

oxygen-independent) mechanisms and nitric oxide for different pathogens, is a recurring problem of interest. Another recurring theme concerns the route by which a pathogen is taken into a macrophage, which may determine its final intracellular location and thus its ability to replicate or be killed.

In summary, this book contains a great deal of information and would be a valuable resource for anyone engaged in research on macrophages, although perhaps not so useful for people with an interest in macrophages and their role in autoimmune disease, for example. There are other, cheaper

books on macrophages, (including a recent one written mainly by British authors), but they reflect a different emphasis.

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Free Radicals in Tropical Diseases

edited by Okezie I. Aruoma, Harwood Academic Publishers, 1993.

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Free-radical biology is a large and rapidly changing field of biomedical research, with several international congresses per year, and its own journals and societies. Even though free radicals play an important role in several tropical diseases, free-radical biology may be intimidating, diffuse, and/or arcane to most parasitologists. *Free Radicals in Tropical Diseases* can change this. It is well written and carefully researched, and could serve as an avenue for parasitologists to learn about the role that free radicals play in tropical diseases. The book should be of equal interest to free-radical biologists who are interested in learning more about tropical diseases.

Free radicals should be of interest to parasitologists because they play important roles in many disease processes. For example, host phagocytic cells, under the influence of cytokines, defend against microorganisms by generating free radicals. In addition, free radicals may play a role in the pathogenesis of many diseases. Finally, there are important chemotherapeutic agents which act by generating free radicals (oxidant drugs) or, alternately, by mopping them up (free-radical scavengers or antioxidants).

The chapter on free-radical biochemistry (Chapter 1) gives an excellent review of the biologically important free radicals, including superoxide (O_2^-), hydroxyl radicals ($HO\cdot$), nitric oxide ($NO\cdot$), and peroxyxynitrite ($\cdot OONO$), and related compounds such as hydrogen peroxide (H_2O_2) and

hypochlorous acid ($HOCl$)*. It reviews how O_2 and H_2O_2 are relatively non-toxic on their own, but are activated into highly toxic $HO\cdot$ radicals in the presence of iron or other transition metals. 'Oxidative stress' is defined as the state in which there is an excess of free radicals, which then damage lipids, proteins and DNA. Free radical biochemistry has progressed rapidly in the past few years, primarily because the technology for the detection of free radicals and free-radical-mediated damage has advanced dramatically. These methodological advances are summarized well in Chapter 11.

Overall, this is an excellent book; written at a level that can be understood by readers with minimal chemistry backgrounds (but still be interesting to chemists). The chapters on iron metabolism and nutrition (Chapters 2 and 9, respectively) are superb, and review much of the basic biochemistry. There are also well written and up-to-date chapters on the role of free radicals in sickle cell anemia (Chapter 3), malaria (Chapter 4), trypanosomiasis and leishmaniasis (Chapter 5) and AIDS (Chapter 8). The role of free radicals in AIDS, however, is such a

rapidly changing field that the latter chapter may become outdated relatively quickly.

There are a few chapters that were not quite up to par with the rest of the book. The chapter on antiparasitic drugs (Chapter 7), is a rather perfunctory review of unrelated topics. Only a few pages cover drugs, with less than one page on antimalarial drugs, even though there are probably close to 100 articles in the literature on oxidants and the antimalarial actions of quinones, artemisinin derivatives, 4-aminoquinolines and 8-aminoquinolines. Two of the chapters are interesting but only peripherally related to tropical diseases – Chapter 6 is mostly about free-radical carcinogenesis, and Chapter 7 postulates the importance of free-radical damage in the gut, but gives little supportive evidence.

Nevertheless, the strengths of this book greatly outweigh any shortcomings. It should serve as an excellent primer for both students and established parasitologists.

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* The terminology can be confusing; terms such as 'reactive oxygen', 'activated oxygen' and 'toxin oxygen' are often used, but are becoming less and less common as nitrogen- and carbon-centered free radicals gain increased attention.