ZOO AND AQUARIUM HISTORY

Ancient Animal Collections to Conservation Centers

SECOND EDITION

EDITED BY
Vernon N. Kisling, Jr.

CRC Press
Taylor & Francis Group

Zoo and Aquarium History

Zoo and Aquarium History

Ancient Animal Collections to Conservation Centers

Second Edition

Edited by
Vernon N. Kisling, Jr.

CRC Press
Taylor & Francis Group
Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

Second edition published 2022
by CRC Press
6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742

and by CRC Press
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN
CRC Press is an imprint of Taylor & Francis Group, LLC

First edition published by Vernon N. Kisling, Jr. 2000

ISBN: 9781032252797 (hbk)
ISBN: 9781032252810 (pbk)
ISBN: 9781003282488 (ebk)

DOI: 10.1201/9781003282488

Typeset in Times
by Deanta Global Publishing Services, Chennai, India

Contents

Preface
From Wilderness to Megazoo

History is a human invention, so it tends to have an anthropocentric perspective that excludes other species. As historian Max Oelschlaeger points out, "The wild plants and animals, the web of life with which our humanity is bound, and without which the human drama could not be enacted, become bit players."[1] This history of zoos and aquariums is about some of those bit players and the forgotten roles they have played in our human drama. Much of our past has been an integral part of nature: our response to environmental changes, our need for natural resources and our need for suitable land have influenced past social, economic and political activities usually considered strictly human endeavors. Animals and plants have been significant parts of this history, but they are often overlooked, or, if mentioned, their importance has not been fully appreciated. Animals have been important for many reasons, particularly in the past when our survival depended upon them. This history, however, is about animals as non-utilitarian resources, about animals maintained in collections for many reasons throughout the past 5,000 years—as symbols of power and prestige, as luxury and diplomatic gifts, as objects of personal pleasure, for recreational use, for educational purposes, to increase zoological knowledge and for conservation purposes.

Animal collections of the past especially (but even modern zoos and aquariums) have not been well studied. Although the published information may be sufficient for an overview, it does not provide an in-depth understanding of these collections and the many facets of their complex evolution. Interestingly, more research has been undertaken on the history of botanical gardens, natural history museums and circuses. There are journals specifically devoted to the history of these institutions, as well as numerous books and academic studies. In comparison, very little easily accessible information has been published on the history of zoos and aquariums.

Most zoo and aquarium histories are institutional ones with limited distribution. More comprehensive histories have occasionally been published, but they also had limited distribution and are now out of print, so copies are difficult to find.[2–6] A comprehensive history of the world's zoos and aquariums from ancient times to the present has been a needed, but daunting, task. A worldwide history of zoos and aquariums needs to overcome the diversity of languages involved with such a task, to gain access to regional information and to understand the varied cultural influences on zoo and aquarium development. Contributions for this history are therefore from individuals who live in, or are from, the countries and regions about which they write.

Every effort has been made to publish a book that is as comprehensive and authoritative as possible. Such an endeavor, however, is destined to fall short. A single volume cannot completely cover 5,000 years of wild animal collections, nor can it cover every country or detail every collection. It is also difficult to provide a balance among regions, and among countries within a region. Each contributor is more familiar with particular countries and collections and less familiar with others. Even within a single country, much less within a large region, there may be an imbalance in coverage because of difficulties obtaining information. Shortcomings in the first edition have been addressed in this edition. Additional countries have been included and the coverage of zoos and aquariums has been expanded. This edition is more comprehensive in its coverage of the regions and institutions.

A growing interest in the history of zoos and aquariums has already become apparent. The Bartlett Society was founded in England on 27 October 1984 as an international society for the study of zoos and wild animal husbandry history. In 1989, the National Zoological Park held an international zoo history symposium in Washington, D.C. and later published the proceedings as *New Worlds, New Animals: From Menagerie to Zoological Park in the Nineteenth Century*.[7]

Additional important zoo histories have been published since the first edition, as well as an in-depth article on the early history of aquariums.[8–16]

ORIGINS AND DEFINITIONS

What constitutes a zoo? The approach taken in this history is a broad one, beginning with the first efforts to keep wild animals. This period (ca. 10,000–3000 B.C.) was dominated by the gathering of wild animals for utilitarian purposes. This resulted in domestication, a biological process requiring many generations. Thus, these early efforts involved keeping animals that remained wild for quite some time. Many species continued to remain wild and were never domesticated. These wild species may have created interest in the formation of collections later in this period.

These early efforts evolved into keeping wild native and exotic animals for non-utilitarian purposes during the period of large civilizations (ca. 3000 B.C.–A.D. 1456). Mesopotamia, Egypt, China and possibly India were the first societies known to have animal collections. The epicenter of these collecting activities then shifted to the Greco-Roman regions, to the Persian and Arabic regions, and later to Medieval Europe. Meanwhile, collections continued to exist in China, India and other Asian countries. Large collections also existed in Central America (the Aztec collections) and South America (the Inca collections).

Animal collections evolved into menageries during and after the European Renaissance period (1456–1828), and then into zoological gardens beginning in the nineteenth century (1828 to present). The idea that collections evolved first into menageries, then into zoological gardens and now into conservation centers has generated a great deal of discussion. As collections changed from private to public entities, as they shifted from the domain of the wealthy to that of the general public, as individual ownership switched to government or society ownership, as individual collections became cultural institutions and as animal husbandry and exhibition standards improved, collections have become different kinds of places. These evolutionary changes have prompted the use of different names to acknowledge these differences, but there is no consensus on the criteria to be used for defining the differences. In contrast, aquarium evolution is less complicated since it sprang forth as a relatively modern concept during the 1850s.

Moving past the continuum from menageries to zoological gardens we now have conservation centers. It is difficult to pinpoint any clearly defined transition points. However, it can be said with some degree of certainty that particular institutions led the transition from menageries to zoological gardens, such as Schönbrunn (Vienna), the Jardin des Plantes (Paris), the London Zoo and the Philadelphia Zoological Garden. Other zoos and aquariums of the world have performed similar roles for their regions. The modern transition to conservation centers is even less clearly defined since it involves a more subtle shift in the mission and programs of zoos and aquariums.

Whatever definition one chooses, modern zoos include a variety of facilities: zoological parks, aviaries, herpetariums, safari parks, insectariums, butterfly parks and sanctuaries. Aquariums and oceanariums are unique forms of zoos and are here distinguished from the other terrestrially oriented facilities (as the aquarium profession generally prefers). All of these variations are considered in this history under the umbrella terms *zoological gardens* and *conservation centers*. In addition, nature itself has been reduced to its own kind of zoo with national parks and wildlife reserves being so intensively managed that they have now become zoogeographic exhibits in a global megazoo.[17]

HISTORICAL TRENDS

Institutions, such as zoological gardens, do not begin fully developed and, in fact, are never fully developed. Zoological gardens are still evolving and today's state-of-the-art facilities will appear crude to future generations. Some individuals do not recognize this and prefer to disparage earlier collections rather than understand them, criticizing them based on today's standards rather than on standards contemporary with the period. Institutions must be understood within their historic

context and are, at any particular time, merely snapshots of broader trends contributing to that historic context.

> We have a responsibility to our captive animals, brought from their native wilds to minister to our pleasure and instruction…. Much as has been done in this direction, we must all admit that there is still more required. The buildings of today will … some day seem to our successors what the former ones seem to us.[18]

The "today" of this statement could easily be 1987, but it is not—the "today" of this statement is 1887. And the truth of this century-old statement has become evident with the often-heard, disparaging remarks about menageries. Our successors in 2087 will, no doubt, feel the same way as they look back on the zoological gardens of the twentieth century. One hopes they will be more understanding and appreciative of our efforts than we are of our predecessors' efforts.

This comparative view of zoos over time is the result of many institutional trends that have occurred. An emphasis on private, personal pleasure gave way to public entertainment and recreation, and then to educational, scientific and conservation concerns. Improved knowledge and technology were used to improve the husbandry and exhibition of animals in the collections, transforming what was essentially agricultural work into a zoo profession. Zoos and aquariums have also been a part of other, broader trends in wildlife biology, veterinary medicine, technology, education, human sensibilities regarding nature and many other facets of cultural change. Reflecting these many influences, zoos have evolved from mere collections to menageries, to zoological gardens and now to conservation centers. It is this latest trend that the present edition emphasizes. The first edition brought this history up to the zoological garden era. Now we examine the trends taking place as zoos and aquariums continue their evolution beyond this era, especially their transformation into institutions with significant conservation programs.

NEW CENTURY ZOOS AND AQUARIUMS

Zoos and aquariums will continue their core programs in recreation, education, research, and conservation. It is the conservation programs, however, that have increased in importance—and for good reason. About 543 species have become extinct since 1900, while another 515 are approaching extinction (those with populations of less than 1,000 individuals).[19] Overall there has been a 60–83% decrease in many species populations since 1970.[20] Some 29% of North American bird populations have been lost since 1970, and in some parts of Asia there are more song birds in household cages than in the wild.[21,22] While it is recognized that zoos and aquariums have limited space and financial resources, they have extensive expertise and interact with over 700 million visitors.[23] These institutions are, and will continue to be, viable backups to field conservation should these field efforts prove ineffective.

This is a real possibility. As this history began 5,000 years ago, the world was a vast wilderness dotted with a few large cities and many small villages. This wilderness has been on a steady decline that continues to this day, and what is left is managed. As nature's megazoo diminishes, the urban megazoo (the zoo and aquarium community) will become essential to the maintenance of our biodiversity. This is the future of zoo and aquarium conservation programs; otherwise, with the continuing loss of natural habitat, conserving biodiversity will be an impossible dream.

The importance of zoos and aquariums in this regard is overlooked by some individuals who would prefer to close these institutions; however, this is a short sighted perspective. Nevertheless, many small, private or inadequate zoos and aquariums have closed on their own over this long history, even in modern times. In the United States alone, over 250 zoos and aquariums closed throughout the 1800s and early 1900s.[24] During the early years of this new century, the COVID-19 pandemic and regional conflicts have also contributed to the difficulties of zoos and aquariums; however, these events are temporary setbacks to the long term vitality of well-established zoos and

aquariums. Unfortunately, some regions of the world have few well-established zoos due to political, cultural or economic difficulties. Despite all of these conditions, zoos and aquariums continue to be popular cultural institutions, continue to improve their programs and continue their increasingly important education and conservation roles as future generations come to grips with the ever declining biodiversity that surrounds them and the quality of life that is slipping away.

REFERENCES

1. Oelschlaeger, Max, *The Idea of Wilderness: From Prehistory to the Age of Ecology*, Yale University Press, New Haven, CT, 1991, 7–8.
2. Baratay, Eric, and Hardouin-Fugier, *Zoos — Histoire des jardins zoologiques en occident (XVI^e – XX^e siècles)*, La Découverte, Paris, 1998 [Zoos — History of Western Zoological Gardens (16th–20th Centuries)].
3. Fisher, James, *Zoos of the World: The Story of Animals in Captivity*, Natural History Press, Garden City, NY, 1967.
4. Loisel, Gustave, *Histoire des ménageries de l'antiquité à nos jours*, Octave Doin et Fils and Henri Laurens, Paris, 1912.
5. Lukaszewicz, K., *Ogrody Zoologiczne–Wczoraj–Dzis–Jutro*, Wiedza Powszechna, Warszawa, 1975 [Zoological Gardens–Yesterday–Today–Tomorrow].
6. Hediger, H., *Zoologische Gärten. Gestern–Heute–Morgen*, Hallwag Verlag, Bern, Switzerland, 1977 [*Zoological Gardens: Yesterday*, Today, Tomorrow].
7. Hoage, R. J., and Deiss, William A., Eds., *New Worlds, New Animals: From Menagerie to Zoological Park in the Nineteenth Century*, Johns Hopkins University Press, Baltimore, MD, 1996.
8. Bell, Catharine E., Ed., *Encyclopedia of the World's Zoos*, Fitzroy Dearborn, Chicago, IL, 2001.
9. Minteer, Ben A., Maienschein, Jane, and Collins, James P., Eds., *The Ark and Beyond: The Evolution of Zoo and Aquarium Conservation*, University of Chicago Press, Chicago, IL, 2018.
10. Donahue, Jesse, Ed., *Increasing Legal Rights for Zoo Animals: Justice on the Ark*, Lexington Books, Lanham, MD, 2017.
11. Itoh, Mayumi, *Japanese Wartime Zoo Policy: The Silent Victims of World War II*, Palgrave Macmillan, New York, 2010.
12. Burger, R. Michael, *The Dragon Traders: A Collective History of the Reptile Trade in America and the Age of Herpetoculture*, Parador Press, (Privately published), Mabank, Texas, 2018.
13. Svanberg, Ingvar, and Moller, Daniel, Eds., Aviculture:A History, Hancock House, Surry, 2018.
14. Hancocks, David, *A Different Nature: The Paradoxical World of Zoos and Their Uncertain Future*, University of California Press, Oakland, CA, 2001.
15. Baratay, Eric and Hardouin-Fugler, *Zoo: A History of Zoological Gardens in the West*, Reaktion Books, London, 2004.
16. Solski, Leszek, "Public Aquariums 1853–1914: Historical Perspective," *Der Zoologische Garten*, 75: 5–6, 2006.
17. Sullivan, Arthur L., and Shaffer, Mark L., "Biogeography of the Megazoo: Biogeographic Studies Suggest Organizing Principles for a Future System of Wild Lands," *Science*, 189: 13, 1975.
18. Flower, William, "Jubilee Address," in *Annual Report*, Zoological Society of London, London, 1887.
19. Ceballos, Gerardo, Ehrlich, Paul R., and Raven, Peter H., "Vertebrates on the Brink as Indicators of Biological Annihilation and the Sixth Mass Extinction," *Proceedings of the National Academy of Sciences of the United States of America*, 117: 13596–13602, 2020.
20. Grooten, M., and Almond, R.E.A., Eds., *Living Planet Report –2018: Aiming* Higher, World Wildlife Fund, Gland, Switzerland, 2018.
21. Rosenberg, Kenneth V., et al., "Decline of the North American avifauna," *Science*, 366: 120–124, 2019.
22. Marshall, Harry, et al., "Spatio-Temporal Dynamics of Consumer Demand Driving the Asian Songbird Crisis," *Biological Conservation*. https://doi.org/10.1016/j.biocon.2019.108237.
23. Barongi, R., Fisken, F.A., Parker, M., and Gusset, M., Eds., Committing to Conservation: The World Zoo and Aquarium Conservation Strategy, World Association of Zoos and Aquariums Executive Office, Gland, Switzerland, 2015.
24. Kisling, Jr., Vernon N., "In the Shadows of History: Extinct Zoos and Lost Collections," *Regional Conference Proceedings*, 87–94. American Zoo and Aquarium Association, Wheeling, WV, 2003.

Acknowledgments

A few acknowledgments are necessary. First, and foremost, this book has been possible only because of the contributors who have written about the zoos and aquariums in their regions and countries. No one individual could know, or even gather, this historical information from throughout the world. Too much time, money, language skills and effort would be required to accomplish what these contributors have achieved. Although some guidance was given to the contributors to establish some degree of conformity, contributors were encouraged to write in their unique ways from their cultural viewpoints. An editorial effort was made to balance consistency with uniqueness.

This project has not enjoyed the usual array of grants, secretaries to do the typing, research assistants or the like. Some eight years of voluntary efforts by the contributors and the editor got the first edition done. In addition to the contributors, I would like to thank Ross Arnett, publisher, editor, writer, scientist and friend. Ross, who passed away just as the manuscript was finished, had faith in the book from the beginning, and helped get it into the publisher's hands, a daunting task for an author to accomplish unaided. I would also like to thank our CRC Press editors for their keen interest, constructive criticism, advice and help: John Sulzycki for the first edition and Alice Oven for the second edition. While the contributors made the book possible, Ross, John and Alice made the book publishable.

Contributors have relied upon numerous individuals who provided them with information. Reviewers, some known to me and some not known, provided constructive criticism on individual chapters, for which I am grateful. Without this array of contacts, both within and outside the zoo profession, the chapters would have been less informative and less accurate. The final result, this particular history, has been a complex effort driven to completion with the help of individuals who have a keen interest, and a passion, for the history of zoos and aquariums. I have enjoyed the opportunity to work with them, and to learn from them.

Vernon Kisling
Gainesville, Florida

Editor's Biography

Vernon N. Kisling, Jr. was University Librarian and Chair at the Marston Science Library, University of Florida, as well as a curator at the Atlanta Zoo and Crandon Park Zoo (Miami). He was Chair of the AZA (Association of Zoos and Aquariums) History Committee. He holds two MS degrees and a DPA. He has done wildlife research in Papua New Guinea and Chile and has written numerous articles on wildlife conservation and zoo history.

Contributors

Rick Barongi has had a professional zoo career spanning over 50 years. He has held executive management and leadership positions at the Walt Disney Company, Houston Zoo, San Diego Zoo and Miami Zoo. He has a BS from Cornell University and an MS in zoology from Rutgers University. He is the founder of Longneck Manor, a conservation park in Fredericksburg, Texas. His passion is wildlife conservation, with over 50 trips to Africa and other continents.

Shai Ben-Ami worked at the Jerusalem Biblical Zoo for over 20 years as a zookeeper and educator. He established and managed the Israel Aquarium education department. He holds a MS from the University of Regensburg (Germany), with a thesis on how zoos in the U.S. and Europe present and contextualize their history. He interned with the European Association of Zoos and Aquaria and is now completing a PhD at the Hebrew University of Jerusalem on the history of zoos in Israel. He has also established a zoo consultancy firm named 101zoos.

Tim Brown is a company director who started his career as a zoo keeper in 1974. Through the next two decades he pursued his amateur interest in zoos before starting the Independent Zoo Enthusiasts Society in 1995. IZES publishes *Zoo Grapevine* which now incorporates *International Zoo News*. He is author of *The IZES Guide to British Zoos and Aquariums*, *An Illustrated History of Bristol Zoo Gardens* and *America's Top 100 Zoos and Aquariums.*

Catherine de Courcy researched the history of the Melbourne Zoo for her MA thesis in 1990. She wrote extensively about the history of Australian zoos over the following decade. On returning to her native Ireland, she wrote the first comprehensive history of Dublin Zoo. A new edition of that history was published in 2019, incorporating the completion of the zoo's master plan.

James F. Ellis, Jr. was Associate Director of International Programs at Washington State University, Pullman. He also worked at the Oklahoma City Zoo, Peoria Zoo and Santa Fe Community College Teaching Zoo. Together with his wife, **Georgeann A. Ellis**, a licensed microbiologist, he spent many years in South America and the Caribbean consulting with zoos in Brazil, Guatemala and Jamaica, as well as the Museum Paraense Emilio Goeldi. Together they have written numerous articles on zoos, wildlife conservation and conservation education in developing countries.

Brent A. Huffman is a resident of Toronto and has been a zoo professional for over 20 years. He is currently the Lead Keeper of Mammals at the Toronto Zoo. He has contributed to a diverse range of scholarly and popular publications on natural history and zoo husbandry and is the founder of ultimateungulate.com, the first online resource (since 1996) dedicated to hoofed mammals.

Ken Kawata was employed at the Tokyo Zoological Park Society before immigrating to the United States in 1969. He has worked as a keeper and curator at zoos in Topeka, Indianapolis and Tulsa. In 2005 he retired as the General Curator at the Staten Island Zoo, New York. He continues to publish commentaries and essays on animals, zoos and zoo history in various zoo-related journals in Europe and the United States.

Vernon N. Kisling, Jr. was University Librarian and Chair at the Marston Science Library, University of Florida, as well as a curator at the Atlanta Zoo and Crandon Park Zoo (Miami). He was Chair of the AZA (Association of Zoos and Aquariums) History Committee. He holds two MS degrees and a DPA. He has done wildlife research in Papua New Guinea and Chile and has written numerous articles on wildlife conservation and zoo history.

Wilhelmus Labuschagne was Director of the National Zoological Garden of South Africa. Prior to this he was a zoologist and then curator at the Johannesburg Zoo. He is a member of the International Union of Directors of Zoological Gardens and is the Chairman of the Pan-African Association of Directors of Zoological Gardens, Aquariums and Botanical Gardens.

Michelle Murphy is a cultural historian, zoo historian and animal studies scholar. She is writing her PhD dissertation at the University of Tasmania on Mary Robert's Beaumaris Zoo at Battery Point (1901–1921). She is interested in the way people and societies interact with animals and their environment, with the negotiation and articulation of individual and collective subjectivities and with what happens in the spaces in which animals and humans (re-)connect.

Herman Reichenbach recently retired as documentalist from the magazine and newspaper publishing house Gruner + Jahr, Hamburg. He enjoyed his first paid employment as a part time zookeeper at the now defunct Tarpon Zoo, Tarpon Springs, Florida while a student at St. Petersburg College. He later studied Chinese literature and history of science at the University of Hamburg. Through the years he has written a dozen historic papers on the evolution of zoos and over a hundred book reviews covering the history of science. He is a regular contributor to *International Zoo News* and the Honorary Editor of *Archives of Natural History* 2017–2020.

Leszek Solski began his professional career as a veterinarian in Szczecinek (northern Poland). In 1981–1982 he was General Manager of the Polish Fauna Garden in Bydgoszcz (now the Zoo Bydgoszcz). Later he worked as an Assistant Professor at the Institute of Biomaterials Research, within the Medical University, Wroclaw. In 2019–2020 he served there as the temporary Director of the education department. He is the author of more than 100 articles, encyclopedia entries, chapters and a book dealing with zoo history, animals and wildlife conservation.

Harro Strehlow holds a Diplom-Biologist from the Freie Universität Berlin and a Dr. rer. nat. from the Technische Universität Berlin. He has worked as an animal keeper, teacher and as a docent and head of the Junior Zoo University Berlin. His main interests are history of biology, history of zoos, zoo and wildlife biology, and conservation. He has written more than 200 publications on these topics.

Sally Walker established Friends of Mysore Zoo, Zoo Outreach Organisation, the Society for Promotion of History of Zoos and Natural History in India, and the Asian Regional Network of Zoo Educators. She was the regional representative for the Captive Breeding Specialists Group and other wildlife conservation organizations. She founded two monthly zoo magazines and published more than 500 articles in India and abroad, primarily about zoos and conservation science in India and Southeast Asia.

1 Ancient Collections and Menageries

Vernon N. Kisling, Jr.

CONTENTS

1.1 INTRODUCTION

Exotic animals have long been the ultimate collectibles. Exotic animals, alive and active, have been more fascinating and exciting than natural history (museum) specimens, plants, or cultural artifacts—in part, because animals are less common, more difficult to acquire and more expensive to maintain. And then, there is the fascination, both emotional and scientific. Since ancient times the passion for possessing wild animals from distant lands has overcome the great difficulties and expense of capturing, transporting and maintaining them. To paraphrase a proverbial saying, if there were no zoo, someone would invent one. And many have done so over the past 5,000 years, in various ways.

Cultural institutions, like the cultures that foster them, evolve over time. This evolution is certainly true for zoos and aquariums, which have evolved in parallel with the diversity of cultures that have nurtured them. Keeping wild animals is as old as the first attempts at domestication, which began about 10,000 B.C.; however, "collections" of wild animals were not assembled until the earliest urbanized civilizations began about 3000 B.C. These early collections, within the context of their times, were in effect the earliest zoos, even though they were not then referred to as zoos. Zoo-related terminology, as it now exists, did not come into use until the modern zoo concept developed during the eighteenth and nineteenth centuries, a period when animal collections significantly changed and became the cultural institutions that are now familiar to us. Because an etymology for zoos and aquariums analogous to etymologies for natural history museums and botanical gardens[1,2]

DOI: 10.1201/9781003282488-1

has not been developed, a preliminary etymology for zoos and aquariums is provided at the end of this chapter, following the discussion of the historical context within which these terms emerged.

Past cultures, ancient through early modern, viewed nature as an integrated whole even while attempting to categorize its many parts. Ancient collections began as more than just gatherings of these parts; animals were kept within a natural setting. Early trade in exotic products also included both animals and plants, and rarely seen species were coveted acquisitions for those who could afford such extravagances. Collecting plants was useful and important because plants had food and medicinal values, while some were popular for their ornamental uses. Plant collections were widespread because plants were easy to transport (as seeds, bulbs, or cuttings) and were economical to maintain and display. Live animals, on the other hand, were more difficult and expensive to transport, maintain and exhibit, and these difficulties made animals more coveted and exclusive. While gardens were pervasive throughout the social strata of societies, living animal collections were, for most of their history, restricted to royalty and the wealthy classes.

Animal collections, and the cultural activities associated with these collections, have not been as well studied as plant collections. No doubt the paucity of information on zoos is partly because of the scarcity of historical documentation and partly because, in the broad sweep of past cultural activities, the gathering of wild animals for collections has played a minor role. This situation is not surprising, but what is surprising is how the study of botanical gardens and natural history museums has overshadowed the study of zoos. Greater historical interest in plants and animal naturalia than in living animals is not easily explained, although the lack of historical interest in the natural world in general is less difficult to explain. The past is, of course, distorted when viewed through the lens of history. Some distortion is unavoidable since the historical record is fragmentary and pertinent information is often difficult to find, as the subject of zoos so well illustrates. Especially important to the study of zoos and aquariums, historical viewpoints are anthropocentric, with interpretations of past events focused on interactions among humans. Historian Max Oelschlaeger has concisely stated this way of thinking:

> The world becomes merely a stage upon which the human drama is enacted. The wild plants and animals, the web of life with which our humanity is bound, and without which the human drama could not be enacted, become bit players. The modern viewpoint thus impels us to relentlessly subjugate the wilderness, since things wild and free are alien to sensibilities nurtured so carefully in the garden of civilization.[3]

To test the veracity of this statement one need only look at the numerous collecting activities that have existed in virtually every civilization throughout history. Gathering animals for collections in ancient times was not as rare an occurrence as one might suspect and became steadily more common during each succeeding century. Ancient animal collections developed initially from the convergence of two ancient trends: the keeping of native wild animals for utilitarian purposes and the evolution of societies into civilizations with attributes favorable to collecting. Essential to both trends were the relationships of individuals to wild animals in particular and to nature in general. These relationships, in turn, had their foundations in earlier preurbanized and preliterate societies, when pertinent environmental knowledge had developed out of necessity.

1.2 KEEPING WILD ANIMALS

1.2.1 Environmental Knowledge

In the Mesolithic period (10,000–8000 B.C.), which followed the end of the last Ice Age, humans were preliterate food gatherers, hunters and fishers living in small social groups. During this era these groups developed distinct cultures, improved their tool technology and exploited natural resources. They advanced socially, intellectually and technologically as they adapted to the challenges of a changing environment, caused by the ending Ice Age with its climatic changes and accompanying changes in local flora and fauna distributions.[4,5] It was also a time when humans began refining their aesthetic appreciation for music, art (figurines, drawings and decorative pottery) and luxury items (jewelry).[6–9]

While still rudimentary, aesthetic and intellectual interests in nature were parts of a broader environmental knowledge that, among other things, laid the foundation for keeping animals. Humans accumulated knowledge about their natural surroundings over many generations and each social group became increasingly familiar with the local animals, plants, habitats and weather essential to its survival. This kind of knowledge has since been categorized as "folk systematics" and "folk ecology."

Historical Periods and the Environmental Activities Characterizing Them	
10,000–8000 B.C. (Mesolithic period)	Small social groups
	Environmental knowledge (an integration of science, religion and magic)
	Environmental changes due to the end of last Ice Age
	Minimal impact on natural resources
	Food gathering, hunting and fishing
	Folk systematics, ecology and medicine
8000–3000 B.C. (Neolithic period)	Villages (kin groups, tribes with chiefs)
	Domestication (animal and plant)
	Agricultural gardens and animal yards
	Exploitation of natural resources
	More complex myths and religious rituals
3000 B.C.–A.D. 1500	Urbanization and city-states
	Gardens, parks, game reserves, fishponds, animal collections
	Comprehensive exploitation of natural resources
	Knowledge of environmental change, but not its effects
	Scientific knowledge beyond observation
	Writing and history
A.D. 1500–2000	Nation-states
	Menageries, zoological gardens and aquariums
	Cabinets and natural history museums, botanical gardens
	Conservation awareness and environmental ethics
	Human-caused extinctions and extensive natural resources depletion
	Scientific specialization (natural sciences from natural history)

Folk systematics concerns the identification and classification of animals (and plants) important to the social groups, based on gross morphological similarities or differences among the animals as well as on the utility of the animals to the group. Each distinct kind of animal had a name and was part of hierarchically arranged categories, much as they are today. For the most part, observations of biological discontinuities used in preliterate societies have been shown to correspond closely to those now recognized in modern classification schemes, and a large portion of their individually named animals and plants correspond with currently recognized taxa.[10–13]

Preliterate societies could recognize an average of 520 plants and 390 animals, based on studies of more modern, yet still primitive, societies. The memory and verbal abilities of individuals, rather than the biological diversity of the region, limited the number of animals and plants that could be identified. With the advent of writing, literate societies expanded upon this basic system of identification and classification, which continued to suffice until 1758, when Carolus Linnaeus (Carl von Linné) codified the folk systematics of Europe into a scientific system using Latin binomial (genus and species) names for each animal and plant.[11,13]

In addition to information on specific kinds of animals and plants, preliterate societies were intimately knowledgeable about the habitats of these animals and plants. This folk ecology included information about the weather and seasons, the geography of the region, the location of water sources, animal behavior and the germination and growth of plants—environmental information that was essential to the emergence of domestication and agriculture.[14–16]

FOLK SYSTEMATICS TO SCIENTIFIC SYSTEMATICS

An inclination to categorize has always been a part of human nature. With regard to animals and plants, this process is known as systematics. Studies of several "primitive" societies that exist relatively unchanged today indicate their forebearers developed accurate biological classification systems and common organizing principles. Organisms are placed in naturally occurring groupings, with each group having easily recognized characteristics distinguishable from characteristics of other groups (what is now referred to as a natural system of classification). These groupings are further merged into several increasingly larger units arranged in a hierarchical order. The extent to which individual genera or species are named depends on the importance of the animals to that society.

Within each society studied, the number of animal taxa recognized (with an average of 390) was fewer than the number of plant taxa (with an average of 520); the number of plant taxa recognized was higher in agricultural societies. Throughout history, prior to the Renaissance, the number of taxa recognized remained relatively constant. Western systematics did not evolve out of these primitive classification schemes, however, because the schemes of the primitive groups studied were unknown to the ancient Greeks, who developed the foundations of modern Western systematics independently. Medieval European systematics, in turn, was derived primarily from the work of Aristotle for animals, Dioscorides for medicinal plants and Theophrastus for all other plants.

This classification work was considered inadequate during the early Renaissance and afterward when an increasing number of new species were discovered. In 1700, the French botanist, Joseph P. de Tournefort, published a botanical list of 698 genera, not much more than the average number of genera recognized by primitive societies and the Greeks. Within a half century, however, this number almost doubled with Linnaeus' description of 1,239 genera in 1764.

Carolus Linnaeus (Carl von Linné, 1707–1778) built upon the folk systematics of Europe as it existed in the first half of the eighteenth century, but with substantial improvements, including the use of binomial nomenclature (using a genus and species to identify each distinct organism). This replaced the polynomial nomenclature (where the name of each organism consisted of a string of descriptive words). Another important contribution was the use of Latin for these scientific names, a "dead" language known to naturalists and that did not favor one nationality over the others. The Linnaeus system of classification was an artificial one, relying on an arbitrary set of characteristics considered more important than others and, often, a set of characteristics that could not be easily discerned by the field naturalist in nature.

Number of Animal and Plant[a] Generic Taxa Discerned by Various Societies

Animals		Plants	
Primitive Societies			
Ndumba (New Guinea)	186	Primitive societies range	238–956
Sahaptin (United States)	236	Primitive societies average	520
Piaroa (Venezuela)	305		
Tzeltal (Mexico)	335		
Kalam (New Guinea)	345	Greek Naturalists[b]	
Anindilyakwa (Australia)	417	Theophrastus	550
Tobelo (Indonesia)	420	Dioscorides	537
Hanunoo (Philippines)	461		
Wayampi (French Guiana)	589	European Naturalists	
Aguaruna (Peru)	606	Tournefort (1700)	698
Primitive societies average	390	Linnaeus (1764)	1,239

[a] Plant studies are more numerous.

[b] Aristotle, while often mentioned, did not provide a clear set of genera.

Systema Naturae, published by Linnaeus in 1758 (the tenth and most important edition), is considered the starting point of modern (Western) systematics. It is the foundation upon which modern international codes of nomenclature have been built. Classification schemes continue to be artificial and increasingly sophisticated, relying on chemical, genetic and molecular characteristics. After remaining stable for most of history, the number of genera exploded to several thousand in the eighteenth century, to a few million in the nineteenth century, to several million in the twentieth century.

Sources: Based on Berlin, Brent, *Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies*, Princeton University Press, Princeton, NJ, 1992; Raven, Peter H., Berlin, Brent and Breedlove, Dennis E., "The origins of taxonomy," *Science*, 174, 1210, 1971; and Morton, A. G., *History of Botanical Science: An Account of the Development of Botany from Ancient Times to the Present Day*, Academic Press, New York, 1981.

This systematic and ecological knowledge was transmitted through folklore and folk rituals, which both aided and impeded the progress of these societies. Although folklore and rituals contained practical information about animals, plants and the environment, they also perpetuated myths. Fact and fiction frequently merged into an inseparable body of lore, with religion, magic, medicine and science indistinguishable. Similarly, humans, nature and the gods were one interdependent whole. Nevertheless, this rudimentary base of knowledge was as rational and scientific as it could have been at the time and provided preliterate populations with a way of looking at, analyzing and understanding a difficult-to-comprehend world.[9,17–19]

Social complexity increased, as did intellectual and technological solutions to the increasingly complex problems faced by these societies. As rudimentary knowledge expanded beyond simple natural curiosity and need-to-know, humans began to progress as a unique species and began to distinguish between themselves and other species. Preliterate humans, however, continued to be part of the natural order, dependent upon an uncontrolled, and still pervasive, wilderness. Humans were not able to escape from this situation until they became relatively self-sufficient producers with the advent of domestication and agriculture.

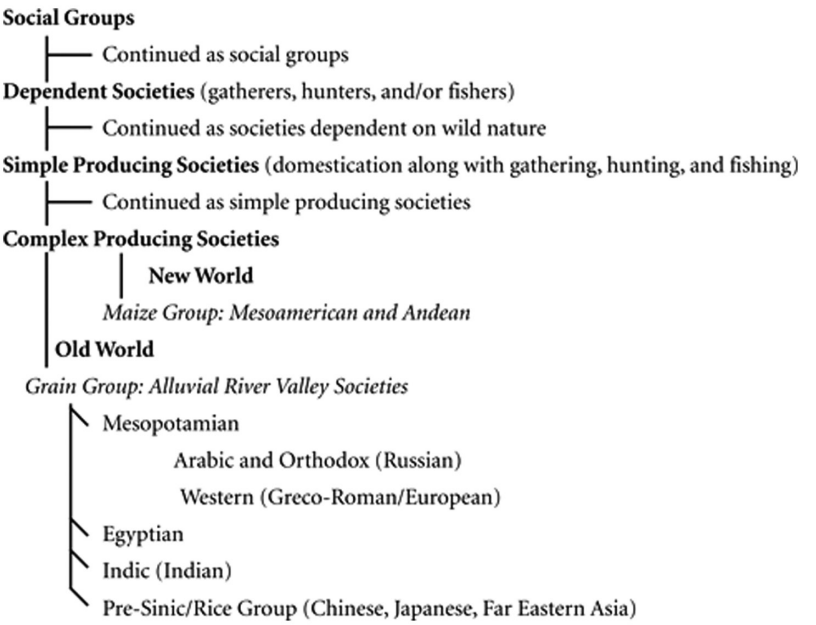
1.2.2 Domestication of Wild Animals

As early humans developed into a socially and intellectually unique species, they intensified their dominion over other species, while distancing themselves from other species through development of socially elaborate cultures. These developments accelerated during the Neolithic period (8000–3000 B.C.) as environmental conditions emerged that were favorable for the settlement of new kinds of organized, and relatively permanent, communities. This in turn provided the impetus for domesticating animals.[4,5]

Some early societies remained groups of gatherers, hunters and fishers, entirely dependent upon nature. Other societies became self-sufficient producers by extending their control over the animals and plants near their settlements. This control involved farming plants (agriculture) through controlled seeding, harvesting, storage and maintenance, as well as farming animals (domestication) through controlled breeding, feeding and maintenance.

Initially, animal husbandry evolved from the practice of herding or penning wild animals, perhaps those animals that raided the crops, those that were easily corralled, or young animals kept as pets. However it might have begun, gaining this initial control of wild animals was a difficult, but important, first step. Some wild species were more compatible with the social environment of humans than were others. Compatible wild animal species had attributes that favored the process of domestication: hardiness and the ability to adapt to new surroundings, social gregariousness that permitted herding and overcoming natural flight behavior, dominance hierarchies that recognized humans as the alpha species, reproductive behavior that adapted to captive breeding conditions, temperaments that facilitated tending with minimum effort and utilitarian value.[20–22]

Domesticating animals was the first effort at keeping wild animals. Although it is now taken for granted, domestication was a long-term biological process. As a biological process, domestication required the keeping of wild animals through many generations and was achieved only after significant changes were made in the behavioral, physical and genetic attributes of the captive species. These necessary changes could not have been anticipated initially, so domestication was not known as such until after it had occurred.



Evolution of human social organizations. *Source*: Based on Quigley, Carroll, The Evolution of Civilizations, 2nd ed., Liberty Press, Indianapolis, IN, 1979.

Domesticated Species[20–22]

Species	First Domestication, B.C.	Range
Dog	10,000–8000	Global; various species of wild dogs, wolves and jackals
Goat	8000–7000	Mesopotamia and western Asia initially; various species
Sheep	8000–7000	Mesopotamia, western Asia and southeastern Europe initially; various species
Reindeer	8000	Scandinavia, Greenland and polar North America; wild reindeer
Pig	7000	Europe and western Asia initially; wild boar
Cattle	6400	Mesopotamia, western Asia and southeast Europe initially; various species
	2500–1500	Northwest India; humped cattle
Llama	5500–4200	South America; guanaco and vicuna
Horse	4000	Europe and Asia (horses); Mesopotamia and western Asia (onagers); western Asia and Africa (donkey, asses)
Camel	2600	North Africa and western Asia (one-humped camel); central Asia (two-humped)
Elephant	2500	Indus valley (India); Asian elephants
Ferret	1800–400	Europe; European polecats
Cat	1600–500	Egypt, Europe, Mesopotamia, India; various species small wild cats
Rabbit	?	Europe; wild European rabbit
Guinea Pig	?	Peru; South American cavy
Bird	?	India (chicken and peacock), Asia (pheasant), Africa (guinea fowl), Central America (turkey), Mesopotamia (pigeon, goose and duck)

Palaeozoological evidence from archaeological sites indicates that only a few species were kept for domestication purposes, although other species were present. Untamable species were eventually killed for food or released, while those that did not present difficulties were maintained over time and eventually domesticated. Regardless of how many species were kept, only a few were successfully domesticated and an unknown number remained wild. It is possible that the still-wild species, rather than being killed for food or released, were retained and kept as protocollections. Since changes occur in incremental steps, this kind of experience may possibly have been a precursor to later collecting activities.

Domestication enabled human population growth and affected the social structure of societies. Societies, previously dependent upon nature, became producing societies, some maintaining simple social structures, others developing more complex structures. Both simple and complex producing societies kept domesticated livestock; however, other factors existed that propelled the societies leaning toward complexity into an era of urbanized and literate civilizations. Regardless of whether protocollections of native wild species existed previously, it was at the newer urbanized level of socioeconomic development that humankind entered into the collecting of wild species for aesthetic, nonutilitarian reasons.[23]

1.2.3 Beyond Domestication—Collecting Wild Animals

Complex producing societies evolved into urbanized, literate civilizations between 3000 and 1500 B.C. The transition from society to civilization was both a physical and a philosophical phenomenon. Physical aspects of urbanization accommodated increasingly large populations, providing social order, civil administration, common defense, cooperative and specialized labor and foreign trade to obtain needed materials not available locally. Although the bulk of the population had little money or time for leisure activities, royalty and a wealthy class of individuals—which included government officials, priests, merchants and landowners—prospered and took advantage of cultural luxuries that became available.

For these privileged classes, the urbanized lifestyle provided a relatively stable social environment conducive to long-term endeavors such as collecting. These wealthy individuals were able to accumulate large tracts of land, not all of which had to be developed for economic reasons and could, therefore, be set aside as animal parks for their pleasure. Expansion of foreign trade increased exposure of these wealthy individuals to exotic lands and the wildlife from these lands. Wealth to buy what they wanted, leisure time to do what they wanted, the availability of luxury items and heightened aesthetic sensibilities provided the newly emerging upper class with the opportunity to plant gardens, build reserves and parks, and collect animals.

Philosophical aspects of urbanization involved attitudes that focused on the distinction between the city and the country, as well as intellectual issues associated with the dichotomy. For the first time, urbanized human environments differed substantially from the rural and wilderness environments. As urban areas increased in number and size, and urban citizens were more removed from the country, these individuals began to feel the loss of their natural environments. The need for a connection with nature became stronger as urbanized populations continued to grow and their lifestyles became increasingly complex. This need contributed to the upper-class desire to re-create natural settings and to collect animals, a desire that existed in tandem with their newfound ability to pursue these activities.

Ancient civilizations first emerged in Mesopotamia along the Tigris and Euphrates Rivers of western Asia in what is now Iraq; in Egypt along the Nile River in northeastern Africa; among the Indus society of India along the Indus River in what is now Pakistan; and in China, along the Yellow River (the Huang Ho). There were other, less complex societies throughout Europe, Asia and Africa; however, they probably did not develop the social structures that were favorable to collecting. Over time, a complex evolution of animal collections occurred as the epicenter of power shifted throughout these regions and finally settled in Europe. Animal collections in Mesopotamia and Egypt

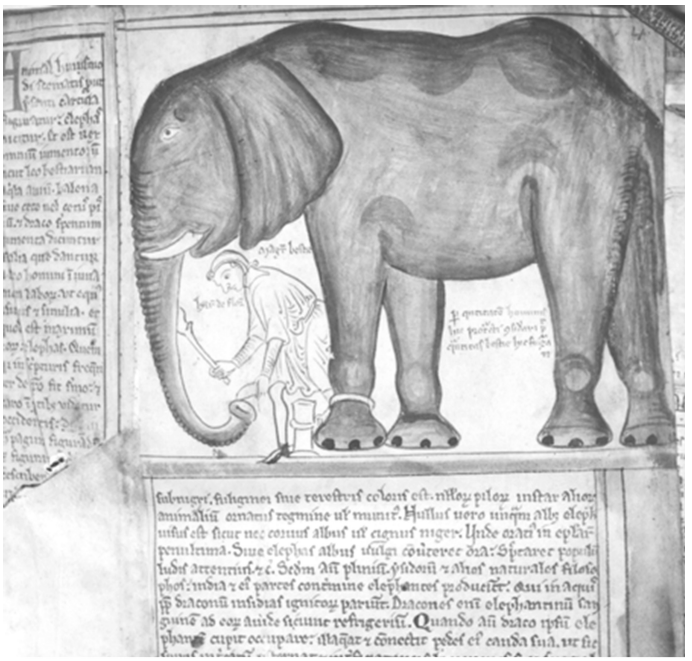


FIGURE 1.1 The Elephant King Louis IX of France brought with him when he returned from the Crusades during the mid-1200s. *Source:* From the *Chronicles of Matthew Paris: Monastic Life in the Thirteenth Century.* © The Master and Fellows of Corpus Christi College, Cambridge.

became less prominent but nevertheless continued, while those in India disappeared with the Indus society and reemerged with India's Indo-Aryan societies. Collections in China and the Americas developed in isolation, and newer collections appeared in Greece, Rome, Persia, the Arab regions and eventually medieval Europe (Figure 1.1).

1.3 ANCIENT COLLECTIONS

1.3.1 Mesopotamian Collections

Mesopotamian societies developed as riverine city-states along the Tigris and Euphrates Rivers. Sumer was the first, flourishing from ca. 3000 to 2800 B.C. in the lower and middle portions of the Mesopotamian region. Akkad society superseded the Sumer society between 2800 and 2200 B.C. The Akkad, located in the middle and upper portions of the Mesopotamian region, eventually ca. 2200–330 B.C. split into Babylonia (the middle region) and Assyria (the upper region). Eventually, these societies were conquered by the Persians in 539 B.C. and later by Alexander the Great of Greece in 330 B.C.[15, 24–27]

Mesopotamian city-states had to protect themselves from the ravages of a harsh environment with unpredictable rivers (floods and periodic changes in the courses of these rivers). This region's environment was perceived as a place of uncontrollable forces, fierce animals and wicked demons. Mesopotamian gods and religion were centered on the forces of nature, the heavens and its planets, the visible earth and the invisible interior earth. Every natural animate and inanimate object, as well as everything manufactured, was assigned to the sphere of a particular god. Divination, magic, medicine and the sciences were often indistinguishable. Knowledge consisted of the ability to produce quoted phrases of established information appropriate to a given situation, requiring memorization rather than original thought. This information was written on clay tablets and stored in libraries, which most Mesopotamian kings maintained.

The natural sciences, less important than mathematics and astronomy, were of practical importance and consisted of observing and classifying animals, plants and minerals. The practice of medicine was first recorded by the Sumerians, but was more fully developed during the Babylonian and Assyrian period. Physicians practiced human medicine, whereas veterinarians known as "ox and ass doctors" practiced animal medicine. Knowledge about animals and plants consisted of being aware of, but not necessarily understanding, their occurrence, properties and habits. Based on this knowledge, animals and plants were listed in groupings that were rudimentary classification schemes. Boundaries between animals, plants and minerals, as well as the groupings within each, were recognized. These natural resources were all given names and some thought was given to their interrelationships. By ca. 2500 B.C. the natural world around Mesopotamia was categorized into domestic animals, wild animals, wild birds, fishes, insects, plants, trees, vegetables and minerals.

Mesopotamians believed that nothing existed without a name, and that once named, the namer held power over the named. They also thought that putting something in writing gave it, and the knowledge about it, permanence. This had the unfortunate effect that texts, once established, were used uncritically, stifling original thinking on a given subject. Thus, efforts to develop knowledge from practical observations of nature and wildlife had begun, but did not progress very far. Nevertheless, the natural world was beginning to be controlled and understood, albeit slowly.

At the same time, the natural world and its wildlife were also increasingly utilized. Much of the area around the rivers was suitable for agriculture but lacked resources necessary to sustain other advancing technologies. This situation encouraged the establishment of trade, which became well developed over time. Mesopotamian merchants traded with other civil societies, as well as with the "barbarians" and their nomadic caravans. Of primary concern was the acquisition of essential raw materials lacking in the Tigris–Euphrates region; however, as commercial ventures progressed and the wealthy prospered, trade in luxury items increased. Included in this trade in luxury items were animals, which were also obtained through confiscations in conquered lands and as tribute from other societies. Early trade in wild exotic animals was undoubtedly negligible since it only fed the passion of a small class of wealthy individuals; however, over time the trade grew as royalty and an increasing number of wealthy individuals attempted to surpass the collections of one another and their predecessors.

Although all classes of society had kitchen gardens and fishponds, royalty and the wealthy landowning class had shade gardens, ornamental gardens and parks. Sumerian shade and ornamental gardens were often small and combined with vegetable plots and orchards. Purely ornamental gardens developed later during the Babylonian and Assyrian period when the wealthy class became more prosperous. For the most part, these gardens and the smaller parks were strictly botanical; the larger parks contained the animal collections.

One of the earliest references to gardens is in the Gilgamesh epic, a story about the adventures of Gilgamesh, King of Uruk (Sumeria) ca. 2750 B.C.; one city he encountered in his adventures was proud that one third of its territory consisted of garden-orchards. Although references to gardens or garden-orchards between 3000 and 2000 B.C. are scarce, later references between 2000 and 1000 B.C. to house, temple and royal gardens are more numerous. By the later Babylonian and Assyrian period, between 1000 and 330 B.C., references to gardens and the larger royal parks become even more common. Likewise, land records during this later period indicate the extent to which gardens had become common features of the wealthy citizen's property holdings.

Property holdings included both domesticated and wild animals. Animals kept included household pets, fish in ponds, birds in flight cages, falcons for sport, lions in cages and wild game in parks. Individuals used blunt arrows to stun wild animals and traps (usually concealed pits) were used to catch these wild animals alive for pets, collections and trade. Some animals, particularly those species rarely seen, were valuable luxury items. Royalty frequently kept tame lions as pets, and other lions were used for hunting or fighting. Lions and other animals were kept for exhibit purposes to

FIGURE 1.2 Lion released from its transport crate into the animal park of Ashurbanipal, King of Assyria (668–627 B.C.) at Nineveh, Mesopotamia. This scene is part of a relief that was on the palace walls. © The British Museum.

impress and entertain local guests and foreign dignitaries. Royal lions were kept in cages and pits during the Ur III period (beginning ca. 2100 B.C.). It is conceivable, therefore, that cages were constructed to hold other dangerous or rare species as well.

Bas-reliefs from Assyrian royal palaces show monkeys, antelopes, camels, elephants and other species brought to the Assyrian kings as tribute. Although they usually viewed nature from a practical perspective, the kings of Sumeria, Babylonia and Assyria were proud of their animal collections, which were symbols of power, wealth and authority. The kings were especially proud of rare specimens their subjects and foreign dignitaries sent after diligent searches and difficult transport. Animals came from Asia via trade with the Indus society and from Africa via trade with the Egyptians (Figure 1.2).

Royalty and wealthy individuals constructed fishponds that also served the economic purpose of keeping fish fresh for the table. They kept wild birds such as ibis, cranes, herons, peacocks and pelicans as pets and in flight cages. Initially, these bird collections also served the economic purposes of being handy food sources and commodities for sale. Falconry and wild beast (primarily lion) hunts were royal sports conducted in the wild and in the royal parks. Royal park collections of elephants, wild bulls, lions, apes, ostrich, deer, gazelle, ibex and other species were combination protomenageries, hunting reserves and garden-parks. The royal families also used the parks for entertaining guests and for personal pleasure.

Eventually, the ability to maintain animals and plants in large park areas was taken to a new level of sophistication with the re-creation of entire habitats. Sennacherib (Assyria, 704–681 B.C.) simulated a marsh environment of southern Babylonia to exhibit rarely seen marsh species from that region of Mesopotamia. He also re-created mountain habitats, one of which is now thought to have been the site of the fabled hanging gardens of Babylon (actually in Nineveh).[28,29] His successors, Esarhaddon (Assyria, 680–669 B.C.) and Ashurbanipal (Assyria, 668–627 B.C.), also provided mountain habitats that resembled the nearby Amanus mountains. Within the cities, the terraces of the monumental, pyramid-shaped, terraced buildings known as ziggurats sometimes were planted with trees, shrubs and vines to give a mountain-like appearance, similar to the hanging gardens of Babylon.

ROYAL PARKS AND THE HANGING GARDENS OF BABYLON–NINEVEH

Babylonian and Assyrian royal parks and hanging gardens were the result of Mesopotamian garden evolution. Some of these parks and gardens may have been public parks for the benefit of the cities in which they were established. However, for the most part, they were for the use and enjoyment of the royal family. Royal parks and gardens were often the site of royal hunts, a place to entertain guests and a place to keep animals.

Tiglath-Pileser I (Assyria, 1114–1076 B.C.) kept herds of deer, gazelle and ibex from conquered territories in his park. He was proud that some of these animals were rare and had never before been seen in Assyria. Ashurnasirpal II (Assyria, 883–859 B.C.) had herds of wild bulls, lions, ostriches and apes, along with many species of imported trees and fruiting plants. Sargon II (Assyria, 721–705 B.C.) was particularly fond of lions and falcons, and laid out several parks around his capital city. Merodach-Baladan II (Babylonia, 721–710 B.C.) had extensive gardens that may have been the predecessors to the fabled hanging gardens. Sennacherib (Assyria, 704–681 B.C.) laid out several parks around his capital (Nineveh) and imported trees and other plants. He also re-created a southern Babylonian marsh environment when he had a swamp created and populated with animals and plants imported from the actual marsh habitat he admired. Sennacherib, Esarhaddon (Assyria, 680–669 B.C.) and Ashurbanipal (Assyria, 668–627 B.C.) re-created habitats of the Amanus mountains in Syria. The conquering Achaemenid (Persian) kings (539–331 B.C.) and Greek rulers that followed continued this tradition of extensive gardens, parks and animal collections. Some of these collections still existed when the Roman armies invaded the region in A.D. 363.

The hanging gardens have become the most famous of these collections. They were urban gardens planted on the terraces of ziggurats, and from a distance they appeared to be vegetation-covered mountains. Surprisingly, these spectacular gardens were not mentioned in Mesopotamian cuneiform texts, which described virtually all aspects of life, business, administration and royal activities. Their description instead comes to us from the writings of Greek travelers, such as Berossos, Strabo, Quintus Curtius Rufus and Diodorus Siculus. The particular hanging garden made famous in these Greek accounts was thought to be one Nebuchadnezzar II (Babylonia, 604–562 B.C.) planted at Babylon to remind Nebuchadnezzar's wife of her mountain meadow homeland, which she missed living in urbanized Babylon.

New research, however, indicates the hanging gardens of Babylon were actually at the palace garden of Sennacherib located at Nineveh, also known at the time (ca. 700 B.C.) as Old Babylon. It was one of Sennacherib's re-creations of habitats that he enjoyed, in this case mountain scenes. The gardens were not unique, as these were only one of many efforts Sennacherib and his predecessors and successors made to create magnificent gardens, parks and animal collections. But they were likely the hanging gardens the Greek travelers saw and wondered at.

Source: Based on Dalley, Stephanie, "Ancient Mesopotamian gardens and the identification of the hanging gardens of Babylon resolved," *Garden History*, 21, 1, 1993 and Finkel, Irving L., "The hanging gardens of Babylon," in *The Seven Wonders of the Ancient World*, Clayton, Peter A. and Price, Martin J., Eds., Routledge, London, 1988, chap. 2.

One aspect of civilization was specialized labor, and this included work related to the keeping of wildlife. Fishermen, bird keepers–fowlers and shepherds cared for the domestic stocks. Servants (animal keepers, perhaps) captured animals in the royal park for release at the appropriate time and place for royal hunts. These servant/animal keepers probably cared for the animals as well. Veterinarians, the ox and ass doctors, dealt primarily with domestic and military livestock, and their fees were preset in King Hammurabi's (Babylonia, 1728–1686 B.C.) Code of Laws.

Animal collections in this region of the world were not unique to Mesopotamian societies. Neighboring Hittite societies also kept pets, domestic livestock and wild animals; however, their wild animal collections were less extensive than those in Mesopotamia. Their collections also served more than one purpose: secular uses, including food, hunting and pleasure; religious uses, including rituals that required animals; and symbolic uses, for which certain species, such as lions and eagles, were reserved for royalty as emblems of their power and authority. As with Mesopotamian collections, Hittite collections contained native and exotic species, including lions, tigers, leopards, wolves, foxes, bears, deer, wild goats, boars, bison, elephants, hares, mice, eagles, snakes, frogs, bees, ants, spiders and several other animals that have not yet been identified.[30]

Persian kings, who conquered Mesopotamia in 539 B.C., continued the Mesopotamian collections using their own traditions of garden design and animal collecting. Greek rulers, conquering the Persians in 330 B.C., did the same, as did the Muslim Arab rulers who followed. Collections in this region still existed in A.D. 363 when Roman armies conquered Babylonia.

1.3.2 Ancient Egyptian Collections

Egyptian civilization began with the unification of lower (the northern delta region of the Nile River) and upper (the southern riverine region) Egypt into the Old Kingdom (ca. 2700–2200 B.C.). Several periods of fragmentation and unification followed: the First Intermediate period and Middle Kingdom (ca. 2200–1786 B.C.), the Second Intermediate period and New Kingdom (ca. 1786–1087 B.C.), the Late Dynastic period (ca. 1087–332 B.C.), the Ptolemaic period (under Greek rule, 332–30 B.C.) and the Roman province period (beginning in 30 B.C.). As time went by, the southern region of upper Egypt was extended farther southward along the Nile River until it covered approximately the same area as does modern Egypt.[15,25,31–35]

This riverine area the Egyptians inhabited was a long, narrow valley dependent upon the seasonally predictable Nile River. There were numerous cities and villages, but these settlements were essentially rural communities with no sharp distinctions between the urban and countryside environments. Kings and priests, with the help of an extensive bureaucracy, controlled government and daily life. Royalty, priests, government officials, and certain other individuals formed the wealthy upper class, artisans and shop owners formed the middle class, and serfs (workers) and slaves formed the lower class. Over time, the society in general, and the upper class in particular, became more prosperous and their luxuries became more extravagant. In the later dynasties, whoever could afford it indulged in a beautiful villa, a fine carriage, a boat, numerous slaves, rich clothing, costly food, good wine, a large herd of cattle, elaborate gardens and exotic animals.

Egyptian belief in magic and superstition hindered significant advances in learning. Nevertheless, outstanding achievements were accomplished in astronomy, geography, biology and technology. Egyptians particularly understood most aspects of basic mathematics, the only science their magic and superstition did not contaminate. Physicians, including veterinarians, developed useful medical and botanical knowledge; however, this knowledge was heavily laced with magic and superstition. These two areas of expertise and belief were closely linked, for many of the drugs and potions the physicians used were of plant origin. Ingredients of animal origin in these drugs and potions were rare. Beyond this, zoology and botany apparently did not become well developed although native and exotic animals and plants were known to the Egyptians, domestication of wild animals and plants was one of their most important activities, and the keeping of animals and plants was one of their great passions.

Representations of animals and plants were pervasive throughout Egyptian culture. Many Egyptian gods assumed animal forms, while other kinds of animals were worshiped without being transformed into gods. Symbols for the lower and upper regions of the Nile River Valley were flowers (the papyrus and the flowering rush, respectively). Animals and plants were graphically rendered as much as any other subject. Domestication of a large variety of birds, ruminants and carnivores was attempted.

Physically, the extent of the Egyptian's natural world was not great. The Nile Valley was relatively narrow, with deserts bordering it on both sides. It had an almost harborless Mediterranean coast to the north and the unknown tropics of Africa to the south. While the valley was pleasant, it was also monotonous, with a limited variety of wildlife, few trees and few wildflowers. Wood was used extensively in the building of structures and boats during the Old Kingdom period, resulting in a gradual decrease in trees and vegetation. Orchards and trees became valuable in the Middle and New Kingdom dynasties, perhaps because so many were cut down during the Old Kingdom. Trees represented shade and protection in an otherwise hot and harsh environment. Deities were thought to live in trees and several groves in each district were considered sacred. The Egyptians believed that trees were essential in cemeteries and near water wells, tombs and temples. They were valued in every kind of garden.

Animal husbandry was primarily concerned with cattle, but the Egyptians experimented with many species. In addition to several breeds of cattle, there were breeds of sheep, goats, donkeys and pigs. Horses and mules came into use between the Middle and New Kingdoms and the camel during the Ptolemaic period. Egyptian domestication attempts included many different kinds of native wild ruminants and carnivores. These animals were fattened on bread dough, as were many kinds of birds. A variety of birds were kept in domestic flocks, particularly geese and ducks, but also swans, doves, ibis, cranes, herons and other marsh and waterbirds. Bees were kept both in the desert and in private gardens, for their honey.

Animal-related jobs in Egyptian society included herdsmen, fowlers–bird catchers, beekeepers–honey gatherers and veterinarians. No doubt there were also animal keepers, but as yet no specific information is known about the individuals who maintained the animal collections. Veterinarians were "physicians"—no separate term existed for animal doctors—who cared for cattle and whose practice was based on human medicine. There are no records to indicate clearly how valued the veterinarian, or any of these animal-related positions, was in Egyptian society. Agriculturists worked harder than anyone at what was considered one of the most important jobs, but these individuals apparently received little recognition or appreciation.

Fowlers came from the lower class, as bird catching was considered one of the dirtiest jobs. Bird hunting, on the other hand, was a sport of the upper class. As one Egyptologist has observed:

> Much of the country formerly covered by marshes and tropical forests was already arable land. At the same time old river beds remained … [and] the greatest delight perhaps that the Egyptian knew was to row in a light boat between the beautiful waving tufts of the papyrus reeds, to pick the lotus flowers, to start the wild birds and then knock them over with the throw-stick, to spear the great fish of the Nile and even the hippopotamus, with the harpoon. Pictures of all periods exist representing these expeditions, and we have but to glance at them in order to realize how much the Egyptians loved these wild districts.*

Both bird hunting and spearfishing, as opposed to commercial bird catching and fishing, were sports of the wealthy. Other sports included harpooning hippopotamus and crocodile and desert hunts for gazelle, antelope, hyena, jackal, fox, leopard, lion and numerous small mammals.

In addition to being a sport of the wealthy, desert hunting was a professional occupation of archers who patrolled the deserts and who protected the honey and resin gatherers working far into these deserts from marauding tribes. Royal hunts ventured not only to the desert regions, but also to more remote regions outside of Egyptian territory. Kings of the New Kingdom dynasties traveled up the Nile River into African territory and along the Euphrates River into western Asia to hunt elephant, rhinoceros, lion and wild bull. Although hunting in the wild deserts and other remote regions predominated, "there is hardly a decorated tomb without its scene of the owner launching showers of arrows with unfailing accuracy at gazelles and antelopes in a fenced-in park rather like a zoo."†

---

* Erman, 1971, 235.
† Montet, 1962, 130.

> Wealthy Egyptians … at all times kept menageries, in which they brought up the animals taken by the lasso or by the dogs in the desert, as well as those brought into Egypt by way of commerce or as tribute. From the neighboring deserts they obtained the lion and the leopard (which were brought to their masters in great cages), the hyena, gazelle, ibex, hare, and porcupine, were also found there; from the incense countries and from the upper Nile came the pard, the baboon, and the giraffe; and from Syria the bear and the elephant.*

Egyptians particularly liked to tame (and eventually domesticate, as has been mentioned) as many of these species as possible. Tuthmosis IV (1425–1408 B.C.) was accompanied by two tame lions used to hunt antelope, and Ramesses II (1298–1235 B.C.) had a tame lion that not only accompanied him into battle, but also guarded the royal tent at night.

Monkeys and birds were often kept as pets. Birdcages in the houses of royalty and wealthy citizens became popular in the New Kingdom, in addition to the more common birdhouses that had always been used for keeping fowl for food, tribute and sacrifice. Egyptians took special delight in displaying wild birds from the marshes, birds of prey and imported exotic species. Fishponds and beehives were also maintained and were often used to complement gardens. Pools became microhabitats containing fish, birds, papyrus, lotus and other aquatic plants. Grander houses and palaces had rooms opening onto gardens in such a way that painted gardens on the walls and floor blended with the real garden just outside the rooms. Paintings of plants, birds and marsh life, together with live birds in cages, blurred the boundary between house and garden as the garden was entered from these rooms.

Trading expeditions were made to obtain needed resources, exotic materials and animals. These expeditions were made to the Holy Land in the east extending up through Palestine, Syria and Mesopotamia for wood, gold, silver, precious stones, horses, bears, elephants, fish and cattle. They extended to Nubia in the south via the Nile River for gold, ebony, ivory, acacia wood, precious stones, dogs, cattle, ostrich feathers and eggs, panthers, panther skins, giraffes and monkeys. They extended to the land of Punt farther south in Africa via the Red Sea for incense, myrrh, other plants and exotic African animals. Little is known about these trading expeditions other than those to the land of Punt.[36,37]

When the Greek Ptolemaic dynasties (323–30 B.C.) replaced the Egyptian New Kingdom dynasties, the city of Alexandria boasted many great amenities. One of these included the largest and most varied animal collection in the ancient world. When the Romans took over Egypt in 30 B.C., this animal collection in Alexandria continued and was probably the source of supply for African animals used in Roman spectacles. Since the collection during these later periods was more properly Greco-Roman than Egyptian, it will be discussed later.

EGYPT'S PUNT EXPEDITIONS

Ancient Egyptians did not often undertake long cross-country journeys; however, trading expeditions to the land of Punt, an African country in what is now the Ethiopia area, had been made since at least the fourth dynasty of the Old Kingdom. These long and difficult expeditions were motivated by the desire of the Egyptians for Punt incense and myrrh, which were used in Egyptian religious services. Even so, there was scant mention of these expeditions until the New Kingdom rule of Hatchepsut (during the eighteenth dynasty, ca. 1520–1480 B.C.). Hatchepsut, the only female pharaoh (something that was generally forbidden—all other female rulers were queens), accomplished much during her well-organized administration. Under her rule, the most ambitious and famous expeditions were made to Punt between ca. 1510 and 1490 B.C. These expeditions were proudly recorded pictographically in her Deir el-Bahari temple.

* Erman, 1971, 243.

Expeditions to Punt under Hatchepsut's sponsorship were significant because of their size and the large amount and variety of items brought back to Egypt, including live myrrh trees for the first time. These trees were planted on the terraced grounds of Hatchepsut's temple to resemble the myrrh terraces found in Punt, thus providing Egypt with its own supply of myrrh. Other items of importance included incense (frankincense), gold, silver, precious gems, ivory, ebony, slaves, animal skins and live animals.

Animals brought to Egypt on the Punt expeditions included birds, greyhounds, cattle, monkeys, apes, leopards, rhinoceroses and giraffes. Some of these animals may have been seen in Egypt for the first time, and they formed the largest known animal collection in Egypt to that time. Unfortunately, although Hatchepsut's temple paintings proclaim the greatness of these acquisitions, they do not depict where the animals were housed or how they were maintained.

Hatchepsut's successors, including the pharaohs of the eighteenth through twentieth dynasties (ca. 1580–1085 B.C.) continued her Punt expeditions. Of particular significance were those of Tuthmosis III, Amenhotep II, Tuthmosis IV, Amenhotep III, Ramesses II and Ramesses III. These pharaohs, along with Hatchepsut, had extensive animal collections, primarily because they were supplied with exotic African species from Punt.

Source: Based on Montet, Pierre, *Everyday Life in Egypt*, Edward Arnold, London, 1962 [translated by A. R. Maxwell-Hyslop and Margaret S. Drower]; Naville, Edouard H., *The Temple of Deir el-Bahari*, Trubner & Co., London, 1894–1908. [issued as the 12–14th, 16th, 19th, 27th, 29th Memoir of the Egypt Exploration Fund]; and Tyldesley, Joyce, *Hatchepsut: The Female Pharaoh*, Viking, New York, 1996.

1.3.3 Ancient Asian Collections—India and China

Observations of the earliest European explorers and merchants to reach Asia indicate royal animal collections existed throughout the region. These observations, made during the sixteenth and seventeenth centuries, are brief morsels scattered among many observations in voluminous travel accounts. Collections mentioned in these accounts were probably continuations of older royal collections, but until more is known about them, the age of these collections remains undetermined. Considering what is known about collections in India and China, however, these other Asian collections may date to ancient times.

An Indus civilization that existed from ca. 2500 to 1500 B.C. was centered around two principal cities, Harappa and Mohenjo-daro, on the Indus River in what is now Pakistan. To date, little is known about the zoological activities of this Indus civilization; however, animals were domesticated, most importantly the elephant. Contact existed with Mesopotamia, as evidenced by the authenticating seals used on traded commodities. These seals depicted wild animals, such as elephants, tigers, rhinoceroses, buffalo, antelope and gharials. Animals such as peacocks and apes, as well as ivory, were exported.[15,25,38–45]

A wealthy class of people in Indus society enjoyed gold, silver, jewels and other marks of wealth. Because of their wealth, their artistic depiction of wild animals and their contacts with other ancient societies (which had animal collections), it is probable that animal collections of some kind were part of Indus society. However, no direct evidence indicates that any structures were used for animal collections.[46] Since the Indus written language has not been deciphered, their attitudes toward nature or animals are not known.

There was little continuity between the ancient Indus civilization and the later Indo-Aryan societies that prospered throughout India between ca. 1500 B.C. and A.D. 1500. Indo-Aryan animal collections are much better known because there is more documentation and because these collections still existed when the Europeans arrived. Indo-Aryan societies, along with their animal collections,

may be representative of the kinds of collections that existed throughout Asia during this same period. These collections had uniquely Asian characteristics that are best described by Walker in Chapter 8 on the zoological gardens of India.

Another region in Asia with a highly developed civilization was China. Like Egypt, China's history has been marked by alternating periods of unification and fragmentation. The first period of unification began with the Shang dynasty (ca. 1500–1000 B.C.) along the Yellow River.[47–53] Periods of unification represented stable times under the most influential rulers. It was during these periods that significant animal collections often developed. Some dynasties are better known for their animal collections and gardens, the importation of exotic species and the study of the natural sciences; nevertheless, it seems they all had animal collections.

Ancient Chinese attitudes toward wild animals and nature vacillated from ethical concern to uncaring use, but for the most part they were unfriendly and fearful. The Chinese viewed animals and landscapes they did not control as menacing and alien, as much, if not more so, than did the Mesopotamians or Egyptians. These attitudes moderated in later dynasties but never completely subsided. Intellectual interest in the natural sciences was minimal except for plants, animals and minerals used for medicinal purposes. Nevertheless, wild animals, especially exotic species, held the interest of rulers and the wealthy class, as they did in other ancient societies.

From the beginning, royal animal collections served both practical and aesthetic purposes. Starting with the founder of the Shang dynasty, China's rulers built animal reserves; however, it was Wen Wang, founder of the Zhou dynasty, who built the first well-known animal reserve. This reserve and similar royal and baronial parks (parks owned by the wealthy class) of the Zhou period (ca. 1000–200 B.C.) were large, walled-in natural areas that required their own staffs of administrators, keepers and veterinarians.

Han dynasty (ca. 200 B.C.–A.D. 220) rulers continued this tradition of large royal parks. Emperor Wu Di enlarged an established reserve around 140 B.C. The reserve was a large wilderness area, but it also had some 70 palace buildings and water gardens. It contained exhibits of gems and minerals, native and exotic plants and animals, including swans, geese, ducks, waterbirds, shorebirds, great bustards, herons, cormorants, turtles, alligators, sturgeons, various aquatic species, camels, asses, mules, horses, yaks, deer, elephants, rhinoceroses and possibly giant pandas. Animals were obtained locally and from Mesopotamia, India and other regions of Asia. In addition to keeping animals in their parks, Han emperors kept birds, bears, tigers and other mammals in palace annexes, in what appear to have been private menageries kept for their own personal pleasure. These animals, as well as dangerous animals in the parks, were kept in cages.

Royal and baronial parks served multiple purposes. Collections in these parks were used to provide food and as sources of specimens for religious ceremonies, hunting, entertainment and leisurely enjoyment. The parks were also the stages for combat spectacles between animals, as well as between men and animals. Chinese combat between men and animals usually involved unarmed men who fought lions, leopards, bears, yaks, elephants, or rhinoceroses. The death of the animal in the course of combat was apparently not the purpose, for it seems the combat itself was the primary interest.

Following the Han dynasty, the Jin, Tang and Song dynasties (ca. 265–1279) continued the fashion of extravagant parks. Generic terms were used to describe different kinds of parks and gardens, for example, *yuan* (a royal park, hunting park, or forest reserve, originally used to describe a large open park) and *you* (a fenced animal reserve or wildlife enclosure, originally meant to connote a fenced *yuan*). Many of these parks and gardens were given individual names by their owners. One park most often known by its personal name was the famous animal reserve of Wen Wang, which he called "Lingyou," commonly referred to as the "Garden of Intelligence"; however, a more accurate meaning would be "Garden for the Promotion (Encouragement) of Knowledge."

Unlike the Mesopotamian and Egyptian collections, which continued under the influence of other societies, the Chinese collections evolved without outside interference. The story of the Chinese collections of the Yuan and Ming dynasties (1200s–1600s), made famous through the travels of

Marco Polo and the trading expeditions of Zheng He, respectively, is told below within the discussion of the medieval period (Section 1.3.6).

1.3.4 Greek and Roman Collections

Greco-Roman societies (ca. 1100 B.C.–A.D. 476) existed alongside those of Mesopotamia and Egypt and eventually overshadowed and conquered them both. Greek intellectual inquiries went beyond what could be learned simply through observation, the factor limiting the growth of knowledge in other previous societies. However, the Greeks' curiosity was still primarily practical and descriptive. Although they had an appreciation for nature, the Greeks were intent on controlling nature, creating what Cicero later called "another nature" out of the wilderness that surrounded them. A primary concern of the Greek city-states was the creation of this second nature, an agricultural and man-made environment. Associations between certain gods and trees were particularly strong, with places of worship located in sacred groves.

Roman natural science was derived from Greek science and made few independent, original contributions. Nevertheless, Roman efforts to copy texts (that were later lost) and compile what was known into encyclopedic tomes carried ancient knowledge about animals forward to the medieval period. Similar to the Greek view, Roman attitudes toward nature were practical and utilitarian. While Romans enjoyed the beauty of nature and preferred rural life over urban life, they felt the land and its natural resources should be used productively. Extensive agriculture, deforestation, mining, quarrying and hunting modified the environment significantly.[15,54–57]

By the end of the Greco-Roman period, a number of animal populations within their region of influence had been eliminated and the environment was deforested and degraded. This damage was so extensive that evidence was still obvious some 1,400 years later, prompting George Marsh to write *Man and Nature: Or, Physical Geography as Modified by Human Action*, one of the first modern books (published in 1864) concerning the need for environmental conservation.[56] To understand how the use of wildlife during this period impacted wild populations so severely, one needs to first examine the early years of the period.

While expressing a desire to enjoy and protect their environment, the early Greeks (up through 323 B.C.) depleted many of their natural resources. Agriculture and deforestation in particular modified the environment. As a result, the Greeks took an interest in forestry, controlling the cutting, exporting and importing of lumber and experimenting with replanting some areas. Mining and quarrying also presented environmental problems, as did hunting, which brought some animal populations to extinction and decimated others. Grazing domestic stocks also took their toll on the countryside and the wild animals that lived there.

Greek curiosity, travel and trade provided favorable conditions for developing animal collections; however, the ruling city-states did not have enough wealth or influence to develop large collections. Pets included various kinds of birds, monkeys, weasels (probably the polecat, domesticated as the ferret to catch vermin), hedgehogs and harmless snakes. Temple collections maintained animals for processionals, during which wild animals appeared in cages, while tame ones walked on leashes or pulled vehicles. Showmen and professional animal trainers exhibited wild animals for entertainment. Some animals, such as bears and lions, were common; others, such as tigers, were rare. Bears and lions were common because they could still be found in Greece and its neighboring areas at the time. Rare animals were ones from other lands that did not exist locally and were not often seen within Greece. Whether an individual animal was considered native or exotic depended on where it was captured. An animal from another land was considered exotic, even if it was the same species as one found locally.

During the Hellenistic Greek period (323–27 B.C.), from the death of Alexander the Great to the reign of the Roman Empire, the number of exotic animals brought into Greece increased, but this does not seem to have influenced the development of collections. Alexander's campaign into Persia and elsewhere in Asia was the most significant Greek expansion of power and brought the Greeks

into contact with little-known lands and animals. Alexander had many of these animals sent back for Aristotle to study, but there is as yet no known information on whether the animals remained alive for an appreciable period of time or if they were maintained in collections. Hellenistic monarchies established after Alexander's death in Macedonia, Asia and Egypt maintained animal collections, but there is little information to indicate these were very extensive, except for the collection at Alexandria in Egypt.

Ptolemy II (283–246 B.C.) established the largest and most varied of the Hellenistic collections at Alexandria. After taking over the Egyptian dynasties, Ptolemaic rulers, the wealthiest, most powerful and most influential of the Hellenistic monarchies established many excellent cultural institutions at Alexandria, making the city one of the centers of ancient scholarship. Unfortunately, while ancient scholars and travelers often mentioned the animal collection of Alexandria, no details were provided. This collection still existed when Egypt became a Roman province in 30 B.C.

The Roman Republic (ca. 509–27 B.C.) began as a city-state at Rome and eventually occupied the entire Italian peninsula. These early Romans were content with their native soil and wildlife for many years, having no desire to conquer other territories or to import exotic wildlife. During this time, hunting and baiting native wildlife were popular. In baiting, animals (usually dogs) were used to attack another animal (such as a bear) that was tethered. This form of "entertainment" remained popular through the medieval period. Deer, wild goats, boars, bears and bulls were often hunted and used in baiting. The first known exotics in the Republic were four Indian elephants captured in a battle at Heraclea against King Pyrrhus and later marched in the procession celebrating the victory (280 B.C.). Thirty years later some 100 African elephants, along with their mahouts, were taken in a battle with the Carthaginians and marched to Rome. These elephants were exhibited to the citizens of the Roman Republic at towns along the route.[58,59]

Although there is no direct evidence of elephant collections during this time, the large numbers of elephants used in military battles indicate that these collections must have existed. Elephants used for military purposes had mahouts who controlled, trained and cared for them, all of which needed to be done at "collection" sites. Throughout the late Republic period and the Empire period, Roman legions faced elephants in battle, their Eastern enemies using Indian elephants and their Carthaginian enemies using African elephants. Despite the use of elephants in battle by the opponents of Rome and the large number of elephants that Rome captured and kept, the Roman army itself rarely used elephants. The Romans believed their enemies' elephants could be successfully opposed by well-disciplined Roman troops and that elephants were just as likely to trample their own troops, if routed, as they were the enemies' troops.

Early Republic hunts and processionals evolved into increasingly elaborate spectacles. These included religious ceremonies, triumphant marches, special events and the *venationes* (public games with animal versus animal and human versus animal combats). Extravagant spectacles began in the late Republic period, but did not reach full notoriety until the Empire period (27 B.C.–A.D. 476). Historians and others have written a great deal about these spectacles because of the large number of animals displayed and killed; however, little has been written about the collections where these animals were kept.[60,61]

In addition to these rather well-known uses of animals, more humane, aesthetic uses of animals existed among the wealthy class, civil administrators and emperors. Both native and exotic wild animals could be found in villa gardens, ponds, bird enclosures, cages, large parks and hunting reserves. The largest of these collections belonged to the emperors, and these collections grew as Roman imperialism spread throughout Europe, Africa and Asia. Imperial expansions brought the Romans into contact with new species of exotic wildlife and with existing foreign collections. As previously noted, Ptolemy II's collection still existed when the Romans overtook Alexandria in 30 B.C. Roman armies also encountered a large collection in Babylonia when they conquered that region in A.D. 363.*

* Jennison, 1937, 134–135.

Public entertainment included itinerant acts with performing animals, but the greatest interest was in the more exciting processionals and public games that emperors, provincial administrations and sometimes wealthy citizens provided. After the initial appearance of elephants in the third century B.C., exotics began replacing native species in the spectacles. Some of these early exotic species included lions, leopards and ostriches, and by the first century B.C., hippopotamuses and crocodiles were included as well. An exhibit at Pompey in 55 B.C. had lions, leopards, monkeys, elephants and an Indian rhinoceros. A few years later, the first incidence of a giraffe in Roman territory was recorded in 46 B.C. These uses of exotic species for exhibition purposes in spectacles increased significantly during the Empire period.

Emperors of the Roman Empire surpassed the Republic's grandeur in every way, including their private collections and public spectacles. These spectacles were presented throughout the Empire, but the most extravagant were those the emperors provided at Rome. Emperors and administrators had the best access to wild animals, although the upper class had some access as well. The ability to obtain wild animals, especially exotic species from distant lands, depended on an individual's wealth and influence, and exotic animals provided the most status.

Hunters, collectors and dealers existed throughout the Roman Empire to obtain animals for private collections. Emperors, however, simply had to make a request to obliging officials and military officers to have animals delivered. Soldiers often captured wild animals for the emperors; the commanders considered it good training for battle. Large military units and municipalities had vivaria for keeping wild animals after they were caught, and there was a state-owned vivarium at Laurentum outside Rome where the imperial elephant herd, managed by a *procurator ad elephantos*, was kept during the first and second century A.D. *Vivarium* is one of several Latin terms that have given rise to modern zoo terminology. Although popular through the nineteenth century, *vivarium* is seldom used today, while other terms, such as *aviary*, are still used.

A variety of capture techniques were used, as one might expect, but the most common were the pit and the netted corral, into which wild animals were driven. Once caught, the animals were transported in solid wood crates, or in barred crates if the animals had calmed down sufficiently. They were transported by wagon, as well as by boat; many animals did not survive the difficult journey. Animals needed for a procession or spectacle were sometimes requested as far as two years in advance.

Animals used in public spectacles were kept in stockyards (a crude form of vivarium) located on the outskirts of town. These holding areas were purposely located away from the main activity centers of town as a safety precaution in case an animal escaped. Public games featuring animal versus animal combats, or human versus animal combats, were usually held in the morning, with the gladiatorial combats following in the afternoon. The latter were considered more important and were preferred by the cultured classes. After the games, any animals still alive were caught, crated and moved back to the stockyards.

Various professions were associated with keeping wild animals, including dealers, performers, animal slayers (those who fought animals in public games), trainers, keepers and veterinarians. In addition to the state-owned stockyards, collections were maintained in a variety of small enclosures, large parks, hunting reserves, bird flight cages and fishponds. Ordinary citizens commonly maintained freshwater fishponds, whereas saltwater fishponds, which were expensive to create and maintain, were a hobby of the nobility.

Roman bird and mammal collections contained a wide variety of species. In the bird collections were waterfowl, poultry, nightingales, goldfinches, thrushes, parrots, peafowl, pheasants, cranes, storks and flamingos. The most common mammals kept as pets or in collections were dogs, cats, monkeys, weasels (tame ferrets used to control vermin), deer, gazelles, wolves, foxes, lynxes, caracals, hyenas and camels. Lions, leopards and bears were sometimes kept in cages or as pets in the houses of nobles and in the imperial palaces. Rare species, such as tiger, cheetah, zebra, giraffe, rhinoceros, hippopotamus and crocodile, were usually only found in the emperor's collections. Others, such as elephants, were only exhibited during the spectacles, and no more than one or two elephants are known to have been privately owned.

As the Western Roman Empire declined, so did the public spectacles; however, they continued in the Eastern (Byzantine) Roman Empire. But the spectacles of Constantinople were not the extravagant affairs they had been in Rome, and, in time, they declined as well. The number of animals used in public spectacles increased from hundreds to thousands toward the end of the Roman Empire, if the Roman chroniclers can be believed. Even taking some degree of exaggeration into account, public spectacles involved an enormous number of animals during the existence of the Empire. While almost nothing is known about where the animal collections were housed or how they were managed, the types of animals in the collections are known because of their appearances in these spectacles.

Disintegration of the Roman infrastructure included the loss of Roman collections; however, monarchs, monasteries and municipalities continued to keep wild animals in post–Roman Empire Europe. These European collections continued through the medieval period to emerge as the menageries of the Renaissance period. An intervening period of Arabic influence also included animal collections.

1.3.5 Persian and Arab Collections

Alexander the Great did not conquer Persia, now Iran, until 331 B.C. But the Greeks already knew of their *paradeisos*, the great paradise gardens of the Persians that had existed since about 546 B.C. These gardens were re-creations of the Garden of Eden, a state of supreme bliss, an ideal place. Essential elements of these gardens were geometric designs, water, trees and flowers; animals were not essential to these gardens, but they were sometimes included, especially in the larger park-like gardens. The influence of these gardens was widespread, impressing those societies that conquered Persian territories and spreading to those societies the Persians conquered. These gardens also influenced Islamic garden design as it spread throughout Asia, northern Africa, and Spain (ca. 622–1492).[62]

After Roman Egypt became a province of the Islamic caliphate (in 641), the Egyptian caliph demanded tribute from its southern regions—camels, elephants, giraffes and other animals. Animals were also captured on the caliph's hunting trips and military excursions in these areas. These animals were kept in the caliph's animal collection at Cairo, occasionally to be used in processions or presented as gifts to foreign dignitaries of Persia, India, China and Europe.

During this same period, Arabic science was probably the most advanced in the world, especially in astronomy, mathematics, alchemy and medicine. The natural sciences, however, were not considered important. Despite this lack of interest in the natural world, Arabic animal collections were part of the Muslim court. Abderrahman III (912–961) established an animal park as part of his new city, Zahra (north of Cordova, Spain), in 936. Here he kept animals in cages and fenced enclosures.[63] Large collections also existed in Baghdad, Constantinople and Cairo. These collections continued through the medieval and into the Renaissance period. During both periods, animals were exchanged between European and Muslim rulers. Ottoman Turkish rulers continued the collections under their control and took part in the exchange of animals with European rulers, exchanges that continued through the early nineteenth century when, for example, giraffes were sent from the Cairo collection to England, France and Germany.[64,65]

1.3.6 Medieval Collections

The medieval period (476–1453) is a construct of European history; the era extended from the decline of the Western Roman Empire in Europe to the emergence of the European Renaissance with its accompanying age of European exploration and influence. For other regions of the world, this time period was merely a continuation of their ancient civilizations and remained so until the Europeans arrived on their doorsteps.

With the disintegration of the Roman infrastructure, Europe developed in relative autonomy. Roman provincial animal collections were dismantled or abandoned when the Romans withdrew, and European monarchs, monasteries, and municipalities and their collections filled the vacuum resulting from the collapse of the Roman infrastructure. Monarchs throughout Europe, along with wealthy barons and nobles, provided structure to civilian life and government; monasteries were the spiritual and political centers of the Church and the community; and villages and towns became important urban municipalities.[63,66–72]

The most important of these monarchies, monasteries and municipalities maintained animal collections. Emperor Charlemagne (Charles the Great, 742–814), founder of the Holy Roman Empire, had royal collections at several of his estates. These collections included elephants, lions, bears, camels, monkeys and birds, especially falcons, reflecting the popularity of falconry as a sport of royalty during the medieval period. Some of these animals were sent to Charlemagne from collections held by other monarchs in Europe and elsewhere, as such gifts were a form of recognition and influence; for example, Haroun-el-Raschid, Caliph of Baghdad (765–809), sent two elephants to Charlemagne.

Monks and nuns at the monasteries usually had a keen interest in gardening and small animal husbandry. These activities had practical purposes, but sometimes served ornamental or aesthetic purposes as well. Monks at St. Gallen, Switzerland (early to mid-800s) maintained one of the better known animal collections, which had animal houses, outdoor paddocks and keepers.

When William the Conqueror swept over the isle of Great Britain (1066), he seized the existing game reserves, forming the first British hunting forests and parks. At his manor, Woodstock, he began a collection of exotic animals about 1100. His son, Henry I, enclosed Woodstock and enlarged the collection, which included lions, leopards, lynx, camels and an owl considered to be "rare." In 1235, during the reign of Henry III, animals from this collection were moved to the Tower of London.

Frederick II (1194–1250), Emperor of the Holy Roman Empire, had an extensive collection at his Palermo residence in Italy. He had a particularly fine collection of falcons and was an authority on falconry and bird biology. Based on his experience with this collection he wrote an authoritative text on the subject, *Über die Kunst, mit Vögeln zu Jagen* (*On the Art of Hunting with Birds*, or *The Art of Falconry*), which has been reprinted many times to the present day.[73] Frederick II also had an animal collection that included elephants, giraffes and white bears. Some of his animals were obtained in exchanges with other European monarchs and with Muslim rulers in India (from whom he acquired an elephant), Egypt (with whom he exchanged a white bear for a giraffe), Spain and Constantinople (Figure 1.3).

Louis IX of France (1214–1270) brought back an elephant when he returned from the Crusades. Philip VI (1293–1350) created an area at his Chateau de Louvre for lions and leopards. Charles V (1337–1380) moved this collection to St. Pol and enlarged it. He particularly liked birds and kept many of them in gold and silver cages throughout every room of his chateau. He also kept caged nightingales in his garden trees and had a large flight cage for other birds. Many of the French nobility had animal collections as well. A collection of René, Count of Anjou (1440s), was one of the largest of these collections. The count's estate included a lion house, a small mammal house, a flight cage for birds, a pond for waterbirds, as well as ostriches, camels and elephants.

In Florence, a new lion house was built in 1293 to replace a deteriorating structure the Romans had constructed. By the early 1300s there were three keepers to oversee the 24 lions in the house. On special occasions these lions were set loose in arenas to do battle with other animals, much like scaleddown versions of the earlier Roman spectacles. Medici rulers of Florence, beginning in 1434, maintained animal collections for many generations. Some of the Popes had collections housed at the Vatican. An early collection of Pope Benedict XII (1285–1342) contained ostriches. Pope Leo X (1475–1521) kept tropical birds, lions, leopards, other cats and other mammals. His prize possession

FIGURE 1.3 Sixteenth-century European noble in falconer's regalia. An illustration in *The Art of Falconry* by Frederick II of Hohenstaufen, translated and edited by Casey A. Wood and F. Marjorie Fyfe. © Stanford University Press.

was an elephant named Hanno, which the King of Portugal, Dom Manuel I (Emanuel I, 1469–1521), had given him. Collections of the Italian princes were the first to flourish as the Renaissance began to sweep across Europe. By the fifteenth century, animal parks (as well as the earliest botanical gardens) were found throughout Italy (Figure 1.4).

Sweyn II, King of Denmark (1047–1075), was known to have an animal collection. William IV, Count of Holland (1350s), kept lions, bears and falcons on his estate at The Hague. About the same time, the Dukes of Guelre had a collection at their castle, Rozendaal, near Arnhem. Prosperous Dutch citizens also maintained collections that, whenever possible, included royal animals (those considered emblematic symbols) such as lions and eagles.

Throughout Europe the population at large, although not allowed to view collections of the privileged, saw animals when they appeared in itinerant animal acts during medieval fairs. Municipalities also provided their citizens and visitors with views of animals, which were kept in

FIGURE 1.4 Giraffe the Sultan of Egypt presented to Lorenzo de Medici of Florence, along with a lion and other animals, in 1487. From Sigismondo Tizio's *Historiae Senenses*. © Città del Vaticano, Biblioteca Apostolica Vaticana, Chigi G II 36, fol 148v. Photograph © Biblioteca Apostolica Vaticana.

moats no longer needed for defensive purposes, as well as in pits and cages. Municipalities often kept animals that appeared on the coats-of-arms of the municipalities, such as eagles, lions and hoofed stock (Figure 1.5).

Animal collections at Cairo and Constantinople continued to thrive during the medieval period. Justinian I, Roman Emperor at Constantinople (483–565), maintained one of the largest animal collections of the time. This collection still existed when the Turks overthrew the Eastern Roman Empire in 1453 and it was continued by the Turkish rulers, who also maintained the collections at Cairo when they gained control of Egypt. Travelers fortunate enough to visit the Holy Land and Egypt to see the antiquities and historical sights often stopped to view the menageries at Cairo and Constantinople.

In China, the Yuan and Ming dynasties (ca. 1271–1644) continued their tradition of animal reserves, parks and gardens during this period. Breeding goldfish, as the gold-colored

FIGURE 1.5 Medieval moat at Berne, Switzerland used to display deer. From *Wild Animals in Captivity* by Heini Hediger. Courtesy of Dover Publications, Inc.

Crucian carp became known, was popular during this period and resulted in a variety of forms, shapes and colors. Kept in ornamental ponds and earthen jars, goldfish enhanced many Chinese gardens.[74]

Marco Polo's travels, which supposedly took place from 1271 to 1295, made the Yuan (Mongol) dynasty well known in Europe (whether Polo actually traveled in China is still debated).[49–51] While in China, Marco Polo was in the service of Kublai Khan, which allowed him ample opportunity to observe the emperor's estates and to travel throughout China. Every once in a while, Polo provides us with a glimpse of the animal collections. As was popular with earlier Chinese emperors, the largest collections existed in the royal parks. The Great Khan's royal park was rich with

> beautiful meadows, watered by many rivulets, where a variety of animals of the deer and goat kind are pastured, to serve as food for the hawks and other birds employed in the chase, whose pens are also in the grounds. The number of these birds is upwards of two hundred, without counting the hawks [and] when [the Great Khan] rides about this enclosed forest, he has one or more small leopards carried on horseback, behind their keepers.*

The Great Khan also maintained an elaborate palace where spaces between the buildings were filled with meadows, trees, hoofed stock and other animals. He also kept a herd of some 5000 elephants for use in processions, as well as a herd of camels. His collections included many leopards and lynxes (now considered to have been cheetahs) used for hunting deer. There were lions said to be larger than Babylonian lions with white, black and red stripes (if by red, Polo meant orange, these "lions" were probably tigers). These cats, transported to the hunt in cages on wagons, were used to seize boars, wild oxen, asses, stags, deer and bear for sport. The Great Khan also had a large collection of falcons for falconry, requiring 10,000 falconers to care for the birds. Polo also saw the

* Polo, 1934, 142.

great parks of regional rulers, which were stocked with animals, but unfortunately he says very little about them.[50]

In turn, the Grand Eunuch Zheng He made China's presence better known in Asia and Africa with his Indian Ocean trading expeditions (1405–1433). These trading expeditions were short-lived, however, because Chinese royal court officials did not hold the merchants, who encouraged these commercial ventures, in high esteem and the expedition costs were felt to be an unnecessary expense. Zheng He was the admiral of these expedition flotillas, which involved 62 ships, over 100 auxiliary vessels and almost 30,000 people. These expeditions called at ports in Indochina, Indonesia, India, Ceylon and the eastern coast of Africa. Included in the fleet were "horse-ships," ships normally used to transport horses and domestic stock, but also used to carry wildlife obtained during the expeditions. Spectacular exotic species obtained during these expeditions included giraffe, lion, rhinoceros, oryx, leopard, ostrich and zebra.[52]

Giraffes were particularly important to the Chinese because they thought giraffes were the legendary unicorn, a sacred animal in Confucian tradition representing the virtue of utmost benevolence. A unicorn would appear only if a ruler possessed this virtue. It was therefore with great joy that the newly throned Ming ruler Yongle (1359–1424) received two giraffes a year apart in 1414 and 1415. These events were signals to the Chinese people that Yongle was the ruler of a perfect government, something that had not happened since the great emperors of the past had ruled China. The Chinese royal court prized the other exotic animals brought to China as well, but what could compete with a unicorn?[52]

1.3.7 Aztec and Inca Collections

Civilizations in the Americas may be as old as those of the Old World, but they did not reach their heights until the medieval period. Aztec and Inca civilizations, the largest and most powerful of the New World civilizations when the Europeans arrived, were continuations of earlier civilizations. They had a long history of established urban settlements, monumental architecture (including huge stone pyramids), extensive road systems and an extensive system of irrigated agriculture. There were well-organized and structured trading systems that extended throughout the Americas, and there were impressive animal collections.

Aztec civilization, which flourished between 1345 and 1521, was at its height prior to the arrival of Hernando Cortes in 1519. When Cortes arrived, Montezuma had just taken power from his rivals, Nezahualpilli and Nezahualcoyotl, and had moved the capital from Tezcuco to Tenochtitlan, a Venice-like city at the center of Lake Texcoco (where Mexico City is now located).[75–81]

The Aztecs were pictographically literate, artistic, agricultural (although few animals were domesticated) and skilled, but they did not use iron, the wheel, or the plow. A favorite science of the Aztec dynasties was astronomy, although civil engineering was clearly well developed in view of the quality of their communities, houses and pyramid temples. They also possessed a good understanding of animals, plants and minerals. Metals, gemstones, silver, gold and other materials, in addition to their practical uses, were made into figurines resembling animals familiar to the Aztecs. Their live collections were supplemented with well-made, detailed figurines. These replicas amazed Cortes: "There was not a living thing on land or sea of which Muteczuma [sic] could have knowledge which was not so cunningly represented in gold, silver, precious stones or featherwork as almost to seem the thing itself."*

There were extensive gardens throughout Tezcuco and the surrounding countryside. These gardens contained water basins stocked with various kinds of fish, flight cages containing a variety

* Cortes, n. d. (1991), 84.

of birds and other animals. Terraced hills were filled with hanging gardens, streams, lakes and waterfalls. Royal forests were extensive and the Aztecs had laws to ensure their preservation. On the march to Tenochtitlan, Cortes came upon these gardens and well-tended groves. Surrounding the capital were groves of oak, sycamore and cedar intermingled with farms, orchards and flower gardens. Streets into the capital were lined with buildings that had gardens on the ground and on their upper levels.

Montezuma had several residences, each of which had gardens, fishponds and birds. His most elaborate residence was at the new capital, Tenochtitlan. This aggregation of several thousand buildings had, among other things, a birdhouse, a wild animal house (with mammals, birds of prey and reptiles) and a collection of deformed humans. The animal houses and birdhouses were contained within extensive gardens of flowering plants, fragrant shrubs and medicinal plants. These gardens also contained freshwater and saltwater ponds filled with fish and waterfowl.

Describing the birdhouse Cortes observed,

> There were also ten pools of water in which were kept every kind of waterfowl known in these parts, fresh water being provided for the river birds, salt for those of the sea and the water itself being frequently changed to keep it pure: every species of bird, moreover, was provided with its own natural food, whether fish, worms, maize or the smaller cereals.

Impressed with this collection, Cortes noted, "It was the whole task of three hundred men to look after these birds. Others likewise were employed in ministering to those who were ill."*

A separate collection contained mammals, birds of prey and reptiles, perhaps because these animals required a building with sturdy cages.

> He had also another very beautiful house in which there was a large courtyard, paved very prettily with flagstones in the manner of a chessboard. In this palace there were cages some nine feet high and six yards round: each of these was half covered with tiles and the other half by a wooden trellis skillfully made. They contained birds of prey, and there was an example of every one that is known in Spain, from kestrel to eagle, and many others which were new to us. Other large rooms on the ground floor were full of cages made of stout wood very firmly put together and containing large numbers of lions, tigers, wolves, foxes and wild cats of various kinds.

The size of this collection required a workforce equal to that needed at the birdhouse, as "there were likewise another three hundred men to look after these animals and birds."†

One of Cortes's men, Bernal Diaz del Castillo, recorded his observations on this mixed collection of birds and mammals:

> Many kinds of carnivorous beasts of prey, tigers and two kinds of lions, and animals something like wolves and foxes, and other smaller carnivorous animals, and all these carnivores they feed with flesh, and the greater number of them breed in the house.

In addition, he mentions the reptiles housed in this collection:

> They also have in that cursed house many vipers and poisonous snakes which carry on their tails things that sound like bells. These are the worst vipers of all, and they keep them in jars and great pottery vessels with many feathers and there they lay their eggs and rear their young.‡

---

* Cortes, n. d. (1991), 95.
† Cortes, n. d. (1991), 95–96.
‡ Diaz del Castillo, 1956, 213.

While Cortes considered these collections, along with many other things he saw, to be as good as anything in his native Spain, and although his awe of the Aztec civilization is evident in his writings, he still considered the Aztecs barbarians. By 1521, Cortes had conquered the Aztecs, decimated their population and destroyed their cities, gardens and animal collections.

Inca civilization, which reached its pinnacle between 1440 and 1533, was weakening when Francisco Pizarro arrived in 1531. The Incas were less cultured than their predecessors and neighbors, but incorporated the best aspects of these cultures into their own as they assumed power. The Incas eventually established a well-organized government and a complex social system that stretched from present-day Ecuador to central Chile. It had about 10,000 miles of roads with runners communicating information orally or with the *quipu* (a set of colored cords with coded knots). They had no written language, did not use the wheel or iron and domesticated very few animals. Royal Inca were the ruling caste with absolute control over other castes and societies; however, they integrated these others into their own system and were tolerant of conquered societies. They were less brutal than the Aztecs and attempted to mold conquered societies into one nation.[80,82]

The Incas were not scientifically oriented, but they did have a refined knowledge of astronomy and various aspects of nature, particularly medicinal plants. Like the Aztecs, the Incas had animal collections and gardens, both real and artificial. The royal palace at Cuzco contained one such collection fabricated in gold and silver. The chronicler Garcilaso de la Vega noted,

> It contained many herbs and flowers of various kinds, small plants, large trees, animals great and small, tame and wild, and creeping things such as snakes, lizards, and snails, butterflies and birds, each placed in an imitation of its natural surroundings.

In this extensive royal collection,

> There were birds of all kinds, some perched on the trees as if they were singing, while others were flying and sucking honey from the flowers. There were, too, deer and stags, lions, tigers, and all the other animals and birds that bred in the country, each being set in its natural surroundings to give greater similitude.*

This palace collection was imitated in the estates of the provincial lords and in the temples.

The Temple of the Sun was covered with

> many gold and silver figures copied from life—of men and women, birds of the air and waterfowl, and wild animals such as tigers, bears, lions, foxes, hounds, mountain cats, deer, guanacos and vicunas, and domestic sheep—were placed round the walls in spaces and niches.

In addition,

> they imitated herbs and such plants as grow on buildings and placed them on the walls so that they seemed to have grown on the spot. They also scattered over the walls lizards, butterflies, mice, and snakes, large and small, which seemed to be running up and down.†

There were also real gardens filled with orchards, groves of trees, flower beds and sweet smelling herbs that were all native to Peru. And there were real animal collections as well. Royal Inca and provincial lords conducted hunts and captured a variety of wild animals, along with guanacos and vicunas that were caught for the domesticated herds. Some wild animals that

* Vega, 1966, 188, 315.
† Vega, 1966, 313–314.

regional lords sent the Royal Inca as tribute were killed. Captured wild animals were kept in collections maintained at a variety of locations. Although some of these animals were kept at the royal court, others were kept in various districts of the capital, districts that were named for the kinds of animals kept there, such as the *amarus* district (where large snakes were kept), the *pumacurcu* and *pumapchupan* districts (where large cats and bears were kept) and the *surihualla* (the ostrich field). Wild animals were kept for aesthetic purposes, for demonstrating the ruler was pleased with the lords who presented the animals and for ceremonial uses. More specific information on these collections is lacking since, unlike the conquerors of the Aztecs, Pizarro and his officials did not leave detailed eyewitness descriptions of the Inca animal collections. By 1533, Pizarro had succeeded in subduing the Inca, destroying the animal collections in the process.

One other major Central American civilization, the Mayan civilization (ca. 250–925), still existed when the Europeans arrived, but was greatly diminished in stature. Much of what we know about the Mayans therefore comes from archaeological evidence rather than colonial documentation. Mayans had gardens, fishponds and pets—such as parrots, other birds, monkeys, coatis and kinkajous. They hunted wild animals, were familiar with wild animals and plants, and domesticated a few species. Folk systematics of their descendants, the Tzeltal society, indicates a knowledge of animals and plants that no doubt existed in the past as well.[83,84] Long-distance trade was used to obtain exotic luxury items, including feathers, jaguar hides and teeth, shark teeth, stingray spines and shells. Royalty and the wealthy imported these items for status purposes. Based on their socioeconomic characteristics and zoological activities, it is conceivable that they kept wild animals in addition to animals for pets and for domestication. Unfortunately, as with the ancient Indus society of India, no conclusive evidence proves that animal collections existed. Knowledge of this aspect of their lives has thus far eluded the historian.[83–87]

While Aztec and Inca animal collections were quite impressive, they were destroyed and had no influence on the emerging European Renaissance collections. Exploration of the Americas and the discovery of many New World species, however, did have profound consequences for these European collections.

1.4 MENAGERIES

1.4.1 European Menageries

Europe evolved into a continent of nation-states with increasing power, wealth and influence during its Renaissance. Relatively small and scattered royal, monastic and municipal collections from the medieval period began to increase in size and numbers. These collections were to become known as *menageries* (although this term did not come into use until about 1712, it is often used to describe earlier collections, especially from this period). Proliferation of fifteenth- and sixteenth-century European menageries coincided with expanding European exploration. Most animals came to these collections from the three parts of the world then familiar to collectors: Europe, Africa, and Asia.[88] Collectors knew these animals through books, art and other collections. Along with familiar animals, collectors obtained animals that had not been seen in Europe since ancient times, such as the rhinoceros brought to Portugal in 1515 for King Dom Manuel I. A new region also joined the three parts of the world then familiar to Europe. As the German cartographer who named this new region, Martin Waldseemüller, pointed out in 1507, the "fourth part of the earth, which … we may call … America," was different and unexpected.[89] New World fauna provided many familiar species (the North American), as well as many unknown species (the South American) (Figure 1.6).