ISOTOPE DETECTIVES

An **uncut** (left) and **cut** (right) **emerald** from Brazil.

Scientists are learning to use isotopes to determine the origin of drugs and gems. It turns out that isotope ratios similar to those used in carbon dating can also identify the source of cocaine or the birthplace of emeralds.

Researchers with the Drug Enforcement Agency (DEA) have created a database of the origin of coca leaves that pinpoints the origin of the leaves with a 90% accuracy. Cocaine keeps a chemical signature of the environment where it grew. Isotopes of carbon and nitrogen are found in a particular ratio based on climatic conditions in the growing region.

These ratios correctly identified the source of90% of the samples tested. This new method can trace drugs a step further back than current techniques, which mainly look at chemicals introduced by processing practices in different locations.

This could aid in tracking the original exporters and stopping production at the source.

It turns out that a similar isotopic analysis of oxygen has led researchers in France to be able to track the birthplace of emeralds. Very high quality emeralds have few inclusions (microscopic cavities). Gemologists use these inclusions and the material trapped in them to identify the source of the gem. Highquality gems can now also be identified by using an oxygen isotope ratio. These tests use an ion microscope that blasts a few atoms from the gems'surface (with virtually undetectable damage). The tiny sample is analyzed for its oxygen isotope ratio and then compared to a database from emerald mines around the world.

Using the information, gemologists can determine the mine from which the emerald was born. Since emeralds from Colombian mines are valued much more highly than those from other countries, this technique can be used to help collectors know just what they are paying for, as well as to identify the history of treasured emeralds.

Leggi attentamente il testo e rispondi alle domande di comprensione.

A Why are isotopes so important to determine the origin of drugs and gems?

B Which isotope allows to identify highquality gems?