

# 'Ugly duckling' diamonds priceless for U of A researcher trying to unlock their origins

By Madeleine Cummings, Edmonton Journal August 19, 2015



Graham Pearson holds a rough diamond from a previous study confirming the existence of "oceans" deep beneath the Earth.

Photograph by: Richard Siemens, Richard Siemens

EDMONTON - Scientists from Canada, the U.S. and the U.K say ancient sea water may have contributed to the formation of diamonds hundreds of kilometres underground.

In a cover story published this week in the journal *Nature*, the scientists suggest diamonds form as a result of plate tectonics carrying sea water into deep parts of the earth.

The discovery came after the scientists found salt in a batch of "dirty diamonds" from the Ekati mine in the Northwest Territories.

High-quality diamonds (the kind that eventually become expensive jewelry) are hard to study and understand because they are essentially pure carbon. But the less valuable and less attractive kind, which are coated in a cloudy greenish shell, contain traces of fluids that offer clues as to their formation.

Researchers obtained 11 "dirty" diamonds from the Dominion Diamond mining company, studied their composition and used a custom laser to polish and drill pits in their surfaces. This produced a vapour that they studied further.

Viewed through a microscope, the diamonds "look like little Aero bars," said Graham Pearson, a professor in the department of earth and atmospheric sciences at the University of Alberta. (Pearson, one of the article's co-authors, is also the Canada Excellence Research Chair in Arctic Resources.)

Pearson likened the air bubbles in an Aero chocolate bar to the diamonds' many pockets of fluids (called inclusions).

"They're quite peculiar," he said.

Researchers found high levels of sodium and chlorine in these fluids, which happened to have the same isotopic composition as sea water.

The salty discovery is important because it provides a more detailed picture of how water is recycled and transported underground. It also offers a new model for how diamonds are formed, which is a question scientists have been grappling with for decades.

Scientists are now planning to study the relationship between low- and high-quality diamonds. One theory is that the dirtier "ugly ducklings of the diamond world" transform into valuable gems over time.

Fluid-rich diamonds have been found elsewhere, including in Jwaneng, Botswana, which has the richest diamond mine in the world. But diamonds from the Northwest Territories seem to have an unusually high abundance of the salty inclusions so valuable to scientists, Pearson said.

The diamonds appear otherwise unremarkable and are worth about \$20 to \$50 per carat.

"There are some extremely valuable diamonds in the Northwest Territories," Pearson said. "But we get all these interesting results out of diamonds that are not generally worth anything."

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