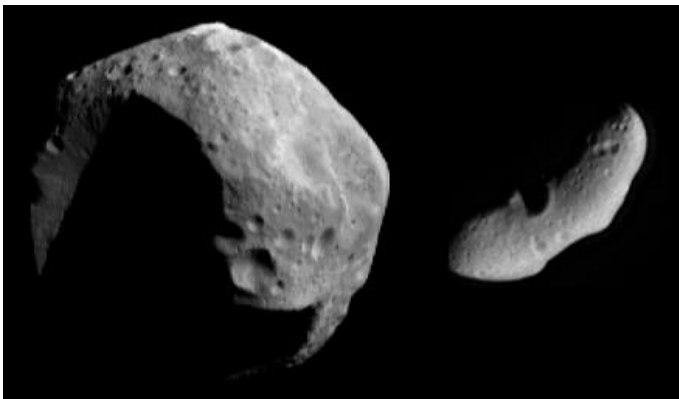
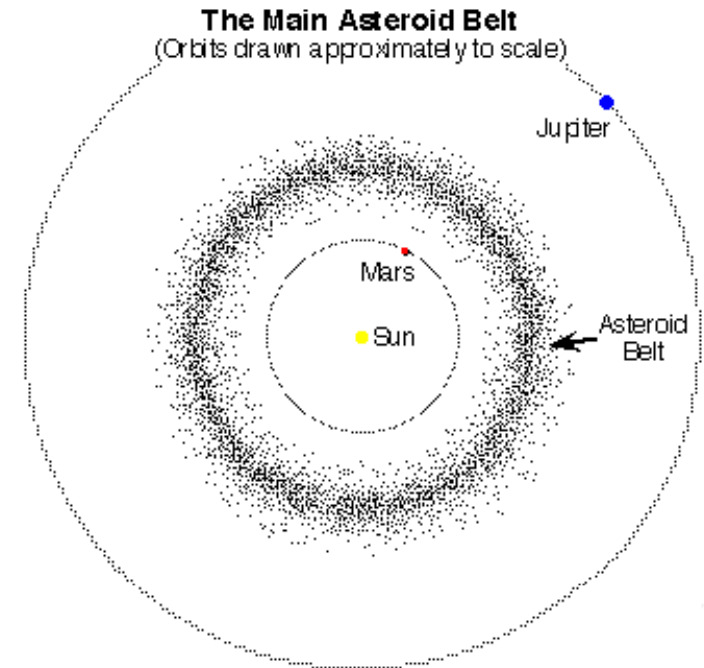


## Ch 23.4 Minor Members of the Solar System

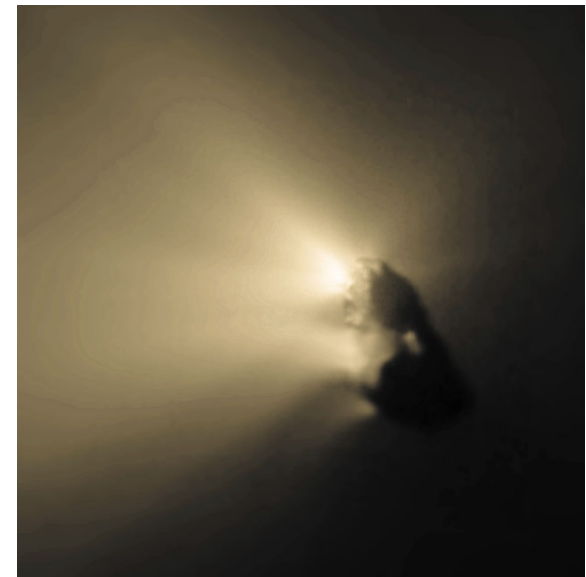
### Asteroids:

- Asteroids are metallic, rocky material that orbits around the Sun in a doughnut-shaped ring between Mars and Jupiter, called the main asteroid belt.
- They are too small to be classified as planets, so are referred to as minor planets or planetoids.
- Asteroids are material left over from the formation of the solar system and are thought to be primordial material that is 4.6 billion years old.
- The word asteroid means "star like", because the first asteroids that were discovered resembled very dim stars.

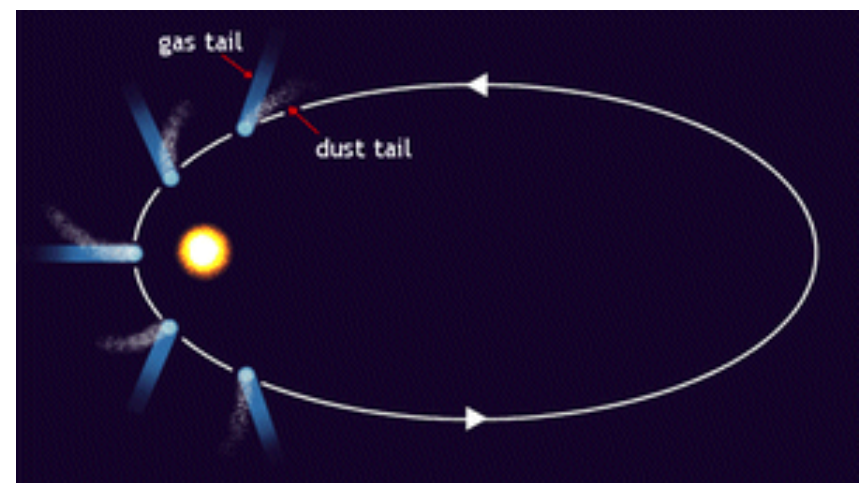
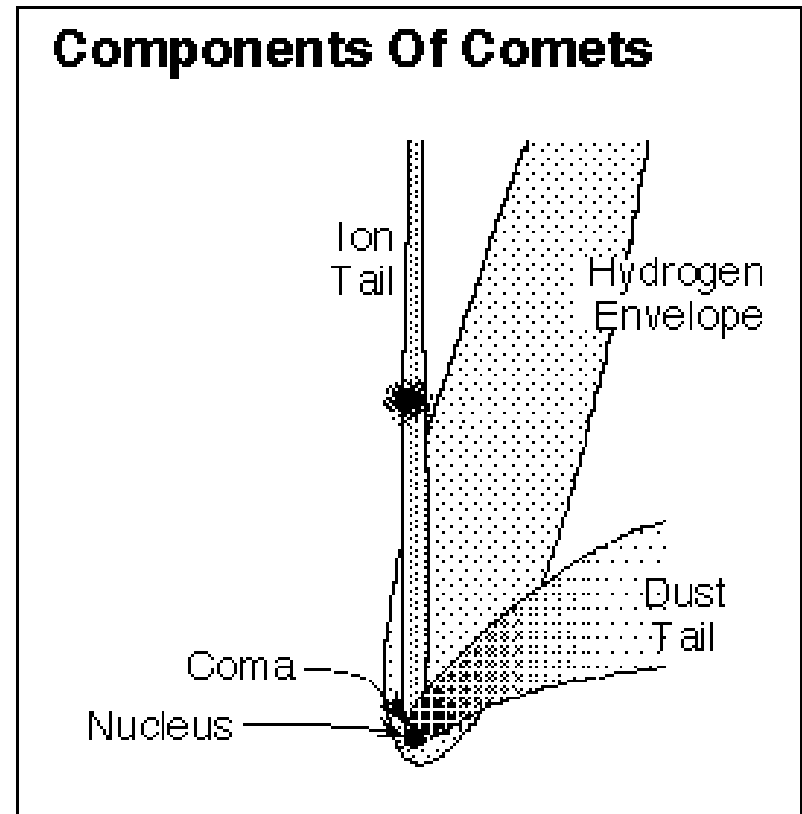


## Comets:

- A comet is a small body in the solar system that orbits the Sun, its icy layers begin to evaporate, releasing dust and dirt to display a coma and a tail.
- Comets are called dirty snowballs because they are a mixture of ices (water and frozen gases) and dust that for some reason did not get incorporated into planets when the solar system was formed.
- It is believed comets originate in the **Oort cloud** which is large distance from the Sun. The Oort cloud consists of debris left over that are cool enough that water exists in a solid, frozen state.
- There is another belt of icy debris is thought to reside within the so-called **Kuiper Belt** that may generate comets.



- Comets come near to the Sun and become active with three distinct parts:
- **Nucleus** - a relatively solid and stable, mostly ice and gas with a small amount of dust and other solids.
- **Coma** - a dense cloud of water, carbon dioxide and other neutral gases coming from the nucleus.
- **Tail:**
  - **The comet's tail points away from the Sun as it moves around the Sun.**
  - **Dust tail** - . This is the most prominent part of a comet we see. Up to 10 million km long composed of smoke-sized dust particles driven off the nucleus by escaping gases.
  - **Ion tail** - Composed of plasma and laced with rays and streamers caused by interactions with the solar wind.



## Meteoroids:

- **Meteors** appear as fast-moving streaks of light in the night sky. Some meteors can be as small as grains of sand to good size chunks of rock.
- Meteors plow into the Earth's atmosphere at very high speeds and are vaporized by air friction in a white-hot streak and burn up in the atmosphere before hitting the Earth.
- **Meteorites** are meteors that fall through the Earth's atmosphere and make it to the surface without burning up. It is estimated that nearly 3,000 meteors hit the Earth each year.
- Meteorites are believed to originate from the asteroid belt between Mars and Jupiter.
- The rough age of meteorites is 4.5 billion years and are considered pristine samples of early solar system matter.
- A **meteor shower** is a number of meteors that are observed to radiate from one point & are associated with the orbits of comets.



- Meteorites are divided into three categories:

**Irons:** largely composed of metallic iron-nickel.

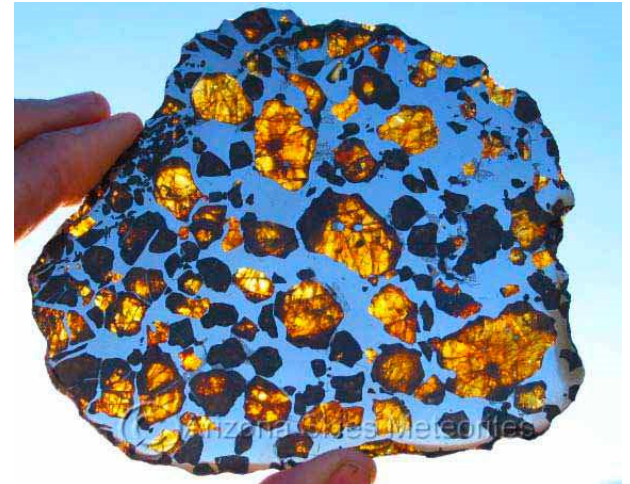
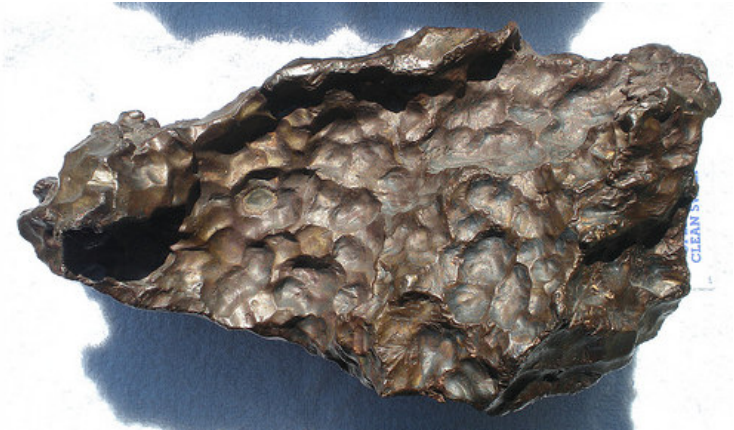
**Stones:** mainly composed of silicate minerals.

Chondrules

**Stoney-Irons:** contain large amounts of both metallic and rocky material.

Pallasites

- Meteorites often contain minerals not found on Earth. Stoney-iron and iron meteorites contain pure iron which is never found on Earth, it rusts away. Only stoney-iron and iron meteorites can contain pure iron because iron never rust in space!
- Seeing a meteorite land is extremely rare. Meteorites are named for the locale, region, or nearby town in which the "fall" occurred.



- On November 8, 1982, in Weathersfield, Connecticut, Robert and Wanda Donahue heard a loud crash from the front of the house. They ran into the living room to find a hole in the ceiling. After the fire department arrived, a fireman found a six-pound, five-inch meteorite under the dining room table. The stone had ripped through the roof, bounced off a carpeted wooden floor, knocked over furniture and dented a wall before coming to rest under the table.

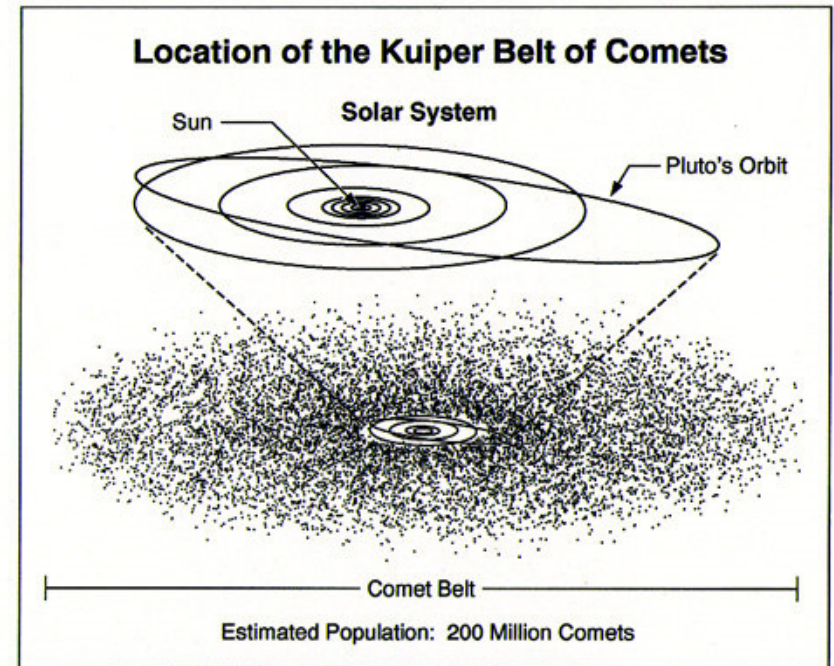


- On September 29, 1938 a meteorite landed in Benld, Illinois punching a hole in the roof of Edward McCain's garage and embedding itself in the seat of his 1937 Pontiac Coupe. The meteorite and portions of the car are now on display at the Field Museum of Natural History in Chicago.



## Kuiper Belt:

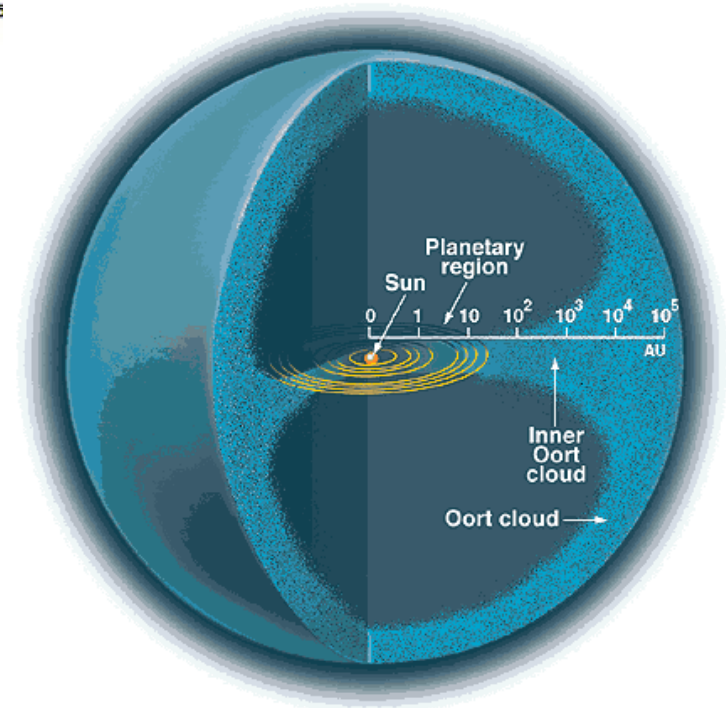
- The Kuiper belt is a region of the Solar System beyond the planets extending from the orbit of Neptune to approximately 55 AU from the Sun.
- They consists mainly of small bodies which are the remnants from the Solar System's formation, and the home to the dwarf planet Pluto.
- The Kuiper belt is now considered to be the source of the short-period comets.



PR95

## Oort Cloud:

- The Oort cloud is a hypothetical spherical cloud of comets which may lie roughly a light-year from the Sun.
- Occasionally comets are dislodged from their orbits within the cloud and send them towards the inner Solar System.
- Astronomers believe that it is the source of all long-period and Halley-type comets.



## More Info About Asteroids

- Asteroids range in size from tiny pebbles to about 578 miles or more in diameter.
- There is increasing interest in identifying asteroids whose orbits cross Earth's orbit, and that could, given enough time, collide with Earth.
- Some asteroids had orbits that did cross Earth's path and have even hit the Earth in times past.
- One theory based on geologic evidence that the dinosaur extinction was due to an impact of a large asteroid.

