The artifacts left to us by ancient societies hold secrets that exert a strong fascination for today's scientists, and modern materials science provides powerful tools to satisfy that curiosity. They allow us to date ancient objects, determine their composition and method of fabrication, and discern the circumstances in which they were made and traded. So important has this activity become that a new field of specialization is emerging, known as "Archaeometry" — the "measuring of the old."

Dr. Ursula Martius Franklin is one of Canada's pioneers in the new discipline. Working with support from the Natural Sciences and Engineering Research Council, she is building on a life-long interest in the nature of materials. After obtaining a doctorate in experimental physics at the Technical University of Berlin in 1948, Franklin came to Canada and began working at the University of Toronto, determining the age of rocks by measuring the ratio of the elements thorium and uranium.

She then spent several years at the Ontario Reserach Foundation, developing X-ray and crystallography services for the characterization of industrial materials.

Since 1967, she has been with the Department of Metallurgy and Materials Science at the University of Toronto, first as an associate and then as a full professor. Franklin's gaze began to shift back in time in a serious way when she was appointed a research associate with the Royal Ontario Museum (ROM) and began to apply modern techniques to such ancient materials as the Museum's Chinese bronzes.

Dr. Franklin gave the 1982-3 Distinguished Lecture to the Canadian Institute of Mining and Metallurgy, the first woman to be so honoured. Active in the women's, peace, and environmental movements, she is married and the mother of two children. She has served as a member of the Science Council of Canada, chairing their committee on the Implications of a Conserver Society, and she has been on the Natural Sciences and Engineering Research Council. Named an officer of the Order of Canada in 1982, Dr. Franklin is currently serving on the National Research Council.

Steve Behal

Science Dimension: As you develop ways to turn the analytical tools of modern technology on the objects of antiquity, you must be helping archaeologists and historians to expand their interpretive abilities.

Franklin: The impact of the exact sciences on the study of ancient materials has become greater and greater in the past three decades, and Canada is making a significant contribution. Now, there are good techniques which use only very small amounts of precious objects, so as not to impair their display value, and there are many methods which have no destructive impact at all.

We are finding out what people *did*, which not infrequently contrasts with what has been *said* by or about them. Until recently, there has been very little deciphering of the materials record of the past. We have lovingly preserved and interpreted written records, which we know to be selective. Books are written for particular motives, and they can be revised, or even burned. Materials such as metals, ceramics, glass, even textiles, paper, wood, and stone, provide us with a much less censored record of history.

The new field of study brings the best of modern materials science, physics, geology, and analytical chemistry to bear on the questions that preoccupy us about the history of technology and its social impact. It provides us with perspective on what we are doing today.

Science Dimension: Can you give us an example of applying these techniques?

Franklin: We had the opportunity to look at 1000-year-old Peruvian metalworking when the "Gold for the Gods" was exhibited in Canada several years ago. We were looking at pendants and other ornamental objects from northern Peru, with the aim of tracing the development of metallurgy and fabrication. Apart from the traditional observations of type and style, we performed thickness measurements with a micrometer, using lens paper to protect the object from being scratched. The Peruvians were skilled at producing sheets of uniform thickness. We examined microsections of objects under both optical and scanning electron microscopes, and used standard X-ray radiography to analyse methods of fabrication.

The Peruvian smiths were very skilled at creating objects whose surfaces looked like solid gold, but which were in fact alloys with copper and silver. They used a sophisticated technique called "depletion gilding" which removed the copper and silver from the surface. Surprisingly, their techniques for shaping and joining are quite different from their neighbours in Ecuador and Colombia, though we don't know why.

Science Dimension: Have you looked at objects closer to home?

Franklin: We have examined the mode of prehistoric native copper utilization in Canada's Arctic and sub-Arctic. X-ray fluorescence permitted us to distinguish native copper and the industrial alloys introduced through trade with Europeans. We have examined small artifacts from pre-contact situations by X-ray, and found a technique that nobody had

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