



## Arizona Rocks 73

Text and photos by Ray Grant

Rocks from space (meteorites) are our next subject. Arizona has a special place in the study of meteorites. Meteor Crater near Winslow is one of the best examples and most studied meteorite impact sites in the world (it will be covered in a later column). Arizona State University is home of the Center for Meteorite Studies that houses a meteorite museum and one of the best collections of meteorites in the world (also covered later). Finally the dry climate in Arizona is good for the preservation of meteorites and at least 57 different ones have been found here (number in the ASU collection).

So what are meteorites? Meteorites are rocks from outer space. They are seen to hit the earth and collected (falls) or are unusual samples that are collected and proven to be a meteorite (finds). They differ from earth rocks in that most are older than any earth rock. Most meteorites are 4.5 billion years old and no earth rocks have been found that are this old. Most meteorites also contain a solid nickel-iron alloy not found in terrestrial rocks. The three main types of meteorites are stony, iron, and stony-iron.

The stony meteorites are the most common type. They are composed mainly of silicate minerals such as olivine and pyroxene. Many of them contain some nickel-iron alloy, up to 26 percent, that makes them unique compared to earth rocks and easier to identify. If they are a recent fall, then the thin black fusion crust helps in identification. The few stony meteorites that do not contain nickel-iron and that have weathered become very difficult to distinguish from earth rocks.



Stony meteorite from the Sahara Desert showing black fusion crust, also note metal spots on left where it has been ground down.

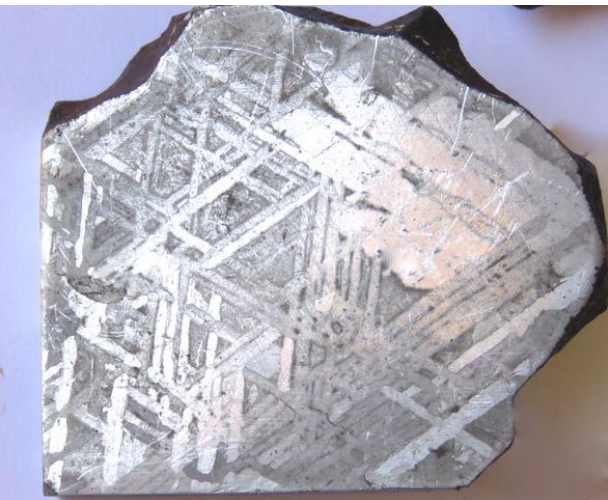


Slice of stony meteorite showing nickel-iron from Plainview, Texas. This meteorite has about 26% metal.

The Iron meteorites are mainly nickel-iron alloy and therefore not like any rock from earth. They are saved when found because they are very heavy. The biggest problem is to distinguish them from man-made iron or steel. To identify them some testing might be necessary.



Iron meteorite from Meteor Crater, Arizona. This is the typical look for most iron meteorites.



Iron meteorite sliced, polished, and etched with dilute nitric acid to show unique pattern (Widmanstätten Pattern) found in meteorites.

Stony-iron meteorites are rare and as named are a combination of metal and silicates about 50% of each.



Pallasite stony-iron meteorite, Brenham, Kansas, nickel-iron and olivine  
Carleton Moore collection and photograph

Of the 57 meteorites found in Arizona 38 are stony, 17 are irons, and 2 are stony-irons. The Center for Meteorite Studies website ([meteorites.asu.edu](http://meteorites.asu.edu)) has lots of good information.

### Curiosity Finds Iron Meteorite on Mars July 15, 2014

This rock encountered by NASA's Curiosity Mars rover is an iron meteorite called "Lebanon," similar in shape and luster to iron meteorites found on Mars by the previous generation of rovers, Spirit and Opportunity. Lebanon is about 2 yards or 2 meters wide (left to right, from this angle). The smaller piece in the foreground is called "Lebanon B."

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