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Writing the history of Catalan molecular biology: Using correspondence, interviews and papers

(1) Introduction

During the 1960s, the Spanish Biochemistry and Molecular Biology received a decisive impulse for their development. A first generation of biochemists, trained abroad, had returned to Spain and set up their own research groups mainly with the support from the Spanish Science Council (CSIC). A new generation, their young graduates, completed their training following the same strategy: postdoctoral stages in research centres in foreign countries.

A particular case, due to their training as chemists, was the group which became to be known as the Catalan Structuralist School, led by Jaume Palau and Joan Antoni Subirana. The aim of this paper is to show how it has been possible to reconstruct their early years, using interviews with the main characters, studying their correspondence and analyzing their scientific papers, in the framework of the historiography of Biochemistry and Molecular Biology in Spain and in the international context, stressing the dynamics established between the centre and the periphery as well.

In order to a better understanding, it is important to make a brief introduction about the rise and development of the Spanish research groups in molecular biology. Although the intellectual origins of molecular biology can be placed in the 1930s, it was in the 1960s when the discipline became a social reality. In four European countries, Germany, United Kingdom, France and Switzerland specific institutions for molecular biology were projected and developed. The coming up of these research centres can be related with the European economic reconstruction after world war 2, the new European institutions (European Economic Community), the creation of the European Molecular Biology Organisation (EMBO), and also, as an answer to the transformation of the experimental work, which had began in the United States before WW2, and to the need of funding resources in order to build and develop new instrumentation.¹

Ten years after the countries mentioned before, and after complex political negotiations, two research centres were created in Spain: the “Centro de Biología Molecular”, in Madrid, under the influence of Severo Ochoa, and the “Institut de Biologia Fonamental” (Basic Biology Institute), in Barcelona, under the influence of Joan Oró, Catalan Biochemist, chair at Houston University, and with the important role played by one of the main characters of this communication: Jaume Palau. In the same context, and within the Barcelona’s Engineering School, Joan Antoni Subirana started another research group, the “Departamento de Química Macromolecular” (Department of Macromolecular Chemistry). It is important to stress that all this processes of emerging research groups in Spain took place in the absence of any work on nucleic acids or biomolecular structural analyses, main issues in the 1960s. The specific characteristic of the Barcelona group, led by Palau and Subirana, was their structural approach to Molecular Biology, which constituted an exception.

The historiography of the groups placed in Madrid has been well developed in the publications of Maria Jesús Santesmases and Emilio Muñoz, but there is a gap concerning the Catalan research teams which started in the 1960s.² The aim of this paper is to show some aspects of my research project

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¹ Krige, John (1997): “The politics of European Scientific Collaboration”, in: *Science in the Twentieth Century*, Krige, J. and Pestre, D. (eds.) (Amsterdam, Harwood Academic Publishers), pp. 897–917.

² Among other publications: Santesmases, María Jesús y Muñoz, Emilio (1994): “Una introducción al origen internacional de la comunidad científica española de biología molecular”, *Arbor CXLVIII*, vol. 583, pp. 9–30. Santesmases, María Jesús & Muñoz, Emilio (1997a): “Scientific Organizations in Spain (1950–1970): social

about the so called Catalan Structuralist School, led by Jaume Palau and Joan Antoni Subirana, stressing the importance of their postdoctoral training abroad in the first years after their return when, previous to the founding of the IBF (Basic Biology Institute) and the DQM (department of macromolecular chemistry), they started a research group in biopolymers.

(2) The postdoctoral training of Subirana and Palau

Trained as organic chemists with Josep Pascual-Vila in the Science Faculty of the University of Barcelona, their postdoctoral years took place in research centres abroad. Having completed his PhD. in polymer chemistry in 1958, and in industrial engineering in 1959 in Madrid, Subirana stayed one year in Paris with Arnold Münster. In 1961, moved to Harvard University's Chemistry Department, led by Paul Doty. Two years later, Subirana obtained a fellowship, which allowed him to stay one year at the Weizmann Institute in Rehovoth, Israel, in the polymer chemistry department with Aaron Katchalsky. Subirana's shift to molecular biology took place in Harvard when, more or less one year before his arrival, denaturation and renaturation of DNA had been discovered by Paul Doty and his co-workers. Subirana's work in Harvard was focused in this issue.

After his PhD. in chemistry in 1963, and the attendance at the biochemistry course given by Alberto Sols, Spanish biochemist from the CSIC (Spanish Science Council) in Madrid in 1964, Palau went to London for a year (1964), to the Chester Beatty Research Institute where, with John Butler, made his shift towards molecular biology working on histone structure. During the same year, Palau obtained a fellowship which allowed him to assist at a course given by Maurice Wilkins in London King's College.

Both Palau and Subirana published their first papers during their postdoctoral training within the research groups in which they were working. Briefly, their return to Barcelona represented a job as research collaborators of the CSIC (Spanish Science Council) and the beginning of the biopolymers section in the genetics department of the Science Faculty in the University of Barcelona, where they began their research on histone structure. In 1967, Subirana became chair of macromolecular chemistry in the Engineer's School and, in 1969, Palau was immersed in the context which led to the creation of the Basic Biology Institute (Institut de Biologia Fonamental; IBF). It is important to stress that, in 1968, Subirana went to Harvard and met Alexander Rich from the Massachusetts Institute of Technology (MIT), and dates from these days and from Rich's suggestions, the idea of an X-ray laboratory in the Department of Macromolecular Chemistry in Barcelona.

This period, from the beginning of their postdoctoral training to the establishment of their research groups in Barcelona, from 1960 to 1977, is being studied as follows: the main secondary sources have been the historiography of Molecular Biology in order to place the subject in an international context and also the historiography of Spanish Molecular Biology, mainly the works of Maria Jesus Santesmases and Emilio Muñoz, as quoted before. In order to contextualize the research topics, reviews dating from the same years have been consulted. These sources, together with the interviews and the characters own written narrative provided the framework which allowed explaining this story.

(3) The problems of the historiography of the 20th century science

It is important to stress some of the problems related with the study of recent cases in which the main characters are still present. According to Thomas Söderqvist³, the first problem could be the imbalance in the supply of primary sources: the scarcity of sources in archives and the corresponding overflow of sources outside. The bulk of documents produced are still in the custody of individual scientists and, practically, all the documents from intermediary stages in the process, as letters, laboratory notes, instrument readings, manuscripts, among others, are still to be found in desk drawers on the shelves of the laboratories and in the basement of departmental buildings. Depending on the case, there is a

isolation and international legitimation of biochemists and molecular biologists of the periphery", *Social Studies of Science*, vol. 27 (2) , pp. 187–219; Santesmases, Maria Jesús & Muñoz, Emilio (1997b): "The Scientific Periphery in Spain: The Establishment of a Biomedical Discipline at the Centro de Investigaciones Biológicas, 1956–1967", *Minerva*, vol 35, pp. 27–45.

³ Söderqvist, Thomas (ed) (1997): *The historiography of contemporary science and technology* (Amsteldijk: The Netherlands, Harwood Academic Publishers), pp. 1–17.

problem concerning the ever-expanding production of scientific publications and the consequent overload of written sources. One acute problem arises: which documents are worth-keeping and which can be discarded? Which documents and publications are significant and which constitute background noise? One solution to this overload, according to Söderqvist, would be to rely on the “scientists / informants” evaluation (in interviews or review articles) of which documents and publications reflect important events and historical trends.⁴

In this case study and taking into account that the training of Palau and Subirana was based mainly in the apprenticeship of laboratory techniques and the use of laboratory instruments, the reading of their scientific publications became essential for this research.

(4) The primary sources

Assuming the difficulties mentioned above, the next step of the research consisted in the localization of the primary sources.

(4.1) The archives

The General Archives from the Universitat Autònoma de Barcelona, were consulted in order to obtain information about the rise and development of the Institut de Biologia Fonamental. Memoirs from the first years were localized and studied. The General and historical archives from the Universitat de Barcelona, were consulted in order to obtain information about the academic records from the training as chemists of Jaume Palau and Joan Antoni Subirana.

(4.2) Edited primary sources

Edited primary sources were also available and consisted, mainly, in their scientific papers published in reference journals. It has been possible to obtain informative documents from the own department of macromolecular chemistry, and also, the inaugural speech given by Subirana when he became chair at the engineer’s school. This document is very interesting in the sense that the author expressed the aims of the Spanish scientific community about the establishment of real scientific policies during the 1960s. Their own narrative about their career has been edited and has been available too.⁵

(4.3) Non edited primary sources

Concerning the non edited primary sources, the main one has been the correspondence between Palau and Subirana during their training period abroad. This correspondence, consisting in fifty-five letters written by Subirana from 18th December 1961 to 31st August 1968, has permitted a follow-up of their careers. The access to this source was possible thanks to the interviews carried out with Joan Antoni Subirana, who arranged a meeting with Palau’s widow, Montserrat Cid, and her daughter, Sònia Palau, who kept the correspondence, and allowed its use in this research. Unfortunately only the letters written by Subirana are conserved. Nevertheless, the great amount of details concerning research, funding, techniques and so on given by Subirana, allows a follow-up of this period. The content of this correspondence confirms that they were in the main stream of the research on histone structure, not only because of the amount of published papers, but also by the collaboration established with the main research groups.

(4.4) The interviews

The next none edited primary source have been the interviews. It is important to consider some details about the use of this source. According to Soraya de Chadarevian (1997), interviews are important in order to understand stories and anecdotes which circulate among the scientific community. In all historical narratives, as has been the case in this research, the reconstruction of certain scientific events is important and scientists can contribute to it because they are participants or witness of their

⁴ *Ibid.*

⁵ Palau, Jaume y Subirana, Juan Antonio (1994): “La escuela estructuralista de Cataluña y su relación con EMBO”, *Arbor* CXLVIII, vol. 583, pp. 95–119.

particular times, and of social and political events probably not shared with the historian or lived with different perspective.

Assuming the problems raised by interviews with living scientists⁶, as the divide between memory and history or the conflict between memory accounts and written documents, the lack of written sources in the archives and the overflow of no localised and unregistered sources elsewhere make oral history essential for those interested in understanding the development of recent science. Interviews with the historical actors can provide information not available from written documents, they can support the interpretation of the significance of documents, and they can lead to laboratory notebooks and private correspondence, as has been the case of this research. Subirana agreed to participate in interview sessions and was keen to provide letters and laboratory notebooks. The usefulness of the interviews has been, mainly, the access to private correspondence and to laboratory notebooks and instruments, but also to details about their research. It is important to stress the access to instruments because one of the main interests of this research is the design and construction of X-ray cameras in the workshop of the engineer's school, that means to carry out interviews with the engineer who designed the instruments or the modifications introduced in the standard instrumentation, with the chair of mechanics and with the master craftsman in order to obtain the details about the whole process.

Taking into account the importance of the introduction of new techniques and, especially, the role played by the instruments of molecular biology as discipline organisers and knowledge transmitters, it has been possible to stress the importance of the continuous relationship between Scientifics and technicians. In this case study, it must be mentioned the work done by the engineer Joaquim Lloveras and also by the people of the faculty's workshop. The case of the so called RICH X-ray diffraction cameras which will be mentioned below constitutes an example of the importance of the development of new techniques and the role played by the instruments in molecular biology. The workshop of the Engineering School started under the responsibility of Cayetano Sierra (chair of mechanics), during the academic year of 1967–68. The objectives of this workshop were the development of the program of practices for the students in order to learn how to mechanise materials but, also tried to be useful to the School Departments. One of the workshop's problems was the lack of personnel. The School took on a master craftsman with the mission to put the machinery to work and to teach the students how to use it, even before the practices' program was organised. The master craftsman was Francisco Navarro, with whom the workshop really began operative and useful to the School.

The workshop's machinery and tools, only allowed the development of very simple tasks. It dates from these days when they received the first assignments from Subirana's engineer, Lloveras. These assignments consisted mainly in unique pieces, from which they only built five or six copies, and represented two problems for the workshop. The first one was the cost, in the case that the work had to be made outside the School. The workshop didn't buy the *materials*, because the lacking of funds. Who asked for the work brought the material, in our case, Subirana. The labour was not charged and the workshop's small budget was used to buy new tools. The second one were the difficulties caused by the ordered pieces. Most of these were for the X-ray cameras, small size pieces. The workshop tools were not the best ones to do the job and all of it became such a matter of *savoir faire* by Mr. Navarro. In spite of the difficulties, the orders could be accomplished because the work had a good technical support: Lloveras, not only provided the sketch but also explained the function of the pieces, which made easier the development of the process.

The next problem was how to plan and how to carry out these interviews. The methodology was as follows: The first step was to get in contact by e-mail or phone with them. It is important to stress that the research group which is the subject of my project is placed in my own city: Barcelona, in Catalonia, Spain. This fact made it easy to contact with them. In this first e-mail or telephone contact, I explained my project and asked for the possibility of having a first meeting in order to ask them some questions and to tape the conversations. It was well established from the very beginning that a transcript of the interview would be sent to be checked by the interviewees and that their authorization must be needed for further use. The reading of the secondary sources, mainly the historiography of

⁶ *Op. cit.* note 3; Gaudillière, J. P. (1997): "The living Scientist Syndrome : Memory and History of Molecular Biology", in: Söderqvist, Thomas (ed.) (1997): *The historiography of contemporary science and technology* (Amsteldijk: The Nederlands, Harwood Academic Publishers), pp. 109–128.

molecular biology, allowed planning further interviews with more clear objectives, following the previous experience from authors who have done projects in the same line. One close example to my research, but at a greater scale, was Soraya de Chadarevian's *Designs for Life*, on the history of molecular biology in the United Kingdom after World War Two. Her previous paper in *The Historiography of Contemporary Science and technology*, edited by Thomas Söderqvist, provided the basis to face up further interviews and, also, the use of letters and laboratory notebooks.⁷ The first questions arise: who has to be interviewed? The scientists, off course, people involved in scientific politics but also the technicians, and the master craftsmen, for example.

In this research, the interviews with the scientists, mainly Subirana, centred on details about the research group and its international situation, the kind of scientific culture which was developed and life and scientific career of the interviewee. Unfortunately, Jaume Palau, friend and colleague of Subirana, died in 2000, two years before I started my research. The interviews carried out with the engineers and with the master craftsman centred on technical details about instrument development. It must be stressed the importance of achieving the confidence of the interviewee in order to obtain his or her cooperation, to show the scope of the interview and to share part of the information about the project. It is also important that the interviewee feels that you can follow the intricacies of the scientific questions and the technical details.

(4.5) Laboratory notebooks and inventory of instruments

Among the materials obtained thanks to the interviews carried out with Subirana, there are the Laboratory Notebooks and the Inventory of instruments. The registration book from the X-ray laboratory has permitted to place in time some facts around the beginnings of the X-ray diffraction techniques during the first years. The access to the inventory books had permitted to know which had been the available instrumentation, their characteristics, price and property.

(4.6) Pictures and sketches

During the interviews carried out with the engineer Joaquim Lloveras arose the opportunity of taking pictures of the instruments, for example the RICH cameras but, also to obtain scanned copies of the sketches of some of instruments from the X-ray lab. The RICH cameras took their name from Alexander Rich's gift to Subirana in 1968. This camera, copy from a Phillips standard instrument, included new characteristics introduced at the MIT. During the early 70s, new copies were made and new modifications were introduced in Barcelona, thanks to the facilities provided by the school's workshop. Starting from the idea about the design or the changes that must be introduced in the cameras, Joaquim Lloveras elaborated a simple sketch, normally in graph paper which was sent to the workshop with the material needed for the manufacture. The sketches not only allowed to copy and to construct the RICH cameras and prototypes, but to introduce modifications in the standard instruments as well. Thanks to the facilities given by Subirana and Lloveras, two photography sessions took place in the X-ray laboratory, which allowed obtaining the images of several instruments, including the so called RICH camera. The dismantling of some of the instruments allowed a better comprehension of their construction process and of the capabilities of the school's workshop.

(5) Memories and interests

Taking into account the problems raised in doing historiography of recent science and the presence of the main characters, I would like to show two situations which arose during the research. The first one is about *forgotten details*, and the second one is about *what is important for the engineer is not important for the scientist and vice versa*. When asking Subirana about certain person who allowed him to establish contact with an international scientific association, not only he didn't remember exactly who was but considered that this was not important. While being conscious of the importance of this kind of

⁷ De Chadarevian, Soraya (1997): "Using Interviews to Write the History of Science", in: *The historiography of contemporary science and technology*, Söderqvist, T. (ed.) (Amsteldijk, The Netherlands, Harwood Academic Publishers), pp. 51–70; De Chadarevian, Soraya (2002): *Designs for Life. Molecular Biology after World War II*. (Cambridge, U.K., Cambridge University Press).

relationships, with the international associations and also with the funding agencies and government departments, perhaps he perceived his own activity as the discovery of pure facts about nature.

The second example is the case of the construction and modification of the X-ray diffraction cameras. It is well known that X-ray crystallography has always been associated with modification or construction of instruments in the laboratory workshops. While the engineer, Joaquim Lloveras, stressed the importance of the instruments, their construction or modification, in the research, this was not important for the scientist, who perceived this process as one more item in “material and methods” and the acknowledgment for the technical assistance at the end of the paper. When I finished the first part of this research, Subirana asked me about why I was stressing the importance of instrument making instead of the details of their research program.

(6) Conclusions

This paper has stressed the importance of the primary sources in writing the history of Catalan Molecular Biology. To sum up, what has been the use of these sources? The character’s own narrative together with the historiography of molecular biology provided the framework for this research. The interviews with the main characters provided details and, mainly, the access to other sources. The correspondence permitted a follow-up of their careers and the development of their research projects and also gave information about the Spanish scientific situation during the 1960s. Finally, the study of their scientific papers and the reviews showed that their research program in histones was in the mainstream of the field. It is important to stress the presence of this research groups in the main international journals. Two important examples, among others, are the first paper by Subirana on X-ray diffraction, in the *Journal of Molecular Biology* in 1969, done in Israel and a joint paper with Palau in *Biochimica et Biophysica Acta* in 1973 concerning the pioneering characterisation and analysis of the aminoacids from the proteins associated with DNA in molluscs.⁸ Although this paper has been centred on the use of primary sources, it is possible to relate it with more general features about the development of molecular biology research groups. The setting up of local molecular biology institutes in Europe preceded the international ones, such as the European Molecular Biology Laboratory in Heidelberg. Perhaps the portrait of the European molecular biology is, at the same time, “global” and “local”.⁹ Palau and Subirana developed a research programme which included how the infrastructures had to be and the scientific politics which could make it possible.

⁸ Suwalsky, M., Traub, W. Schmueli, U., Subirana, J.A. (1969): “An X-ray Study of the Interaction of DNA with Spermine”, *J. Mol. Biol.*, vol. 42, pp. 363–373; Subirana, Juan Antonio, Cozcolluela, Carmen, Palau, Jaume, Unzeta, Mercedes (1973): “Protamines and other basic proteins from spermatozoa of molluscs”, *Biochim. Biophys. Acta*, vol. 317, p. 364–379.

⁹ De Chadarevian, Soraya & Strasser, Bruno (2002): “Molecular Biology in postwar Europe: towards a ‘glocal’ picture”, *Stud. Hist. Phil. Biol. & Biomed. Sci.*, vol. 33, pp. 361–365.