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Book Review

FREE RADICALS BIOLOGY AND DETECTION BY SPIN TRAPPING
GERALD M. ROSEN, BRADLEY E. BRITIGAN, HOWARD J. HALPERN, SOVITJ POU, OXFORD UNIVERSITY PRESS, NEW YORK, OXFORD, 1999, 482 PP.

It was 100 years ago that Moses Gomberg changed the face of chemistry through his discovery of organic free radicals, and now we can see how the face of biology is changing due to demonstration and investigation of oxygen and oxygen-centered free radicals. The problem is that it is not enough to have a good Electron Paramagnetic Resonance instrument to demonstrate the existence of these nonstable radicals. As a result, in the late 1960s several laboratories suggested to use addition reactions of the free radicals with nitrones or nitrosoalkanes. The resulting spin trapped adduct (nitroxide) is remarkably stable and its lifetime is much higher than that of the parent radical.

With time spin traps became more and more popular and in 1998 the number of publications describing spin traps and their application reached 255. In 1999 and 2000 this number was slightly lower, but still above 200 per year and it was comparable to the number of publications using or describing nitroxides. There were already six International Symposia on Spin Traps and the last one was in August 2000 in Marseille, France. The number of the papers in the area warrants the necessity of the book, which would summarize the achievements in the area and would help those interested in the area. Still I would say that the title is too broad to reflect the real content of the book. A more accurate title would be for example, *Spin Traps. Detection of free radicals in biology.*

The book is written by four authors, who have actively worked in the area and that is why the reader is getting information from the "first hands". The goal of the book as it is stated in the introduction, was to write "a text that could serve as a practical guide to spin trapping that scientists, regardless of their expertise, research focus and experience with the technique, would find current and helpful". Another positive aspect is that a reader can see not only recent achievements, but also the progress in the area, and its history, including the most important discoveries.

The book has 12 chapters, starting with the chapter "In the beginning", describing evolution of life in the world starting from anaerobic to oxygen rich environments. A reader can find chapters describing oxygen paradox and role of nitric oxide, historical perspective of spin trapping and its comparison with other methods, synthesis of spin traps and the basics of EPR and three chapters describing kinetics of spin trapping, its chemistry and applications in biological

systems. Finally it describes pharmacological activity of spin traps and even future directions of spin traps and EPR. This broad coverage certainly makes the book a valuable source of information.

As it is clear both from contents and the book it self, the book is addressed to a wide audience. A possible reader can be both a specialist in the area, who is interested in additional information, and a student or a beginner entering the area. The problem is that when the goal is so broad, it is difficult to satisfy all sides. For example, Chapter 7 (principles and practical aspects of EPR) is certainly too difficult for an average biology student.

Chapter 6 (the biggest in the book, 80 pages) describes synthesis of spin traps and is certainly addressed mainly to organic chemists. Though of course synthesis of new traps is important and is one of the possible future directions in the area, those who use the spin traps usually do not synthesize them. Main traps are already available commercially, including relatively new 5-diethoxyphosphoryl-5-methyl-1-pyrroline-N-oxide (DEPMPO), which gives more stable adducts with superoxide and became very popular in recent years.

The references are very important in the book, describing a special, though important area of modern life sciences. The authors certainly did not give all available references, which is impossible to do, but they gave a lot of them and chose them with the purpose to present the general picture and also to pay tribute to the pioneers in the area, which makes the book interesting. For example a reader can find references on the papers published by Soviet scientist E. Zavoiskii, who discovered the EPR in 1945, during the Second World War.

Being a chemist by background I really enjoyed reading some biological chapters, but my mood changed when I found that according to the figure 2.1 singlet oxygen in the excited state has the same molecular orbital structure as in the ground state. Another example: disproportionation reaction of spin adduct is second order, but it is characterized based on a first order decay kinetics and half-life time is given without concentration of the adduct (Table 8.6 and 8.7). The book does not have a list of abbreviations, but it has a lot of them, and sometimes without explanations. As the result it is not clear what DMF is in the figure caption 8.1. Unfortunately it is possible to find some more examples of not very accurate statements and also several examples of typographic mistakes.

Summarizing, I would say that the book really contains a lot of important information that can be very helpful for people working in the area of spin traps and free radicals in biology. It certainly should find a proper place in many university libraries. The method of spin traps is still quickly developing and though it is difficult to keep up with the fast tempo of modern science, this book is certainly a good and useful attempt to do this.

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