

COMPARATIVE ANATOMY
OF THE MOUSE AND THE RAT
A COLOR ATLAS AND TEXT

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ILLUSTRATIONS AND TEXT

GHEORGHE M CONSTANTINESCU, DVM, PHD, MULT. DRHC

SCIENTIFIC EDITOR AND CONTRIBUTOR

NICOLE DUFFEE, DVM, PHD

CONTRIBUTOR

CYNTHIA BESCH-WILLIFORD, DVM, PHD, DACLAM

REVIEWERS

LYNDA LANNING, DVM, DABT

TRACY GLUCKMAN, MS, DVM, DACLAM

MARK HOENERHOFF, DVM, PHD, DACVP

JULIE WATSON, MA, VETMB, DACLAM

GRAPHIC DESIGN AND LAYOUT

AMY B TIPPETT, BFA

EDITORIAL ASSISTANCE

NICOLE BROWN, MA

MELISSA BAGAGLIO, BS

PAMELA GRABEEL, MA

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The author is open for any suggestions, comments, or criticism, and kindly asks readers to send them to the AALAS office in care of Dr. Nicole Duffee.



Gheorghe M. Constantinescu
Professor of Veterinary Anatomy and Medical Illustrator
Professional Member of the Association of Medical Illustrators
College of Veterinary Medicine
University of Missouri-Columbia

Preface

Comparative Anatomy of the Mouse and Rat: a Color Atlas and Text was developed to provide detailed comparative anatomical information for those who work with mice and rats in animal research, mainly researchers and laboratory veterinary professionals. These individuals require information on the anatomical features and landmarks for conducting a physical examination, collecting biological samples, making injections of therapeutic and experimental materials, using imaging modalities, and performing surgeries. This atlas compares in these species the structures of the skeleton; the skull and teeth; the pharynx; the digestive, respiratory, and genitourinary organs; the heart and major blood vessels; the brain; the tail; and the major vessels and nerves of the pelvic limb. The nomenclature for regions of the body and the topography of thoracic and abdominal structures is shown in lateral and ventral views.

An important aspect of this atlas is the use of the veterinary anatomical nomenclature from the *Nomina Anatomica Veterinaria* (NAV), 5th edition, 2005.⁷ Anatomical terms are referenced in the Index, in which the page numbers refer to the labeled figures only, not the text corresponding to the figures.

In each set of illustrations, the same view is depicted in the mouse and the rat. Text is provided with all illustrations to draw attention to the anatomical features which are important for supporting the care and use of these animals in research. This work departs from a classical atlas illustrating all body systems and structures because its purpose is to provide the reader with essential information for research and clinical purposes and to describe structures that are not shown in any other anatomy atlas. For example, the muscles of the pelvic limb are deemphasized in transparency to depict the vessels and nerves used for common procedures such as injections and blood collection.

In the development of the figures, considerable emphasis was given to revealing the structures of the urogenital apparatus, particularly in the male. In both species, a median section of the penis, stained with hematoxylin and eosin, was prepared to show the corpus spongiosum glandis and the os penis (penis bone) in detail. This atlas includes a dorsal view of the internal genitalia, which is an unusual view in anatomical publications but quite valuable for developing an understanding of the glandular structures associated with the urethra, such as the coagulating gland, the vesicular gland, and the prostate gland. In the mouse, the urethra is incised to show the urethral fold over the fibro-cartilaginous plate in the urethral floor. A latex cast was prepared of the mouse pelvic urethra and the initial part of the penile urethra to highlight the urethral recess, the bulbourethral diverticulum, and the spatial relationship of the urethra with associated glands and ducts in the lateral and dorsal aspects of the urethral epithelium. In the rat, the proximal urethra and related structures are shown in a sagittal section to best illustrate the presence of a urethral recess, the opening of the bulbourethral gland, and the absence of a bulbourethral diverticulum. These differences add a new dimension to the knowledge of the comparative anatomy of these two species.

Multiple specimens were dissected to generalize the normal anatomical findings in each species. For example, abdominal organs can vary greatly in their location due to the animals' state of feeding and fasting. Therefore, body landmarks approximate, at best, organ positions in the abdomen. The illustrations provide a typical position for the organs, as determined over the multiple specimens used to prepare each figure.

In each set of illustrations, mice and rats are presented in the same size, so that comparative details in anatomy can be best appreciated. Anatomical information is generalized to the species, without regard to animal strain or stock. Albino animals were most commonly dissected: CD-1 or Swiss Webster mice and CD/SD or Wistar rats. Pigmented animals were used for some figures: C57BL/6 mice, agouti mice of a mixed background (F2 generation from B6C3F1 or B6D2F1 cross), and rats of a mixed background (cross of Sprague Dawley with either Long Evans or ACI).