BOOK REVIEW

The Avian Immune Response to Infectious Diseases  D.A. Higgins & G.W. Warr (Eds.), 2000 Developmental and Comparative Immunology, 24

The poultry industry places heavy reliance on vaccination for preventing outbreaks of infectious diseases and, in the past 50 years, has had some notable successes where the introduction of vaccines has efficiently controlled, although not necessarily completely eliminated, a disease problem and led to improvements in poultry health, welfare and production. Unfortunately, pathogens continually evolve new strategies to break through the protection of existing vaccines and cause outbreaks of disease. And, in recent years, there have been some worrying examples where the intensive use of vaccines has led to the emergence of increasingly virulent field strains. This is especially a problem with some lymphotropic viruses, e.g. Marek’s disease virus and infectious bursal disease virus that cause immunosuppression and where a switch to the use of more aggressive vaccine strains is a counter-productive long-term strategy. The next generation of poultry vaccines, based on recombinant and DNA technology, provides us with an opportunity to develop novel vaccines on a rational, rather than empirical basis. We should be able to design vaccines that stimulate more effective immune responses without the harmful side effects and reduce the risk of evolution to greater virulence. This is a tall order and it can only achieved by obtaining detailed knowledge of the way pathogens behave during the course of infection, their antigenic determinants, and a fundamental understanding of those immunological processes that protect the host. This was clearly in the mind of the editors of The Avian Immune Response to Infectious Diseases, a special edition of Development and Comparative Immunology. This supplement has brought together a number experts from around the world who have contributed 18 review papers on immune responses to a variety of different poultry pathogens. Obviously, most of the papers deal with chickens and chicken diseases, since this species dominates both the poultry industry, as well the world of avian immunology. However, there are three contributions on diseases of ducks and wildfowl, and one paper on haemorrhagic enteritis disease in turkeys.

The editors have not just restricted the contributors to describing the acquired immune responses to poultry diseases. The supplement starts with three contributions on non-specific, or innate, immune responses. The first is a useful and informative review on mannan-binding lectin, a member of the family of molecules that act as opsonins and complement activators in the early stages after infection and before the generation of acquired immune responses. This is followed by a broad review of the avian macrophage, the factors that regulate its activities and its role in health and disease. A detailed review of cellular defences in the avian respiratory system follows. This provides both practical information on the harvesting of avian respiratory phagocytic cells as well as detailed descriptions of their activities in the face of challenge by bacterial and viral pathogens. The respiratory tract is an important interface between the bird and the environment, and the portal of entry for many important pathogens. However, we know little about its defences, and there are important differences between the avian lung and its mammalian counterpart. In the discussion to this paper, the authors tackle the question of why the avian lung has so few resident phagocytic cells and offer a very plausible explanation.

The papers on responses to avian diseases begin with a contribution on the use of immunocytochemistry to investigate bird–pathogen interactions. Immunocytochemical techniques used with mammalian tissues cannot always be directly applied to avian tissues, and this paper provides some useful advice on methods to successfully stain avian tissues using monoclonal antibodies. This is followed by 11 papers that review immune responses to a variety of different pathogens. There seems no particular logic to the order in which the papers are presented. Most, but not all, of the major poultry diseases are covered: Marek’s disease, infectious bronchitis, infectious bursal disease, chicken anaemia, avian influenza, Newcastle disease, and coccidiosis as well as Riemerella (formerly Yersinia) and hepatitis B in ducks, Mycobacterium in wildfowl and haemorrhagic enteritis in turkeys. The quality of the papers varies, and this very much depends on the size and quality of the body of information available to the reviewer. What seems amazing is how little is known about immune responses to some of the most important poultry pathogens. Worldwide, Newcastle disease is the most economically important disease of poultry and yet the host responses to vaccination and the infection with Newcastle disease virus are covered in two short sections. By contrast, with some diseases there is
plentiful information for the reviewer to get his/her teeth into – Marek’s disease, infectious bronchitis, infectious bursal disease, chicken anaemia virus and coccidiosis. Here, the reviewers have taken the opportunity to develop more detailed models, usually based on work carried out in his/her own laboratory, and they have been able to describe key pathways involved in immunological protection. These are very useful, for it helps the uninitiated reader to get a grasp of some of the complexities involved and helps the specialist, who may not agree with every facet, to criticize the model and consider alternative hypotheses.

The final group of papers considers new approaches to vaccination, with contributions on novel immunization strategies to induce intestinal immunity and the use and delivery of avian cytokines as natural adjuvants for novel vaccines. These last papers are somewhat speculative in nature but direct the reader to think about the new approaches that may be taken in future to improve the effectiveness of vaccines. However, this reader was left thinking that there is much more work that needs to be done and we must learn a great deal more about immunoregulation before we can make proper ‘designer vaccines’ and apply them to poultry production.

The Avian Immune Response to Infectious Diseases, edited by David Higgins and Greg Warr, is both timely and welcome, for it is some years since a compendium of reviews on immune responses to avian diseases has been published. This volume should be a very useful addition to the bookshelves of most avian immunologists and those with an interest in avian infectious diseases and vaccines

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