

San Diego Zoo – Volunteer Training

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San Diego Zoo – Volunteer Training is an online training course designed for the San Diego Zoo and the San Diego Zoo's Wild Animal Park volunteers who interact with visitors. This course will help the volunteers understand the concept of taxonomy also relate that understanding to the park visitors. This design document describes out the content that will be included in the course.

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Executive Briefing

The San Diego Zoo and San Diego Wild Animal Park are among the largest zoos in the entire world; and every year millions of guests visit both parks. In order to accommodate for such large number of visitors, the zoo administration uses volunteers to help educate guests about the animals and the conservation. These volunteers go through several trainings to gain the knowledge necessary to understand the animals and also relate that understanding to the park visitors. One of these topics is Taxonomy which is the practice and science of classification of animals. Currently, the volunteers attend a 45 minute classroom training to learn the subject of Taxonomy. However, Taxonomy is a vast and complicated topic which is not easy to learn and even more difficult to memorize. This results in the volunteers not feeling confident about their knowledge on this topic. This situation presents an opportunity for online learning. If successful, volunteers will learn at their own pace and have the chance to re-visit the course materials when they need additional information or forget important details.

For this purpose, a web-based learning module will be created to teach the volunteers the topic of taxonomy. This module will be an online course which will be divided into several units. Every unit will contain interactive lessons and examples to engage the learners and help them understand important topics about taxonomy. This course will explain the definition of taxonomy, and its benefits to the volunteers. Also, the zoo volunteers will learn the definition of species and subspecies and will be taught different methods of recognizing them. Finally, the zoo volunteers will gain adequate knowledge about the different schools of taxonomy. Also, the volunteers are provided with an interactive quiz at the end of each unit to present them with the necessary practice and to reinforce understanding. In summary, this course will allow the zoo volunteers to have a great understanding of taxonomy; thus enabling them with adequate knowledge to perform better in their jobs and answer the guests' questions.

Introduction

As stated in the Executive Briefing, currently, the volunteers at the San Diego Zoo and San Diego Wild Animal Park are required to attend a 45 minute classroom training to learn the subject of Taxonomy and to relate that understanding to the park visitors. However, Taxonomy is a vast and complex topic which is challenging to learn and hard to memorize. Thus, attending only one instructor-led classroom session, and listening to the lecturer trying to cover all areas of taxonomy in only 45 minutes may not provide the ideal situation for the volunteers to walk away with sufficient knowledge and practice to be able to address the visitors' questions. Also, the absence of adequate practice and lack of ample understanding of the topic, results in the volunteers' lack of confidence about their knowledge on taxonomy. This situation presents an excellent opportunity for an online course.

The web-based learning environment provides the volunteers with the chance to learn the course content at their own pace. Thus, if they have difficulty understanding specific areas of taxonomy, they may go back and repeat the corresponding lessons until they feel confident in that area. Moreover, interactive examples and quizzes which will be implemented in the online version will offer the volunteers the opportunity to have a more engaging learning experience, plus, have the ability to examine their knowledge in different areas. Finally, the volunteers have the chance to re-visit the course materials any time they need additional information or if they forget important details. This capability will help boost the volunteers' confidence.

This web-based training will be divided into several interactive units to cover important areas of taxonomy. The key topics will be covered in this online course are: the definition of taxonomy and its benefits, the definition of species and subspecies, plus their methods of recognition; and finally different schools of taxonomy.

The following document presents an outline for creating this web-based training. First is the analysis section which includes detailed analyses of the audience, the environment, and the course content. The analysis section will serve as a guide in instructional design. Next, is the content map which features all the key topics that the course will cover. Subsequently, the instructional objectives are listed, followed by a framework for evaluation. Finally, a detailed story board of the course prototype is included.

Analysis

This analysis is being conducted to elaborate the specific skills/knowledge that is necessary for successful performance on the job.

The sources for this analysis are the zoo volunteers and Karen Weise, a training manager at the San Diego Zoo, who will serve as the subject matter expert for this study. This analysis starts by examining the volunteers at the zoo who are the main audience for this study. Next, the zoo environment, in which the volunteers will work and actually utilize the acquired training, will be analyzed. Finally, the analysis will focus on the specific content that this online training will offer.

Audience Analysis

The main audience for this study is the volunteers who work at the San Diego Zoo and San Diego Wild Animal Park. These volunteers are scattered throughout different exhibits in both parks. According to Karen Weise, the subject matter expert, most of them are retired individuals from diverse backgrounds, who have very limited prior knowledge about the animals. Volunteers invest their time at the zoo for self-fulfillment and their love for animals. The main responsibility of the volunteers is to take part in educating people concerning diverse species and conveying the zoo's message about conserving the animals and rescuing endangered species. These volunteers are enrolled in an interpretation program which has been available for two years now. The volunteers go through a twenty hour of general training and an additional thirty-two hours, if they would like to qualify to work at the Elephant Odyssey exhibit. The goal of the interpretation program is for the volunteers to gain knowledge about different topics regarding the animals and then relate that understanding to the park visitors. One of the more complicated training topics for the volunteers is Taxonomy.

According to an official survey done by the San Diego Zoo training department, which included sixteen participating volunteers, the majority of the survey participants have been volunteering at the zoo ranging from six months to two years. The survey results revealed that the volunteers were highly **motivated** to learn about the animals and interpret the information for the park guests. Furthermore, all sixteen volunteers highly **valued** the significance of the message they were spreading among the park visitors. Figure 1 shows the sample volunteers' responses to a question from this official survey. These responses demonstrate the high value and motivation levels among these individuals.

Figure 1

| What kinds of themes/messages do you deliver to guests during your programs, tours, guest conversations and/or other interpretive experiences? |
|---|
| Relay information and display attitude to connect the guests to wildlife, share how wildlife is in danger and let them know what they can do to protect and conserve. At all times, be excited and interested about what I am doing because it's so much fun. |
| Our care for our animals and our world-wide efforts on their behalf. What we can do to help. |
| I deliver themes and messages that fall within the scope of the Zoo's general themes which include: 1) wildlife and threatened wildlife habitats; 2) there are certain dangers faced by animals and their habitat; 3) we can all help. |
| Loss of habitat, how endangered the animals are in their natural habitat, what the Zoo is doing to help them in the wild, what we can all do to help in the conservation of wildlife. |

However, when asked about their comfort level and **confidence** regarding their knowledge and interpretation skills, only five out of sixteen volunteers felt very confident. In fact, six out of sixteen volunteers surveyed, believed that their knowledge and interpretation skills would fall below the necessary average. Furthermore, a personal interview with three zoo volunteers revealed that although they found the classroom trainings very useful, they had a difficult time remembering the information they had obtained in the classroom. When asked specifically about the topic of Taxonomy, although they all remembered having had training on the subject, they did not have much recollection of the covered content; thus would not be able to answer specific questions about Taxonomy.

As a result, it can be seen that there clearly is a skills/knowledge deficiency among the zoo volunteers, particularly on the subject of Taxonomy. Therefore, additional instruction in the proper method is needed to close the existing gaps. Furthermore, since the classroom trainings are not being offered on a regular basis to help the volunteers, there is visibly a need for online courses. Essential evidence supporting this fact was found in the zoo's official survey of the sixteen volunteers. The table in Figure 1 demonstrates the need for online courses by analyzing some of the volunteers' responses to this question: **"What do you feel are your greatest challenges?"**

Figure 2

| What do you feel are your greatest challenges? | |
|--|---|
| Volunteers' Replies | Benefits of Online Trainings to close the Skills/Knowledge Gaps |
| The information we are passing along to guests per interpretation is time sensitive and changes while we are left with less timely passé data. | The online information can be continuously updated to provide the volunteers with the up-to-date information. |
| Remembering all the important data. | The volunteers can refer to the online courses any time they need to remember important data. |
| Need to re-educate myself about information prior | The volunteers can access the |

| | |
|----------------------------------|--|
| to shift. | information in the online courses any time they need additional information or to re-educate themselves. |
| Classroom sessions are too long. | The volunteers can take the courses at their own paces. |

In summary, the result of the audience analysis revealed that although the zoo volunteers were greatly motivated and had a high value toward the subject matter, their confidence level was very low in general. Further study of the volunteers determined that the low confidence was the direct result of insufficient skills and knowledge. As a result, additional instruction in form of online training, especially on Taxonomy, would greatly benefit the volunteers, to help them share their knowledge with the zoo visitors.

Environment Analysis

After volunteers finish their classroom trainings, they are stationed at different exhibits within the San Diego Zoo and San Diego Wild Animal Park. However most of the volunteers are stationed at the following five exhibits at the San Diego Zoo: Polar Bears, Koalas, Elephant Odyssey, Gorillas, and Galapagos Tortoises. The volunteers interact with many individuals throughout the day; but the frequency of their interactions with the park guests depends on the number of visitors on any given day. For this reason, their work environment is constantly changing from slow-paced on some days to fast-paced on others. Consequently, this change in the environment directly affects the volunteers' performances since on the busy days they have to answer a lot more questions and interact with more guests. In addition, the training staffs are not always available to respond to the volunteers' questions. Although the volunteers do not have access to computers or the internet while working at their designated stations, they can still benefit from online classes. For example, on busy days, they may choose to prepare themselves ahead of time at home, or by using the computers at the training department at the zoo, to re-visit the online courses and quickly look up important details. However, if the volunteers only rely on the classroom lectures, they will clearly miss the opportunity for continuous self-training. This example undoubtedly demonstrates the need for online training at the San Diego Zoo. Furthermore, since Taxonomy is one of the more difficult subjects to memorize, an online course about Taxonomy will provide the opportunity for the volunteers to quickly update themselves on the several computers available at the zoo, thus increasing their performance in answering the guests' questions.

Content Analysis

A consultation with Karen Weise, the Subject Matter Expert (SME), revealed that there are five specific topics in the area of Taxonomy that would greatly benefit the volunteers and help them improve their performances: *Taxonomy Definition*, *Reasons for Taxonomy*, *History of Taxonomy*, *Schools*

of Taxonomy, Hierarchy of Taxonomy, and finally Species. The following is the potential hierarchy of these topics.

1. Taxonomy Definition

The zoo volunteers need to know the definition of Taxonomy before they can begin learning about its proper use. For this reason, first, the definition and a broad overview of taxonomy will be presented. Next, this section will be divided into five subsections to highlight and cover the key components about Taxonomy.

2. Reasons for Taxonomy

It is essential for the volunteers to learn the reasons behind the scientists' decisions to classify the animals into different groups. Therefore, this section will briefly explain the reasons for Taxonomy.

3. History of Taxonomy

Throughout history, there have been many individuals who have attempted to furnish different theories for Taxonomy. This section will be dedicated to listing, and briefly explaining the important work of several scientists. The following is the potential outline for this section:

1. *Aristotle* : Explaining the difference between Air, Water and Land dwellers
2. *Theophrastus* : Categorize based on form, life span, and habitat
3. *St. Augustine* : Classify based on usefulness, Harmfulness, and Superfluous
4. *John Ray* : Formulated “species” as a group of organisms with the same morphology and can reproduce their own kind.
5. *Linnaeus* : Gave the animals binomial names, and created a hierarchical system.

4. Hierarchy of Taxonomy

Next, the volunteers are introduced to the hierarchy of Taxonomy. This section will be divided into seven sub-sections, each one going deeper into the hierarchy. In this section the order is very important.

1. Kingdom
2. Phylum
3. Class
4. Order
5. Family
6. Genus
7. Specific Epithet

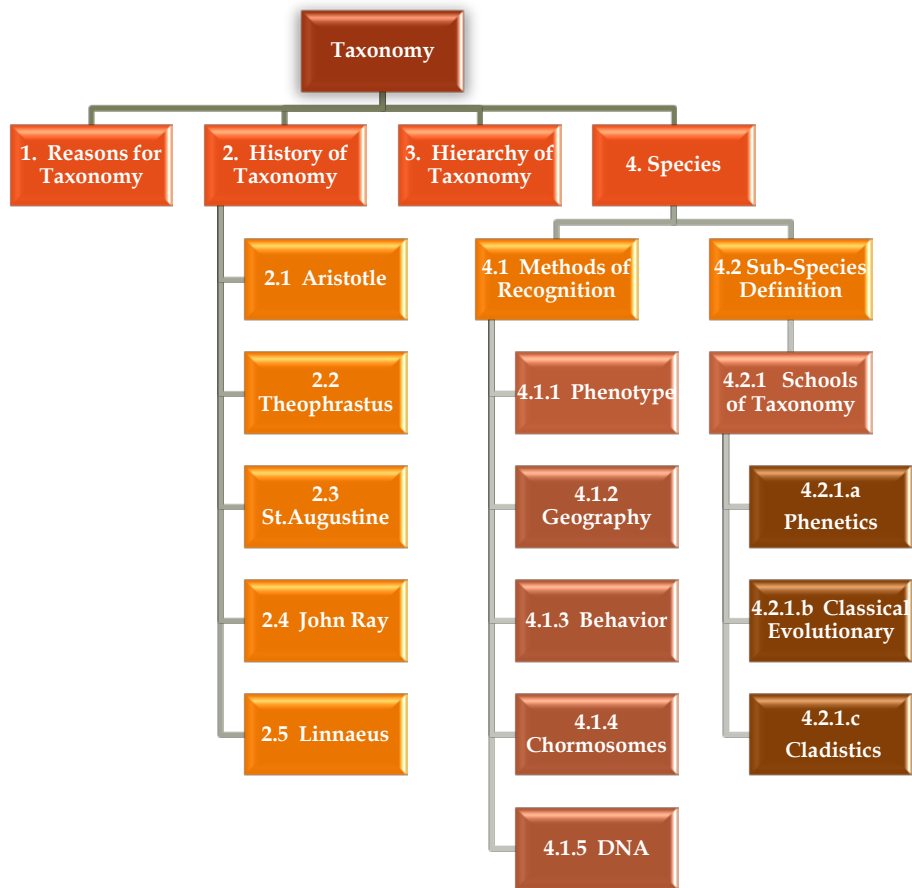
5. Species

Finally, it is essential for the volunteers to learn about different species and subspecies and be able to distinguish one type from another. For this purpose, this section begins by first explaining the meaning of species and subspecies. Next, the volunteers are introduced to different methods of distinguishing different types of species. The potential outline of this section is as follow:

1. Definition of Species
 - a. Methods of Species recognition
 - i. *Phenotype* : color, pattern, size, anatomy
 - ii. *Geography* : where they are, physical Barriers
 - iii. *Behavior* : courtship display, song
 - iv. *Chromosomes* : number, size, banding
 - v. *DNA* : banding patterns, molecular sequence
 - b. Definition of Sub-species
 - i. Schools of Taxonomy
 1. Phenetics
 2. Cladistics
 3. Classical Evolutionary

Content Map

The content map for this course follows the flow of the content analysis section. In order to follow the directions specified by the SME, as well as taking into consideration the resources provided by her, this course was divided into five units: *Reasons for Taxonomy*, *History of Taxonomy*, *Hierarchy of Taxonomy*, and finally *Species*. The first unit *Reasons for Taxonomy* contains only one lesson. The second unit, *History of Taxonomy* is divided into five lessons, with each lesson explaining the work of a single scientist. Once the volunteers have completed all five lessons, an assessment will be offered which will cover the content of all five lessons combined. The third unit, *Hierarchy of Taxonomy*, describes the seven different levels of the hierarchy of Taxonomy. A single assessment will be offered upon completion of this lesson. The fourth unit, titled *Species*, is divided into two sub-units. The first sub-unit will introduce Species. Then, this sub-unit is divided into five lessons to explain different *Methods of Species Recognition*. Upon completion of all five lessons, an assessment will be offered to cover the content of these sub-lessons. The second sub-unit, called *Subspecies* will first introduce the Subspecies. Then, this sub-unit is divided into three lessons to explain different *Schools of Taxonomy*. Upon completion of all three lessons, an assessment will be offered to cover the content of these lessons. Finally, individual colors in the content map represent different levels of hierarchy.



Objectives & Test Items

The overarching goal of instruction is to provide the San Diego Zoo volunteers with an understanding of animal Taxonomy which is the classification of organisms in an ordered system. Consecutively, to help the volunteers better understand the concept of animal taxonomy; they first need to learn about *Reasons for Taxonomy*, *History of Taxonomy*, *Hierarchy of Taxonomy*, *Species*, and *Schools of Taxonomy*. As a result, each of these headings in the content map has an overarching terminal objective (see CM1, CM2, CM3, CM4 and CM5). In addition, subsection 4.3 (Methods of Recognition) has a terminal objective. The remaining objectives related to the content map are all enabling objective.

Objectives & Test Items Matrix

| CM | Objective | Category | Instructional Methods | Practice Methods | Assessment Type | Assessment Item (TO only) |
|--------------------------|--|-----------------------------|--|--------------------|--|--|
| 1.0 | When asked by a visitor, the zoo volunteer will be able to describe at least three reasons why animal taxonomy exists. | Recall Concept | Web-Based Learning - Provide text definition | Drill and Practice | Matching, Multiple Choice, or True/False Review Quiz | Describe the main five reasons for existence of animal taxonomy |
| 2.0 | When asked by a visitor, the zoo volunteer will be able to name at least three scientists who contributed to animal taxonomy and describe the correct classification technique for each scientist. | Recall Fact/ Recall Concept | Web-Based Learning - Provide text definition | Drill and Practice | Matching, Multiple Choice, or True/False Review Quiz | Name the main five scientists who contributed to animal taxonomy and describe each scientist's method. |
| 2.1 2.2 2.3 2.4 | Each time the volunteer explains the history of taxonomy to the zoo visitors, he/she will be able to select one scientist from the following list and describe the technique which the selected scientist used to classify the | Recall Concept | Web-Based Learning - Provide text definition | Drill and Practice | Matching, Multiple choice or true/false review quiz | |

| CM | Objective | Category | Instructional Methods | Practice Methods | Assessment Type | Assessment Item (TO only) |
|-----|---|--|--|--------------------|---|--|
| 2.5 | animals: <ul style="list-style-type: none"> • Aristotle • Theophrastus • St. Augustine • John Ray • Linnaeus | | | | | |
| 3.0 | When asked about different animals, the zoo volunteer will be able to correctly categorize at least one animal according to the taxonomy hierarchy. | Recall Fact/ Recall Concept/ Apply Concept | Web-based learning: step-by-step written instructions with accompanying visual examples. | Drill and Practice | Multiple Choice or True/False Review Quiz | Categorize the given animals in the correct taxonomy hierarchy. |
| 4.0 | When asked by a zoo visitor, the volunteer will be able to accurately define species, subspecies, and apply different methods to recognize them. | Recall Fact/ Recall Concept/ Apply Concept | Web-Based Learning - Provide written instructions with accompanying conceptual and visual examples | Drill and Practice | Multiple Choice or True/False Review Quiz | Define species and sub-species, and list the six methods of species recognition, and finally describe the characteristics for each method. |
| 4.1 | When presented with two or more pictures of the same species, the volunteer will be able to | Recall Fact/ Recall | Web-Based Learning - | Drill and Practice | Multiple Choice or | Distinguish different types |

| CM | Objective | Category | Instructional Methods | Practice Methods | Assessment Type | Assessment Item (TO only) |
|---|--|--|--|---------------------------|---|--|
| | use at least three methods of species recognition, to distinguish different types of the sub-species of the same species. | Concept/ Apply Concept | Provide written instructions with accompanying visual and conceptual examples | | True/False Review Quiz | of the sub-species of any given species |
| 4.1.1 4.1.2 4.1.3 4.1.4 4.1.5 | When explaining the methods of species recognition to the visitors, the volunteer will be able to name at least three characteristics of the following recognition methods: <ul style="list-style-type: none"> • Phenotype • Geography • Behavior • Chromosomes • DNA | Recall Fact/ Recall Concept/Apply Concept | Web-Based Learning - Provide visual and conceptual example, and text definition | Drill and Practice | Matching, Multiple Choice or True/False | |
| 4.2 | When asked by a zoo visitor, the volunteer will be able to describe an accurate definition of sub-species. | Recall Concept | Web-Based Learning - Provide text definition and conceptual examples | Drill and Practice | Multiple Choice or True/False | The volunteer will be able to state an accurate description of subspecies, and also correctly state which school of taxonomy was used to determine if |

| CM | Objective | Category | Instructional Methods | Practice Methods | Assessment Type | Assessment Item (TO only) |
|-------------------------------|---|--|---|--------------------|---|---|
| | | | | | | the two subspecies were from the same species or not. |
| 4.2.1 | When asked about different animals, the zoo volunteer is able to use at least one school of taxonomy to describe if the given animals are related or not. | Recall Fact/ Recall Concept/ Apply Concept | Web-Based Learning - Provide written instructions with accompanying conceptual, and visual examples | Drill and Practice | Multiple Choice or True/False Review Quiz | The volunteers will be able to use the three schools of taxonomy to describe if different animals are related or not. |
| 4.2.1.a 4.2.1.b 4.2.1.c | Every time the zoo volunteer is asked about two different animals, he/she is able to use one of the following schools of taxonomy to explain if the given animals are related or not: <ul style="list-style-type: none"> • Phenetics • Cladistics • Classical Evolutionary | Recall Fact/ Recall Concept/ Apply Concept | Web-Based Learning - Provide visual and conceptual examples and text definition | Drill and Practice | Matching, Multiple Choice or True/False | |

Implementation Guidance

The findings in the analysis section revealed that the causes for the existing performance gaps are mainly due to a skills/knowledge deficiency which results in lack of motivation, both in terms of confidence and value. As stated in the analysis section, the current classroom training on taxonomy does not provide the volunteers with sufficient skills/knowledge on this topic. As a result, the volunteers lack the necessary confidence to perform their job and answer the volunteers' questions about taxonomy. Also, while the volunteers greatly value learning about animals, they may not value the topic of taxonomy as much as other topics. This lack of value is a direct result of insufficient skills/knowledge which produces a lack of motivation to learn about taxonomy. This web-based training addresses all of these three gaps.

Learning the complicated topic of taxonomy may seem like a difficult task to the volunteers. However, this online course simplifies this complex topic by taking advantage of the web-based environment to provide easy to understand and interactive lessons which enforce learners' engagement. Learning a complex topic such as taxonomy in smaller modules containing many visuals and interactive examples helps the volunteers to understand the topic better. Also, the interactive quizzes provide the much needed practice which in turn helps the volunteers to commit the lessons to memory for much longer periods. Therefore, the web-based training will help reduce the gap caused by the skills/knowledge deficiency.

Consequently, as the volunteers' understanding of taxonomy increases, they will have a much greater motivation and confidence to answer the visitors' questions about this topic.

Furthermore, this online course uses many visuals and interactive examples to ensure that the volunteers realize the importance of taxonomy and its benefits to science. This will result in the volunteers appreciating the value of taxonomy much more, resulting in added motivation to discuss taxonomy with the zoo visitors.

For the volunteers, completing the course in full once should be adequate to generate satisfactory results when helping the zoo guests. However, the volunteers are encouraged to perform continual practice to ensure maintaining and remembering different areas of taxonomy.

Evaluation Framework

Since the volunteers' performance occurs in an informal setting instead of the traditional work setting, the evaluation for this web-based training is unique and rather challenging. Since this training is web-based, surveys can be built into the training module to measure Kirkpatrick's first level of evaluation which is *reaction*. This evaluation must measure how the volunteers have reacted to the online training. This survey may be performed immediately following the completion of the online training.

Furthermore, this web-based module will contain several tests and quizzes. Additional online pre-tests and post-tests can be easily added to this online course. As a result, the data collected from these tests and quizzes may be used for Kirkpatrick's second evaluation level which is *learning*. This evaluation must measure what the volunteers have learned from this online training. This evaluation may also be performed immediately following the completion of the online training.

Kirkpatrick's third level of evaluation or *transfer* answers the question of whether the training has been transferred back to the job. This evaluation must measure how much of the training the zoo volunteers received is actually being applied on the job. One way of measuring transfer may be to observe the volunteers performance following completion of the course. Also, individual pre- and post-training tests or surveys may be done to measure the third level of evaluation. It is recommended that this evaluation be done one to three months after the volunteers have completed the online training. Moreover, it is important to remember that this evaluation is resource intensive and costly.

Kirkpatrick's fourth level of evaluation or *results* answers the question of whether the training has been transferred back to the job. However, return on investment is difficult to measure because of the nature and intent of this course.

Key Evaluation Questions

Considering Kirkpatrick's four levels of evaluation, the following questions are essential and relevant in evaluating this product.

Level 1:

Based on the volunteers' initial reaction, was this web-based training easy to navigate? How easily were the volunteers able to follow the course directions?

Level 2:

Were the volunteers successful in completing the online practice and review quizzes? Are the volunteers able to demonstrate the information they learned in this training?

Level 3:

- Are the volunteers able to accurately answer the visitors' questions about taxonomy as a result of the information they learned in the online training?
- Are they able to answer more questions about taxonomy in compare to the number of questions they could answer prior to completing this online course?

Evaluation Instrumentation & Data Collection

Since this training is web-based, surveys can be built into the training module to measure the volunteers' *reaction*. The surveys may be performed immediately following the completion of the online training. If additional data is necessary, face to face interviews with the volunteers may also be conducted.

Furthermore, this online course will contain several tests and quizzes. Additional online pre-tests and post-tests can also be added. As a result, the data collected from these tests and quizzes may be used to measure what the volunteers have learned from this online training. This evaluation can be performed immediately following the completion of the online training. If additional data is necessary, role plays with the volunteers may also be conducted.

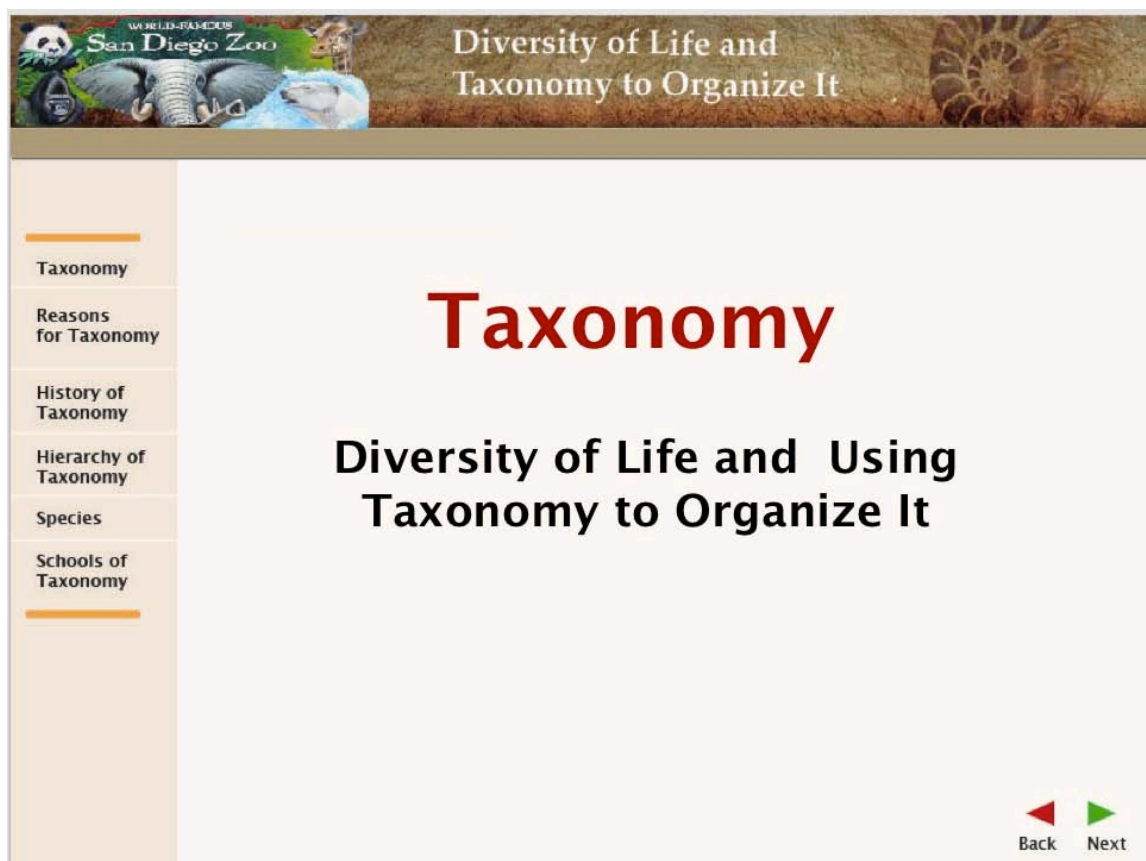
In order to collect data for the third evaluation level, individual pre- and post-training tests or surveys are recommended. Other methods of data collection for level three evaluations include face to face interviews with the volunteers, on the job performance observation, and finally feedback from the park visitors. It is recommended that this type of evaluation (including the post-training tests and surveys) be performed one to three months after the volunteers have completed the online training.

Evaluation Question & Procedure Matrix

| Evaluation Question | Information Required to Answer Question | Source of Information | Data Collection Strategy |
|--|---|-----------------------------|---|
| 1. Based on the volunteers' initial reaction, was this web-based training easy to navigate? How easily were the volunteers able to follow the course directions? | 1. Survey results | 1. Post-instruction surveys | 1. Distribution of post instruction surveys |
| 2. Were the volunteers | Practice and review quiz | Archive of the volunteers' | Automatic ally |

| Evaluation Question | Information Required to Answer Question | Source of Information | Data Collection Strategy |
|--|---|--|--|
| successful in completing the online practice and review quizzes? | results | quiz scores | archiving the volunteers' quiz scores |
| 3. Are they able to answer more questions about taxonomy in compare to the number of questions they could answer prior to completing this online course? | 1. Pre and post test results | 1. Archive of the volunteers' pre and post test scores | 1. Automatically archiving the volunteers' pre and post test scores |
| 4. Are they able to answer more questions about taxonomy in compare to the number of questions they could answer prior to completing this online course? | 1. Results of individual pre- and post-training test or surveys | 1. Archive of individual pre- and post-training test or survey results | 1. Archiving the results of individual pre- and post-training tests or surveys |

Prototype Design Specification



| | |
|-------------|---|
| Slide # | 1 |
| Description | Introduction to Taxonomy course. |
| Links | Click on Next button to begin (slide 2) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | No media |



Welcome

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

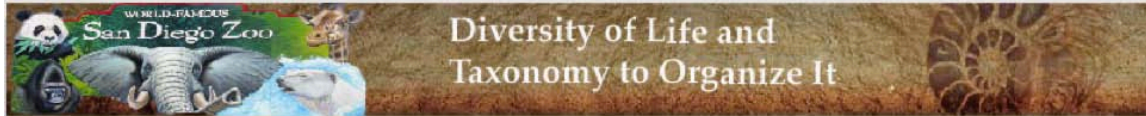
Species

Schools of Taxonomy



◀ Back Next ▶

| | |
|-------------|---|
| Slide # | 2 |
| Description | Introduction video automatically plays to inspire inquiry arousal. Presents two questions: 1) How many different Species are there? 2) How are they related? |
| Links | Next button (slide 3) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Introduction video |



Diversity of Life

How many animals do you think there are?

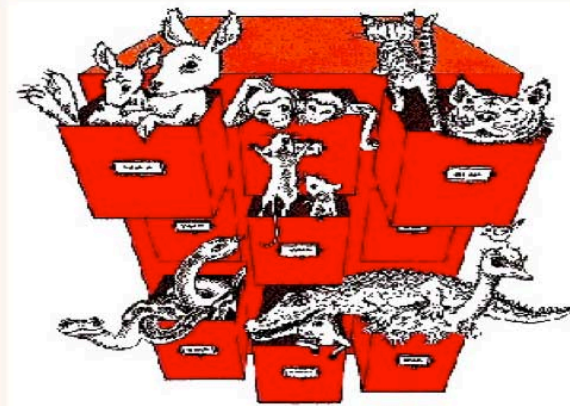
- There are 13 billion known species of organisms
- This is only 5% of all organisms that ever lived
- New Species are still being found and identified
- There is a wide range of diversity of organisms living on earth



| | |
|-------------|---|
| Slide # | 3 |
| Description | Inquiry arousal: How many animals do you think there are? |
| Links | <p>Next button (slide 4) Back button (slide 2)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic images show variety of animals. |

What is Taxonomy?

Taxonomy or classification is the arrangement of organisms into orderly groups based on their similarities.



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| | |
|-------------|--|
| Slide # | 4 |
| Description | Inquiry arousal: Introduction to What is Taxonomy? |
| Links | Next button (slide 5) Back button (slide 3) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of drawer demonstrating classification of organisms. |

Why Classify?

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

- The desire to organize and classify things is part of human nature. People wanted to organize their world so they began grouping or classifying everything they saw.
- We use classification every day. **Example:** We organize the kitchen drawers, our closets, etc.
- For centuries, the naming and classification of living organisms into groups has been an important part of the study of nature.



◀ Back ▶ Next

| | |
|-------------|--|
| Slide # | 5 |
| Description | Inquiry arousal: Why Classify? |
| Links | Next button (slide 6) Back button (slide 4) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic images shows kitchen drawer as example of classification. |



Diversity of Life and Taxonomy to Organize It

Classification Example

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

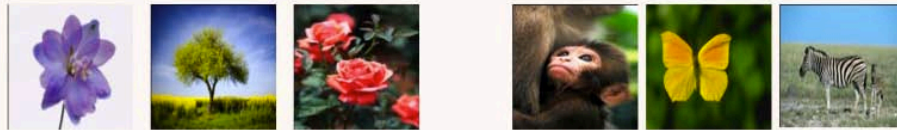
We can see six pictures of different organisms:



One way of classifying them into two groups is:

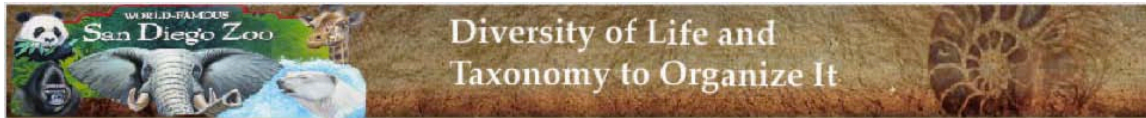
Plants

Animals



◀ Back Next ▶

| | |
|-------------|---|
| Slide # | 6 |
| Description | Classification example focuses on dividing two organisms, plants and animals. |
| Links | <p>Next button (slide 7) Back button (slide 5)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic images include plants and animals. |



Classification Example

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Click on the images that can be classified as Animals? Then hit submit.



Question 1 of 33

Clear

Submit



| | |
|-------------|---|
| Slide # | 7 |
| Description | Interaction: Learner is asked to interact by clicking on images that can be classified as animals. |
| Links | <p>Next button (slide 8) Back button (slide 6)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic images include plants and animals. |



Diversity of Life and Taxonomy to Organize It

Taxonomy Benefits

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Taxonomy enables us to :

- Organize all the species we discover
- Accurately and uniformly name organisms
- Have a single universal name for every species
- Avoid confusion of common names
- Understand how living things are related together
- Allow scientific repeatability
- Use same language (Latin or some Greek) for all names
- Method of expressing relationships among groups



| | |
|-------------|--|
| Slide # | 8 |
| Description | Taxonomy Benefits is defined. |
| Links | <p>Next button (slide 9) Back button (slide 7)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | No media. |

Example of Taxonomy Benefits

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

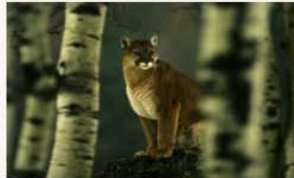
Schools of Taxonomy

There are at least 50 names for this animal. However, taxonomy helps us select only one scientific name which is recognized by taxonomists all over the world.

Click on the images below to view some of the names used for the same animal.



Devil Cat



Back Next

| | |
|-------------|--|
| Slide # | 9 |
| Description | <p>Example of Taxonomy Benefits. Example shows 6 images of the same animal with different names.</p> <p>Interaction: Learner is asked to click on images to show species name.</p> <p>Bottom left text: shows current number of question.</p> |
| Links | <p>Next button (slide 10)</p> <p>Back button (slide 8)</p> <p><u>Sidebar/Navigation bar:</u></p> <p>Taxonomy: Introduction (slide 1)</p> <p>Reasons for Taxonomy (slide 4)</p> <p>History of Taxonomy (slide 16)</p> <p>Hierarchy of Taxonomy (slide 33)</p> <p>Species (slide 47)</p> <p>Schools of Taxonomy (slide 60)</p> |
| Media | 6 different images of the same species. Hot spots on image allow species name to fade in. |

Taxonomy Benefits Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Taxonomy enables us to organize all the species we discover

- A) True
- B) False



Question 2 of 33

Submit

Back Next

| | |
|-------------|---|
| Slide # | 10 |
| Description | <p>Taxonomy Benefits Quiz. True or False question: Taxonomy enables us to organize all the species we discover. Answer: A Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 11) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | <p>Photographic image of elephant is used to show correct answer or incorrect answer.</p> |

Taxonomy Benefits Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Taxonomoy adds to the confusion of common names

- A) True
- B) False



Question 3 of 33

Submit

Back Next

Forward

| | |
|-------------|---|
| Slide # | 11 |
| Description | <p>Taxonomy Benefits Quiz. True or False question: Taxonomy adds to the confusion of common names. Answer: A Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 12) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | <p>Photographic image of elephant is used to show correct answer or incorrect answer.</p> |



Taxonomy Benefits Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Taxonomy enables us to accurately and uniformly name organisms

- A) True
- B) False



Question 4 of 33

Submit

Back Next


| | |
|-------------|---|
| Slide # | 12 |
| Description | <p>Taxonomy Benefits Quiz. True or False question: Taxonomy enables us to accurately and uniformly name organisms. Answer: A Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 13) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | <p>Photographic image of elephant is used to show correct answer or incorrect answer.</p> |

Taxonomy Benefits Quiz

Please select if statement is true or false:

Taxonomy enables us to understand how living things are related together

A) True
 B) False



Question 5 of 33

| | |
|-------------|--|
| Slide # | 13 |
| Description | Taxonomy Benefits Quiz. True or False question: Taxonomy enables us to understand how living things are related together. Answer: A Bottom left text: shows current number of question. |
| Links | Submit button (slide 14) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Taxonomy Benefits Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Taxonomy does not allow scientific repeatability

- A) True
- B) False



Submit

Back Next

Question 6 of 33

| | |
|-------------|---|
| Slide # | 14 |
| Description | <p>Taxonomy Benefits Quiz. True or False question: Taxonomy does not allow scientific repeatability. Answer: B Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 15) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | <p>Photographic image of elephant is used to show correct answer or incorrect answer.</p> |



Diversity of Life and Taxonomy to Organize It

Taxonomy Benefits Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Taxonomy is a method of expressing relationships among groups

- A) True
- B) False



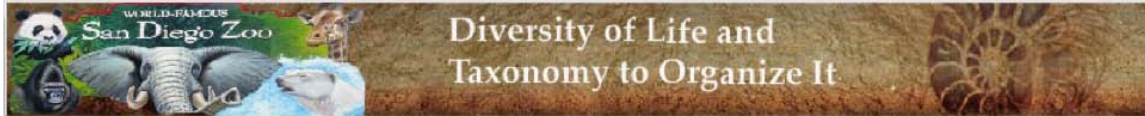
Submit

Back Next

Question 7 of 33

Forward

| | |
|-------------|---|
| Slide # | 15 |
| Description | <p>Taxonomy Benefits Quiz. True or False question: Taxonomy is a method of expressing relationships among groups. Answer: A Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 16) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | <p>Photographic image of elephant is used to show correct answer or incorrect answer.</p> |



History of Taxonomy

Taxonomy

Reasons for Taxonomy

History of Taxonomy

>Aristotle

>Theophrastus

>St. Augustine

>John Ray

>Linnaeus

Hierarchy of Taxonomy

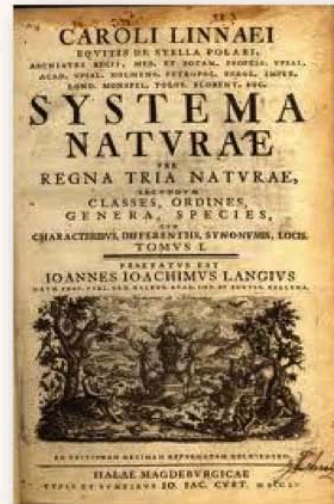
Species

Schools of Taxonomy

Taxonomists are scientists that identify & name organisms.

Some of the early taxonomists are:

- Aristotle
- Theophrastus
- St. Augustine
- John Ray
- Carolus Linnaeus



Back Next

| | |
|-------------|---|
| Slide # | 16 |
| Description | Introduction to History of Taxonomy. Explains early taxonomists. |
| Links | <p>Next button (17) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Aristotle (slide 17) Theophrastus (slide 18) St. Augustine (slide 19) John Ray (slide 20) Linnaeus (slide 21) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of Carolus Linnaeus. |

History of Taxonomy

Taxonomy

Reasons for Taxonomy

History of Taxonomy

>Aristotle

>Theophrastus

>St. Augustine

>John Ray

>Linnaeus

Hierarchy of Taxonomy

Species

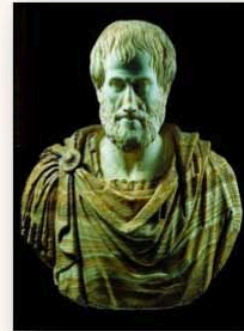
Schools of Taxonomy

Aristotle:

Greece, 384–322 B.C.

Aristotle was the first taxonomist

- He divided organisms into:
 - **Plants**
 - **Animals**
- He then subdivided them by their habitat:
 - **Land Dwellers:** Animals that lived on land
 - **Sea Dwellers:** Animals that lived in the sea
 - **Air Dwellers:** Animals that lived in the air
- He used common names



Back Next

| | |
|-------------|--|
| Slide # | 17 |
| Description | History of Taxonomy highlights Aristotle's taxonomy approach. |
| Links | <p>Next button (slide 18) Back button (slide 17)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Aristotle (slide 17) Theophrastus (slide 18) St. Augustine (slide 19) John Ray (slide 20) Linnaeus (slide 21) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of Aristotle. |

History of Taxonomy

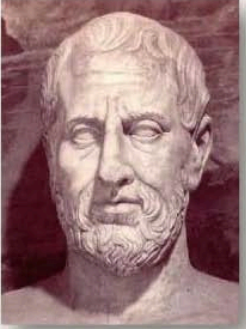
- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
 - >Aristotle
 - >Theophrastus
 - >St. Augustine
 - >John Ray
 - >Linnaeus
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Theophrastus

Greece 370–285 B.C.

Theophrastus, also referred to as the “Father of Botany” classified species based on:

- **Form:** What they look like
- **Life span:** How long do they live
- **Habitat:** Where they live



He divided the plants into:

- Trees, Shrubs, Under-shrubs, and Herbs



| | |
|-------------|--|
| Slide # | 18 |
| Description | History of Taxonomy highlights Theophrastus taxonomy approach. |
| Links | Next button (19) Back button (slide 17) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Aristotle (slide 17) Theophrastus (slide 18) St. Augustine (slide 19) John Ray (slide 20) Linnaeus (slide 21) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Theophrastus. |



Diversity of Life and Taxonomy to Organize It

History of Taxonomy

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
 - > Aristotle
 - > Theophrastus
 - > St. Augustine
 - > John Ray
 - > Linnaeus
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

St. Augustine

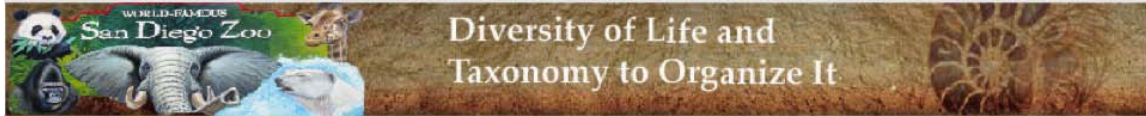
6th Century

St. Augustine divided the species into three categories:

- **Useful:** The ones which are useful to you
- **Harmful:** The ones which are harmful to you
- **Superfluous:** The ones that are neither useful or harmful



| | |
|-------------|---|
| Slide # | 19 |
| Description | History of Taxonomy highlights St. Augustine taxonomy approach. |
| Links | <p>Next button (20) Back button (slide 18)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Aristotle (slide 17) Theophrastus (slide 18) St. Augustine (slide 19) John Ray (slide 20) Linnaeus (slide 21) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of St. Augustine. |



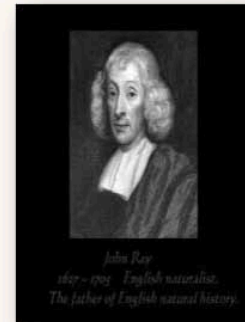
History of Taxonomy

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
 - > Aristotle
 - > Theophrastus
 - > St. Augustine
 - > John Ray
 - > Linnaeus
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

John Ray

England, 17th Century

- **John Ray**, a botanist, was the first taxonomist who introduced and defined the term “**Animal Species**”
- He formulated “species” as a group of organisms with the same morphology which reproduce their own kind.
- He used descriptive & **polynomial** names
- First word in the name was the **Genus** name

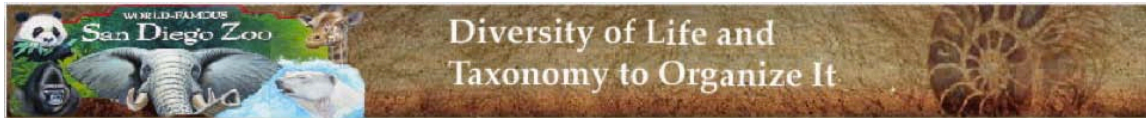


Example:

- Long footed rat with big ears
- Long footed rat with small ears



| | |
|-------------|---|
| Slide # | 20 |
| Description | History of Taxonomy highlights John Ray taxonomy approach. |
| Links | <p>Next button (21) Back button (slide 19)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Aristotle (slide 17) Theophrastus (slide 18) St. Augustine (slide 19) John Ray (slide 20) Linnaeus (slide 21) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of John Ray. |



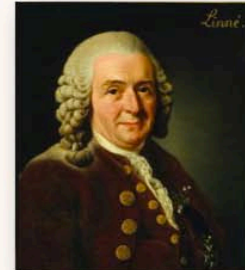
Diversity of Life and Taxonomy to Organize It

History of Taxonomy

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
 - >Aristotle
 - >Theophrastus
 - >St. Augustine
 - >John Ray
 - >Linnaeus
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Carolus Linnaeus

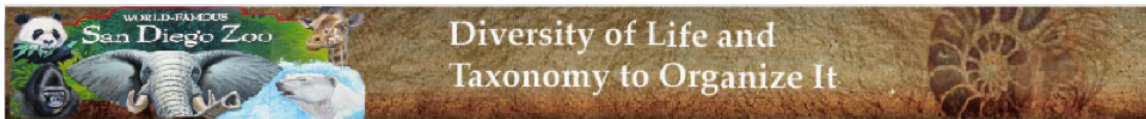
Sweden, 1707–1778



- **Linnaeus** was a botanist who developed a 7-level (taxa) hierarchical classification system based on similarities between organisms (Linnaean Taxonomy)
- Taxon (taxa-plural) is a category into which related organisms are placed
- He devised naming system for organisms called: **Binomial Nomenclature**



| | |
|-------------|--|
| Slide # | 21 |
| Description | History of Taxonomy highlights Carlos Linnaeus taxonomy approach. |
| Links | <p>Next button (22) Back button (slide 19)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Aristotle (slide 17) Theophrastus (slide 18) St. Augustine (slide 19) John Ray (slide 20) Linnaeus (slide 21) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of Carlos Linnaeus. |



Taxonomy History Quiz

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Match the name of the scientist in the left column to the correct classification method to the right column:

| Scientists' Name | Method of Classification |
|--|--|
| <input type="checkbox"/> Aristotle | A) He classified species based on: Form (What they look like), Life Span (How long do they live) and Habitat (Where they live) |
| <input type="checkbox"/> Theophrastus | B) He developed a 7-level hierarchical classification system based on similarities between organisms |
| <input type="checkbox"/> St. Augustine | C) He classified the species into three categories: Harmful, Useful and Superfluous |
| <input type="checkbox"/> John Ray | D) He divided the organisms based on their habitat into land, air and water dwellers |
| <input type="checkbox"/> Linnaeus | E) He used descriptive & polynomial names |

Question 8 of 33

Submit

◀ Back Next ▶

| | |
|-------------|---|
| Slide # | 22 |
| Description | <p>History of Taxonomy multiple-choice quiz. Question: Match the name of the scientist in the left column to the correct classification method to the right column. Answers: D,A,C,E,B Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 23) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | No media. |

WORLD-FAMOUS San Diego Zoo


Diversity of Life and Taxonomy to Organize It

Taxonomy History Quiz

Please select if statement is true or false:

John Ray was the first taxonomist

A) True
 B) False

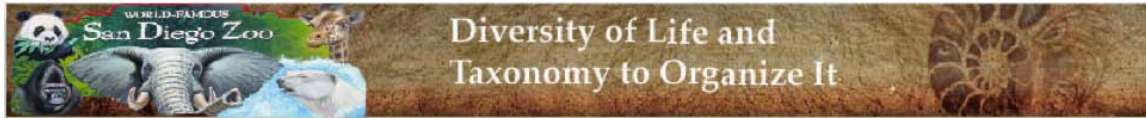


Question 9 of 33

Submit

Back Next

| | |
|-------------|--|
| Slide # | 23 |
| Description | History of Taxonomy True or False quiz. Question: John Ray was the first taxonomist. Answers: B Bottom left text: shows current number of question. |
| Links | Submit button (slide 24) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Taxonomy History Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Aristotle divided the organisms into plants and animals

- A) True
- B) False



Question 10 of 33

Submit



| | |
|-------------|--|
| Slide # | 24 |
| Description | History of Taxonomy True or False quiz. Question: Aristotle divided the organisms into plants and animals. Answers: A Bottom left text: shows current number of question. |
| Links | Submit button (slide 25) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species


Schools of Taxonomy

Taxonomy History Quiz

Please select if statement is true or false:

Theophrastus is referred to as the “Father of Botany”

A) True
 B) False



Submit

◀

▶

Question 11 of 33

| | |
|-------------|--|
| Slide # | 25 |
| Description | History of Taxonomy True or False quiz. Question: Theophrastus is referred to as the “Father of Botany” Answers: A Bottom left text: shows current number of question. |
| Links | Submit button (slide 26) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Taxonomy History Quiz

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Please select if statement is true or false:

St. Augustine was the first taxonomist who introduced and defined the term “Animal Species”

- A) True
- B) False



Question 12 of 33

Submit

Back Next


| | |
|-------------|--|
| Slide # | 26 |
| Description | History of Taxonomy True or False quiz. Question: St. Augustine was the first taxonomist who introduced and defined the term “Animal Species” Answers: B Bottom left text: shows current number of question. |
| Links | Submit button (slide 27) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |

Taxonomy History Quiz

Please select if statement is true or false:

Linnaeus developed a 7-level hierarchical classification system

A) True
 B) False



Question 13 of 33

| | |
|-------------|--|
| Slide # | 27 |
| Description | History of Taxonomy True or False quiz. Question: Linnaeus developed a 7-level hierarchical classification system. Answers: A Bottom left text: shows current number of question. |
| Links | Submit button (slide 28) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |

Linnaean System of Nomenclature

Taxonomy

Reasons for Taxonomy

History of Taxonomy

- >Aristotle
- >Theophrastus
- >St. Augustine
- >John Ray
- >Linnaeus


Hierarchy of Taxonomy

Species

Schools of Taxonomy

Binomial Nomenclature

- Bi means two, Nomen means name
- A binomial nomenclature is a classification system using two names to identify an organism
- This system uses Latin or Latinized names
- The **genus** name is written first (always Capitalized).
- The **species** name is written second (never capitalized).
- Both words are italicized if typed or underlined if hand written.
- Example :**
The scientific name for the common house cat is *Felis catus*



◀ Back Next ▶

| | |
|-------------|---|
| Slide # | 28 |
| Description | Linnaean System of Nomenclature is defined with example. |
| Links | <p>Next button (29)</p> <p>Back button (27)</p> <p><u>Sidebar/Navigation bar:</u></p> <p>Taxonomy: Introduction (slide 1)</p> <p>Reasons for Taxonomy (slide 4)</p> <p>History of Taxonomy (slide 16)</p> <p>Hierarchy of Taxonomy (slide 33)</p> <p>Species (slide 47)</p> <p>Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of cat is used for example. |



Linnaean System of Nomenclature Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

A binomial nomenclature is a classification system using three names to identify an organism

- A) True
- B) False



Question 14 of 33

Submit

Back Next


| | |
|-------------|---|
| Slide # | 29 |
| Description | <p>Linnaean System of Nomenclature True or False quiz. Question: A binomial nomenclature is a classification system using three names to identify an organism. Answers: B Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 30) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | <p>Photographic image of elephant is used to show correct answer or incorrect answer.</p> |

Linnaean System of Nomenclature Quiz

Please select if statement is true or false:

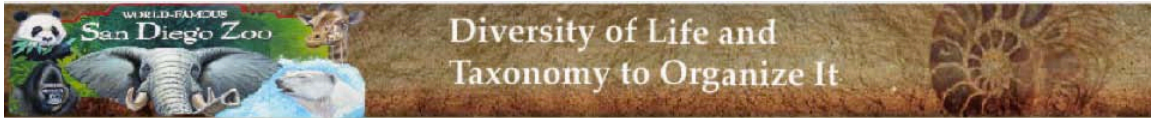
The genus name is written first, always Capitalized

A) True
 B) False



Question 15 of 33

| | |
|-------------|--|
| Slide # | 30 |
| Description | Linnaean System of Nomenclature True or False quiz. Question: The genus name is written first, always Capitalized. Answers: A Bottom left text: shows current number of question. |
| Links | Submit button (slide 31) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Linnaean System of Nomenclature Quiz

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Please select if statement is true or false:

The Species name is written second, always Capitalized

- A) True
- B) False



Question 16 of 33

Forward

Submit

Back Next

| | |
|-------------|--|
| Slide # | 31 |
| Description | Linnaean System of Nomenclature True or False quiz. Question: The Species name is written second, always Capitalized. Answers: B Bottom left text: shows current number of question. |
| Links | Submit button (slide 32) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Linnaean System of Nomenclature Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Both words are italicized if typed or underlined if hand written.

- A) True
- B) False



Question 17 of 33

Submit

Back Next

| | |
|-------------|---|
| Slide # | 32 |
| Description | <p>Linnaean System of Nomenclature True or False quiz. Question: Both words are italicized if typed or underlined if hand written. Answers: A Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 33) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | <p>Photographic image of elephant is used to show correct answer or incorrect answer.</p> |

Taxonomy Hierarchy

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Kingdoms are divided into groups called phyla

Phyla are subdivided into classes

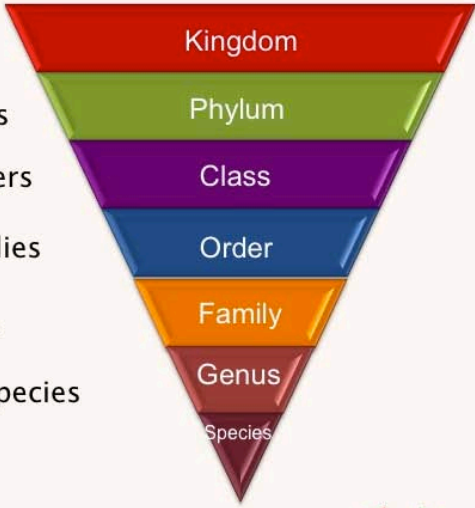
Classes are subdivided into orders

Orders are subdivided into families

Families are divided into genera

Genera contain closely related species

Specific epithet is unique



◀ Back Next ▶

| | |
|-------------|---|
| Slide # | 33 |
| Description | Introduction to levels of Taxonomy Hierarchy |
| Links | <p>Next button (34)</p> <p>Back button (32)</p> <p><u>Sidebar/Navigation bar:</u></p> <p>Taxonomy: Introduction (slide 1)</p> <p>Reasons for Taxonomy (slide 4)</p> <p>History of Taxonomy (slide 16)</p> <p>Hierarchy of Taxonomy (slide 33)</p> <p>Species (slide 47)</p> <p>Schools of Taxonomy (slide 60)</p> |
| Media | Graphic image used to show Hierarchy level. |



Taxonomy Hierarchy

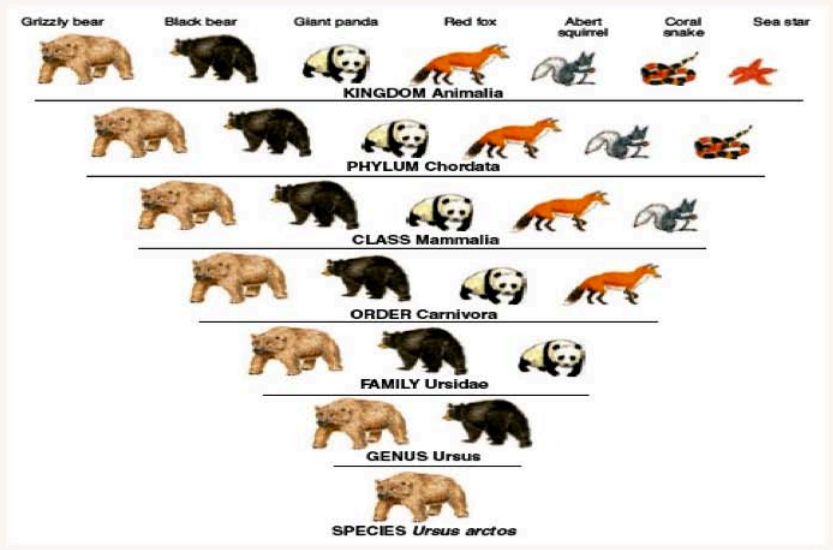
| | | | |
|-----------------------|--|---------------|------------|
| Taxonomy | Linnaeus's Seven Layer Hierarchy: (Easy way to remember layers) | | |
| Reasons for Taxonomy | | | |
| History of Taxonomy | 1. Kingdom | Very Broad | 1. King |
| Hierarchy of Taxonomy | 2. Phylum | ↓ | 2. Phillip |
| Species | 3. Class | ↓ | 3. Came |
| Schools of Taxonomy | 4. Order | ↓ | 4. Over |
| | 5. Family | ↓ | 5. For |
| | 6. Genus | ↓ | 6. Good |
| | 7. Specific epithet | Very Specific | 7. Soup |

◀ Back Next ▶

| | |
|--------------------|--|
| Slide # | 34 |
| Description | Memorization example of Taxonomy Hierarchy |
| Links | Next button (35) Back button (33) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Graphic image used to show Hierarchy level. |

Taxonomy Hierarchy Example

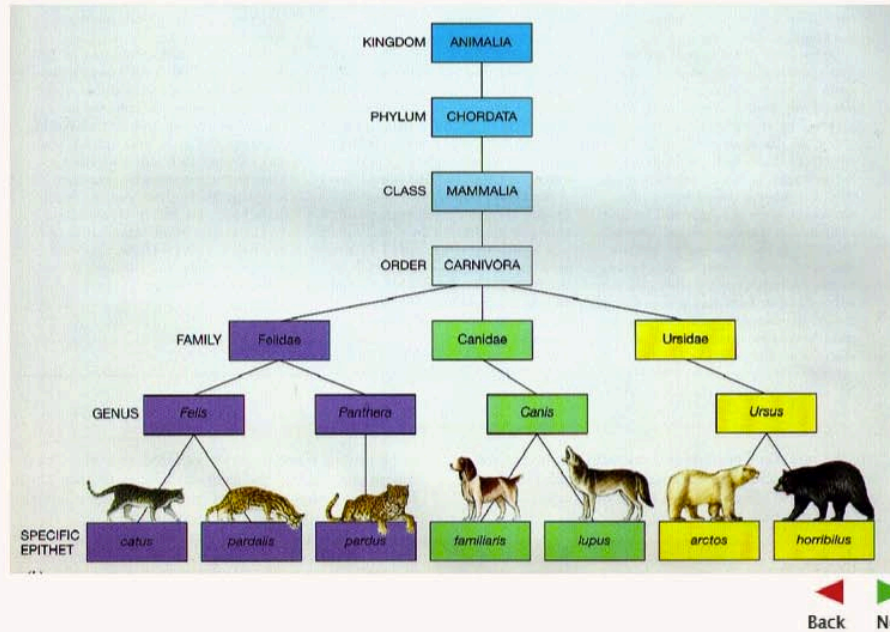
- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy



Back Next

| | |
|-------------|---|
| Slide # | 35 |
| Description | Taxonomy Hierarchy Example of animals |
| Links | <p>Next button (36) Back button (34)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Graphic image used to show Hierarchy level. |

Taxonomy Hierarchy Example



| | |
|-------------|--|
| Slide # | 36 |
| Description | Taxonomy Hierarchy secondary Example of animals |
| Links | <p>Next button (37) Back button (35)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Graphic image used to show Hierarchy level. |

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species


Schools of Taxonomy

Taxonomy Hierarchy

Animal Classification Game

Can you guess the correct classification for this **Bear**?

Start the game




◀ Back Next ▶

| | |
|-------------|--|
| Slide # | 37 |
| Description | Game: Animal Classification introduction. Learner is asked to play a game to guess the correct classification. |
| Links | <p>Next button (38) Back button (36)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of Bear. |

Taxonomy Hierarchy

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Select the Kingdom that seems the most right:



- A) Animalia: Organisms that get their energy by ingesting other organisms. Commonly multi-celled
- B) Bacteria: Single-celled organisms that do not have nucleus
- C) Fungi: Single-celled and multi-celled organisms that get their energy mainly by absorbing nutrients from their surroundings and not through photosynthesis
- D) Plantae: Organisms that get their energy through photosynthesis. Commonly multi-celled
- E) Protocista: Multi-celled organisms that are not plants, animals, or fungi

Question 18 of 33

Submit

Back Next

Kingdom

| | |
|-------------|--|
| Slide # | 38 |
| Description | Game: Animal Classification first level. Learner is asked to select the best Kingdom the bear belongs to. Learner must choose correct answer to proceed. Bottom left text: shows current number of question. |
| Links | <p>Next button (39) Back button (37)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of Bear. Progress bar shows current level of hierarchy. |

Taxonomy Hierarchy

Taxonomy

Reasons for Taxonomy

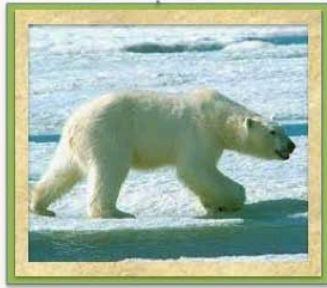
History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Select the Phylum that seems the most right:



- A) Chordata: Animals with a notochord at some stage of development that sometimes develops into a backbone
- B) Echinodermata: Animals with five-part symmetry and an internal skeleton made from calcium carbonate
- C) Arthropoda: Segmented animals consisting of a head, thorax, and an abdomen. Bodies are covered with an exoskeleton
- D) Crustacea: Segmented animals with 16 to 20 segments, 2 pairs of antennae, and compound eyes that are usually on stalks

Question 19 of 33

Submit

Back Next

Kingdom Phylum

| | |
|-------------|--|
| Slide # | 39 |
| Description | Game: Animal Classification first level. Learner is asked to select the best Phylum the bear belongs to. Learner must choose correct answer to proceed. Bottom left text: shows current number of question. |
| Links | Next button (40) Back button (38) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Bear. Progress bar shows current level of hierarchy. |

Taxonomy Hierarchy

Taxonomy

Reasons for Taxonomy

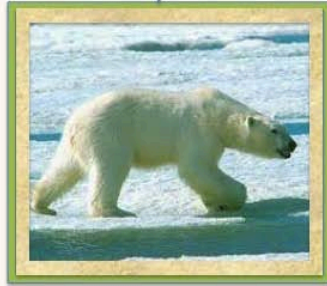
History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Select the Class that seems the most right:



- A) Ascidiaceae: Cold blooded marine animals that have neither a brain nor a skull and live inside a sac
- B) Aves: Warm blooded animals with beaks and light bones that are hollow in areas
- C) Mammalia: Warm-blooded animals with fur or skin that may grow hair. Females have mammary glands
- D) Reptilia: Cold-blooded animals with scaly and either short legs or no legs at all

Question 20 of 33

Submit

Back Next

Kingdom → Phylum → Class →

| | |
|-------------|--|
| Slide # | 40 |
| Description | Game: Animal Classification first level. Learner is asked to select the best Class the bear belongs to. Learner must choose correct answer to proceed. Bottom left text: shows current number of question. |
| Links | Next button (41) Back button (39) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Bear. Progress bar shows current level of hierarchy. |

Taxonomy Hierarchy

Taxonomy

Reasons for Taxonomy

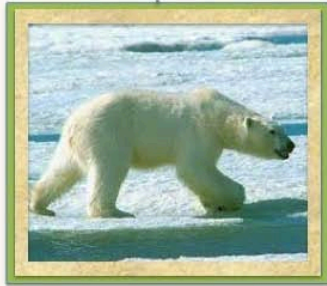
History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Select the Order that seems the most right:



- A) Artiodactyla: Two or four toed mammals that are usually found in groups or herds
- B) Carnivora: Meat-eating mammals, though some supplement their diet with fruits, plants, and insects
- C) Diprotodonts: Mammals in which 2 of the 4 digits of their hind legs are fused together up to the base of their claws
- D) Primates: Mammals with opposite thumbs and hands that are able to grasp

Question 21 of 33

Submit

Back Next

Kingdom → Phylum → Class → Order →

| | |
|-------------|--|
| Slide # | 41 |
| Description | Game: Animal Classification first level. Learner is asked to select the best Order the bear belongs to. Learner must choose correct answer to proceed. Bottom left text: shows current number of question. |
| Links | Next button (42) Back button (40) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Bear. Progress bar shows current level of hierarchy. |

Taxonomy Hierarchy

Taxonomy

Reasons for Taxonomy

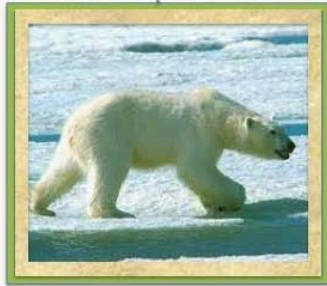
History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Select the Family that seems the most right:



- A) Felidae: Carnivores that have retractable claws that can either purr or roar
- B) Mustelidae: Carnivores that typically have long tails. All have especially developed anal glands
- C) Procyonidae: Small to medium sized mammals with short to long tails. Found only from Canada to Argentina
- D) Ursidae: Small to large mammals with larger ears and short tails

Question 22 of 33

Submit

Back Next

Kingdom → Phylum → Class → Order → Family →

| | |
|-------------|--|
| Slide # | 42 |
| Description | Game: Animal Classification first level. Learner is asked to select the best Family the bear belongs to. Learner must choose correct answer to proceed. Bottom left text: shows current number of question. |
| Links | Next button (43) Back button (41) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Bear. Progress bar shows current level of hierarchy. |

Taxonomy Hierarchy

Taxonomy

Reasons for Taxonomy

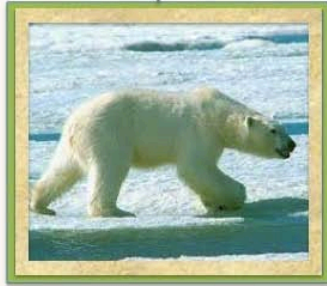
History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Select the Genus that seems the most right:



- A) Melursus: Bears with long narrow snouts which look similar to an anteater's snout. They have small teeth and incisors
- B) Helarctos: Small bears that stand only about 30 inches to the shoulder
- C) Ursus: Bears whose fur is typically uniform in color
- D) Tremarctos: Large bears with white fur circling or almost circling its eyes. Feeds mostly on fruits

Question 23 of 33

Submit

Kingdom → Phylum → Class → Order → Family → Genus → Back Next

| | |
|-------------|--|
| Slide # | 43 |
| Description | Game: Animal Classification first level. Learner is asked to select the best Genus the bear belongs to. Learner must choose correct answer to proceed. Bottom left text: shows current number of question. |
| Links | Next button (44) Back button (42) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Bear. Progress bar shows current level of hierarchy. |

Taxonomy Hierarchy

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Select the Species that seems the most right:



- A) Arctos: Large bear known for its brown coat. Eats mostly vegetarian
- B) Americanus: Medium or large bear known typically for its dark brown or black coat
- C) Maritimus: Large aquatic bear adapted to a cold climate
- D) Ursinus: Small to medium bear with black fur, though sometimes with gray and brown fur mixed in

Question 24 of 33

Submit




Kingdom → Phylum → Class → Order → Family → Genus → Species → Back Next

Forward

| | |
|-------------|--|
| Slide # | 44 |
| Description | Game: Animal Classification first level. Learner is asked to select the best Species the bear belongs to. Learner must choose correct answer to proceed. Bottom left text: shows current number of question. |
| Links | Next button (45) Back button (43) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Bear. Progress bar shows current level of hierarchy. |

Congratulations!



Back Next

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

| | |
|-------------|---|
| Slide # | 45 |
| Description | Game: presents positive feedback when all 7 levels are completed. |
| Links | Slide proceeds to next slide 46 in 4 seconds. Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Bear. |



Hierarchy Quiz

Match the correct seven levels of hierarchy

| Name of Each Level | Hierarchy Order |
|---------------------------------------|-----------------|
| <input type="text"/> Order | 1. |
| <input type="text"/> Specific Epithet | 2. |
| <input type="text"/> Family | 3. |
| <input type="text"/> Genus | 4. |
| <input type="text"/> Phylum | 5. |
| <input type="text"/> Kingdom | 6. |
| <input type="text"/> Class | 7. |

Question 25 of 33

| | |
|-------------|---|
| Slide # | 46 |
| Description | <p>Hierarchy Quiz.</p> <p>Question: Match the correct seven levels of hierarchy.</p> <p>Answer: 4,7,5,6,2,1,3</p> <p>Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 47)</p> <p>Clear button clears answers from drop-down list.</p> <p>Next button (disabled)</p> <p>Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u></p> <p>Taxonomy: Introduction (slide 1)</p> <p>Reasons for Taxonomy (slide 4)</p> <p>History of Taxonomy (slide 16)</p> <p>Hierarchy of Taxonomy (slide 33)</p> <p>Species (slide 47)</p> <p>Schools of Taxonomy (slide 60)</p> |
| Media | No Media |

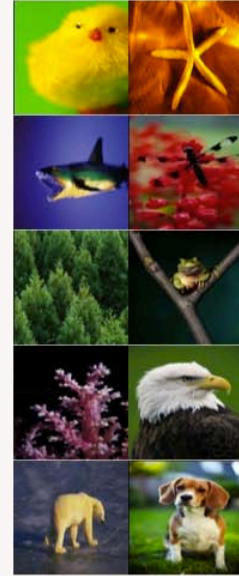


Species

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Species is an individual class of organisms which are distinctive from other animals, and unable to breed with other groups of animals. Members of a species are defined on the basis of their differences, which may be quite diverse or very minimal.

Species are identified by Genus and specific epithet.



Back Next


| | |
|-------------|--|
| Slide # | 47 |
| Description | Introduction to Species. Species is defined. |
| Links | Next button (48) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic images of species. |

Species Guessing Game


Guess if these two animals are the same species?

A) Yes

B) No



Indian Elephant



African Elephant

Question 26 of 33

Submit

Back Next

| | |
|-------------|--|
| Slide # | 48 |
| Description | <p>Game: Species Guessing Game. Learner is asked to guess if the following two animals are the same species?</p> <p>Answer: No.</p> <p>Learner must choose correct answer to proceed.</p> <p>Bottom left text: shows current number of question.</p> |
| Links | <p>Submit (slide 49)</p> <p>Next button (disabled)</p> <p>Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u></p> <p>Taxonomy: Introduction (slide 1)</p> <p>Reasons for Taxonomy (slide 4)</p> <p>History of Taxonomy (slide 16)</p> <p>Hierarchy of Taxonomy (slide 33)</p> <p>Species (slide 47)</p> <p>Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of Indian Elephant and African Elephant. |



Diversity of Life and Taxonomy to Organize It

How Are Species Distinguished?

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Methods of Distinguishing Species:

There are several methods used for distinguishing species.

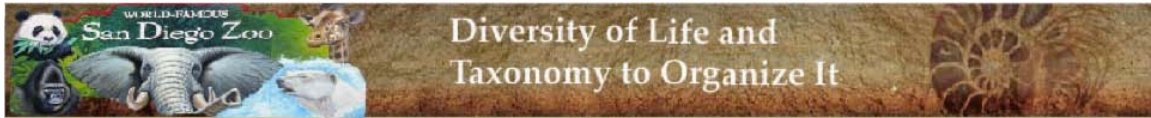
These methods are usually not exclusive – often a combination of these methods are used

The following is a list of the most common methods:

- **Phenotype**
- **Geography**
- **Behavior**
- **Chromosome**
- **DNA**



| | |
|-------------|--|
| Slide # | 49 |
| Description | How are Species Distinguished Methods of distinguishing species is defined. |
| Links | Next button (50) Back button (48) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | No media |



Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

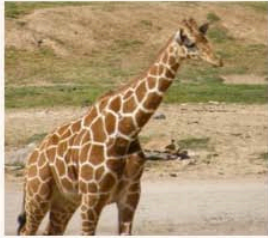

Schools of Taxonomy

Methods of Distinguishing Species

Phenotype:
This method is based on physical differences:

- How do they look like
- What are their colors
- Do they have pattern
- Are they big, or small
- What is their anatomy:
 - They have feathers but don't fly
 - How many legs, do they have
 - Do they have scales

Example:
In the two images on the right, notice that the color of the giraffes' coats and the patterns are different.

◀ Back Next ▶

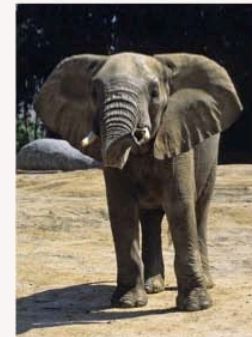
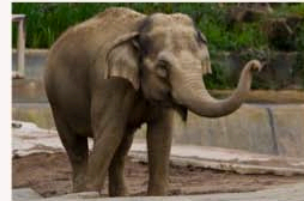
| | |
|-------------|--|
| Slide # | 50 |
| Description | Methods of Distinguishing Species Method: Phenotype is defined and example is given. |
| Links | Next button (51) Back button (49) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of giraffe is used to demonstrate differences. |

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Methods of Distinguishing Species

Geography:

This method is based on where the Species are, and if there are physical barriers that have created different populations. These barriers can be mountain ranges, bodies of Water, continents, etc.



Example:

In the two images on the right, notice that these two elephants look different because they live in different locations

Back Next

| | |
|-------------|--|
| Slide # | 51 |
| Description | Methods of Distinguishing Species Method: Geography is defined and example is given. |
| Links | Next button (52) Back button (50) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to demonstrate differences. |

Methods of Distinguishing Species

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

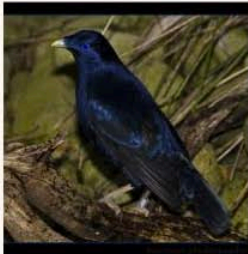
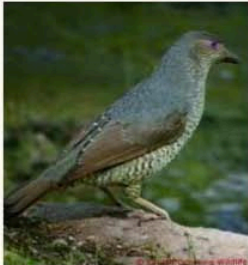
Schools of Taxonomy

Behavior

This method is based on how the species interact with each other, with other species and with the environment. For instance, in case of many bird species this method depends on how they attract mates, vocalize, etc.

Example:

The two bowerbirds on the bottom have different courtship behaviors.

◀ Back Next ▶

| | |
|-------------|--|
| Slide # | 52 |
| Description | Methods of Distinguishing Species Method: Behavior is defined and example is given. |
| Links | Next button (53) Back button (51) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of bowerbirds is used to demonstrate differences. |

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

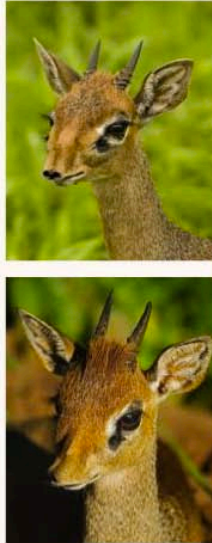
Species

Schools of Taxonomy

Methods of Distinguishing Species

Chromosome:
Some species look identical on the outside, but their chromosomes have different characteristics such as number, size, and banding. For instance two species may look the same and they can breed, but the offspring are infertile because of the chromosomal differences.

Example:
The two Dik diks or the small antelopes on the right look the same and they can breed, but their offspring are infertile because of the chromosomal differences.



◀ ▶
 Back Next

| | |
|-------------|--|
| Slide # | 53 |
| Description | Methods of Distinguishing Species Method: Chromosome is defined and example is given. |
| Links | Next button (54) Back button (42) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Dik diks is used to demonstrate differences. |

Methods of Distinguishing Species

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy


Species

Schools of Taxonomy

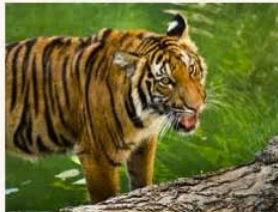
DNA:
Technology enables us to use DNA as a tool to determine different types of species. this method looks at the molecular structure of organisms.

Example:
DNA evidence led some scientists to suggest that the Indochinese tiger subspecies should be divided into northern Indochinese (on top) and peninsular Malayan (on bottom)

Northern Indochinese Tiger

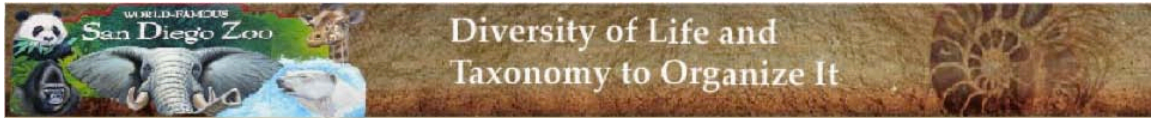


Peninsular Malayan Tiger



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| | |
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| Slide # | 54 |
| Description | Methods of Distinguishing Species Method: DNA is defined and example is given. |
| Links | Next button (55) Back button (53) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of Northern Indochinese and Peninsular Malayan Tigers are used to demonstrate differences. |



Taxonomy

Reasons for Taxonomy

History of Taxonomy

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Species

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Question 27 of 33

Species Quiz

Please select if statement is true or false:

Species is an individual class of organisms which are distinctive from other animals

A) True
 B) False



Submit

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|-------------|---|
| Slide # | 55 |
| Description | <p>Species True or False quiz.</p> <p>Question: Species is an individual class of organisms which are distinctive from other animals.</p> <p>Answers: A</p> <p>Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 56)</p> <p>Next button (disabled)</p> <p>Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u></p> <p>Taxonomy: Introduction (slide 1)</p> <p>Reasons for Taxonomy (slide 4)</p> <p>History of Taxonomy (slide 16)</p> <p>Hierarchy of Taxonomy (slide 33)</p> <p>Species (slide 47)</p> <p>Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Taxonomy

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Species Quiz

Please select if statement is true or false:

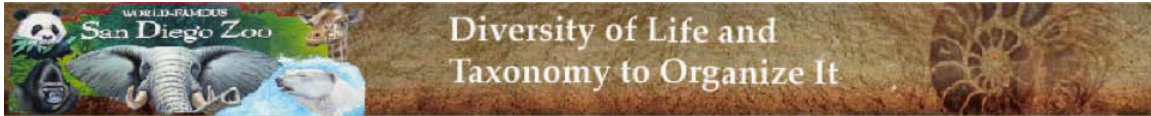
Species are able to breed with other groups of animals

A) True
 B) False

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Question 28 of 33

| | |
|-------------|--|
| Slide # | 56 |
| Description | Species True or False quiz. Question: Species are able to breed with other groups of animals. Answers: B Bottom left text: shows current number of question. |
| Links | Submit button (slide 57) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Species Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

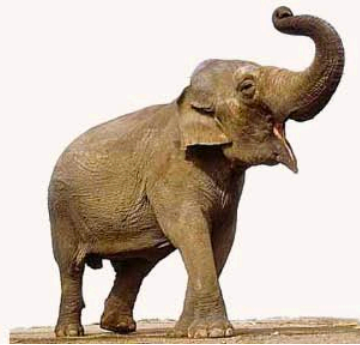
Species

Schools of Taxonomy

Please select if statement is true or false:

Species are identified by Kingdom and Class

- A) True
- B) False

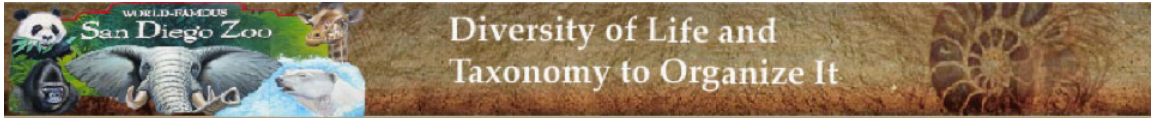


Question 29 of 33

Submit



| | |
|-------------|--|
| Slide # | 57 |
| Description | Species True or False quiz. Question: Species are identified by Kingdom and Class. Answers: B Bottom left text: shows current number of question. |
| Links | Submit button (slide 58) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Species Quiz

Taxonomy

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Schools of Taxonomy

Question 30 of 33

Match the correct Method of Species Recognition

| Name | Method of Species Recognition |
|-------------------------------------|---|
| <input type="checkbox"/> Phenotype | A) This method is based on where the species lives. |
| <input type="checkbox"/> Geography | B) This method looks at the molecular structure of organisms. |
| <input type="checkbox"/> Behavior | C) This method is used when two species look the same and they can breed, but the offspring is infertile. |
| <input type="checkbox"/> Chromosome | D) This method is based on physical differences. |
| <input type="checkbox"/> DNA | E) This method is based on how the species interact with each other, with other species and with the environment. |

| | |
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| Slide # | 58 |
| Description | Species matching quiz. Question: Match the correct Method of Species Recognition. Answers: D,A,E,C,B Bottom left text: shows current number of question. |
| Links | Submit button (slide 59) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | No Media |

What is a Subspecies?

Taxonomy

Reasons for Taxonomy

History of Taxonomy

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Species

Schools of Taxonomy

Subspecies

A subspecies is an individual division within a species, meaning that the members of the subspecies are individual enough that they cannot be lumped together, but they are not so distinct that they are entirely different species. Subspecies are defined by a **trinomial**

Example: A subspecies which you may be familiar with is the domestic **dog**, *Canis lupus familiaris*, as opposed to the **wolf** *Canis lupus lupus*, or the **dingo**, *Canis lupus dingo*. All of these animals can interbreed, but they are morphologically distinct, and they lead very different lives

Select a picture to see the subspecies name.



Dog



Back Next

| | |
|-------------|--|
| Slide # | 59 |
| Description | Introduction to What is a Subspecies? Subspecies is defined with example. Learner is asked to select picture to reveal subspecies name. |
| Links | Next button (60) Back button (58) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of three species. |

Schools of Taxonomy

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy



What makes subspecies different from other subspecies? Are there enough difference between them to call them a separate subspecies?


It is more difficult to draw the line to distinguish the subspecies. For this reason, different groups of scientists draw divisions at different thresholds.

Example: Which two animals are related? Lizard, Bird, or Crocodile?

Three schools of taxonomy are used to answer these questions:

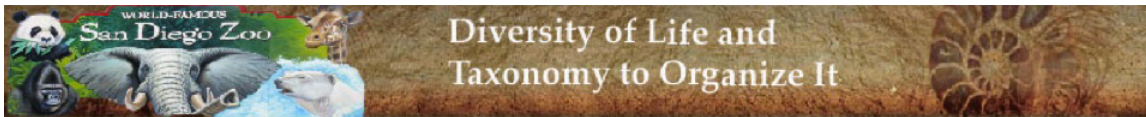
- Phenetics**
- Cladistics**
- Classical Evolutionary**



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| | |
|-------------|--|
| Slide # | 60 |
| Description | Introduction to Schools of Taxonomy Schools of Taxonomy is defined with example. Inquiry arousal: Which two animals are related? Lizard? Bird? or Crocodile? |
| Links | Next button (61) Back button (59) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of three species. |



Diversity of Life and Taxonomy to Organize It

Schools of Taxonomy

| | |
|-----------------------|---|
| Taxonomy | <p>Phenetics affinities based on measurable similarities or differences with no evolutionary assumptions. All criteria are weighted equally</p> <p>Characteristics:</p> <ul style="list-style-type: none"> ▪ Good for <i>DNA sequencing</i>, when DNA is used to see the differences between species or subspecies, because DNA is measurable. ▪ Good for fossils because there are concrete things that you can measure or look at. ▪ Phenetics need many criteria to overwhelm convergent traits not due to common ancestor. Therefore, they have to have overwhelming evidence to say that two subspecies are different. ▪ Phylogenetic tree for Phenetics is very dependent on the characters selected. For example, if an emphasis is placed on geography or the kind of environment a subspecies needs to survive, then the Phylogenetic tree will be based upon the environment. |
| Reasons for Taxonomy | |
| History of Taxonomy | |
| Hierarchy of Taxonomy | |
| Species | |
| Schools of Taxonomy | |

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| | |
|-------------|--|
| Slide # | 61 |
| Description | Introduction to Schools of Taxonomy Phenetics is defined and characteristics are explained. |
| Links | Next button (62) Back button (60) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | No media |

Schools of Taxonomy

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

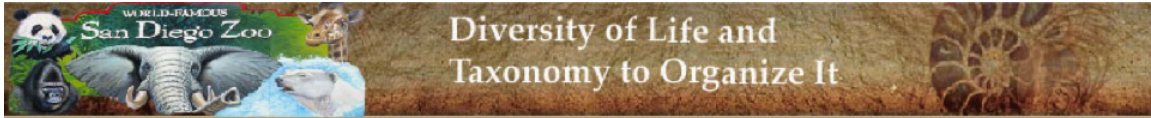
Schools of Taxonomy

Phenetics Example:

Phenetics believe that lizards and crocodiles are related. They look at all the common characteristics that these species have. They are both reptiles and cold blooded; therefore these common characteristics make them closely related. Also, lizards and crocodiles have a common ancestor where birds split off.

◀ Back Next ▶

| | |
|-------------|--|
| Slide # | 62 |
| Description | Introduction to Schools of Taxonomy Phenetics example is defined by using graphic imagery. |
| Links | Next button (63) Back button (61) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of three species are separated by a tree to defined Phenetics. |



Diversity of Life and Taxonomy to Organize It

Schools of Taxonomy

| | |
|-----------------------|--|
| Taxonomy | <p>Cladistics focus more on the evolutionary path, and affinities based on evolutionary branches ordered by time and defined by novel homologies.</p> <p>Charcteristics:</p> <ul style="list-style-type: none"> ▪ Their goal is to show the evolutionary path and how things are related to one another. ▪ Cladistics are more subjective due to holes in fossil record. Therefore, they need to make some assumptions about what relationships actually existed. ▪ For Cladistics, truth is hard to know due to lack of data; thus, they have to accept that there will be unknowns in their data sets. ▪ Cladistics believe that each taxonomic group must have one origin (i.e., single ancestor) with novel character; thus, everything can be traced back to that single ancestor. ▪ Inherently provides additional information, for example Cladistics look at whether subspecies can interbreed, to know if they are from the same species or separate ones. ▪ Cladistics are typical splitters, so, for them one difference is enough to make a new group. |
| Reasons for Taxonomy | |
| History of Taxonomy | |
| Hierarchy of Taxonomy | |
| Species | |
| Schools of Taxonomy | |

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| | |
|-------------|--|
| Slide # | 63 |
| Description | Introduction to Schools of Taxonomy continued. Cladistics is defined and characteristics are explained. |
| Links | Next button (64) Back button (62) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | No media |

Schools of Taxonomy

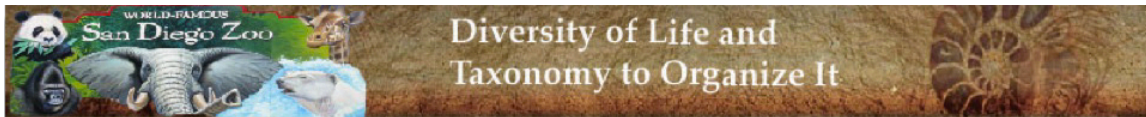
- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Cladistics Example:

Cladistics believe that birds and crocodiles are related because they have a common ancestor.

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| | |
|-------------|--|
| Slide # | 64 |
| Description | Introduction to Schools of Taxonomy continued Cladistics example is defined by using graphic imagery. |
| Links | Next button (65) Back button (63) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of three species are separated by a tree to defined Cladistics. |



Diversity of Life and Taxonomy to Organize It

Schools of Taxonomy

- Taxonomy
- Reasons for Taxonomy
- History of Taxonomy
- Hierarchy of Taxonomy
- Species
- Schools of Taxonomy

Classical Evolutionary considers overall homology and branching sequence. It solves conflict with subjective judgment over which criteria are given higher priority.

Charcteristics:

- Classical Evolutionary is a balance between Phenetics and Cladistics
- Classical Evolutionary looks for measurable data like the Phenathis; however, they count some criterion more than others. For example, appearance and anatomy may weigh more than the DNA
- Single interbreeding unit is weighted heavy. For example, Classical Evolutionary may examine two subspecies to see if they are able to breed and produce viable offspring, to determine if they are from the same species
- Taxonomic groups can have one or several origins/ancestors




| | |
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| Slide # | 65 |
| Description | Introduction to Schools of Taxonomy continued Classical Evolutionary is defined and characteristics are explained. |
| Links | Next button (66) Back button (64) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | No media |

Subspecies Quiz

Please select if statement is true or false:

A subspecies is an individual division within a species

A) True
 B) False



Question 31 of 33

| | |
|-------------|--|
| Slide # | 66 |
| Description | Subspecies True or False quiz. Question: A subspecies is an individual division within a species Answers: A Bottom left text: shows current number of question. |
| Links | Submit button (slide 67) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Subspecies Quiz

Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Please select if statement is true or false:

Subspecies are defined by a binomial

- A) True
- B) False

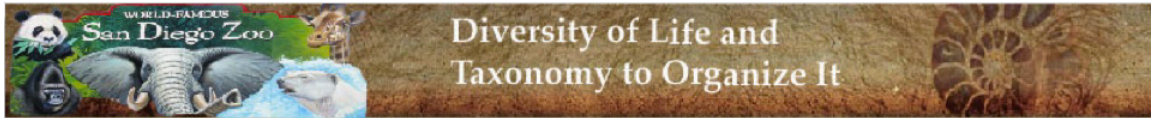


Question 32 of 33

Submit



| | |
|-------------|--|
| Slide # | 67 |
| Description | Subspecies True or False quiz. Question: Subspecies are defined by a binomial. Answers: B Bottom left text: shows current number of question. |
| Links | Submit button (slide 68) Next button (disabled) Back button (disabled) <u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60) |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



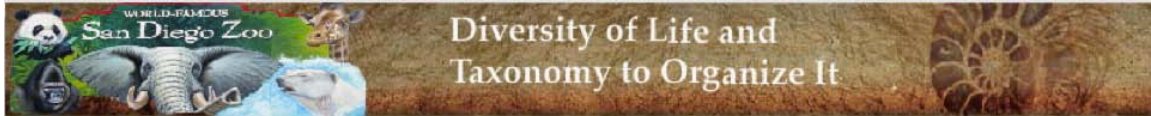
Methods of Species Recognition Quiz

Match the three schools of taxonomy with the correct description

| | <u>Name</u> | <u>Method of Species Recognition</u> |
|--|--|--|
| <ul style="list-style-type: none"> Taxonomy Reasons for Taxonomy History of Taxonomy Hierarchy of Taxonomy Species Schools of Taxonomy | <input type="checkbox"/> Phenetics <input type="checkbox"/> Cladistics <input type="checkbox"/> Classical Evolutionary | <p>A) This method focuses more on the evolutionary path, and affinities based on evolutionary branches ordered by time and defined by novel homologies.</p> <p>B) This method considers overall homology and branching sequence. It solves conflict with subjective judgement over which criteria are given higher priority.</p> <p>C) This method affinities based on measurable similarities or differences with no evolutionary assumptions. All criteria are weighted equally.</p> |

Question 1 of 1

| | |
|-------------|---|
| Slide # | 68 |
| Description | <p>Species Matching quiz.</p> <p>Question: Match the three schools of taxonomy with the correct description.</p> <p>Answers: C,A,B</p> <p>Bottom left text: shows current number of question.</p> |
| Links | <p>Submit button (slide 69)</p> <p>Clear button clears choices.</p> <p>Next button (disabled)</p> <p>Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u></p> <p>Taxonomy: Introduction (slide 1)</p> <p>Reasons for Taxonomy (slide 4)</p> <p>History of Taxonomy (slide 16)</p> <p>Hierarchy of Taxonomy (slide 33)</p> <p>Species (slide 47)</p> <p>Schools of Taxonomy (slide 60)</p> |
| Media | Photographic image of elephant is used to show correct answer or incorrect answer. |



Taxonomy

Reasons for Taxonomy

History of Taxonomy

Hierarchy of Taxonomy

Species

Schools of Taxonomy

Final Quiz Result

| | |
|--------------------------|-----|
| Your Score: | 0 |
| Max Score: | 330 |
| Questions Correct: | 0 |
| Number of Questions: | 33 |
| Accuracy: | 0% |
| Number of Quiz Attempts: | 1 |

Sorry, you failed

Continue

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 ▶ Next

| | |
|-------------|--|
| Slide # | 69 |
| Description | Final Quiz Results are shown. Learner will be prompted with positive feedback if accuracy is 80% or more. Learner will be prompted with negative feedback if accuracy is below 79%. |
| Links | <p>Continue button (ends course) Next button (disabled) Back button (disabled)</p> <p><u>Sidebar/Navigation bar:</u> Taxonomy: Introduction (slide 1) Reasons for Taxonomy (slide 4) History of Taxonomy (slide 16) Hierarchy of Taxonomy (slide 33) Species (slide 47) Schools of Taxonomy (slide 60)</p> |
| Media | No media |