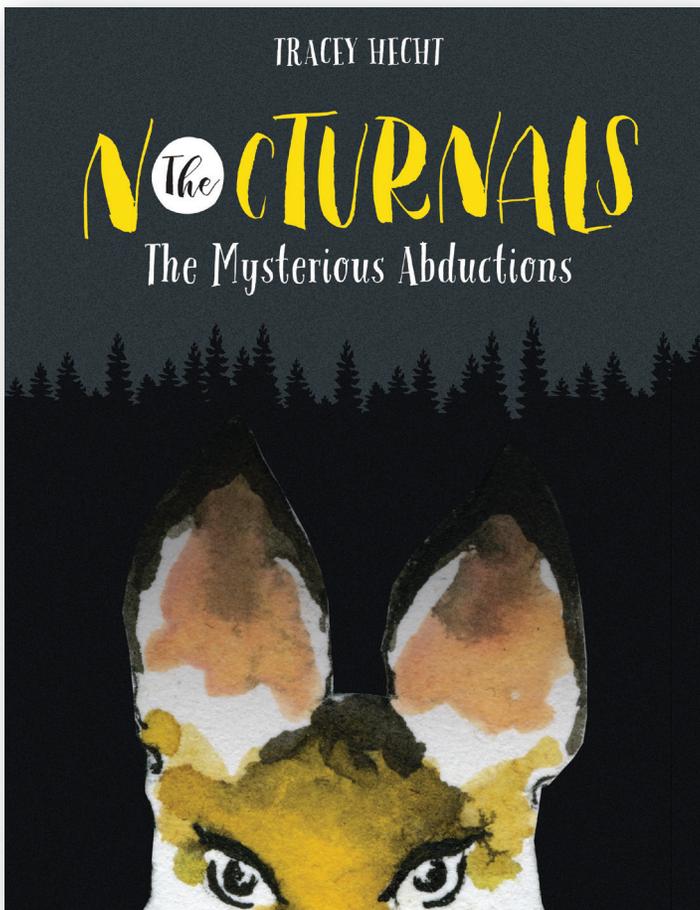


EDUCATOR'S SCIENCE GUIDE

The Nocturnals: The Mysterious Abductions



ISBN: 978-1-944020-002 • \$15.99

About the Book

In *The Mysterious Abductions*, Dawn, a serious fox, Tobin, a sweet pangolin, and Bismark, the loud mouthed, pint sized sugar glider, are nocturnal friends that form a brigade to protect themselves from a blood-thirsty snake. Then animals begin disappearing without a trace, and the brigade realizes that their night realm is threatened. Together with the help of a wombat, a band of coyotes, and many other Nocturnals, Dawn, Tobin, and Bismark journey to the depths of the earth in a wacky, high stakes game that determines their survival.

By
TRACEY HECHT
with illustrations by
KATE LIEBMAN

A Flabbergastifying Adventure Under the Stars!

Next Generation Science Standards Alignments and Activities

The activities in this guide have been correlated with the Next Generation Science Standards (NGSS), which were developed by the National Research Council (NCR) of the National Academy of Sciences. The NCR's framework for K–12 science education combines practices, crosscutting concepts, and disciplinary core ideas to address relevant science, technology, engineering, and math (STEM) concepts that students should learn.

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Meet the Animals from *The Nocturnals*

1. Prior to conducting this activity, make copies of *The Nocturnals* science activity sheets. These sheets represent the front and back of *The Nocturnals* identification cards. Either make double-sided copies or make individual copies and provide students with plain index cards, scissors, and glue so they can create their own cards.
2. Begin the discussion by asking your students what the word “nocturnal” means and invite a volunteer from the class to explain how a nocturnal animal is different from an animal that is awake during the day or crepuscular.
 - ***Nocturnal:** of, relating to, or occurring in the night
 - ***Nocturnal animals:** active at night
 - ***Crepuscular animals:** active at twilight
3. As a class, brainstorm reasons why animals might be nocturnal. Possible responses: animals that go out at night to avoid the heat lose less water through evaporation; there is less competition for food, water, shelter, and space at night; it’s easier to hide from predators in the dark; and some predators find prey at night.
4. Next, challenge students to identify characteristics of nocturnal animals. Possible responses: large eyes; large ears; heightened senses of touch, taste, and smell; *echolocation or a process for locating distant or invisible objects by means of sound waves reflected back to the sender from the objects. Discuss the advantages of each characteristic.
5. Assign each student a partner. Give each student a copy of *The Nocturnals* science activity sheets. Instruct students to conduct research with their partners to learn about the eight animals in the book. Recommend that they select the species of each animal that they think is most likely represented in the book.

6. Review the cards to familiarize students with the different types of information required. Helpful sites include:
 - IUCN Red List of Threatened Species site at: <http://www.iucnredlist.org/>
 - University of Michigan’s Museum of Zoology Animal Diversity Web: <http://animaldiversity.org/>
 - BBC’s Nature: <http://www.bbc.co.uk/nature/adaptations/Nocturnality>
 - San Diego Zoo Kids: <http://kids.sandiegozoo.org/>
 - National Geographic Kids: <http://kids.nationalgeographic.com/animals/>
 - National Geographic: <http://animals.nationalgeographic.com/animals/facts/>
7. Give students time to conduct research and compile information on each of the animals and draw a picture of each animal on it’s respective card. Invite them to share what they learned about *The Nocturnals* in small groups or have them present an animal’s characteristics to the class.

NEXT GENERATION SCIENCE STANDARDS USED IN THIS ACTIVITY

LS3.A: Inheritance of Traits

- Many characteristics of organisms are inherited from their parents. (3-LS3-1)
- Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)
- The environment also affects the traits that an organism develops. (3-LS3-2)

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

Investigate Poaching

1. Begin the discussion by asking your students what the word “poaching” means and encourage students to share what they know about poaching.

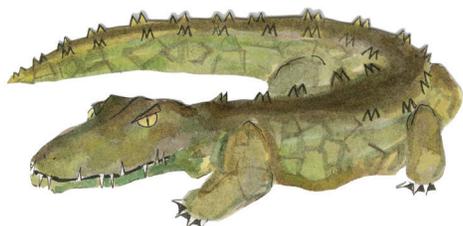
***Poaching:** to hunt or fish unlawfully

2. Next, inform students that although conservationists are working to stop poaching, the practice continues. Poachers have already hunted many animal species into extinction, and many more animals could disappear within our lifetime. Online resources to review with students include:

- <http://education.nationalgeographic.org/topics/poaching/>
- <http://www.africanconservation.org/>

3. Tell students that they will conduct an investigation to learn more about poaching and the impact it has on the animals featured in *The Nocturnals*. Divide the class into small groups and assign each group one of the following topics:

- **An Overview of Poaching:** What is it, why do people do it, and why does it matter?
- **Poaching and Crocodiles:** What happened to Boris’s family?
- **Poaching and Pangolins:** Why are pangolins like Tobin classified as a critically endangered species?
- **Without a Trace:** Which endangered animals are poachers hunting into extinction?
- **The Domino Effect:** How do disappearing species impact the larger ecosystem?
- **Solutions:** What can people do to stop poachers?



4. Give the student groups time to research poaching. If they need help finding information, suggest the following resources:

- National Geographic Society: <http://education.nationalgeographic.org/topics/poaching/>
- The Humane Society of the United States: <http://www.humanesociety.org/issues/poaching/>
- African Wildlife Foundation: <http://www.awf.org/campaigns/poaching-infographic/>

5. Challenge the student groups to use what they learned to write a two- to three-minute news report on poaching. Inform students that a good news report begins with a catchy lead that will grab listeners’ attention and combines research with an objective summary that answers vital questions about their assigned topic.

6. Give students time to complete their news reports. Invite students to present their reports to the class as a recorded segment or an online newspaper article. Record the presentations and compile them into a complete “Special Nocturnals Poaching Report.” Share the complete report with other classes or post it on a class or school website.

NEXT GENERATION SCIENCE STANDARDS USED IN THIS ACTIVITY

LS4.D: Biodiversity and Humans

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

*Source: <http://wordcentral.com/cgi-bin/student>

This guide was written by LIBBY ROMERO B.J. (University of Missouri-Columbia) and M.Ed. (Marymount University). Libby is a former journalist and teacher who has developed curriculum guides and activities for numerous educational publishers, including National Geographic and the Smithsonian Institution.

ANSWER KEY FOR ACTIVITY 1

Meet the Animals from *The Nocturnals*

NOTE: The information below was obtained from the IUCN Red List of Threatened Species (<http://www.iucnredlist.org/>) and the University of Michigan's Museum of Zoology Animal Diversity Web (<http://animaldiversity.org/>). Responses are accurate based upon the species selected. Student answers will vary if they choose to investigate a different member of the identified species.

PANGOLIN

Scientific Name: *Manis javanica*

Common Name: Malayan pangolin

Physical Characteristics: covered from just above nostrils to tips of tails by many rows of hard, overlapping, movable, sharp-tipped scales; 79–88 cm long, including the prehensile tail; scales on back and sides are olive-brown to yellow; underbelly and face are white; skin is bluish gray; small, conical heads

Behavioral Characteristics: nocturnal; mainly solitary; timid; climbs trees; moves fast when threatened; strong digger

Diet: ants and termites

Map: species found in southeastern Asia within the Indomalayan regions

Habitat: primary and secondary forests, open savannah country, areas vegetated with thick bush, gardens and plantations

Major Threats: hunting and poaching

Status: Critically endangered

SUGAR GLIDER

Scientific Name: *Petaurus breviceps*

Common Name: sugar glider

Physical Characteristics: head and body 12–13 cm; tail 15–28 cm; bluish-gray back with pale front; dark stripe down back to end of nose; stripes on side of face; gliding membrane from outer side of fore foot to ankle of hind foot; scent glands on forehead and chest

Behavioral Characteristics: nocturnal; spread limbs to open gliding membrane to glide up to 45 meters; nest in groups; territorial; males mark members of group with scent glands; use sounds to communicate with each other

Diet: pollen, nectar, insects and larvae, arachnids, small vertebrates

Map: species found in New Guinea and certain nearby islands, Bismark Archipelago, and northern and eastern Australia

Habitat: forests of all types

Major Threats: no major threats

Status: Least Concern

RED FOX

Scientific Name: *Vulpes vulpes*

Common Name: red fox

Physical Characteristics: pale yellowish-red to deep reddishbrown coat on top with white or ashy underside; lower parts of legs usually black; tail has white or black tip; dark brown or black nose; body length is 45.5–90 cm and tail length is 30–55 cm

Behavioral Characteristics: nocturnal; solitary; often live in dens abandoned by other animals; nocturnal; can run up to 48 km/h and jump up to 2 m high; stay in same home range entire life

Diet: rodents; rabbits; insects; fruit; carrion

Map: species located throughout much of the northern hemisphere from the Arctic Circle to Central America, the steppes of central Asia, and northern Africa

Habitat: forest, tundra, prairie, desert, mountains, farmlands, and urban areas

Major Threats: loss of habitat

Status: Least Concern

WOMBAT

Scientific Name: *Lasiorhinus krefftii*

Common Name: northern hairy-nosed wombat

Physical Characteristics: thick, stocky body about 1 m long; large head with small eyes and pointed ears; covered with soft, silky brown coat; long whiskers; continuously growing upper molars; bad eyesight but good senses of hearing and smell

Behavioral Characteristics: nocturnal; solitary; construct tunnel systems in deep sand; like to sunbathe close to tunnels

Diet: grass

Map: species found in Epping Forest National Park in Central Queensland, Australia

Habitat: live above and below ground in semi-arid, open woodlands or grasslands

Major Threats: loss of habitat and competition with livestock for food

Status: Critically Endangered

JERBOA

Scientific Name: *Euchoreutes naso*

Common Name: long-eared jerboa

Physical Characteristics: body length of 7–9 cm with tail that is 15–16 cm long; reddish yellow upper body; white belly; tail covered with short hairs and has white or black tuft on the end; hind foot is 4–4.6 cm long and has five digits; ears are one-third longer than head

Behavioral Characteristics: nocturnal; dig burrows; hunt at night; bathe in dust as a form of chemical communication; may use sounds or vibrations to communicate

Diet: flying insects

Map: species found in southernmost Mongolia and regions of northwestern China

Habitat: sandy valleys covered with low-growing bushes; cold, high-elevation desert or semi-arid desert regions

Major Threats: no major threats

Status: Least Concern

KIWI

Scientific Name: *Apteryx australis*

Common Name: brown kiwi

Physical Characteristics: flightless bird with wings just 5 cm long; about the size of a chicken; brownish grey with long, soft feathers that look and feel like fur; tough skin; whiskers at base of bill; small eyes with poor vision; no tail; powerful legs; fast runners

Behavioral Characteristics: nocturnal; shy and mainly solitary; build burrows; beat prey on ground before eating it; usually try to escape threats instead of attacking; coil body into a ball when hiding in burrows

Diet: worms, insects, crayfish, amphibians, eels, fruit

Map: species found on islands of New Zealand

Habitat: subtropical and temperate forests and grasslands; prefer large, dark forest areas

Major Threats: predators, such as dogs, pigs, cats, brush-tailed possums, and stoats

Status: Vulnerable

CROCODILE

Scientific Name: *Crocodylus porosus*

Common Name: saltwater crocodile

Physical Characteristics: males up to 7 m long; females up to 3 m long; large head with a pair of ridges running from eyes along center of snout; oval-shaped scales; young have pale yellow backs with black stripes and spots; adults have darker backs with lighter tan or gray areas; underside is white or yellow; tail is gray with dark bands; heavyset jaw with 64–68 teeth

Behavioral Characteristics: hide in water when hunting with only eyes and nostrils exposed; lunge to capture prey; eat under water; strong swimmer that can swim very far from land; bark to communicate

Diet: young prey on insects and small amphibians, crustaceans, fish and reptiles; adults eat larger prey, including buffalo, wild boar, and monkeys

Map: species most commonly found on coasts of northern Australia and islands of New Guinea and Indonesia

Habitat: coastal waters or around rivers; freshwater rivers, billabongs, and swamps

Major Threats: habitat loss from coastal development; hunting and poaching

Status: Least Concern, though Threatened in some areas

COYOTE

Scientific Name: *Canis latrans*

Common Name: coyote

Physical Characteristics: body length of 80–93 cm with tail that is 40 cm long; gray upper parts with white throat and belly; reddish-brown forelegs, sides of head, muzzle, and feet; long, black-tipped guard hairs on shoulder area; drooping tail with black tip; pointed, erect ears; eyes with yellow iris and round pupil; black nose; excellent senses of hearing and smell

Behavioral Characteristics: nocturnal; form packs; dig or find burrows for dens; can run up to 65 km/h and jump as far as 4 m; very vocal; secretive

Diet: rabbits, squirrels, mice, birds, snakes, insects, fruits, and vegetables; prefer fresh meat but will consume carrion and human trash

Map: species found throughout North and Central America

Habitat: extremely adaptable to forests, grasslands, deserts, and swamps

Major Threats: no current threats

Status: Least Concern

PANGOLIN

Scientific Name: _____

Common Name: _____

SUGAR GLIDER

Scientific Name: _____

Common Name: _____

FOX

Scientific Name: _____

Common Name: _____

WOMBAT

Scientific Name: _____

Common Name: _____

Physical Characteristics: _____ _____ _____		Behavioral Characteristics: _____ _____ _____	
Diet: _____ _____ _____	Map: _____ _____ _____	Habitat: _____ _____ _____	
Major Threats: _____ _____ _____		Status: _____ _____ _____	

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