (Comenius), teacher of nations)
- 12838 Adamsmith (Adam Smith, social philosopher)
- 13916 Bernolák (Anton Bernolák, linguist)
- 40440 Dobrovský (Josef Dobrovský, linguist)

Philosophers

- 238 Hypatia (Hypatia of Alexandria)
- 423 Diotima (Diotima of Mantinea)
- 2431 Skovoroda (Hryhorii Skovoroda)
- 2755 Avicenna (Avicenna)
- 2807 Karl Marx (Karl Marx)
- 2940 Bacon (Francis Bacon)
- 2950 Rousseau (Jean-Jacques Rousseau)
- 5102 Benfranklin (Benjamin Franklin)
- 5148 Giordano (Giordano Bruno)
- 5329 Decaro (Mario De Caro)
- 5450 Sokrates (Socrates)

- 5451 Plato (Plato)
- 6001 Thales (Thales)
- 6123 Aristoteles (Aristotle)
- 6629 Kurtz (Paul Kurtz)
- 7009 Hume (David Hume)
- 7010 Locke (John Locke)
- 7012 Hobbes (Thomas Hobbes)
- 7014 Nietzsche (Friedrich Nietzsche)
- 7015 Schopenhauer (Arthur Schopenhauer)
- 7056 Kierkegaard (Søren Kierkegaard)
- 7083 Kant (Immanuel Kant)
- 7142 Spinoza (Baruch Spinoza)
- 8318 Averroes (Averroes or Ibn Rushd)
- 19730 Machiavelli (Niccolò Machiavelli)
- 21665 Frege (Gottlob Frege)
- 48435 Jaspers (Karl Jaspers)
- 73687 Thomas Aquinas (Thomas Aquinas)
- 90481 Wollstonecraft (Mary Wollstonecraft)
- 100027 Hannaharendt (Hannah Arendt)

The arts

Literature

General authors

- 254 Augusta Auguste von Littrow
- 1931 Čapek (Karel Čapek)
- 2428 Kamenyar (Ivan Franko)
- 2616 Lesya (Lesya Ukrainka)
- 2681 Ostrovskij (Nikolai Ostrovsky)
- 3047 Goethe (Johann Wolfgang von Goethe)
- 3412 Kafka (Franz Kafka)
- 4112 Hrabal (Bohumil Hrabal)
- 5418 Joyce (James Joyce)
- 5535 Annefrank (Anne Frank)
- 5666 Rabelais (François Rabelais)
- 5676 Voltaire (Voltaire)
- 6984 Lewiscarroll (Lewis Carroll or Charles Dodgson)
- 7328 Casanova (Giacomo Casanova)
- 8315 Bajin (Bajin)
- 8379 Straczynski (J. Michael Straczynski)
- 8382 Mann (brothers Heinrich Mann and Thomas Mann)
- 13406 Sekora (Ondřej Sekora)
- 26314 Škvorecký (Josef Škvorecký)
- 40106 Erben (Karel Jaromír Erben)
- 44597 Thoreau (Henry David Thoreau)
- 79144 Cervantes (Miguel de Cervantes)

- 308306 Dainere (Dainere Anthoney)

Novelists

- 348 May (Karl May)
- 2362 Mark Twain (Mark Twain)
- 2448 Sholokhov (Mikhail Sholokhov)
- 2578 Saint-Exupéry (Antoine de Saint-Exupéry)
- 2625 Jack London (Jack London)
- 2675 Tolkien (J.R.R. Tolkien)
- 3453 Dostoevsky (Fyodor Dostoevsky)
- 3479 Malaparte (Curzio Malaparte)
- 3628 Božněmcová (Božena Němcová)
- 3836 Lem (Stanisław Lem)
- 4124 Herriot (James Herriot)
- 4266 Waltari (Mika Waltari)
- 4370 Dickens (Charles Dickens)
- 4474 Proust (Marcel Proust)
- 4923 Clarke (Arthur C. Clarke)
- 5020 Asimov (Isaac Asimov)
- 6223 Dahl (Roald Dahl)
- 6371 Heinlein (Robert A. Heinlein)
- 6440 Ransome (Arthur Ransome)
- 7016 Conandoyle (Arthur Conan Doyle)
- 7232 Nabokov (Vladimir Nabokov)
- 7390 Kundera (Milan Kundera)
- 7644 Cslewis (C. S. Lewis)
- 9766 Bradbury (Ray Bradbury)
- 10177 Ellison (Harlan Ellison)
- 10251 Mulisch (Harry Mulisch)
- 10733 Georgesand (George Sand)
- 10930 Jinyong (Jinyong)
- 11020 Orwell (George Orwell)
- 11379 Flaubert (Gustave Flaubert)
- 17776 Troska (J. M. Troska)
- 25399 Vonnegut (Kurt Vonnegut)
- 25924 Douglasadams (Douglas Adams)
- 39415 Janeausten (Jane Austen)
- 39427 Charlottebrontë (Charlotte Brontë)
- 39428 Emilybrontë (Emily Brontë)
- 39429 Annebrontë (Anne Brontë)
- 77185 Cherryh (C. J. Cherryh)
- 127005 Pratchett (Terry Pratchett)

Poets

- 1875 Neruda (Jan Neruda)
- 2106 Hugo (Victor Hugo)
- 2208 Pushkin (Aleksandr Pushkin)
- 2222 Lermontov (Mikhail Lermontov)
- 2427 Kobzar (Taras Shevchenko)
- 2604 Marshak (Samuil Marshak)
- 3067 Akhmatova (Anna Akhmatova)
- 4110 Keats (John Keats)
- 4369 Seifert (Jaroslav Seifert)
- 4635 Rimbaud (Arthur Rimbaud)
- 7855 Tagore (Rabindranath Tagore)
- 9495 Eminescu (Mihai Eminescu)
- 11306 Åkesson (Sonja Åkesson)
- 12163 Manilius (Marcus Manilius)
- 18624 Prévert (Jacques Prévert)
- 59830 Reynek (Bohuslav Reynek)

Playwrights

- 496 Gryphia (Andreas Gryphius)
- 615 Roswitha (Hrotsvitha)
- 2930 Euripides (Euripides)
- 2985 Shakespeare (William Shakespeare)
- 2921 Sophocles (Sophocles)
- 2934 Aristophanes (Aristophanes)
- 3046 Molière (Molière, French playwright)
- 3079 Schiller (Friedrich Schiller, German playwright)
- 5696 Ibsen (Henrik Ibsen)

Satirists

- 2734 Hašek (Jaroslav Hašek)
- 3244 Petronius (Petronius)
- 15017 Cuppy (Will Cuppy)
- 15946 Satinský (Július Satinský)

Other

- 4049 Noragal' (Nora Gal, Russian translator)
- 12608 Aesop (Aesop, fabulist)

Visual arts

- 2730 Barks (Carl Barks, cartoonist)
- 3001 Michelangelo (Michelangelo Buonarroti, painter and sculptor)
- 3246 Bidstrup (Herluf Bidstrup, caricaturist)
- 3566 Levitan (Isaac Levitan, painter)
- 4511 Rembrandt (Rembrandt van Rijn, painter)
- 4671 Drtikol (František Drtikol, photographer)
- 4691 Toyen, (Toyen), painter and graphic artist)
- 5055 Opekushin (Alexander Opekushin, sculptor)
- 5122 Mucha (Alfons Mucha, painter and graphic artist)
- 5363 Kupka (František Kupka, painter and graphic artist)
- 5800 Pollock (Jackson Pollock, painter)
- 6056 Donatello (Donatello, painter)
- 6584 Ludekpesek (Ludek Pesek, painter)
- 6592 Goya (Francisco Goya, painter)
- 6674 Cézanne (Paul Cézanne, painter)
- 6676 Monet (Claude Monet, painter)
- 6677 Renoir (Pierre-Auguste Renoir, painter)
- 6701 Warhol (Andy Warhol, artist)
- 6768 Mathiasbraun (Mathias Braun, also known as Matyáš Braun, sculptor and carver)
- 6769 Brokoff (Johann Brokoff, also known as Jan Brokoff, sculptor and carver)
- 7701 Zrzavý (Jan Zrzavý, painter)
- 7867 Burian (Zdeněk Burian, painter and book illustrator)
- 8236 Gainsborough (Thomas Gainsborough, landscape and portrait artist)
- 8237 Constable (John Constable, painter)
- 8240 Matisse (Henri Matisse, painter)
- 10189 Normanrockwell (Norman Rockwell, artist)
- 10218 Bierstadt (Albert Bierstadt, Landscape artist)
- 10343 Church (Federic Edward Church, painter)
- 10372 Moran (Thomas Moran, landscape artist)
- 10404 McCall (Robert T. McCall, space artist)
- 13227 Poor (Kim Poor, space artist)
- 13329 Davidhardy (David A. Hardy, space artist)
- 13330 Dondavis (Don Davis, astronomical artist)
- 13543 Butler (Chris Butler, space artist)
- 13562 Bobeggleton (Bob Eggleton, painter)
- 14976 Josefčapek (Josef Čapek, painter and writer)
- 17625 Joseflada (Josef Lada, painter)
- 17806 Adolfborn (Adolf Born, painter)
- 20364 Zdeněkmiler (Zdeněk Miler, animator and illustrator)
- 21501 Acevedo (Tony Acevedo, multimedia graphic designer)
- 29490 Myslbek (Josef Václav Myslbek, sculptor)
- 43724 Pechstein (Max Pechstein, painter)
- 43775 Tiepolo (Giovanni Battista Tiepolo, painter)
- 46280 Hollar (Václav Hollar, graphic artist and painter)
- 48434 Maxbeckmann (Max Beckmann, painter)
- 98127 Vilgusová (Hedvika Vilgusová, painter and illustrator of books for children)

Architects

- 3062 Wren (Christopher Wren)
- 5318 Dientzenhofer (Dientzenhofer family or architects, like Christoph Dientzenhofer and his son Kilian Ignaz Dientzenhofer)
- 6055 Brunelleschi (Filippo Brunelleschi)
- 6266 Letzel (Jan Letzel)
- 6550 Parléř (Peter Parler, Czech: *Petr Parléř*)
- 19129 Loos (Adolf Loos)
- 35233 Krčín (Jakub Krčín)

Classical music

Composers

- 734 Benda (Karel Bendl)
- 1034 Mozartia (Wolfgang Amadeus Mozart)
- 1059 Mussorgskia (Modest Mussorgsky)
- 1405 Sibelius (Jean Sibelius)
- 1814 Bach (member of Bach family, probably Johann Sebastian Bach)
- 1815 Beethoven (Ludwig van Beethoven)
- 1818 Brahms (Johannes Brahms)
- 2047 Smetana (Bedřich Smetana)
- 2055 Dvořák (Antonín Dvořák)
- 2073 Janáček (Leoš Janáček)
- 2205 Glinka (Mikhail Glinka)
- 2266 Tchaikovsky (Pyotr Ilyich Tchaikovsky)
- 2420 Čiurlionis (Mikalojus Konstantinas Čiurlionis)
- 2523 Ryba (Jakub Jan Ryba)
- 2669 Shostakovich (Dmitri Shostakovich)
- 3081 Martinůboh (Bohuslav Martinů)
- 3159 Prokof'ev (Sergei Prokofiev)
- 3590 Holst (Gustav Holst)
- 3592 Nedbal (Oskar Nedbal)
- 3784 Chopin (Frédéric Chopin)
- 3826 Handel (George Frideric Handel)
- 3917 Franz Schubert (Franz Schubert)
- 3941 Haydn (Joseph Haydn)
- 3954 Mendelssohn (Felix Mendelssohn)
- 3955 Bruckner (Anton Bruckner)
- 3975 Verdi (Giuseppe Verdi)
- 3992 Wagner (Richard Wagner)
- 4003 Schumann (probably Robert Schumann)
- 4040 Purcell (Henry Purcell)
- 4079 Britten (Benjamin Britten)
- 4132 Bartók (Béla Bartók)
- 4134 Schütz (Heinrich Schütz)
- 4330 Vivaldi (Antonio Vivaldi)
- 4345 Rachmaninoff (Sergei Rachmaninoff)

- 4382 Stravinsky (Igor Stravinsky)
- 4406 Mahler (Gustav Mahler)
- 4492 Debussy (Claude Debussy)
- 4515 Khrennikov (Tikhon Khrennikov)
- 4527 Schoenberg (Arnold Schoenberg)
- 4528 Berg (Alban Berg)
- 4529 Webern (Anton Webern)
- 4532 Copland (Aaron Copland)
- 4534 Rimskij-Korsakov (Nikolai Rimsky-Korsakov)
- 4546 Franck (César Franck)
- 4559 Strauss (Johann Strauss family or Richard Strauss)
- 4579 Puccini (Giacomo Puccini)
- 4625 Shchedrin (Rodion Shchedrin)
- 4727 Ravel (Maurice Ravel)
- 4734 Rameau (Jean-Philippe Rameau)
- 4802 Khatchaturian (Aram Khatchaturian)
- 4818 Elgar (Edward Elgar)
- 4850 Palestrina (Giovanni Pierluigi da Palestrina)
- 4972 Pachelbel (Johann Pachelbel)
- 5004 Bruch (Max Bruch)
- 5063 Monteverdi (Claudio Monteverdi)
- 5157 Hindemith (Paul Hindemith)
- 5177 Hugowolf (Hugo Wolf)
- 5210 Saint-Saëns (Camille Saint-Saëns)
- 6354 Vangelis (Vangelis Papathanassiou)
- 6480 Scarlatti (Alessandro and Domenico Scarlatti)
- 6549 Skryabin (Alexander Scriabin)
- 6777 Balakirev (Mily Balakirev)
- 6780 Borodin (Alexander Borodin)
- 6798 Couperin (François Couperin)
- 69288 Berlioz(Hector Berlioz)
- 7622 Pergolesi (Giovanni Battista Pergolesi)
- 7624 Gluck (Christoph Willibald Gluck)
- 7625 Louisspohr (Louis Spohr)
- 7903 Albinoni (Tomaso Albinoni)
- 8181 Rossini (Gioacchino Rossini)
- 8249 Gershwin (George Gershwin)
- 8877 Rentaro (Taki Rentaro)
- 9438 Satie (Erik Satie)
- 9493 Enescu (George Enescu)
- 9912 Donizetti (Gaetano Donizetti)
- 9913 Humperdinck (Engelbert Humperdinck)
- 10055 Silcher (Friedrich Silcher)
- 10116 Robertfranz (Robert Franz)
- 10186 Albéniz (Isaac Albéniz, Spanish Catalan composer and pianist)
- 10820 Offenbach (Jacques Offenbach)
- 10875 Veracini (Francesco Maria Veracini)

- 11050 Messiaen (Olivier Messiaen)
- 11289 Frescobaldi (Girolamo Frescobaldi)
- 11530 d'Indy (Vincent d'Indy)
- 11899 Weill (Kurt Weill)
- 12782 Mauersberger (Brothers Rudolf and Erhard Mauersberger, composers and conductors)
- 15808 Zelter (Carl Friedrich Zelter)
- 16590 Brunowalter (Bruno Walter, composer and conductor)
- 17509 Ikumadan (Ikuma Dan)
- 53159 Mysliveček (Josef Mysliveček)

Conductors

- 5230 Asahina (Takashi Asahina)
- 6432 Temirkanov (Yuri Temirkanov)
- 11201 Talich (Václav Talich)
- 21801 Ančerl (Karel Ančerl)
- 21804 Václavneumann (Václav Neumann)
- 36226 Mackerras (Charles Mackerras)

Opera Singers

- 218 Bianca (Bertha Schwarz, stage name Bianca Bianchi)
- 5203 Pavarotti (Luciano Pavarotti)
- 6583 Destinn (Ema Destinnová, also known as Emmy Destinn)
- 18460 Pecková (Dagmar Pecková)
- 37573 Enricocaruso (Enrico Caruso)

Others

- 644 Cosima (Cosima Wagner, director of the Bayreuth Festival and wife of Richard Wagner)
- 677 Aaltje (Aaltje Noordewier-Reddingius, soprano)
- 5184 Cavaillé-Coll (Aristide Cavaillé-Coll, Organ builder)
- 8471 Obrant (Arkadij Efimovich Obrant, ballet-master, producer, and teacher-humanist)
- 9914 Obukhova (Nadezhda Andreevna Obukhova, soloist at the Bolshoj Theater and People's Artist of the U.S.S.R.)
- 11305 Ahlqvist (David Ahlqvist, Swedish artist, author, and musician)
- 58373 Albertoalonso (Alberto Alonso, Cuban choreographer and dance visionary)

Entertainment

Popular music

- 1889 Pakhmutova (Aleksandra Pakhmutova, composer)
- 2620 Santana (Carlos Santana, musician)
- 2644 Victor Jara (Víctor Jara, musician)
- 3738 Ots (Georg Ots, musician)
- 3834 Zappafrank (Frank Zappa, musician)
- Beatles members:
  - 4147 Lennon (John Lennon)
  - 4148 McCartney (Paul McCartney)
  - 4149 Harrison (George Harrison)

  - 4150 Starr (Ringo Starr)
- 4305 Clapton (Eric Clapton, musician)
- 4422 Jarre (Maurice Jarre and Jean Michel Jarre, French composers)
- 4442 Garcia (Jerry Garcia, musician)
- 5656 Oldfield (Mike Oldfield, composer)
- 5892 Milesdavis (Miles Davis, musician)
- 5945 Roachapproach (Steve Roach, musician)
- 6354 Vangelis (Vangelis Papathanassiou, composer)
- 6433 Enya (Enya, musician)
- 7226 Kryl (Karel Kryl, musician)
- 7707 Yes (Yes, band)
- 7934 Sinatra (Frank Sinatra, vocalist)
- 8249 Gershwin (George Gershwin, composer)
- 9179 Satchmo (Louis Armstrong, musician)
- 10313 Vanessa-Mae (Vanessa-Mae, musician)
- 14024 Procol Harum (Procol Harum, band)
- 15092 Beegees (Bee Gees, band)
- 16155 Buddy (Buddy Holly, musician)
- 17059 Elvis (Elvis Presley, musician)
- 18132 Spector (Phil Spector, musician)
- 18125 Brianwilson (Brian Wilson, musician)
- 19367 Pink Floyd (Pink Floyd, band)
- 19383 Rolling Stones (Rolling Stones, band)
- 23990 Springsteen (Bruce Springsteen, musician)
- 44016 Jimmypage (Jimmy Page, musician)
- 65769 Mahalia, (Mahalia Jackson, singer)
- 79896 Billhaley (Bill Haley, musician)
- 91287 Simon-Garfunkel (Simon and Garfunkel, band)
- 94291 Django (Django Reinhardt, musician)
- 110393 Rammstein (Rammstein, band)

Film, TV and Theatre

- 2374 Vladvysotskij, (Vladimir Vysotsky, singer, poet, writer, movie and theatre actor)
- 2816 Pien, (Armand Pien (1920–2003), Belgian TV weatherman)
- 3252 Johnny (Johnny Carson, Talk Show Host)
- 3998 Tezuka (Osamu Tezuka, pioneering Japanese comic artist and animator)
- 4238 Audrey (Audrey Hepburn, actress)
- 4535 Adamcarolla (Adam Carolla, comedian, television and radio host)
- 4536 Drewpinsky (Drew Pinsky, television and radio host, actor)
- 4659 Roddenberry (Gene Roddenberry, *Star Trek* creator)
- 5608 Olmos (Edward James Olmos, actor)
- 6318 Cronkite (Walter Cronkite, TV newsreader)
- 6377 Cagney (James Cagney, actor)
- 6546 Kaye (Danny Kaye, actor and comedian)
- 7032 Hitchcock (Alfred Hitchcock, film director)
- 7037 Davidlean (David Lean, film director)
- 7307 Takei (George Takei, actor)

- 8299 Téaleoni (Téa Leoni, actress)
- 8347 Lallaward (Lalla Ward, actress)
- 8353 Megryan (Meg Ryan, actress
- 8883 Miyazakihayao (Hayao Miyazaki, animator)
- 9341 Gracekelly (Grace Kelly, actress)
- 9342 Carygrant (Cary Grant, actor)
- Monty Python members:
  - 9617 Grahamchapman (Graham Chapman)
  - 9618 Johncleese (John Cleese)
  - 9619 Terrygilliam (Terry Gilliam)
  - 9620 Ericidle (Eric Idle)
  - 9621 Michaelpalin (Michael Palin)
  - 9622 Terryjones (Terry Jones)
- 10221 Kubrick (Stanley Kubrick)
- 10378 Ingmarbergman (Ingmar Bergman, film director)
- 11333 Forman (Miloš Forman, film director)
- 11548 Jerrylewis (Jerry Lewis, comedian and actor)
- 12561 Howard (Ron Howard, actor, director, producer)
- 12562 Briangrazer (Brian Grazer, producer)
- 12818 Tomhanks (Tom Hanks, actor, producer)
- 12820 Robinwilliams (Robin Williams, actor, comedian)
- 13070 Seanconnery (Sean Connery, actor)
- 13441 Janmerlin (Jan Merlin, actor and author)
- 15131 Alanalda (Alan Alda, actor, director, screenwriter, author)
- 17023 Abbott (Bud Abbott, actor, producer, comedian)
- 17744 Jodiefoster (Jodie Foster, actress)
- 19291 Karelzeman (Karel Zeman, film director)
- 19578 Kirkdouglas (Kirk Douglas, actor)
- 26733 Nanavisitor (Nana Visitor, actress)
- 26734 Terryfarrell (Terry Farrell, actress)
- 26858 Misterrogers (Fred Rogers, US children's television host)
- 38461 Jiřítrnka (Jiří Trnka, puppet maker and puppet-film director)
- 39557 Gielgud (John Gielgud, actor)
- 68410 Nichols (Nichelle Nichols, actress)
- 71000 Hughdowns (Hugh Downs, Television and radio anchorman)
- 116939 Jonstewart (Jon Stewart, comedian and TV host)
- 132874 Latinovits (Zoltán Latinovits, actor)
- 133161 Ruttkai (Éva Ruttkai, actress)

Sports

Olympic medalists

- 1740 Nurmi (Paavo Nurmi, middle- and long-distance runner)
- 5910 Zátopek (Emil Zátopek, long-distance runner)
- 8217 Dominikhašek (Dominik Hašek, ice hockey player)
- 9224 Železný (Jan Železný, javelin thrower)
- 26986 Čáslavská (Věra Čáslavská, gymnast)
- 128036 Rafaelnadal (Rafael Nadal Parera, tennis player)

Other sports

- 1909 Alekhin (Alexander Alekhine, chess world champion)
- 33179 Arsènewenger (Arsène Wenger, football manager)
- 2472 Bradman (Donald Bradman, cricketer)
- 3027 Shavarsh (Shavarsh Karapetyan, finswimmer)
- 5891 Gehrig (Lou Gehrig, baseball player)
- 6758 Jesseowens (Jesse Owens, athlete)
- 7835 Myroncope (Myron Cope, sportscaster and journalist)
- 10634 Pepibican (Josef Bican, called "Pepi", football player)
- 10675 Kharlamov (Valeri Kharlamov, hockey player)
- 12373 Lancearmstrong (Lance Armstrong, cyclist)
- 12413 Johnnyweir (Johnny Weir, figure skater)
- 12414 Bure (Pavel Bure, ice hockey player)
- 78071 Vicent (Francesc Vicent, chess writer)
- 82656 Puskás (Ferenc Puskás, football player)
- 85386 Payton (Walter Payton, American football player)
- 90414 Karpov (Anatoly Karpov, chess world champion)

Other entertainers

- 3163 Randi (James Randi, magician and skeptic)

Contest winners

Discovery Channel Young Scientist Challenge

- 2001 winners
  - 15155 Ahn (Ryan J. Ahn, a middle school student from Pennsylvania, U.S.A.)
  - 15559 Abigailhines (Abigail M. Hines, a middle school student from Indiana, U.S.A.)
- 2002 winners
  - 13434 Adamquade (Adam Robert Quade, a middle school student from Minnesota, U.S.A.)
- 2003 winners
  - 19564 Ajburnetti (Anthony James Burnetti, a middle school student from Maryland, U.S.A.)
- 2004 winners
  - 20503 Adamtazi (Adam Ryoma Tazi, a middle school student from Florida, U.S.A.)
- 2005 winners
  - 21850 Abshir (Iftin Mohamed Abshir, a middle school student from Colorado, U.S.A.)

- 21933 Aaronrozon (Aaron Alexander Rozon, a middle school student from Hawaii, U.S.A.)
- 2006 winners
  - 22638 Abdulla (Almas Ugurgizi Abdulla, a middle school student from Florida, U.S.A.)
  - 22656 Aaronburrows (Aaron Phillip Burrows, a middle school student from Texas, U.S.A.)
- 2007 winners
  - 23768 Abu-Rmaileh (Muhammad Akef Abu-Rmaileh, a middle school student from Arkansas, U.S.A.)
  - 23924 Premt (Prem Thottumkara, a middle school student from Illinois, U.S.A)

Intel International Science and Engineering Fair

- 2002 winners
  - 10237 Adzic (Vladislav Adzic, high school student from New York, U.S.A.)
  - 11685 Adamcurry (Adam Michael Curry, high school student from Colorado, U.S.A.)
  - 11697 Estrella (Allan Noriel Estrella, high school student from Manila, Philippines)
  - 12088 Macalintal (Jeric Valles Macalintal, high school student from Manila, Philippines)
  - 12522 Rara (Prem Vilas Fortran Rara, high school student from Iligan, Philippines)
  - 12553 Aaronritter (Aaron M. Ritter, high school student from Indiana, U.S.A.)
  - 13241 Biyo (Josette Biyo, high school teacher from Iloilo, Philippines)
- 2003 winners
  - 16999 Ajstewart (Andrew James Stewart, high school student from NSW, Australia)
  - 17984 Ahantonioli (Alexandra Hope Antonioli, high school student from Montana, U.S.A.)
  - 18084 Adamwohl (Adam Richard Wohl, high school student from North Dakota, U.S.A.)
  - 18142 Adamsidman (Adam Daniel Sidman, high school student from Colorado, U.S.A.)
  - 18796 Acosta (Iyen Abdon Acosta, high school student from Maryland, U.S.A.)
  - 19444 Addicott (Charles Michael Addicott, high school student from Florida, U.S.A.)
  - 19488 Abramcoley (Abram Levi Coley, high school student from Montana, U.S.A.)
  - 21395 Albertofilho (Alberto Filho, a technical school teacher from Rio Grande Do Sul, Brasil)
- 2004 winners
  - 20780 Chanyikhei (Chan Yik Hei, high school student from Hong Kong, China)
  - 20813 Aakashshah (Aakash Shah, high school student from New Jersey, U.S.A.)
- 2005 winners
  - 21483 Abdulrasool (Ameen Abdulrasool, high school student from Illinois, U.S.A.)
  - 21712 Obaid (Sami Obaid, college student from Quebec, Canada.)
  - 21758 Adrianveres (Adrian Veres, high school student from Quebec, Canada)
- 2006 winners
  - 21400 Ahdout (Zimra Payvand Ahdout, high school student from New York, U.S.A.)
  - 21623 Albertshieh (Albert David Shieh, high school student from Arizona, U.S.A.)
- 2007 winners
  - 23113 Aaronhakim (Aaron Hakim, high school student from Ontario, Canada)
  - 23238 Ocasio-Cortez (Alexandria Ocasio-Cortez, high school student from New York, U.S.A.)
  - 23306 Adamfields (Adam Chaplin Fields, high school student from New York, U.S.A.)
- 2008 winners
  - 24520 Abramson (Ronit Batya Roth Abramson, high school student from California, U.S.A.)
  - 24346 Lehienphan (Le Hien Thi Phan, high school student from Georgia, U.S.A.)

- 2009 winners
  - 25638 Ahissar (Shira Ahissar, high school student from Rehovot, Israel.)
  - 25642 Adiseshan (Tara Anjali Adiseshan, high school student from Virginia, U.S.A.)
  - 25677 Aaronenten (Aaron Christopher Enten, high school student from Florida, U.S.A.)
- 2010 winners
  - 26386 Adelinacozma (Adelina Corina Cozma, high school student from Ontario, Canada)
  - 26447 Akrishnan (Akash Krishnan, high school student from Oregon, U.S.A.)
  - 26462 Albertcui (Albert Cui, high school student from Utah, U.S.A.)
  - 26544 Ajjarapu (Avanthi Sai Ajjarapu, high school student from Iowa, U.S.A.)
  - 26557 Aakritijain (Aakriti Jain, high school student from California, U.S.A.)
  - 26737 Adambradley (Adam Bradley Halverson, high school student from South Dakota, U.S.A.)
  - 26740 Camacho (Martin Ayalde Camacho, high school student from Minnesota, U.S.A.)
  - 28400 Morgansinko (Morgan Walker Sinko, high school student from Texas. U.S.A.)
- 2011 winners
  - 28439 Miguelreyes (Miguel Arnold Silverio Reyes, high school student from Quezon City, Philippines)
  - 28442 Nicholashuey (Nicholas Michael Huey, high school student from Missouri, U.S.A.)
  - 28443 Crisara (Alexander Raymond Crisara, high school student from Texas, U.S.A.)
  - 28444 Alexrabii (Alexander Jahan Rabii, high school student from Texas, U.S.A.)
  - 28446 Davlantes (Christopher Joseph Davlantes, high school student from Florida, U.S.A.)
  - 28447 Arjunmathur (Arjun Mathur, high school student from Florida, U.S.A.)
  - 28449 Ericlau (Eric Lau, high school student from Georgia, U.S.A.)
  - 28450 Saravolz (Sara Ellen Volz, high school student from Colorado, U.S.A.)
  - 28451 Tylerhoward (Tyler Trettel Howard, high school student from Kansas, U.S.A.)
  - 28452 Natkondamuri (Nathan Sai Kondamuri, high school student from Indiana, U.S.A.)
  - 28453 Alexcecil (Alexander Michael Cecil, high school student from North Carolina, U.S.A.)

Intel Science Talent Search

- 2002 Winners
  - 16113 Ahmed (Tahir Ahmed, high school student from New York, U.S.A.)
- 2003 Winners
  - 15421 Adammalin (Adam Mikah Malin, a high school senior from New York, U.S.A.)
- 2005 Winners
  - 21411 Abifraeman (Abigail Ann Fraeman, a high school senior from Maryland, U.S.A.)
  - 21413 Albertsao (Albert Tsao, a high school senior from Massachusetts, U.S.A.)
- 2006 Winners
  - 22551 Adamsolomon (Adam Ross Solomon, a high school senior from New York, U.S.A.)
- 2008 Winners
  - 24121 Achandran (Ashok Chandran, a high school senior from New York, U.S.A.)
- 2009 Winners
  - 25410 Abejar (Patrick Jeffrey Abejar, a high school senior from New York, U.S.A.)
  - 25422 Abigreene (Abigail Sara Greene, a high school senior from New York, U.S.A.)
- 2010 Winners
  - 25966 Akhilmathew (Akhil Mathew, a high school senior from New Jersey, U.S.A.)
  - 25979 Alansage (Alan Robert Sage, a high school senior from New York, U.S.A.)
  - 27239 O'Dorney (Evan Michael O'Dorney, a high school senior from California, U.S.A.)

- 2011 Winners
  - 27072 Aggarwal (Amol Aggarwal, a high school senior from California, U.S.A.)
  - 27257 Tang-Quan (David Tang-Quan, a high school senior from California, U.S.A)
- 2012 Winners
  - 26200 Vandoren (Benjamin Van Doren, a high school senior from New York, U.S.A.)

Editors and publishers

- 305 Gordonia (James Gordon Bennett, Jr., publisher of the *New York Herald*)
- 6282 Edwelda (Edwin L. Aguirre and Imelda B. Joson, Filipino editors of *Sky & Telescope*)
- Editors of the Japanese monthly astronomical magazine *Gekkan Tenmon Guide*:
  - 9067 Katsuno (Gentaro Katsuno)
  - 11928 Akimotohiro (Hiroyuki Akimoto)

Discoverers' relatives

- 3044 Saltykov (Nikita Saltykov, one of the discoverers' grandfathers)
- 10588 Adamcrandall (Adam Crandall Rees, the discoverer's stepson)
- 12848 Agostino (Agostino Boattini, the discoverer's father)
- 13691 Akie (Akie Asami, the discoverer's wife)
- 19524 Acaciacoleman (Acacia Coleman, the discoverer's granddaughter)
- 60001 Adélka (Adélka Kotková, the discoverer's daughter)

Others

Simon Wiesenthal

- 83 Beatrix (Beatrice Portinari, immortalized in Dante's *Divine Comedy*)
- 156 Xanthippe (Xanthippe, wife of Socrates)
- 323 Brucia (Catherine Wolfe Bruce, astronomical philanthropist)
- 609 Fulvia (Fulvia, wife of Mark Antony)
- 719 Albert (Albert Salomon von Rothschild, banker and benefactor of the Vienna Observatory)
- 904 Rockefellia (John D. Rockefeller, philanthropist)
- 1038 Tuckia (Edward Tuck, philanthropist)
- 1462 Zamenhof (L. L. Zamenhof, father of Esperanto)
- 3018 Godiva (Lady Godiva)
- 3147 Samantha (Samantha Smith, peace activist)
- 4318 Baťa (Tomáš Baťa, founder of the Bata Shoes Company)
- 4487 Pocahontas (Pocahontas)
- 4987 Flamsteed (Ethelwin ("Win") Frances Flamsteed Moffatt, a direct descendant of the brother of John Flamsteed, the first Astronomer Royal of England)
- 7166 Kennedy (Malcolm Kennedy, secretary of the Astronomical Society of Glasgow)
- 19718 Albertjarvis (Albert G. Jarvis, inventor)
- 69275 Wiesenthal (Simon Wiesenthal, Nazi hunter)
- 80652 Albertoangela (Alberto Angela, Italian science writer)

Fictional characters

Characters in classic fiction

- 92 Undina (Undine, heroine of the novella *Undine* by Friedrich de la Motte Fouqué)
- 264 Libussa (Libuše, mythical Bohemian prophetess)
- 1143 Odysseus (Odysseus, legendary king of Ithaca)
- 2041 Lancelot (Arthurian knight)
- 2082 Galahad (Arthurian knight)
- 2483 Guinevere (Guinevere, King Arthur's queen)
- 2597 Arthur (King Arthur, legendary king of England)
- 2598 Merlin (Merlin, wizard who helped King Arthur)
- 3102 Krok (Krok, mythical Bohemian duke, father of Libuše, Kazi and Teta)
- 3552 Don Quixote (Don Quixote, hero of the novel *Don Quixote de la Mancha* by Miguel de Cervantes)
- 5797 Bivoj (Bivoj, mythical Bohemian hero)
- 7695 Přemysl (Přemysl the Ploughman, mythical founder of the Přemyslid dynasty)
- 9551 Kazi (Kazi, Bohemian mythical female healer)
- 9713 Oceax (Oceax, son of Nauplius of Euboea and brother of Palamedes)
- 10764 Rübezahl (Rübezahl, Czech Krakonoš, giant ruler of the Giant Mountains)
- 15374 Teta (Teta, mythical Bohemian prophetess)
- 24601 Valjean (Jean Valjean, protagonist of the novel *Les Misérables* by Victor Hugo)
- 38086 Beowulf (Beowulf)

Characters in modern fiction

- 1683 Castafiore (the diva in Hergé's *The Adventures of Tintin*)
- 2309 Mr. Spock (Mr. Spock, the famous Vulcan, by way of the discoverer's cat)
- 2521 Heidi (title character in Johanna Spyri's well-known book *Heidi*)
- 4512 Sinuhe (title hero of *The Egyptian* by Mika Waltari)
- Characters created by Arthur Conan Doyle:
  - 5048 Moriarty (Professor Moriarty, archenemy of Sherlock Holmes)
  - 5049 Sherlock (Sherlock Holmes, detective)
  - 5050 Doctorwatson (Doctor Watson, sidekick of Sherlock Holmes)
- Characters created by Lewis Carroll in *Alice in Wonderland*:
  - 6042 Cheshirecat (the Cheshire cat)
  - 6735 Madhatter (the Mad Hatter)
  - 6736 Marchare (the March Hare)
- Fabulous beasts described or mentioned by Lewis Carroll in *Jabberwocky*:
  - 7470 Jabberwock (the Jabberwock)
- 7796 Járacimrman (Jára Cimrman, a fictional Czech genius)
- 7896 Švejk (Josef Švejk, the good soldier)
- 9007 James Bond (James Bond, fictional spy created by Ian Fleming)
- 12448 Mr. Tompkins (Mr. Tompkins, hero of science books by George Gamow)
- 12796 Kamenrider (Kamen Rider, Japanese hero created by Shotaro Ishinomori)
- 18610 Arthurdent (Arthur Dent, hapless protagonist in *The Hitchhiker's Guide to the Galaxy* series)
- 20496 Jeník (Jeník, hero of Bedřich Smetana's opera *The Bartered Bride*)
- 20497 Mařenka (Mařenka, hero of Bedřich Smetana's opera *The Bartered Bride*)
- Comic strip characters by Goscinny and Uderzo:

  - 29401 Asterix (Asterix)
  - 29402 Obelix (Obélix)
- 29471 Spejbl (Spejbl, popular puppet character created by Josef Skupa)
- 29472 Hurvínek (Hurvínek, son of Spejbl, popular puppet character created by Josef Skupa)
- 33377 Večerníček (Večerníček, animated character inviting Czech children to watch evening TV fairytale)
- Petit-Prince, moon of 45 Eugenia (The Little Prince, hero of book by Antoine de Saint-Exupéry)
- 58345 Moomintroll (Moomintroll, hero of books by Tove Jansson)
- 99942 Apophis (Apophis, character from sci-fi TV show *Stargate SG-1*)

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- Minor Planet Center. "Minor Planet Names: Alphabetical List" (21 April 2011). http://www.minorplanetcenter.org/iau/lists/MPNames.html (was updated 4 June 2011).
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List of minor planets named after rivers

This is a **list of minor planets named after rivers**, organized by continent.

Asia

- 16563 Ob (river in central Asia)
- 1089 Tama (Tama River in Tokyo)
- 1090 Sumida (Sumida River in Tokyo)

Europe

- 1381 Danubia (River Danube)
- 2081 Sázava (Sázava River)
- 2123 Vltava (Vltava River)
- 2321 Lužnice (Lužnice River)
- 2390 Nežárka (Nežárka River)
- 4405 Otava (Otava River)
- 4698 Jizera (Jizera River)
- 4702 Berounka (Berounka River)
- 4801 Ohře (Ohře River)
- 7669 Malše (Malše River)
- 21290 Vydra (Vydra River)
- 13121 Tisza (Tisza River)
- 1488 Aura (Aura river)
- 1149 Volga (Volga River)

North America

- 1345 Potomac (Potomac)

South and Central America

- 1042 Amazone (Amazon River)

References

- Jet Propulsion Laboratory. "JPL Small-Body Database Browser" http://ssd.jpl.nasa.gov/sbdb.cgi (accessed 06 April 2012).

List of minor planets named after places

This is a **list of minor planets named after places**, organized by continent.

Africa

- 1193 Africa (Africa)

Countries of Africa

- 1197 Rhodesia (Rhodesia, now Zimbabwe)
- 1213 Algeria (Algeria)
- 1278 Kenya (Kenya)
- 1279 Uganda (Uganda)
- 1432 Ethiopia (Ethiopia)
- 1638 Ruanda (Rwanda)
- 1718 Namibia (Namibia)
- 1816 Liberia (Liberia)

Cities of Africa

- 790 Pretoria (Pretoria, South Africa)
- 858 El Djezaïr (Algiers)
- 859 Bouzaréah (Bouzareah)

Asia

- 67 Asia (Asia)
- 1157 Arabia (Arabia)
- 2169 Taiwan (Taiwan)
- 16563 Ob (river in central Asia)

Japan

- 498 Tokio (Tokyo)
- 1089 Tama (Tama River in Tokyo)
- 1090 Sumida (Sumida River in Tokyo)
- 1098 Hakone (Hakone, Kanagawa)
- 1584 Fuji (Mount Fuji)
- 2084 Okayama (Okayama)
- 2247 Hiroshima (Hiroshima)
- 3319 Kibi (Kibi)
- 3380 Awaji (Awaji)
- 3720 Hokkaido (Hokkaidō)
- 4157 Izu (Izu)
- 4578 Kurashiki (Kurashiki)
- 4774 Hobetsu (Hobetsu
- 5618 Saitama (Saitama)
- 5881 Akashi (Akashi)
- 5908 Aichi (Nagoya)
- 6218 Mizushima (Mizushima)
- 6255 Kuma (Kumakogen)
- 6879 Hyogo (Hyōgo)
- 7253 Nara (Nara)
- 8120 Kobe (Kobe)
- 8892 Kakogawa (Kakogawa)
- 9782 Edo (Edo)
- 10159 Tokara (Tokara)
- 10163 Onomichi (Onomichi)
- 11612 Obu (Ōbu)
- 17286 Bisei (Bisei)
- 20625 Noto (Noto)
- 48736 Ehime (Ehime)

China

- 1125 China (China)
- 2045 Peking (Beijing)
- 2077 Kiangsu (Jiangsu)
- 2078 Nanking (Nanjing)
- 2085 Henan (Henan)
- 2162 Anhui (Anhui)
- 2184 Fujian (Fujian)
- 2185 Guangdong (Guangdong)
- 2197 Shanghai (Shanghai)
- 2209 Tianjin (Tianjin)
- 2215 Sichuan (Sichuan)
- 2230 Yunnan (Yunnan)
- 2255 Qinghai (Qinghai)
- 2263 Shaanxi (Shaanxi)
- 2336 Xinjiang (Xinjiang)

- 2344 Xizang (Xizang)
- 2355 Nei Monggol (Inner Mongolia)
- 2380 Heilongjiang (Heilongjiang)
- 2387 Xi'an (Xi'an)
- 2398 Jilin (Jilin)
- 2425 Shenzhen (Shenzhen)
- 2503 Liaoning (Liaoning)
- 2505 Hebei (Hebei)
- 2510 Shandong (Shandong)
- 2514 Taiyuan (Taiyuan)
- 2515 Gansu (Gansu)
- 2539 Ningxia (Ningxia)
- 2547 Hubei (Hubei)
- 2592 Hunan (Hunan)
- 2617 Jiangxi (Jiangxi)
- 2631 Zhejiang (Zhejiang)
- 2632 Guizhou (Guizhou)
- 2655 Guangxi (Guangxi)
- 2693 Yan'an (Yan'an)
- 2719 Suzhou (Suzhou)
- 2729 Urumqi (Urumqi)
- 2743 Chengdu (Chengdu)
- 2778 Tangshan (Tangshan)
- 2789 Foshan (Foshan)
- 2851 Harbin (Harbin)
- 2903 Zhuhai (Zhuhai)
- 3011 Chongqing (Chongqing)
- 3024 Hainan (Hainan)
- 3048 Guangzhou (Guangzhou)
- 3051 Nantong (Nantong)
- 3088 Jinxiuzhonghua (Splendid China, themed park in Shenzhen)
- 3136 Anshan (Anshan)
- 3139 Shantou (Shantou)
- 3187 Dalian (Dalian)
- 3206 Wuhan (Wuhan)
- 3239 Meizhou (Meizhou)
- 3297 Hong Kong (Hong Kong)
- 3335 Quanzhou (Quanzhou)
- 3494 Purple Mountain (Purple Mountain Observatory)
- 3613 Kunlun (Kunlun Mountains)
- 3650 Kunming (Kunming)
- 3729 Yangzhou (Yangzhou)
- 4273 Dunhuang (Dunhuang)
- 7859 Lhasa (Lhasa)
- 8423 Macao (Macau)
- 12418 Tongling (Anhui)

Korea

- 12252 Gwangju (Gwangju)
- 34666 Bohyunsan (Bohyeon Mountain)

Vietnam

- 7816 Hanoi (Hanoi)

Russia and the former Soviet Union (Asia)

- 780 Armenia (Armenia)
- 1094 Siberia (Siberia, Russia)
- 2120 Tyumenia (Tyumen Oblast, Russia)
- 2140 Kemerovo (Kemerovo, Russian SFSR, now Russia)
- 2297 Daghestan (Daghestan, Russia)
- 2566 Kirghizia (Kirghiz SSR, now Kyrgyzstan)
- 2584 Turkmenia (Turkmen SSR, now Turkmenistan)
- 2698 Azerbajdzhan (Azerbaijan)
- 2700 Baikonur (Baikonur Cosmodrome, Kazakhstan)
- 5471 Tunguska (Tunguska, Russia)

Europe

- 257 Silesia (Silesia)
- 1381 Danubia (River Danube)
- 1391 Carelia (Karelia)
- 2206 Gabrova (Gabrovo, Bulgaria)
- 2236 Austrasia (Austrasia, historic region from western Germany to eastern France)
- 3933 Portugal (Portugal)
- 7671 Albis (Latin name for the Elbe)
- 8020 Erzgebirge (German name for the Ore Mountains)
- 22618 Silva Nortica (Silva Nortica, a region at the border of Austria and the Czech Republic)

Baltic States (Estonia, Latvia, Lithuania)

- 1284 Latvia (Latvia)
- 1541 Estonia (Estonia)
- 1796 Riga (Riga, Latvia)
- 2577 Lietuva (Lithuania)
- 3072 Vilnius (Vilnius, Lithuania)
- 4163 Saaremaa (Saaremaa, Estonia)
- 4227 Kaali (Kaali crater, Estonia)
- 13995 Tõravere (Tõravere, Estonia)
- 23617 Duna (Riga, Latvia)
- 24709 Mitau (Jelgava, Latvia)
- 24794 Kurland (Courland, Latvia)
- 35618 Tartu (Tartu, Estonia)
- 37623 Valmiera (Valmiera, Latvia)
- 73059 Kaunas (Kaunas, Lithuania)
- 274084 Baldone (Baldone, Latvia)

Czech Republic

- 371 Bohemia (Bohemia)
- 1901 Moravia (Moravia)
- 1942 Jablunka (Jablunka)
- 2080 Jihlava (Jihlava)
- 2081 Sázava (Sázava River)
- 2123 Vltava (Vltava River)
- 2199 Kleť (Kleť, a hill and its observatory, place of discovery)
- 2321 Lužnice (Lužnice River)
- 2337 Boubín (Boubín, a hill)
- 2367 Praha (Prague)
- 2390 Nežárka (Nežárka River)
- 2403 Šumava (Šumava)
- 2524 Budovicium (Latin name for České Budějovice)
- 2599 Veselí (Veselí)
- 2613 Plzeň (Plzeň)
- 2672 Písek (Písek)
- 2747 Český Krumlov (Český Krumlov)
- 2811 Střemchoví (Střemchoví, birthplace of discoverer)
- 2889 Brno (Brno)
- 3137 Horky (Horký, a hill)
- 3735 Třeboň (Třeboň)
- 4054 Turnov (Turnov)
- 4249 Křemže (Křemže)
- 4277 Holubov (Holubov)
- 4405 Otava (Otava River)
- 4408 Zlatá Koruna (Zlatá Koruna)
- 4610 Kájov (Kájov)
- 4698 Jizera (Jizera River)
- 4702 Berounka (Berounka River)
- 4801 Ohře (Ohře River)
- 4823 Libenice (Libenice)
- 4824 Stradonice (Stradonice)
- 5894 Telč (Telč)
- 6060 Doudleby (Doudleby)
- 6064 Holašovice (Holašovice)
- 6802 Černovice (Černovice)
- 7118 Kuklov (Kuklov)
- 7204 Ondřejov (Ondřejov)
- 7440 Závist (Závist)
- 7498 Blaník (Blaník, a hill)
- 7532 Pelhřimov (Pelhřimov)
- 7669 Malše (Malše River)
- 7694 Krasetín (Krasetín)
- 7711 Říp (Říp Mountain)
- 8554 Gabreta (ancient name for Bohemian Forest)
- 9711 Želetava (Želetava)

- 9884 Příbram (Příbram)
- 11128 Ostravia (Latin name for Ostrava)
- 11134 České Budějovice (České Budějovice)
- 11163 Milešovka (Milešovka, a mountain)
- 11167 Kunžak (Kunžak)
- 11339 Orlík (Orlík a castle and a dam)
- 11656 Lipno (Lipno Dam)
- 12406 Zvíkov (Zvíkov Castle)
- 12468 Zachotín (Zachotín)
- 12833 Kamenný Újezd (Kamenný Újezd)
- 13804 Hrazany (Hrazany)
- 14537 Týn nad Vltavou (Týn nad Vltavou)
- 14974 Počátky (Počátky)
- 15890 Prachatice (Prachatice)
- 15960 Hluboká (Hluboká nad Vltavou, a castle)
- 16801 Petřínpragensis (Petřín, a hill in Prague)
- 17600 Dobřichovice (Dobřichovice)
- 17607 Táborsko (Táborsko, Czech district)
- 18497 Nevězice (Nevězice)
- 18531 Strakonice (Strakonice)
- 20254 Úpice (Úpice)
- 20964 Mons Naklethi (old name of the hill Kleť)
- 21257 Jižní Čechy (*Jižní Čechy*, English: South Bohemia, a Czech Republic region)
- 21290 Vydra (Vydra River)
- 21873 Jindřichůvhradec (Jindřichův Hradec)
- 22450 Nové Hrady (Nové Hrady)
- 24837 Mšecké Žehrovice (Mšecké Žehrovice)
- 24838 Abilunon (Abilunon, nowadays non-existing ancient town)
- 26328 Litomyšl (Litomyšl)
- 26971 Sezimovo Ústí (Sezimovo Ústí)
- 27079 Vsetín (Vsetín)
- 27088 Valmez (Valašské Meziříčí)
- 30564 Olomouc (Olomouc)
- 31650 Frýdek-Místek (Frýdek-Místek)
- 31232 Slavonice (Slavonice)
- 31238 Kroměříž (Kroměříž)
- 40206 Lhenice (Lhenice)
- 43954 Chýnov (Chýnov)
- 47294 Blanský les (Blanský les, highlands)
- 49448 Macocha (Macocha Gorge)
- 61208 Stonařov (Stonařov)
- 68779 Schöninger (old name for the hill Kleť)
- 159743 Kluk (Kluk, a Czech hill near Kleť mountain)

Eastern Europe

- 183 Istria (Istria, Croatia)
- 434 Hungaria (Hungary)
- 589 Croatia (Croatia)
- 1160 Illyria (Illyria, Croatia)
- 1537 Transylvania (Transylvania, Romania)
- 1989 Tatry (Tatra Mountains)
- 2315 Czechoslovakia (Czechoslovakia, now the Czech Republic and Slovakia)
- 2575 Bulgaria (Bulgaria)
- 9674 Slovenija (Slovenia)
- 12123 Pazin (Pazin, Croatia)
- 12124 Hvar (Hvar, Croatia)
- 13121 Tisza (Tisza River)
- 38674 Těšínsko (Těšínsko, a region in south-eastern Silesia, nowadays in the Czech Republic and Poland)
- 187700 Zagreb (Zagreb, Croatia)

Finland

- 1460 Haltia (Halti)
- 1471 Tornio (Tornio)
- 1472 Muonio (Muonio)
- 1473 Ounas (Ounastunturi)
- 1488 Aura (Aura river)
- 1494 Savo (Savonia)
- 1495 Helsinki (Helsinki)
- 1496 Turku (Turku)
- 1497 Tampere (Tampere)
- 1498 Lahti (Lahti)
- 1499 Pori (Pori)
- 1500 Jyväskylä (Jyväskylä)
- 1503 Kuopio (Kuopio)
- 1504 Lappeenranta (Lappeenranta)
- 1507 Vaasa (Vaasa)
- 1518 Rovaniemi (Rovaniemi)
- 1519 Kajaani (Kajaani)
- 1520 Imatra (Imatra)
- 1521 Seinäjoki (Seinäjoki)
- 1522 Kokkola (Kokkola)
- 1523 Pieksämäki (Pieksämäki)
- 1524 Joensuu (Joensuu)
- 1525 Savonlinna (Savonlinna)
- 1526 Mikkeli (Mikkeli)
- 1532 Inari (Lake Inari)
- 1533 Saimaa (Saimaa)
- 1534 Näsi (Näsijärvi)
- 1535 Päijänne (Lake Päijänne)
- 1536 Pielinen (Pielinen)
- 1656 Suomi (Finland)

- 1659 Punkaharju (Punkaharju)
- 1757 Porvoo (Porvoo)
- 1758 Naantali (Naantali)
- 1882 Rauma (Rauma)
- 1883 Rimito (Rimito)
- 1928 Summa (Summa)
- 1929 Kollaa (Kollaa)
- 2291 Kevo (Kevo)
- 2292 Seili (Seili)
- 2299 Hanko (Hanko)
- 2397 Lappajärvi (Lappajärvi)
- 2479 Sodankylä (Sodankylä)
- 2501 Lohja (Lohja)
- 2512 Tavastia (Tavastia)
- 2535 Hämeenlinna (Hämeenlinna)
- 2678 Aavasaksa (Aavasaksa)
- 2679 Kittisvaara (Kittisvaara)
- 2733 Hamina (Hamina)
- 2737 Kotka (Kotka)
- 2750 Loviisa (Loviisa)
- 2774 Tenojoki (Tenojoki)
- 2820 Iisalmi (Iisalmi)
- 2840 Kallavesi (Kallavesi)
- 2841 Puijo (Puijo)

France

- 20 Massalia (Marseille)
- 21 Lutetia (Paris)
- 138 Tolosa (Toulouse)
- 4690 Strasbourg (Strasbourg)
- 6268 Versailles (Versailles)
- 9385 Avignon (Avignon)
- 8371 Goven (Goven)
- 100033 Taizé (Taizé)

Germany

- 241 Germania (Germany)

Cities and towns:

- 325 Heidelberga (Heidelberg)
- 386 Siegena (Siegen)
- 526 Jena (Jena)
- 449 Hamburga (Hamburg)
- 811 Nauheima (Bad Nauheim)
- 2424 Tautenburg (Tautenburg)
- 3539 Weimar (Weimar)
- 5816 Potsdam (Potsdam)

- 5820 Babelsberg (Potsdam-Babelsberg)
- 9336 Altenburg (Altenburg)
- 10114 Greifswald (Greifswald)
- 10746 Mühlhausen (Mühlhausen)
- 10774 Eisenach (Eisenach)
- 10775 Leipzig (Leipzig)
- 10801 Lüneburg (Lüneburg)
- 52334 Oberammergau (Oberammergau)
- 149884 Radebeul (Radebeul)

Regions:

- 301 Bavaria (Bavaria)
- 418 Alemannia (Alemannia)
- 930 Westphalia (Westphalia)
- 5616 Vogtland
- 5628 Preussen
- 5846 Hessen
- 5866 Sachsen
- 5904 Württemberg
- 6068 Brandenburg
- 6070 Rheinland
- 6099 Saarland
- 6120 Anhalt
- 6124 Mecklenburg
- 6209 Schwaben
- 6293 Oberpfalz
- 6305 Helgoland
- 6320 Bremen
- 6332 Vorarlberg
- 6396 Schleswig
- 6402 Holstein
- 21074 Rügen
- 22322 Bodensee

Greece

- 582 Olympia (Olympia)
- 1119 Euboea (Euboea)
- 1138 Attica (Attica)
- 1142 Aetolia (Aetolia)
- 1150 Achaia (Achaea)
- 1151 Ithaka (Ithaca)
- 1161 Thessalia (Thessaly)
- 4356 Marathon (Marathon)
- 4357 Korinthos (Corinth)

Hungary

- 434 Hungaria
- 908 Buda (Buda)
- 2242 Balaton (Balaton)
- 3103 Eger (Eger)
- 28196 Szeged (Szeged)
- 82071 Debrecen (Debrecen)
- 107052 Aquincum (Aquincum)
- 129259 Tapolca (Tapolca)
- 157141 Sopron (Sopron)

Italy

- 472 Roma (Rome)
- 477 Italia (Italy)
- 487 Venetia (Venice)
- 704 Interamnia (Teramo)
- 1191 Alfaterna (Nocera Inferiore, previously called Nuceria Alfaterna)
- 2601 Bologna (Bologna)
- 4464 Vulcano (Vulcano, Italy)

The Low Countries

- 1052 Belgica (Belgium)
- 1132 Hollandia (Holland)
- 1133 Lugduna (Leiden, Netherlands)
- 1276 Ucclia (Uccle, Belgium)
- 1294 Antwerpia (Antwerp, Belgium)
- 1336 Zeelandia (Zeeland, Netherlands)
- 2713 Luxembourg (Luxembourg)
- 9471 Ostend (Ostend, Belgium)
- 9472 Bruges (Bruges, Belgium)
- 9473 Ghent (Ghent, Belgium)

Poland

- 1112 Polonia (Poland)
- 1352 Wawel (Wawel - Kraków)
- 16689 Vistula (Latin name Vistula River)

Cities:

- 690 Wratislavia (Latin name Wrocław)
- 764 Gedania (Latin name Gdańsk)
- 1110 Jaroslawa (Paul Herget *The Names of the Minor Planets* Jarosław?)
- 1263 Varsavia (Latin name Warsaw)
- 1419 Danzig (German name Gdańsk)
- 1572 Posnania (Latin name Poznań)
- 12999 Toruń (Toruń)
- 19981 Bialystock (Białystok)
- 46977 Krakow (Kraków)

Regions:

- 257 Silesia (Silesia)
- 38674 Těšínsko (Těšínsko, a region in south-eastern Silesia, nowadays in the Czech Republic and Poland)

Russia and the former Soviet Union (Europe)

- 232 Russia (Russia)
- 787 Moskva (Moscow, Russia)
- 951 Gaspra (Gaspra, Ukraine)
- 1140 Crimea (Crimea, Ukraine)
- 1146 Biarmia (Bjarmaland, historical region in northern Russia)
- 1147 Stavropolis (Stavropol, Russia)
- 1149 Volga (Volga River)
- 1284 Latvia (Latvia)
- 1479 Inkeri (Ingria)
- 1480 Aunus (Olonets, Russia)
- 1541 Estonia (Estonia)
- 2046 Leningrad (Leningrad, now Saint Petersburg)
- 2121 Sevastopol (Sevastopol, Ukraine)
- 2141 Simferopol (Simferopol, Ukraine)
- 2170 Byelorussia (Belarus)
- 2171 Kiev (Kiev, Ukraine)
- 2250 Stalingrad (Stalingrad, now Volgograd)
- 2258 Viipuri (Vyborg, Russia)
- 2419 Moldavia (Moldavia)
- 2577 Litva (Lithuania)
- 2606 Odessa (Odessa, Ukraine)
- 2699 Kalinin (Kalinin, now Tver, Russia)
- 2922 Dikan'ka (Dykanka, Ukraine)
- 2983 Poltava (Poltava, Ukraine)
- 3012 Minsk (Minsk, Belarus)
- 3072 Vilnius (Vilnius, Lithuania)
- 3799 Novgorod (Veliky Novgorod, Russia)
- 4163 Saaremaa (Saaremaa, Estonia)
- 4227 Kaali (Kaali crater, Estonia)
- 73059 Kaunas (Kaunas, Lithuania)

Scandinavia

- 2191 Uppsala (Uppsala and Uppsala University, Sweden)
- 2676 Aarhus (Århus, Denmark)
- 6795 Örnsköldsvik (Örnsköldsvik, Sweden)
- 6796 Sundsvall (Sundsvall, Sweden)
- 6797 Östersund (Östersund, Sweden)
- 10549 Helsingborg (Helsingborg, Sweden)
- 10550 Malmö (Malmö, Sweden)
- 10551 Göteborg (Göteborg, Sweden)
- 10552 Stockholm (Stockholm, Sweden)

Slovakia

- 1807 Slovakia (Slovakia)
- 4018 Bratislava (Bratislava)
- 9543 Nitra (Nitra)
- 11118 Modra (Modra)
- 20495 Rimavská Sobota (Rimavská Sobota)
- 22185 Štiavnica (Banská Štiavnica)
- 24260 Kriváň (Kriváň, a mountain)
- 25384 Partizánske (Partizánske)
- 59419 Prešov (Prešov)

Spain

- 804 Hispania
- 945 Barcelona (Barcelona)
- 1159 Granada (Granada)
- 9453 Mallorca (Majorca)
- 14967 Madrid (Madrid)
- 13260 Sabadell (Barcelona)
- 99193 Obsfabra (Fabra Observatory in Barcelona)

Switzerland

Cities and villages

- 1938 Lausanna (Lausanne)
- 1935 Lucerna (Lucerne)
- 1936 Lugano (Lugano)
- 1937 Locarno (Locarno)
- 1775 Zimmerwald (Zimmerwald)
- 13025 Zürich (Zürich)

Regions (Cantons)

- 1768 Appenzella (Appenzell)
- 1687 Glarona (Glarus)

Turkey

- 25 Phocaea (Foça)
- 1174 Marmara (Sea of Marmara)

United Kingdom

- 2830 Greenwich (Greenwich)
- 7603 Salopia (Shropshire)
- 8837 London (London)
- 8849 Brighton (Brighton)
- 11626 Church Stretton (Church Stretton)

North America

Canada

- 6714 Montréal (Montreal, Québec)
- 96192 Calgary (Calgary, Alberta)
- 96193 Edmonton (Edmonton, Alberta)
- 176710 Banff (Banff, Alberta)
- 176711 Canmore (Canmore, Alberta)

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- 334 Chicago (Chicago)
- 341 California (California)
- 484 Pittsburghia (Pittsburgh, Pennsylvania)
- 508 Princetonia (Princeton University)
- 516 Amherstia (Amherst College, Massachusetts)
- 581 Tauntonia (Taunton, Massachusetts)
- 736 Harvard (Harvard University)
- 793 Arizona (Arizona)
- 916 America (United States of America)
- 1345 Potomac (Potomac)
- 1602 Indiana (Indiana)
- 2118 Flagstaff (Flagstaff, Arizona)
- 2322 Kitt Peak (Kitt Peak, Arizona)
- 3031 Houston (Houston, Texas)
- 3043 San Diego (San Diego, California)
- 3512 Eriepa (Erie, Pennsylvania)
- 6216 San Jose (San Jose, California)
- 7041 Nantucket (Nantucket, Massachusetts)
- 10195 Nebraska (Nebraska)
- 10379 Lake Placid (Lake Placid, New York)
- 32570 Peruindiana (Peru, Indiana)
- 35352 Texas (Texas)
- 49272 Bryce Canyon (Bryce Canyon National Park, Utah)

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- 10799 Yucatán (Yucatán, Mexico)

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- 3563 Canterbury (Canterbury, New Zealand)
- 8088 Australia (Australia)

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- 293 Brasilia (Brazil)
- 469 Argentina (Argentina)
- 1008 La Paz (La Paz)
- 1029 La Plata (La Plata)
- 1042 Amazone (Amazon River)
- 4337 Arecibo (Arecibo Observatory, Puerto Rico)
- 8277 Machu-Picchu (Machu Picchu, Peru)
- 8279 Cuzco (Cuzco, Peru)
- 9357 Venezuela (Venezuela)
- 10797 Guatemala (Guatemala)

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