



# Interview: Frances Separovic

In recognition of her professional commitment and research excellence, Frances Separovic\* received the Robertson Award at the December 2009 Meeting of the Australian Society for Biophysics in Ballarat. She is interviewed by Helmut Hugel.

*Congratulations on winning the Robertson Award. Can you describe the history of this award?*

The award was inaugurated in 2002 to recognise outstanding contributions to the field of biophysics in Australia and New Zealand and to commemorate Sir Rutherford (Bob) Robertson's contributions to the Australian Society for Biophysics and Australian science in general. While research contributions are of primary importance, other contributions, including to biophysics teaching or service to the discipline, are also considered. The research or other contribution should have been undertaken principally in Australia or New Zealand. I feel especially privileged having worked at CSIRO with Bob after his retirement on a project that involved using solid-state NMR to determine the location of ubiquinone in model membranes.

*When did you first develop your passion for science?*

Although I enjoyed science, it was no more interesting than any of the other subjects I did at Broken Hill High School. I do recall when I got my science textbook reading it from cover to cover, but I did that with all my texts. Being a first-generation new Australian, I read everything in the school library so I could learn to be an Aussie and by the time I found out that I should have played more sport, it was too late. It was only when I went back to school after my son was born that I realised that I loved studying – I did a Biology Technician's Certificate at TAFE. Since I was working full time and caring for a child, I preferred subjects where I could solve problems without too much additional reading and went on to do a BA part time in maths and physics at Macquarie. By that time I was working as a technical officer running spectra on a home-built NMR spectrometer but it was not until I did Honours in EPR that

I was hooked. I still recall the evening when using a PDP-11 computer I simulated a complex spectrum based on second-order perturbation theory and it looked almost identical to the experimental version. It seemed amazing that quantum mechanics could predict spectra and to me NMR is an everyday application of quantum mechanics.

*How did you get interested in NMR spectroscopy and where has your research taken you?*

Working in an NMR laboratory and studying at the same time was synergistic. For example, trying to write a pulse program with 16 lines of code and at the same time studying Fortran was useful; similarly doing Fourier transforms and Fourier theory, and membrane phase transitions and thermodynamics. NMR is particularly exciting because it inherently deals with very weak interactions and is able to report on subtle changes at the atomic level. I started off doing solid-state NMR of phospholipid membranes and then looked at how proteins and peptides perturb these model systems, and subsequently moved on to the structure of membrane peptides in phospholipid bilayers. Our research group now concentrates on antimicrobial and amyloid peptides in model membranes and how these peptides damage bacterial and neuronal membranes. This work is related to the development of better antibiotics and understanding of neurodegenerative diseases such as Alzheimer's.

*As a researcher, what would you like to achieve in the next five years?*

Ideally I would like to be able to determine how these membrane-active peptides act in real membranes, rather than in model systems, and in the long term I would like



Frances Separovic (left) with Professor Ada Yonath, winner of the 2009 Nobel Prize in Chemistry. Image credit: Natalie Pestana, Faculty of Science, University of Melbourne.

to be able to determine the structure of a protein in a membrane using solid-state NMR. I hope that within five years I am able to work more at the bench and spend less time in bureaucratic pursuits.

*What are the specific challenges that women face in undertaking a career in science?*

Research and academic environments have historically been inhospitable to women scientists. When I started at CSIRO, women were just allowed to qualify for superannuation. It was a very male-dominated environment – I was told that I did not understand when I complained to the EO officer about a stripper at a retirement function! On several occasions I wanted to give up, but this was not an easy option as I was a sole parent and also enjoyed research. The situation has certainly improved; however, the workload appears to be increasing, particularly for teaching and research staff. Women tend to have greater family responsibilities and research places excessive demands on time; I know I'd rather do more research but because I think of it as a hobby, I think I have to do the less enjoyable tasks first.

*Diversity is necessary in university research. What is the percentage of women engaged in research at the University of Melbourne?*

At the University of Melbourne, about 20% of the professors (about 80) and 40% of the teaching and research staff are women. Women make up 56% of our students and 46% of our academic staff. In science, the

big drop happens at the postdoctoral level and it takes a lot to recover from that gender imbalance. It concerns me that in the present research environment, the gap between research-only and teaching and research staff is growing, with fewer and fewer grants going to the latter. I changed from a research-only institution to a university, where I saw the opportunity to both create and pass on knowledge, but it is getting harder and harder to do both. Women, especially those with family commitments, may have to choose between one or the other – to teach or do research – so it may be difficult to change the imbalance.

*What can the RACI do to encourage women's participation in chemistry?*

In 2005, I was the first female professor of chemistry in Victoria and, when I told the RACI, I got an email back saying congratulations. But when one of my male colleagues was promoted to professor later that year, he got a full-page article in *Chemistry in Australia*. Maybe we value the achievements of women differently from those of men? We should encourage women to apply for prizes and actually take into account impediments and different career paths. The RACI should help raise the visibility of women in chemistry and ensure diversity of speakers and session chairs at conferences and symposia. At a recent conference session, which I chaired, there were only women speakers, and several men came up to me afterwards saying how they felt 'excluded'. Subconsciously, this is what happens to women at meetings where only men speak. We should also show more examples of women chemists to our primary and secondary school students, which is already happening in our high school textbooks but should be broadened. And we should make a huge fuss about Women in Chemistry in 2011, a century after Marie Curie received the Nobel Prize in Chemistry!

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\* **Professor Frances Separovic** MRACI CChem is a biophysical chemist with expertise and research focus in NMR spectroscopy; she also teaches and is Head, School of Chemistry, and Associate Dean, Faculty of Science, at the University of Melbourne. She is Honorary Treasurer and a member of the RACI Board.

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