Avian and Exotic Animal Hematology and Cytology

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Avian and Exotic Animal Hematology and Cytology (Third Edition). By Terry W. Campbell, and Christine K Ellis. Blackwell Publishing, 2121 State Avenue, Ames, Iowa 50014, USA. 2007. 287 pp. ISBN 978-0-8138-1811-5. US $149.99 (hardback).

Review by A. Rick Alleman

This book is a comprehensive guide and manual that is an essential component for the library of any in-house or reference laboratory that evaluates specimens of avian and exotic animal species. In addition, this book is a valuable asset to clinicians in the field because it provides detailed illustrations and descriptions on collection and preparation of tissue and body- fluid samples from birds, reptiles, and small mammals. The writing is clear and consistently organized throughout, with a comprehensive index that provides easy and rapid access to pertinent information.

The book is composed of seven chapters. The first five chapters (138 pages) are dedicated to the hematology of birds, reptiles, amphibians, fish, and exotic / laboratory small mammals. The last two chapters (pages 139 to 238) describe the collection, preparation, and cytological evaluation of various tissue specimens and body fluids from avian and exotic animal species. The book also contains two appendices, the first of which describes the preparation of materials and the staining procedures for several common stains and solutions used in hematology and cytology. This appendix also provides a brief explanation of the interpretation of results used with each stain. The second appendix consists of a series of tables providing hematologic reference intervals for selected avian, reptile, amphibian, and small mammal exotic species. Each table is a compilation of data from previously published reference intervals. These are extremely valuable tools, particularly for practicing clinicians. Most exotic animal clinicians work with a number of species, and finding reliable reference intervals is challenging, which makes having these in a single source of reference invaluable.

The first five chapters on hematology are organized in a similar manner. Each begins with a brief introduction to the hematology of the species (avian, reptile, etc.) followed by sections describing and illustrating the various methods of restraint, blood collection, and sample preparation. The authors' experience in both collection and evaluation of samples is evident in the details that they provide in each chapter. The authors not only describe the various methods of sample collection, but also provide information regarding indications for using each of the various methods. Photographs of excellent quality illustrate proper restraint and sample collection. Descriptions of the procedures are fully detailed in all hematology chapters, but are particularly noteworthy in the chapters covering avian and reptile species.

The sections on sample collection in these first five chapters are followed by a discussion of various anticoagulants. The authors point out species differences with regard to proper anticoagulant, spelling out why some anticoagulants are not suitable for certain exotic animal species. The chapter on avian hematology (Chapter 1) also details, by text and images, the proper methods for blood-film preparation.

The sections on restraint and sample collection are complemented by material describing laboratory methods of sample evaluation such as quantitative analysis of blood cells and qualitative analysis of blood cell morphology. This topic is particularly well detailed in the avian chapter, but is adequately covered in other chapters as well. This information is appropriate, since many of the principles described in the avian section may be applied across animal classes, particularly nonmammalian species with nucleated erythrocytes.

Each chapter (1–5) concludes with a detailed description and photomicrograph illustrations of the normal and abnormal erythrocyte, leukocyte, and thrombocyte morphology, followed by a section describing various hemoparasites seen in each species. The text in these sections is extensive, particularly for the avian and reptile species, and the authors not only describe normal and abnormal findings but also provide valuable information on the clinical significance of various abnormalities, as they relate to specific diseases in each species. The photomicrograph illustrations of the various blood cells and blood cell abnormalities are comprehensive. The quality of these illustrations is good and sometimes excellent, but always of adequate clarity (focus) and size to allow easy evaluation of normal and abnormal cell morphology and hemoparasite identification. Some of the images have a yellow tint that may slightly alter the true color, but this does not interfere with the overall accuracy and usefulness of the image.

The chapters describing amphibian, fish, and exotic small mammal hematology are not as extensive as the chapters on avian and reptile hematology, which is understandable

considering the lack of abundant published information regarding the hematology of these species. Still, the chapters provide detailed information (in the same order described above) that is relatively comprehensive. Photomicrographs are of high quality and illustrate normal compared to abnormal findings, while the text provides information regarding the interpretation of various abnormal findings with regard to specific disease states. The chapter on fish hematology is particularly noteworthy and may be the most comprehensive source for this information available in the literature published to date.

The remaining chapters (6 and 7) detail the use of cytology in the diagnosis of disease processes in nondomestics, exotics, small mammals, avians, and reptiles (Chapter 6) and microscopic evaluation of wet-mount preparations used in the evaluation of amphibian and fish species (Chapter 7).

Chapter 6, covering diagnostic cytology, provides excellent descriptions of sampling techniques and slide preparation of samples taken from tissue masses–organs, body cavity effusions, and wash preparations from the respiratory and gastrointestinal tract. There are also sections that discuss ocular cytology, synovial fluid analysis, and analysis of lymphoid organs, liver, and kidney. Sampling techniques are described in detail with color illustrations that are instructive in the performance of the procedures. The quality of the color photographs is good to excellent, while ample text describes the cytologic appearance of various types of pathologic changes in tissues and fluid preparations. The authors also provide information regarding the interpretation of these changes with regard to specific clinical diseases where abnormalities may be observed. This allows users to systematically review a cytologic preparation and arrive at a meaningful interpretation that is accurate as well as useful. Many commonly encountered abnormalities (inflammatory and neoplastic lesions) are pictured in good-quality photomicrographs. Some cytology images of excellent quality are also included. These photomicrographs are clear and focused, adequately illustrating the lesions. In a few examples, however, the images are of low magnification, and the magnification indicated on the figure legend does not appear to match the size of the magnification seen in the image. Color quality is good in most images.

The final chapter (Chapter 7) in the book is dedicated to the collection and interpretation of wet-mount preparations from amphibian and fish species. The sampling techniques are described in such a way that even the novice can perform these procedures successfully, while the illustrated color photographs are more than adequate. Most of the text is dedicated to the interpretation and identification of several ectoparasites, and fungal and bacterial infections in fish. The photomicrographs are of excellent quality and provide sufficient detail to identify several pathogenic organisms that are often encountered in these species.

In summary, this book provides excellent detail and illustrations on the multitude of sampling techniques used in a wide variety of avian, exotic small mammal, reptile, amphibian, and fish species. The scope of the material is wide—a truly impressive undertaking by the authors. *Avian and Exotic Animal Hematology and Cytology* should be an essential addition to the library of all investigators who rely on microscopic analysis in the diagnosis of diseases that occur in avian and other exotic species.

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