The Many Faces of Gold Basin

Gold Basin
Ordinary chondrite (L4)
Mohave County, Arizona, USA
Initial find 1995 November 24

A meteorite was found in an area of arroyos draining the White Hills by Professor Jim Kriegh (UAz, emeritus) while prospecting for gold with a metal detector. As of 1997 November, 1484 stones have been recovered, with a total mass of 61.0 kg, from an area of ~130 km^2. The largest individual stone has a mass of 1.52 kg. Classification and mineralogy (D. Kring, UAz): olivine, $Fa_{24\pm1}$; pyroxene $Fs_{20}Wo_1$; kamacite contains 0.72 ± 0.09 wt% Co; weathering grade W2–3. Specimens: UAz, 0.8 kg; SI, 8.4 kg; bulk of the mass with Jim Kriegh and his fellow collectors.

The team of Jim Kriegh, John Blennert, and Twink Monrad carefully documented and mapped the main strewnfield long before GPS was widely available. All three meteorite hunters went on to find other, new meteorites, too! Thousands of meteorites have been recovered from a 22 km x10 km, roughly elliptical area by many meteorite hunters over the years. It is thought that the true edges of the strewnfield have not yet been found.

Measurements by Welten et al. (2005) of cosmogenic nuclides (^{14}Carbon and ^{10}Beryllium) have confirmed that the Gold Basin meteoroid is, in fact, an L4-6 breccia. They determined also that many of the L6 Hualapai Wash XXX meteorites found within the Gold Basin strewnfield probably came from the same incoming meteoroid.

It is thought that some parent asteroids were repeatedly disrupted by large impacts and reassembled to form these kinds of mixed breccias. Data suggest there was major impact on the Gold Basin parent body between 300 and 400 Myr ago and that the meteoroid that eventually struck the Earth was ejected from the parent body in another impact 18 Myr ago.

Professor Jim Kriegh and Twink Monrad at the Gold Basin site. Notice the meteorite under Jim's arm. Inset is John Blennert.

What is a Strewnfield

A strewnfield is a region over which meteorites from a particular impact event have fallen. A large meteoroid may break up high in the atmosphere or a shower of stones may collide with Earth at once. Generally, the larger mass meteoroids travel farther than the smaller ones so there is a gradient of sizes. Careful and complete mapping can provide information on pre-atmospheric size of the incoming meteoroid(s), direction of travel before impact, overall mechanical strength of the body, and history of exposure to cosmic rays in space.

Above is a strewnfield with many meteorites. Modern meteorite hunters at Gold Basin have the luxury of GPS to mark their finds.

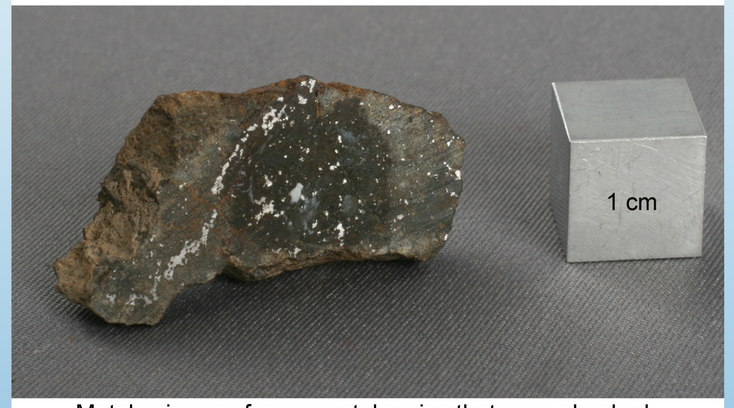
The following 3 photographs show the exterior of typical Gold Basin Meteorites.

Patchy fusion crust with caliche on the bottom right.

Broken surface with no fusion crust on facing side.

Cut faces show chondrules mantled by iron-nickel grains.

The dark oval spot has not been studied sufficiently to ascertain its origin. Notice the fusion crust on the left edge.



Metal veins are former metal grains that were shocked.

Evidence of brecciation in Gold Basin Meteorites. The broken clasts are L4 and L6 (different petrologic types from mixing on the parent body).

Exterior with rusty weathered surface.

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