

# A Life in Chirality

**Professor Reiko Kuroda** of the University of Tokyo has had numerous research papers on chirality (handedness) published in some of the world's most authoritative science magazines, including *Nature* (U.S.). She has studied for many years in the United Kingdom and currently serves as vice president of the International Council for Science and as an elected foreign member of the Royal Swedish Academy of Sciences in its class for chemistry. Osamu Sawaji of the Japan Journal interviewed Professor Kuroda.

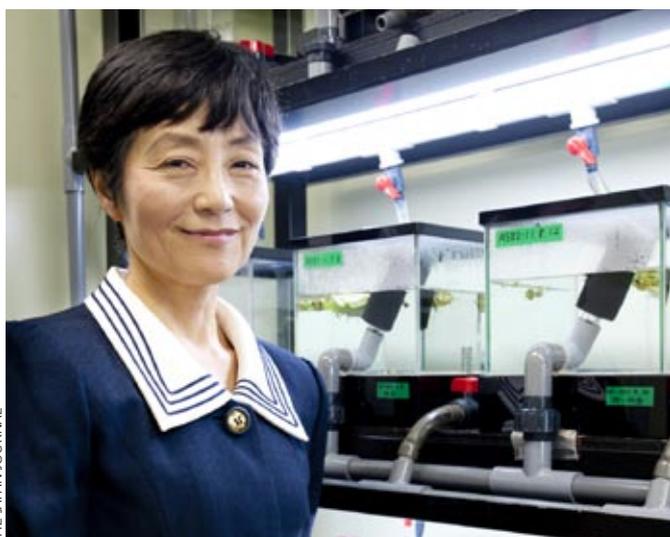
## Please tell us how you became interested in science.

**Professor Reiko Kuroda:** Sendai City in Miyagi Prefecture, where I grew up, was full of natural features. When I was a kindergarten and elementary school pupil, I caught cicadas, crickets, other insects and frogs in the rice paddies, fields, ponds and woods, and kept them at home. I once watched baby mantises hatching from eggs one after another, and I completely lost track of the time. These experiences with nature got me interested in science.

My chemistry teacher in my senior year of high school had students conduct many experiments in class. These were extremely interesting and this is one of the things that opened my eyes to the wonders of chemistry. For example, carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>) have completely different characteristics even though the only difference is an oxygen atom (O). There are diverse substances in the world but they are all made up by combining some of the only about 100 atoms. I wanted to clarify why so many varieties are generated, so in university I started formal study of chemistry.

## You went to the United Kingdom in 1975 after completing a Ph.D. at the University of Tokyo. Why did you choose that path?

In Japan at that time it was difficult to find placement at a university even after earning a Ph.D. By coincidence, a post needing knowledge and outcomes of the research I conducted was open at King's College London. With a contract only for a year and one month, I decided to move to London. I ultimately spent about eleven years there engaged in research and education.



Professor Reiko Kuroda at her laboratory in which snails are cultivated. One of Kuroda's important research themes is clarifying the mechanism at the molecular level that determines whether a snail is sinistral or dextral.

I have many memories there. The famous Royal Opera House is located close to King's College, and at night many well-dressed people gathered there. I passed by them on the way home, with my mind occupied with experiments that were not going well. That memory is still fresh in my mind.

I also remember traveling through European countries with friends, and without much money. We sat on a bench near the city hall in Stockholm, Sweden, and ate baguettes and cheese for our dinner. At that time I never dreamed that twenty years later I would be attending a banquet at that same city hall for the Nobel Prize ceremony.

### **What are the important aspects of chirality that you specialize in?**

A pair of shoes has a symmetrical structure. There are pairs of substances with a molecular structure symmetrical like a pair of shoes, even though their type and number of atoms and the way the atoms are connected are the same. Such a pair of substances with a symmetrical structure is described as chiral. There are numerous chiral substances, some of which have completely different features between the dextral and sinistral types. An example is thalidomide, which induced deformities in the 1960s. There are two types of thalidomide—dextral and sinistral. Research later revealed that the sinistral type adversely affects embryos.

Amino acids are also chiral substances, and the same quantity of dextral and sinistral types are generated when we artificially create amino acids. But for some unknown reason, all living matters on Earth are made up of proteins using

only sinistral amino acids. Clarification of this mystery would bring us closer to the secrets of the origins of life.

We can see how chirality is closely related with people's daily lives and life forms. It is important to study this subject and it is endlessly interesting.

### **You are from Sendai, an area affected by the Great East Japan Earthquake. Could you tell us your feelings about the disaster?**

First of all, I would like to express my deepest condolence to those who lost their lives in the disaster and hope that people get back to peaceful days as soon as possible. Concerning the accident at the nuclear power station that was caused by the tsunami, quite a few including some scientists have expressed extreme views on nuclear power being either safe or dangerous. What is important here is not labeling nuclear power as entirely safe or entirely dangerous, but instead reviewing its risks and benefits from social and scientific viewpoints and making judgments through discussion.

I have always asserted that it is necessary to cultivate scientists with social literacy and general citizens with scientific literacy. For this reason I have established a campus-wide minor program for graduate students at the University of Tokyo, to develop human resources, science interpreters, to stimulate bilateral communications between science and society. Hearing debates over the nuclear power plant accidents, I feel even more strongly today that an increasing number of science interpreters needs to be cultivated. 