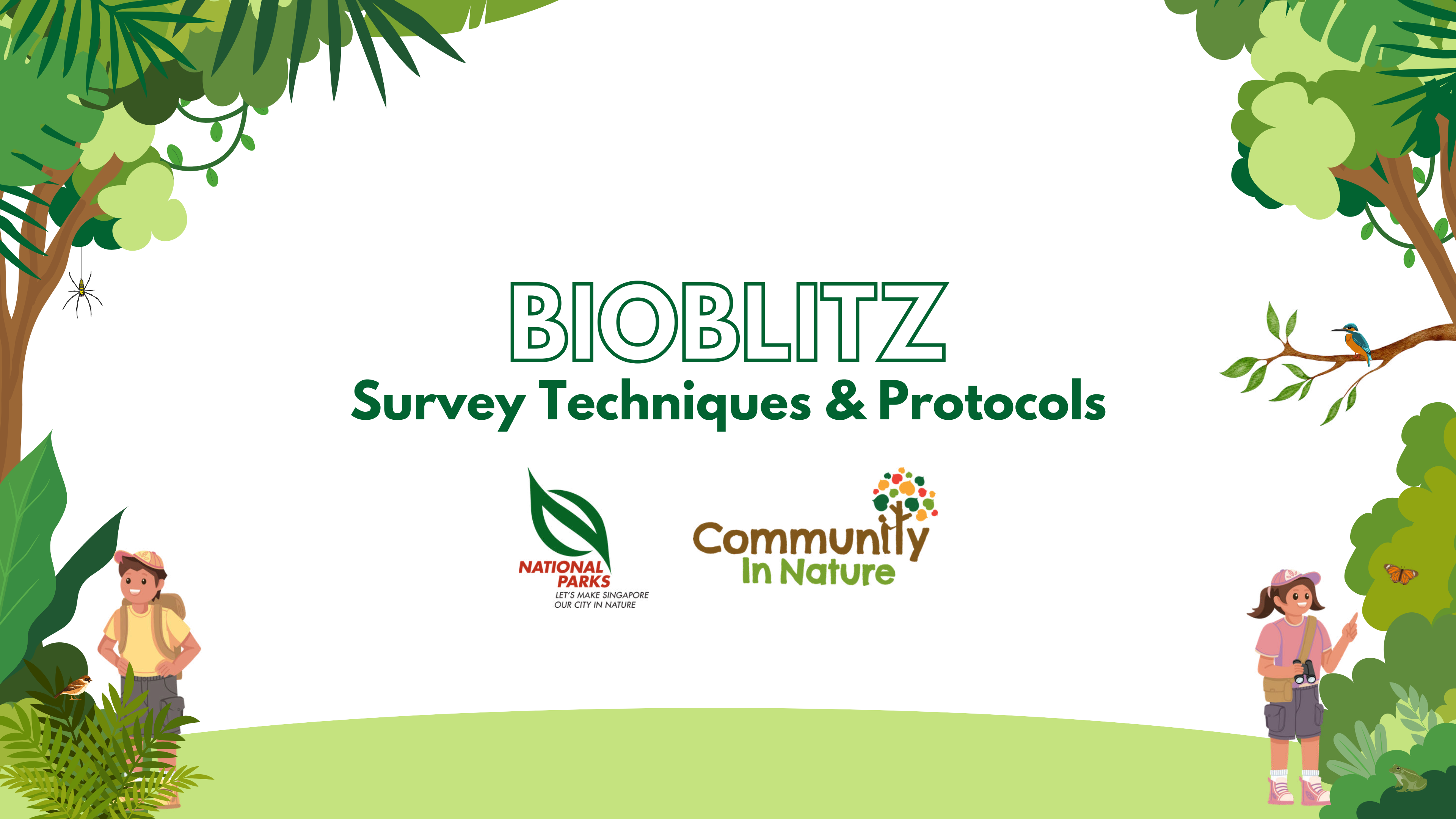


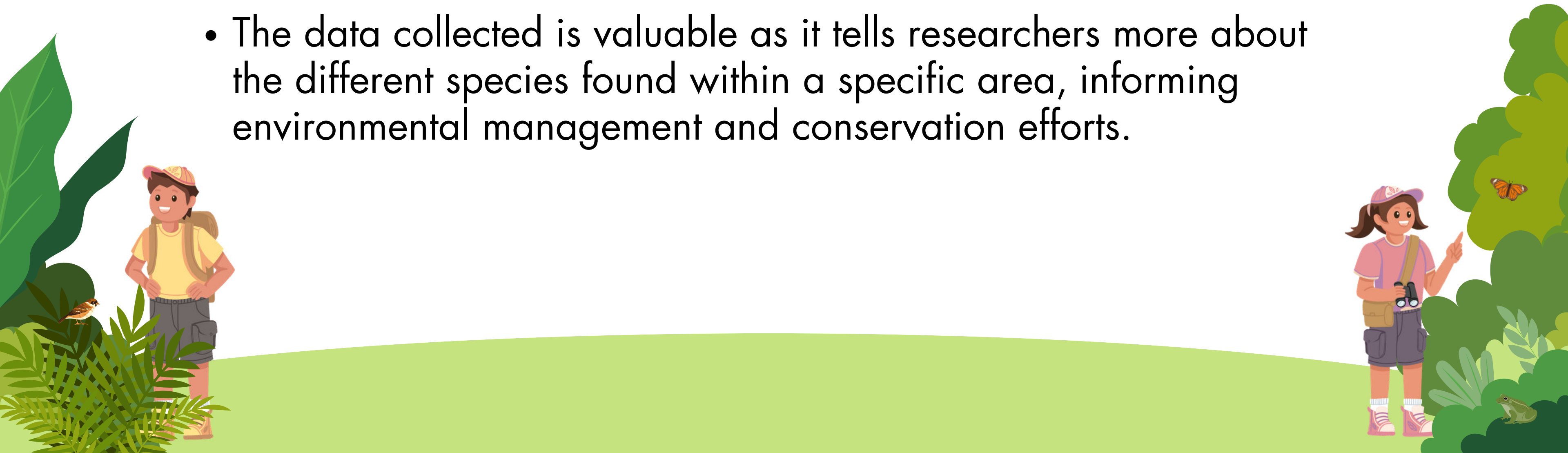
BIOBLITZ

Survey Techniques & Protocols



What is a BioBlitz?

- BioBlitz is a **citizen science event** where participants document and identify as many species as possible in a designated area over a specific period.
- The data collected is valuable as it tells researchers more about the different species found within a specific area, informing environmental management and conservation efforts.

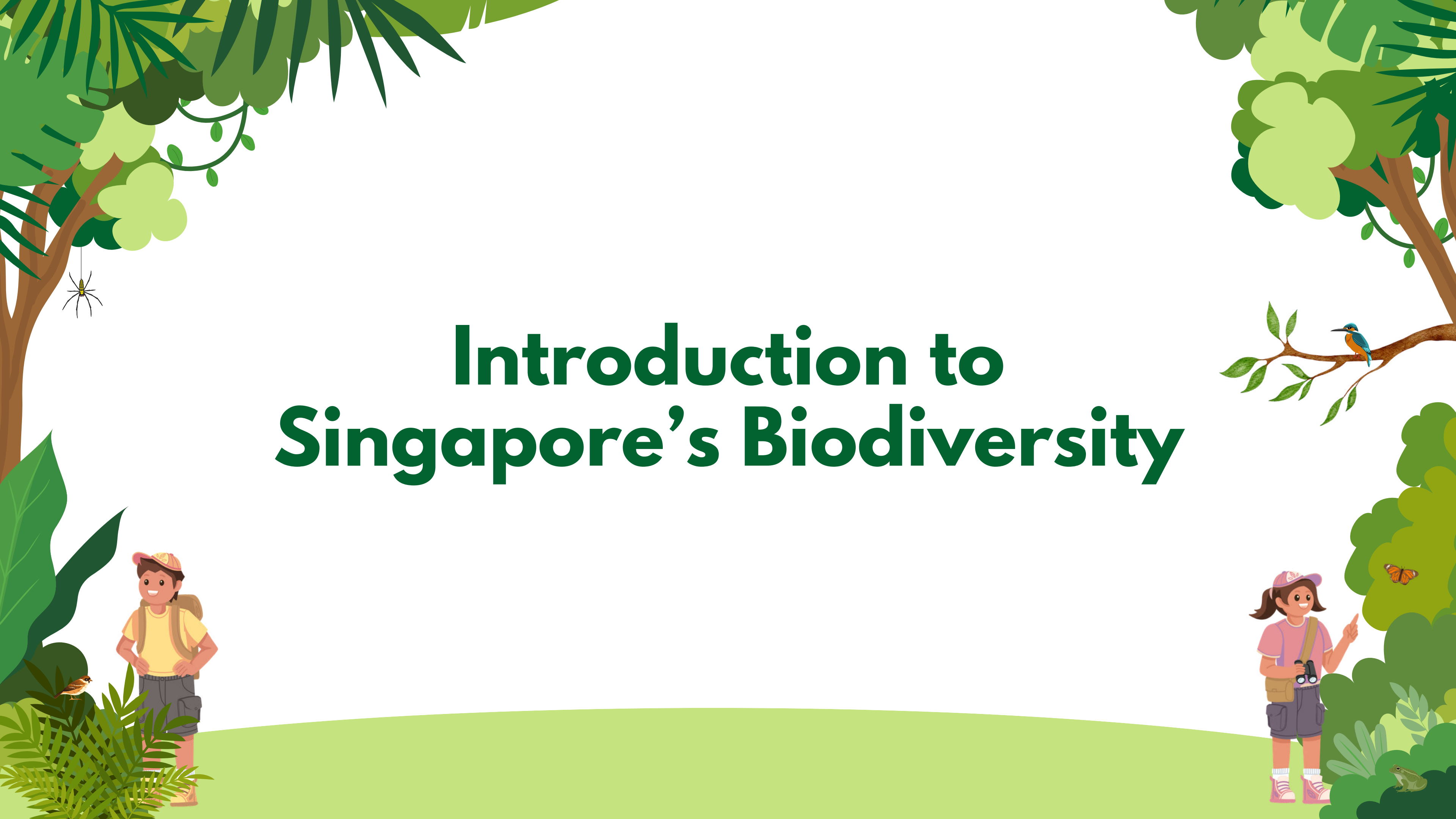


What to do for a BioBlitz?

1. Learn the survey protocol and etiquette.
2. Prepare necessary survey equipment, e.g. camera, binoculars.
3. Conduct the survey at the survey site(s) and record your findings.
4. Consolidate and submit your data via the forms provided.
5. Share the results with all participants!



Introduction to Singapore's Biodiversity



Singapore's Biodiversity

- Biodiversity refers to the **variety of living things on Earth**, including plants and animals, and the ecosystems they live in.
- Despite its small size, Singapore is **rich in biodiversity** and hosts a wide range of ecosystems due to its tropical location near the Equator.

What are some of the ecosystems that can be found in Singapore?



Ecosystems in Singapore

Terrestrial



Forest



Freshwater



Ecosystems in Singapore

Coastal



Mangrove



Marine



Ecosystems in Singapore



Urban



Singapore's Biodiversity

- In these ecosystems, we can find... **1,814 native vascular plants**

429 birds

367 butterflies

68 terrestrial mammals

126 dragonflies
(including damselflies)

36 freshwater fish

108 reptiles

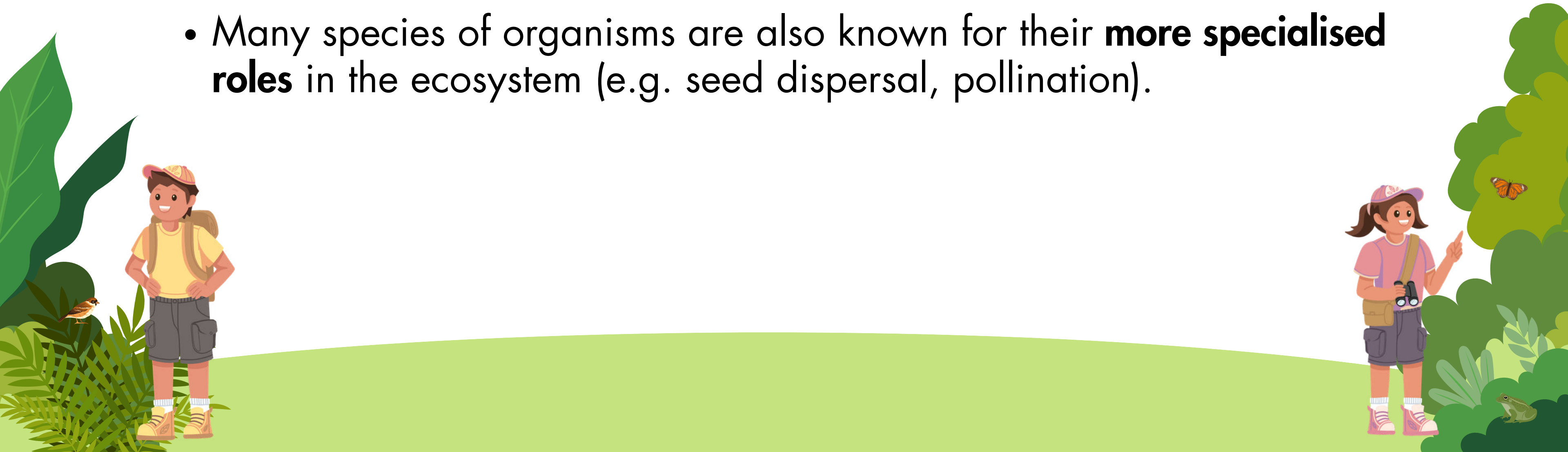
275 hard corals

12 seagrasses



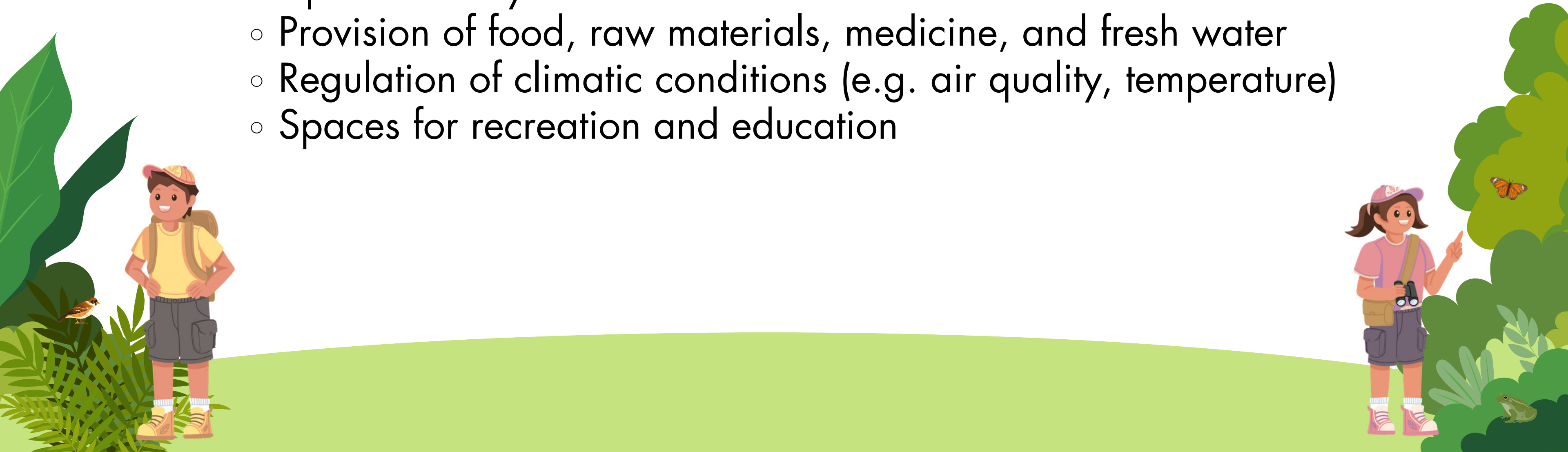
Roles in the Ecosystem

- All organisms in an ecosystem play an important role in **keeping the ecosystem in balance** (e.g. maintaining levels of prey and predator populations, providing food for scavengers and decomposers).
- Many species of organisms are also known for their **more specialised roles** in the ecosystem (e.g. seed dispersal, pollination).



Ecosystem Services

- Biodiversity also influences **ecosystem services**, which are the **benefits provided by ecosystems to humans**.
- Examples of ecosystem services are:
 - Provision of food, raw materials, medicine, and fresh water
 - Regulation of climatic conditions (e.g. air quality, temperature)
 - Spaces for recreation and education



Birds



Role of Birds in the Ecosystem

- Birds keep the ecosystem in balance through:

Seed Dispersal



The Scarlet-backed Flowerpecker is a **frugivore** (feeds on fruits).

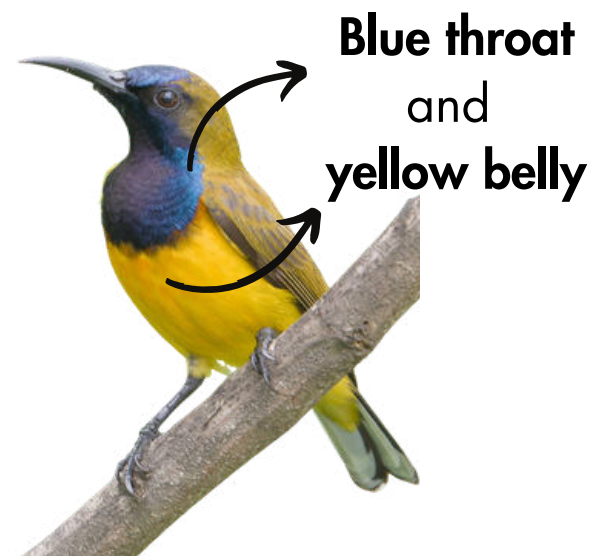
Pollination



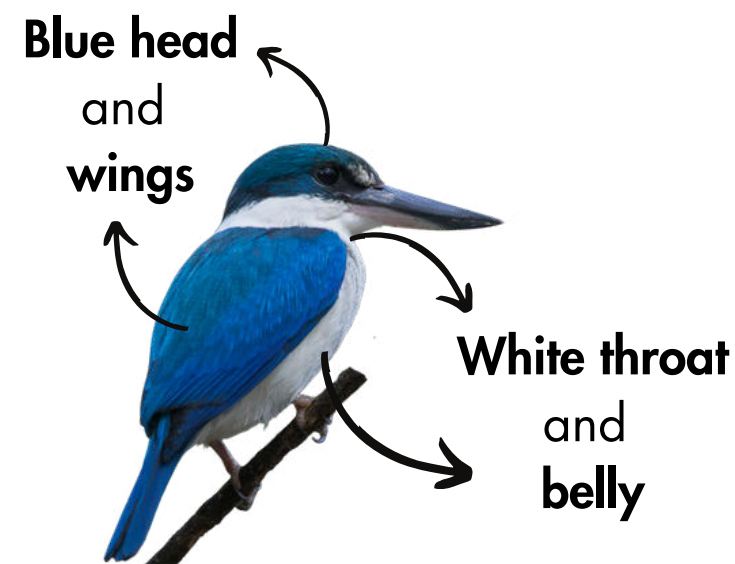
The Ornate Sunbird is a **nectarivore** (feeds on nectar).

How to Identify Birds: Colour

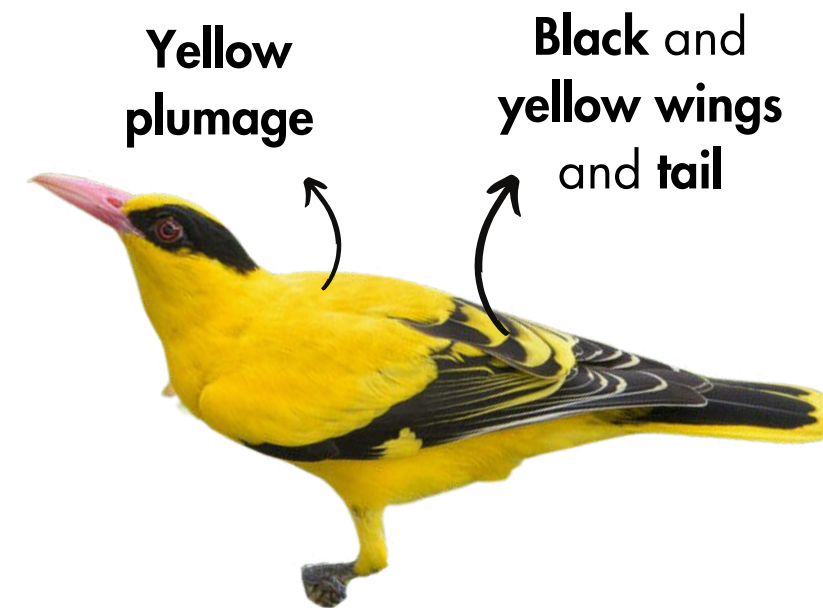
- Many species have distinct colour patterns on their feathers, making it easier to tell them apart.



ORNATE SUNBIRD
Cinnyris ornatus



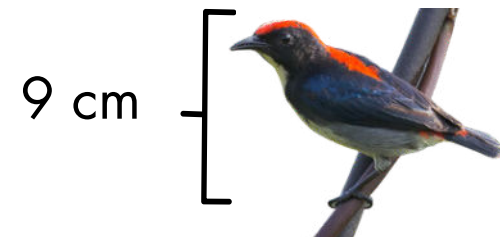
COLLARED KINGFISHER
Todiramphus chloris



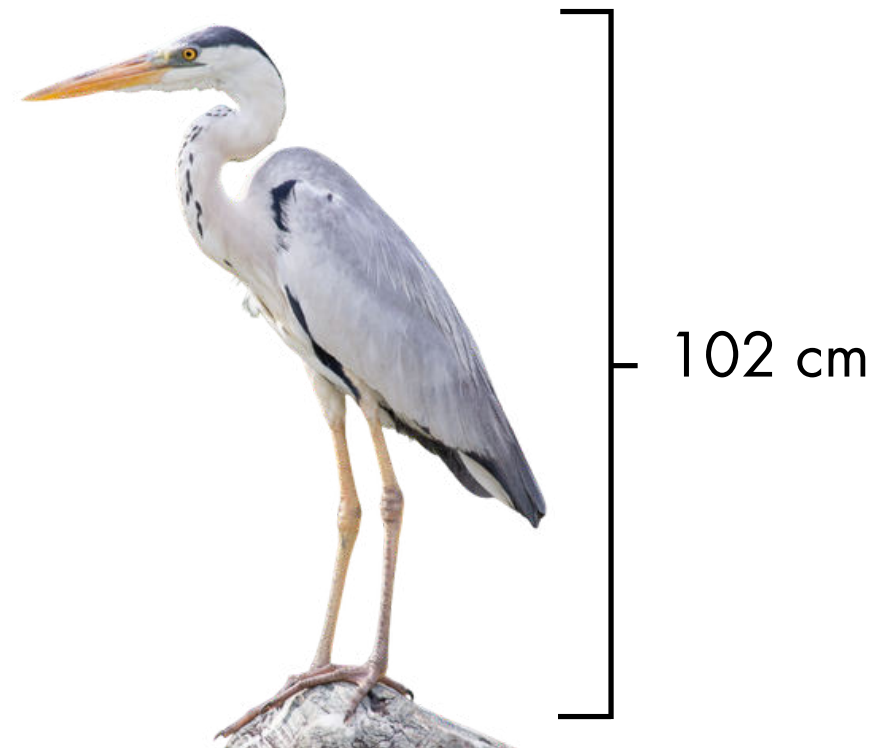
BLACK-NAPED ORIOLE
Oriolus chinensis

How to Identify Birds: Size

- Birds come in all sizes, from tiny little birds that can fit in your hand to big ones that are as tall as a child!



SCARLET-BACKED FLOWERPECKER
Dicaeum cruentatum



GREY HERON
Ardea cinerea

*The pictures are not to scale.

Photo credit: Francis Yap



How to Identify Birds: Size

- Birds come in all sizes, from tiny little birds that can fit in your hand to big ones that are as tall as a child!
- Use a familiar bird as a **relative comparison** (e.g. smaller than, larger than, or same size as a Javan Myna).



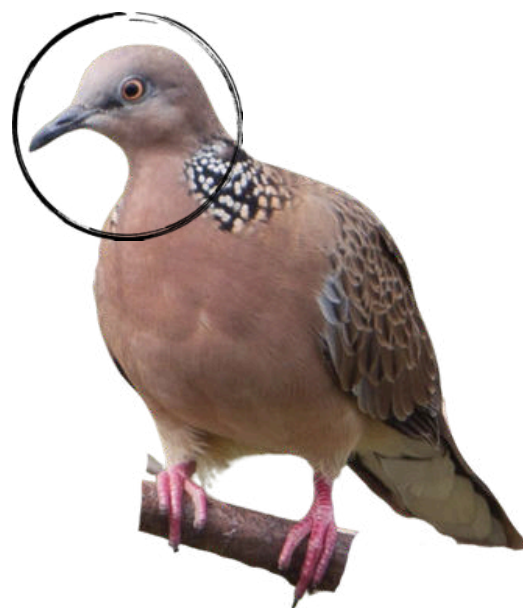
Photo credit: Francis Yap

How to Identify Birds: Shape

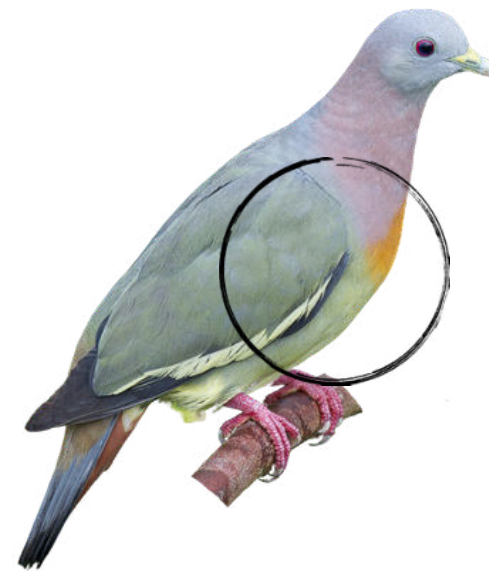
- Birds belonging to a particular family often share similar body shapes.

Family Columbidae: Doves and Pigeons

Doves and pigeons look similar because they have ...



SPOTTED DOVE
Spilopelia chinensis



PINK-NECKED GREEN PIGEON
Treron vernans

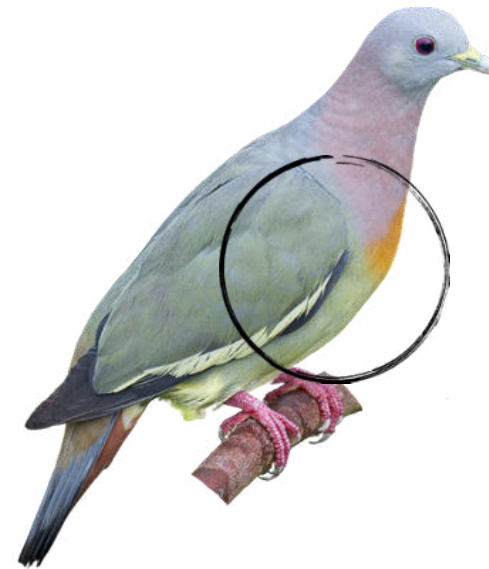
How to Identify Birds: Shape

- Birds belonging to a particular family often share similar body shapes.

Family Columbidae: Doves and Pigeons



SPOTTED DOVE
Spilopelia chinensis



PINK-NECKED GREEN PIGEON
Treron vernans

Doves and pigeons look similar because they have **small rounded heads** and **plump bodies** with a **rounded breast**.



How to Identify Birds: Shape

- Birds belonging to a particular family often share similar body shapes.

Family Picidae: Woodpeckers



[1]

COMMON FLAMEBACK
Dinopium javanese



[2]

SUNDA PYGMY WOODPECKER
Dendrocopos moluccensis

Woodpeckers look similar to each other because they have ...

How to Identify Birds: Shape

- Birds belonging to a particular family often share similar body shapes.

Family Picidae: Woodpeckers



[1]

COMMON FLAMEBACK
Dinopium javanese



[2]

SUNDA PYGMY WOODPECKER
Dendrocopos moluccensis

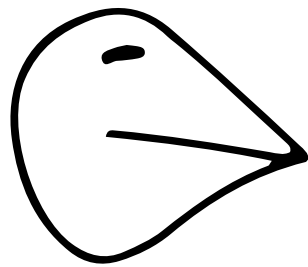
Woodpeckers look similar to each other because they have **short legs with long claws** and a **long and sharp bill**.

How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



SCALY-BREASTED MUNIA
Lonchura punctulata



Short and
wide

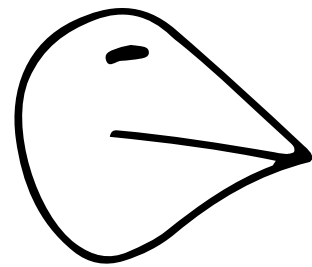


How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



SCALY-BREASTED MUNIA
Lonchura punctulata



Short and
wide



NUTS & SEEDS



How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



ORIENTAL MAGPIE ROBIN
Copsychus saularis



Slender and
straight



How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



ORIENTAL MAGPIE ROBIN
Copsychus saularis



Slender and
straight



INSECTS



How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



CRIMSON SUNBIRD
Aethopyga siparaja



Long and
hooked



How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



CRIMSON SUNBIRD
Aethopyga siparaja



Long and
hooked



NECTAR



How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



GREY HERON
Ardea cinerea



Long and
straight



How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



GREY HERON
Ardea cinerea



Long and
straight



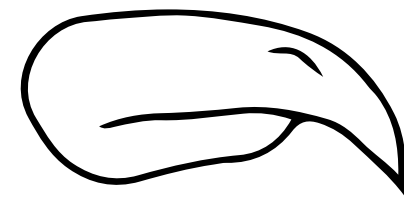
FISH

How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



YELLOW-VENTED BULBUL
Pycnonotus goiavier



Slender and
hooked

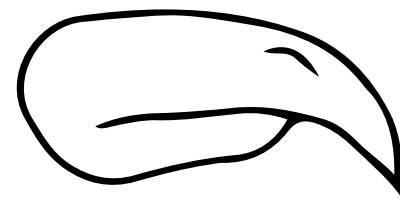


How to Identify Birds: Shape

- Birds have different beak shapes depending on their diet.



YELLOW-VENTED BULBUL
Pycnonotus goiavier



Slender and
hooked



FRUIT

Morphology of a Bird

- Knowing how to describe the morphology (physical features) of a bird helps others identify it as well.

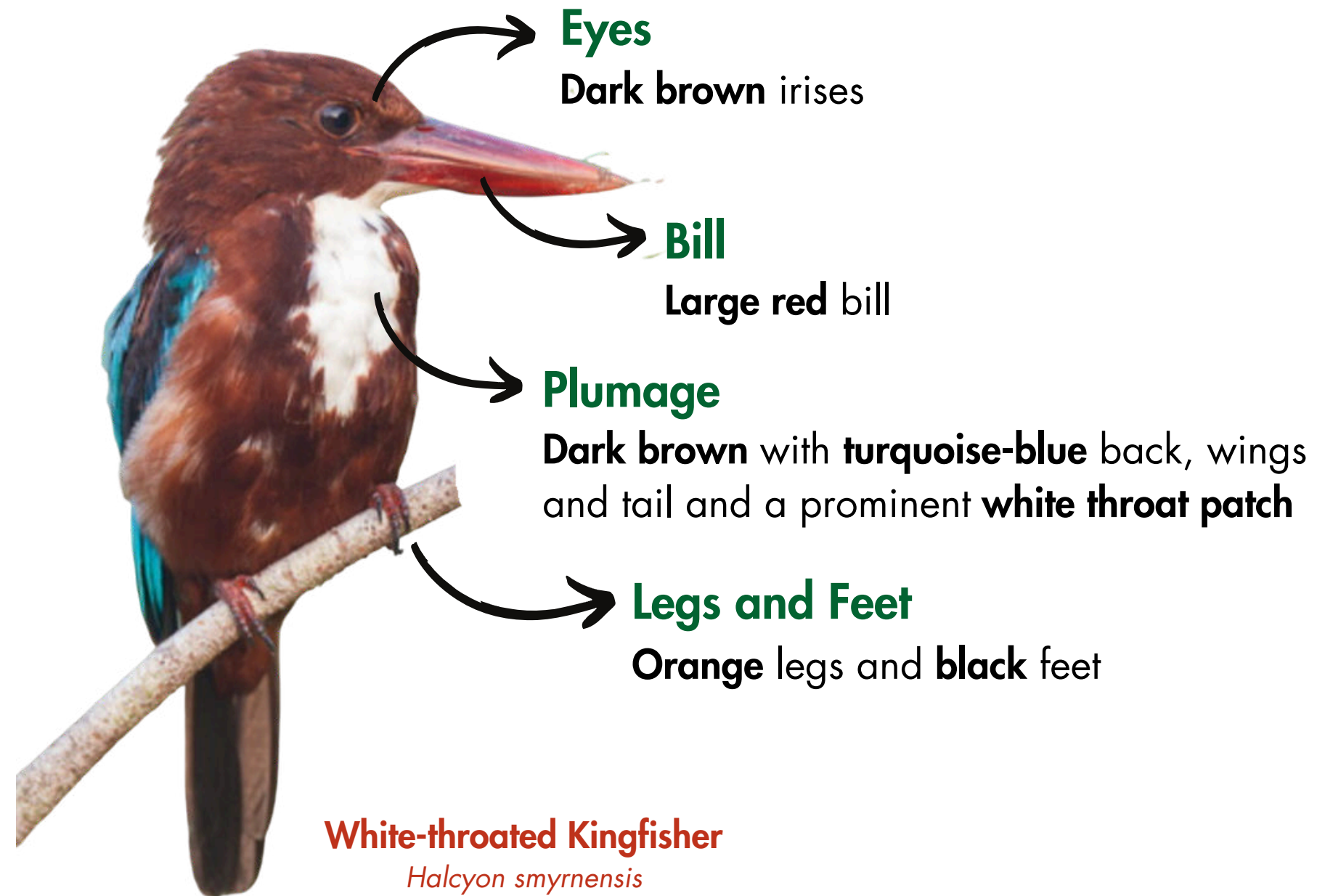


Photo credit: Francis Yap

It's Your Turn!

- Look at the bird below and describe its different parts in terms of colour, size and shape!



Scarlet-backed Flowerpecker
Dicaeum cruentatum

Photo credit: Francis Yap

It's Your Turn!

- Look at the bird below and describe its different parts in terms of colour, size and shape!

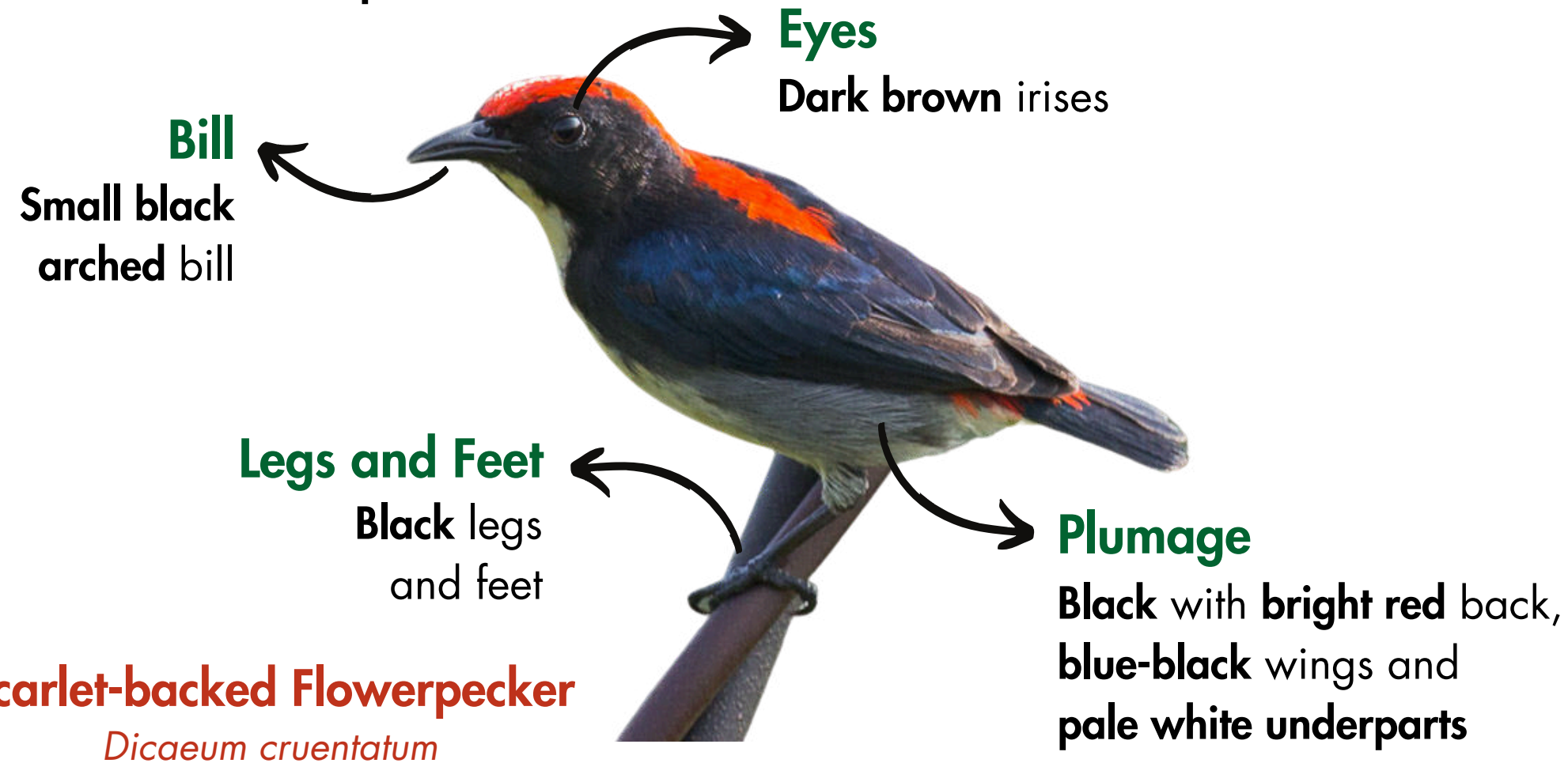
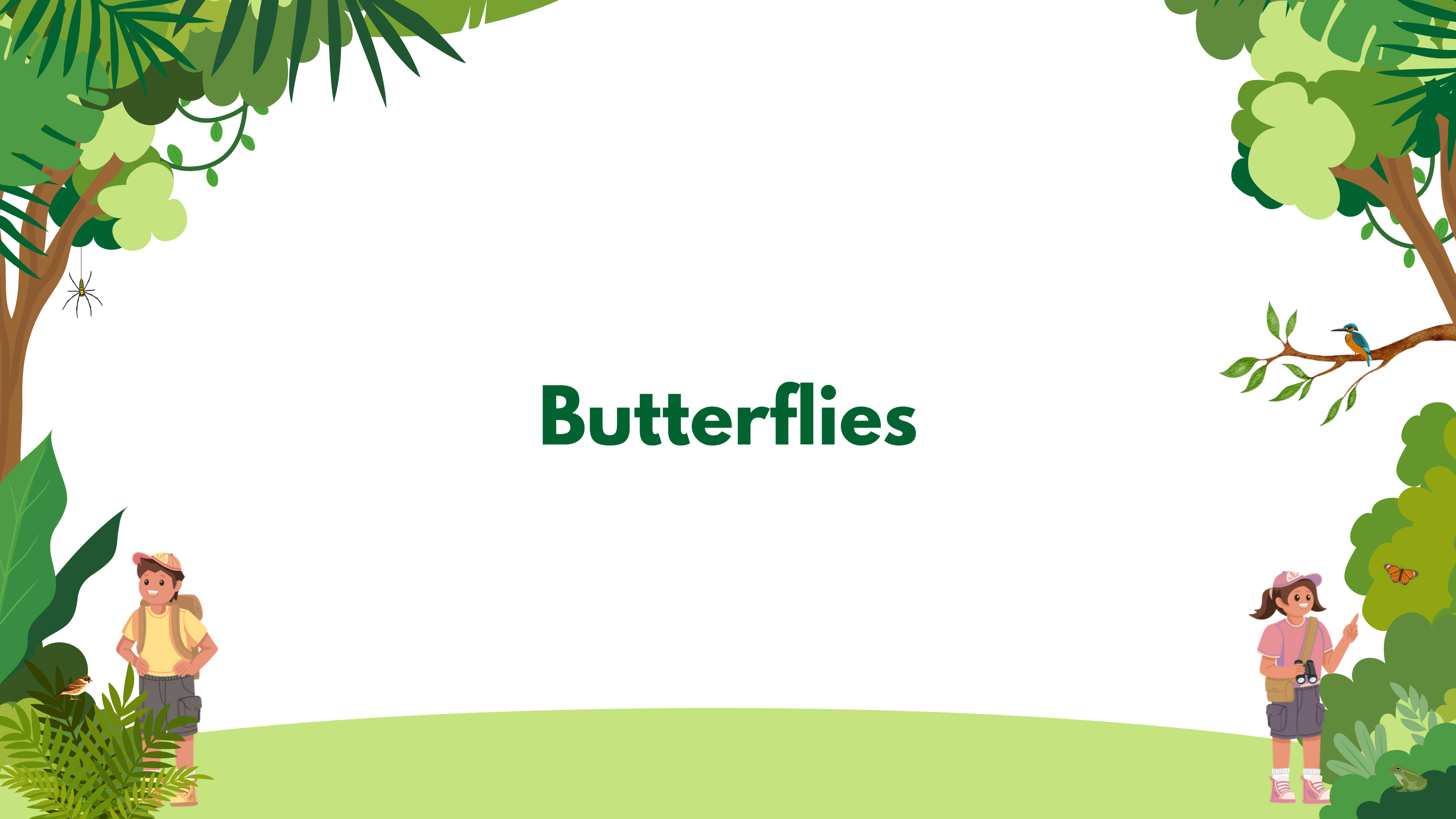


Photo credit: Francis Yap

Butterflies



Role of Butterflies in the Ecosystem

- Butterflies keep the ecosystem in balance through **pollination**.
- They are also important **bioindicators** of air pollution, changes in temperature, and changes in habitat structure.
 - The presence of butterflies in an ecosystem indicates that the ecosystem is healthy.



How to Identify Butterflies: Colour

- Butterflies come in a wide range of colours.



PAINTED JEZEBEL
Delias hyparete



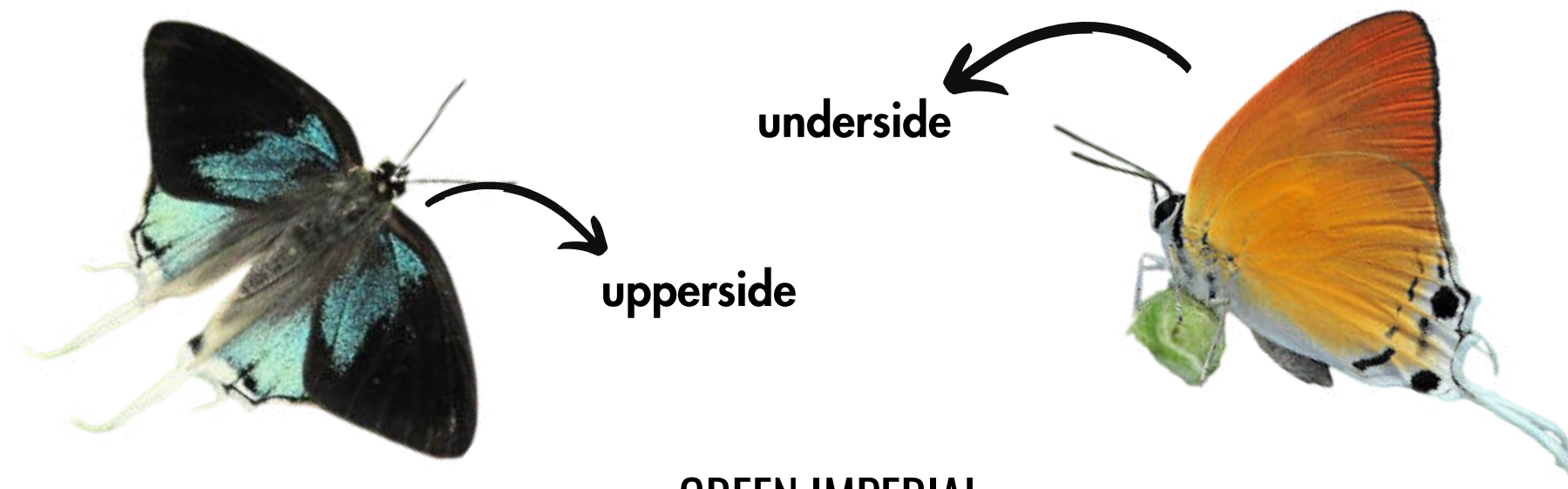
BLUE PANSY
Junonia orithya wallacei



COMMON MIME
Papilio clytia

How to Identify Butterflies: Colour

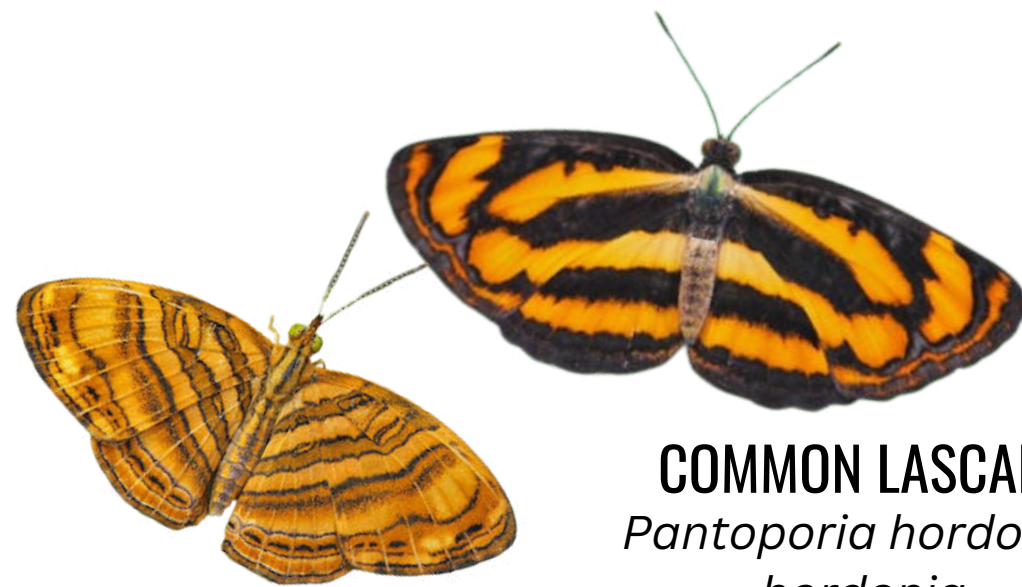
- In some butterflies, the colours on the upperside of their wings are very different from those on the underside! The details of both the upperside and underside of a butterfly are important when identifying a butterfly.



GREEN IMPERIAL
Manto hypoleuca terana

How to Identify Butterflies: Wing Markings

- Butterfly wings aren't just colourful – they have varying patterns that make each butterfly unique!



LITTLE MAPLET
Chersonesia peraka peraka

COMMON LASCAR
Pantoporia hordonia
hordonia

These wings have stripes.

How to Identify Butterflies: Wing Markings

- Butterfly wings aren't just colourful – they have varying patterns that make each butterfly unique!



TAWNY COSTER
Junonia almana javana



[1]

LEOPARD
Phalanta phalantha
phalantha

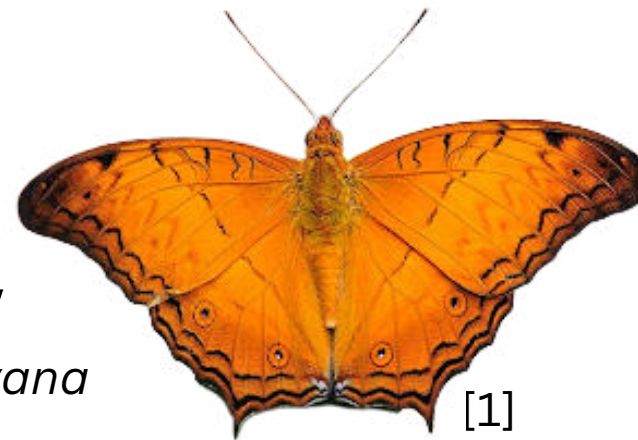
These wings have spots.

How to Identify Butterflies: Wing Markings

- Butterfly wings aren't just colourful – they have varying patterns that make each butterfly unique!



PEACOCK PANSY
Junonia almana javana



CRUISER♂
Vindula dejone erotella

These wings have eye-spots.

How to Identify Butterflies: Wing Markings

- Butterfly wings aren't just colourful – they have varying patterns that make each butterfly unique!



STRIPED BLUE CROW
Euploea mulciber
mulciber



COMMON TIGER
Danaus genutia genutia

These wings have veins.



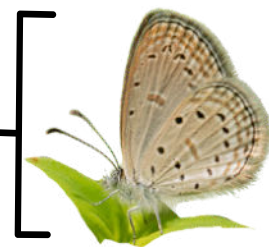
How to Identify Butterflies: Size

- Butterflies come in all sizes – some can fit on your finger while others may be bigger than your palm!

Size of a 10-cent coin!



1 cm



[1]

PYGMY GRASS BLUE
Zizula hylax pygmaea

14 cm



[2]

COMMON BIRDWING
Troides helena cerberus

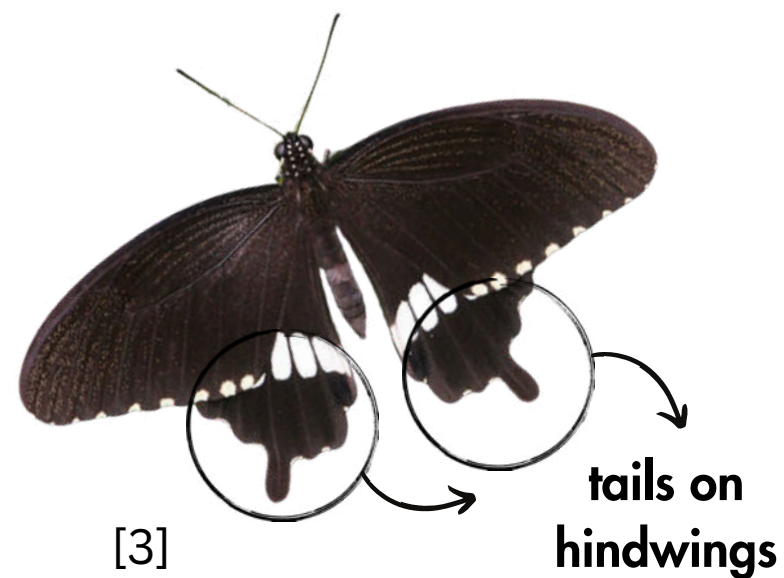
*The pictures are not to scale.

Photo credit: Zhou Boyi [1], Khew Sin Khoon [2]

How to Identify Butterflies: Wing Shape

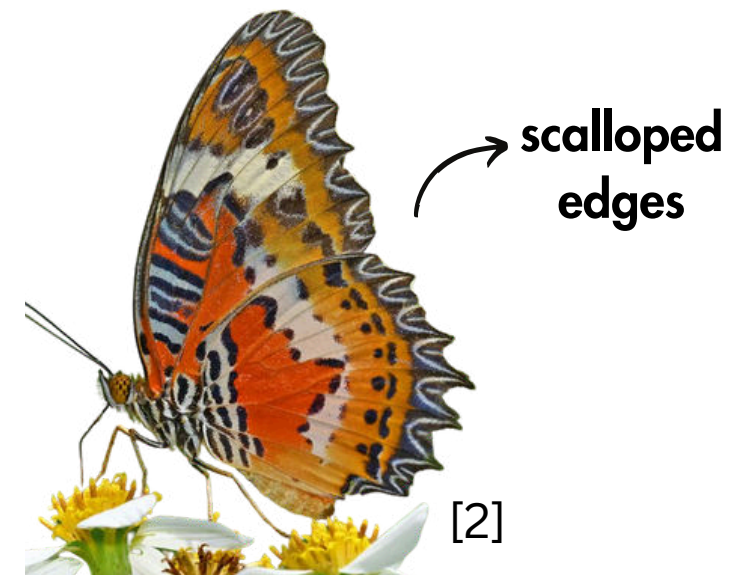
- From pointy tails to round edges, butterfly wings come in all shapes.

Tailed Wings



COMMON MORMON
Papilio polytes romulus

Scalloped Wings



MALAY LACEWING
Cethosia hypsea

How to Identify Butterflies: Wing Shape

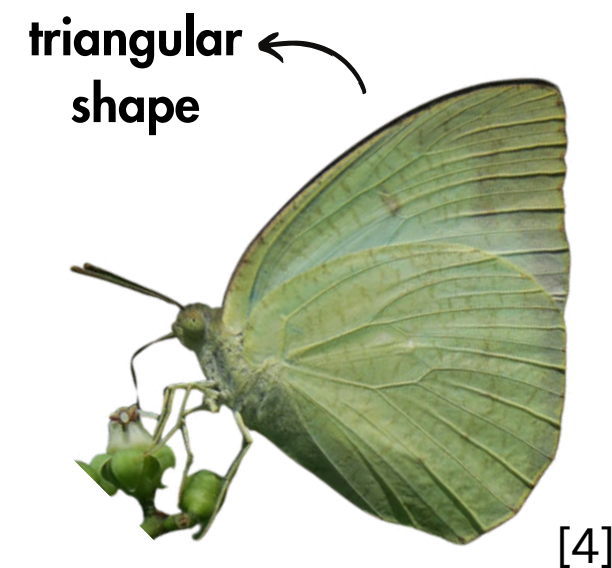
- From pointy tails to round edges, butterfly wings come in all shapes.

Rounded Wings



PLAIN TIGER
Danaus chrysippus chrysippus

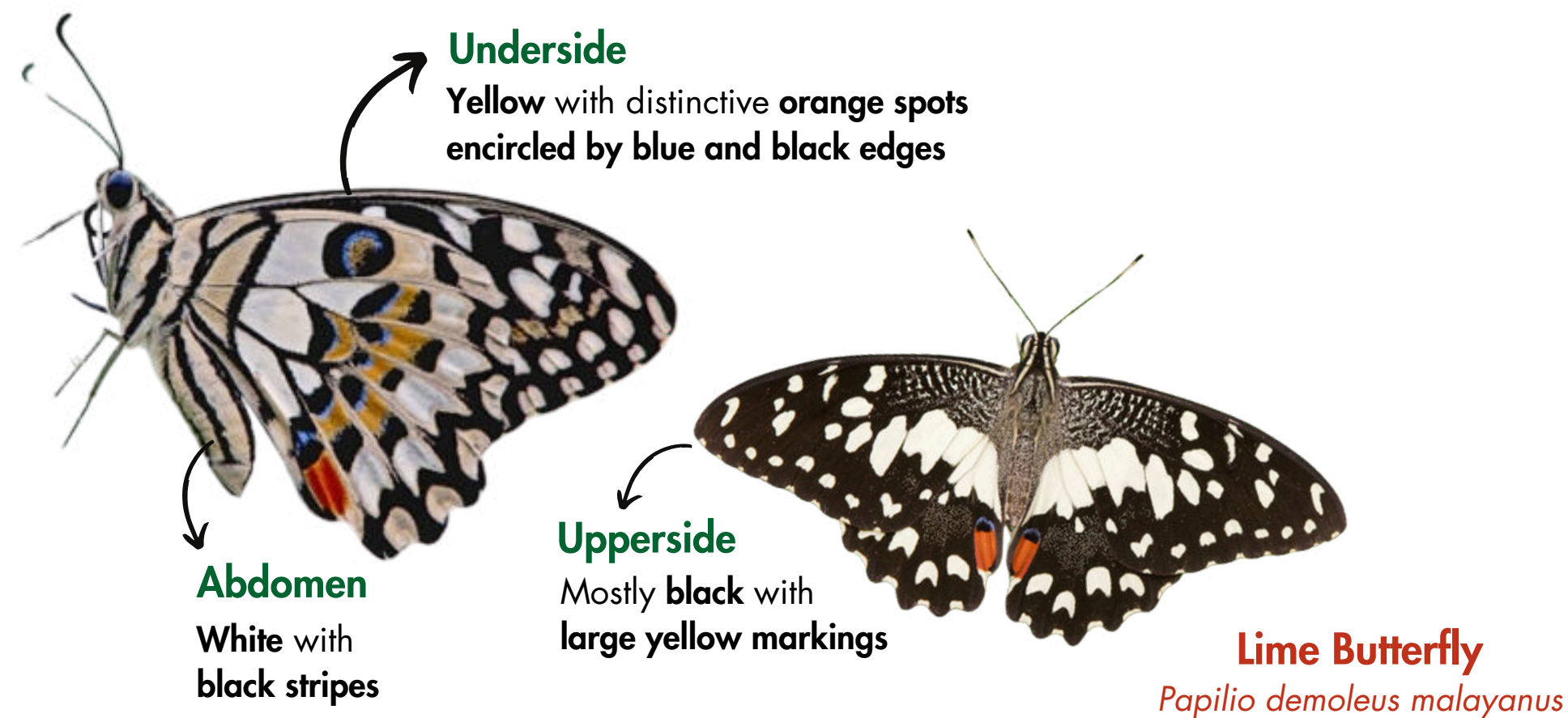
Triangular Wings



MOTTLED EMIGRANT
Catopsilia pyranthe

Morphology of a Butterfly

- Knowing how to describe the morphology (physical features) of a butterfly helps others identify it as well.



It's Your Turn!

- Look at the butterfly below and describe its different parts in terms of colour, markings, size and shape!



Common Tiger
Danaus genutia

Photo credit: Horace Tan



It's Your Turn!

- Look at the butterfly below and describe its different parts in terms of colour, markings, size and shape!

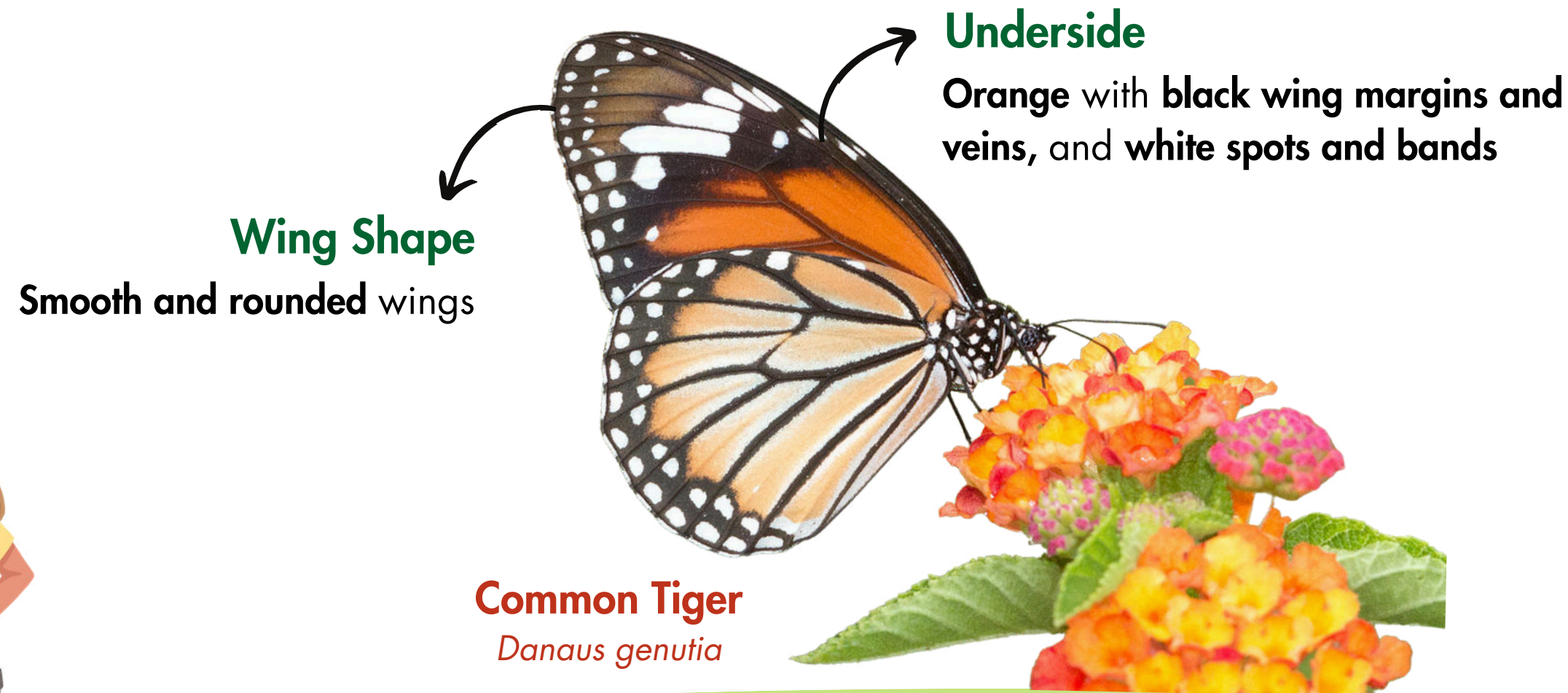
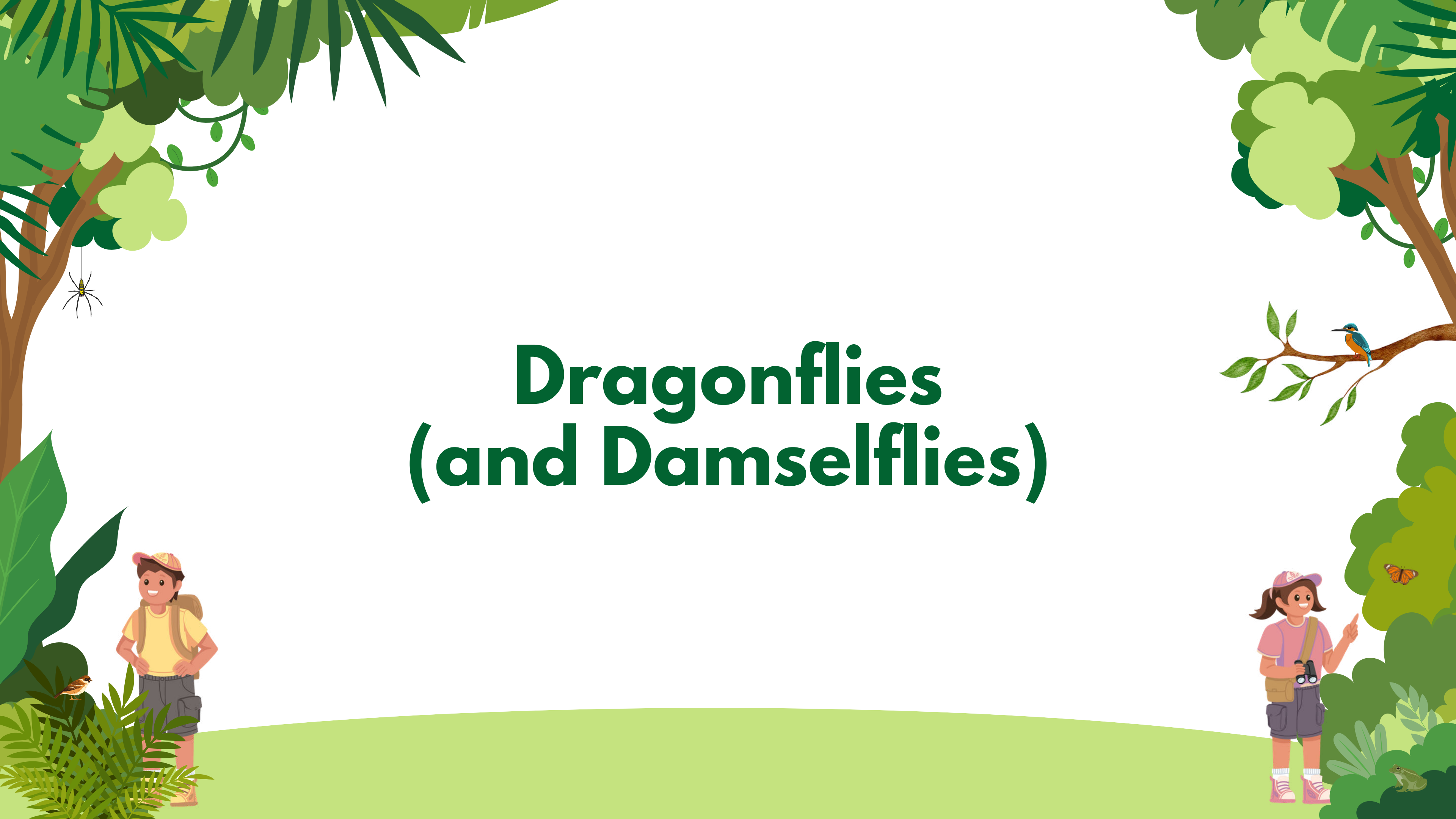


Photo credit: Horace Tan

Dragonflies (and Damselflies)

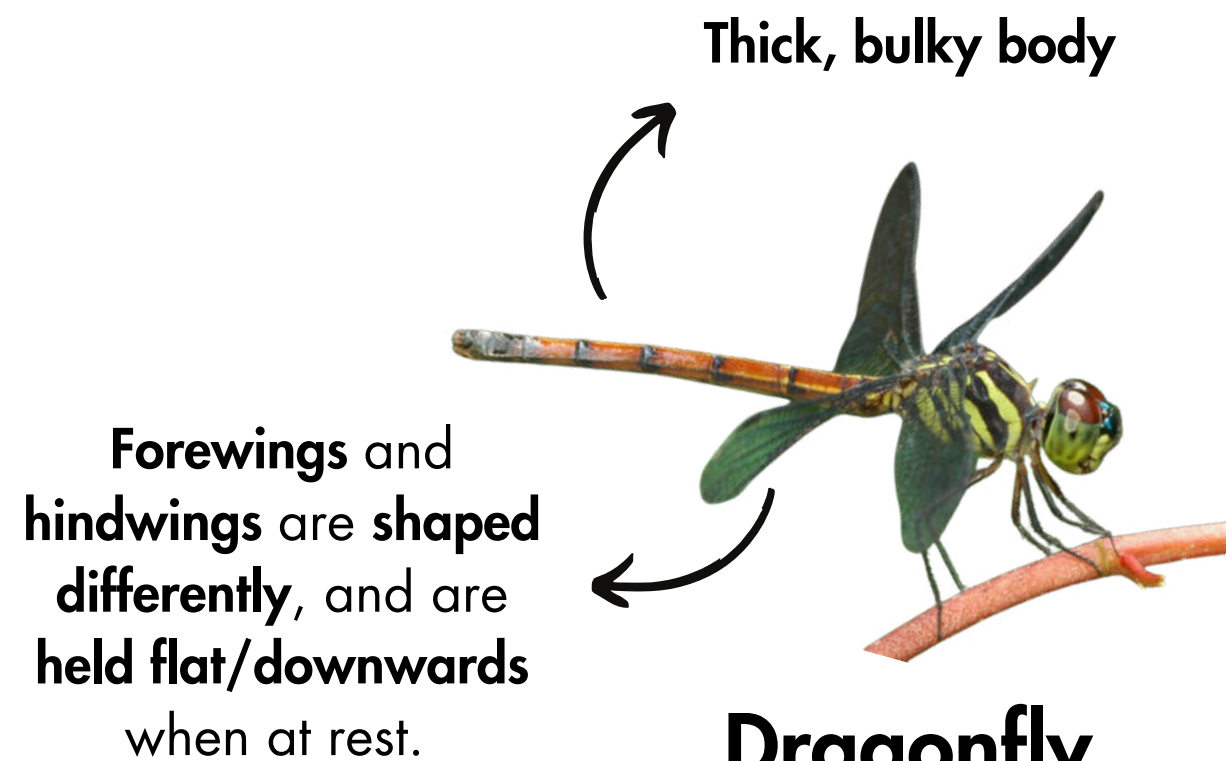


Role of Dragonflies in the Ecosystem

- Dragonflies keep the ecosystem in balance.
- Like butterflies, dragonflies are also important **bioindicators** of water quality, wetland diversity, and health.
 - The presence of dragonflies in an aquatic ecosystem indicates that the ecosystem is healthy, as dragonfly larvae require clean, unpolluted water to thrive.
- As predators, they regulate the numbers of other insect species, such as mosquitoes.

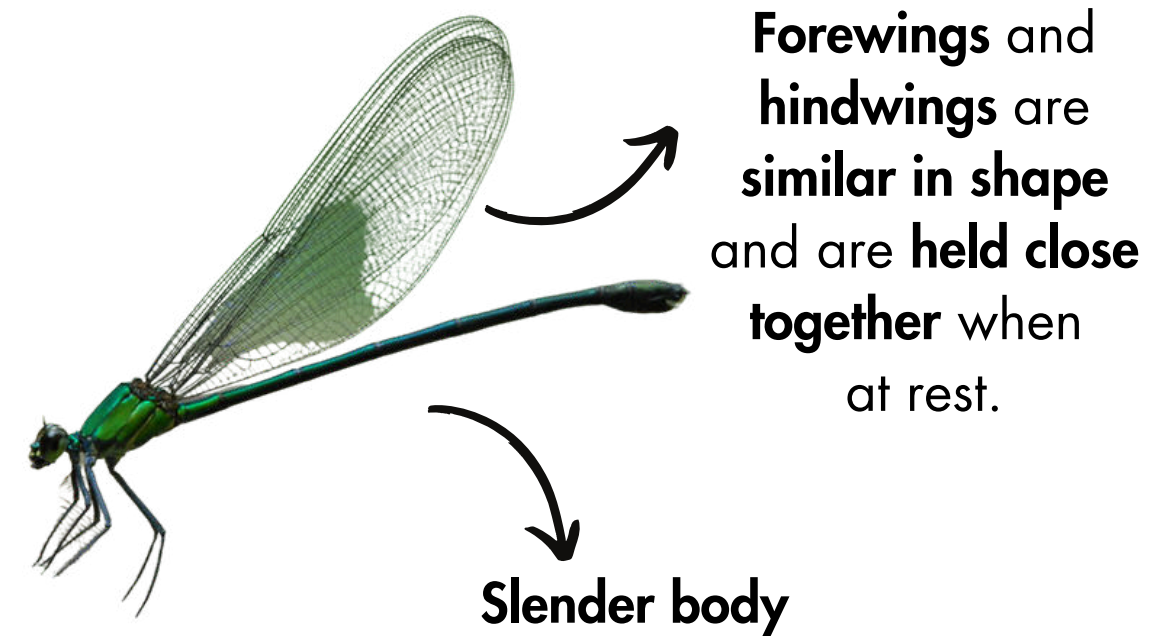


Dragonfly vs Damselfly



Dragonfly

SCARLET GRENADIER
Lathrecista asiatica

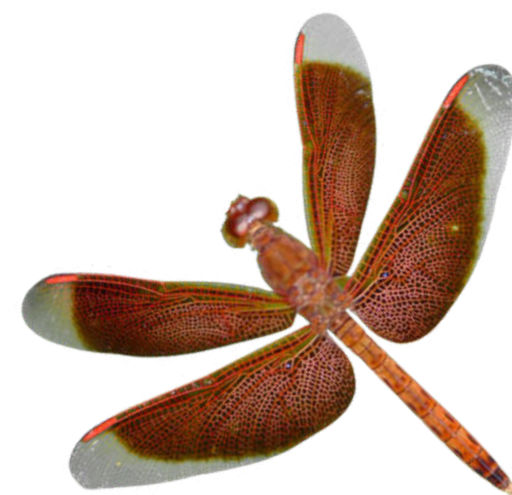


Damselfly

COMMON FLASHWING
Vestalis amethystina

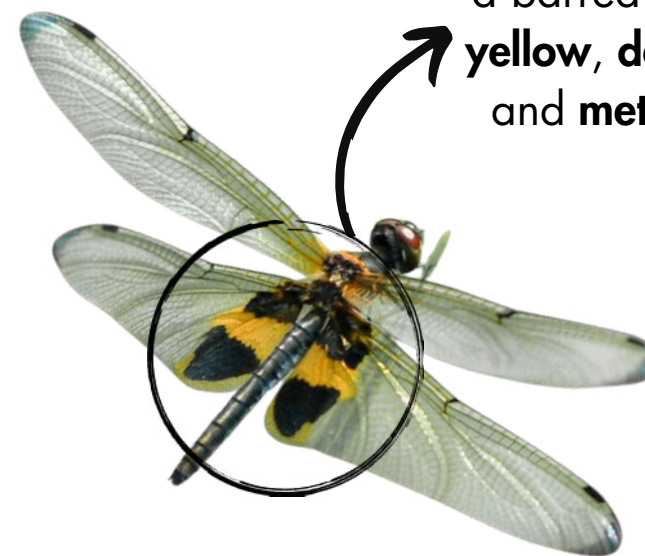
How to Identify Dragonflies: Colour

- Dragonflies and damselflies come in different abdominal or wing colours! Some species have prominent markings on their abdomen and wings.



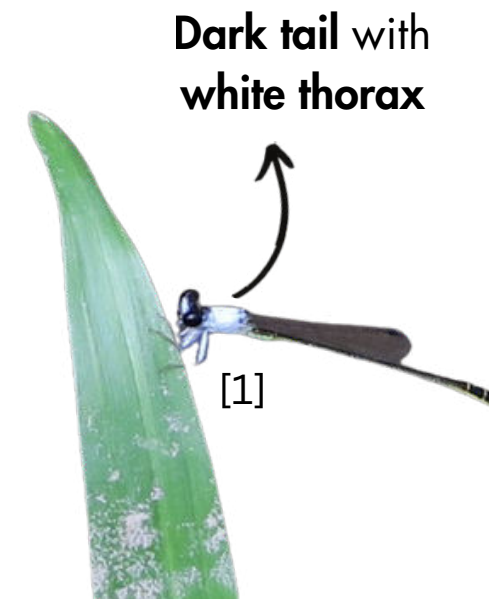
Brownish-red abdomen and wings with clear wing tips

COMMON PARASOL♂
Neurothemis fluctuans



Base of hindwing has a barred pattern of yellow, dark brown and metallic blue

YELLOW-BARRED FLUTTERER
Rhyothemis phyllis



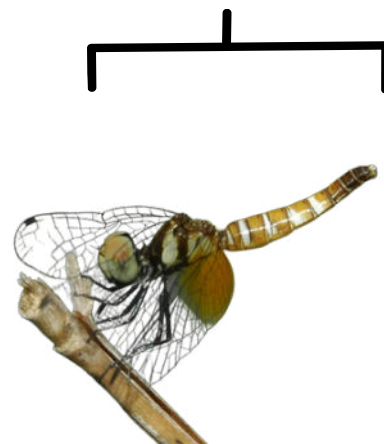
Dark tail with white thorax

VARIABLE WISP
Agriocnemis femina

How to Identify Dragonflies: Size

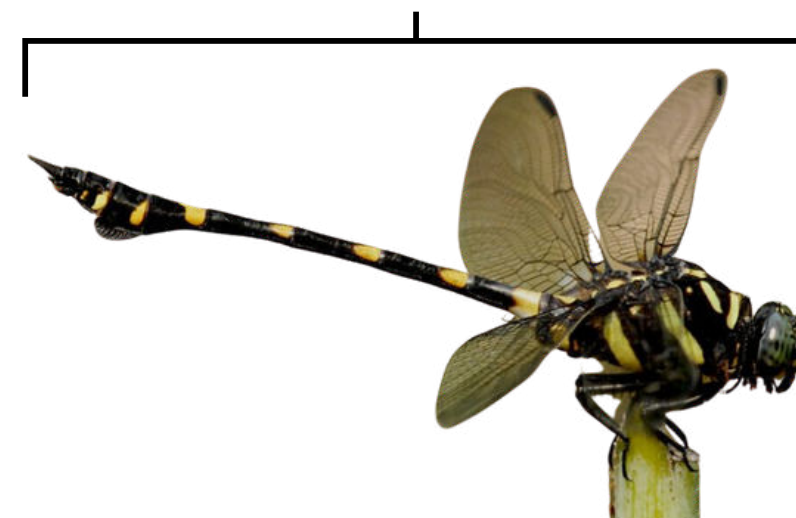
- Dragonflies and damselflies come in all sizes – some are as small as a paperclip while others are as big as the width of your hand!

17 mm



SCARLET PYGMY ♀
Nannophya pygmaea

68 mm



COMMON FLANGETAIL
Ictinogomphus decoratus

*The pictures are not to scale.

Photo credit: Cai Yixiong



How to Identify Dragonflies: Flight Pattern

- Depending on the way they fly, dragonflies and damselflies can be classified into four groups.

Gliders



COASTAL GLIDER ♂
Macrodiplax cora

Gliders have **large wings** to fly smoothly and effortlessly.

Flutterers



BRONZE FLUTTERER
Rhyothemis obsolescens

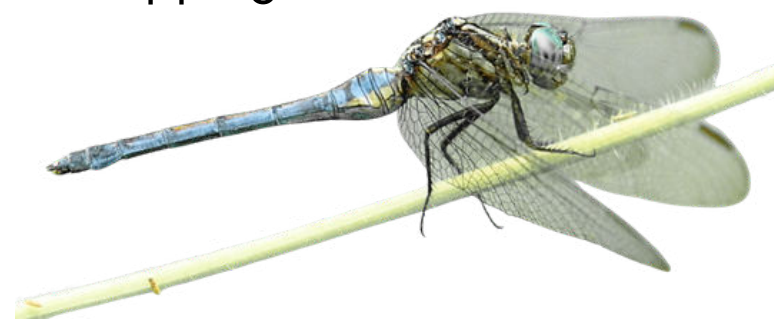
Flutterers **generally fly slowly.**

How to Identify Dragonflies: Flight Pattern

- Depending on the way they fly, dragonflies and damselflies can be classified into four groups.

Skimmers

Skimmers can fly a **long distance** without stopping.



COMMON BLUE SKIMMER♂
Orthetrum glaucum

Darters

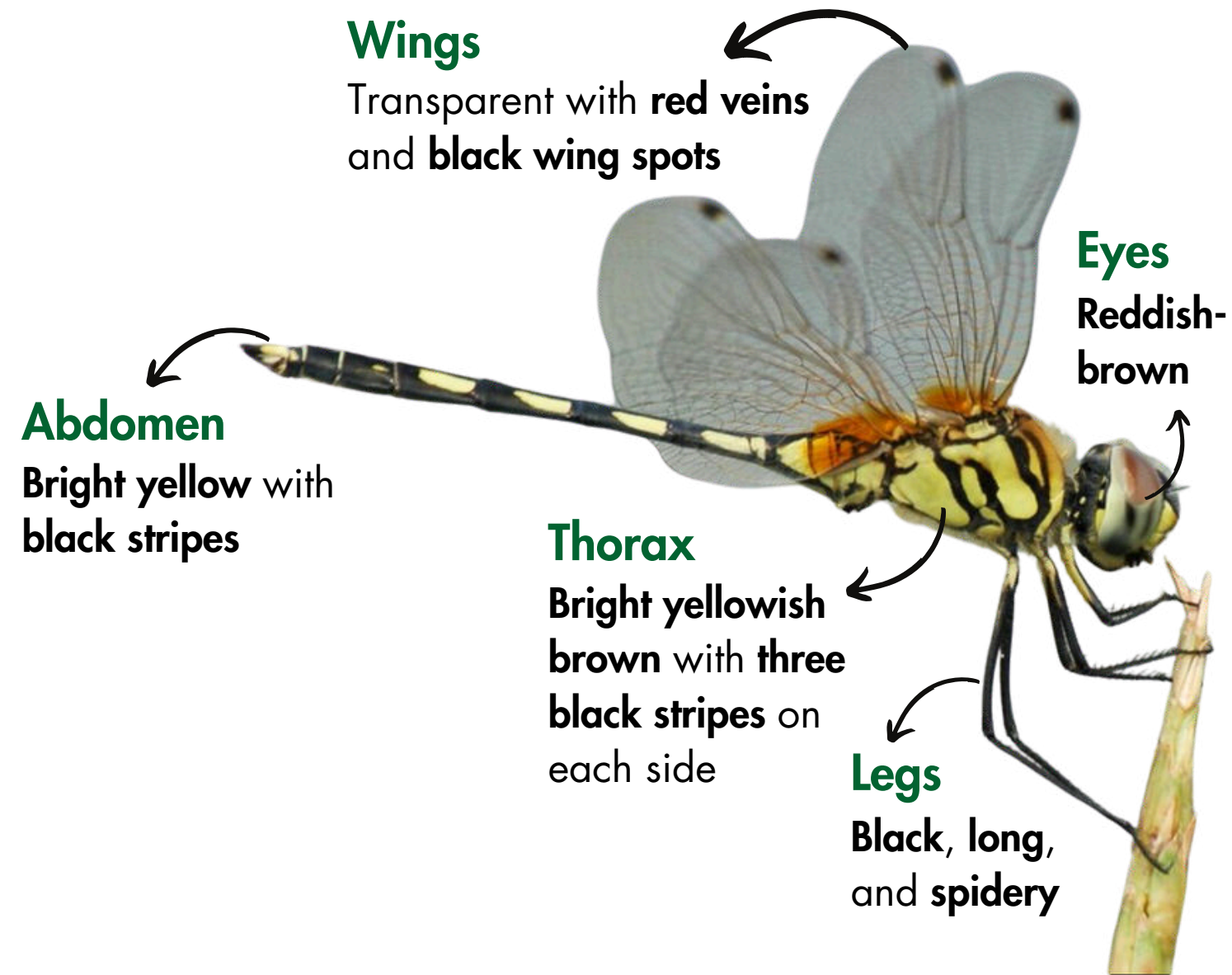
Darters fly **quickly in short, straight paths** with short periods of hovering.



BLUE DASHER♂
Pachydiplax longipennis

Morphology of a Dragonfly

- Knowing how to describe the morphology (physical features) of a butterfly helps others identify it as well.



Long-legged Marsh Glider
Trithemis pallidinervis

It's Your Turn!

- Look at the dragonfly below and describe its different parts in terms of colour, size and shape.

Thorax
Greenish-yellow
with dark
markings

Abdomen

Trumpet-shaped (wide at
the top, tapered at the end)

Trumpet Tail
Acisoma panorpoides

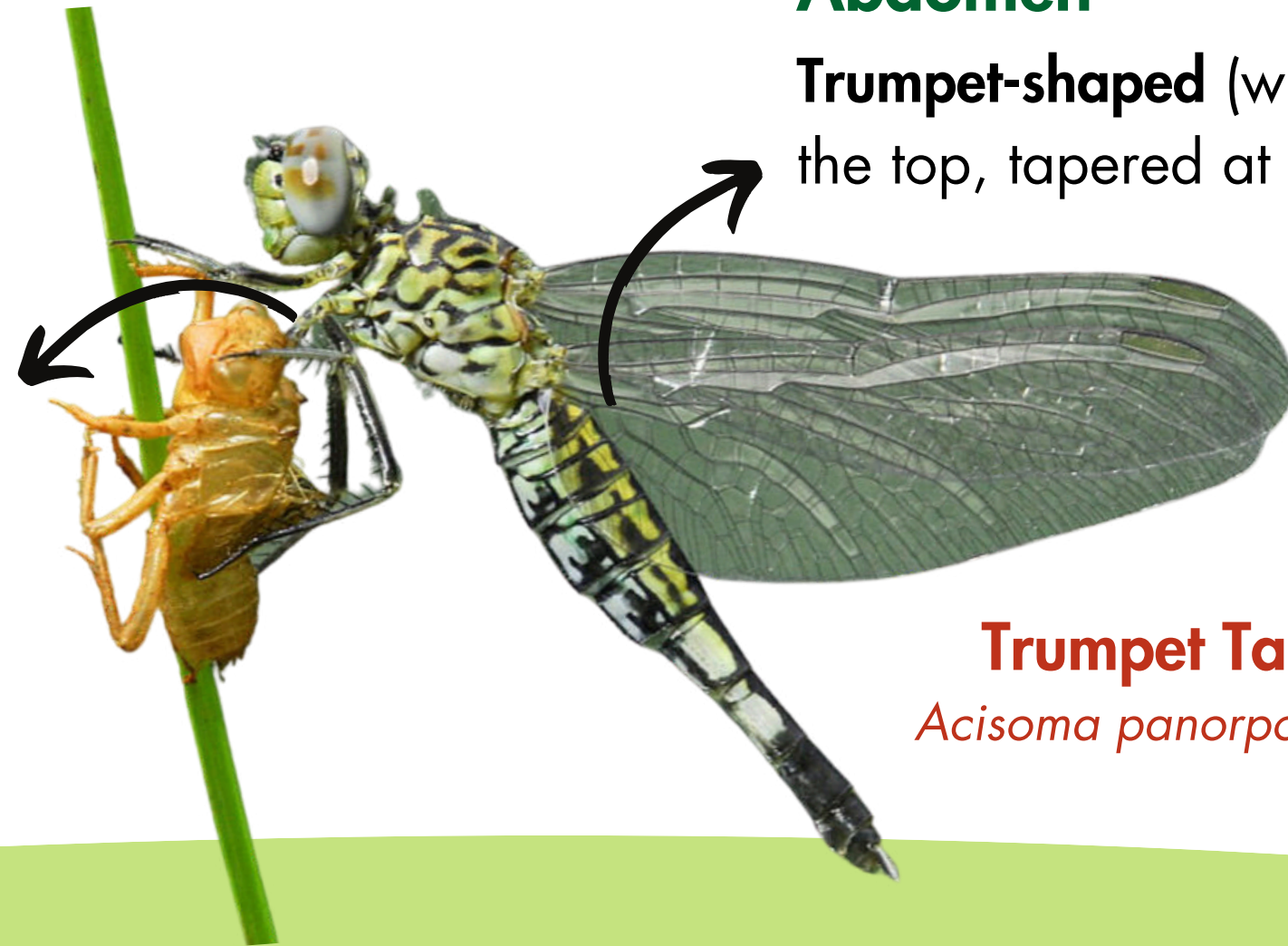


Photo credit: Cai Yixiong



Bees

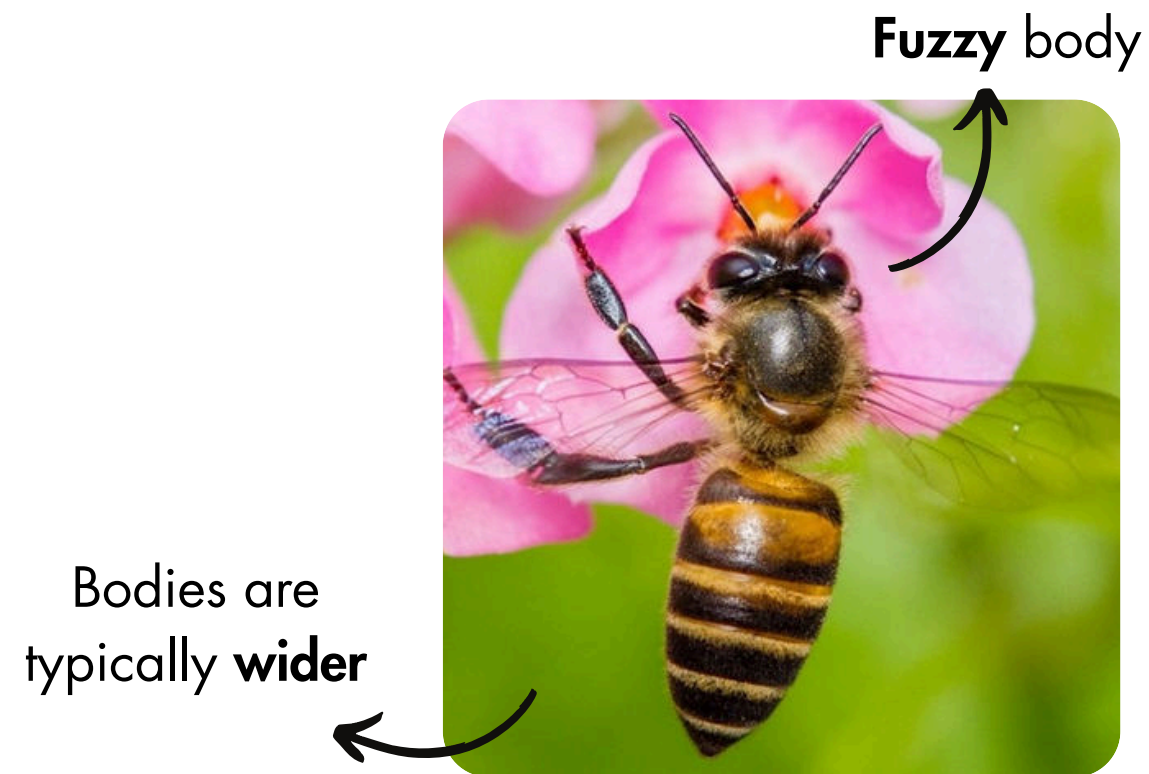


Role of Bees in the Ecosystem

- Bees play an important role as pollinators in the ecosystem. Many plants rely on bees to disperse their pollen.
- In turn, these plants support the local ecosystem by providing food and shelter to animals.
- Bees also pollinate many local plant species such as Tomato (*Lycopersicon esculentum*), Sponge Gourd (*Luffa cylindrica*), and Cashew (*Anacardium occidentale*).

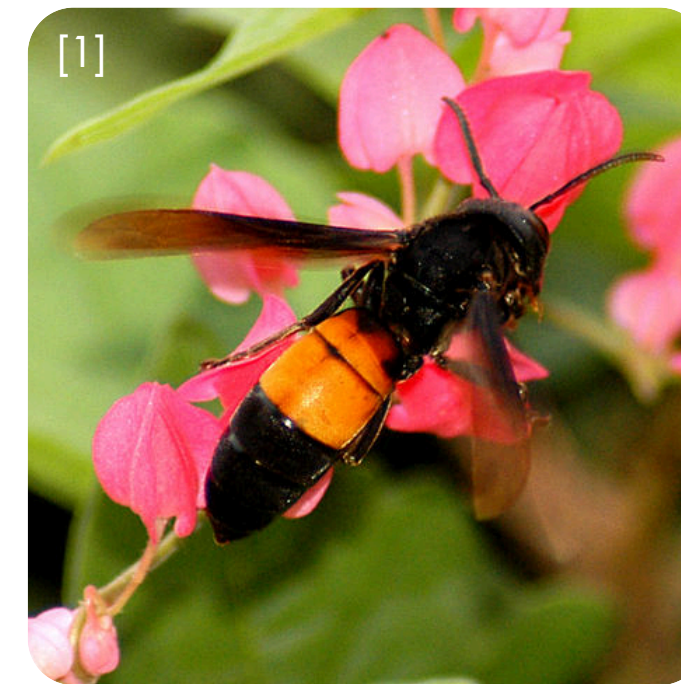


Bee vs Wasp



Bee

ASIAN HONEY BEE
Apis cerana



Wasp

LESSER BANDED HORNET
Vespa affinis

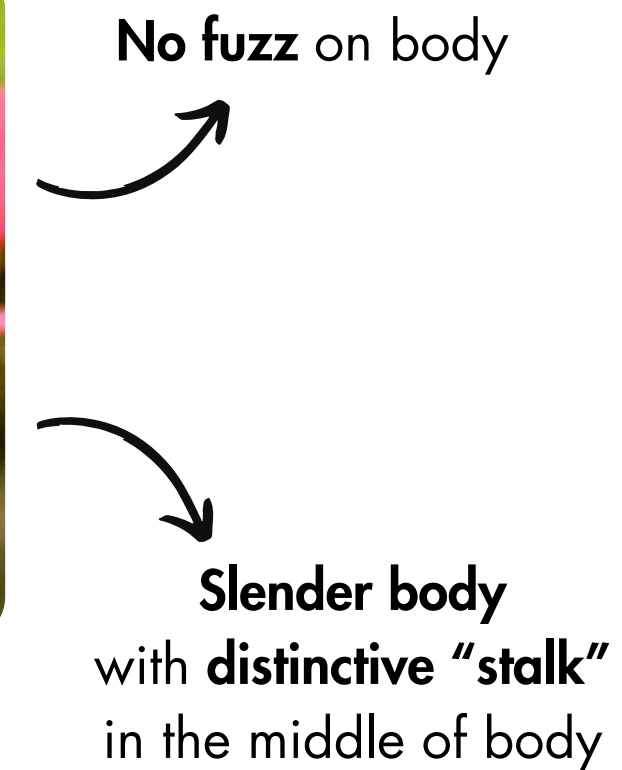


Photo credit: John X.Q.Lee [1]

How to Identify Bees: Colour

- Bees come in different abdominal or wing colours! Some species have prominent markings on their abdomen and wings.



Brown to black
abdomen with
cream banding

BLACK DWARF HONEY BEE
Apis andreniformis



Black body with light
blue markings

HIMALAYAN CLOAK-AND-DAGGER BEE
Thyreus himalayensis



Light grey body, half red
abdomen with black and
white bands

RED DWARF HONEY BEE
Apis florea



How to Identify Bees: Size

- Bees come in all sizes – some are as small as the head of a thumbtack while others are bigger than a \$1 coin!

3 mm

A small, brown and black bee is shown from a side profile. Above it is a horizontal scale bar with a vertical tick mark in the center, labeled "3 mm".

SMOOTH HEADED STINGLESS BEE
Tetragonula laeviceps

30 mm

A large, black bee is shown from a side profile, positioned inside a pink flower. Above it is a horizontal scale bar with vertical tick marks at each end, labeled "30 mm".

BROAD-HANDED CARPENTER BEE
Xylocopa latipes

*The pictures are not to scale.



Morphology of a Bee

- Knowing how to describe the morphology (physical features) of a bee helps others identify it as well.

Asian Honey Bee

Apis cerana



Abdomen

Orange and dark brown banding

Body

Brownish-grey body



It's Your Turn!

- Look at the bee below and describe its different parts in terms of colour, size and shape.

Head

Reddish-orange
head and body



Abdomen

Black bands
on abdomen

Broad-headed Leafcutter Bee

Megachile laticeps



Other Animals



Mammals



PLANTAIN SQUIRREL
Callosciurus notatus



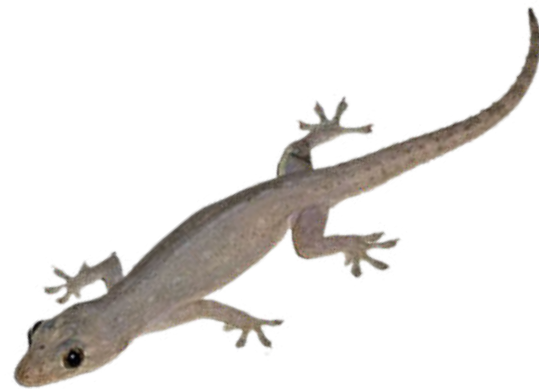
LESSER DOG-FACED FRUIT BAT
Cynopterus brachyotis

Photo credit: Nick Baker

Reptiles and Amphibians



FOUR-LINED TREE FROG
Polypedates leucomystax



COMMON HOUSE GECKO
Hemidactylus frenatus



COMMON SUN SKINK
Eutropis multifasciata



Insects and Arachnids



ASIAN HONEY BEE
Apis cerana

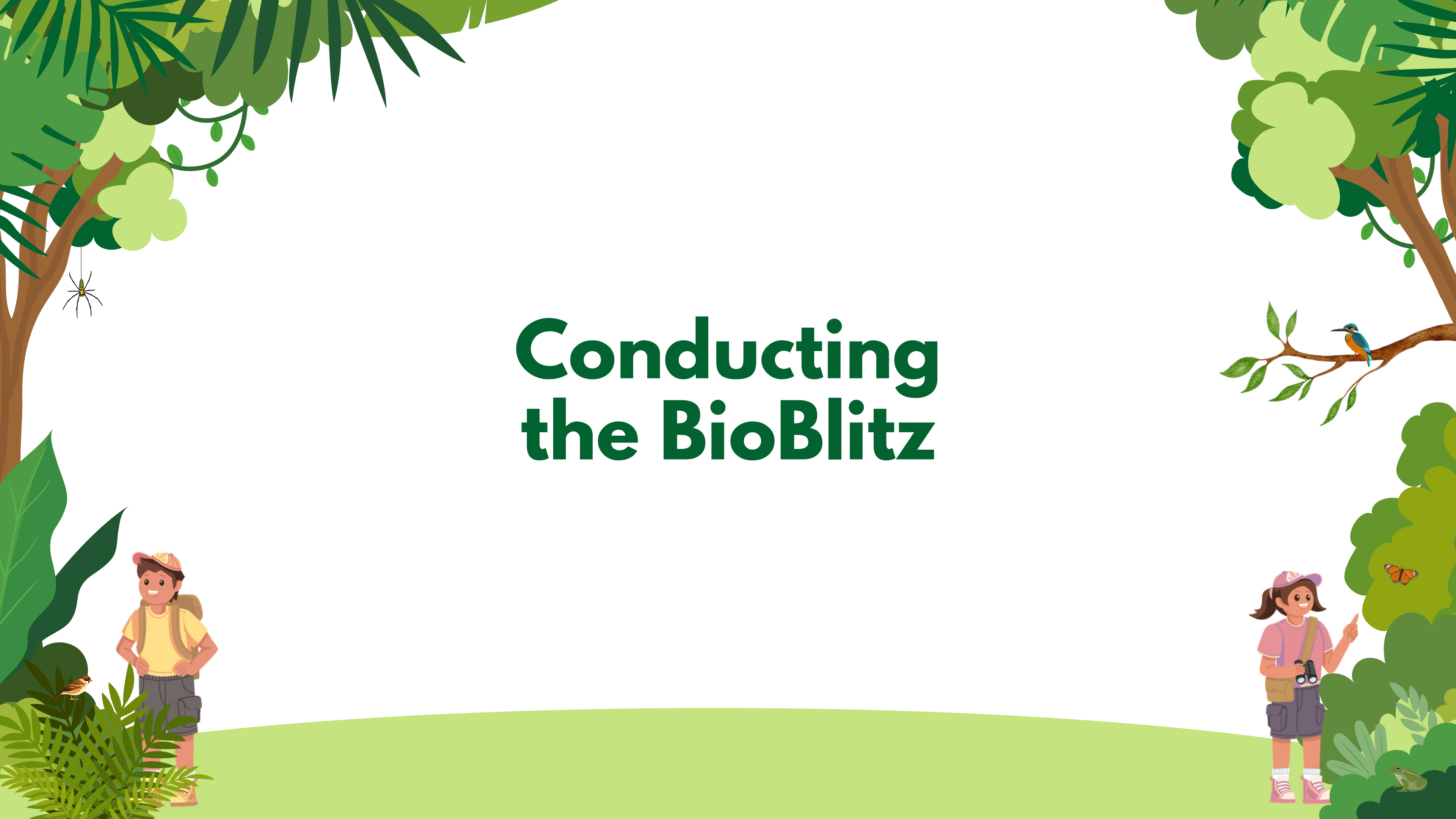


BROAD-HANDED CARPENTER BEE
Xylocopa latipes



ELECTRIC BLUE JUMPER
Phintella vittata

Conducting the BioBlitz



Survey Etiquette

- To ensure that the data collected is reliable, scientists observe certain behaviour and survey etiquette to minimise disturbance to wildlife, as their actions may affect the survey findings.



Observe animals from a distance



Stay on designated paths



Stay quiet and be mindful of your surroundings



Do not feed or handle animals



Do not damage vegetation or wildlife



Do not litter



Survey Protocol: Survey Time

- As different types of animals are active at different times of the day, surveys are carried out at specific timings to get the best possible results.
- **Bird surveys** are usually carried out in the early morning and late afternoon.
- **Butterfly/Dragonfly surveys** are usually carried out in the late morning.



Survey Protocol: Study Site

- Different ecosystems are home to different types of flora and fauna and can affect your survey results.

What types of plants and animals might you see in and around your chosen survey site?





Conducting the BioBlitz

- Note down all your sightings in your datasheet on pages 15 – 17 of your handbook.
- If you are unable to identify the animal, draw or describe it instead! You may also capture a photo or video of the animal.



What's Next?

- Share with your friends and family what you have seen and learnt!
- Join NParks' Biodiversity Watches to contribute to the long-term monitoring of fauna populations in Singapore!



**GARDEN
BIRD WATCH**



**HERON
WATCH**



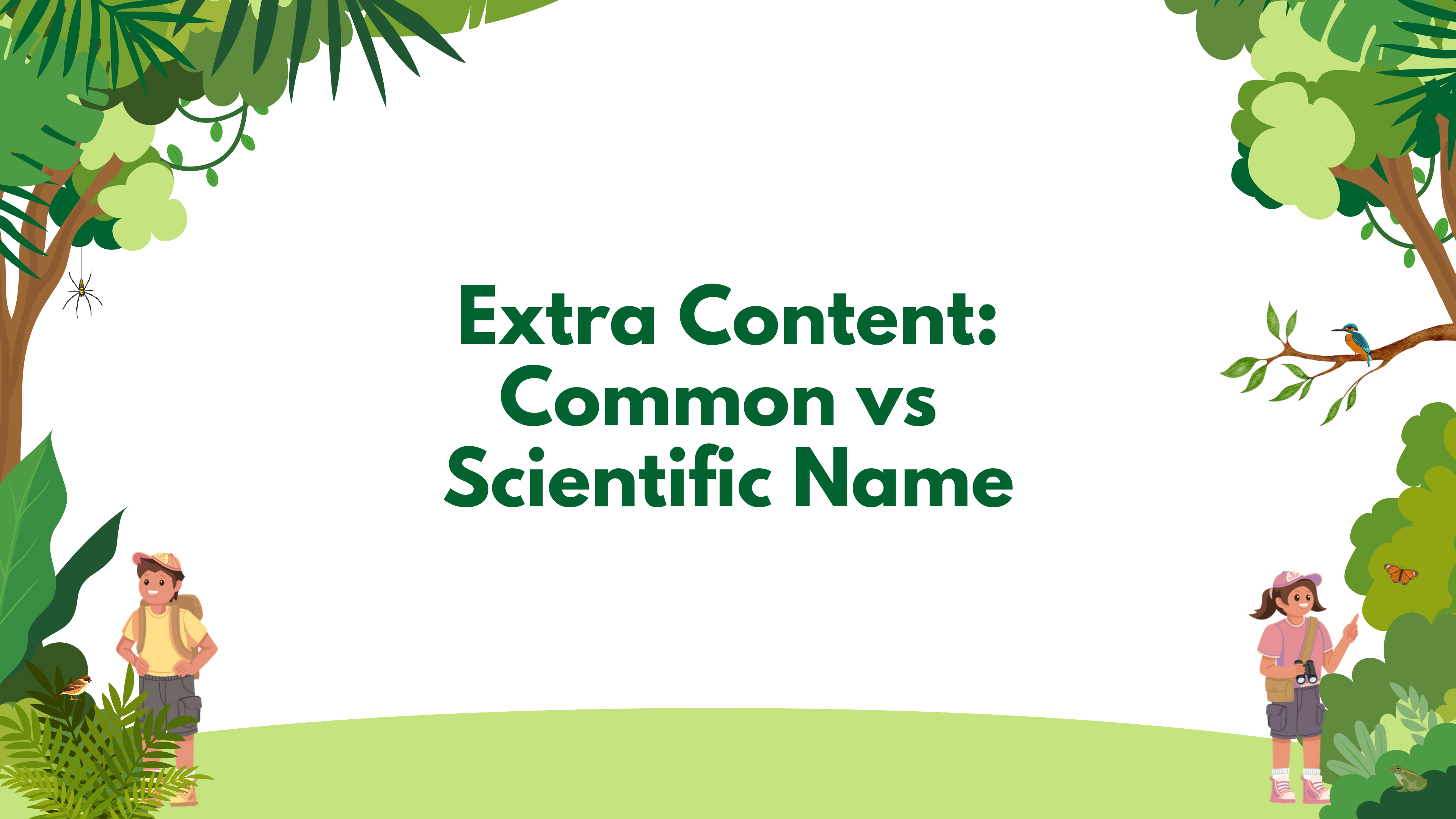
**BUTTERFLY
WATCH**



**DRAGONFLY
WATCH**

Photo credit: Francis Yap [1], Horace Tan [2], Cai Yixiong [3]

Extra Content: Common vs Scientific Name



Common vs Scientific Name

Common Name
Scientific Name

Scarlet-backed Flowerpecker

Dicaeum cruentatum

↑
Genus

↑
Species



Common vs Scientific Name

Common Name	Scientific Name
A species may have more than one common name	Each species has only one scientific name
Influenced by languages, geographical region, or even local culture	Based on scientific evidence and classification system
E.g. Rock Pigeon, Rock Dove, Common Pigeon, Merpati Biasa, 原鸽	E.g. <i>Columba livia</i> or <u>Columba livia</u> (Note the <i>italics</i> or <u>underlines</u> !)

Do you know what the scientific name for humans is?