FOREWORD

Chickens are not mice with feathers

Jim Kaufman

Immunology is not just restricted to investigations on the immune systems of mice and humans. Historically, studies on other species have contributed greatly to the development of immunological understanding. Amongst these other species, birds have provided an invaluable model for investigating basic immunological mechanisms. Birds have also played a crucial role in the development of vaccinology, and they still do to this day. The first attenuated vaccine discovered by Pasteur was directed against fowl cholera, a poultry disease. Likewise the first widely used vaccine against a naturally occurring cancer, Marek's disease, was developed for the poultry industry. The current threat from avian influenza reminds us of the necessity for gaining a thorough understanding of the avian immune system in order to develop novel and effective strategies for control.

Birds have many immunological mechanisms in common with mammals but have evolved a number of quite distinct strategies; they achieve the same goal through use of different mechanisms. Some of their different physiological characteristics such as their lung ventilation system, significantly different from the mammalian one, may partly explain the pressures for the evolution of different mechanisms.

One key feature of research on the avian immune system has been the seminal contributions it made on the key role of lymphocytes in adaptive immunity, graft-versus-host responses, delineation of the two major lymphocyte lineages – B cells and T cells – and gene conversion for developing the immunoglobulin repertoire. In addition the chicken major histocompatibility complex (MHC) – the first non-mammalian MHC to be sequenced – is compact, considerably smaller than its mammalian counterpart, and strongly associated with resistance to certain infectious diseases. No doubt the availability of the entire chicken genome sequence will help provide us with a more precise picture and a better understanding of the avian immune system.

Birds have been described as living dinosaurs, as exemplified by the discovery of dinobirds, mainly in China. This discovery provides a major incentive to carefully study the avian immune system and gain a better understanding of the rules of evolution. At the same time, we should bear in mind that infections provide an important selection pressure and immunocompetence is a valuable trait for the survival of a species. I firmly believe that a full understanding of the immune system will be acquired only through comparative analysis of its structure, function and physiology in a multitude of different species.

Apart from all these fundamental aspects of avian immunology, practical aspects should not be neglected. As consumption of meat is expected to increase considerably during this century (Delgado's livestock revolution) it must be expected that poultry will have a key contribution. Reproductive traits, a short productive lifespan, production of eggs, absence of dietary restrictions and worldwide distribution, all favour the use of poultry as a major source of animal protein. These same characteristics are also valuable for the avian research model. Well-defined inbred strains of chickens are already available. These can produce large numbers of progeny that are relatively easy to house and handle in laboratory research. From this point of view, chickens can be considered 'mice with feathers'.

This book on avian immunology is timely; it should play a key role by gathering together available information on the avian immune system and synthesizing new ideas to prepare for the future. I warmly congratulate the initiators on their achievement. They have persuaded some of the foremost world experts in avian immunology to review their respective subject areas, condense their thoughts and share with the reader new ideas about the immune system. There has never been a more exciting time to read about and study avian immunology.

Paul-Pierre Pastoret
Fontin, Belgium
January 2007