



PRE-VISIT INFORMATION FOR EDUCATORS

Thank you for choosing the Butterfly Conservatory for your school excursion.

NIAGARA PARKS
NATURE & GARDENS

Please ask our Group Sales representatives about other Nature & Gardens and Niagara Heritage Trail educational programs that are available at Niagara Parks.



Every dollar you spend with us helps preserve the nature and heritage of the Falls and the Niagara River Parkway. Niagara Parks has operated without tax dollars since 1885.

The following pages contain information and activities that will help you and your students prepare for a visit to the Niagara Parks Butterfly Conservatory. To ensure your group has a fulfilling and focused experience, you may print these pages for use in the classroom and/or during your visit.

You may also choose to participate in three Educational Programs presented by Niagara Parks that are designed to enrich your visit to the Conservatory:

- Parts of a Butterfly (Kindergarten to Grade 3)
- Life Cycle of a Butterfly (Kindergarten to Grade 3)
- Colours and Patterns (Grade 4 to OAC)
- Monarch Migration (Grade 4 to OAC)

These Programs are offered Monday to Friday. Each Program is less than one hour long and will precede your self-guided tour of the Butterfly Conservatory. Bookings for Group visits and Programs should be made in advance through the Niagara Parks Group Sales Department at 1-877-642-7275 ext. 2.

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BACKGROUND

The Niagara Parks Commission opened the doors of its Butterfly Conservatory on December 14, 1996 and held an official Opening Ceremony in January 1997. Located on the grounds of the Niagara Parks Botanical Gardens, 10 minutes north of the Falls, the facility houses approximately 2,000 live, free-flying butterflies of about 45 different species. North America's largest glass-enclosed Butterfly Conservatory, the 1,022 square metre (11,000 square feet) structure protects a lush, tropical environment including a waterfall and pathways meandering 180 metre (600 feet). The atmosphere is maintained around 27 degrees Celsius (80 degrees Fahrenheit) and at approximately 75% humidity.

YOUR VISIT

Upon entering the Conservatory, leaders are asked to proceed to the ticket counter to purchase the tickets for the group. Tickets are sold on a timed basis and reservations can be held for 15 minutes only. The group will be asked to wait in the auditorium for a Niagara Parks' interpreter that will be your escort. Coats should be hung on the racks in the lobby and exhibit hall.

To start your visit, you will watch a 7-minute introductory video. The video will give a brief look at some of the butterflies and plants housed in the Conservatory, and will review some of the etiquette required in the Conservatory. A French-language version of the video is available upon request. When booking your group visit, ask the Niagara Parks Group Sales representative about renting audio equipment that provides audio commentary for the tour of the Conservatory, available in English, French, Spanish, German, Japanese or Mandarin.

The leader-to-student ratio of the group must be at least 1:10 during your visit to the Butterfly Conservatory. Niagara Parks will provide one complimentary adult admission with every 10 paying students.

Please make sure your students and supervisors are all aware of the following:

- Food and drinks are not permitted in the Conservatory.
- Visitors are asked to keep voices at a conversational level.
- Please do not touch the butterflies. They have scales on their wings that will rub off when touched. Since these scales help them to fly, touching the scales may shorten the life of the butterfly.
- Do not try and scoop up butterflies with other objects like paper or shirt sleeves.
- For your safety and the safety of others, do not run in the Conservatory or climb up on rocks. Stay on the paths.
- Butterflies may sometimes sit on the path to drink from a puddle, or to warm their bodies in the sun. Please watch where you walk.
- Butterflies may land on you because they are attracted to your scent or to the colours that you are wearing. Do not be afraid, they cannot harm you. Butterflies will usually fly away within a few minutes. This is a favourite photo opportunity.
- Picnicking is not permitted on the grounds of the Botanical Gardens.

Allow time prior to your reservation to explore our Exhibit Hall in the lobby, to look and learn from our informative exhibits about butterflies.

THE PARTS OF A BUTTERFLY

Like all insects, the body of a butterfly consists of three main parts: the head, the thorax (which includes the wings and three pair of legs) and the abdomen. A hard protective exoskeleton provides protection and is the framework for a butterfly's body parts.

The Head

The butterfly's head contains its sensory organs and feeding parts. The sensory apparatus include the eyes and antennae. Butterflies have a pair of compound eyes which consist of thousands of lenses called ommatidia.

A butterfly has a pair of clubbed antennae. The antennae are covered with sensory organs that provide the butterfly with a sense of smell. Special organs at the base of the antennae provide a butterfly with a sense of balance and orientation for flying.

For feeding, a butterfly uses its proboscis and palps. The proboscis is a coiled, straw-like feeding tube that the butterfly uses to suck up liquid foods such as nectar from flowers. When not in use, the proboscis curls up like a coil. The palps are two furry mouth parts at the base of the proboscis which the butterfly uses to feel and taste food.

The Thorax

The thorax acts as an anchor for the wings and legs and contains the flight and leg muscles. Butterflies have four wings: two hind wings and two fore wings. The wings are supported by veins. Thousands of overlapping scales cover the wings and give the butterfly its colours.

The butterfly's six legs are jointed to allow for movement. On some species of butterfly the front pair of legs may be short, nonfunctional and more difficult to see. The butterfly's feet or tarsi have small claws for clinging, climbing and walking. Butterflies can taste with their feet; sense organs for taste are located on the tarsi.

The Abdomen

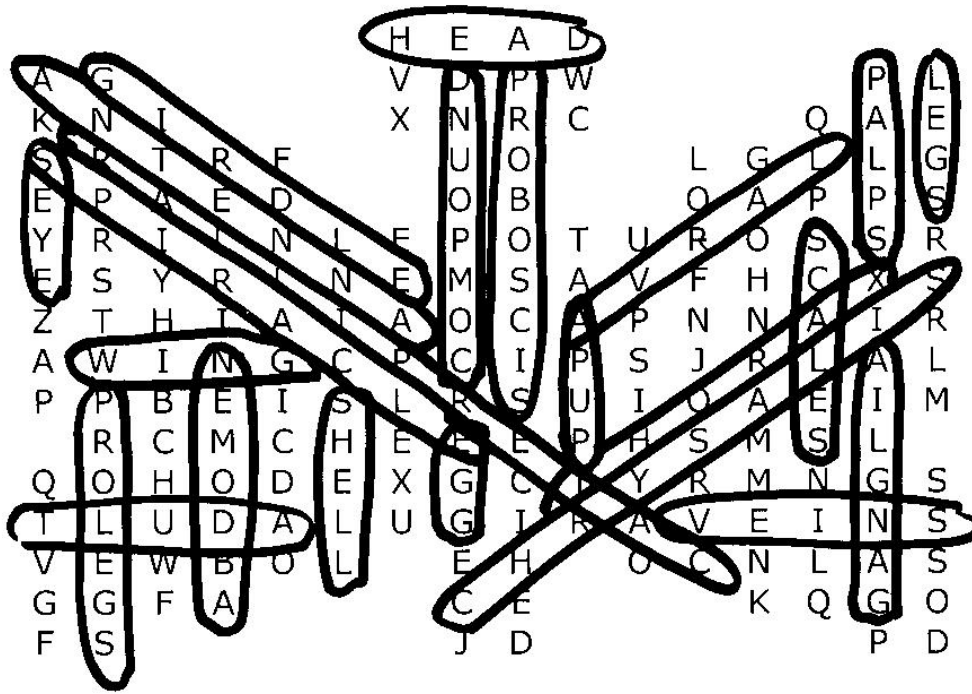
The butterfly's abdomen is a long segmented tube containing its digestive tract, reproductive organs, circulatory system and spiracles. The reproductive organs are found at the end of the abdomen. Males have a pair of grasping sex organs called claspers. Females have less visible genitalia but tend to have larger abdomens for carrying eggs. Spiracles are a series of holes that allow air to pass into the butterfly's body through a network of tubes called trachea.

Exoskeleton

As with all insects, butterflies have a hard protective exoskeleton, made of a strong chemical substance called chitin, which is an outer casing on their bodies. The internal muscles and organs are attached to the inside of the exoskeleton.

Butterfly Parts and Stages - Word Search Puzzle

ANSWERS



Butterfly Parts and Stages - Word Search Puzzle Exercise

Fill in the chart using the words from the word search puzzle list (previous page) to show which "parts" are found in which stage of the life cycle.

NOTE: Some words may be used more than once.

EGG**LARVA/
CATERPILLAR**

Eg. Abdomen

**PUPA/
CHRYsalIS****ADULT
BUTTERFLY**

Eg. Abdomen

What is the Difference Between a Butterfly and a Moth?

After you have read over the information below, use the letters in **BOLD** to spell out the answer to this question:

Q. What butterfly is brown with seven little eye spots on its outer wings and bright blue on the top side when it spreads its wings?

BUTTERFLIES

- Most **b**utterflies are active during the day.
- Butterflies have **l**ong, thin antennae that are knobbed at the ends.
- Most butterflies are brightly coloured.
- Most **b**utterflies rest with their wings closed.
- All butterflies have a proboscis (straw-like feeding tube)

MOTHS

- **M**ost **m**oths are active at night.
- Moths have bushy, feather-like antennae.
- Most moths are dull coloured.
- Most moths rest with their wings open.
- Some moths do not have a **p**roboscis and **t**herefore do **n**ot eat.

A. ***The butterfly that is a beautiful bright blue colour when it spreads its wings is the _____ !***

SOME OF OUR FAVOURITE BUTTERFLIES



Owl Butterfly

Caligo memmon

Native to South and Central America

Wingspan : 12-15cm

Active: Dawn and Dusk (Crepuscular)

Larval Food Source:

Heliconiaceae & Musaceae



Blue Morpho

Morpho peleides

Native to South and Central America

Wingspan: 9.5-12cm

Active: Daytime (Diurnal)

Larval Food Source:

Fabaceae



Queen

Danaus gilippus

Florida

Wingspan: 7 cm

Active: Daytime (Diurnal)

Larval Food Source: Asclepias
(Milkweed)



Red Lacewing

Cethosia biblis

Malaysia

Wingspan: 8-9 cm

Active: Daytime (Diurnal)

Larval Food Source:

Passifloraceae

SOME OF OUR FAVOURITE BUTTERFLIES



Banded Orange

Dryadula phaetusa

Costa Rica

Wingspan: 7 cm

Active: Daytime (Diurnal)

Larval Food Source:

Passifloraceae (Passion Flower)



Banded Peacock

Papilio palinurus

Malaysia

Wingspan: 10 cm

Active: Daytime (Diurnal)

Larval Food Source:

Euodia



Zebra Longwing

Heliconius charitonius

Native to South and Central America

Wingspan: 7.5-8cm

Active: Daytime (Diurnal)

Larval Food Source:

Passifloraceae (Passion Flower)



Gray or Hatian Cracker

Hamadryas februa

Native to South and Central America

Wingspan: 5.5-7cm

Active: Daytime (Diurnal)

Larval Food Source: Euphorbiaceae
(Dalechampia)

FREQUENTLY ASKED QUESTIONS (FAQ)

How Many Butterflies Are in the Conservatory?

We have approximately 2,000 butterflies at the Conservatory at any given time. It is difficult to give an exact number, as the numbers fluctuate on a daily, sometimes hourly, basis.

How Many Species Do You Have?

There are approximately 45 different species of butterflies in the Conservatory. Again, it is difficult to know exactly how many species are in the Conservatory from one day to the next. Some butterflies are seasonal, so over the year we will deal with over 100 species.

How Long Do Butterflies Live?

The adult life-span of a butterfly varies from one species to the next. On the short end of the scale, some butterfly species will live only a few days, while the migrating generations of Monarchs can live 6-8 months. On average, butterflies live between two and three weeks.

If Butterflies Live for Such a Short Time, How Do They Fly to Mexico?

There are a few species of butterfly that migrate, and the Monarch butterfly is one of them. Monarchs have a fairly complex life cycle, with different generations serving different functions. Throughout the spring and summer months, we have Monarchs throughout Canada and the United States. These butterflies will simply feed and reproduce throughout the warm season and will live about one month.

The caterpillars that develop into Monarch butterflies during the late summer will be the "migrating generation". During the caterpillar's development, the days are shorter and the nights are cooler. This is believed to be the "trigger" for migration, and this generation will develop into adults that will begin an unbelievable journey. Taking advantage of southbound breezes, the Monarch migrates 4500 kilometers, or 2800 miles, in just 6 weeks. Monarchs along the west coast rest for the winter in California, and east coast Monarchs go to Mexico. They will not reproduce until the next spring when they start the return migration.

In the fall, they will gather at certain landmark areas in great numbers and wait together for the right conditions before setting off on their journey. Butterflies will arrive in Mexico around October-November, gathering together in the mountains in the oyamel (fir) trees where the temperature hovers just above the freezing point. As the days become longer in February, they will reach sexual maturity, descend from the mountains and travel north to lay their eggs on milkweed plants. This generation will then die and their offspring will begin migrating northward around the middle of March. It may be two or three generations later that reach Ontario and start the cycle once again.

Where Do Your Butterflies Come From?

Many of our butterflies are imported from tropical regions around the world. Approximately 60% of our butterflies come from butterfly farms in Costa Rica, El Salvador and the Philippines. Another 40% are raised in a quarantined greenhouse that is located behind the Conservatory.

Why Aren't There Any Caterpillars in the Conservatory?

Because the Conservatory is a closed environment, the butterflies have no natural predators here, so we need to control their population. Female butterflies all require a specific species of plant, known as a host plant, on which to lay their eggs. Except for a few like the Banana, host plants that butterflies require to lay their eggs on are not grown in the Conservatory. Without these plants, most of the butterflies will not lay any eggs at all. If they do happen to lay eggs on another plant, the larvae will not develop because they are not getting the proper nutrients.

What Do Butterflies Eat? Do You Have Enough Food for Them?

Butterflies do not have chewing mouth parts but a sucking straw-like feeding structure called a proboscis. They feed from a variety of sources such as nectar and pollen of plants, juices from ripe fruit, puddles, and animal feces. The butterflies in the Conservatory feed on the nectar and the pollen from our plants, from trays of decaying fruit, and from dishes of artificial nectar.

Although there are many different plants in the Conservatory that butterflies will feed from, important food sources like Pentas and Stachytarphaeta are in constant rotation to ensure that there is always ample food for the butterflies.

What Is the Difference Between Butterflies and Moths?

Butterflies and moths make up the order of insects known as Lepidoptera. With about 165,000 known species, this order is second in numbers only to beetles, the order known as Coleoptera. Butterflies and moths have a number of observable differences:

1. Most butterflies fly by day, and most moths by night
2. Most butterflies hold their wings together above their bodies at rest, while moths tend to rest with their wings flat
3. Butterfly antennae are long and slender, moth antennae are wide and feathery

While these traits are all observable differences, there is not one single feature that separates all butterflies from all moths.

LEARNING FROM BUTTERFLY BEHAVIOUR

When people enter the Butterfly Conservatory for the first time, they immediately notice the beauty and serenity of the environment. That's certainly a very pleasant aspect of the Conservatory. Yet, when you look closer at the insects' activity, you should understand that what seems like aimless fluttering, is actually carefully determined behaviour that butterflies require to survive.

Areas of study that can be included in your visit to the Conservatory are:

- Evolution
- Ecology - sustaining populations, plant/insect interactions
- Energy requirements
- Physics of flight
- Biology - insect anatomy, metamorphosis, life cycles
- Defense strategies, camouflage

The following are simplified explanations of the types of behaviour most often seen inside the Butterfly Conservatory. Educators may decide to focus on specific aspects of this behaviour or take a holistic approach, depending on your curriculum.

FLYING

Flying is a butterfly's primary mode of locomotion. It enables them to reach food sources, evade predators, find a mate and also to take in oxygen.

Flapping is achieved by contracting special muscles located on the thorax where the wings are attached to the body. Like other flying insects, butterflies can contract these muscles up to 100 times a minute. It takes a lot of energy to keep up a pace like that. That's one reason why you'll see many butterflies at rest with their wings held still between flights.

Notice how different species have varying wing size and shape. The narrow-winged Heliconids, or long wings, have a fast, fluttery flight. (Examples: Zebra Longwing, Small Postman). Larger species, like the magnificent Owl and the Blue Morpho, have a larger, broader wing surface area and are able to glide on the air like a kite.

Suggested Activities re: Flying

1. Draw 2 different species and compare the size and shape of the wings.
2. Calculate how long it would take a butterfly to fly from your house to your school if its average speed is 18 kmph (11 mph).
3. Make a paper butterfly and test its aerodynamics.

BREATHING

Butterflies do not have a lung system like humans do, but instead take in oxygen through tiny openings along their abdomens called spiracles. These openings tightly close up to prevent foreign matter from getting inside the body, but open periodically to allow oxygen inside. When a butterfly is in flight the spiracles open and fresh air is pushed into the body. It is then transported through a system of tunnels or tubes called trachea. This is why you'll see butterflies periodically open and close their wings while they are resting.



"STEERING"

Adult butterflies have "compound" eyes which allow them to distinguish colour and motion better than humans' "simple" eyes can. Each of the hundreds or thousands of lenses on the surface of the eye receives an image, so butterflies can see in all directions at once and are adept at avoiding collisions. Sensory organs located on the antennae also help butterflies judge the distance between obstacles. Notice how they seem to be flying straight at your head, then veer off at the last instant. Butterflies are particularly aware of motion, so visitors who extend their arms in hopes of a butterfly landing are actually presenting more obstacles to be avoided!

MATING

Since most butterflies only live a very short time, 2 to 3 weeks on average, they need to be efficient at finding a mate. Most species identify a suitable partner by chemical scent markers known as pheromones. These can be emitted by either male or female butterflies, depending on the species. Butterflies seeking a mate may also look for certain patches on the wings that are only discernible through a butterfly's compound eye. Butterflies, like other insects, see colours differently than humans do. Humans see three primary colours: red, blue and yellow. Butterflies also see a fourth, short-wave violet hue that is invisible to us, that helps them see these patches and flowers more easily.

Butterflies are rarely territorial. When we see different species chasing each other, it is usually a case of mistaken identity. However, males of the same species will show aggression when competing for a female. They will circle each other in an upward spiral flight to try to outdo each other.

The beautiful Blue Morpho females will rest with their shiny wings open as part of a display to attract a male. The ensuing courtship flight is quite a sight, with the smaller male gliding after the larger female. As a general rule, female butterflies are larger and duller in colour than males. Keep that in mind as you watch these insects chasing each other. After a brief courtship, the couple will connect, abdomen to abdomen and stay that way for several hours. You can usually see two distinct butterflies, but with the Blue Morphos one butterfly is almost completely concealed by the wings of the other. The next generation is then ready to begin.

Question: Do you know why the Conservatory does not contain the specific plants that the females search for to deposit their eggs on?

BASKING

Butterflies are cold-blooded and need the energy and warmth of the sun to be able to fly. On cloudy days you'll likely see more butterflies at rest. However, on sunny days you'll often see many butterflies resting with their wings held open to collect solar radiation.

FEEDING

Butterflies have a special mouth called a proboscis which acts like a straw. Most butterflies ingest only fluids, although the Longwings are able to digest pollen. Other insects, like mosquitoes, flies and bees, also have sucking mouth parts but butterflies have no mouth parts capable of biting or piercing.

Inside the Conservatory, you can see two general feeding groups: fruit juice feeders and nectar feeders. Both food sources supply insects with the carbohydrates they require for their active flights.

The juice feeders are usually the easiest to observe. Two species that are likely to be present at the feeding stations are the Magnificent Owls and the Blue Morphos. These species are typical of tropical fruit juice-feeding butterflies. They are large-winged and large bodied. Since the proboscis cannot pierce the skin of the fruit, the butterfly feeds once the fruit has fallen from the tree and broken open. Their outer-facing wings are dark brown and patterned to blend in with leaf litter, so they remain quite still as they feed. They will occasionally touch down with their antennae to gauge the distance and direction of the fruit. Notice that these species appear to have only 4 legs. They belong to a large family



known as brush-footed butterflies because the front pair of legs are no longer used for walking and are held close to the body.

Nectar-feeders are quite different in their feeding activities. They are attracted by bright colours of flowers such as red, orange, yellow and purple. They still taste with their feet, however, you'll see them make quick scratching motions with their legs as they sample the flower. If it tastes sweet enough, the proboscis will uncoil and the butterfly will drink in the nectar. Notice that these species are constantly in motion as they feed. This helps create a suction effect drawing fluid up the proboscis.

Butterflies only feed on fluids and obtain most of their nutrients through their diet. Some, especially males, need to ingest dissolved minerals such as salt. In their natural environment they will gather in groups on damp sand or mud, a behaviour called "puddling". You may see some drinking from puddles on the path.

Question: The Conservatory also has supplemental feeding stations of a honey and water solution set out. Can you tell which butterflies prefer, nectar or honey?

Activities: Compare the feeding behaviour of juice-feeders and nectar-feeders.

A COLLECTION OF LEPIDOPTERA TRIVIA

1. The caterpillar of the Io moth has spines that sting like a nettle.
2. A migrating Monarch butterfly can fly 130 km (80 miles) per day, at a height of 123 metres (400 ft) above ground.
3. Vampire moths from Asia can puncture skin and suck blood.
4. The wing tips of the Giant Silkmoth look like snakes' heads.
5. A Hawkmoth from Madagascar has the longest proboscis - over 30 cm (12 in).
6. The female Queen Alexandra's Birdwing is the largest butterfly - it is 15-28 cm (6-11 in.) in wingspan.
7. Birdwings' caterpillars and chrysalids are eaten as delicacies in New Guinea.
8. Lepidopteran wings may contain 200-600 scales per square millimetre.
9. Moths in the family Saturniidae have no mouth parts as adults and do not feed in that stage; they only exist to find a mate and reproduce.
10. Some Hawkmoths can fly at speeds of up to 50 kmph (30mph).
11. Some female moths have no wings and cannot fly.
12. Hornet moths mimic the colour and behaviour of wasps.
13. Mourning Cloak butterflies hibernate over winter as adults and occasionally fly on warm winter days.
14. Zebra Longwing butterflies will make a creaking sound if disturbed.
15. Cracker butterflies make clicking noises when flying.
16. Burnet moth caterpillars ingest cyanide from plants which the adults release when attacked by predators.
17. Caterpillars of some Arctic butterfly species can take over 3 years to mature.
18. South American Water Tiger caterpillars live underwater.
19. Female butterflies may lay 200-500 eggs at a time.
20. Some pupae will wiggle vigorously when touched.

A SEEK AND FIND SHEET FOR THE BUTTERFLY CONSERVATORY

Copy this worksheet to use during your visit, or select a few questions to make your own sheet.

IN THE LOBBY

Find the two-word meaning for "Lepidoptera"

Find the name of the butterfly with the big yellow eye spots on brown wings, that looks like an owl.

Name the four stages in the butterfly's life cycle.

IN THE AUDITORIUM

Find out where the Monarch butterfly spends the winter.

Find which butterfly develops from the larva or caterpillar who likes to eat parsley and carrots.

Name one flower that butterflies like to feed from, and one flower that is less attractive to them.

What country features butterflies on some of its stamps?

What zoo is raising Karner Blue butterflies to release back into selected parks?

IN THE CONSERVATORY

1. Find a butterfly with brilliant blue top wings and underwings that are brown with several little circles on them. This is called the Blue Morpho, and many believe it is our most beautiful butterfly. Is it feeding on the fruit trays, or is it a nectar feeder?

2. Find the emergence window where the pupae are hanging behind the glass. How would you describe some of the pupa to someone who couldn't see? What advantages are there to the pupa to be so unusual looking?

3. What colours do you see in the large rocks in the Conservatory? What kind of rock is this, and where did it come from?

4. Find a tree that looks like it has 100 legs. (Hint: it is near the first feeding tray.) Why do the Owl butterflies like to roost in this tree through the day?

5. Find a statue of a woman. This is Diana, goddess of hunters. What kind of animal is with her?

6. Find a feeding tray with fruit on it. What colour are the underwings of most of the butterflies feeding on the fruit? Why is it an advantage for fruit feeders to have this colour? (Think of the fruit lying in the leaf litter on the forest floor.)

7. Look at the head of a butterfly as it feeds from the fruit. What is the name of the feeding tube through which it drinks the fruit juices? How is a butterfly like an elephant?

8. Find a misting nozzle. Why do the rainforest butterflies feel at home here in the Conservatory?

9. Find some fish. What kind are they?

10. Find a big white flower with a sweet perfume. Read the sign in the soil beneath the plant. What is the plant's name?

11. Find some plants with purple flowers where many butterflies are feeding. What is the name of this plant?

12. Why are so many people in the Conservatory smiling?

IN THE GIFT SHOP

1. Find a house for butterflies. How would the butterflies get into this house? Why might they go there in stormy weather?

2. Find a book that tells you lots of interesting facts about butterflies. What is the book called?
