

# SPURGEON'S COLOR ATLAS OF

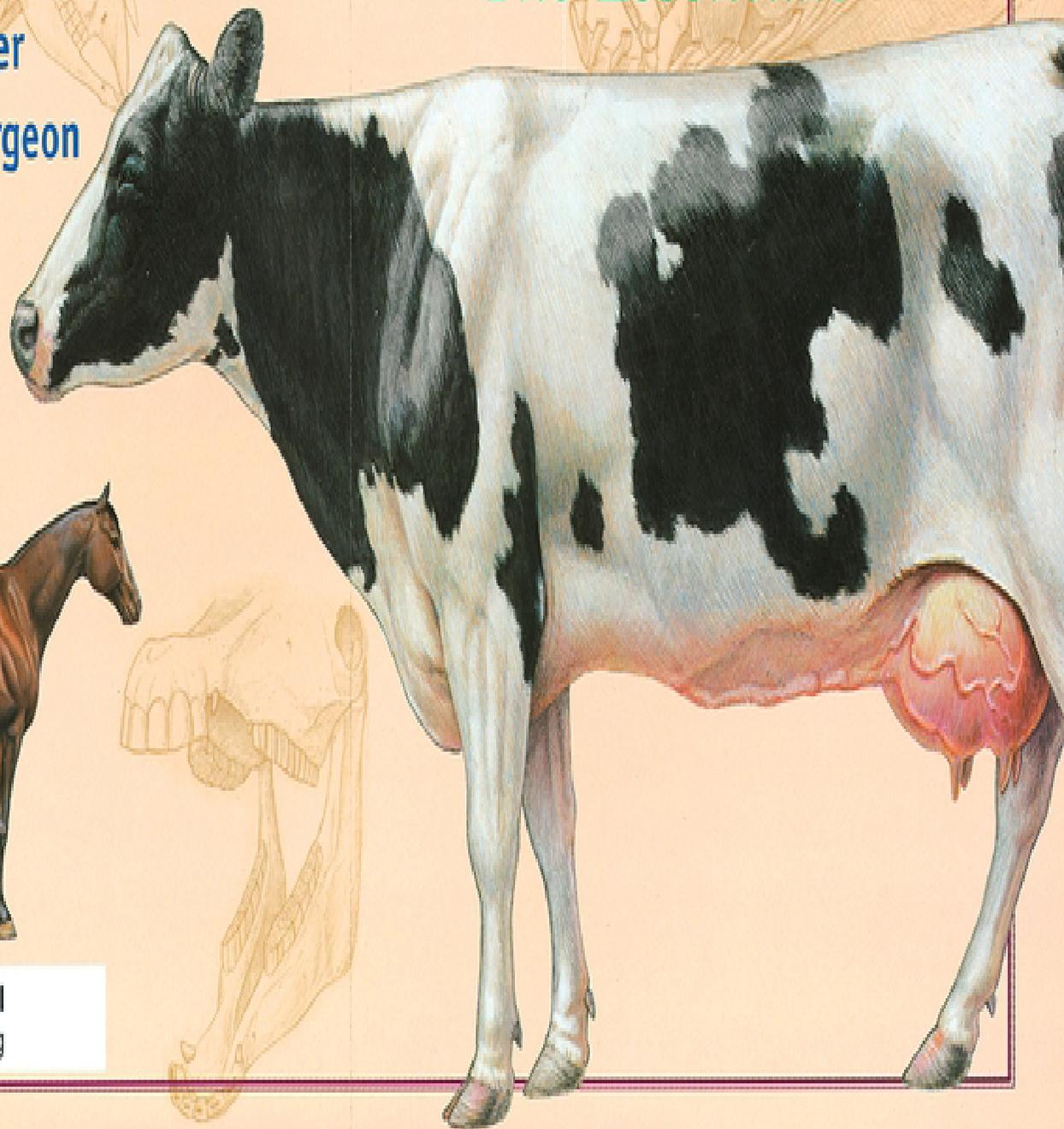
## Large Animal Anatomy

### *The Essentials*

Thomas O. McCracken

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# Spurgeon's Color Atlas of Large Animal Anatomy: *The Essentials*

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2121 State Avenue, Ames, Iowa 50014, USA

Orders: 1-800-862-6657

Office: 1-515-292-0140

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Web site: [www.blackwellprofessional.com](http://www.blackwellprofessional.com)

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First edition

Library of Congress Cataloging-in-Publication Data

McCracken, Thomas O.

Spurgeon's color atlas of large animal anatomy : the essentials /

Thomas O. McCracken, Robert A. Kainer, Thomas L. Spurgeon

p. cm.

ISBN 978-0-6833-0673-6

1. Veterinary anatomy Atlases. I. Kainer, Robert A. II. Title.  
SF7613M35 1999  
636.089'1—dc21

99-20525  
CIP



*Thomas Spurgeon*

*TO OUR COLLEAGUE AND FRIEND*

*Dr. Thomas L. Spurgeon, exceptionally well-trained anatomist, superb teacher, and educational innovator, devoted his professional life to the advancement of anatomic education through scientific investigation and the dissemination of anatomic knowledge.*

*Following service to his country in the United States Air Force, Thomas L. Spurgeon entered college. Upon completion of his doctorate in anatomy in the School of Veterinary Medicine at the University of California-Davis, Dr. Spurgeon accepted a faculty position in the College of Veterinary Medicine at Washington State University. His record as an excellent anatomist at that institution led to a position in the College of Veterinary Medicine and Biomedical Sciences at Colorado State University.*

*His broad knowledge of both human and veterinary anatomy was utilized fully at Colorado State. Students requiring courses in basic human anatomy as well as those majoring in veterinary medicine and various animal sciences profited from the instruction provided by this well-rounded anatomist who possessed outstanding pedagogic skill. His expertise was equally appreciated by the graduate students he mentored, particularly those in the biomedical illustration program.*

*Dr. Spurgeon, a pioneer in the computer-assisted instruction of anatomy, was continually seeking new methods of presentation. He and his colleague and close friend, Thomas O. McCracken, conceived the unique anatomic presentation used in this atlas.*

*Tragically, Dr. Spurgeon's untimely death in an automobile accident in 1997 brought a halt to his brilliant career. Dr. Spurgeon's devoted sons, Aaron and Kyle, are indeed proud of their father's accomplishments. Countless students mourn the passing of a man who, as teacher and friend, contributed so much to their lives.*

# ACKNOWLEDGMENTS

Many talented individuals contributed to the production of *Spurgeon's Color Atlas of Large Animal Anatomy: The Essentials*. Foremost among them were the artists, Conery Calhoun, Molly Babich, Gale Mueller, and Sandra Mullins, who colored Thomas McCracken's original drawings of anatomic specimens. They employed manual and digital techniques to reproduce the subtle colors of tissues and organs.

Consultants, who authored plates drawn by Thomas McCracken, selected clinical conditions and husbandry applications based on their anatomic significance. The consultants were Dr. Gayle Trotter for the horse; Dr. Frank Garry for the ox; Dr. Joan Bowen for the sheep and goat; Dr. LaRue Johnson for the llama and alpaca and the swine; and Dr. John Avens for the chicken. These specialists reviewed the plates on the various species, enhancing the accuracy of the presentations. Their contributions are gratefully acknowledged.

Carroll Cann, Executive Editor of Teton-New Media, was an enthusiastic supporter of the concept of the atlas. We thank him for his suggestions and encouragement.

Special thanks are due the late Dr. Patricia Brooks who supported her husband, Dr. Spurgeon, and frequently assisted him in his work. She, too, was a contributor to this atlas.

We greatly appreciated the reliable assistance of Dennis Madden, pathology technician in the College of Veterinary Medicine and Biomedical Sciences at Colorado State University. His procurement of specimens and his dissection skills were essential to the production of this atlas.

We thank Mark Goldstein for a student's viewpoint. His assistance with compilation of the index and his review and comments on the plates were most helpful.

We are grateful to Dr. Michael Smith from the School of Veterinary Medicine at Ross University for his careful review of the final proofs. His knowledge of anatomy, his fine teaching skills, and his critical eye well qualified him for this arduous task.

Acknowledgment is due the Department of Anatomy and Neurobiology and the Department of Clinical Sciences at Colorado State University for the use of their facilities and for providing living animals, skeletons, embalmed specimens, and necropsy specimens. Dr. Robert Lee prepared and was most helpful in providing anatomic specimens. We acknowledge the kindness of exhibitors at the National Western Stock Show and Midnight Valley Friesens for permission to photograph their animals.

We thank Alpine Publications, Inc. of Loveland, Colorado, for permission to use drawings from our book, *Horse Anatomy, A Coloring Atlas*. Permission from Pfizer Animal Health Group to use drawings of the chicken's anatomy from *Anatomical Atlas* is also appreciated.

# INTRODUCTION

*Spurgeon's Color Atlas of Large Animal Anatomy: The Essentials* is not a complete, detailed anatomic atlas. Instead, it presents topographic relationships of the major organs of the horse, ox, sheep, goat, llama, alpaca (a smaller species with long, lustrous hair), swine, and chicken in a simple yet technically accurate format. As an important food animal, the chicken is included with the large domestic animals in this atlas. Throughout the *Atlas*, most male and female of a given species are on facing pages. The majority of the plates contain information on the entire body. Some plates are confined to a region; a few contain organs isolated from the rest of the body. Whereas most systems (e.g., digestive and reproductive) are presented for each animal, other systems are included only for some species to illustrate general anatomic patterns. Structures common to the various animals are labeled several times; other structures are labeled on only one or two species, usually emphasizing specific anatomy (the anatomy peculiar to a certain species). Animal specialists authored plates illustrating selected clinical or husbandry applications that reflect the anatomy of the organs involved.

The *Atlas* is intended for use by individuals at different stages of their education, serving as a survey of the specific anatomy of the different animals. Advanced 4-H club members, high school vocational agriculture students, and college students studying veterinary medical technology, veterinary medicine, animal science, and wildlife biology can use this *Atlas* as an introduction to the anatomy of common farm animals. The *Atlas* can also serve as a reference for horse breeders and trainers, as well as livestock and poultry producers. It will provide a quick review for persons with previous training in anatomy and

will be an invaluable aid for the professional—e.g., a veterinarian or animal scientist—in explaining to a client some aspect of anatomy that pertains to an animal's condition and needs.

The following introductory pages provide the reader with a background in nomenclature and anatomic orientation.

# NOMENCLATURE AND ANATOMIC ORIENTATION

## ANIMAL CLASSIFICATION

The horse (*Equus caballus*) is classified as an odd-toed ungulate (hoofed mammal) in the order Perissodactyla, suborder Hippomorpha, and family Equidae. Members of this family are termed equids. “Equine” is an adjective. Equine characteristics include the grouping of limb muscles close to the trunk with tendons extending over long third metacarpal and metatarsal bones to the digits, providing leverage for sustained, rapid locomotion. Because this leverage arrangement does not develop great force, the heavy draft horse must rely on body weight to perform pulling tasks. Another equine characteristic is the horse’s extensive large intestine, the site of final microbial digestion and absorption of nutrients.

Cloven-hoofed ungulates that walk on their third and fourth digits are in the order Artiodactyla. Domestic ungulates in the suborder Ruminantia include those in the family Bovidae, subfamily Bovinae—the ox (*Bos taurus*) and zebu (*Bos indicus*)—and subfamily caprinae, the sheep (*Ovis aries*) and goat (*Capra hircus*). The noun “bovids” (after Bovidae) is usually reserved for cattle, bison, yak, and water buffalo; sheep are ovids and goats are caprids, named according to each genus. Adjectives end in -ine: bovine, ovine, and caprine, respectively.

The llama (*Lama glama*) and alpaca (*Lama pacos*) are cud-chewing artiodactyls from South America called camelids, named after the family Camelidae in the suborder Tylopoda. South American camelids are also called lamoids. Both

ruminants and camelids have large, compartmented stomachs essential for the microbial digestion of cellulose. Feed is more finely divided by rumination, a physiologic sequence of regurgitation of stomach contents, remastication (chewing), and redeglutition (swallowing).

Swine (pigs are young; hogs are mature) are artiodactyls in the suborder Suiformes, family Suidae. Domestic swine (*Sus scrofa domesticus*) are descended from the European wild boar with some input from the smaller *Sus indica* from China. The adjective “porcine” is derived from the Latin *porcinus*, from *porcus*, a hog. Reflecting its omnivorous diet, the swine’s digestive tract is somewhat simpler than those of ruminating animals.

The chicken or domestic fowl (*Gallus gallus domesticus*) is classified with other comb-bearing gallinaceous birds in the order Galliformes. Descended from the Red Junglefowl of southeast Asia, the chicken is in the family Phasianidae.

## **GENERAL TERMINOLOGY**

With some exceptions, particularly for most muscles wherein traditional Latin names are used, the terminology in this *Atlas* conforms to English translations of Latin terms in the *Nomina Anatomica Veterinaria (N.A.V.)*, 3rd ed., 1983. There are some departures from N.A.V., however. For example, according to N.A.V., the hoof includes the underlying corium (dermis) with the horny epidermis, whereas in common usage hoof refers only to the horny epidermal structure. In compliance with the intent of N.A.V., nomenclature will be consistent for all species. Common terms and meat-packing terms are used on some plates. Abbreviations for organs in this *Atlas* include: a, artery; b, bone; j, joint; lig., ligament; ln, lymph node; m, muscle; n, nerve; v, vein. Double letters indicate the plural form of these words (e.g., aa, arteries). Positional and directional

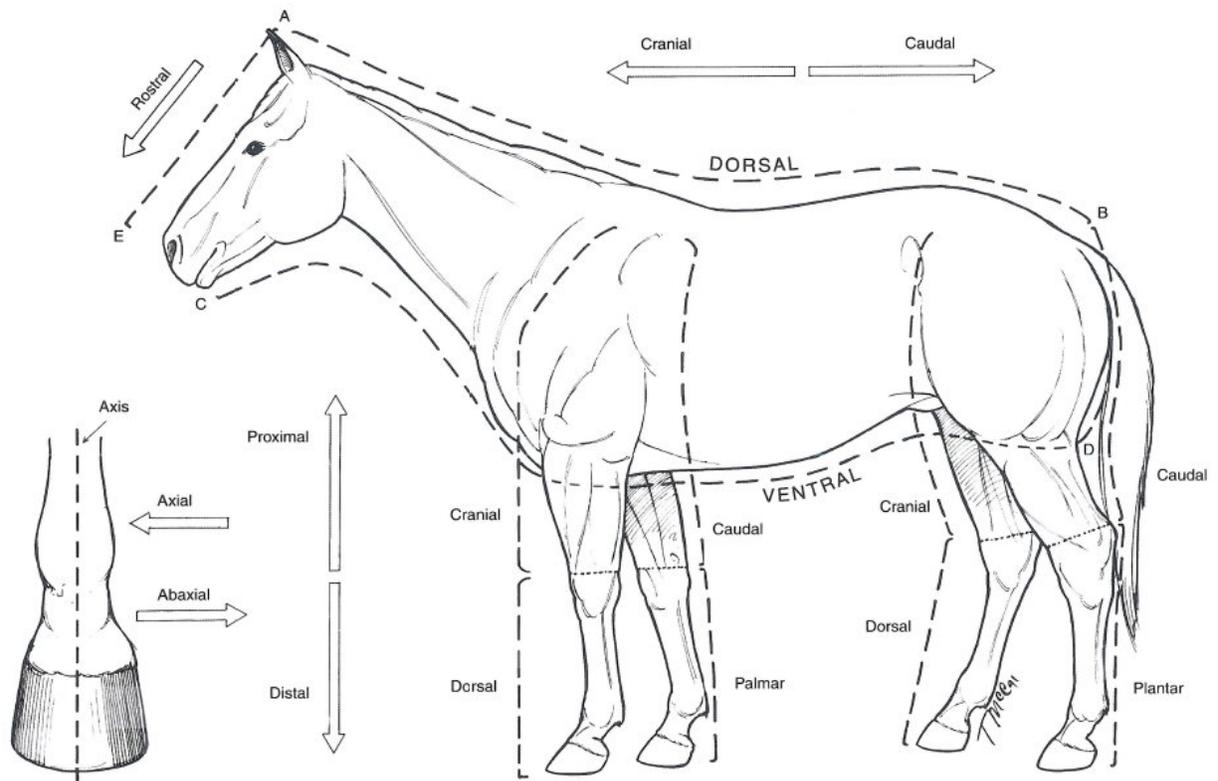
terms, body planes, and the extent of body cavities are used to indicate the location of parts of the body and functional changes in position. The extent of diseased regions is defined using this anatomic terminology.

## POSITIONAL AND DIRECTIONAL TERMS

The following terms are illustrated on the accompanying drawing of a horse. **Dorsal** and **ventral** are opposite terms indicating relative locations toward the back (L., dorsum) or belly (L., venter). Above the knee (carpus) and hock (tarsus) and from the belly to the back, a structure located closer to the cranium (skull case) is **cranial** to another structure, and a structure located toward the tail (L., cauda) is **caudal** to another. On the head, the term **rostral** indicates a structure closer to the nose (L., rostrum).

**Proximal** indicates a location toward the attached end of a limb; **distal** indicates a location toward the free end of a limb, that is, further from the trunk. Distal to and including the carpus, **dorsal** replaces cranial; **palmar** replaces caudal. Distal to and including the hock, dorsal replaces cranial, but **plantar** replaces caudal.

On a frontal view of the distal end of a limb, notice that an **axial** structure is located toward the **axis**. An **abaxial** structure is located away from it.



# BODY PLANES

Drawings of a horse are used to illustrate body planes. The **median plane** (L., medius, middle) divides the animal body into right and left halves. A **sagittal plane** (L., sagitta, arrow) is any plane parallel to the median plane. **Medial** and **lateral** (L., latus, side) are directional terms relative to the median plane. Medial structures are located closer to the median plane. Lateral structures lie away from the median plane, that is, toward the side. A **transverse plane** passes through the head, trunk, or limb perpendicular to the part's long axis. A **dorsal plane** (also called a **frontal plane**) is a longitudinal plane that passes through the body parallel to its dorsal surface at right angles to the median plane.

Figure 1

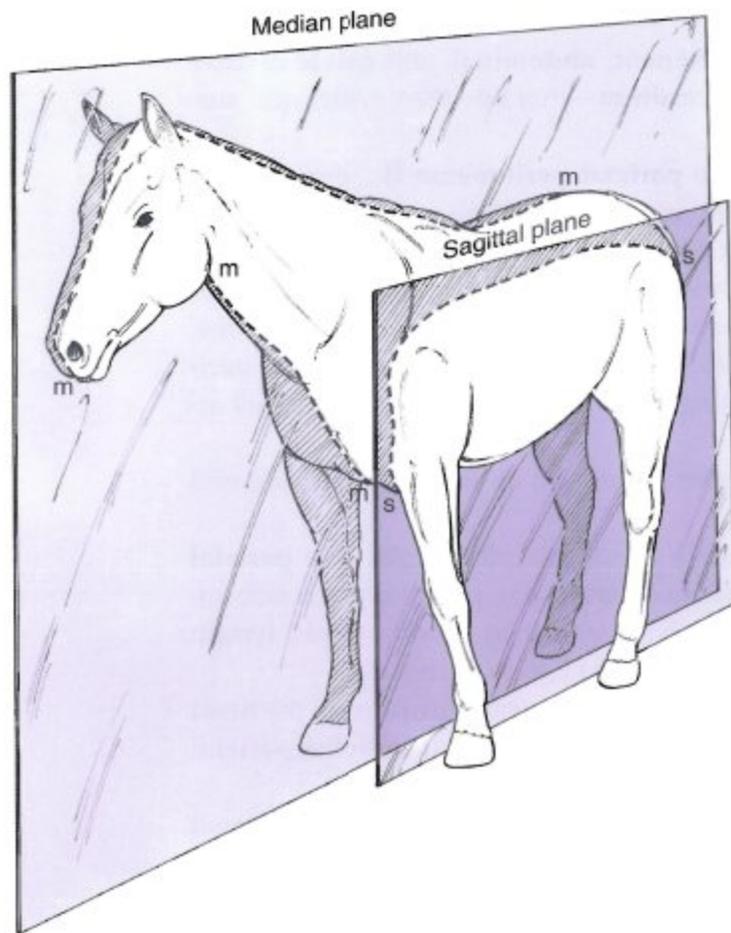


Figure 2