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Obituary

René Wurmser (September 24, 1890 – November 9, 1993)

René Wurmser was born in Paris 1890, and pursued his university education at the Faculty of Sciences in Paris. Despite the fact that biophysics was not yet a recognized discipline at the Faculty, Wurmser felt drawn to the physico-chemical side of biology, which led him to attend the courses given by Jean Perrin, Georges Urbain and Marie Curie. At the age of 21 and armed with a first degree, Wurmser became an unpaid assistant in the laboratory of Albert Dastre, Professor of Physiology at the Sorbonne, who put him under the charge of Victor Henri, a gifted physical chemist whose work remains regrettably underestimated: Victor Henri contributed much towards laying the foundations of the kinetic theory of enzymatic reactions. During three years of intense scientific activity in collaboration with Victor Henri, René Wurmser devoted himself to the theoretical and experimental study of photochemical reactions, publishing 14 articles and notes on this subject. He adopted the most modern approaches to the problem, using the theory developed by Albert Einstein, and concentrated his attention particularly on substances of biological interest. He proposed that the absorption of a photon by a photosensitive molecule leads to the formation of an active state which precedes the photochemical transformation (1913), a concept that he successfully applied later to the particular case of photosynthetic reactions.

Wurmser's brilliant career was interrupted for five years by the 1914–18 war. After demobilization, he was accepted in the laboratory of Jean Perrin, where he began his studies devoted to chlorophyll-dependent photosynthesis, a subject that he had been longing to tackle since his earliest work on photochemistry. He joined Emile Terroine at Strasbourg, who offered him a post as '*préparateur*'. During a period of two years at Strasbourg, and also at the Marine Biological laboratory at Roscoff, Wurmser accomplished the studies for his Doctoral thesis, devoted to '*assimilation chlorophyllienne*' (1921). This research, which Wurmser pursued until 1930, marks a turning point in the history of bioenergetics. Contrary to the ideas of R. Willstatter and later Otto Warburg, Wurmser showed that the target of light action was not as they thought a complex of chlorophyll and carbon dioxide. Based on his measurements of the energetic yields of photosynthesis, he proposed that the primary photochemical reaction must be coupled to the photolysis of water and that the assimilation of carbon dioxide takes place in the uncolored stroma of chloroplasts (1930). One of his most important contributions concerns the role of

supramolecular structures in the mechanisms of photosynthesis. Based on thermodynamic arguments, he showed that the photosynthetic reaction cannot take place in a homogeneous phase. He proposed that a structure involving lipids and pigment chlorophylls – *lipoïdes* – separates two aqueous phases, one of which is the site where water is decomposed and the other where carbon dioxide is assimilated. The need for compartmentation, based on structural elements now seen as the forerunners of membranes, was a fundamental concept later incorporated in the chemiosmotic theory of Peter Mitchell and is now at the roots of modern bioenergetics.

It was in 1927 that the baron Edmond de Rothschild, at the instigation of Jean Perrin, André Mayer and André Job, took the decision to create the Institut de Biologie Physico-Chimique. Decades ahead of others, these scientists had enough insight to understand that the problems of modern biology could be solved only by adopting a multidisciplinary approach associating physicists, chemists and biologists. From the very start these disciplines were present at the Institut de Biologie Physico-Chimique, which, together, collected some of the finest french scientists of the age in a structure that preserved the independence of each. René Wurmser was appointed head of the department of Biophysics, a position he occupied until his retirement in 1963. In collaboration with Louis Rapkine, Wurmser applied to the study of respiration the concepts he had developed during his work on photosynthesis. He underlined the central role of oxido-reductive reactions and characterized the thermodynamic constants associated with numerous biological compounds participating in these reactions, thereby contributing to the foundations of a new discipline that was to become bioenergetics. Convinced that physico-chemical biology could not remain purely reductionist, Wurmser developed with Louis Rapkine new techniques which allowed them to measure intracellular oxido-reduction potentials with the aid of natural pigments.

In 1936, René Wurmser married Sabine Filitti, a young Roumanian who had come to Paris to prepare her doctoral thesis under his direction. She became his principal collaborator and from that point on their contribution to science was undissociable.

With the outbreak of the second world war, René and Sabine Wurmser were requested by the army to develop a method for preserving blood. In a very short time, they produced a new technique based on acidifying blood, which was rapidly applied on a large scale. This work was a turning point in the research of René Wurmser and Sabine Wurmser who became increasingly interested in the study of human red-cell agglutination. Remaining faithful to the intellectual approach that underlined all he did, René Wurmser set about this new problem by characterizing the thermodynamic parameters of the process of agglutination. René and Sabine Wurmser showed that isohemagglutinins reacting with a particular antigen had molecular structures dependent on the genotype of the individual who synthesized them, an observation that opened a new chapter in the field of blood immunology.

In 1946, René Wurmser was appointed to the chair of Physico-Chemical Biology at the University of Paris. In his *'Titres et Travaux'* he explained the reasons that led him to choose this chair over that of Biophysics: 'the accent is thus placed on the significance of higher levels of organization, on what the construction of tissues and cells adds to the properties of the underlying elements'. This broad conception of biophysics seems to me to be more valid than ever: it is indeed essential that biophysical approaches, founded on the concepts and methodology of physical chemistry, should not be reserved solely for studying isolated molecules of biological interest but must also be applied to higher order molecular structures and indeed to cells and tissues, thereby covering all the levels of integration of living matter.

I first met René Wurmser in 1953, when attending the course he gave in Biophysics at the University of Paris. Though his lectures were considered by my student colleagues as difficult to follow, to me they were fascinating. For those prepared to take trouble, they allowed a real understanding of the subtle and intricate concepts of cellular energetics and enzyme kinetics. A year later, René Wurmser welcomed me into his laboratory and guided me towards the study of photosynthesis. Thanks to René Wurmser, the years spent preparing my doctoral thesis were amongst the happiest of my scientific life. He considered that a scientific director should allow young researchers to express their own originality, which resulted in his leaving a great deal of room for individual initiative. In spite of this, René Wurmser was always available to provide help during difficult periods, but in such a way as not to impose his own ideas. Therein maybe lies one of the rare criticisms that I might make of my teacher, inasmuch as I came to understand only much later many of his own insights into nature.

Though a scientist of great individual talent, René Wurmser believed it his duty to participate in the orga-

nization of biological research in France, taking part in the bodies responsible for research and teaching. Having been at the forefront of the development of biophysics in the Universities and at the *Centre National de la Recherche Scientifique*, he presided over and animated the molecular biology committee of the *Délégation générale à la Recherche Scientifique et Technique*, which played a vital role in the development of this new discipline in France. In many instances René Wurmser offered his single-minded support to newly emerging disciplines, which were often confronted by the overbearing forces of conservatism.

The nomination of René Wurmser as Administrator of the Institut de Biologie Physico-Chimique in 1958 led to an era of renewal and dynamism in the research activities of the institute. After his retirement and for more than twenty years, René Wurmser remained amongst us in his department at the Institut de Biologie Physico-Chimique, and continued to make a significant contribution to the scientific life of the institute. Until his final days, he continued to keep up with scientific developments and remained for his previous collaborators an invaluable person to speak with, always delighted to learn about new advances in the fields which he had made his own.

Both through his contribution to science and his great humanity, René Wurmser will remain dear to the hearts of those many students he helped to train throughout his long career.

The author thanks Richard Buckingham, who has kindly translated this text from French to English. Three of Wurmser's earlier publications are listed below.

References

Henri V and Wurmser R (1931) Absorption des rayons ultraviolets et action photochimique. Journal de physique théorique et appliquée (5°) série 8: 305–323

Wurmser R (1921) Recherches sur l'assimilation chlorophyllienne. Thèse de Doctorat de l'Université de Paris, France

Wurmser R (1930) Oxydations et réductions. Les Presses Universitaire de France, Paris, France.

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