Walk-Through Aviaries

Walk-through aviaries have special entrances and exits with doors connecting a zoo walkway to an enclosed vestibule and another set of doors that connect the vestibule to the aviary. Making sure both sets of doors connected to the vestibule are never open at once prevents any resident birds from accidentally escaping.
zilvergolf/Adobe Stock

Species choice is an important step in designing a successful exhibit. Certain species that can be dangerous, such as raptors and cassowaries, are not suited for aviaries because visitors share space with the birds. Nonaggressive birds—including, but not limited to, tits, magpies, finches and sparrows—are excellent choices for walk-through exhibits. Some birds that spend much of their lives on the ground, such as pheasants and quails, can also be safely housed in walk-through aviaries.[112] In addition to adequate space, facility staff involved with designing an aviary must have an understanding of all selected species' natural proclivities. Adding design features—such as extra nesting boxes, more feeding stations, etc.—can reduce competition over roosting areas, nesting sites, food and other resources. Many birds have complex social behaviors, and an aviary must be designed in a way that allows each species to naturally interact with one another.[113]

History of Walk-Through Aviaries

The first walk-through aviary was built by Smithsonian Institute to house birds at the St. Louis World's Fair in 1904.[1] The exposition sprawled across Forest Park as part of a celebration of the centennial anniversary of the Louisiana Purchase.[2] The aviary was subsequently purchased by the Saint Louis Zoo, where it currently remains.[3] Today, walk-through aviaries are a common feature in many zoos, some safari parks and even a few aquariums worldwide.[4]

©Saint Louis Zoo

1 Miller, R. E., Lamberski, N., & Calle, P. (Eds.). (2019). Fowlers Zoo and Wild Animal Medicine: Current Therapy (Vol. 9). St. Louis, MO: Elsevier.
2 Saint Louis Zoo. (n.d.). 1904 World's Fair Flight Cage. Retrieved August 28, 2019, from https://www.stlzoo.org/visit/thingstoseeanddo/historichill/1904flightcage
3 ScienceDirect. (n.d.). Aviaries. Retrieved August 28, 2019, from https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/aviaries
4 Miller, R. E., Lamberski, N., & Calle, P. (Eds.). (2019). Fowlers Zoo and Wild Animal Medicine: Current Therapy (Vol. 9). St. Louis, MO: Elsevier.

112 ScienceDirect. (n.d.). Aviaries. Retrieved August 28, 2019, from https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/aviaries
113 Miller, R. E., Lamberski, N., & Calle, P. (Eds.). (2019). Fowlers Zoo and Wild Animal Medicine: Current Therapy (Vol. 9). St. Louis, MO: Elsevier.

Entrances and exits are designed to prevent birds from accidental escape. Usually, there is a small vestibule at the entrance and exit. This is an enclosed area with a door leading to/from the aviary and a door leading from/to the rest of the zoo. By making sure only one door is open at a time, this design prevents many potential bird escapes.[114]

Walkways must be well-demarcated so visitors do not accidentally disrupt any exhibit features. Additionally, appropriate signage is of the utmost importance, as zoo visitors must understand they cannot feed or touch birds in aviaries. During operating hours when the aviary is open to visitors, AZA standards require zoo staff supervision. This helps safeguard both visitors and birds from preventable injuries and inappropriate interaction.[115]

To keep animals and visitors safe, there must always be staff to monitoring walk-through aviaries.
marcuspon/Adobe Stock

114 Forshaw, J. M., & Shephard, M. (2012). Grassfinches in Australia. Collingwood, VIC: CSIRO Publishing.

115 Miller, R. E., Lamberski, N., & Calle, P. (Eds.). (2019). Fowlers Zoo and Wild Animal Medicine: Current Therapy (Vol. 9). St. Louis, MO: Elsevier.

Mixed-Species Exhibits

Designing exhibits to house multiple species can have several major advantages but must be done carefully, as it poses some serious risks as well.

An exhibit that houses multiple species allows a facility to save space and reduce cost while still displaying the same number of species.[116] Since different species can use different parts of the exhibit (e.g, birds can perch in foliage and trees while tortoises can use the ground space) they can safely share the same enclosure.[117]

Giraffe and zebra are both native to Africa; putting them in an exhibit together can simulate what a visitor might see if they were visiting these animals' natural habitat.
Julia Mashkova/Adobe Stock

By displaying species that normally live together in the wild, exhibits can be an informative educational display for visitors. Some species even have symbiotic relationships, and housing them together can give visitors an opportunity to view these interspecies interactions.[118] For example, some birds eat parasites off other species.[119]

The most serious problem a facility must consider before constructing a mixed species exhibit is the possibility of interspecies aggression. This could be potentially fatal in some cases. It is usually caused by one species failing to identify the warnings or threats of another, and can be mitigated by careful selection of compatible species. Certain species that are known to be territorial, aggressive or predatory, such as leopards, must not be housed in a mixed-species exhibit since they could harm other animals.[120]

Another risk is the potential for transmission of disease or parasites from one species to another. However, as will be discussed in Stage 3: Animal Health, proper quarantine procedures will help prevent introducing disease into a zoo population.[121]

116 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

117 Kleiman, D. G., Allen, M. E., Thompson, K. V., & Lumpkin, S. (Eds.). (1996). Wild mammals in captivity: Principles and techniques. Chicago, IL: University of Chicago Press.

118 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

119 Sazima, I., & Sazima, C. (2010). Cleaner birds: an overview for the Neotropics. Biota Neotropica, 10(4), 195–203. doi: 10.1590/s1676-06032010000400025

120 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

121 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

Unwanted interspecies breeding might also occur in mixed-species exhibits. For example, zebras and African wild asses can interbreed.[122] This can be prevented by either opting to not place the animals in the same exhibit or through birth control methods, which will be expounded upon in Stage 8: Conservation and Breeding Programs.[123]

Visitors might glean an educational benefit if all species come from the same general geographical region.[124] For example, an exhibit highlighting southern California could house California quails with California desert tortoises and black-tailed jackrabbits, and include plants native to the region.[125]

However, there are exceptions. For example, rheas and emus can successfully share an enclosure, despite being from two different continents. These two species can demonstrate convergent evolution to zoo visitors.[126]

Animals might compete over resources such as resting or feeding areas. Therefore, the design of mixed-species exhibits must incorporate more resources than would be necessary in single-species ones.[127] For example, exhibits that house multiple bird species should have lots of perching spaces, just as they do in walk-through aviaries.[128]

Fun Fact

Convergent evolution is the process in which organisms independently evolve similar features. Examples include wings in pterosaurs, birds and bats; spines on the bodies of echidnas, hedgehogs and porcupines; the silk-producing ability of spiders, silk worms, silk moths and weaver ants; and echolocation in dolphins and bats.[1]

1 Biology Dictionary. (n.d.). Convergent Evolution. Retrieved August 29, 2019 from https://biologydictionary.net/convergent-evolution/

122 Bradford, A. (2016, April 1). Facts About Donkeys. Retrieved August 29, 2019, from https://www.livescience.com/54258-donkeys.html

123 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

124 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

125 Saint Louis Zoo. (n.d.). Mixed Species Exhibits. Retrieved August 29, 2019, from https://www.stlzoo.org/animals/enrichmenttraining/mixedspeciesexhibits

126 Sackton, T. B., Grayson, P., Cloutier, A., Hu, Z., Liu, J. S., Wheeler, N. E., … Edwards, S. V. (2019). Convergent regulatory evolution and loss of flight in paleognathous birds. Science, 364(6435), 74–78. doi: 10.1126/science.aat7244

127 Kleiman, D. G., Allen, M. E., Thompson, K. V., & Lumpkin, S. (Eds.). (1996). Wild mammals in captivity: Principles and techniques. Chicago, IL: University of Chicago Press.

128 Miller, R. E., Lamberski, N., & Calle, P. (Eds.). (2019). Fowlers Zoo and Wild Animal Medicine: Current Therapy (Vol. 9). St. Louis, MO: Elsevier.

Hiding areas and visual barriers allow animals to isolate themselves from other resident species if they choose to. Heavily planted areas, large rocks, logs, nest boxes, caves, etc. can all provide hiding areas.[129]

Providing different areas within an exhibit that are ideal for individual species can also help mitigate or prevent interspecies issues. Small branches or burrows can be used by smaller, lighter animals and exclude larger, heavier ones; large caves might be too open for smaller species, but ideal for larger ones.[130]

If a facility has continuing issues with animals in a mixed-species exhibit, it can opt to only house a single species in the enclosure. However, good design and careful species selection can maximize the success of these visually appealing exhibits.[131]

Not many animals can be housed with rhinoceroses, but several bird species can live with them in harmony.
photobeginner/Adobe Stock

129 Kleiman, D. G., Allen, M. E., Thompson, K. V., & Lumpkin, S. (Eds.). (1996). Wild mammals in captivity: Principles and techniques. Chicago, IL: University of Chicago Press.

130 Kleiman, D. G., Allen, M. E., Thompson, K. V., & Lumpkin, S. (Eds.). (1996). Wild mammals in captivity: Principles and techniques. Chicago, IL: University of Chicago Press.

131 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

Petting/Children's Zoos

The London Zoo opened the first Children's Zoo in 1938. Since that time, interactive petting zoos that house domestic species visitors can interact with have become a common feature in numerous zoos worldwide.[132]

Petting zoos have double-gated entrances to prevent any animals from accidentally being let loose.
Tomsickova/Adobe Stock

There are many species a facility can include in its petting zoo, with appropriate restrictions put in place based on the amount and type of interaction with visitors they are expected to have. Additionally, each individual animal has its own idiosyncrasies, which should be taken into account; all animals included in a petting zoo must be properly socialized and docile.[133,134]

In areas where visitors can walk among animals in a corral, species must be carefully selected. Animals should be small enough so their size alone will not cause any accidental injuries to a visitor (e.g., a full-grown dairy cow could unintentionally injure a person by stepping on their foot), but large enough to withstand any visitor's potentially unruly behavior (e.g., a child might pull on an animal's ear or tail). Some ideal candidates are small- to medium-sized sheep, goats and pot-bellied pigs.[135]

Similar to walk-through aviaries and dog parks, visitors enter a double-gated vestibule to prevent animals from escaping. One door must always be closed. Staff can arrange the entrance and exit of visitors from the corral to ensure no animals escape.[136]

132 Hosey, G. R., Melfi, V., & Pankhurst, S. (2009). Zoo Animals: Behavior, Management and Welfare. New York, NY: Oxford University Press.

133 Integrating Safety into Agritourism. (n.d.). Petting Zoo Checklist. Retrieved September 17, 2019, from https://safeagritourism.org/wp-content/uploads/PettingZooChecklist.pdf

134 Hosey, G. R., Melfi, V., & Pankhurst, S. (2009). Zoo Animals: Behavior, Management and Welfare. New York, NY: Oxford University Press.

135 Farrand, A., Hosey, G., & Buchanan-Smith, H. M. (2014). The visitor effect in petting zoo-housed animals: Aversive or enriching? Applied Animal Behaviour Science, 151, 117–127. doi: 10.1016/j.applanim.2013.11.012 https://www.sciencedirect.com/science/article/abs/pii/S0168159113002840

136 Integrating Safety into Agritourism. (n.d.). Petting Zoo Checklist. Retrieved September 17, 2019, from https://safeagritourism.org/wp-content/uploads/PettingZooChecklist.pdf

Fun Fact

The Oregon Zoo has a building designed especially for domestic cats in which visitors can sit and interact with adoptable animals provided by the animal adoption center and rescue, The Pixie Project. The building includes an outdoor portion enclosed by a mesh screen: a catio. It is furnished with cat scratchers, climbing areas and plentiful lounging cushions.[1]

Catios have become more popular during the past decade as a way for pets to experience the outside world safe from disease, poisons, vehicle collisions and predators (e.g, coyotes and raptors), as well as preventing them from hunting any native species, such as indigenous birds.[2,3]

1 Oregon Zoo. (n.d.). Catio. Retrieved September 11, 2019, from https://www.oregonzoo.org/discover/exhibits/catio

2 Rodan, I., & Heath, S. (2015). Feline Behavioral Health and Welfare. United Kingdom: W B Saunders Co.

3 Oregon Zoo. (n.d.). Catio. Retrieved September 11, 2019, from https://www.oregonzoo.org/discover/exhibits/catio

Other pens or corrals can be designated areas that visitors can reach into, but not enter. These can house larger domesticated species (e.g., camels, donkeys, mules and cows) or smaller species (e.g., rabbits, guinea pigs, chickens and ducks). This protects both guests and animals from injury, while still allowing visitors an interactive experience.[137, 138]

The facility ultimately decides which animals will reside in walk-in corrals and which will be in separate areas.[139] Some facilities might opt to have smaller animals in their walk-in corrals. For example, a pen might include pygmy goats, ducks and chickens. Others might have larger stock, such as standard goats, sheep, small donkeys and alpacas.[140, 141]

137 Integrating Safety into Agritourism. (n.d.). Petting Zoo Checklist. Retrieved September 17, 2019, from https://safeagritourism.org/wp-content/uploads/PettingZooChecklist.pdf

138 Zoo Atlanta. (2018, April 19). Spring Brings Animal Travels. Retrieved September 17, 2019, from https://zooatlanta.org/press-release/spring-brings-animal-travels/

139 Hosey, G. R., Melfi, V., & Pankhurst, S. (2009). Zoo Animals: Behavior, Management and Welfare. New York, NY: Oxford University Press.

140 Bretz, A. (2010). Tulsa State Fair. Charleston, SC: Arcadia Publishing.

141 Peter Weber Equestrian Center. (2013, March 2). Petting Zoo. Retrieved September 17, 2019, from http://pwecent.com/petting-zoo/

There must always be sufficient staff to monitor animals and visitors in petting zoos.[142] Staff must be alert, and watch for any unsafe interaction between visitors and animals. They can also educate visitors on the proper way to interact with animals in petting zoos, and ensure every child is accompanied by an attentive adult.[143] In addition to watching visitors for safety, they will often be tasked with cleaning duties and equipped with a rake and long-handled pan.[144]

Docile sheep and goats are ideal animals to house in petting zoos.
Africa Studio/Adobe Stock

142 Integrating Safety into Agritourism. (n.d.). Petting Zoo Checklist. Retrieved September 17, 2019, from https://safeagritourism.org/wp-content/uploads/PettingZooChecklist.pdf

143 Center for Disease Control and Prevention. (n.d.). Stay Healthy at Animal Exhibits. Retrieved September 17, 2019 from https://www.cdc.gov/healthypets/specific-groups/stay-healthy-animal-exhibits.html?CDC_AA_refVal=https://www.cdc.gov/healthypets/specific-groups/contact-animals-public-settings.html

144 Miller, R. E., Lamberski, N., & Calle, P. P. (Eds.). (2019). Fowlers Zoo and Wild Animal Medicine: Current Therapy (Vol. 9). St. Louis, MO: Elsevier.

Section Review

1. Explain why facilities might choose to house aquatic or semiaquatic animals indoors: _____

2. Explain why reptiles require an external heat source: _____

3. List the three environmental components that are essential in amphibian exhibits:_____

4. Explain how nocturnal houses allow visitors to see animals normally only active at night during regular operating hours: _____

5. Explain benefits of a mixed-species exhibit and potential problems that could arise: _____

JUAN CARLOS MUNOZ/Adobe Stock

Exhibit Organization

Zoos typically display their animals based upon their taxonomy, geographic location or natural habitat. In addition, there are several basic concepts that zoos follow when planning species selection and collection.

Taxonomic

As discussed in Stage 1, the first truly modern zoos opened their doors in the middle of the 18th century. These zoos housed animals in enclosures organized by taxon (type of animal), such as the reptile, aquarium and insect houses at the London Zoo.[145] This style of exhibit organization can still be seen today in a number of zoos.[146] Some might have, for example, a monkey house that displays a collection of primates from around the world or an aviary housing a variety of birds.

The Los Angeles Zoo's LAIR (living amphibians, invertebrates and reptiles) houses animals from the classes Reptilia and Amphibia, as well as a variety of invertebrate species, such as arachnids.
©Los Angeles Zoo

Geographic

Over time, some zoos moved away from organizing their animals by taxon, opting for a geographic model instead, which became highly popular in the 1980s.[147] These zoos typically organize their animals by continent, such as an Africa section. This model of organization is still used by many institutions, but generally has less educational value for visitors than those structured around ecosystems or habitats.[148]

145 Kleiman, D. G., Allen, M. E., Thompson, K. V., & Lumpkin, S. (Eds.). (1996). Wild mammals in captivity: Principles and techniques. Chicago, IL: University of Chicago Press.
146 Van Vliet, E. (2015). Exhibiting Zoo Animals. United Kingdom: Schüling Verlag.
147 Van Vliet, E. (2015). Exhibiting Zoo Animals. United Kingdom: Schüling Verlag.
148 Van Vliet, E. (2015). Exhibiting Zoo Animals. United Kingdom: Schüling Verlag.

Habitat

Some zoos display their animals based on habitat or ecosystem, which may or may not be geographically based.[149] For example, a zoo might choose to display several species from the Amazon rainforest together, or opt to display several species from different rainforests around the world together. Regardless of whether the animals are also displayed by geographic location, exhibits based on habitat can be very educational to zoo visitors and can help to highlight the myriad connections between all aspects of an ecosystem.[150]

Many zoos organize their animals by natural habitat. For example, animals that naturally live in the savanna would be placed near one another.
kengmerry/Adobe Stock

Other Organizational Structures

Some zoos do not easily fall into any one of the above categories. They may include a mixture of the categories or may not use any of them. Some facilities display all or some of their animals based on other qualities. For example, animals that need similar habitat temperatures might all be kept in the same building. Nocturnal animals are also often housed together in areas with reversed day and night rhythms, allowing visitors to view them during their active periods. Other zoos may have a general organizational theme, but still choose to display some species differently, such as in a petting zoo or discovery center. Some zoos may even go so far as to only display animals fitting their facility's overall structure, such as a safari park that only displays hoofstock species.

149 Van Vliet, E. (2015). Exhibiting Zoo Animals. United Kingdom: Schüling Verlag.
150 Van Vliet, E. (2015). Exhibiting Zoo Animals. United Kingdom: Schüling Verlag.

Species Selection and Collection Planning

Selecting the species to be displayed at a facility is just as important as choosing the overall exhibit organization in a zoo.[151] Some species may be housed together in multi-species exhibits, whereas other species may not even be housed in adjacent enclosures.

An example of species that should not be housed near one another is predators and their natural prey. Animal welfare requires that animals live without fear or distress.[152] The word distress is used here to characterize the effect of negative stress on an animal.[153]

This group of nyala might feel distress if housed directly beside hyenas or leopards, both of which are predator species in their natural habitat.
MaZiKab/Adobe Stock

This concept applies to both species in a predator-prey relationship that are housed near one another. A prey animal will feel fear and distress if it is constantly able to see, hear or smell its natural predator. Due to the confines of its exhibit, it would most likely be unable to perform its natural behavior response (flight), causing distress. Likewise, a predator may feel distress if it is constantly in the vicinity of a species it would normally hunt.[154]

To help make informed decisions about which species to display, zoos create collection plans. A collection plan is a document that outlines all the species that a zoo currently displays and which species it would like to add in the future.[155] Collection plans are usually developed by the zoo director and senior management staff. They are intended to help provide direction by listing not only species the zoo wishes to acquire, but also those it currently has that need to be moved out of the collection.[156]

151 Mellor, D. J., Hunt, S., & Gusset, M. (Eds.). (2015). Caring for Wildlife: The World Zoo and Aquarium Animal Welfare Strategy. Retrieved September 17, 2019, from https://www.waza.org/wp-content/uploads/2019/03/WAZA-Animal-Welfare-Strategy-2015_Landscape.pdf

152 Wolfensohn, S., Shotton, J., Bowley, H., Davies, S., Thompson, S., & Justice, W. (2018). Assessment of Welfare in Zoo Animals: Towards Optimum Quality of Life. Animals, 8(7), 110. doi: 10.3390/ani8070110

153 Kleiman, D. G., Allen, M. E., Thompson, K. V., & Lumpkin, S. (Eds.). (1996). Wild mammals in captivity: Principles and techniques. Chicago, IL: University of Chicago Press.

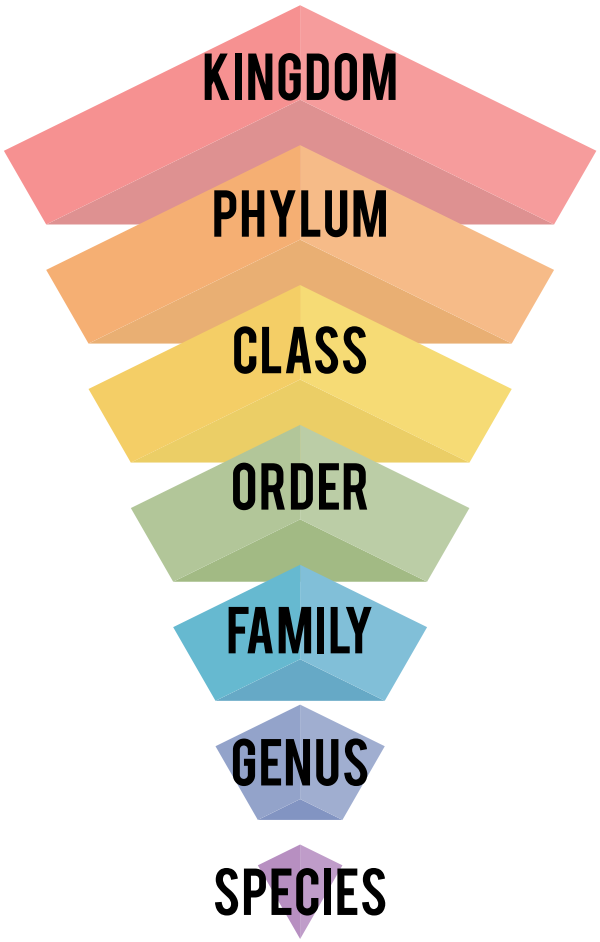
154 Kleiman, D. G., Allen, M. E., Thompson, K. V., & Lumpkin, S. (Eds.). (1996). Wild mammals in captivity: Principles and techniques. Chicago, IL: University of Chicago Press.

155 European Association of Zoos and Aquaria. (2013). The Modern Zoo: Foundations for Management and Development. Retrieved September 17, 2019, from https://www.eaza.net/assets/Uploads/images/Membership-docs-and-images/Zoo-Management-Manual-compressed.pdf

156 European Association of Zoos and Aquaria. (2013). The Modern Zoo: Foundations for Management and Development. Retrieved September 17, 2019, from https://www.eaza.net/assets/Uploads/images/Membership-docs-and-images/Zoo-Management-Manual-compressed.pdf

Jeanu/Adobe Stock

Animal Taxonomy



alinabel/Adobe Stock

Taxonomy is derived from Ancient Greek taxis, meaning arrangement, and nomia, meaning method. It is the science of naming, defining and classifying groups of biological organisms on the basis of shared characteristics. Organisms are grouped together into taxa (singular taxon) and these groups are given a taxonomic rank.[157] This creates a taxonomic hierarchy. The principal ranks in modern use for animals are, in order: Domain, Kingdom, Phylum, Class, Order, Family, Genus and Species.[158] More than 1.5 million species have been identified and formally described to date and thousands more are identified every year.[159, 160] However, animals only represent a small fraction of the organisms that live on earth.[161]

Why is Taxonomy Important

Global biodiversity is shrinking at an unprecedented rate due to past and present human activities. Knowing how and why organisms are related is essential to understanding the components of biodiversity. This, in turn, is necessary for making effective decisions on conservation and sustainable use.[162] For example, it can help combat invasive species by making it possible to distinguish them from native species.

For zookeepers and keeper assistants, taxonomy is also important in several ways. It can help them in caring and managing the animals they are responsible for because often times closely related species share characteristics and have similar needs.[163] Zoo animal caretakers at every level also play a pivotal role in educating visitors. Because some visitors will want to know what family an animal is in and what it is closely related to, understanding taxonomy can help you educate them more effectively.

157 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

158 Biology Dictionary. (2017, April 29). Taxonomy. Retrieved July 10, 2019, from https://biologydictionary.net/taxonomy/

159 Ruggiero, M. A., Et al. (2015). A Higher-Level Classification of All Living Organisms. Plos One,10(6). doi:10.1371/journal.pone.0130114

160 University of Chicago. (2017, August 30). A new estimate of biodiversity on Earth. Retrieved October 29, 2019, from https://phys.org/news/2017-08-biodiversity-earth.html.

161 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

162 Convention on Biological Diversity. (2010, April 06). What is Taxonomy? Retrieved July 10, 2019, from https://www.cbd.int/gti/taxonomy.shtml

163 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

Classification and Naming

Organisms are classified based on how similar they are. Historically, similarity was determined by examining the physical characteristics of an organism, but modern classification uses a variety of techniques, including genetic analysis.[164]

The classification system used today is called binomial or binary nomenclature. It is the formal system of naming organisms consisting of two Latinized names, the genus and the species. The genus and species form the "scientific name." All living things, and even some viruses, have a scientific name. For example, the North American porcupine's scientific name is *Erethizon dorsatum*. When writing scientific names, the first word (genus) is capitalized while the second word (species) in not. Scientific names are always italicized.[165]

Organisms are taxonomically classified according to a hierarchal system of eight ranks: Domain, Kingdom, Phylum, Class, Order, Family, Genus and Species. Taxonomic ranks can be further divided into subgroups, such as subphylum, subclass, suborder, subfamily, etc. Some find it useful to do this to further classify animals into smaller groups. Subclass and suborders can further be broken down into infraclasses or infraorders.[166]

Fun Fact

The reason we use scientific names and not common names (e.g., North American Porcupine) is because "common" doesn't necessarily mean "universal."[1] Common names can vary in different parts of the world. For example, a polecat in the U.S. is a skunk (family Mephitidae), while in Europe it is a ferret (family Mustelidae). Scientific names allow animal keepers, curators, scientists, conservationists and researchers to effectively communicate by using the same words to identify animals.

1 Mortenson, P. B. (2004). This is not a weasel: A close look at nature's most confusing terms. Hoboken, NJ: Wiley.

164 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

165 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press

166 Biology Dictionary. (2017, April 29). Taxonomy. Retrieved July 10, 2019, from https://biologydictionary.net/taxonomy/

For example, the Mammalia class can be broken down into two subclasses: Prototheria, which are egg laying monotremes (i.e., duck-billed platypus and echidna), and Theria (all other mammals).[167] The subclass Theria can be further divided into two infraclasses: Metatheria (marsupials) and Eutheria (placental mammals).[168]

Some biological ranks can also be organized into supergroups (e.g., superclass, superorder or superfamily). For example, the superfamily Canoidea includes not only dogs but all doglike carnivores, such as bears, raccoons and weasels.[169]

The Commission on Zoological Nomenclature (ICZN) provides and regulates a uniform naming system for animals. The formation of names is made so that the taxon level can be recognized even if it is not identified. For example, the ICZN specifies that family names end in "idae" (e.g., Canidae for dog family). Bird orders usually end in "iformes," such as Anseriformes (e.g., ducks, geese, swans, etc.). There are many other rules and as well as exceptions. While animal keepers and keeper assistants are not expected to learn the rules of nomenclature, knowing basic similarities can help you identify which taxon is being referred to.[170]

Echidnas are one of two extant (i.e., still living) egg-laying mammals.
pelooyen/Adobe Stock

167 Wund, M., Sorin, A. B., & Myers, P. (2014). Prototheria (egg-laying mammals). Retrieved on August 26, 2019, from https://animaldiversity.org/accounts/Prototheria/

168 Jollie, M. T. Vertebrate. Retrieved on August 26, 2019, from https://www.britannica.com/animal/vertebrate

169 Allaby, M. (2014). A dictionary of zoology (4th ed.). Oxford: Oxford University Press. doi: 10.1093/acref/9780199684274.001.0001

170 Cobaugh, A. M., Stoner, J. B., & Irwin, M. D. (Eds.). (2013). Zookeeping: An introduction to the science and technology. Chicago, IL: University of Chicago Press