
In tribute to André Adoutte



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Comité pour l'histoire du CNRS

In tribute to André Adoutte¹

- 1 The objective of this issue was to give an historical panorama of French biological research and the role played by research organizations, in particular the CNRS: a project that proved too ambitious for the size of this issue. Instead a small number of contributions have been assembled here.
- 2 It is a matter of attempting, more modestly, to define a certain tradition of French biological research, a certain style, and the manner in which this tradition slowed, or alternatively, facilitated the development in biological research². Fields of research like Ecology and developmental biology were deliberately omitted.
- 3 The specific character of french biology is underlined by a number of observers. The relatively favorable welcome among numerous French intellectuals for the theories of Lyssenko in 1948, many of whom were biologists, is certainly not the most glorious episode. The strength of the Communist Party in French political life is not the only explanation, we must also look at the reticence of many French biologists toward Darwinism and Mendelism.
- 4 Stephane Schmitt's study of Lucien Cuénot is particularly interesting for better understanding this French tradition. Cuénot was the first French geneticist. But he abandoned genetics very early because of the hesitation of his colleagues and for fortuitous reasons – the destruction of his animal facilities during the First World War. But above all he did so because Mendelian theory did not appear to him capable of providing understanding of the phenomena observed in nature, and in particular, the evolution of living organisms. S. Schmitt shows that L. Cuénot, like André Lwoff and a number of other French biologists, did not reject Mendelism or Darwinism in favor of neo-Lamarckian theory, but simply considered these theories insufficient, leaving the door open for other mechanisms of heredity and evolution.
- 5 This new light on the special nature of French biology must not mask, however, the reality of its slowness to develop in the first half of the 20th century. This was due to the rigidity of the structure of university administration, to an isolation from the international scientific community, and an excessive appreciation for the past French contribution. The heritage of the great ancestors, Louis Pasteur and Claude Bernard, was considered sufficient to keep French biology the leader in the international scientific community indefinitely.

- 6 At the end of the Second World War, many French researchers were shocked by the discovery of the advances made by the United States. French researchers then put in place a policy for reconstruction of French research by the CNRS, with the aid of the Rockefeller Foundation. Jean-Paul Gaudillière recalls a little known episode in this evolution of French research “to mirror America”, the transitional creation of a Centre français de production de la pénicilline (French center for the production of penicillin). Relations between public and private research and the always-delicate passage from fundamental or pure research to an applied research are well-known difficulties today, but which were being encountered already at the time of this episode.
- 7 French biological research was transformed after the Second World War. This is evident in the fact that the 1965 Nobel prize in medicine was awarded to François Jacob, André Lwoff and Jacques Monod for their work at the Institut Pasteur in Paris on mechanisms of genetic regulation. This success has already been described many times³, we have decided instead to recall the work accomplished by Boris Ephrussi and his students, in particular Piotr Slonimski, which was conducted first at the *Institut de biologie physico-chimique* (IBPC), then at the CNRS laboratories in Gif-sur-Yvette.
- 8 The IBPC, founded by Jean Perrin and Baron Edmond de Rothschild, is a completely original institution, anchored in the Bernardian tradition : Baron Rothschild was a fervent admirer of Claude Bernard. The IBPC may be considered the first institute for molecular biology in the world, both by its objectives – to bring together biology and physico-chemical sciences – and its organization, with, in particular, the presence of numerous labs with experimental devices that permit the study of living organisms at the molecular level. This is where B. Ephrussi made, with George Beadle, the first steps toward the elaboration of relationship between a gene and an enzyme, then began with P. Slonimski their work on the extra-nuclear genetic structure of yeast. Jean-François Picard shows us, in the CNRS laboratory in Gif-sur-Yvette⁴, that P. Slonimski fully developed this project and contributed to making France one of the leading countries in the study of yeast genetics : we see the important role the French teams played in the genome sequencing of this organism (finished in 1997), just as in the post-genome work that grew out of it.
- 9 It was said that the *molécularisation* of French biological research was done in large part “against” the CNRS, thanks to General de Gaulle’s creation of the *Délégation générale à la recherche scientifique et technique* (DGRST)⁵. The support provided for B. Ephrussi by the CNRS and the creation of the laboratories in Gif-sur-Yvette show that things are not so simple : it is true that the institutions have a tendency, by natural conservatism and concern for independence, to oppose very rapid changes from outside, even if these changes go in the direction these institutions had already indicated – the example of the IBPC and its resistance to *molécularisation* at the beginning of the 1960s is particularly illustrative of this.
- 10 The research organisms – the Institut Pasteur and the CNRS – also have supported research that could have appeared in the 1960s to be marginal by comparison to work being done on genes and their regulation. Jérôme Segal describes for us the studies on *repliement des protéines* done by Michel Goldberg et Jeannine Yon. Finding part of their roots in the allosteric model proposed by Jean-Pierre Changeux and Jacques Monod, and benefiting from the support of Monod at the beginning, this work had little echo in the community of biologists, linked as it was to models that were fundamentally difficult to understand, even by biologists, and without evident practical applications.

Little outside importance was given to their work. This changed with the development of diseases caused by infectious proteins – the most well-known of which is “Mad Cow” disease – and more generally the study of pathologies, in particular neurodegenerative ones, linked to the formation of protein aggregates.

- 11 One of the weaknesses of this body of work is that it remains too “Parisian”, even if L. Cuénot spent his entire research and teaching career at Nancy, and if the laboratories at Gif-sur-Yvette are in many aspects, and despite the mere 25 km that separates them from the Capital, more provincial than Parisian ! It would be very interesting to describe the *Centre de biochimie et de biologie moléculaire* in Marseille, founded by P. Desnuelle in the 1960s, or the *Institut de chimie biologique of the medical school* at Strasbourg, headed by P. Mandel, and their role in the molecularisation of French biology, or later developments in Nice, Montpellier or Toulouse just to give several examples. We hope that the exploration of the archives and the research of historians allow us to fill in the lacunas in the coming issues.
- 12 Jean-Louis Fischer evokes the importance of marine stations in French biological research and, in part, fills some of the lacunas. Because of the abundance and diversity of its coasts, France was particularly well placed in the 19th century for the creation of these centers of biological and zoological research. If, at the beginning of the 20th century, marine stations no longer played the major role in biological research that they had previously, Roscoff remained a unique place in France for French biologists to meet. The arrival of molecular biology sounded the death knell for research that was considered old-fashioned and for the marine stations, until it was realized that these stations constituted an exceptional mode of entry to the study of diversity of the living world, and that this diversity contains “treasures”, both in terms of fundamental or pure research and potential applications. At the dawn of the 21st century, with the aid of the CNRS and the University, these stations were reinvigorated to carry on scientific work.
- 13 Without wanting to make hasty conclusions from these studies, it seems to us that they confirm the existence of French traditions, but that these traditions are richer and more complex than commonly appear in descriptions. These traditions were sources of progress and success when one discovered how to marry them with advanced techniques and concepts realized in other places.
- 14 We wish to dedicate this issue to the memory of André Adoutte, to give homage to a scientific personality and an exceptional human being, but also because his work perfectly represents this successful marriage of tradition and progress. Director of the *Centre de génétique moléculaire* in Gif-sur-Yvette and the indirect successor of Piotr Slonimski, he performed his first research on ciliates, and was thus the inheritor of the strong French zoological tradition. But he knew how to renew this study with the applications of molecular techniques and was, in France and in the world, one of the principal actors in the rapprochement between evolution and development. He was the perfect example of bringing forward a rich tradition and combining it with new beginnings.

NOTES

- 1.A. Adoutte (1947-2002), director of the Centre de génétique moléculaire (CNRS) at Gif-sur-Yvette.
 - 2.On this question, see also : C. Debru, J. Gayon and J.-F. Picard (ed.), *Les Sciences biologiques et médicales en France 1920-1950*, CNRS ÉDITIONS, Paris, 1994. R.-M. Burian and J. Gayon, « The French school of genetics: from physiological and population genetics to regulatory molecular genetics », *Annu. Rev. Genet.* 33, 1999, p. 313-349.
 - 3.M. Morange, « Les mousquetaires de la nouvelle biologie », *Pour la science*, coll. Les génies de la science, février 2002.
 - 4.R.M. Burian and J. Gayon, « Genetics after World War II: The Laboratories at Gif », *Les Cahiers pour l'histoire du CNRS*, vol. 7, 1990, p. 25-48.
 - 5.X. Polanco, « La mise en place d'un réseau scientifique : les rôles du CNRS et de la DGRST dans l'institutionnalisation de la biologie moléculaire en France (1960-1970) », *Les Cahiers pour l'histoire du CNRS*, vol. 7, CNRS ÉDITIONS, 1990, p. 91-147 ; J.-P. Gaudillière, « Chimie biologique ou biologie moléculaire ? La biochimie au CNRS dans les années soixante », *Les Cahiers pour l'histoire du CNRS*, vol. 7, CNRS ÉDITIONS, 1990, p. 91-147.
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Mots-clés: André Adoutte, centre de génétique moléculaire, Gif-sur-Yvette, Lyssenko theories