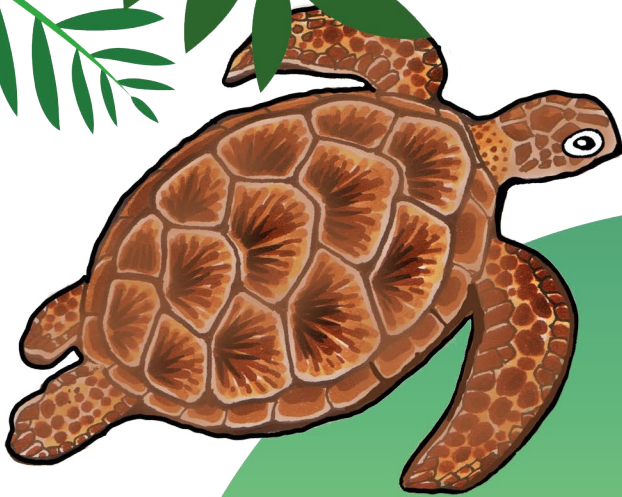




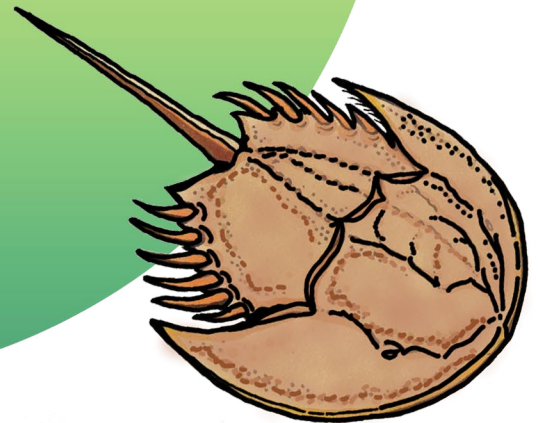
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of Singapore

Lee Kong Chian
Natural History Museum



COLOURS OF BIODIVERSITY IN SINGAPORE

An exploratory colouring book on
local biodiversity for
Young Explorers!

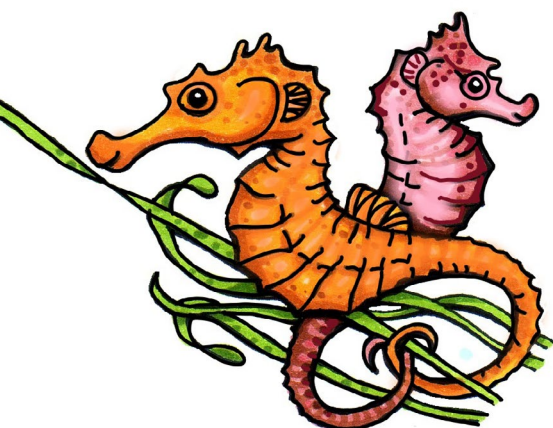


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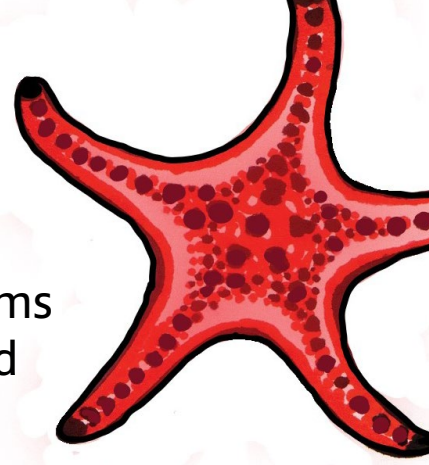
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Biodiversity refers to the different types of life forms around us. These include organisms like plants and animals. We are part of biodiversity too!



At the Lee Kong Chian Natural History Museum (LKCNHM), we have a wide variety of biodiversity specimens. These were once alive, and later kept as specimens when dead. We use special methods to preserve them so that they can be used for research and education.

The LKCNHM has over 4,000 specimens on display. Come visit us and be amazed by our collections!

HOW CAN YOU USE THIS BOOK?

There are ten organisms in this booklet, each with three activities for you to try.

(A) Compare and Contrast

Observe the images of the specimens at LKCNHM and compare them to when they were alive in their natural habitats. How are they different?

(B) Colour!

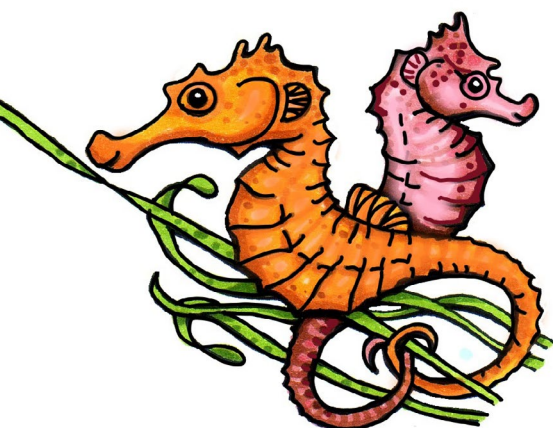
Try colouring in the line drawings of the specimens. You can use colour pencils, crayons, watercolours—unleash your creativity!

To challenge yourself further, attempt part (C)! You will need to do some research to find more information about the plant or animal.

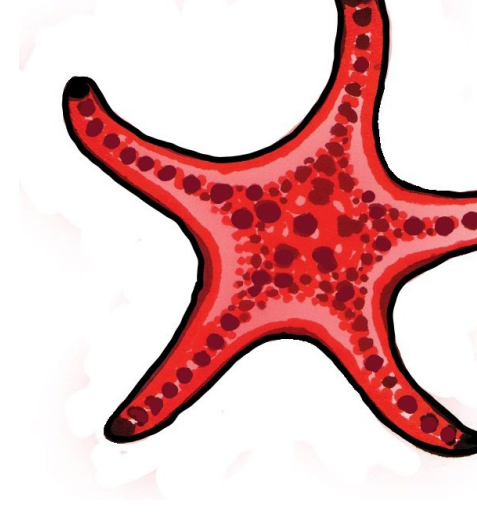
(C) Creativity

Pretend you are the plant or animal and answer the following questions:

1. What is something interesting that you like about yourself?
2. Are you under threat? Threats can be due to natural reasons or caused by humans. What can humans do to help protect and conserve you?



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ORIENTAL PIED-HORNBILL

Anthracoceros albirostris



DESCRIPTION

Relatively large birds with large, pale yellow bills! Their plumage is mostly black with white bellies and thighs, white tips on wings and tails. They also have white skin patches on their faces.

DIET

They are omnivorous, feeding mainly on fruits but they also feed on small animals such as reptiles, birds and mammals.

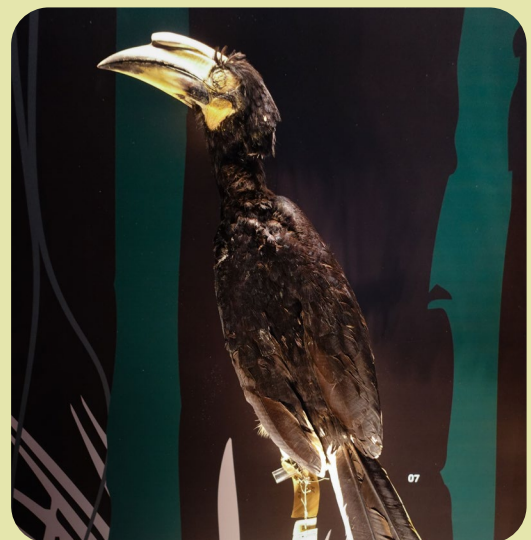
HABITAT

They can be found in forests. In Singapore, hornbills can breed in urban environments if there are suitable large trees with cavities (tree holes) for them to nest.

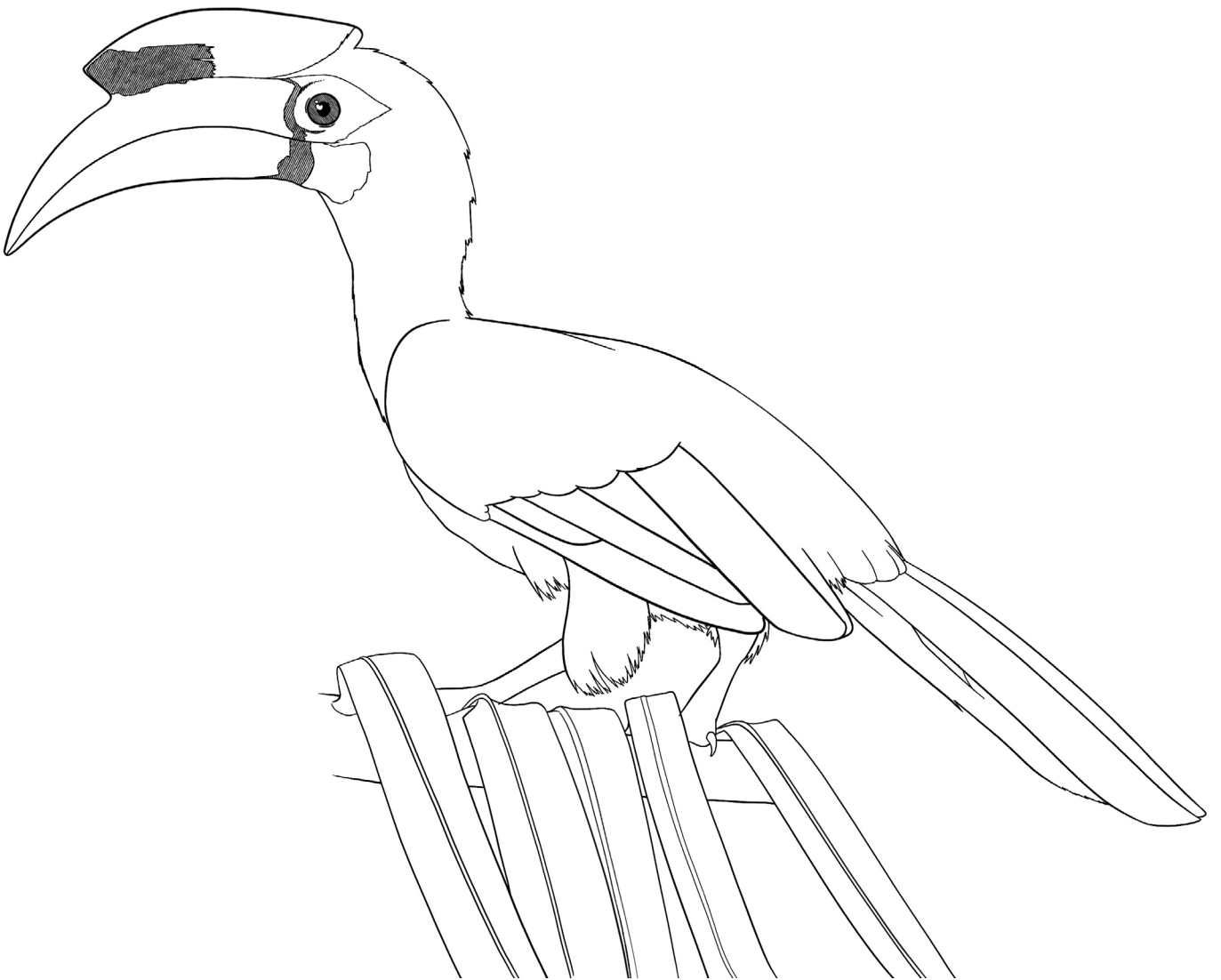
DID YOU KNOW?

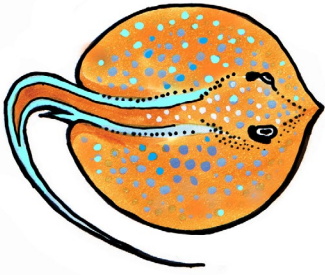
When the female hornbill is nesting, the male will deliver earth for the female to seal herself up in the tree cavity. This can protect the mother and chicks from large predators.

A narrow slit will be left open so that the male hornbill can bring food to feed the female hornbill and the young chicks. After three months when the young chicks are ready to fly, the female will then break open the seal and emerge as a family.



Enjoy colouring the oriental pied-hornbill!





Pretend you are the
oriental pied-hornbill!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans
can do to help protect and conserve you?
Write your answer in the box below.



PITCHER PLANT

Nepenthes spp.



DESCRIPTION

Pitcher plants usually have two types of leaves. One type is narrow and oblong, with tendril-like tips that could be coiled around other plants for support. The second type of leaves are shaped like a pitcher—hence the name!

DIET

They can make their own food (photosynthesize) but they also feed on animals like insects!

HABITAT

They are commonly found in nutrient-poor environments. In Singapore, they can be seen in places like the Central Catchment Nature Reserve and Kent Ridge Park.

DID YOU KNOW?

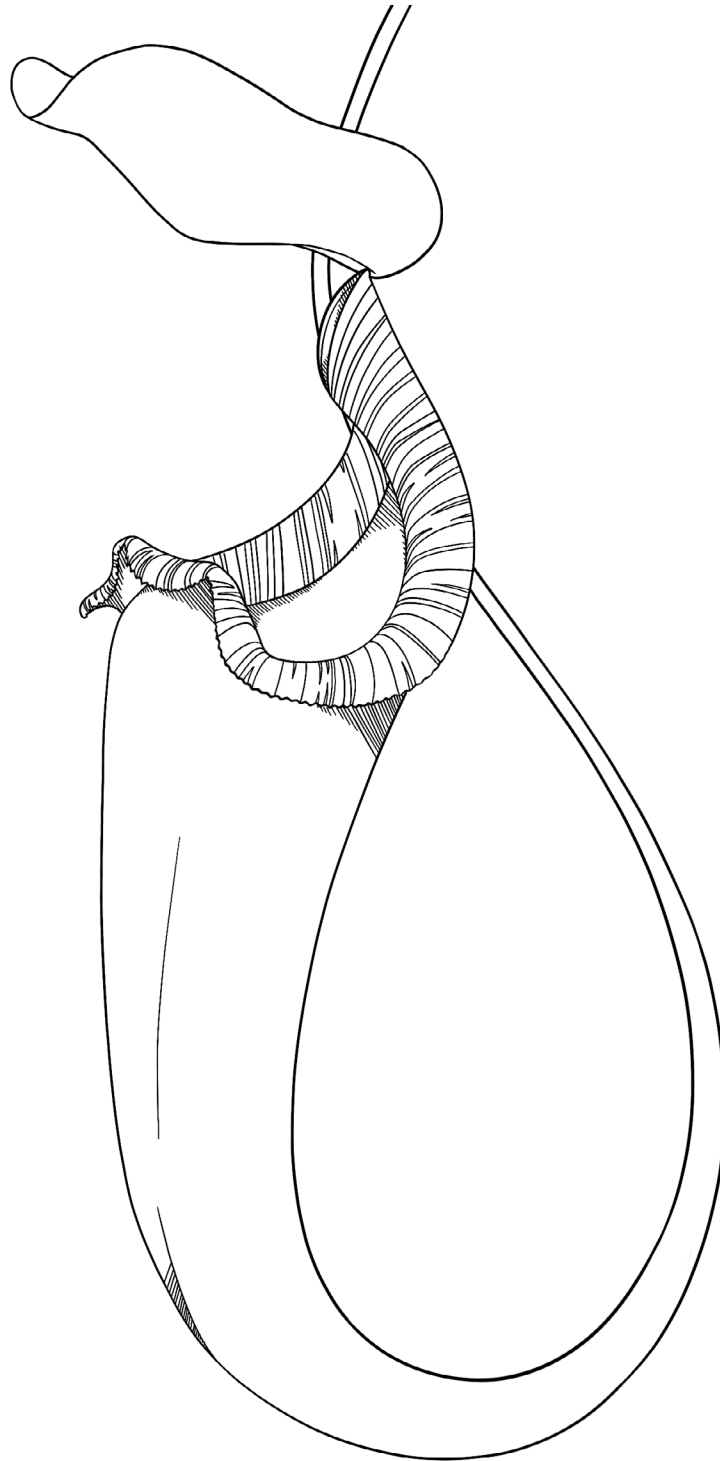
These pitchers are the perfect traps to catch insects.

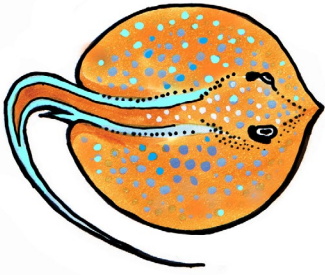
Certain species produce sweet nectar on the underside of the lid to attract insects and the pitchers are filled with digestive juices to digest the unfortunate insect!

The inside walls of the pitchers are also extremely slippery to prevent the insects from escaping.



Enjoy colouring the pitcher plant!





Pretend you are the pitcher plant!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans can do to help protect and conserve you?
Write your answer in the box below.



WHITE-THROATED KINGFISHER

Halcyon smyrnensis



DESCRIPTION

These birds are brown with bright blue wings, tails and backs. They also have large reddish-orange bills. They get their name from the big white patch on the throat that extends down to the breast.

DIET

They feed on fish, lizards, insects and small amphibians.

HABITAT

They can be spotted along reservoirs, as well as open fields!

DID YOU KNOW?

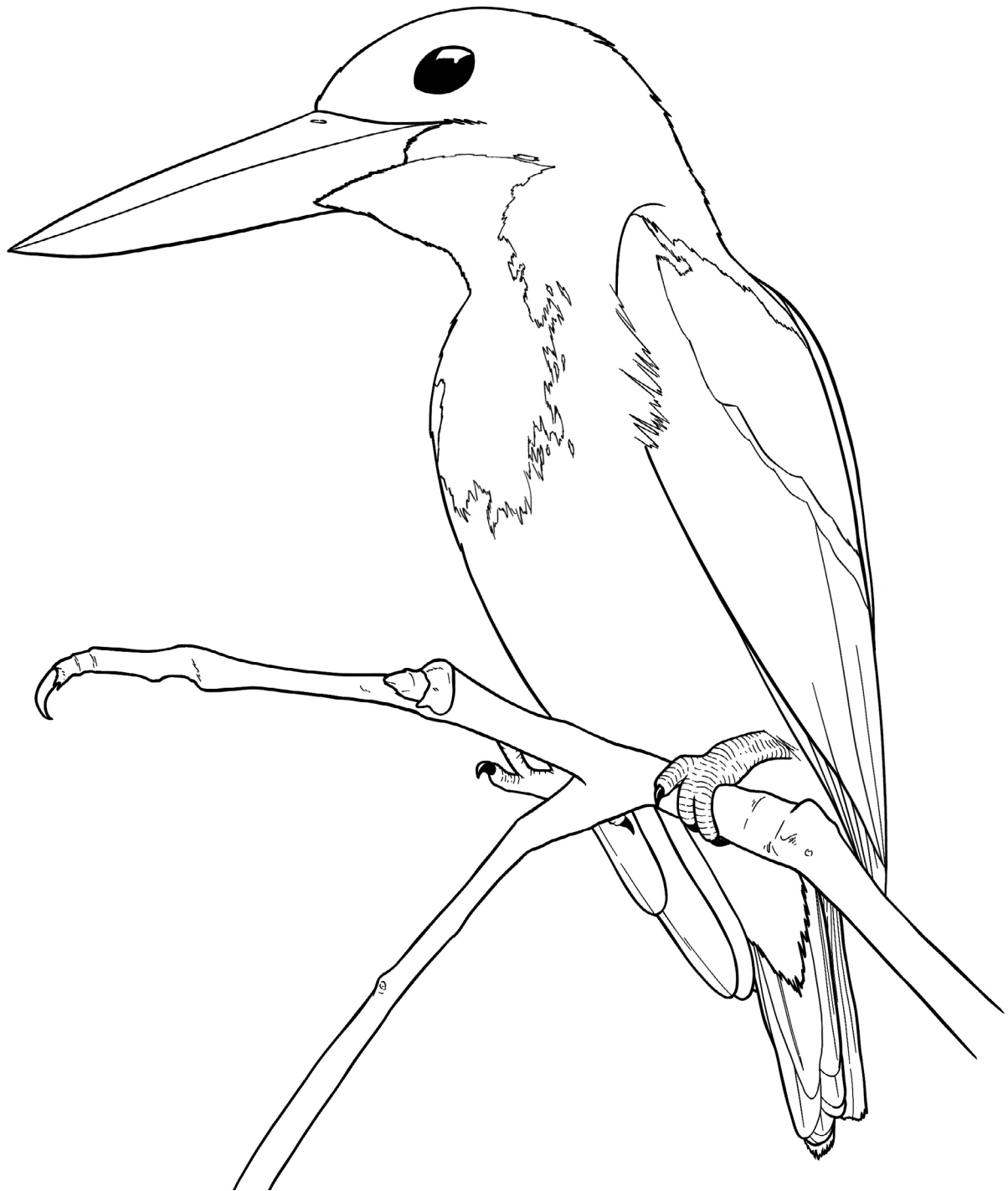
Of the eight species of kingfishers in Singapore, only four of them are here year-round (resident) while the rest are migratory. Resident birds do not migrate. The white-throated kingfisher is one of the resident kingfishers that breeds and nests here.

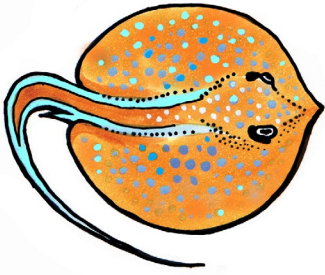
WHY DO SOME BIRDS MIGRATE?

Birds which migrate fly long distances so that they can find better conditions for feeding and to raise their young. Visit Sungei Buloh Wetland Reserve with your binoculars one day! This is a rest point for many migratory birds, so you will surely be able to spot some migratory birds during the migratory season.



Enjoy colouring the white-throated kingfisher!





Pretend you are the
white-throated kingfisher!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans
can do to help protect and conserve you?
Write your answer in the box below.



SEAHORSE

Hippocampus spp.



DESCRIPTION

Seahorses are fish!

Instead of having scales like most fishes, seahorses have bony plates which are not flexible. They are poor swimmers as they lack tail fins and pelvic fins. Their prehensile tail allows them to grab on to vegetation for support.

They come in many colours including yellow, brown, pink and orange! Some also have spots on the body.

HABITAT

They are commonly found in coral reefs among sponges and seagrasses.

DIET

They are ambush predators that capture tiny animals such as zooplanktons and tiny crustaceans via suction feeding.

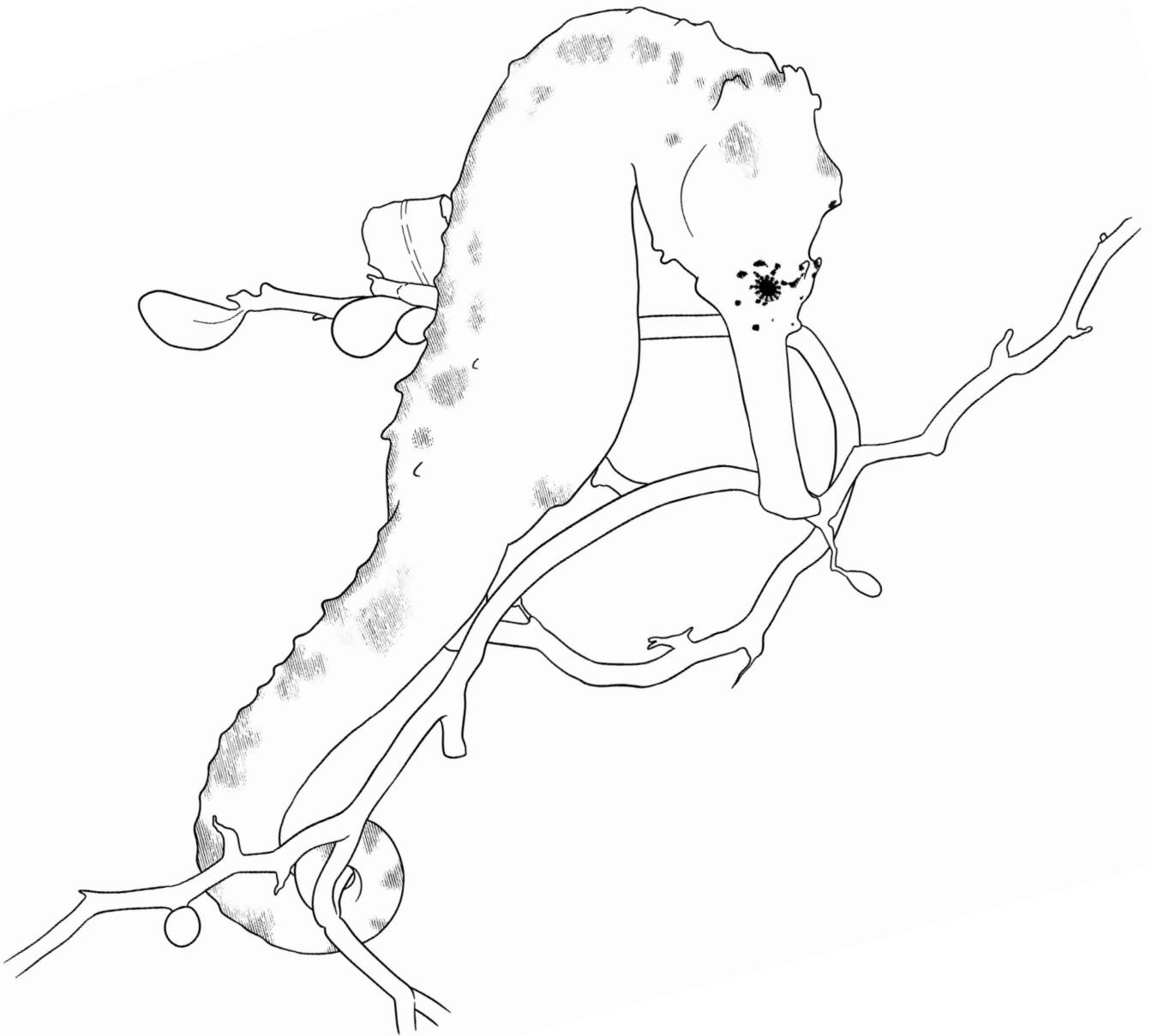
DID YOU KNOW?

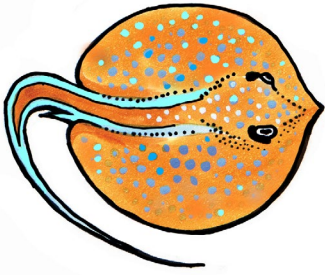
The male seahorses carry the eggs instead of the females. The female seahorse deposits her eggs into the male's brood pouch to be fertilized.

The blood vessels in the pouch then provides oxygen and nutrients to the young, before they are actively forced out of the pouch two to three weeks later.



Enjoy colouring the seahorse!





Pretend you are the seahorse!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans can do to help protect and conserve you?
Write your answer in the box below.



NOBLE VOLUTE

Cymbiola nobilis



DESCRIPTION

These belong to a group of animals called molluscs. Molluscs have soft bodies and most of them have hard shells for protection.

The noble volutes have thick, heavy conical shells. The glossy shells are usually beige, yellow or orange in colour with reddish-brown or black zigzag lines across the shell.

They have a black fleshy body with bright yellow or orange spots.

DIET

They are carnivorous, and can prey on other molluscs (e.g. snails or clams) and echinoderms.

HABITAT

They are usually found in sandy areas, near seagrass and coral rubble habitats.

DID YOU KNOW?

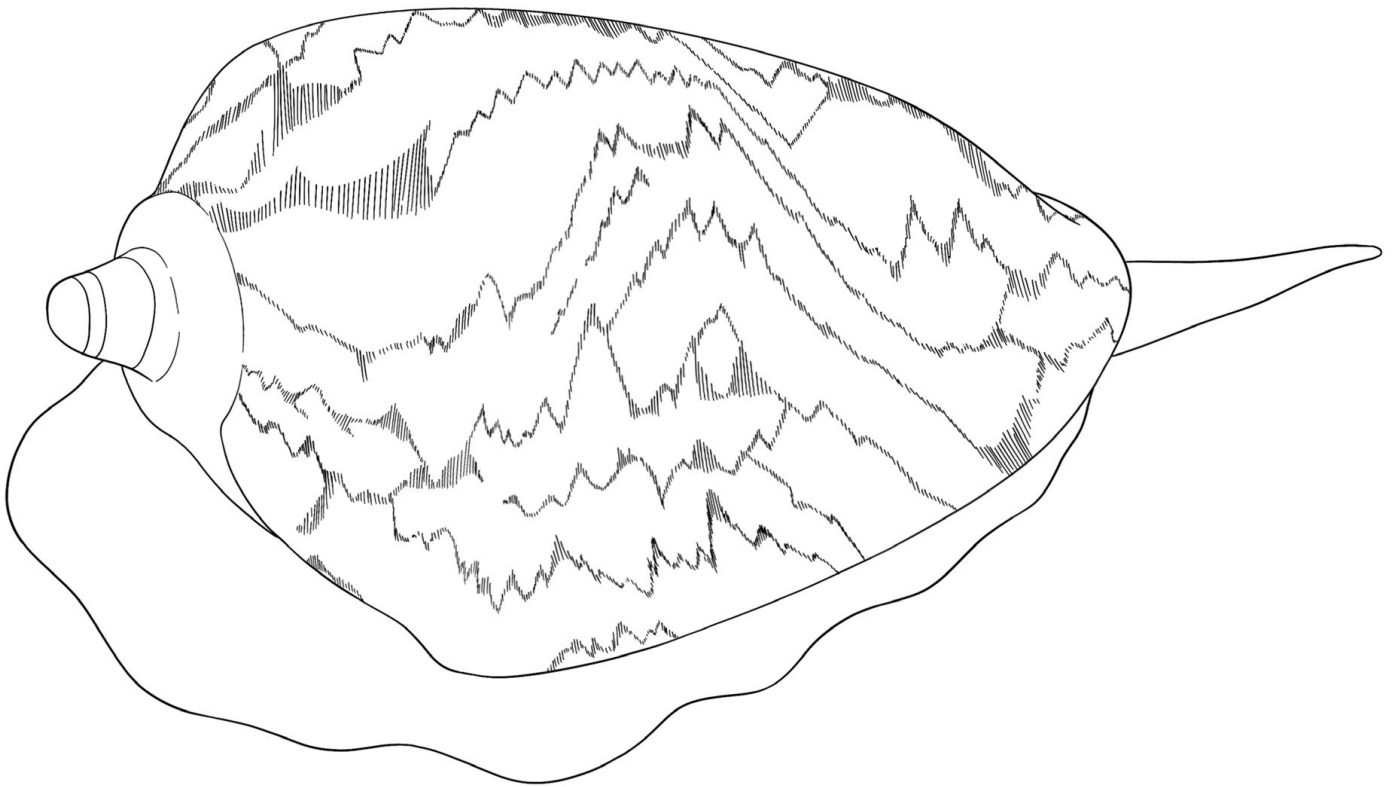
When a noble volute dies, the empty shell is often reused by hermit crabs as their new shelter.

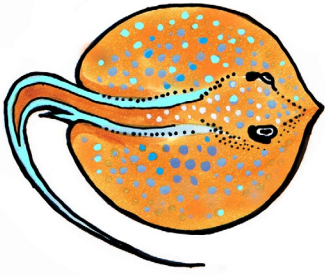
This is why we should not collect empty shells from the beach—they can be reused by other animals!



09

Enjoy colouring the noble volute!

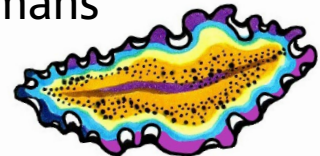




Pretend you are the noble volute!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans can do to help protect and conserve you?
Write your answer in the box below.



CLOWNFISH AND SEA ANEMONE

Amphiprion sp. (Clownfish)



DESCRIPTION

Clownfish are bright orange to reddish-brown in colour and have three broad white bars found on their bodies. The edges of their fins are lined with black bands. Sea anemones are animals related to corals and jellyfish.

DIET

Clownfish feed mainly on plankton and zooplankton, sometimes grazing on algae.

Sea anemones use their tentacles to trap small animals and tiny particles. The stinging cells help to stun small fishes, which will then be pushed by the tentacles towards the mouth of the sea anemones.

HABITAT

Clownfish are reef fish, living in coral reefs and sheltered lagoons. This is also where anemones are found in abundance!

DID YOU KNOW?

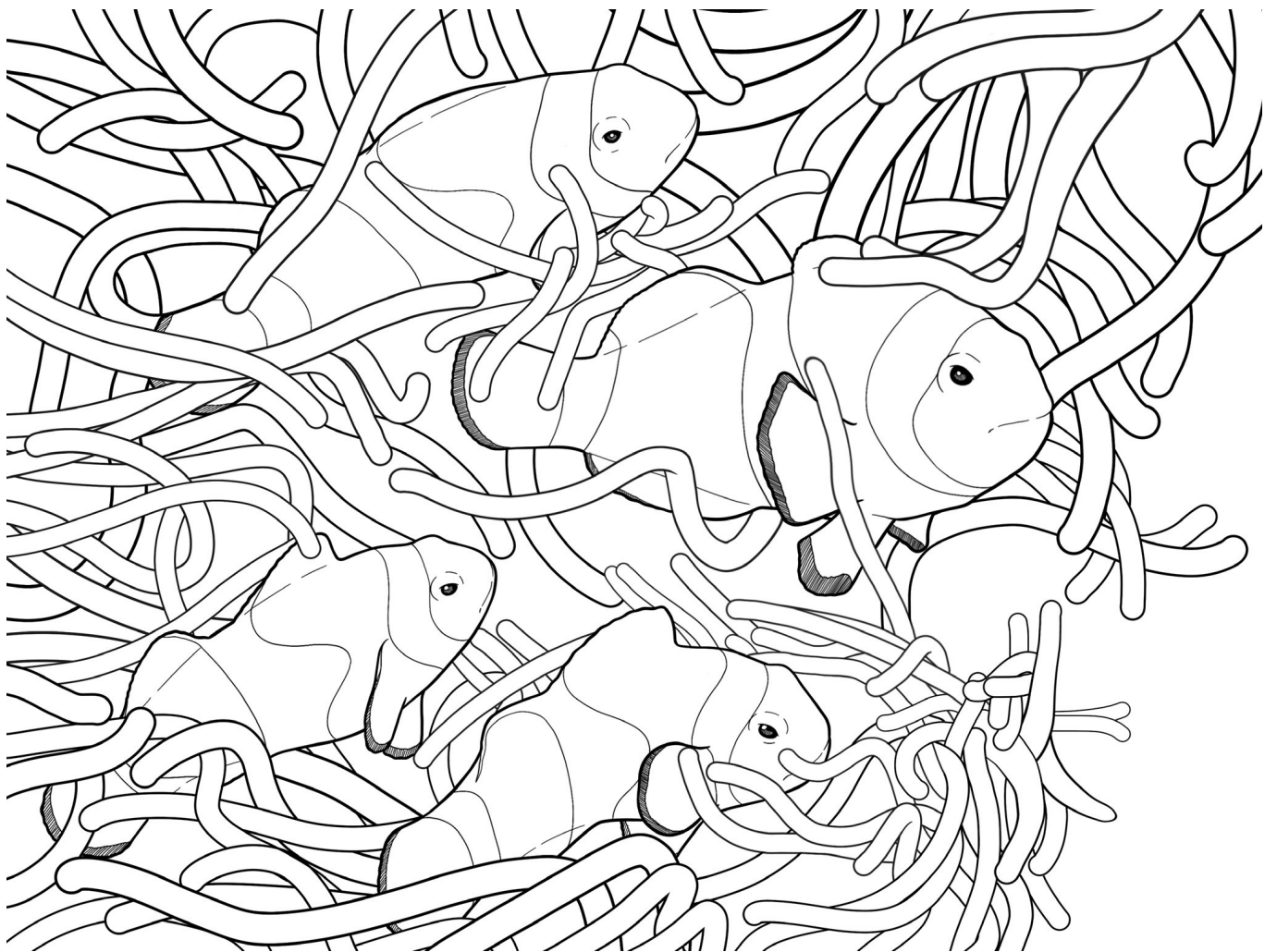
The clownfish has a symbiotic relationship with the anemone.

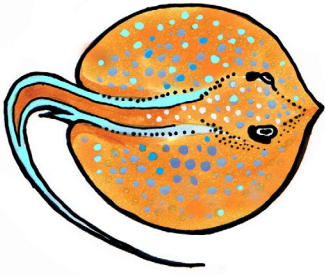
The mucus produced by the clownfish helps to protect against the stinging cells of the anemone. Hence, the stinging cells (nematocysts) of anemone help to provide the clownfish with protection and shelter.

The clownfish provides the anemone nutrients in the form of waste, helps to clean the anemone and also scare away anemone-eating fishes.



Enjoy colouring the clownfish and sea anemone!

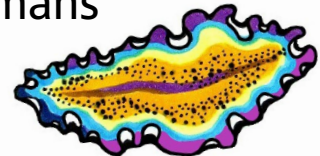




Pretend you are the clownfish and sea anemone!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans can do to help protect and conserve you?
Write your answer in the box below.



HAWKSBILL TURTLE

Eretmochelys imbricata



DESCRIPTION

These turtles can be easily distinguished from the other sea turtles. They have distinctly hooked-shape jaws and front flippers with claws, unlike other turtles. The edge of their shells at the back is also jagged.

Their brown shells are brightly coloured with yellow and orange patches.

DIET

They are carnivorous and feed mainly on sponges and crustaceans.

HABITAT

They can be found in the tropical waters of the Atlantic, Pacific and Indian Oceans, usually preferring shallow waters around coral reefs.

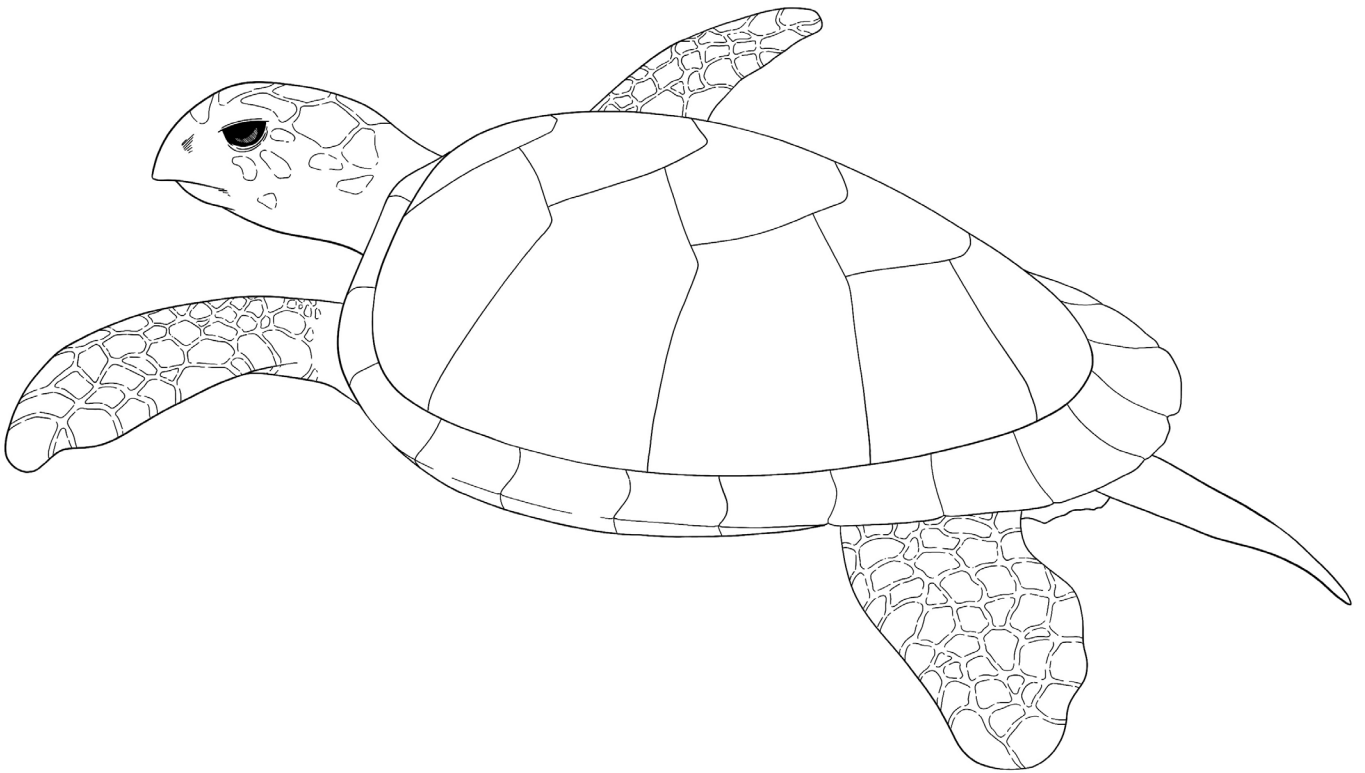
DID YOU KNOW?

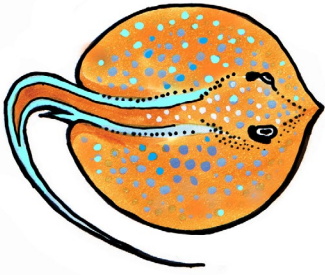
How do baby sea turtles find their way to the sea when they first hatch on the sandy shores?

The starlight and moonlight reflected on the water would guide them in the right direction. However, in urbanized environments, they may be affected by the streetlights and end up going in the wrong direction, away from the seas.



Enjoy colouring the hawksbill turtle!





Pretend you are the
hawksbill turtle!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans
can do to help protect and conserve you?
Write your answer in the box below.



GOLD-RINGED CAT SNAKE

Boiga dendrophila



DESCRIPTION

These snakes have shiny black bodies with a series of 40 to 50 narrow, bright yellow bands.

Their eyes are large with narrow, vertical slits (like a cat!), hence its name, the gold-ringed cat snake!

As nocturnal animals, their eye structure helps them see better at night while hunting for prey.

DIET

They feed on small vertebrates such as lizards, birds, and small mammals.

HABITAT

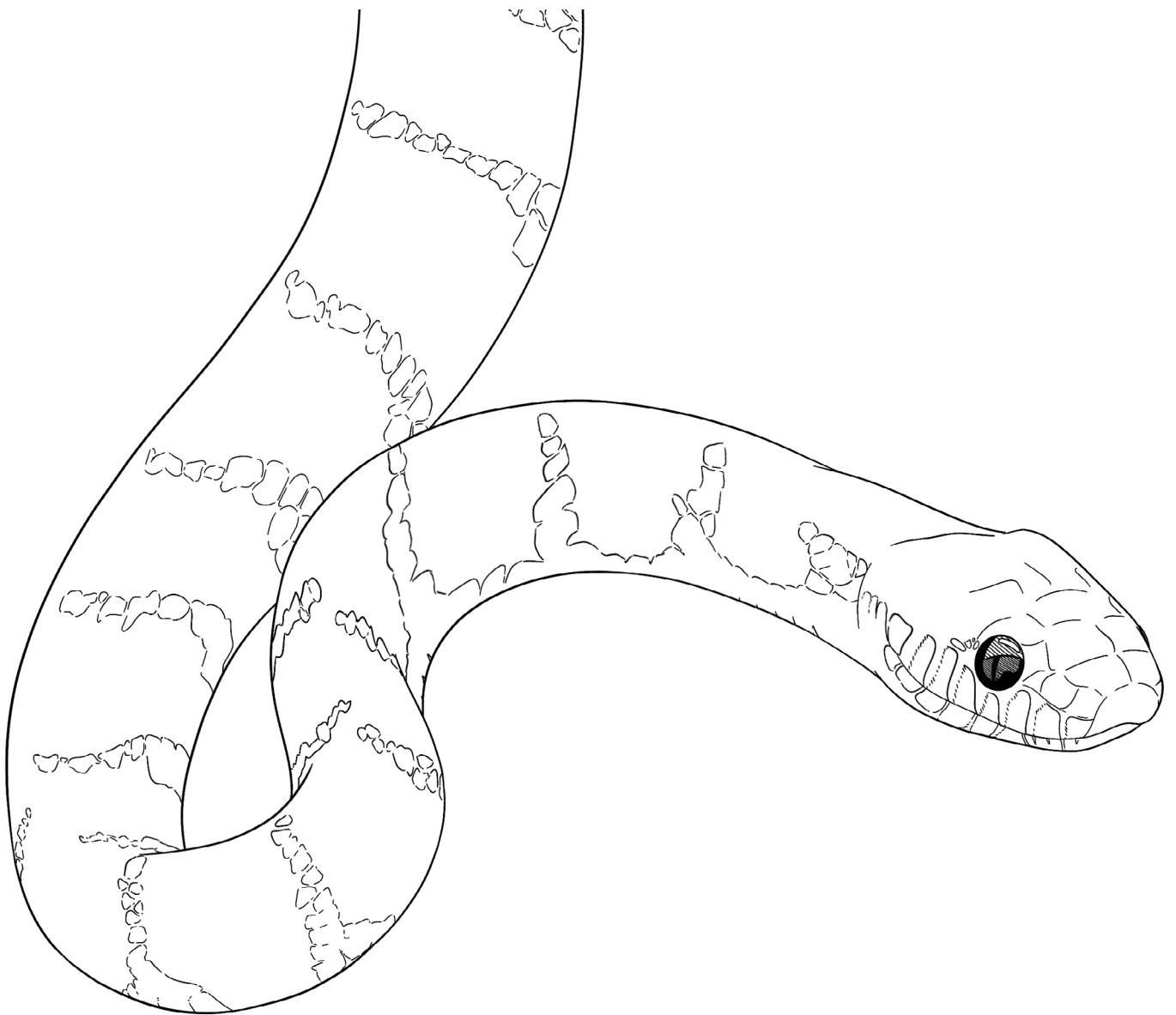
They can be found in lowland forests. In Singapore, they have been spotted in the Central Catchment Nature Reserve.

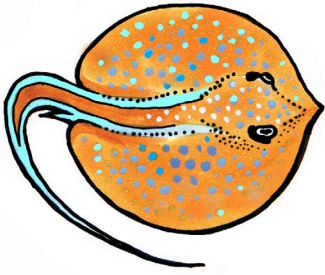
DID YOU KNOW?

Compared to other snake species with similar colouration, the venom of the gold-ringed cat snake is relatively milder and not considered life threatening to humans.



Enjoy colouring the gold-ringed cat snake!

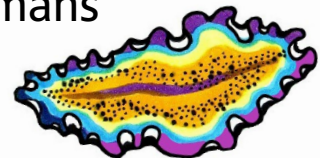




Pretend you are the
gold-ringed cat snake!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans
can do to help protect and conserve you?
Write your answer in the box below.



MALAYAN COLUGO

Galeopterus variegatus



DESCRIPTION

These mammals have large eyes with great night vision, which helps them with their nocturnal lifestyle (they are mostly active at night). They have an extensive membrane, called the patagium, which stretches between their limbs to their tails. Colugos are arboreal animals, meaning they spend most of their time high up on tree trunks.

DIET

They feed on leaves, young shoots and flower buds.

HABITAT

They can be found in tropical rainforests, and sometimes in nearby plantations or parks at the edge of these forests.

In Singapore, the colugos are mainly found in well-forested areas such as the Central Catchment Nature Reserve and Bukit Timah Nature Reserve.

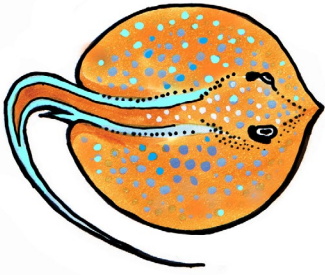
DID YOU KNOW?

Also known as the “flying lemurs”, they are neither lemurs, nor do they fly. Instead, they glide from tree to tree with the help of their patagium.



Enjoy colouring the Malayan colugo!





Pretend you are the
Malayan colugo!

What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans
can do to help protect and conserve you?
Write your answer in the box below.



SMOOTH-COATED OTTER

Lutrogale perspicillata



DESCRIPTION

They have short and sleek fur which is dark to reddish-brown along the back, and slightly paler in colour on the belly, throat and sides of the neck.

They are well-adapted to swimming with its webbed feet. Smooth-coated otters have hairless noses, flattened tails and more rounded heads than other otter species.

DIET

They mainly eat fishes but also feed on shellfish and crustaceans.

HABITAT

They need both terrestrial and aquatic habitats to survive. They find food in water bodies and build their holt (den) on land.

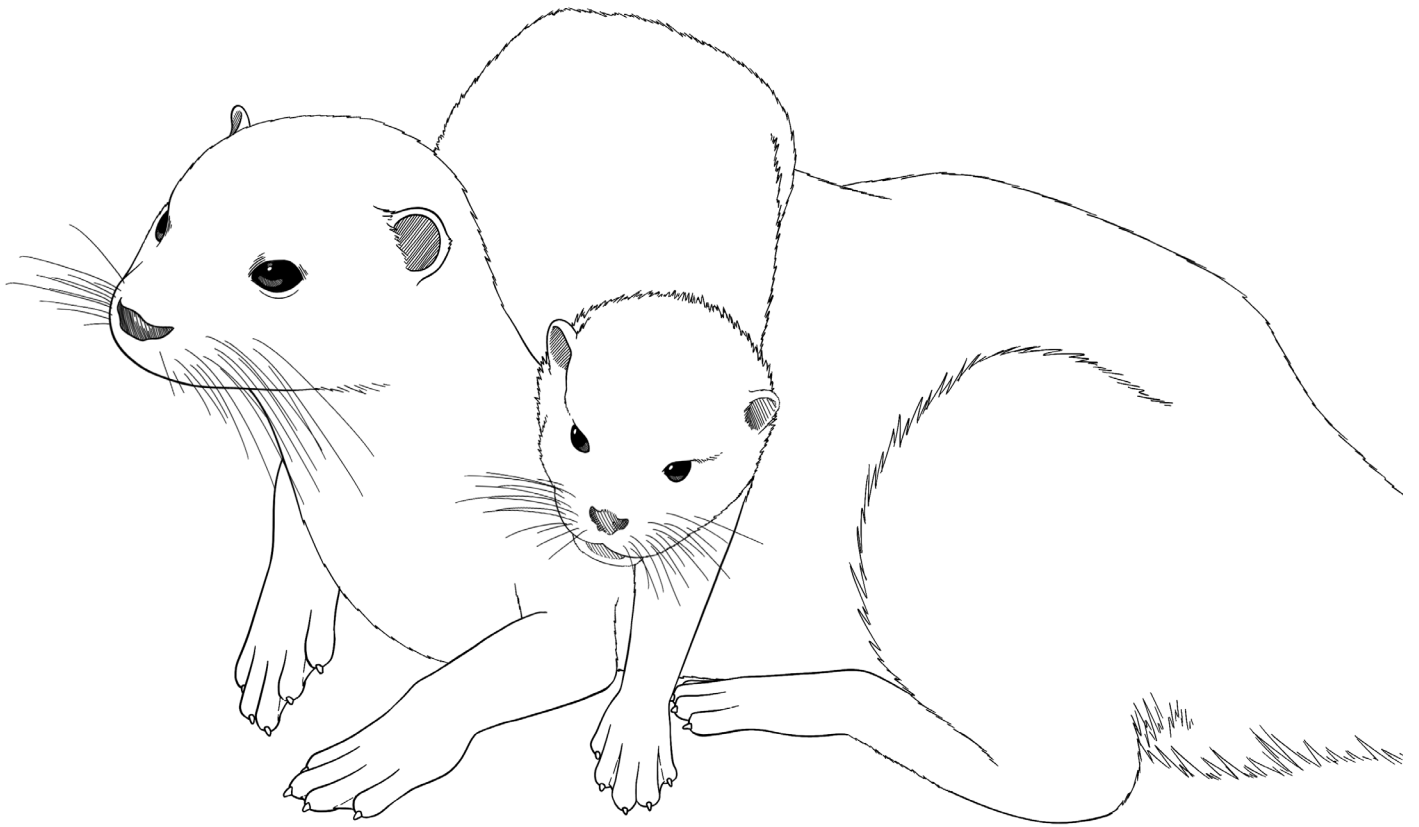
In the past, they were mostly found in the mangroves and coastal areas such as Pulau Ubin, Pasir Ris and the Sungei Buloh Wetland Reserve. Recently, these adaptable otters have begun to make use of our urban waterways and can commonly be spotted in parks and reservoirs as well!

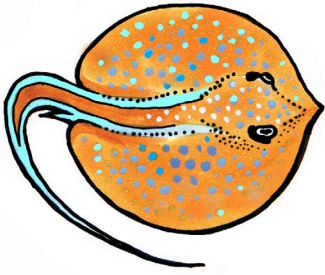
DID YOU KNOW?

Smooth-coated otters only have one partner throughout their lifetime. Unlike other otter species which might live in big communities of up to 100 otters, smooth-coated otters form small family groups consisting of the mating pair and their young pups.



Enjoy colouring the smooth-coated otter!

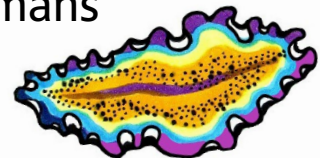




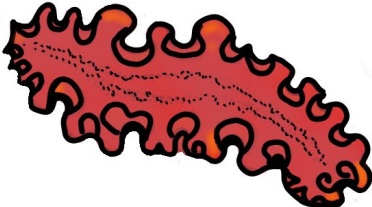
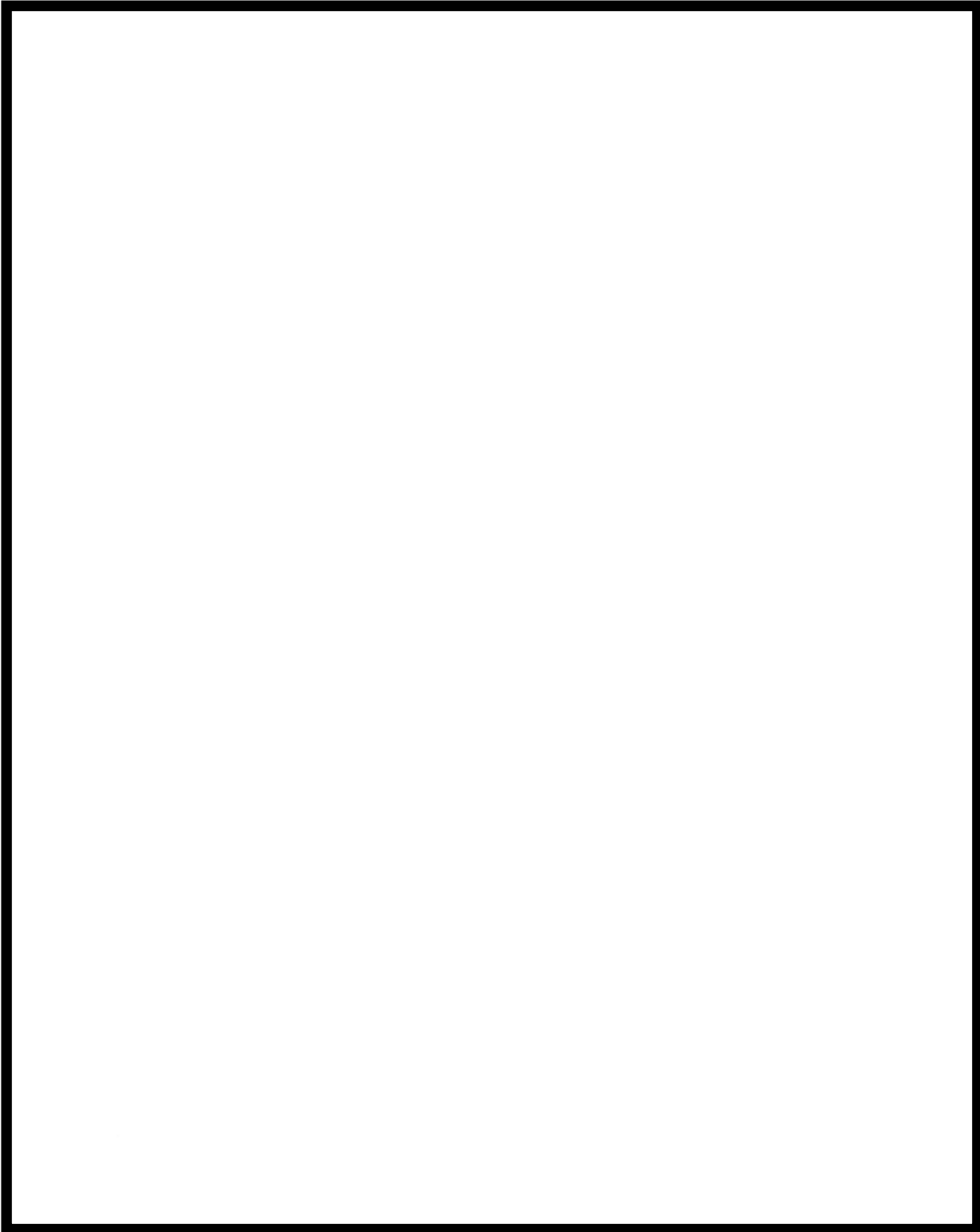
Pretend you are the smooth-coated otter!

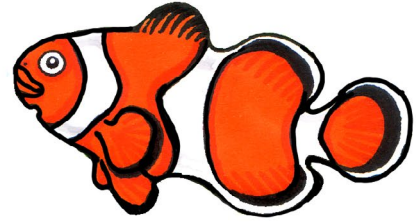
What is something interesting that you like about yourself?
Write your answer in the box below.

Are you under threat? What do you think humans can do to help protect and conserve you?
Write your answer in the box below.



EXPLORER NOTES!





EXPLORER NOTES!

EXTENDED LEARNING

Why do the specimens at LKCNHM look different compared to when it is living in the wild?

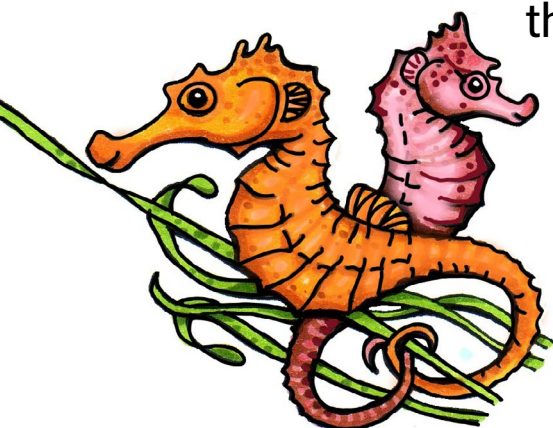
The specimens at LKCNHM were once alive but are now preserved. The methods we use to keep them well preserved can cause the colours of the organisms to discolour over time. Hence they look dull compared to when they were in their natural habitats where they may be bright and colorful!

Why do organisms have a name that is not in English?

This refers to the scientific name of the organism, and it is in the Latin language! The scientific name is always italicized. Scientific names have two words and the first alphabet of the first word must be capitalized.

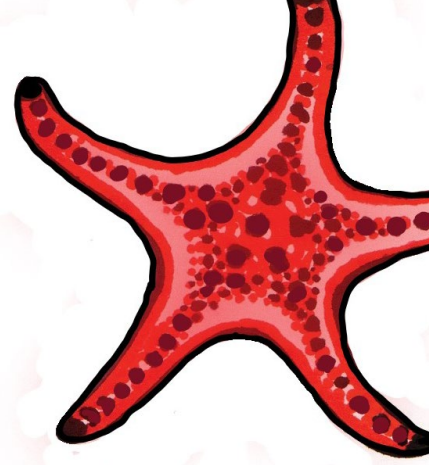
The name that is in English is called the common name. For example, the common name of the above colugo is 'Malayan colugo' and its scientific name is *Galeopterus variegatus*. All organisms are given a scientific name because it is unique to each organism. Sometimes, two animals can have similar common names and this can be confusing!

Latin is also a universal language, so when researchers of different nationalities talk about the organisms using Latin, they know that they are all referring to the same organism and will not make any mistakes.

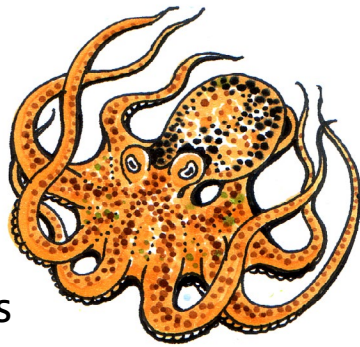


EXTENDED LEARNING

There are other animal friends that appear in this book—find out what they are here!



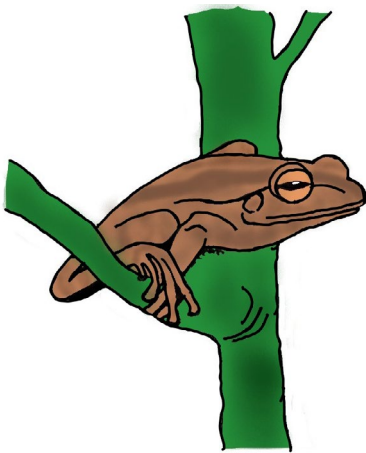
Knobbly sea star



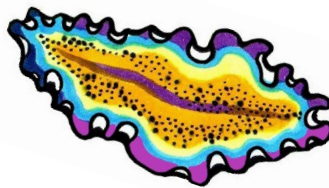
Octopus



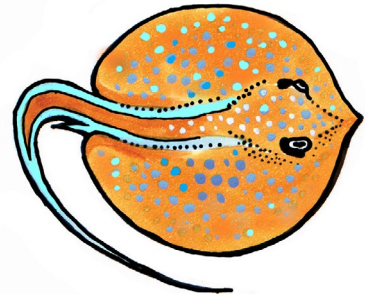
Great-billed heron



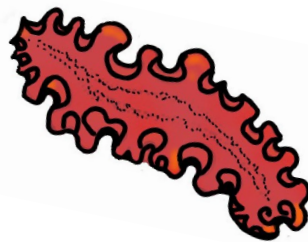
Four-lined tree frog



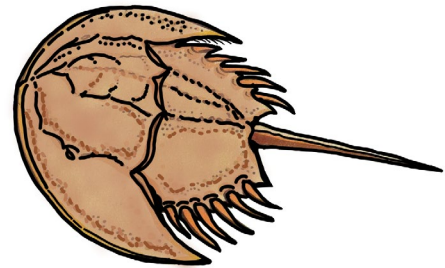
Marine flatworms



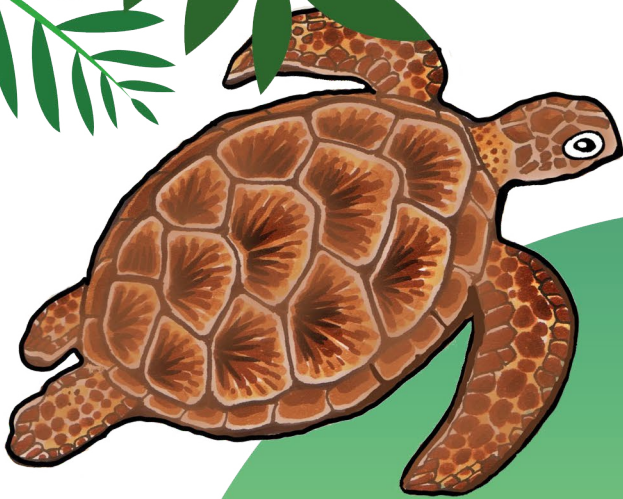
Blue-spotted fantail ray



Gold-spotted mudskipper



Coastal horseshoe crab



Simply look around and you will find colours everywhere! Pick up your colouring materials and unleash your creativity as you have fun adding colours to the biodiversity drawings and complete other activities in this book. As you observe images of the specimens at the Lee Kong Chian Natural History Museum (LKCNHM) and compare them to how they look when they were alive in their natural habitats, discover interesting facts about these organisms too!



Lee Kong Chian
Natural History Museum

