Diamond Mind

The University of Alberta Alumni Magazine | By Rachel Singer February 1, 2012

Graham Pearson, the U of A's foremost expert in diamond research, uses unique "fingerprints" to determine the origins of the world's favourite gemstone

Have you ever wondered how diamonds were formed or where they come from? Do you know what types of minerals are located in Canada's Arctic region and how those minerals affect the environment? Just ask Graham Pearson, the University of Alberta's Canada Excellence Research Chair in Arctic Resources, he'll tell you amazing things.

Pearson, whose previous research in England led to the first method for looking at the solid impurities within a diamond and calculating when the diamond crystallized, is now at the U of A and is focusing on the fluids within diamonds. "Fluids are more intimately and more obviously related to diamond growth than the solids, so if you can directly date the fluids then you have a much more robust age for the diamond," Pearson explains.

Currently, Pearson's research is focused on understanding the deep, diamond-bearing roots of Canada's Arctic. "There is a lot of economic interest in the Arctic regions; they've got a lot of untapped mineral potential, but the mineral potential is poorly understood and poorly characterized. One of my goals is to try to increase the specific knowledge of that mineral potential," Pearson said. The Arctic project that his lab is working on is looking into how the structure deep inside Earth has changed through geological time.

To carry out this research, Pearson is in the midst of building a new laboratory—the Arctic Resources Laboratory—near the Earth and Atmospheric Science Building. The laboratory (which Pearson hopes will be completed in late spring or early summer) will house the new laser-based technology Pearson has developed, allowing him to analyze diamonds and other minerals with enhanced precision.

In addition, Pearson has done fascinating work relating to conflict diamonds. "What we have been able to do so far is to extract information that relates to the geographical origin of a diamond," Pearson explains. The ability to discriminate between the source locations of diamonds is of great interest to the diamond industry, but, according to Pearson, is something technological solutions are needed to do. The method that his team has been developing allows for analysis of small sub-samples of diamonds in order to ascertain the trace element compositions of the diamonds, the ratios of which are then compared. "Based on the trace elements found, you can use that as a kind of fingerprint as to where those diamonds come from. Then we can test the notion that different diamonds from different locations have a different fingerprint," Pearson says. "We've just started to do that, and the results look surprisingly promising."

For Pearson, the ability to identify conflict diamonds is a by-product of his research on improving knowledge about how and when diamonds form. "It is a nice example of the kind of blue sky research where you never know quite what you're going to get," he says. "Often the questions are perhaps more challenging, and so you end up developing new techniques that have very obvious applications to other aspects of life."

Pearson's initial decision to apply for the Canada Excellence Research Chair and come to Edmonton was motivated by the well-established researchers and facilities at the U of A. "The University of Alberta already had a number of people that were really excellent scientists in the [diamond research] field," he said. "So what attracted me was working with those people and pooling our resources to develop something that is really unique globally in terms of academic expertise in diamond and deep lithosphere processes. And certainly the analytical facilities that we will have as a result of this will also be unique as well."

Source: http://www.newtrail.ualberta.ca/en/FeatureStories/FeatureStories%20Current/DiamondMind.aspx