# COMMONLY ASKED QUESTIONS

## About the Exhibition

1. **What is the *Butterflies + Plants* exhibition?**

   *Butterflies + Plants: Partners in Evolution,* a new, long-term exhibition opening Feb. 15 at the Smithsonian's National Museum of Natural History, is destined to be one of the most interactive, entertaining and educational experiences anywhere in Washington, D.C. Visitors will gain a rare look at how butterflies and plants have evolved, adapted and diversified together as partners for millions of years.

   *Butterflies + Plants* innovatively combines traditional and experiential learning through an array of colorful murals, timelines, photographs, and a state-of-the-art Live Butterfly Pavilion. Visitors will walk away from this experience with the following:

   - A new appreciation for nature as a diverse and interconnected system of many parts and a valuable community worth observing and preserving.

   - A better understanding of how butterflies and moths exist in wonderful, varied ways that developed as evolutionary responses to their environments over hundreds of millions of years.

2. **What does the exhibition include?**

   Designed by Smithsonian entomologists, botanists and paleontologists, *Butterflies + Plants* promises to be a fun, educational experience for visitors of all ages. The exhibition offers two distinct experiences: the Exhibition Hall and Live Butterfly Pavilion.

   - **The Exhibition Hall** traces the co-evolution of butterflies and plants – and other animals – for millions of years. From the Jurassic period to modern times, exhibition displays feature captivating images, educational videos and interesting facts that show how nature evolves and changes throughout time.

   - The highly-anticipated **Live Butterfly Pavilion** offers visitors a chance to walk amid hundreds of tropical butterflies. There, students, families and nature enthusiasts alike can observe the behavioral habits of more than 400 butterflies at any one time and watch how they interact with their plant partners and peer insects. Through a built-in emergence chamber, visitors also can observe the final stages of metamorphosis – the organism's transformation from chrysalis to butterfly.

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3. **What makes *Butterflies + Plants* a unique exhibition?**

   While butterfly pavilions are not a new concept, the National Museum of Natural History has dedicated a talented team of researchers, designers and writers to creating a dynamic exhibition that engages visitors and excites them about nature's complexity.

   For two years, museum curators and scientists have worked together to synthesize research into appealing graphics, videos and displays that take science education to the next level and make learning enjoyable. Live tropical butterflies and plants appear side by side with compelling stories of co-evolution, providing visitors with a new way to look at the world around them. In addition, with new butterfly species arriving every one to two weeks, visitors are guaranteed a different experience every visit.

4. **What is the significance of co-evolution?**

   Organisms – from humans to insects to plants – have all evolved from a common ancestor and throughout time have adapted to a wide range of environments, producing the rich biodiversity seen in nature today. But organisms are not in isolation during this process. An essential part of evolution is how organisms interact with one another and how they change from generation to generation because of those interactions – what scientists call co-evolution.

   For example, co-evolution is responsible for the relationship between the star orchid and the giant hawk moth in Madagascar. When Charles Darwin first saw the Madagascar star orchid, which produces nectar at the bottom of its narrow, foot-long spur (throat), he predicted the existence of a moth with a proboscis (tongue) long enough to reach that nectar. Decades later, the giant hawk moth was discovered. Today, the hawk moth continues to use its 8-inch-long tongue to drink nectar from the orchid and, in the process, plays an important role in the orchid's pollination process. These two partners evolved together.

   But co-evolution is an ongoing process, and all species – even humans – play a role in the evolution of the natural community. With the knowledge that 99 percent of all species that have inhabited the planet are now extinct, the importance of *Butterflies + Plants* is clear: The more people understand biodiversity and the evolutionary and ecological processes that form all life, the more they can learn how to appreciate and conserve life as it exists today.

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5. **Is there a cost for visiting *Butterflies + Plants*?**

   The National Museum of Natural History charges a small entry fee for admission into the Live Butterfly Pavilion, while access to the surrounding exhibition is free for visitors to enjoy. *For more information, reference the Ticketing Information Fact Sheet.*

6. **How are butterflies chosen for the exhibition?**

   While butterflies can be found all around the world, including the Arctic, the *Butterflies + Plants* exhibition features species from the tropics of North America, South America, Central America, Africa and Asia. At any given time, more than 30 species will be featured in the Live Butterfly Pavilion. Butterflies are selected based on availability from suppliers and are replenished on a regular basis.

7. **How do the butterflies get to the museum?**

   Each week, the museum staff receives shipments of butterfly chrysalides from around the world. The chrysalides are unpacked from insulated boxes and hung in the emergence chamber featured in the Live Butterfly Pavilion, where visitors can actually witness the final stage of metamorphosis and the butterflies' first flight. The entire shipping process is conducted in close coordination with the U.S. Department of Agriculture.

8. **Why are moths included in a butterfly exhibition?**

   The quick answer is that butterflies and moths belong to the same order, the Lepidoptera, or "scale-winged insects." But moths came first – about 170 million years ago; when plants lacked what are known today as flowers, there were moths, not butterflies. Approximately 48 million years ago, after the emergence of flowering plants, one group of day-flying moths – butterflies – came into existence. Today, 350,000 species of flowering plants and more than 150,000 kinds of moths and butterflies inhabit the Earth.

9. **What did it cost the National Museum of Natural History to build the exhibition?**

   The National Museum of Natural History dedicated $3 million in funds raised from private donors toward the development of *Butterflies + Plants: Partners in Evolution*. An annual budget of $800,000 to $1 million will cover ongoing costs, including exhibition operation and maintenance, and the purchase of the diverse butterfly and plant species that populate the Live Butterfly Pavilion.

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## About the Live Butterfly Pavilion

1. **What types of butterflies will visitors see?**

   Visitors will enjoy an ever-changing and diverse collection of butterflies at the Live Butterfly Pavilion. At any one time, more than 400 butterflies will fly through the exhibition, representing more than 30 species from North America, Central America, South America, Africa and Asia. Species include Clippers, Morphos, owls, grey pansies, common sailors, blue glassy tigers, monarchs, tree nymphs, birdwings, queens, sunset moths, julias and many more.

2. **What types of plants are featured?**

   The butterflies and moths that inhabit the Live Butterfly Pavilion sip nectar and collect pollen from a variety of plant species, including jasmine, pentas, lantana, verbena, clerodendron, jatropha and more. Provided by the Smithsonian's Horticulture Division, these plants are rotated regularly to provide constant nectar and pollen sources for the insects.

3. **Are host plants (on which adult females lay their eggs) included in the Pavilion?**

   Due to USDA regulations, no host plants are featured in the Live Butterfly Pavilion. These restrictions apply to all butterfly pavilions across the United States. Introducing host plants would create an unacceptable threat to North American ecosystems by increasing the risk that eggs and larvae would escape from a butterfly house and lead to a possible and unwanted infestation.

4. **How do the butterflies survive in the Pavilion?**

   Butterflies survive in the Live Butterfly Pavilion by feeding on nectar, fruit and sugar water. While flowers provide the nectar, the museum staff ensures a ready supply of ripening fruit and sponges soaked with sugar water at stations scattered throughout the exhibition.

5. **How was the Pavilion designed?**

   Staff from the Smithsonian's National Museum of Natural History and Horticulture Services Division commissioned a Butterfly House Feasibility Study in September 2004 through HSMM and exhibit designer Gallagher & Associates. The findings of the study, completed in April 2005, provided the basis for the design of the Live Butterfly Pavilion.

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In a subsequent concept design for the butterfly enclosure, and additional exhibition elements, HSMM worked closely in workshops and interviews with the Smithsonian core team and the exhibit designer, Reich & Petch, to provide a house structure, lighting scheme and building infrastructure that allows for the greatest possible interaction between visitors and butterflies. Smithsonian staff and HSMM also researched the construction and operation of several other butterfly houses to help determine the baseline criteria for their design and examine various challenges encountered by other museums and institutions operating living butterfly exhibitions.

HSMM is a full-service architecture, engineering and planning firm with 22 offices throughout the United States.

6. **Why is the roof of the Live Butterfly Pavilion curved and not flat?**

   The roof of the Live Butterfly Pavilion is not the only curved feature. In fact, right angles are scarce. Butterflies are easily trapped in corners and crevices, keeping them away from the valuable light that they need for survival. Pavilion designers took these and other factors into consideration throughout the design and development process to ensure that the safety of the butterflies is never compromised.

7. **How large is the Pavilion?**

   The Live Butterfly Pavilion is a 1,200-square-foot structure with its highest point reaching 13 feet.

8. **How many people can fit inside the Pavilion?**

   The Pavilion can accommodate approximately 35 visitors at any one time. To ensure access at the desired time of entry, visitors are encouraged to purchase tickets in advance online at http://butterflies.si.edu or by phone at (202) 633-4629.

## About the Visitor Experience

1. **Where in the museum is the exhibition?**

   *Butterflies + Plants* is located on the second floor of the Smithsonian's National Museum of Natural History, adjacent to the O. Orkin Insect Zoo.
   There is an entry fee of $6 ($5 for children; 2-12 years old) for the Live Butterfly Pavilion, and the Exhibition Hall is free.

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2. **What will visitors experience when exploring the *Butterflies + Plants* exhibition?**

   The *Butterflies + Plants* exhibition brings learning to life. Whether exploring the Exhibition Hall or strolling through the Live Butterfly Pavilion, visitors will gain a new appreciation for the natural world around them.

   The Exhibition Hall takes visitors on an historical journey through the co-evolution process of butterflies and plants – a journey that spans more than 180 million years, from the Jurassic period to modern times. Think this is boring? Think again. Visitors will learn interesting facts about how these organisms have changed over time. For example, visitors may not realize that moths have outlived dinosaurs by millions of years and originally had mandibles (teeth-like structures) that enabled them to chew their food. Or, they may be interested to learn that a hairstreak caterpillar can turn the same color as the flowers it eats. If a caterpillar is moved to a new flower, it matches that flower's color within days.

   In the Live Butterfly Pavilion, visitors will literally feel the flutter™ as they mingle with hundreds of colorful butterflies in one of Washington, D.C.'s most interactive museum experiences. Walking into the tropical setting, visitors will be met with the warmth of humid air and bright lights that simulate the species' native climate. Before entering and exiting the pavilion, visitors will pass through two sealed chambers that help prevent the butterflies from escaping. Thanks to the frequent introduction of new species, visitors can enjoy a fresh experience during every visit.

3. **Who will enjoy *Butterflies + Plants*?**

   The *Butterflies + Plants* exhibition offers something for everyone. Whether butterfly enthusiasts or aspiring ones, visitors young and old will undoubtedly feel the flutter of this thrilling exhibition.

   - Butterfly enthusiasts will have the chance to observe, up-close and personal, more than 30 species of tropical butterflies and learn about their evolution.

   - Those with a passion for gardening will learn more about the plants that attract butterflies and discover how these delicate creatures can add new life to their own gardens.

   - Student groups can enjoy a variety of colorful videos, images and tutorials that demonstrate how plants, animals and insects have adapted together over time to create the rich biodiversity seen today.

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- Romantics at heart can walk hand-in-hand through the Live Butterfly Pavilion and get lost in the flutter of these whimsical creatures; and others might enjoy the quiet solitude that the Pavilion provides.

- Travelers can learn how ecological interactions between insects and their environments are interconnected and influence other species interactions throughout the world.

4. **What are a few quick tips to make visiting the Pavilion easy and enjoyable?**

   - **Buy tickets in advance.** The Pavilion can accommodate up to 35 visitors at any one time. To ensure access at the desired time of entry, visitors are encouraged to purchase tickets in advance online at http://butterflies.si.edu or by phone at (202) 633-4629.

   - **Arrive early.** Leave enough time to pick up tickets at the box office located in the *Butterflies + Plants* Exhibition Hall. Because ticket holders are admitted into the Pavilion every 15 minutes, it won't take long to miss their entry time.

   - **Leave the strollers behind.** For the safety of the insects and to avoid overcrowding, no strollers will be allowed into the Live Butterfly Pavilion. The museum recommends that visitors leave their strollers at home, if possible. Otherwise, visitors may temporarily store strollers in the unattended area outside of the O. Orkin Insect Zoo, space permitting.

   - **Store your coats.** The Pavilion is heated to 80 degrees with a humidity level of 80 percent to simulate the butterflies' native climates. To avoid overheating, visitors may wish to store their coats in one of the designated locker rooms available at each museum entrance.

## About Ticketing

1. **What does admission cost for the Live Butterfly Pavilion?**
   The National Museum of Natural History charges an entry fee for admission into the Live Butterfly Pavilion, while access to the surrounding exhibition is free. Ticket prices are as follows:

   $6 Single Full Price Admission *(Age 13-59)*
   $5 Single Youth Admission *(Age 2-12)*
   $5.50 Single Senior Admission *(Age 60+)*

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$5 Smithsonian Member *(Limit four tickets per visit with valid Smithsonian membership card)*
$5 Non-Advance Reserved Group *(10 or more, no complimentary tickets allowed)*
$4.50 Advance Reserved Group *(10 or more, one complimentary ticket allowed per 20 paid)*

*Free Tuesdays: Visitors can enjoy free admission to the Live Butterfly Pavilion every Tuesday. Entry is granted on a first come, first serve basis. No tickets are required.*

2. **Everything at the Smithsonian is free. Why is there a cost associated with the Live Butterfly Pavilion?**

The entry fee was established to defray costs associated with populating the Pavilion with hundreds of new butterflies every week, including procurement of the butterflies from exotic locations around the world and ongoing care. At any one time, visitors can expect to see more than 400 tropical butterflies fluttering throughout the Pavilion. These fragile insects represent more than 30 species native to a host of countries from Costa Rica to Malaysia. Thanks to visitor admission fees, new butterflies can be introduced to the Pavilion on a weekly basis, offering visitors a wide variety of species.

3. **How are tickets obtained?**

Tickets to the Live Butterfly Pavilion are sold on a 15-minute basis. Visitors can purchase tickets in advance to avoid ticket lines at the museum and ensure quicker access at the desired time of entry. Tickets are available online at http://butterflies.si.edu or by calling (202) 633-4629. Visitors who prefer to purchase tickets in-person may do so at IMAX ticket counters located in the National Museum of Natural History's main rotunda in the *Butterflies + Plants* Exhibition Hall, at the National Air and Space Museum on the National Mall, and at the Steven F. Udvar-Hazy Center in Northern Virginia. No tickets are required on Free Tuesdays.

## About Research

1. **What related research projects are currently underway at the National Museum of Natural History?**

The National Museum of Natural History is not just a museum but a living laboratory, where scientists explore a variety of topics that provide new and exciting

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content for the ever-changing exhibition offerings. Several of these research projects are featured in *Butterflies + Plants: Partners in Evolution*. For example:

- A decade-long plant-pollinator project in the Caribbean islands traces the co-evolution of heliconia plants and the hummingbirds that visit them. This research entails field observations and experiments on plant floral traits and hummingbird behavior, as well as laboratory-based DNA studies of evolutionary relationships and population genetic structure across the entire archipelago from Cuba to Trinidad and Tobago.

- Fungus-growing ants have a fascinating system for cultivating fungus gardens, upon which they depend for food. When a daughter queen leaves the nest to start her own colony, she carries fungus from her mother's garden that serves as the starter for her own. These gardens are infected by a "crop disease" fungal parasite, which the ants control in a number of ways – by weeding the garden and applying an antibiotic that is produced by bacteria grown on the ants' bodies. Smithsonian researchers travel to the New World tropics to collect these ants (there are approximately 250 species) and reconstruct their evolutionary histories, as well as the evolutionary histories of their cultivated fungi, the crop disease parasite, and the antibiotic-producing bacteria.

- The minute details that can be seen in butterflies preserved in amber are being used by Smithsonian researchers to determine when butterflies arose and how they evolved.

- Plants and insects, the two most diverse macroscopic groups of organisms, have long been associated, dating as far back as the Devonian Period (410 million years ago). The ways in which insects used plants has increased more with time, shifting from mostly leaf chewing to include piercing-and-sucking, galling and leaf mining. Researchers in the Department of Paleobiology study the associations between plants and insect herbivores to better understand the diversity and evolution of these groups of organisms.