

Meteorite bounty on track for Canadian record

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University of Calgary researchers Alan Hildebrand (left) and Ellen Milley were the first to locate fragments from the Nov. 20 asteroid impact in western Saskatchewan, Canada. Credit: Grady Semmens, University of Calgary

A University of Calgary-organized team recovered more than one hundred meteorites from the November 20 meteorite fall southwest of Lloydminster, Saskatchewan/Alberta, which is expected to set a new Canadian record for the largest recorded meteorite fall.

"Finding all we could before the snow came on December 6 was a real challenge and tough on searchers with wind chills routinely colder than -40°C degrees," said Dr. Alan Hildebrand, holder of the Canada Research Chair in Planetary Science. "We did as well as we did by collaborating with experienced researchers from The University of Western Ontario

including Dr. Phil McCausland and Dr. Peter Brown." Both Hildebrand and Brown are veterans of the Tagish Lake (2000) and St-Robert (1994) meteorite recovery efforts and McCausland is a veteran of the Tagish Lake recovery.

Volunteer searchers numbered up to twenty people per day including local residents, U of C staff and graduate & undergraduate students, professors from the University of Saskatchewan and the University of Regina, amateur astronomers from the Saskatoon, Calgary and Edmonton Centres of the Royal Astronomical Society of Canada, and geoscientists from ConocoPhillips Canada. Most searchers found at least one meteorite despite having a thin layer of snow down the last five days.

"The last day that the search teams were out, it snowed all day and we still found five meteorites which is ridiculous. It shows just how many are out there," Hildebrand said.

Using the abundance of meteorites on the pond where U of C grad student Ellen Milley found the first fragments on November 27, Hildebrand calculated that about 2,000 meteorites of more than 10 grams in size occur per square kilometer in the northern part of the strewn field, and probably more than 10,000 meteorites of this size are on the ground altogether. Many local residents and landowners also found meteorites, as well as persons from across the prairies and meteorite dealers who traveled to Saskatchewan to try their luck.

"We have had great cooperation from landowners, who are having a once-in-a-lifetime experience of a meteorite harvest," Hildebrand said. "Approximately 130 well-substantiated meteorites have been found totaling about 40 kg, but probably double that number, weighing more than 50 kg, have been recovered."

Hildebrand encourages everyone who has collected specimens to please send him the masses (in grams) and locations (GPS coordinates, NAD27 datum) of their finds to help map the strewn field.

Milley and Hildebrand have formally proposed the name Buzzard Coulee to describe the fall to the International Meteoritical Society. The name comes from the picturesque valley near the hamlet of Lone Rock, Sask. where the first meteorites were discovered.

Typing of the meteorite has been completed with the collaboration of Dr. Alex Ruzicka and Dr. Melinda Hutson, a husband and wife team at the Cascadia Meteorite Laboratory at Portland State University, Portland, Oregon.

"The meteorite is at the low end of the H4 type and may be transitional with type 3. It will take some more work to sort out everything, but we have good prospects to learn a lot about the rock's history," Ruzicka said.

A lower number in the classification indicates that a meteorite experienced less heating on its parent asteroid, making it of more interest to researchers and potentially to collectors as well. Lower metamorphic grades are relatively unusual in meteorites of the H, or "high iron" type, such as the Buzzard Coulee rocks.

Dr. Hutson observed: "The meteorite also appears to show that different types of material are mixed together in a subtle way, but we will have to study more thin sections to better understand this. The meteorite is slightly shocked, so the material was possibly stirred by an impact on its parent asteroid."

Hand specimens of the meteorite show only rare fragmental texture, but with the prospect of hundreds of meteorites to study, including some large ones (the largest recovered to date is approximately 13 kg), more

will be learned about the history of the asteroid fragment that fell at Buzzard Coulee than for most falls.

"It was a great experience to visit the Cascadia Meteorite Lab to see how they do things, and it has been fun to apply the things that we learned in class to a new meteorite fall," said Milley, who is pursuing her MSc with Hildebrand in the U of C's Department of Geoscience. "It feels good to be making a real research contribution. When we determine the orbit we will also know from where in the asteroid belt this rock originated."

The recovered meteorites are being stored in an inert nitrogen atmosphere in a clean room in the meteorite lab at the University of Calgary to prevent weathering by the Earth's atmosphere.

"Since these meteorites are a fresh fall collected early and nearly dry, they are unweathered for the most part and deserve the best care anywhere," Milley said.

The U of C researchers and their collaborators will now turn their attention back to determining the orbit for the space rock. The H4 classification matches the history of meteorite falls of this type that usually occur during the afternoon or evening. About 8 million years ago a large impact occurred on an asteroid of H composition and further studies will be done to see if Buzzard Coulee is another fragment from that impact. Although orbit evolution is chaotic, determining this rock's orbit may help locate that impact. Knowing the fireball's exact trajectory will also help better plan for the spring searching.

"I think that the number of individual meteorites that will be recovered for Buzzard Coulee will easily set the Canadian record for the largest fall, but we still don't know how big the biggest meteorite out there is, so we don't know how much mass we can expect to be recovered of the approximately 1 tonne that fell," Hildebrand said. The largest Canadian

meteorite fall currently on record dates to 1960 when hundreds of meteorites fell near Bruderheim, Alberta.

"During the spring before cultivating and seeding, we will try to organize the biggest meteorite search effort that Canada has ever seen," Hildebrand said. "One of our ambitions at the Prairie Meteorite Search project is to train everyone in the country to recognize meteorites so more new ones will be discovered, and this is a great opportunity to introduce hundreds of people to rocks from space."

Source: University of Calgary

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