Meteorite Falls In Canada:
The Role of The Meteorites and Impacts Advisory Committee (MIAC/CCMI) To The Canadian Space Agency

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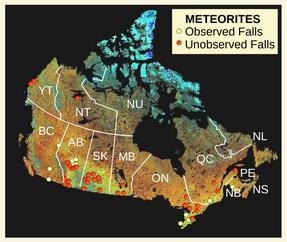
Earth Is Accumulating Matter!

The Earth accumulates about 100 tons of extraterrestrial material every day (Taylor, 1992; Love and Brownlee, 1993). Most of this material enters the Earth's atmosphere as tiny dust particles, which burn up to form visible streaks of light (meteors or "shooting stars"). Larger fragments produce larger and brighter 'fireballs' as they are frictionally heated and broken up by the atmosphere. These typically land asmeteorites.

An actual photo of the Peekskill Fireball, 1992

Meteorites Are Rare, Right?

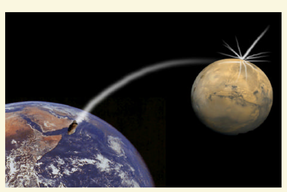
Meteorites have been accumulating on the Canadian land mass since the end of the last glaciation, approximately 10,000 years ago. The current rate of fall for meteorites >100g mass (surviving to the ground) is ~27 per year per 106 km^2 (Hildebrand *et al.*, 2003). Presuming that fragmentation by atmospheric breaking produces a five-fold increase in number, this rate implies that ~14 meteorites >100 g mass occur in each 10 km^2 (Hildebrand *et al.*, 2003). Despite this, only 63 meteorites have currently been found in Canada. Obviously, more are out there - waiting to be discovered!



Canadian meteorite fall sites

Why Are Meteorites Important?

Meterorites are an invaluable source of information about the early history of the solar system, the internal composition of planetesimals, and can even comprise material from outside our solar system. Some meteorites have even been derived from Mars, and provide a unique laboratory for investigation into the history of the Red Planet. Every new meteorite find is thus potentially significant.



Martian meteorites are ejected from Mars by impacts

What Is MIAC/CCMI?

The Meteorites and Impacts Advisory Committee to the Canadian Space Agency (Comité consultatif sur les météorites et les impacts de l'Agence spatiale canadienne) is a volunteer group of geologists and astronomers that serves as the coordinating body for meteorite and impact reporting and research in Canada. Our full and associate members help to investigate and verify reports of fireball trajectories in order to reconstruct the flight path of the meteors with the aim of locating the impact sites of themeteorites so that they can be recovered.

How Can You Get Involved?

About one third of the Canadian meteorites were actually seen to fall. The larger fragments typically leave a long trail in the sky, and may break into fragments as they interact with the atmosphere: these are called fireballs. To determine the location of the impact at the end of the trail requires that the trail be accurately recorded from a number of widely spaced locations. Triangulation can thus define the fall site.

You can volunteer to become an associate member of MIAC/CCMI (it's free!) by contacting the authors (above). When a fireball is seen in your area you will be the sleuth that will help us track down sighting reports and gather the information that may allow you to determine the fall site of the meteorite(s). Youmaywishtotryandfindthemeteoritesthemselves.

The following information should be recorded from your own observations of the fireball, or from the observers that you interview:

- The location from which the sighting wasmade(latitude and longitude)
- The date and time of the fireball sighting, preferably to the nearest minute
- The starting and finishing direction and elevation in degrees above the horizon (preferably return to the site with a compass/clinometer as soon as possible after the original sighting to make accurate measurements).
- Time how long it takes from first seeing the fireball to the start of the thunder-like sound, if present. This will indicate the distance to the fireball.
- Take care to note the number of fragments if it breaks up.
- Note its brightness, colour, whether smoke was present and its velocity compared to othermeteors you may have seen.

Send the information to the closest MIAC/CCMI representative:

Maritimes: JamesWhitehead, Fredericton, NB, jwhitehe@unb.ca
Newfoundland: Garry Dymond, St John's, NL, Gdymond@mail.gov.nf.ca
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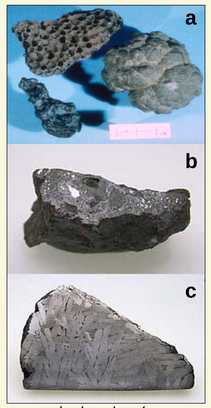
Alberta:Alan Hildebrand, Calgary,AB, ahildebr@ucalgary.ca
Alberta:Martin Connors,Athabasca,AB,martinc@athabascau.ca
British Columbia: Brett Gladman, Vancouver, BC, gladman@astro.ubc.ca

Meteo-rite Or Meteo-wrong?

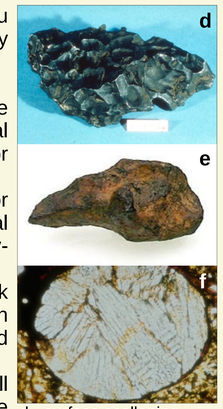
Some meteorites can look very similar to terrestrial rocks, though most look sufficiently different that they can be distinguished. Many of Canada's meteorites are found by observant farmers who notice a 'different' kind of rock in their fields.



a - vesicular slag (a meteor-wrong!)
b - visible metal (light colour)
c - an iron meteorite with typical crystalline pattern

The following is a list of things you should look for in the most easily distinguishedmeteorites:

- an absence of cavities - cavities are common in smelter slag and terrestrial basalts, which are often mistaken for meteorites
- any visible metal in the fresh interior of the rock - the amount of metal defines whether it is an 'iron', a 'stony-iron' or a 'stony'meteorite
- the presence of a thin (<1 mm) dark coloured, glassy, smooth crust, which may exhibit surface scalloping, and may oxidise a rusty brown colour
- chondritic meteorites contain small spheres (chondrules) that are typically visible in hand sample - they look like tiny amygdales
- iron and stony-iron meteorites are very dense



d - surface scalloping formed by fusion in the atmosphere
e - iron meteorites often rust on weathering
f - spherical chondrules

Did You Know...?

- A *meteoroid* is a piece of rock in space, it becomes a *meteor* (shooting star) when passing through the atmosphere, then a *meteorite* when it has landed on Earth.
- Meteorites have hit both animals and people, though don't panic, the risk is not great! A dog that was killed in Egypt in 1911 has the inauspicious honour of being the only creature to have been killed by a meteorite that originated from Mars!
- Fireballs with steeper trajectories are slightly more likely to yield meteorites than those travelling at shallower trajectories.
- Fireball brightness is not necessarily related to the probability of a meteorite fall
- Slower fireballs aremorelikely to yield meteorites.
- Meteorite falls do not increase during the Leonid/Perseid meteor showers - these showers are generated by cometary debris, which probably entirely burns up in the atmosphere.
- The presence of a thunder-like sound from a fireball indicates that the meteor has reached a lower altitude, and is therefore more likely to yield a meteorite.
- **You can readmoreathttp://www.unb.ca/passc/meteorites**

References

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