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**SPACE**

**A Cosmic Journey**

# Asteroids, Comets, and Meteors. Oh, My!

Dr. Katherine Auld  
Bentonville Public Library  
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# Asteroids, Comets, and Meteors...

- \* How are they different?
- \* How are they the same?



# Asteroids, Comets, and Meteors...

- \* How are they different?
  - Different components
  - Distance from the Sun)
- \* How are they the same?
  - Orbit shape

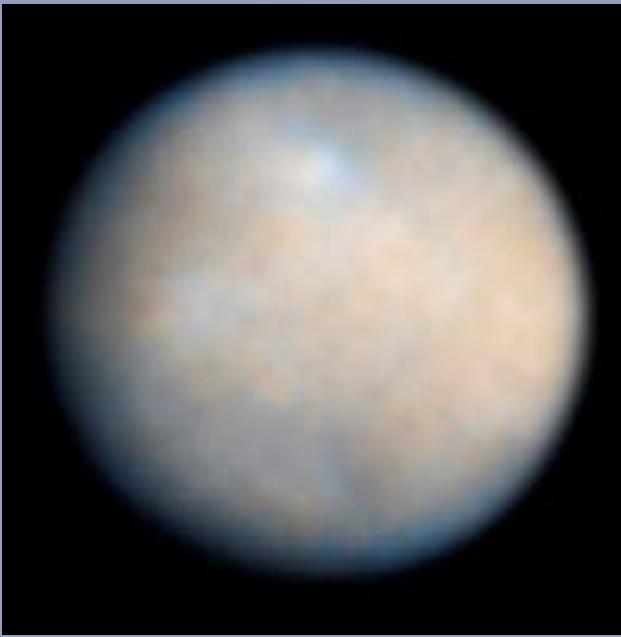


# Big flying rocks (Asteroids)

- \* Dwarf planets  
(especially in the inner Solar System)
- \* Millions of them,  
mostly in the Asteroid Belt
- \* 3 class types
  - C
  - S
  - M



253 Mathilde,  
a C-type  
asteroid 50  
km across



Ceres, ball of  
rock and ice  
950 km  
(590 mi) in  
diameter,  
containing a  
third of the  
mass of the  
asteroid belt



## \* Carbonaceous asteroids

Most common variety

~75% of all known asteroids

Outer portion of Asteroid Belt beyond 2.7 AU dominated by this type

Darker than other types

Close in chemical composition to the Sun and primitive solar nebula, except for the absence of volatiles

Made up of carbon and other complex organics

# C-type





# S-type



- \* Silicaceous asteroids

- Second most common variety

- 17% of asteroids

- Dominate in the inner asteroid belt within 2.2 AU; rare outside 3 AU

- Moderately bright so visible in 10X50 binoculars

- Chemical composition main iron- and magnesium-silicate

# M-type

## \* Metallic asteroids

Found in the middle of the main asteroid belt

Fairly bright

Some are composed of nickel-iron (pure or mixed with stone)

Thought to be the metallic core of larger asteroids that shattered

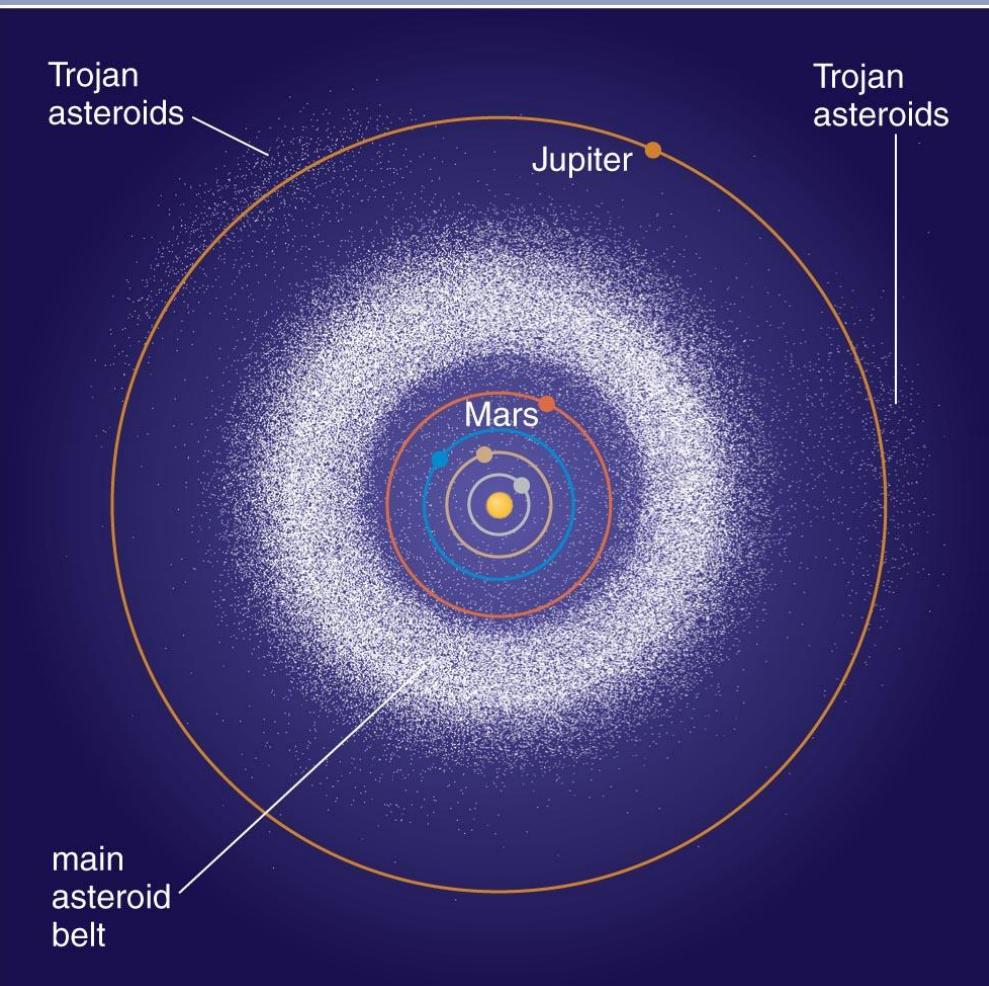
Some have unknown compositions

The density, mass and compositions don't match





# Asteroid Orbits



- \* Most asteroids orbit in a belt between Mars and Jupiter
- \* Trojan asteroids follow Jupiter's orbit
- \* Orbits of near-Earth asteroids cross Earth's orbit



# Flying balls of ice and dust (Comets)

\* So what is in a comet?

“Dirty snow ball”

Frozen carbon dioxide, organic compounds, stellar dust, water



This image of Comet C/2001 Q4 (NEAT) was taken at Kitt Peak National Observatory near Tucson, Ariz. in 2004.



# What is the comet's tail?



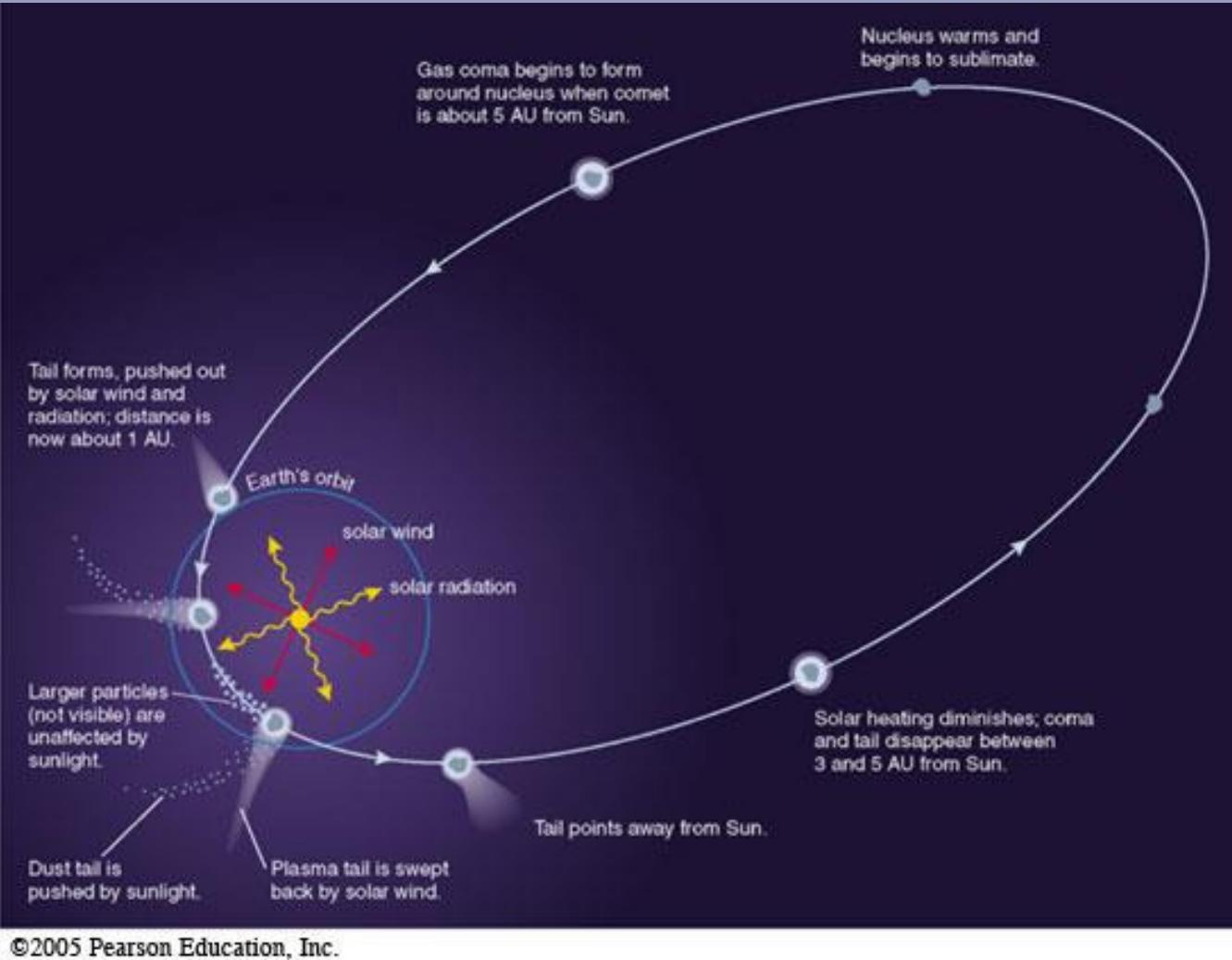
\* A comet has two tails

Ion tail

Dust tail

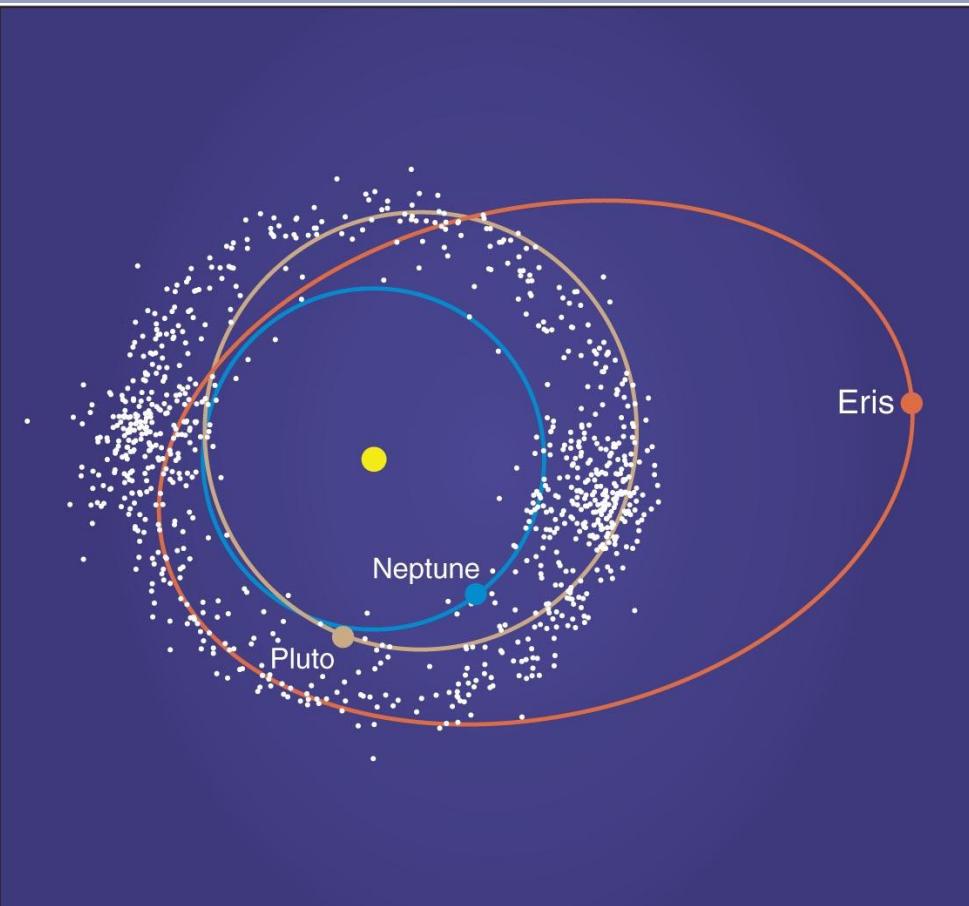


# Why does it sometimes point backwards?





# Kuiper Belt Objects



- \* These large, icy objects have orbits similar to the smaller objects in the Kuiper Belt that become short period comets
- \* So are they very large comets or very small planets?



# Smaller flying rocks (Meteors)

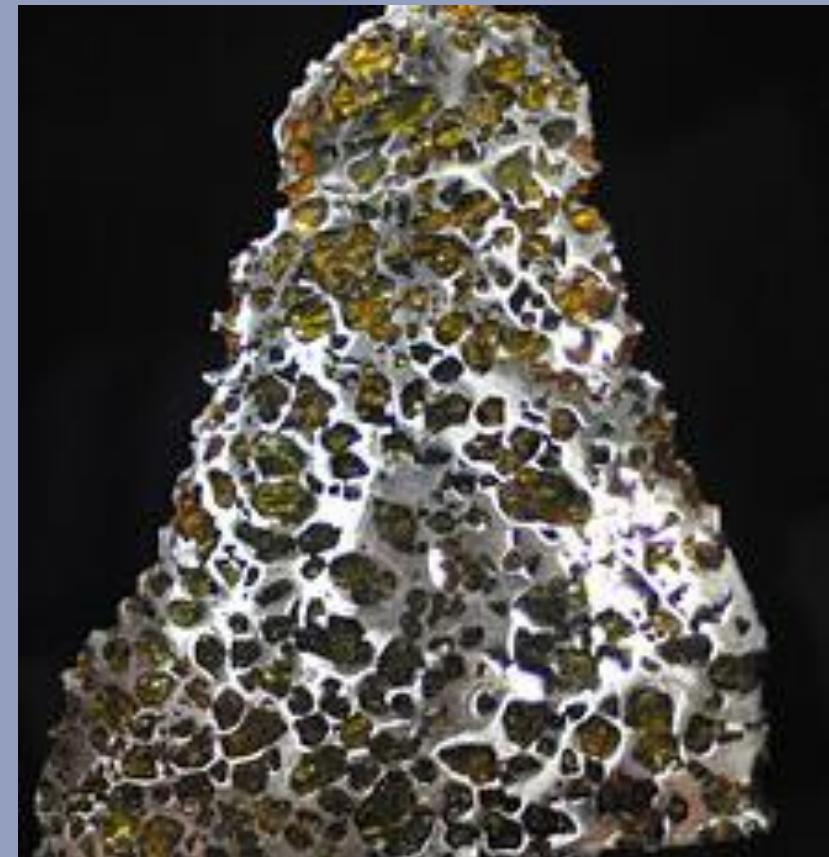
## \* Meteroid

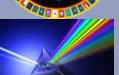
Small rocky or metallic body traveling through space

Small grains to 1 meter-wide

Fragments from comets or asteroids

Collision impact debris





# More Name Problems, Oh MY!!

Meteoroid

\* Out in space

Meteor

\* In the atmosphere

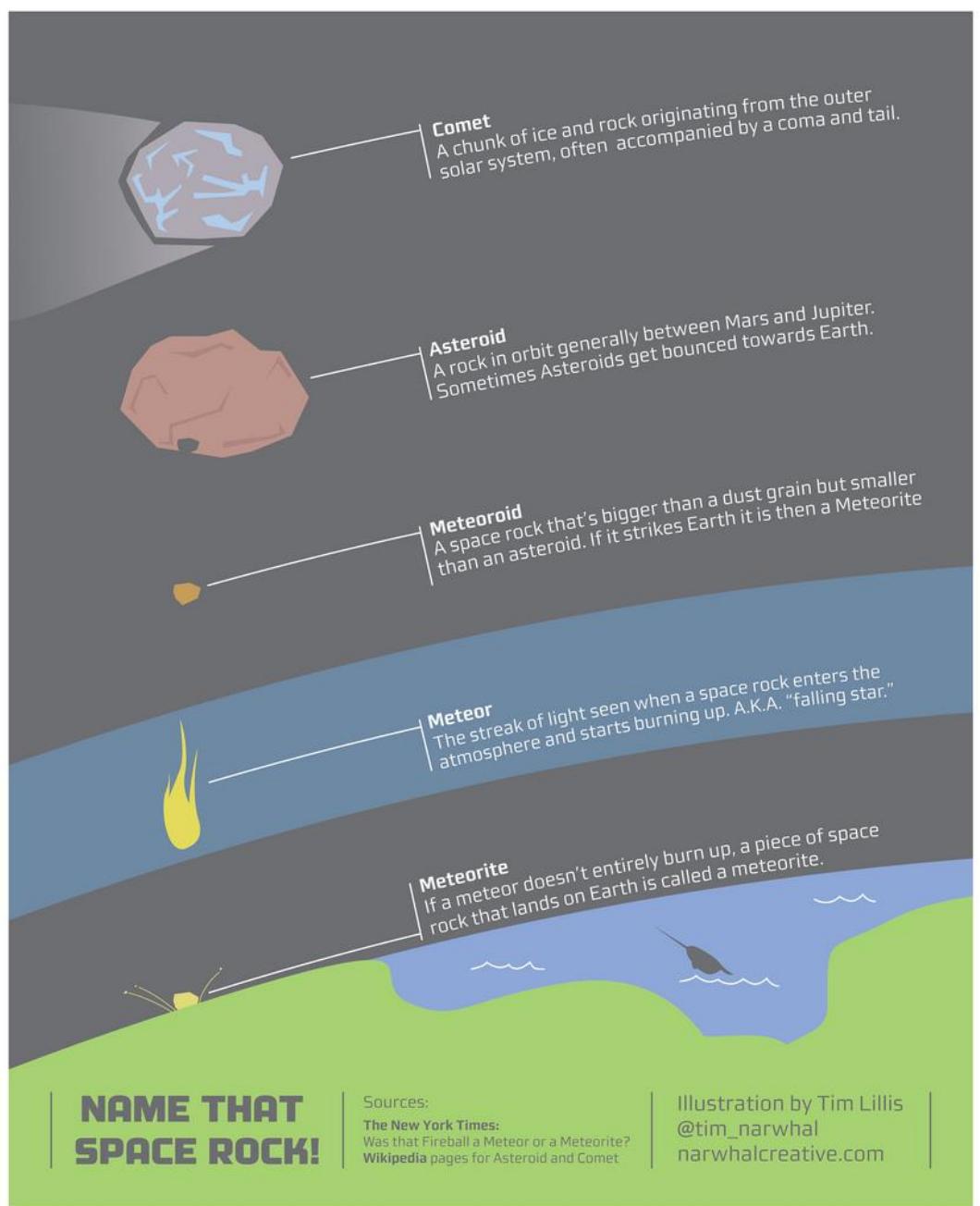
Meteorite

\* On the ground

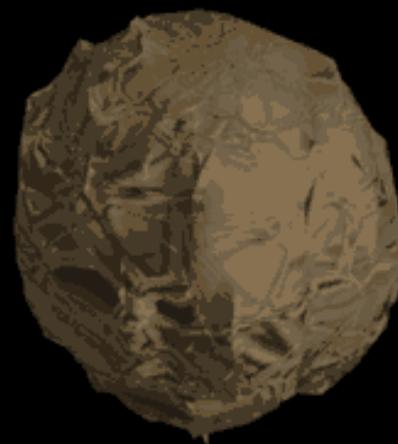


# Overview

## \*Comets, Asteroids, and Metoroids



Have Fun!!



Meteoroid