

SMALL ANIMAL CARE & MANAGEMENT

FOURTH EDITION



Dean M. Warren

SMALL ANIMAL CARE & MANAGEMENT FOURTH EDITION



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Dean M. Warren



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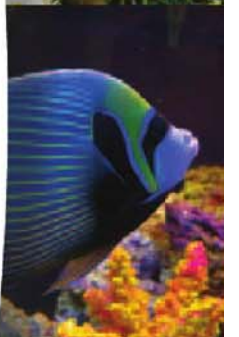
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PREFACE

Small Animal Care and Management, fourth edition, offers a current guide to the care and husbandry of small animals. Designed for small animal and companion animal courses in secondary education and vocational–technical programs, this highly illustrative book combines an overview of the industry with breed-specific information, providing learners with an exciting introduction to this field.

WHY I WROTE THIS TEXT

When I started a class on small animal care several years ago, it soon became apparent that there weren't any textbooks available in the subject area. I purchased numerous books from pet shops and bookstores to use in developing my course and spent many hours creating teaching materials, quizzes, and tests. Because I understood that some educators might be reluctant to start a course in small animal care due of their lack of knowledge and the lack of teaching materials in this subject area, I proceeded to write this text and accompanying instructor resources.

I aimed to write a book that would be flexible enough to be used by general readers, pet enthusiasts, and students with varying abilities at diverse grade levels. If it is used as a text for an animal science class, then the instructor can decide how difficult or easy to make the course. The instructor can also decide what chapters to cover and whether or not to cover all the material in a specific chapter. The reader of the text should realize that not all animals discussed in this text are used exclusively as pets. Some animals are used for food and for fur production. Handling and management practices may vary depending on what the animal is being produced for. This book also encourages the reader to research and explore subject areas to learn more about them. Learning is an ongoing process and should be promoted through the activities and resources presented in the chapters.

The pet and companion animal industry continues to be a rapidly growing segment of our economy. Employees with knowledge and skills to work with small animals are constantly in demand.

It is the sincere hope of this author that this text meets the needs of those who wish to learn about the proper care and management of small animals.

HOW THIS TEXT IS ORGANIZED

This textbook is organized logically and divided into two sections to facilitate learning:

Section I offers an overview of the small animal care and management field, including a brief history of small animals and the small animal industry, a review of important safety and health concerns, caring for small



animals as pets, animal rights and welfare, careers in small animal care and management, and a discussion of the nutritional needs and digestive systems of small animals.

- Chapter 1 is an introduction to small animal care. It begins with a brief discussion of when and how life on earth began, including a geologic time chart that shows the steps in the evolution of life from the beginning to present time. The discussion includes the domestication of animals and explains the scientific classification of animals. The chapter also discusses the small animal industry, including the number of pets, number of households with pets, and the estimated expenditures associated with pets.
- Chapter 2 is a discussion on the risks in handling and caring for pets. Diseases that can be transmitted from animals to humans are covered. Physical restraint of animals is discussed and general safety guidelines for the workplace or school laboratory are listed.
- Chapter 3 discusses small animals as pets, including the considerations in choosing the proper pet, as well as children and their relationships with pets and what they can learn from having a pet. Pets and pet therapy is discussed in addition to the overpopulation of animals and euthanasia.
- Chapter 4 is a discussion of animal rights and animal welfare. The terms are defined, and a history of the animal rights movement and animal welfare legislation is discussed. Current issues dealing with animal rights and welfare are covered.
- Chapter 5 is a discussion of the careers in small animal care. The chapter explores the jobs and careers that exist in the care and management of small animals. Topics include education and training needed, exploration of the careers, advancement and outlook, earnings, and work environment. Contact information for students seeking additional information of particular careers is also provided.
- Chapter 6 defines the terms nutrition and nutrient and discusses the six basic nutrient groups. The digestive systems of small animals are discussed.

Section II dives into the species-specific information, covering dogs, cats, reptiles, amphibians, birds, fish, and exotic species. Comprehensively crafted, each species-specific chapter discusses the characteristics, anatomy, handling techniques, housing, feeding and exercise, grooming, common medical concerns, and other care considerations related to the specific small animal.

ABOUT THE AUTHOR

Dean M. Warren taught vocational agriculture at Columbia City High School in Columbia City, Indiana, for 30 years. He received numerous awards during his three-decade teaching career, including the IVATA Outstanding Young Member award for 1994–95, the 1987 Indiana State Agriscience Teacher of the Year award, and the 1991 Outstanding Indiana Vocational Agriculture Teacher of the Year award. Warren is a member of the Indiana Retired Teachers Association and a life member of the National Association of Agriculture Educators, the Indiana IVATA/IAAE, the Indiana Association for Career and Technical Education, and the Purdue University Alumni Association. He has received the Honorary State FFA Degree and the Honorary American FFA Degree. He holds a bachelor's of science in agriculture degree and a master of science in education degree from Purdue University.





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I wish to thank the many persons who have helped in putting this text together, both in this newly published fourth edition, and in all prior editions.

Both the publisher and I are indebted to Melanie Berndtson, Wellsboro Area High School, who, for the fourth edition, co-authored Chapter 5, entitled “Careers in Small Animal Care,” and conducted a thorough review of all chapters. We also gratefully acknowledge her vision and work on the accompanying workbook. Thank you for offering your valuable insight and expertise.

In addition, I especially want to thank Mary Martha Scott, former English teacher and librarian at Columbia City High School, Columbia City, Indiana, for her assistance in checking the manuscript for grammatical errors and for assisting in locating reference materials.

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Dr. Jack L. Albright of Purdue University and William McVay, retired agriculture teacher at Whitko High School, South Whitley, Indiana, provided materials and input on animal rights and animal welfare. Cindy Raker, agriculture educator at Carroll High School, Fort Wayne, Indiana, provided me with her class outline and materials on dogs and cats. It was her material that I used in my early classes on small animal care.

I wish to thank my former students; the staff of Columbia City High School, Columbia City, Indiana; and the agriculture educators in Indiana for their support and encouragement throughout this project, especially during the first and second editions.

I want to thank Jack Caster, computer coordinator, for his assistance with word processing and other computer problems during the writing of the first and second editions.

A special thanks goes to Cengage Learning for seeing a need for a text on small animal care and giving me an opportunity to provide one. Also to Jennifer Starr and all the staff at Cengage Learning who had a hand in putting this text together, I truly appreciate their assistance and patience throughout this project.

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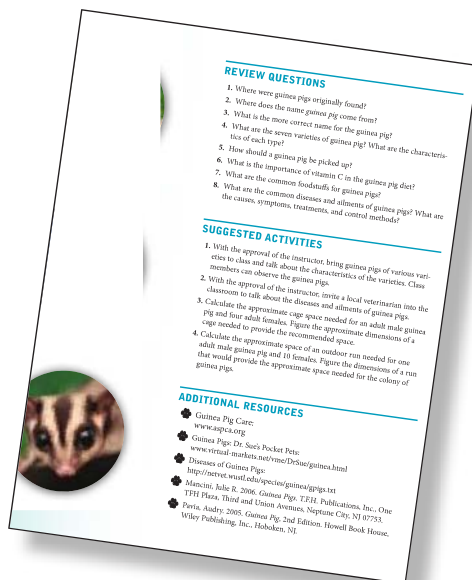
FEATURES OF THIS EDITION

LEARNING FEATURES such as the **Objectives** and **Terms to Know** set the stage for the chapter and help learners identify key concepts and information. In addition, **Classification** identifies scientific information about each small animal, as applicable.

LOGICALLY ORGANIZED, each chapter focusing on a specific small animal is presented in such a manner as to offer consistency and provide a roadmap for the learner. First, a history of the animal is introduced, followed by a description of the various breeds, groups, or families. Then, a look at the anatomy and characteristics completes the background information by discussing the genetic make-up and particular behaviors of that animal. Finally, these chapters focus on the care of the animal: housing and equipment, feeding, handling, medical concerns, and reproduction. Each chapter ends with **Fast Facts**, which provide a summary of statistics for that animal.

HIGHLY ILLUSTRATIVE, this edition continues to feature vibrant full-color photos and illustrations throughout each chapter to help learners identify different types of species within each small animal classification.

ACTIVE LEARNING is also emphasized within the chapters. Each contains a set of **Review Questions**, **Suggested Activities**, and **Additional Resources** to offer opportunities for the learner to review the key concepts and information from the chapter and spark interest in learning further about the subject areas.



NEW TO THIS EDITION

- Reflects current statistics, provided by leading experts and organizations, to validate learning and make certain that learners remain well-versed in the latest information from the industry.
- Thoroughly revised chapter on careers (Chapter 5) promotes success, with professional advice on seeking and obtaining a position, as well as building a career in the industry.
- Species-specific chapters in Section II are reorganized to present like animals in sequence, while a fresh design and new photos and illustrations offer supporting visual instruction to promote learning.
- New information related to each species, reflecting the latest knowledge available on breeds, diseases and ailments, grooming, housing and equipment, and reproduction.
- “Fast Facts” in species-specific chapters summarize important characteristics of each animal and provide a helpful review tool.
- Appendices contain current lists of Colleges of Veterinary Medicine, Veterinary Technology programs, and Recognized Veterinary Specialty Organizations drawn from the American Veterinary Medical Association. Also included are updated statistics for reported cases of Lyme Disease in the United States.

EXTENSIVE TEACHING/LEARNING PACKAGE

Instructor's Guide

The printed Instructor's Guide includes Answers to the Review Questions in the book and the questions and activities in the accompanying workbook, to ensure that the instructor is prepared for classroom instruction and evaluation.

Classmaster CD-Rom

The Classmaster CD-ROM is an integrated tool that contains many useful resources for the instructor:

- Instructor's Guide—an electronic version of the printed Instructor's Guide, including the answers to the book and the workbook questions and activities. In addition, Lesson Plans correlating to the corresponding PowerPoints on the CD are also provided to help instructors prepare for the classroom.
- PowerPoint® presentations—visually robust with photos and illustrations, each presentation maps out the key points contained within

a chapter and correlates to the Lesson Plans that are included in the Instructor's Guide.

- A link to login to the new flexible online testing system powered by Cognero provides instructors with the ability to:
 - author, edit, and manage test bank content from multiple resources
 - create multiple test versions in an instant
 - deliver tests from instructor/institution-specific LMS or classrooms

The link will direct you to CengageBrain.com at <http://login.cengage.com>. Follow the prompts for obtaining access to this secure site.

- Also available on the CD are versions of the same tests that appear online in a Microsoft Word® format. This option is for instructors who prefer to use the questions as provided, while still having the flexibility to edit or print the tests.
- An Image Gallery, containing all the images from the book, enables instructors to enhance classroom presentations or review key concepts and information.

New! Companion Site

Instructor resources on the ClassMaster CD-ROM are also available online, including the new flexible online testing system powered by Cognero. Please visit CengageBrain.com at <http://login.cengage.com> and follow the prompts for obtaining access to this secure site.

Student Workbook

Thoroughly revised for the fourth edition, the student workbook contains a variety of questions, problems, and activities for each chapter to help learners retain and apply key concepts and information presented in the book. Also included are links to online resources that expand upon various subject areas discussed in the chapters.

New! Coursemate

Another new online option for the fourth edition, this course is designed for students and combines the *Small Animal Care and Management 4th Edition* ebook with additional features to enhance learning for the student. It includes the PowerPoint® presentations, additional quizzing, glossary, interactive games and activities, and other helpful resources related to the lessons in the book. Also featured is an Engagement Tracker that allows instructors to monitor time on task for each individual student.

SECTION I











Introduction to Small Animal Care

OBJECTIVES

After reading this chapter, you should be able to:

-  briefly describe the history of animals on the earth.
-  list the important time periods in the evolution of animals.
-  describe the theories of how animals became domesticated.
-  describe the importance of the small-animal industry.
-  describe how organisms are classified.
-  compare and contrast the Linnaeus classification system and the Woese system.

TERMS TO KNOW

amino acids	invertebrates	Plantae
Amphibia	Mammalia	Protista
Animalia	mitochondrion	protozoa
Archaea	Monera	Reptilia
Aves	natural selection	ribonucleic acid (RNA)
bacteria	notochord	semi-feral
binomial nomenclature	nuclear envelope	stromatolites
cherts	nucleus	taxa
Chordata	Osteichthyes	taxonomy
dealers	paleontologists	trinomial nomenclature
ecosystems	pariah dogs	vertebrate
Eukarya	pharyngeal	
feral	photosynthetic organisms	
Fungi	placental mammals	

A BRIEF HISTORY OF ANIMALS

When and where on earth did life begin? Four theories are being studied and debated by scientists around the world. These theories are that life began (1) in layers of rock; (2) in hot boiling water around hydrothermal vents at the bottom of the oceans; (3) in slimy, porous rock faces where the sea water laps against the shore; and (4) from comets, meteorites, and asteroids

Paleontologists (those who deal with prehistoric life forms through the study of fossils) have found fossils of microbes dating back at least 3.4 billion years in rocks found in Australia and Southern Africa. **Stromatolites** (layered structures created by the activity of primitive algae and bacteria) have been found in these rocks. Other rocks of similar age found in Australia contain sections known as **cherts**. These cherts show fossilized remains of blue-green algae. Chemical analysis of even older rocks suggest that **photosynthetic organisms** (organisms that convert light energy into chemical energy) were present as early as 3.7 billion years ago. There are rocks in Greenland dating back 3.85 billion years that contain a mix of carbon isotopes, which would indicate life.

Researchers have discovered whole **ecosystems** (community of living organisms and their environment interacting together to form a functional unit) around hydrothermal vents on the ocean floor. These ecosystems contain giant tube worms and blind shrimp. Sulfur-eating microorganisms around the vents are, according to **ribonucleic acid (RNA)** analysis, the closest living links to the first creatures on earth. RNA is an essential component of all cells.

Slimy, porous rocks where the sea laps against the land could have provided the environment that helped organize organic molecules carried by the seawater into the building blocks of primitive life. Meteorites, comets, and asteroids falling to earth may have carried **amino acids** (compounds that contain both the amino (NH_2) group and the carboxyl (COOH) group; considered the building blocks of protein) and other molecules necessary for life. High concentrations of amino acids have been discovered inside meteorites found on earth and in gas clouds in space. Some 2.2 billion years ago, free oxygen was present in the atmosphere. Living things used this reactive substance in the biochemical functions of their cells. The free oxygen in the atmosphere also produced a layer of ozone, which filters out the ultraviolet light from the sun that is harmful to life. See *Figure 1-1*.

It is believed that the first land plants were established between 500 and 425 million years ago during the Ordovician period. This is also the period of time when **invertebrates** (any animal without a backbone, or spinal column), such as arthropods and worms, appeared on land. These first terrestrial invertebrates fed on decaying plant material.

Vertebrate animals (animals having a backbone, or spinal column), in the form of amphibians and reptiles, appeared during the Devonian period between 405 and 345 million years ago. The bony fish appeared during the

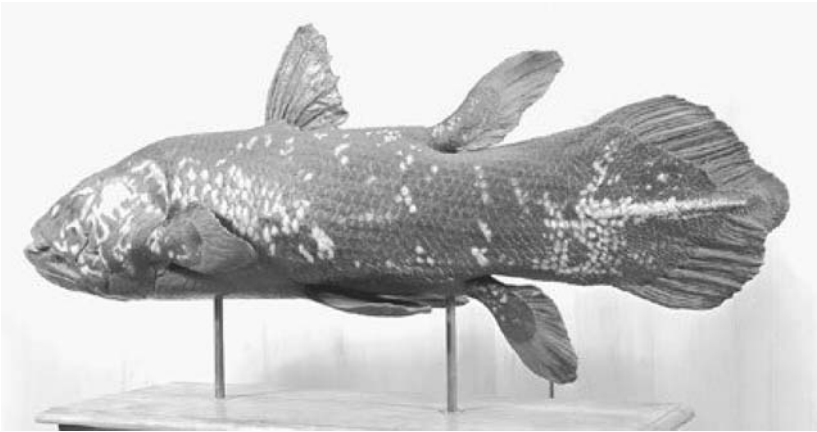
Era	Period	Epoch	Biologic events	Years before present (B.P.)	Geologic events Events refer especially to North America and do not reflect great worldwide variations
PRE-CAMBRIAN	Hadean		Fossil algae; other fossils extremely rare; evidence of sponges and worm burrows	4.5 billion	Volcanic activity; mountain building; glaciations; variable climate
	Archeon			3.8 billion	
	Proterozoic			2.5 billion	
PALEOZOIC	Cambrian		Origin of many invertebrate phyla and classes; trilobites dominant; marine algae	600 million	Three periods of land submergence; mild
	Ordovician		Ostracoderms (first vertebrates); abundant marine invertebrates; first land plants	500 million	Submergence of land; warm
	Silurian		First jawed fishes	425 million	Continental seas and reefs; mild
	Devonian		First amphibians; freshwater fishes abundant; bryozoans and corals	405 million	Inland seas; first forests; mild
	Carboniferous	Mississippian	Radiation of amphibians; abundant sharks; scale trees and seed ferns	345 million	Inland seas; warm to hot; swamplands
		Pennsylvanian	First reptiles; giant insects; great conifer forests	310 million	Shallow inland seas; extensive coal deposits; warm and moist
	Permian		Radiation of reptiles; ; displacement of amphibians; extinction of many marine invertebrates	280 million	Continents elevated; building of Appalachians; cold and dry
MESOZOIC	Triassic		First dinosaurs; mammal-like reptiles; conifers dominate plants	230 million	Continents elevated; widespread deserts; cool and dry
	Jurassic		First birds; first mammals; dinosaurs abundant	180 million	Continents with shallow seas, building of Sierra Nevada mountains; cool then mild
	Cretaceous		Climax of giant land and marine reptiles, followed by extinction; flowering plants; decline of gymnosperms	135 million	Spread of inland seas and swamps; building of Andes, Himalayas, Rockies; mild to cool
CENOZOIC	Tertiary	Paleocene	First placental mammals	70 million	Mountain building; subtropical
		Eocene	Radiation of placentals	60 million	Mountain erosion; rain and mild
		Oligocene	Apes, monkeys, whales	40 million	Mountain erosion; mild
		Miocene	Abundant grazing mammals	25 million	Plains and grasslands; moderate
		Pliocene	Large carnivores	7 million	Continental elevation; cool
	Quaternary	Pleistocene	Early man	0.5 to 3 million	Ice ages; then warmer
		Recent	Modern man	11 thousand	

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Figure 1-1 The history of the earth is divided into periods of time. This geologic time chart shows the geologic events that occurred in North America and the living organisms that were present during the geologic events.

Ordovician period and became abundant during the Devonian period. See Figure 1-2.

During the Triassic period, between 230 and 180 million years ago, dinosaurs appeared, along with mammal-like reptiles. The first birds and mammals appeared between 180 and 135 million years ago during the Jurassic period, when dinosaurs became abundant. Most paleontologists



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Figure 1-2 Coelacanth, a primitive, lobe-finned, bony fish that some believe may be the ancestor of land animals. Coelacanth was thought to be extinct until some living specimens were discovered off the East Coast of South Africa.

agree that birds and dinosaurs are closely related. However, there is controversy among paleontologists about how they are related. One theory suggests that birds are a branch of the dinosaur family tree that survived the Cretaceous period and evolved into the forms we see today.

A second theory suggests that birds and dinosaurs had a common ancestor that evolved into both groups. See *Figures 1-3 and 1-4*. *Archaeopteryx* is believed to be one of the ancestors of modern birds. It lived 150 million years ago during the Jurassic period. In 1860, a fossilized



Courtesy Department of Library Services, American Museum of Natural History

Figure 1-3 *Archaeopteryx* is one of the ancestors of modern birds. It lived 150 million years ago during the Jurassic period. This fossil was discovered in a Bavarian stone quarry.



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Figure 1-4 *Archaeopteryx* is believed to be one of the ancestors of modern birds.

feather from *Archaeopteryx* was found in a German limestone quarry. A more-complete fossilized specimen was found in 1861 in the same quarry. This specimen, missing most of its skull and neck vertebrae, was discovered just two years after Charles Darwin published his book *On the Origin of Species* (1859). Darwin believed in evolution by **natural selection**, a process by which organisms change over time as a result of heritable physical or behavioral traits. These changes allow an organism to adapt to its environment and help it survive. Given enough time and enough accumulated changes, natural selection can create an entirely new species. The discovery of the fossilized specimen in 1861 seemed to confirm the natural selection theory that Darwin had claimed in his book.

Ten other fossil specimens of *Archaeopteryx* have been found since that first discovery. In 2011, a fossil with similar characteristics of *Archaeopteryx* was discovered in Liaoning Province, China. This new specimen was named *Xiaotingia zheng*. Numerous other specimens have been found in other areas of Asia. Among these specimens are a magpie-sized primitive bird called *Confuciusornis*, *Protoperyx*, and *Epidexipteryx hui*, a pigeon-size specimen that is considered the earliest known of the bird-like dinosaurs. Magpies are 17 to 24 inches in length and weigh five to seven and one-half ounces. They are related to the jays, crows, and ravens.

During the Cretaceous period 135 to 70 million years ago, dinosaurs and marine reptiles reached their period of greatest abundance and then disappeared. Scientists still debate the reason for their demise.

With the extinction of the dinosaurs, an opportunity arose for smaller creatures to evolve and become abundant. During the Paleocene and Eocene epochs 70 to 40 million years ago, **placental mammals** evolved, dispersed, and adapted to new environments. Placental mammals have a placenta through which the embryo and fetus are nourished while in the uterus.

Many of the small animals discussed in this book are placental mammals and evolved during this period.

CLASSIFICATION OF ORGANISMS

Taxonomy is the science concerned with the naming and classification of organisms. The Greek philosopher and biologist Aristotle is credited with the first attempts at classifying organisms based on their structural similarities. An English naturalist, John Ray (1627–1705), developed a more comprehensive system of classification, but Carolus (Carl) Linnaeus (1707–1778), a Swedish botanist, is credited with developing our modern method of classification.

Linnaeus's System of Classification

Linnaeus's system has been expanded since then and today is made up of seven categories, or **taxa**. These categories are kingdom, phylum, class, order, family, genus, and species. These categories can be subdivided into finer categories, such as subphylum or subclass. Today, about 30 different taxa are recognized.

In Linnaeus's system, all organisms are divided into one of five kingdoms:

1. **Monera** are the bacterial organisms that lack a true nucleus in the cell, and reproduce by fission.
2. **Protista** are typically single-celled, microscopic organisms that contain a nucleus. They include the algae and **protozoa**. Algae contain chlorophyll, but lack stems, roots, and leaves. Protozoa are animal-like, usually live in water, and are important because many are disease-causing organisms.
3. **Plantae** include all land plants. They are multicellular photosynthesizing organisms.
4. **Fungi** are molds, yeasts, and fungi.
5. **Animalia** is composed of the invertebrates and vertebrates.

All animals discussed in this book belong to the phylum **Chordata** in the kingdom Animalia. All members of this phylum have the following four distinctive characteristics:

1. an embryonic **notochord**, which is usually replaced by the spinal cord;
2. a dorsal tubular nerve cord running down the back side;
3. **pharyngeal** or throat area gill slits; and
4. a rear-area tail.