

On the occasion of the

## International Day of Women and Girls in Science

### **Interview of Sandrine Sagan**

Directrice de Recherche au CNRS,

Directrice Adjointe Scientifique à CNRS Chimie

Senior Distinguished Member 2023 of the French Chemical Society (SCF), proposed, together by the Organic Chemistry Division (DCO) and the Transverse Division of Chemobiology (ChemBio)



- *Can you describe your scientific background ?*

*After studying biochemistry at the Université Pierre et Marie Curie (now Sorbonne Université), I entered the DEA in Molecular and Cellular Pharmacology, which in those days was a joint program of the Universities of Paris 6 (SU), Paris 11 (UPSaclay) and ENS-Ulm. I was awarded a scholarship on the basis of continuous and oral tests, enabling me to enroll for a doctorate and explore, at the Institut Jacques Monod, the structure-activity relationships of small peptides isolated from the skin of a South American tree frog: peptide synthesis and peptide affinity/activity measurements. I then decided to explore molecular biology during a post-doctorate funded by the French Ministry of Foreign Affairs, at the Research Institute of the Austrian Academy of Sciences in Salzburg. I was not at all won over, and decided to return to the molecular field more dedicated to Life. That same year, I took part in the CNRS competition in section 20 (now section 16), chaired by Professor Andrée Marquet, with one laboratory in Paris and the other in Montpellier, as was required of candidates at the time. I was lucky enough to be recruited and then assigned to the Paris laboratory, URA493 "Mechanisms of Enzymatic Reactions", which became the "Synthesis, Structure and Function of Bioactive Molecules" laboratory (UMR7613) and then the current Biomolecules Laboratory (UMR7203).*

- *What prompted you to become a researcher ?*

*From the Maîtrise (current Master 1) onwards, I loved all my classes and greatly appreciated certain teachers who knew how to pass on their passion for research. I have also always loved the rigor and logic of the scientific approach (I had almost opted for philosophy after my A-levels), which fascinated me and seemed to me to be the best guide. Academic freedom in research was also a major attraction. Teamwork also seemed inescapable, and the exchanges between researchers that I witnessed during my laboratory internships reinforced this orientation. In those days, you could do internships in laboratories of your own free will, and from the Licence year onwards, whenever I did not have classes and on a voluntary basis, I was able to train in a laboratory. This freedom enabled me not only to train but also to build up my portfolio, since by the end of my thesis I had contributed to around ten publications. On the other hand, I had no initial preconceived idea of whether I wanted to become a scientist or an assistant professor, having in mind that I would go where I was lucky enough to be recruited. I had applied for (and obtained) my CNU qualification, but I didn't need to use it, as I was recruited by the CNRS during my first year as a post-doc.*

- *During your training and career, have you met people who have supported and guided you ?*

*I did not have any colleagues or other people to really guide or support me throughout my career. My shyness probably had something to do with it; I never really sought advice. For the CR CNRS competition, the laboratory director even told me during a rehearsal for my*

audition, which was to take place two days later, that she would not do anything for me. This was undoubtedly an indication of her ethical concern, since she was a member of the section that was auditioning me. Nevertheless, this kind of sentence can either destroy you or forge your capacity to go further. It was undoubtedly my personal and family experience that gave me the energy to try and go further. I had become accustomed to fending for myself during my school and university career and, in retrospect, it seemed the right thing to do. Later, when I applied for a Senior Scientist position, several colleagues in the laboratory told me that I could and should go for it. Otherwise, I pursued my career rather by mimicry, looking at what colleagues around me were doing.

When I became team leader, it was also against my better judgement. We were a number of colleagues, professors and scientists who had never worked together before. There was a plan to merge with another laboratory, and some researchers did not really fit into the proposed structure. Some colleagues left the laboratory, while others from 4-5 different teams joined forces to build a team that I had the pleasure of leading. This construction brought the permanent members of the team much closer together. There was a great deal of cohesion, which can still be seen today despite the natural changes. When my predecessor as director of the LBM, Solange Lavielle, had to step down, several colleagues in the laboratory asked me to get involved in steering the unit. This is how I came to manage the laboratory. However, I did not benefit from any guidance from the previous management team, and I trained myself for this position through the CNRS and practical experience. I was also lucky enough to be able to work with Eliane Moulinié, the laboratory's administrative manager, who supported me effectively. For the record, Eliane Moulinié had been Pierre Potier's secretary at the start of her career, before she became Andrée Marquet's secretary (whose courses I had the pleasure of following), then the LBM's administrative manager.

- You have a multidisciplinary background in chemobiology, at the interface between chemistry and biology. What was the most important obstacle in your path?

The difficulty, which is not new to interdisciplinarity, is to be recognized by the disciplines. When you work at the frontiers, whatever they may be, your work is not seen as the heart of a discipline and is always difficult to evaluate by peers. I vividly remember discussions with colleagues who were more chemists or biologists (not to fall into the pitfall of pigeonholing) than I was, during which I would tirelessly hear myself say at some point in the conversation that I was doing chemistry on the part of the biologist, or biology on the part of the chemist. Human beings need to classify and simplify in order to reason, and boundaries are complex and confusing places. I remember when I was up for promotion to DR, I also submitted my application and was auditioned by one of the first interdisciplinary CID sections. Despite all the talk of interdisciplinarity, this pitfall of disciplinary positioning could not be avoided, and I was asked directly: "What indicates that you are at the interface of these two disciplines? It's always the same question, how to position the cursor between designing and developing tools or molecules and using them. You can design the tools and collaborate on their implementation, or develop the whole chain yourself. The latter option is necessarily slower, but from my point of view, more interesting. Disciplines, according to Auguste Comte's classification, are a continuum, far from having clear boundaries. From time to time, other disciplines are created at these interfaces or borders, such as physical chemistry, biochemistry or biophysics, for example. In July 2018, at a round table discussion I was invited to on the theme of "Chemistry and the Living", as part of the SCF congress in Montpellier, I took up the words "Nature is the supreme chemist" lent to Gordon Cragg (head of the natural products department at the National Cancer Laboratory in Frederick, Maryland), in Janine M. Benyus's book, "Biomimicry, Innovation Inspired by Nature" (1997). Of course, this observation about Nature applies to other disciplines whose object

*of study is the living, such as physics and biology in particular. Interdisciplinarity is not simply the addition of disciplinary knowledge. All too often, it still suffers from our inability to clearly perceive the respective contributions of disciplines to an integrative vision of science.*

- *What responsibilities do you currently have, and have you experienced any difficulties in accessing them?*

*Since October 2020, I have been deputy scientific director at CNRS Chimie and I am delighted to be working alongside Jacques Maddaluno and all the other colleagues, in the service of chemistry and all its interfaces. The first difficulty was to decide whether I should "let go" of managing the LBM. I had in fact been contacted in December 2019 and only really made my decision during April-May 2020, once internally in the laboratory we had been able to work to propose a new direction. As you know, it was not the best time for this kind of reflection, and we had many other worries and problems to deal with inside and outside the laboratory. When I took up my position as Deputy Scientific Director, I found the same complexity of tasks and missions as in laboratory management. With a change of scale, the activities are almost transposable. I have a national vision of the themes of Molecular Chemistry, Supramolecular Chemistry and Chemistry and Life, which makes the job extremely interesting. Of course, I also solve, or rather help to solve, a number of individual problems at the level of each of the 49 laboratories I work with. It is a great challenge to ensure that activities continue within the laboratories, but also to encourage the emergence of new scientific activities that will enable tomorrow's breakthroughs. Of course, the current context is not an easy one, as younger people are less interested in research and research support. This situation does not make daily life any easier for CNRS research units and institutes.*

*So, in the end, I did not have any difficulty in reaching this position, as it came as a complete surprise, a step in my career that I had never even considered. I never planned my career and I am continuing to do so, which does not mean I am not sensitive to the opportunities that arise along the way.*

- *When you began your career, did you ever imagine that you would become a research director at CNRS and take on major managerial responsibilities?*

*I never imagined my career as it is today. My primary motivation was research, and I had no idea that this activity would lead me sooner or later to take on scientific and/or managerial responsibilities. At the time, we were totally unprepared for this. When I was a doctoral student, doctoral training was very much focused on the core business of research and teaching. When I was director of the LBM, I systematically interviewed new PhD students. I was very surprised to hear in a number of cases that the ambition of the doctoral student was to become a "project manager"; without ever having worked in the laboratory, received any management training whatsoever, or carried out a research project.*

- *How do you reconcile your career with your personal life? Is there a balance?*

*Research is often synonymous with priesthood, that is for sure. It is a job where, if you're passionate about it, you cannot stop thinking when you leave the lab at the end of the day. It is invasive. Fortunately, there is no one way to be a researcher. Reconciling career and personal life is always a challenge. In research, you can have many reasons for wanting to leave the laboratory at a decent hour. As for me, I have always worked hard, but my initial motivation for leaving the laboratory was sport and tap-dancing, to which I added married life and the birth of my children. At the start of my career, I certainly suffered from the fact that I was a mother, and organization was the key to my successful reconciliation. For my part, even though we were both parents, I did not want to take time away from my young children to attend conferences that were too far away or too long. Firstly, to make it easier*

*to organize family life. It is a choice I do not regret, and one I would make again today, given that support for research parents is still not optimal. Now that my two boys have reached adulthood, I am less constrained.*

- You have received a number of awards, including the CNRS Bronze Medal in 2001, and this year you have become a Distinguished Senior Member of the SCF. What do these awards mean to you?*

*First of all, it is obviously with great pleasure that you receive these marks of recognition. The profession of researcher is a difficult one, and so is the practice of research: responding to calls for proposals to finance your work, trying to maintain a collective effort (when the general context is less and less conducive to this), writing reports on the use of funding or to assess your activities, being evaluated by your peers, applying for promotion, writing publications, etc. The sources of satisfaction are often hardly palpable: a doctoral student's outstanding defense, the publication of an article, obtaining funding, and so on. I remember that winning the bronze medal had an incredible impact on me, because at the start of my career, I doubted everything I could do, and this recognition gave me greater confidence in my abilities. The recent recognition from the SCF was also a great and pleasant surprise. Over and above my scientific activities, it seems to me that it is also a sign that my investment in research and in the community of chemists in all its diversity is supported and encouraged. I would like to extend my warmest thanks to the Organic Chemistry Division and the Transverse Division of Chemobiology for this vote of confidence.*

- Female candidates for science prizes are still very much in the minority. Do you have any suggestions for motivating potential female candidates?*

*I believe that the best way to motivate women to apply for scientific prizes is to encourage them to do so, when they are colleagues in the office, in charge of laboratories or institutions. CoNRS sections could also help in this respect, identifying colleagues and encouraging them to apply. Simply providing information is not enough. Self-censorship is all too common. The vast majority of women read the announcements for these awards, but feel little or nothing about it. On the other hand, I do not think it would be a good idea to make the awards exclusively for women, or to introduce quotas. There would also be investment to be made in training women to write their CVs or activity reports. These are just a few ideas; there are many others.*

- In your experience, what other action(s) could be envisaged to help women in the world of research and higher education?*

*Mentoring is an excellent initiative that CNRS Chimie, for example, is implementing initially with researchers (both women and men), between 4 and 12 years into their career. This initiative could be extended to more experienced researchers if there is a clear interest in it. The possible bias is that this initiative is based on voluntary participation. In the laboratories, colleagues need to encourage women in particular to ask for support, since we know that women are more likely to adopt a posture of "imposter complex" or self-censorship. Another type of support that needs to be stepped up is that for women returning to research after maternity leave: financial or human assistance to enable them to resume their activities, while giving them time to organize their professional and personal lives. The Maison de la Chimie has been doing this for a long time, and more recently CNRS Chimie has also set up the "R surgence@INC" program, which goes in the same direction. In addition, I think we should explore all avenues that could help relieve women's mental workload.*

- What advice would you give to young women starting out in this business?*  
*Get in touch with a laboratory colleague and/or Unit Director to get a progress report on their activities once a year; encourage them to contact the scientific departments,*

*especially at the CNRS, with any questions they may have; be a driving force behind proposals for schemes or actions that would enable women to progress in the scientific field with the same provisions as their male colleagues.*

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Interview conducted by Emmanuelle Schulz (DR CNRS, DCO-SCF President), Jeanne Crassous (DR CNRS, DCO-SCF Board Member) and Frédéric Lamaty (DR CNRS, DCO-SCF Vice-President in charge of diversity, parity and links with the SCF youth network).

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