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HOW TO USE THE EDUCATOR RESOURCE GUIDE

We hope this resource guide provides ideas on how to prepare for a meaningful, informative, and fun visit to the Discovery Center that provides a relevant connection to your classroom learning objectives.

This resource guide will help orient you with the exhibition content and layout, provide helpful prompts and activities to prepare students for their visit and ideas for onsite interactions, as well as follow up prompts and activities.

In each section you will find suggestions for standards-based onsite engagement and classroom preparation, videos and resources to explore, or follow up activities related to that particular section’s content.

Teachers can pick and choose which sections, activities or themes they want to focus on with their students. On their field trip, students will experience all sections of the exhibition.

EDUCATION STATEMENT

The Discovery Center of Idaho hopes that by visiting *Exquisite Creatures* visitors will:

- Experience unique displays of biodiversity and view rare specimens, motivating them to take further interest in learning about and preserving nature.

- Understand the integration of art and science in nature and how both art and science are integral to each other in understanding the world around us.

The Discovery Center of Idaho’s mission is to inspire lifelong interest and learning in Science, Technology, Engineering, and Math.

The Education Department at the Discovery Center of Idaho seeks to provide quality educational experiences & programs that reflect excellence in their development, mastery in their delivery, and offer relevant and sustainable interactions that inspire lifelong interest and learning in S.T.E.M. for a diverse, DCI community.
II. ART AND SCIENCE THEMES & STANDARDS ALIGNMENT

**SCIENTIFIC THEMES**
*Exquisite Creatures* explores many scientific themes including:
- Taxonomy and Variations
- Morphology
- Color
- Size & Scale
- Conservation
- Biodiversity

- The structure of an organism can affect its ability to survive
- Conservation
- Human actions impact the natural world. How can we design our actions to compliment a sustainable ecosystem?

**ARTISTIC THEMES**
*Exquisite Creatures* explores many Artistic (and math-related) themes including:
- Composition
- Symmetry
- Color wheel and spectrum

- Try this DCI @ Home Post - CLICK HERE

**NGSS (Next Generation Science Standards) ALIGNMENT:**
- Question and Observe
- Make observations about unique, rarely seen creatures and form connections with science topics
- Structure and Variation

- Try this DCI @ Home Post - CLICK HERE

**NATIONAL CORE ARTS STANDARDS ALIGNMENT:**
- Creating (via field trip art project add-on)
- Organize and develop artistic ideas and work
- Performing (via field trip art project add-on)
- Convey meaning through the presentation of artistic work
- Responding
- Perceive and analyze artistic work
- Interpret intent and meaning in artistic work
- Connecting
  - Relate artistic ideas and works with societal, cultural and historical context to deepen understanding

**Austin’s Butterfly - CLICK HERE**
We suggest taking time to watch this mind-blowing video created at a local Boise School as a foundation for understanding the importance of how art, critical thinking, facilitated inquiry & positive feedback can help support students’ scientific and artistic observation skills.
Exquisite Creatures is a celebration of the awe-inspiring scope of Earth’s biodiversity. The exhibit, created by Oregon-based artist, Christopher Marley, showcases stunning, three-dimensional displays of animals, minerals, and plants from all over the world. The collection reveals the connection between art, science and conservation, provoking wonder and admiration for the natural world.

Christopher Marley is known worldwide. He grew up in Oregon, and has made it his life’s work to broaden the world’s appreciation for little-known or misunderstood organisms. Currently, Marley maintains studios both in the Willamette Valley and in Malaysia, where he develops new methods to preserve and display natural artifacts.

Tour Schedule
Christopher Marley’s artwork has been displayed in over 500 galleries and exhibits worldwide. This exhibit, known originally as Biophilia, premiered at the Wiener Museum of Decorative Arts in Florida in 2018. Most recently, the exhibit was on display at the Houston Museum of Natural Science, OMSI in Portland, Oregon, the Beaty Biodiversity Museum in Vancouver BC, and the Stamford Museum and Nature Center in CT, making the Discovery Center of Idaho the 6th museum to host Exquisite Creatures.
EXHIBIT GALLERIES
Each gallery contains a variety of artwork made from diverse natural specimens. Remember, all specimens are real!

*This exhibit displays shadow frames of preserved, 3D organisms, NOT photographs.*

Christopher Marley is an artist. He therefore organizes his specimens based on color, appearance, and design. Still, his work delves into several scientific themes. These themes are present in many, if not all sections of the exhibit. So while these themes may not be evident in the gallery floor plan, they are prominent in the content of each individual mosaic and specimen.

OTHER EXHIBIT ELEMENTS
- Artwork labels that specify common name, scientific name, and native range of every plant, animal, and mineral used in the exhibit
- Artist statement panels
- Touch screen kiosks
In order to provide the most impactful learning experience for student audiences; field trips to *Exquisite Creatures* will follow the structure outlined below.

Field Trips are available Tuesdays through Fridays in the mornings from 9:30am-11am.

A student field trip experience offers a 60 or 90 minute, hybrid of facilitated and self-guided learning, with an option of a take-home art project inspired by the exhibition.

**Group size is limited to 60 students maximum per 60-90 minute Field Trip slot.**

**Pricing**

**Gallery Only Option**

<table>
<thead>
<tr>
<th>FRL Percentage</th>
<th>Student Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%-49% FRL</td>
<td>$6/student</td>
</tr>
<tr>
<td>50% + FRL</td>
<td>$3/student</td>
</tr>
</tbody>
</table>

Chaperone: $10

Additional Adult: $18

**Optional Take Home Art Project Option**

Available for an additional $3/student
Field Trip Experience Breakdown

GALLERY-ONLY OPTION

» Groups of 10 to 60 students
» Up to 60 minutes (self-guided)

• Group will be split into groups of 4-6 students

• Each group will be given a Nature Activity Journal to complete together along with the help of a chaperone and the gallery volunteers

• Gallery volunteers will also engage students in various hands-on demonstrations and observational activities in the galleries

TAKE HOME ART PROJECT OPTION

» Groups of 10 to 60 students
» Up to 90 minutes
» Additional $3/student

When your group arrives:
• Groups of 30 or more will be divided in half into a Group A & a Group B
• Each group will begin their tour with an introductory video and procedural reminders before entering the exhibition

GROUP A: 30-40 minutes

• Will be further split into smaller groups of 4-6 students

• Each small group will be given a Nature Activity Journal to complete together along with the help of a chaperone and the volunteers

(sample Nature Activity Journal can be found on page 17)

• Volunteers will also engage students in various hands-on demonstrations in the galleries

GROUP B: 30-40 minutes

• Students will be led through a short, hands-on art-project lesson where they will create an art piece inspired by the science and art themes from the exhibition

ART PROJECT OUTLINE & SAMPLES ON PAGE 19

• At the end of the 1st 30-40 minutes, groups will switch places
• Once both groups have completed an art project and gallery exploration, the full group will gather at the Field Trip exit door for a brief reflection with DCI staff and volunteers

For more information, to book a field trip or to learn about our Virtual School Programs, contact the Education Department at:

reservations@dcidaho.org or 208-343-9895 x224
WHERE DOES CHRISTOPHER MARLEY GET THE SPECIMENS USED IN THE EXHIBITION?
Christopher Marley collects or reclaims his subjects in an environmentally sensitive manner using a worldwide network of people and institutions that share his passion for nature. Creatures either die naturally, or are harvested by sustainably minded organizations that promote healthy ecosystems.

SPECIFICALLY:
- The vertebrates (animals with a backbone) in the exhibit were reclaimed from individuals and institutions such as breeders, aviaries, aquariums, and zoos.
- The ocean creatures that did not come from aquariums were reclaimed bycatch (animals that are accidentally caught and killed by fishermen).
- The insects were all sustainably collected. The biggest threat insects face is habitat loss. When local people who live in forested areas - or any endangered ecosystems- are able to make a living by harvesting a renewable, sustainable resource such as insects, they have an economic incentive to conserve the habitat where their livelihood is produced.
ART ELEMENTS AND TOOLS FOR FINDING THEM:

COMPOSITION
The way a piece of visual art is composed helps to tell a story or identify the artists’ intent. One simple tool we can use to observe composition in an art piece is by identifying whether or not the artist uses the “Rule of Thirds.” Or the method of dividing an image into thirds to tell a better story.

Here’s a video from our friends at Mondays @ Museums, LLC describing how to look for and use the rule of thirds when visiting a museum: Rule of Thirds
SYMMETRY

Symmetry is another math concept that is also an important part of art and the way artists tell stories. Just like the Rule of Thirds, it’s also something really fun to look for in an exhibition like Exquisite Creatures, as symmetry is found all over nature. Here is a fantastic video from the World Science Festival to help us better understand Symmetry and why it’s so fascinating.

(The first 3 minutes are the best for student viewing)

VIDEO: Beyond Beauty: The Predictive Power of Symmetry

COLOR WHEEL

While we can look at color through the eyes of science, as a tool for survival, an artist might choose color combinations based on the color wheel, that of course, is first - based in nature.

Why do green and red look so good together? Because they’re complementary colors, or they are exactly opposite each other on the color wheel.

What is a primary color? Yellow, blue and red are the primary colors that when mixed with each other, create a whole “spectrum” of colors that is reflected all around us in nature.

Colors right next to each other are called analogous colors or harmonious colors. These are also found throughout nature while they might not make the other colors “pop” the way complementary colors do next to each other, they provide a sense of harmony when placed together.

What kind of colors do we see here?

The blue, red and yellow colors are all primary and seem to melt into each other using harmonious colors to complete the full spectrum.
V. GALLERY BY GALLERY OVERVIEW

This section of the guide provides background information and fun facts about various collections within the exhibition. There are so many specimens included in this exhibition that each one is not covered in this guide! However, we chose to highlight some of our favorites.

A. BEETLE MOSAICS:

Background information:
These mosaics showcase a vastly diverse range of insects found worldwide. They display endlessly unique shapes, colors, and textures. When creating these mosaics, Christopher Marley tucked the specimen’s legs underneath their bodies to make them seem less random and disconcerting.

Fun Facts:
- Most insects have an exoskeleton (a hard, shell-like body covering), three body parts (a head, thorax, abdomen), antennae, and six legs
- There are about 900,000 different kinds of insects known to scientists. This means insects represent 80% of the world’s species!

VIDEOS FOR VIEWING:

What Is a Mosaic? Early Roman Mosaics for Kids
DCI@Home STEM Exploration: Insects

B. RAINBOW WALL

Background information:
Color is a critical component of science and art, capable of shaping our emotions as well as teaching us about plants, minerals, and animals. When light hits a living or non-living object, some light is absorbed and some light bounces back to our eyes. The wavelength of reflected light determines the colors we perceive. Most humans can see wavelengths of light between red and purple.

Fun Facts:
- Some animals, such as birds and bees, can perceive ultraviolet light (shorter wavelengths than purple light)
- True blue pigment is very rare in nature: in many animals, blue color is due to molecular structures and the way they reflect light
- Some animals’ pigment is related to their diet. For example, salmon are pink because of the small pink shellfish they eat

VIDEOS FOR VIEWING:

Why Is Blue So Rare In Nature?
COLOR THEORY BASICS: Use the Color Wheel & Color Harmonies to Choose Colors that Work Well Together
C. MONOCHROMATIC WALL

Background information:
All the organisms on this wall are completely devoid of color! Animals that are black have more melanin pigment in their skin, fur, scales or feathers. Their dark color could evolve as a form of UV protection, camouflage, or heat acquisition. White coloration could also be a form of camouflage, or in rarer cases, because of albinism. Albino animals have a genetic condition that prevents high levels of melanin production.

Fun Facts:
• Some animals can only see in black, white, and shades of gray, such as bats, raccoons, seals, and dolphins
• Although polar bears look white, their skin is actually black, and their fur is see-through. It takes on a white color because of its structure and the way it reflects light

D. SNAKES ON BLACK

Background information:
Snakes are legless, carnivorous reptiles covered in overlapping scales. Many species of snakes have highly mobile jaws, allowing them to swallow prey much larger than their heads. All the snakes on this wall are non venomous. Instead, they capture prey by constriction or by swallowing it alive.

Fun Facts:
• There are over 3,000 kinds of snakes in the world, and they are found on every continent except Antarctica
• About 70% of snake species lay eggs, while the other 30% give birth to live young
• Snakes shed their skin about once a month to make room for growth and get rid of parasites

VIDEO FOR VIEWING:
Why So Many Animals Are Black And White

VIDEO FOR VIEWING:
Facts about Snakes for Kids
E. CAMOUFLAGE

Background information:
Camouflage is a strategy used by animals to help them blend in with their surroundings and ward off predators. Some animals also use bright warning coloration to signal their toxicity to predators. Others, such as the leaf katydids on this wall, use mimicry to look like something predators want to avoid.

Fun Facts:
- Some species of cephalopods (octopus and squid) can display 30-50 different appearances, which allow them to blend into their environments
- Many birds and mammals produce different colors of fur or feathers depending on the time of year. For example, arctic foxes are white in the winter snow but brown in the summer
- Chameleons do not change colors to blend in with their surroundings. Instead, they change colors to warn other chameleons of danger, attract mates, and even regulate their body temperature

VIDEO FOR VIEWING:
Top 10 Animals with Amazing Camouflage

F. OCEAN ORGANISMS

Background information:
Many of the ocean organisms displayed in the exhibit died in aquariums or sanctuaries. Some creatures were victims of bycatch. Bycatch, when fishers accidentally catch and kill unintended species, is a large threat to maintaining healthy fish populations. By preserving specimens that may have been otherwise discarded or used for culinary purposes, Christopher Marley hopes to convey how critical it is to conserve ocean habitats.

Fun Facts:
- Scientists estimate that 70% of the oxygen in our atmosphere comes from tiny marine plants (phytoplankton and kelp)
- About 80% of life on Earth is found in the ocean
- Less than 5% of the planet’s oceans have been explored

VIDEO FOR VIEWING:
10 Most Beautiful Sea Creatures in the World
G. FOSSILS

Background information:
A fossil is evidence of a once-living thing from a past geological age. Fossils can take many forms, such as bones, imprints, objects preserved in amber, and more. The fossil record (the total collection of fossils in the world) is important to our understanding of Earth's history, because fossils can tell us about prehistoric organisms. This section features displays of Megalodon teeth, ammonites, and fossilized fish.

Fun Facts:
• Paleontologists can guess the age of fossils containing organic material using a process called carbon dating. Radioactive carbon breaks down at a known rate, so measuring the radioactive carbon levels of a fossil can estimate when it died.
• Some fossils are of footprints or animal burrows, instead of the animals themselves.
• Fossilized feces, called coprolite. Scientists have found coprolites from Tyrannosaurus rex dinosaurs that contain bits of crushed bones.

(Check out our coprolites on display along with our TINKER THE T-REX exhibit, while you’re here!)

H. MINERALS

Background information:
Minerals are solid chemical compounds that form naturally. Minerals can form when magma cools, or when separated out of mineral-rich water in underground caves. Minerals can be made from a single element or a combination of elements, but their chemical structure is always fixed and they always have a crystal structure. Some mineral crystal structures are known as gemstones (diamonds, rubies, emeralds, etc.), and are highly sought after by humans.

Fun Facts:
• Scientists who study minerals are called mineralogists.
• The most common mineral found on Earth is quartz.
• There are over 5,000 different types of known minerals.
• When two or more minerals come together, they form a rock.

VIDEOS FOR VIEWING:
Learn about King Tut Part 24: Materials of the Tomb (Pt. 5 of 5) - Lapis Lazuli
MINERALS for Kids - Classification and Uses
I. BEETLES

Background information:
Beetles are a group of insects that form the taxonomic order Coleoptera. Like other insects, beetles have three major body segments and a hard exoskeleton. However, their distinguishing feature is their front pair of wings, which are hardened into wing-cases called elytra. Beetles also have chewing jaws called mandibles and paired mouthparts.

Fun Facts:
• The Coleoptera order is the largest of all taxonomic orders, constituting almost 40% of described insects and 25% of all known animal life forms
• Beetles are found in almost every habitat in the world, except for oceans and polar regions
• Beetles are one of the world’s oldest animals. Scientists estimate they evolved around 300 million years ago

J. SIZE & SCALE

Background information:
This area contains organisms that are noteworthy primarily because of their size. Size is an example of a physical adaptation that helps animals survive in their specific environment. Different sizes provide animals with different advantages. For example, larger animals may be able to more easily defend themselves from predators. However, smaller animals do not need to expend as much energy to find food.

Fun Facts:
• The smallest known vertebrate (animal with a backbone) in the world is a frog Paedophryne amauensis (7.7 mm long). The largest is a blue whale (100 ft long)
• Some animals, including crabs, must shed or molt their original exoskeleton in order to grow larger
• The Goliath butterfly (ornithoptera goliath) featured in the exhibit is the world’s largest male butterfly species and the second-largest female butterfly species.

VIDEOS FOR VIEWING:
Facts About Beetles - Secret Nature | Beetle Documentary | Natural History Channel - 44min
Beetle | Amazing Animals - 1:15 min

VIDEO FOR VIEWING:
Living Things Change: Crash Course Kids #41.1
K. MORPHOLOGY

Background information:
Scientists that study morphology are examining the physical structure and form of organisms. Usually, an animal's structure serves a specific function, helping it survive in the wild. For example, an animal's structure could help it move, find food, or defend against predators. The organisms on this wall exhibit very unique structures that may be unlike those you usually see in the wild.

Fun Facts:
- Structures such as webbed feet, claws, beaks, wings, feathers, and scales are all examples of physical adaptations that help animals survive in their environment.
- Tails aren’t just for show: some animals can use them for balancing, grasping, social signaling, or even steering.
- Animals of the same species can have different morphology. For example, ants that fulfill different roles within their colony may be siblings but look significantly different.

VIDEO FOR VIEWING:
Adaptations at Animal Wonders - Field Trip

L. BIRDS

Background information:
This exhibit contains bird specimens from all over the world. This wall alone contains birds from Australia, New Zealand, Columbia, Argentina, India and more! Although these birds look very different from one another, they are all warm-blooded, lay hard-shelled eggs, and share key characteristics such as feathers and beaks. They have been displayed without their wings spread in order to simulate the way museums classically preserve bird specimens.

Fun Facts:
- There are around 10,000 known bird species worldwide.
- Some birds, such as crows, are intelligent enough to create and use tools.
- Around 20% of bird species migrate long distances every year.

VIDEO FOR VIEWING:
8 Most Beautiful Macaws on Planet Earth
M. TAXONOMY

Background information:
Taxonomy is the science of naming, defining and classifying groups of biological organisms based on shared characteristics. Every known organism belongs to a taxonomic rank: a species, genus, family, order, class, phylum, kingdom and domain. Newly discovered organisms can be placed into a pre-existing group or a new group may be created for it based on resemblances to (or differences from) known organisms.

Fun Facts:
- Humans are classified as Homo (genus) sapiens (species) and belong to the Primate order. Other animals in the Primate order include orangutans, gorillas, and other monkeys.
- Scientific names consist of two parts: the first word is the genus name and the second word is the species name.
- All dogs, from Great Danes to Chihuahuas, are known by the scientific name Canis familiaris.

N. VARIATIONS

Background information:
Organisms within the same species can look very different from one another. These differences are caused by either genetic variation or environmental factors. The genetic variation in the specimens shown here are mostly physical (color, shape, size, etc.), but variations can be behavioral as well.

Fun Facts:
- Some butterflies’ wing color and pattern varies depending on the season during which they were born.
- Genetic variations are crucial to natural selection. When certain genetic variants help an animal survive, those traits are more likely to be passed down to future generations.

VIDEO FOR VIEWING:
Activity: Young Discoverers: Chromatography Butterflies!

VIDEO FOR VIEWING:
A simple way to tell insects apart - Anika Hazra
XI. ART PROJECT OUTLINE & STANDARDS

DESCRIPTION:
Displays of animals, minerals, and plants from all over the world. In Exquisite Creatures, we are celebrating the awe-inspiring scope of Earth’s biodiversity.

If you would rather do this activity in your classroom than as a part of your students’ field trip, we offer instructions & a list of suggested materials.

GOAL:
For an additional $3, students can create their own 3D artwork of plants and animals whose special characteristics, by way of morphology, make them well suited to certain ecosystems. This way you get to take a little of what we’ve learned about biodiversity and conservation home with you.

LEARNING OBJECTIVES:
1. Students will be able to identify taxonomy and categories of life based on characteristics
2. Students will be able to identify how they have used compositional elements such as symmetry to create a work of art
3. Students will be able to identify what makes colors complementary
4. Students will be able to identify the 6 different ecosystems we have on earth including ocean’s

STANDARDS ALIGNMENT:
NGSS (Next Generation Science Standards)
• Question & Observe
• Structure and Variation
• Conservation

National Core Arts Standards
• Creating
• Responding
• Connecting
Discover: Beetle Mosaics
These mosaics showcase a vastly diverse range of insects found worldwide. They display endlessly unique shapes, colors, and textures. When creating these mosaics, Christopher Marley tucked the specimen’s legs underneath their bodies to make them seem less random and disconcerting.

Fun Facts!
- Most insects have an exoskeleton (a hard, shell-like body covering), three body parts (a head, thorax, abdomen), antennae, and six legs.
- There are about 900,000 different kinds of insects known to scientists. This means insects represent 80% of the world’s species.

- How many insects do you think are in each mosaic?
- Which insect is your favorite? Why?
- Can you find an insect that is blue, red, spotted, striped, etc.
- Can you find two insects that are the same?

Help us collect data!
Our eyes are drawn to special color combinations that artists apply using the Color Wheel. Most combinations that we like to look at are called complimentary or contrasting colors, and appear opposite each other on the color wheel.

These colors can also have other meanings in nature such as “I’m poisonous!” or “I’m not the bug you’re looking for.”

Help us find out what the most common color found in the specimens in our galleries is. Mark an “x” above each color you see represented on a single specimen:

Draw What You See!
The best artists use the same skills as scientists! Scientists observe closely, document what they see and wonder. Drawing or art is another way of documenting what you observe and telling a story with it. Scientists and artists also love patterns and math!

Symmetry is a mathematical pattern that is seen throughout nature and art where a line can be drawn in the middle of something and both halves are exact mirror images of each other.

1. Find the “whole” insect below in the galleries.
2. What is it called?
3. Draw the rest of the insect by looking closely at the specimen on the wall and see how close you get to creating a perfectly symmetrical insect.

Show your friends and ask for helpful feedback! They might notice something you don’t. Scientists work best as a team!
XI. EDUCATION AT THE DISCOVERY CENTER OF IDAHO
INFORMATION & CONTACT

The Discovery Center of Idaho’s mission is to inspire lifelong interest and learning in Science, Technology, Engineering, and Math.

The Education Department at the Discovery Center of Idaho seeks to provide quality educational experiences & programs that reflect excellence in their development, mastery in their delivery, and offer relevant and sustainable interactions that inspire lifelong interest and learning in S.T.E.M. for a diverse, local, regional, and state-wide, Discovery Center community.

If you have any questions or need help in any way while planning your class trip to the Discovery Center of Idaho, or to learn more about our Virtual School Program options, please reach out to education@dcidaho.org.

Thank you to OMSI for letting us use and modify content from their 2019-2020 Exquisite Creatures Facilitation Guide and Staff Training Guide to complete this Educator Resource Guide.