METEORITES

Meteorites are extraterrestrial rocks that traveled through interplanetary space, traversed our atmosphere and landed on the surface of the Earth. Meteorites that are observed to fall are called “falls”; during atmospheric passage, they create bright fireballs and generally also sonic booms. There are about 1300 observed falls in the world’s collections. Meteorites not seen to fall, but recognized because of their properties, are called “finds.” There are more than 60,000 known finds. The vast majority of meteorites come from asteroids; more than 400 come from the Moon or Mars.

La Criolla L6 ordinary chondrite (17.5 cm across)

UCLA METEORITE COLLECTION

If you think you have a meteorite, you can contact UCLA meteorite researchers at meteorites@ucla.edu. If possible please include a photograph or two of the suspected meteorite as well as its mass, discovery location, and mention properties indicating that it might be a meteorite.

Ness County (1894) L6 ordinary chondrite (14 cm across)

Meteorites are exhibited in the
UCLA Meteorite Gallery
Room 3697 in the Geology Building.

UCLA College
Earth, Planetary, and Space Sciences

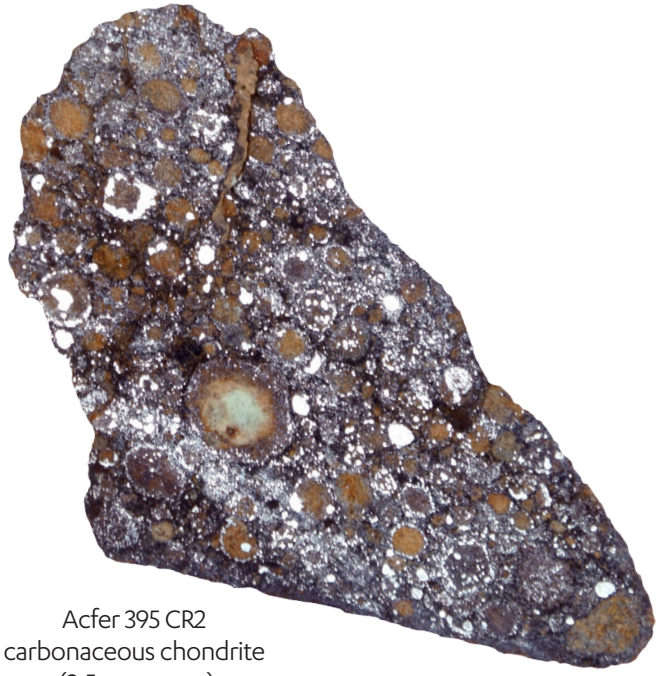
HOW TO RECOGNIZE METEORITES

Kinsella IIIAB iron meteorite
(15 cm long)

TYPES OF METEORITES

PRIMITIVE METEORITES

Meteorites consisting of materials that formed in the solar nebula are known as chondrites or "primitive" meteorites. Many were heated on their parent asteroids, but the asteroids themselves did not undergo large-scale melting. There are 11 major chondrite groups, each derived from a separate asteroid; each group contains distinctive abundances of chondrules and fine-grained matrix material. Some groups are closely related and must have formed in adjacent regions of the nebula. The ordinary chondrites comprise three groups (H, L, LL); R chondrites comprise one; carbonaceous chondrites comprise five (CI, CM, CO, CR, CV-CK); and enstatite chondrites comprise two (EH, EL).



Acfer 395 CR2 carbonaceous chondrite (2.5 cm across)

DIFFERENTIATED METEORITES

Some regions of individual asteroids got hot enough to melt. The heat may have come from the decay of short-lived radioactive isotopes and/or the collisions of large bodies. When a chondritic asteroid melts, two immiscible liquids form – a dense metallic liquid that sinks to the center and a silicate-rich liquid that rises. The metallic melt crystallizes to form a core; the silicate melt crystallizes to form the mantle and crust. An asteroid with this structure is called "differentiated."

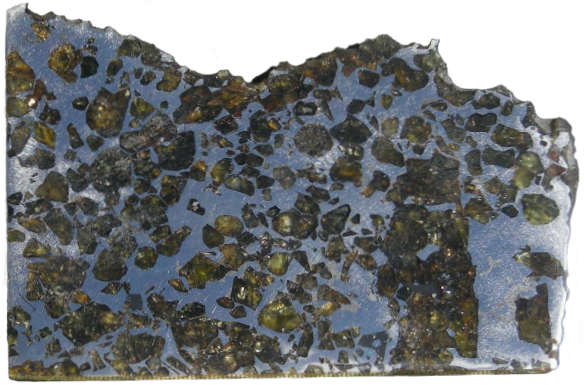
Achondrites

These meteorites resemble terrestrial volcanic rocks and formed as flows at or near the asteroid surface or solidified in shallow magma chambers.

Pasamonte eucrite (a basalt) (6.5 cm across)

Pallasites

Pallasites contain angular or rounded grains of the magnesian-silicate mineral olivine surrounded by metal. They formed at the core-mantle boundary.



Seymchan pallasite (12.5 cm across)

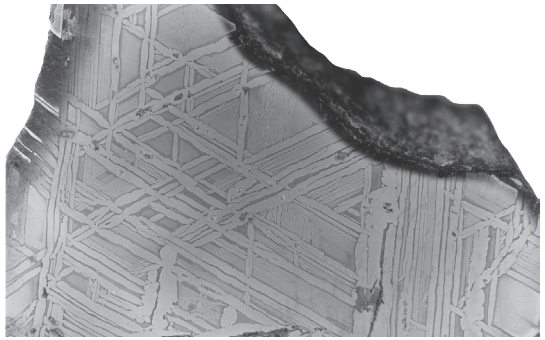
Mesosiderites

Mesosiderites typically consist of a mix of small dark basalt and bright metal particles with some larger dark, angular rock fragments.

Emery mesosiderite (18.5 cm long)

Irons

These metallic objects are composed of an alloy of iron and nickel; they have a silvery color, are highly magnetic and very dense. Most come from the cores of melted and differentiated asteroids.



Needles IID iron meteorite (3.5 cm across)

METEORITE TEXTURES

Meteorites are typically irregular in shape with rounded edges, but they are never spherical. Most weigh between half a kilogram and a few kilograms and are commonly 10 – 40 cm in length. They are classified into three principal structural types (based on the amount of metal they contain): irons, stones and stony irons. Fresh falls have a black fusion crust about 1 mm in thickness. Finds that have been lying on the ground for many decades have a red, reddish brown, or rusty coating. Many meteorites have dimples or "thumb prints" on their surfaces. Pictures of many different kinds of meteorites are available on the internet.