

Preface

*The important thing in science
is not so much to obtain new facts
as to discover new ways
of thinking about them.*

—Sir William Henry Bragg,
1915 Nobel prize in Physics

In *The Wonderful Wizard of Oz*, Dorothy Gale heads for the Emerald City by following the yellow brick road, in order to get back home. It is no secret that eventually she will return to Kansas only thanks to the silver shoes she has worn since the beginning of her journey. As a child, I enjoyed reading Dorothy's adventures, and dreamed of getting to know the Scarecrow and the Cowardly Lion (though I have never been a big fan of the Tinman, no offense intended). As an adult, I am now aware that from moral imperatives to philosophical reflections to political plots, L. Frank Baum offers a magic box of profound discoveries, buried in a playground of childhood whimsy. Indeed, the hallmark of superb writing lies in the ability to compress multiple layers of meaning into a single narrative.

On a certain level, science is not much different, as it resembles a complex yet exciting book that is just waiting to be unrolled by those avid readers commonly known as "researchers." Biology makes no exception, and such a perspective fits well with the experimental evidence discussed in the present work. Addressing either students or specialists, the authors will introduce them to an innovative research field, which is ironically based on the consolidated knowledge of an almost 100-year-old molecule.

Now, let's take a step back. Despite the considerable early successes achieved by the global eradication program launched a few years ago (2007) by charity foundations such as the Bill & Melinda Gates Foundation and Rolling Back Malaria, also endorsed by World Health Organization, malaria remains an alarming emergency in

developing countries. Therefore, any parasite or host molecules serving as new affordable markers for early diagnosis of disease complications or as new targets for vector control need to be urgently identified. Intriguingly, old well-known enzymes such as lysozymes have been proposed in recent years as very relevant molecules to be targeted either in mosquito or in human hosts, possibly paving the way for the future development of innovative and cost-effective tools to fight malaria.

Lysozymes are antibacterial proteins widely present in the animal kingdom and defined by their ability to hydrolyze β -1,4-glycosidic linkage between *N*-acetylmuramic acid and *N*-acetylglucosamine of peptidoglycan in the cell wall of bacteria. Recently, a few independent research groups have reported some interesting evidence on the involvement of both human and mosquito lysozymes in malaria. Hemozoin, a lipid-bound ferriprotoporphyrin IX crystal produced by *Plasmodium* parasites after hemoglobin catabolism, was shown to promote in vitro the early release of human lysozyme from adherent monocytes. Consistently, the plasma levels of human lysozyme and the number of hemozoin-containing leukocytes in the peripheral blood of *P. falciparum*-infected patients correlated well with parasitemia degree and disease severity. On the other hand, the mosquito homologue of human lysozyme was shown to facilitate the development of *Plasmodium berghei* and *falciparum* within *Anopheles gambiae*, *stephensi*, and *dirus* vectors after binding to oocysts. All these data will be thoroughly discussed in this book in an attempt to show the readers the potential role of these molecules in malaria diagnosis and vector control approaches.

My editing of *Human and Mosquito Lysozymes: Old Molecules for New Approaches Against Malaria* has been rather time consuming, yet very rewarding in providing me with a privileged look at the status of cutting edge research in this field. I would like to thank all of the authors (Nicoletta Basilico, Sarah D'Alessandro, Luca Facchinelli, Giuliana Giribaldi, Clelia Oliva, Manuela Polimeni, Roberta Spaccapelo, and Vivian Tullio) for their hard work in preparing excellent discussions on their respective topics. Additionally, I am very grateful to Springer's staff members (Rita Beck, Susan Safren, and Arthur Smilios) for inviting me on board and helping me during such an exciting journey. And, of course, thanks to you, who are reading this book. Will lysozymes reveal themselves as the "silver standard" to leave the Land of Malaria? Let's knock our heels together three times and command the shoes to...

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Human and Mosquito Lysozymes

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