Editorial

Radioecology is undoubtedly a key science when thinking about the future of nuclear industry. Even if it is likely that industry can further reduce the probability of accidents, accidents will always be possible, and therefore, reasonable decisions can only be made if we have a clear idea about their consequences. The most discriminating problems are not short term consequences. As dreadful as they are, they are not so different from those of other kinds of severe industrial accidents. Hence, the short term consequences are not sufficient reason to stop the use of nuclear reactors. On the other hand, the long term consequences can be very large, since it is still not possible to exclude the hypothesis that weak but persistent harmful effects could be unacceptable for man and nature when accumulated over a long period. This is the real discriminating point and the main challenge for radioecology (and perhaps the nuclear industry). The problem can be split into two families of questions, both still largely unanswered:

1 - What will be the long term distribution and bioavailability of contaminants?

2 - What will be the effect on living matter of long term exposure to low levels of contaminants?

An answer to the first question, the easiest if using adequately sized human and financial resources, is advancing reasonably well. The advancements are clearly due to the improvement (quantity and quality) of measurements done in territories, including zones hit by accidents. One obvious result of this work is the observation that the artificial component of the radioactive background is continuously decreasing. It is even more obvious when considering the radioactivity of living matter rather than the radioactivity of other components of our environment (such as soil). This does not mean that the problem is solved and that the effort can be reduced. There is still much to do in order to build and validate models that are able to explain and, more importantly, predict what will happen in the long run. Without such models it is not possible to determine if a decrease in radioactivity will continue, or if it will slow down and be followed by an accumulation phase. This question is obviously a key one in the case of an area contaminated by an accident. In the case of a waste repository, it is also an important point: will there be a continuous, largely unlimited accumulation in top soil of what is leaking from the repository, or will there be a balance between inputs in this sensitive zone and outputs towards other compartments of less biological interest (deep soils, growing layers of sediments...)? It is interesting to note that from a scientific viewpoint, this part of radioecology is strongly linked to soil sciences and that agronomists have very similar concerns regarding fluxes of traces elements. To be correctly solved, this question requires a better understanding of these phenomena. Measurement alone is not sufficient; as explanatory models that only include simple phenomena (dispersion, dilution) are not sufficient either. Since the biosphere is always far from thermodynamic equilibrium, including biological processes is necessary to achieve a reasonably good model.

The second question is harder to solve because the answers are linked to fundamental biological mechanisms. We cannot expect an indisputable answer until we have a better understanding of these mechanisms, that are also operating to fight cancer and repair inflammation. Obviously, this problem does not happen only in the case of stresses due to ionizing radiations. Taking into account the size of concerned scientific communities, it is clear that the interest of radioecologists is having close links with biologists from other specializations. Odds are great that advances will come from the collaborations. However, it should be kept in mind that knowledge needs in environmental radioprotection are large at the "ecosystem" level: population dynamic, true ecology... Since these parts of biology are not as "popular" as molecular biology, it is the duty of radioecologists to take a lead and to try and interest other biologists in this important question.

As we can see, there is still much to do and many congresses are still to come!

Similar to previous congresses, we publish in this book the text written by participants who made the effort of comply to constraints of a scientific journal. I thank members of the scientific committee who verified this quality. Like in past issues, texts are not only coming from typical researchers but also from

practitioners of radioprotection, regulators and industry representatives. This is of course on purpose to provide a large 2011 survey of environmental radioprotection.

We thank those who prepared this congress, with a special thanks for its scientific and organizing committees, for “Institut de Radioprotection et de Sûreté Nucléaire”, for the “Norwegian Radiation Protection Authority” and foremost to Mac Master University of Canada, who was the local organizer of this congress.

Jean-Claude BARESCUT
Paris, October 24th 2011

DOI: 10.1051/radiopro/20116001s