

Lena Anlauf & Vitali Konstantinov



GENIUS NOSES

A Curious Animal Compendium



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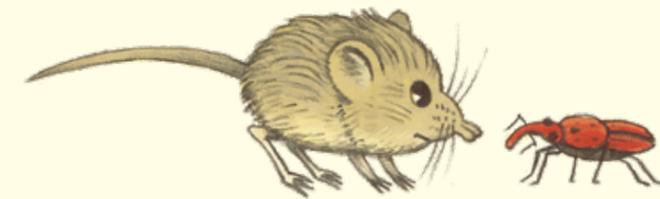
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Lena Anlauf & Vitali Konstantinov



GENIUS NOSES

A Curious Animal Compendium

Translated from the German
by Marshall Yarbrough

North
South

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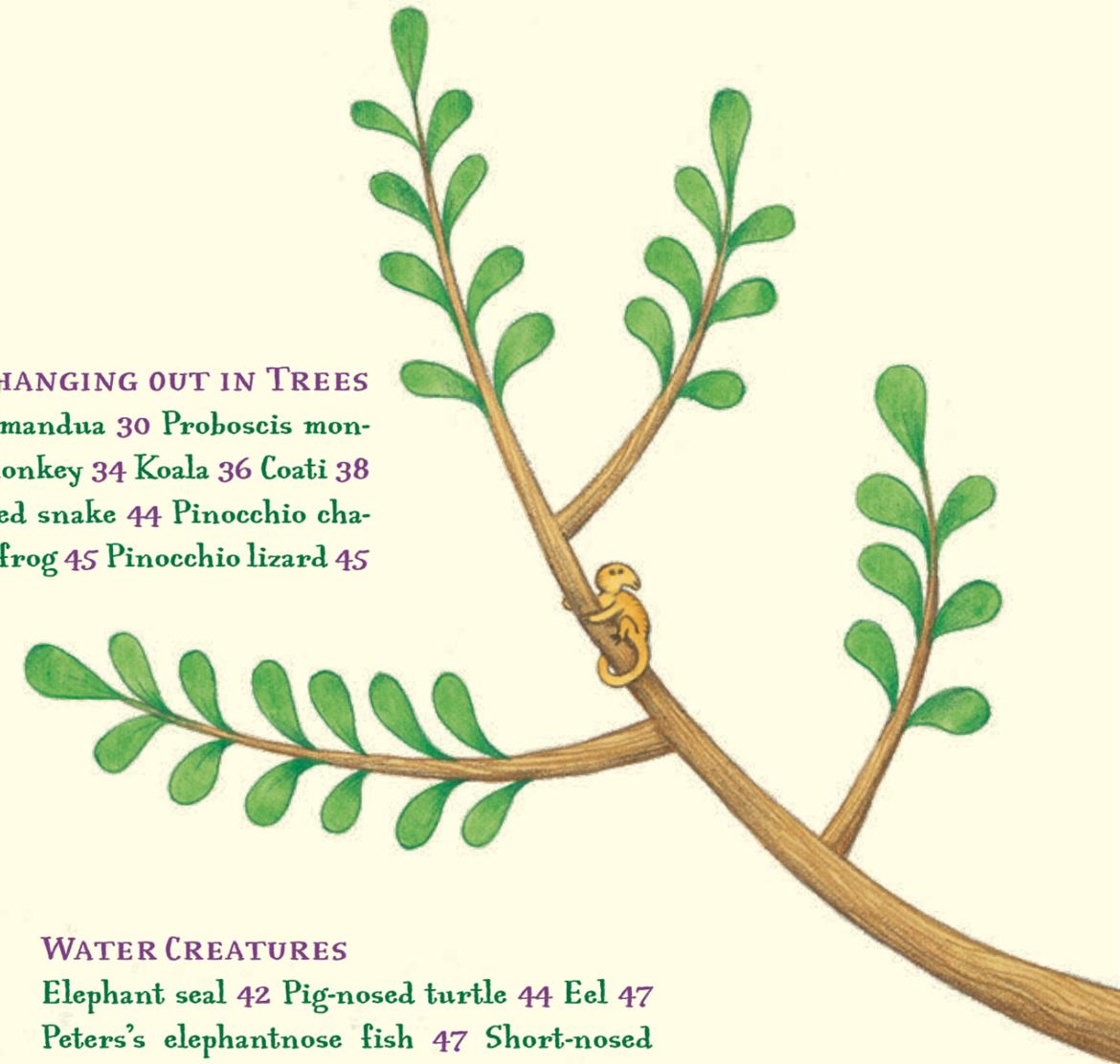


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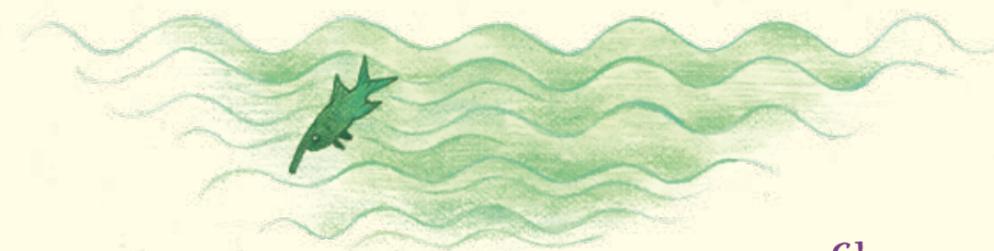
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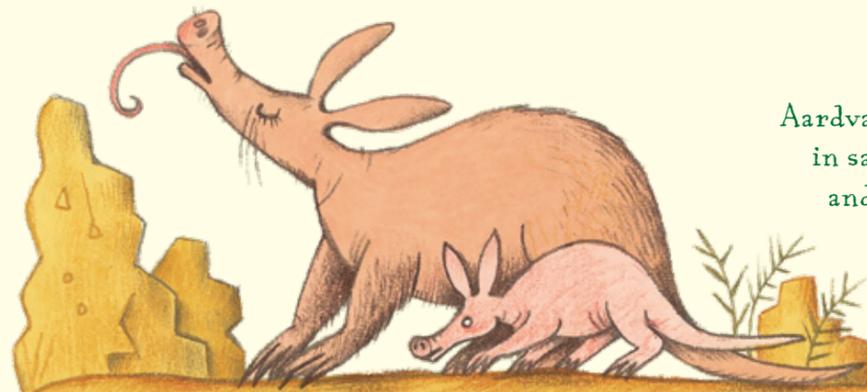


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AARDVARK

Orycteropus afer

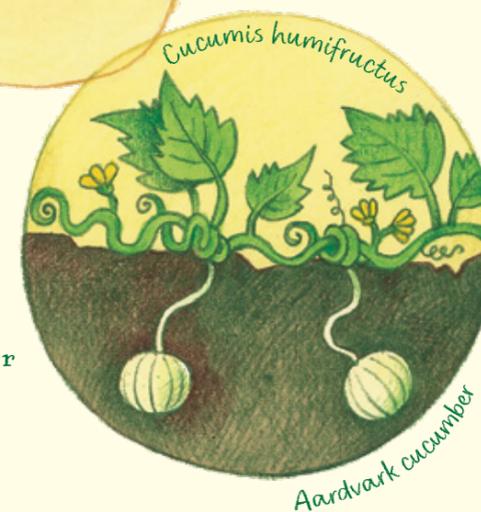


Aardvarks live in sub-Saharan Africa, in savannas, bushlands, grasslands, and forest—anywhere the earth is soft enough for them to dig their underground tunnels and burrows, and where there are termites and ants close by.

When the aardvark has sniffed out a termite nest, it breaks it open with its sharp claws, gathers the insects up on its sticky tongue, swallows them whole, and chews them up with its stomach muscles.

Aardvarks are macrosmatic. That means they find their way around mainly by using their sense of smell. They can even recognize others of their kind by their personal scent.

It's not clear whether aardvarks eat the cucumber named after them on purpose or by accident. Either way, they help spread the seeds by carefully burying their dung, cucumber seeds and all.



When the aardvark senses a predator, it takes off running—it can run surprisingly fast—and dives head-first into one of its burrows. It can close its nostrils so that no dirt gets in while it digs. Its bristly nose hairs work as an additional filter.

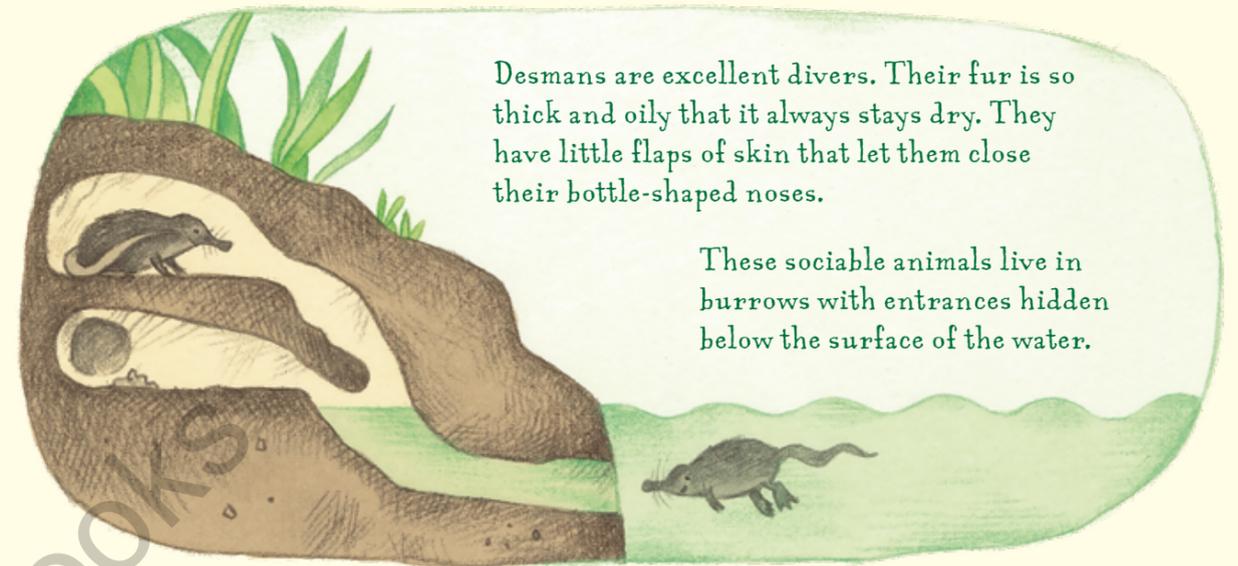


Before the desman surfaces, it sometimes sticks its nose out of the water like a snorkel to sniff out potential danger.

Also known as the *wychochol*.

DESMAN

Desmana moschata / Galemys pyrenaicus



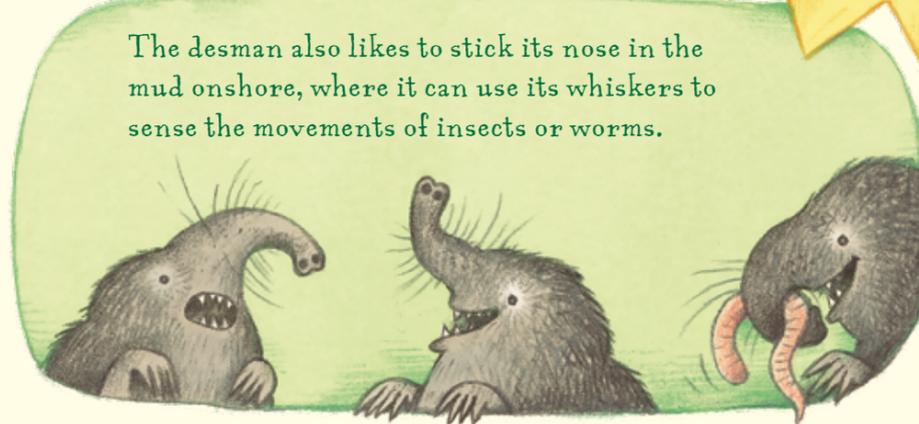
Desmans are excellent divers. Their fur is so thick and oily that it always stays dry. They have little flaps of skin that let them close their bottle-shaped noses.

These sociable animals live in burrows with entrances hidden below the surface of the water.

The Russian desman is a semiaquatic mole. It lives beside slow-moving rivers, lakes, and ponds in Russia, Ukraine, and Kazakhstan. The somewhat smaller Pyrenean desman is found in the mountain streams of Spain, Portugal, and France. Both species are nearly blind and find their way around by feeling and sniffing with their noses. When the desman locates its prey, it snatches it up with its snout and devours it on the spot.



The desman also likes to stick its nose in the mud onshore, where it can use its whiskers to sense the movements of insects or worms.



Every day it gobbles up at least half its body weight in tiny critters!

Desman is another word for *musk*, a particular kind of animal odor that desmans secrete from a gland. Because of this, they used to be hunted to make perfume. Today hunting them is prohibited, but now they are at risk from increasing levels of pollution in the water.



TELEDU **STINK BADGER** PANTOT
Mydaus javanensis / *Mydaus marchei*



Stink badgers are found in forests on the islands of Indonesia and the Philippines. They are also called *false badger* because they don't actually belong to the badger family at all. In fact they are skunks and belong to the Mephitidae family.

The stink badger spends its day in an underground burrow. Sometimes it digs the burrow itself, but often it will take over an abandoned porcupine tunnel. Every now and then, stink badgers and porcupines will even share a home.



Long, flexible snouts help these small carnivores sniff out and dig up things to eat.



When a stink badger feels threatened, it turns its rear end toward its attacker and sprays it with a greenish-yellow fluid from its anal glands. The fluid has a ferocious stink to it, and works as a defense against predators like wild cats and dogs. This defense mechanism works less well against birds of prey, however, whose sense of smell isn't particularly good: They hardly even notice the nauseating stench.





Eastern long-beaked echidna

Zaglossus bartonii



A blond subspecies of the short-beaked echidna is found on Australia's Flinders Island.

Tachyglossus aculeatus setosus

ECHIDNA

Echidnas are divided into two genera: short-beaked and long-beaked. The long-beaked variety is found exclusively in New Guinea; short-beaked echidnas also live in Australia and Tasmania. Echidnas are also known as spiny anteaters.

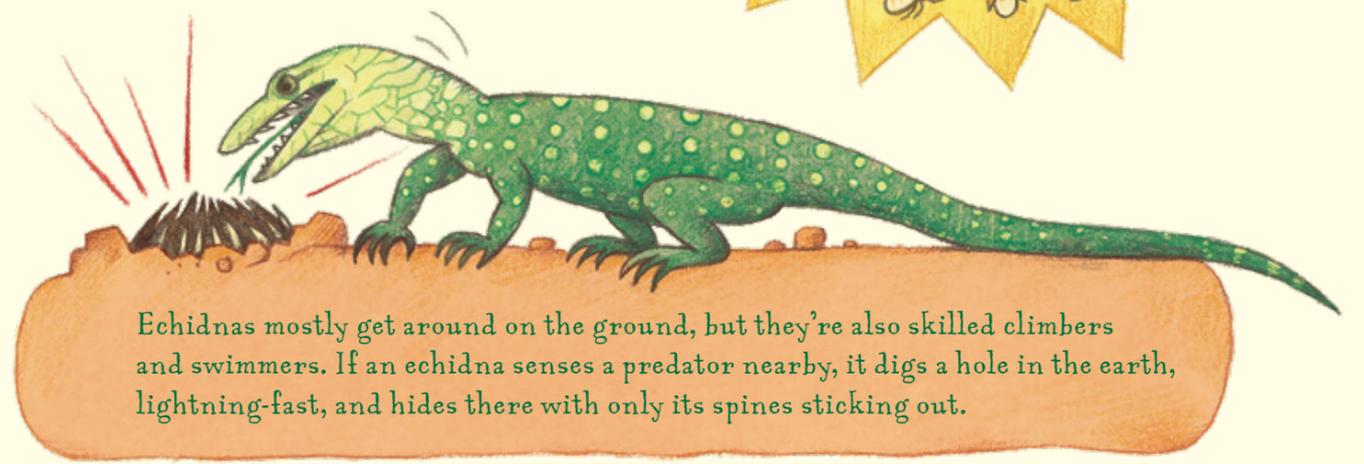
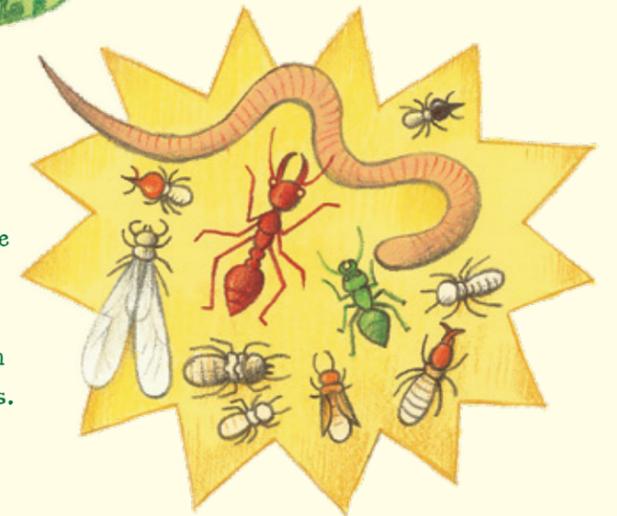
Echidnas, along with the platypus, are the only egg-laying mammals. The mothers move the leathery, grape-sized egg from their cloaca to their pouch with the help of their beak-like snout. There they incubate it for about ten days before the baby echidna hatches.



The tiny mouth opens just wide enough to take in small insects and worms.



Spiny anteaters use their beaks as levers, breaking apart rotting tree trunks or turning over stones to find insects. When they come across an anthill or termite mound, they sniff around to figure out where in the structure the insects are to be found. As they do this they are helped by additional special electroreceptors on the tips of their noses, which allow them to locate their prey by tracking its muscle movements.



Echidnas mostly get around on the ground, but they're also skilled climbers and swimmers. If an echidna senses a predator nearby, it digs a hole in the earth, lightning-fast, and hides there with only its spines sticking out.



It's also called the rabbit-eared bandicoot.

BILBY

Macrotis lagotis / Macrotis leucura

Greater bilbies live in Australia. They have silky soft fur and get around mostly by hopping. The female has a pouch that faces backward.

During the day bilbies sleep in their burrows, which are two meters (six feet) underground. The burrows also offer protection to other vulnerable animals from heat and wildfires, which occur often in summer.



The bilby's sense of smell is very good. It pokes its nose out of its burrow to sniff the air for nearby predators. By doing so it avoids run-ins with dingoes, the wild dogs of Australia.

When humans brought cats and foxes to the continent, though, bilbies didn't recognize the scent of the unfamiliar predators. The smaller of the two bilby species, the lesser bilby, has since gone extinct.

Rabbits were also introduced into the bilby's habitat. As a result, bilbies were driven out. Their population is getting smaller and smaller. In response to this, there have been efforts in recent years to call more attention to these animals and better protect them. For example, the bilby has been suggested as an Easter Bunny alternative.



To date, the sale of chocolate bilbies has paid for a fence twenty kilometers (twelve miles) long to keep out predators. Thanks to this fence, a group of bilbies inside one of Australia's national parks is now protected.



It's also called a star mole.

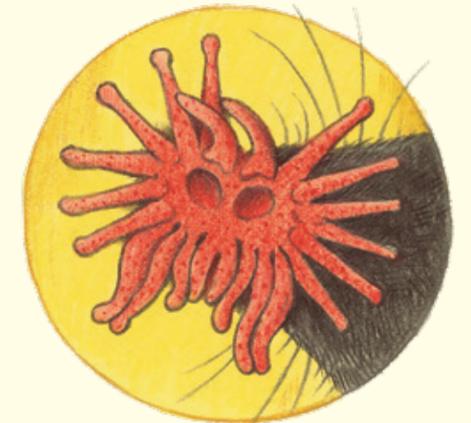
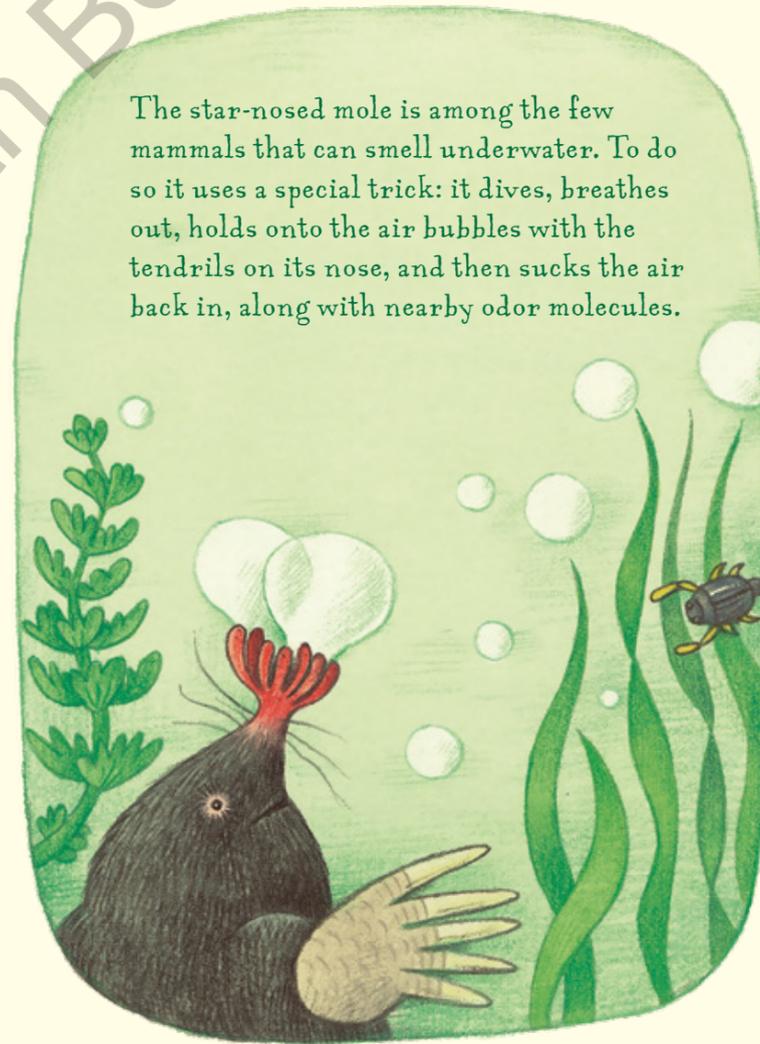
STAR-NOSED MOLE

Condylura cristata

Star-nosed moles live in North America. They dig tunnels underground, but also like to spend time aboveground or in ponds and creeks. Almost totally blind and deaf, they find their way around mainly by using their fantastically good sense of touch: scientists have discovered that by constantly feeling around with their nose they form star-shaped images of their surroundings in their minds.



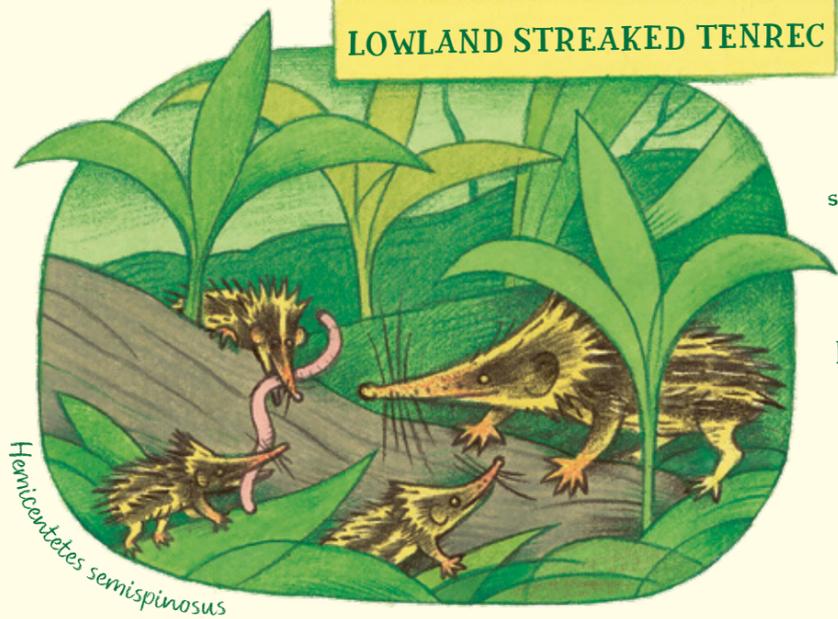
The star-nosed mole is among the few mammals that can smell underwater. To do so it uses a special trick: it dives, breathes out, holds onto the air bubbles with the tendrils on its nose, and then sucks the air back in, along with nearby odor molecules.



This mole's unique olfactory organ is about the size of a finger and has twenty-two tendrils arranged in a star shape around its two nostrils. It contains more than a hundred thousand nerve receptors on tiny bumps. That's almost five times as many as are found in a whole human hand!

With the help of its highly sensitive tendrils, the star-nosed mole can detect up to thirteen bugs per second, while at the same time checking to see if they are edible. It devours its prey in less than a quarter of a second. That makes it the fastest eater among all mammals.

LOWLAND STREAKED TENREC

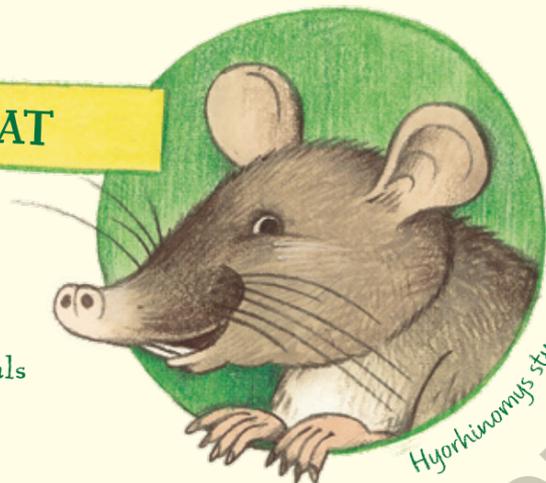


Hemicentetes semispinosus

The lowland streaked tenrec lives in Madagascar. Its snout is covered in sensitive whiskers and wart-like bumps that help it track down prey. When a new tenrec couple meets for the first time, the first thing they do to get to know each other is to sniff each other's noses. And if the young try to leave the nest too early, their parents carefully push them back in with the quill-free tips of their noses.

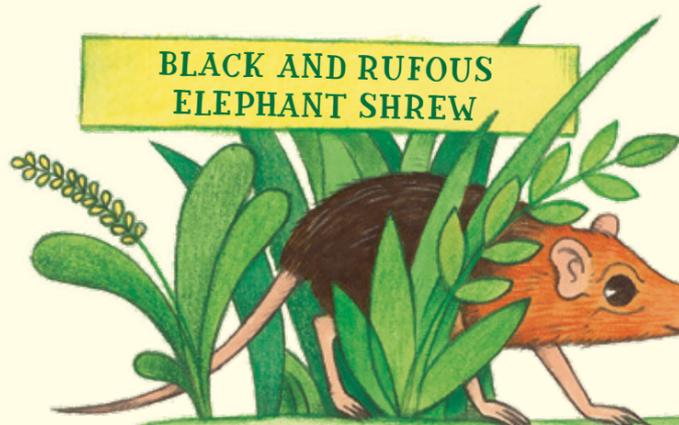
HOG-NOSED SHREW RAT

The hog-nosed shrew rat lives on the island of Sulawesi in Indonesia. Its binomial name *Hyorhinomys stuempkei* honors the zoologist Gerolf Steiner, who wrote a book under the pseudonym Harald Stümpke about a fictitious order of mammals called "rhinogrades," or "snouters."



Hyorhinomys stuempkei

BLACK AND RUFOUS ELEPHANT SHREW



Rhynchocyon petersi

BUSHVELD ELEPHANT SHREW



Elephantulus intufi

These two animals belong to the order of elephant or jumping shrews that are native to Africa. They find tasty insects by sticking their flexible noses under leaf litter and following their highly developed sense of smell.

SOLENODON

Solenodons are found only on the islands of Cuba and Hispaniola. The Hispaniolan solenodon has a very special nose bone: it has a ball-and-socket joint that lets it twist the tip of its nose all the way around. Like their pointy-nosed relatives the water shrews, solenodons number among the few poisonous mammals.



GAMBIAN POUCHED RAT

A trained Gambian pouched rat can help diagnose diseases with its superpowered nose. It can also sniff out smugglers and detect land mines in former war zones.



Cricetomys gambianus

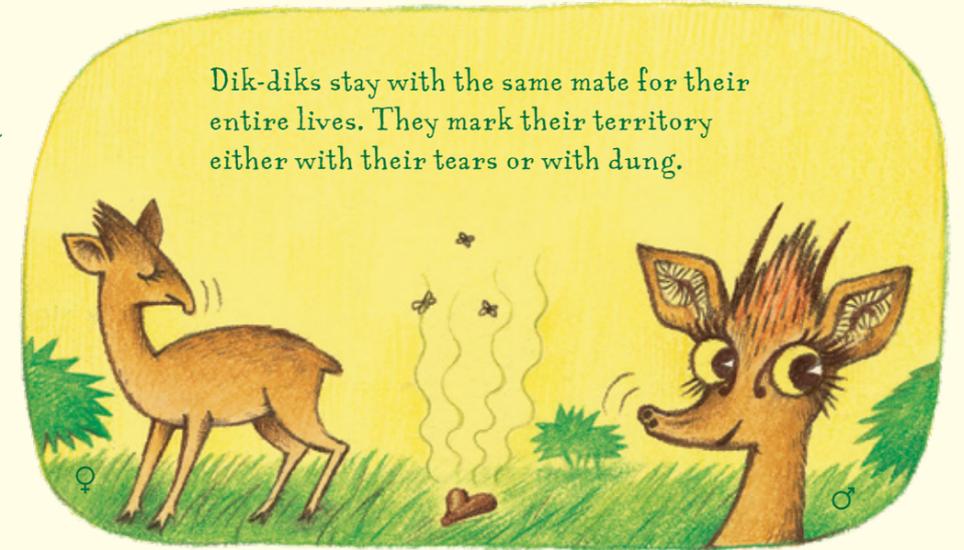


Magawa the rat was awarded a gold medal for her sniffing work in Cambodia. By the time she retired in 2021, she had found seventy-one land mines and thirty-eight explosive devices, and in doing so had made about 225,000 square meters (800,000 square feet) of land safe to walk on again.



Madoqua saltiana  **DIK-DIK**  *Madoqua piacentinii*
 *Madoqua guentheri* / *Madoqua kirkii* 

Dik-diks are small antelopes that live in African steppe and semidesert habitats. They take in so much water from the plants they eat that they hardly ever need to drink. It is a matter of debate whether there are just four species or many more than that. Günther's dik-diks have the longest snouts.



Dik-diks stay with the same mate for their entire lives. They mark their territory either with their tears or with dung.

The dik-dik can twist and extend its nose in every direction.



Its long nostrils function like air conditioners. When the dik-dik breathes quickly in and out, the air that passes over the moist mucous membrane inside the nostrils cools the blood in the snout. As the blood travels throughout the rest of the body, the total body temperature decreases.



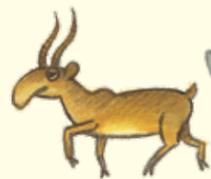
When in danger, this small antelope raises the fuzzy shock of hair on top of its head and makes a whistling noise through its nose that sounds like *dsik-dsik*. This cry, which also warns other animals about nearby predators and hunters, is how it got its name. When fleeing, the dik-dik dashes off, leaping up to three meters (ten feet) in a single bound and moving in a zig-zag pattern from one sheltering bush to the next.



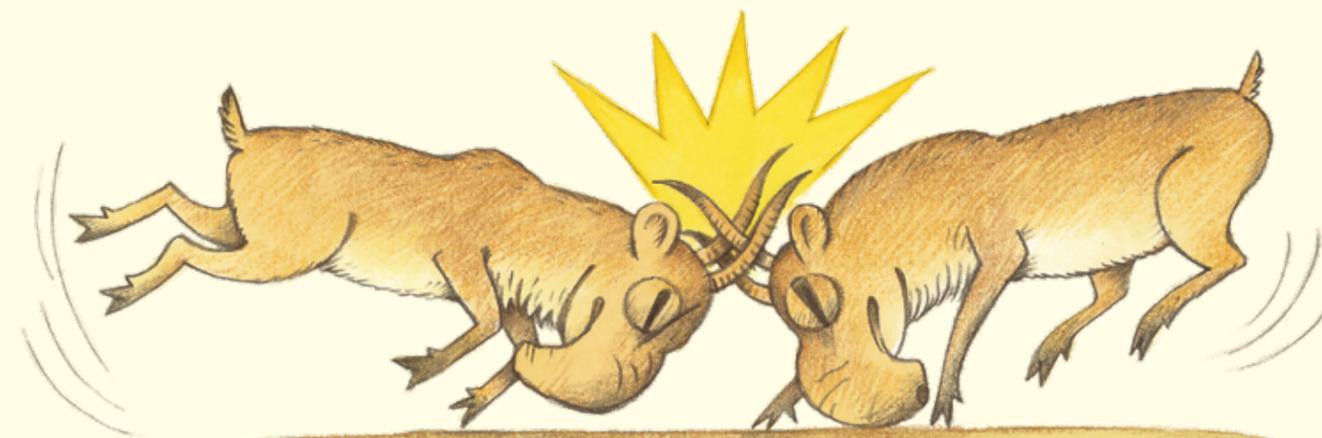
In the cold months, the saiga grows a fluffy winter coat.

SAIGA ANTELOPE

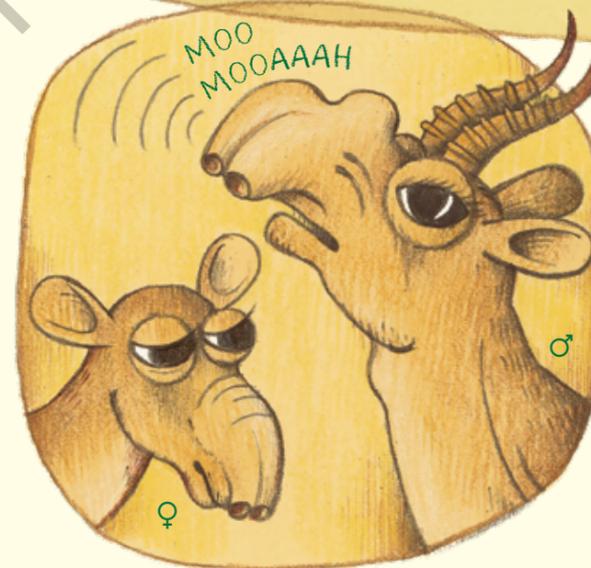
Saiga tatarica / Saiga mongolica



The saiga antelope lives in the semidesert and steppe regions of southern Russia, Kazakhstan, and Mongolia. Nose-focused cave paintings and engravings dating back to the ice age show that even thousands of years ago people found its appearance fascinating.

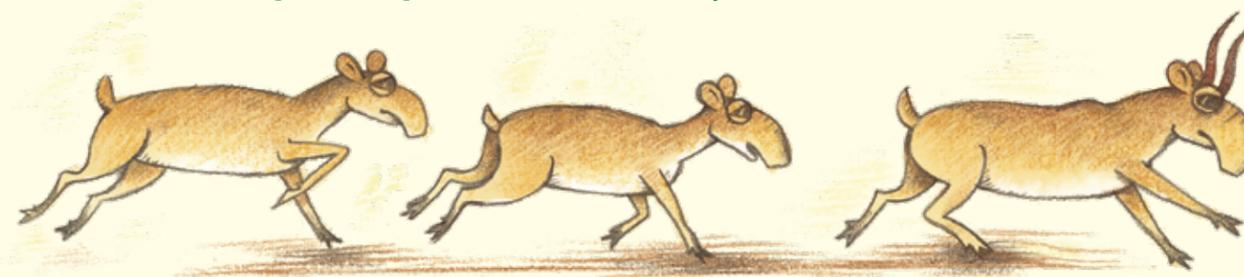


The saiga antelope's trunk-like nose gives it more than just a good sense of smell. It also helps it to survive on the steppe, which gets very hot in the summer and icy cold in the winter. Like the dik-dik's snout, the saiga's snout is a helpful temperature regulator. In the summer it helps keep the saiga from overheating: the saiga breathes quickly and cools down the blood in the trunk, which then flows to the rest of the body. Similarly, in cold weather it can warm up the air the saiga breathes.



The nostrils function as air filters and as humidifiers: they are densely packed with hair and mucus glands, which can filter out dust that gets kicked up by the herd in summer. The male saiga's trunk-like nose also helps him in his search for a mate. It can swell up in size and act as a resonating body, impressively amplifying his mating calls.

Saigas are important for the ecosystem, spreading fertilizer and seeds across wide distances with their dung. In a single day they can travel up to 120 kilometers (seventy-five miles).



PIGS

There are about a billion pigs in the world. The vast majority of them are domestic pigs, which were bred by humans from wild pigs. The family of suidae is divided into six different genera:

PIGS

Wild boar

Domestic pig

Bornean bearded pig

Sulawesi warty pig

POTAMOCHOERUS PORCUS
Red river hog

WARTHOGS
Common warthog

PORCULA
Pygmy hog

BABIRUSA
North Sulawesi babirusa

HYLOCHOERUS
Giant forest hog

There are more than 500 breeds of domestic pig!

2m/6ft

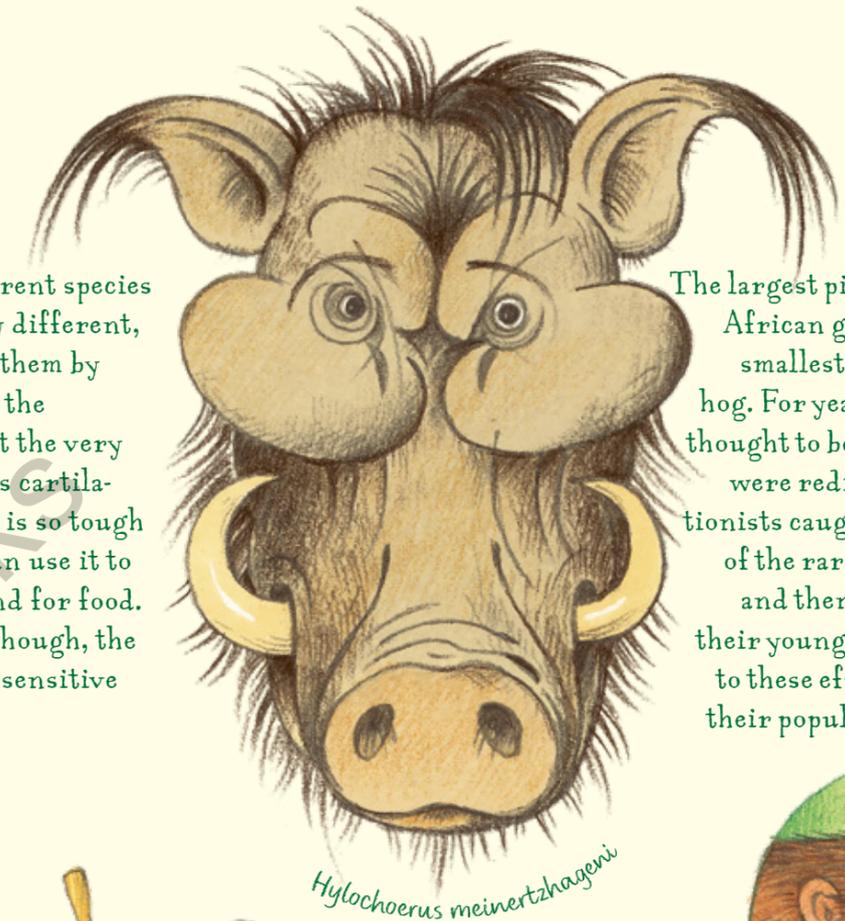
+ five more species

+ one more species

+ one more species

+ two more species

Even though different species of pig all look very different, you can recognize them by one common trait: the disc-shaped nose at the very tip of the snout. Its cartilaginous upper edge is so tough that the animals can use it to dig and root around for food. At the same time, though, the nose is also a very sensitive tactile organ.



The largest pig in the world is the African giant forest hog. The smallest is the Indian pygmy hog. For years pygmy hogs were thought to be extinct. After they were rediscovered, conservationists caught a few individuals of the rare species, bred them, and then returned them and their young to the wild. Thanks to these efforts, little by little, their population is recovering.



Pigs are intensely macrosmatic: they can smell a tasty morsel up to fifty centimeters (twenty inches) belowground. For that reason, they were once often used as truffle hunters. Today people prefer to use dogs for the job. This is because, if you don't watch out, these clever, stubborn omnivores will just gobble up the truffles themselves.



TAPIR

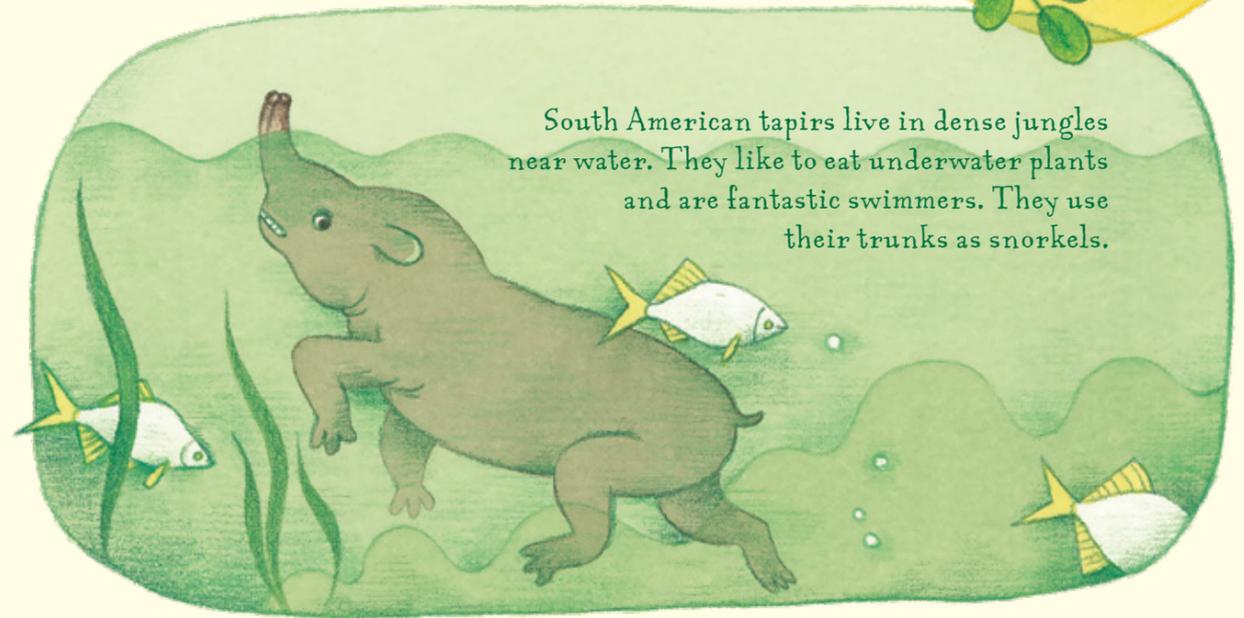
Tapirs belong to an ancient genus of mammals. A few species have gone extinct. Today, all that remain are the Malayan tapir of Southeast Asia and its Central and South American relatives. The Kabomani tapir was acknowledged only a few years ago, in 2009—though there is still not perfect agreement as to whether it is a species in its own right or just a subspecies of the South American tapir.

The nose and upper lip of the tapir are fused together to form a trunk. Muscles set in a screw-like pattern allow it to move its trunk in all directions and utilize it as a versatile tool. Not only can tapirs sniff out food, but their noses are also prehensile: they can use them to break off leaves and branches and pop them into their mouths.

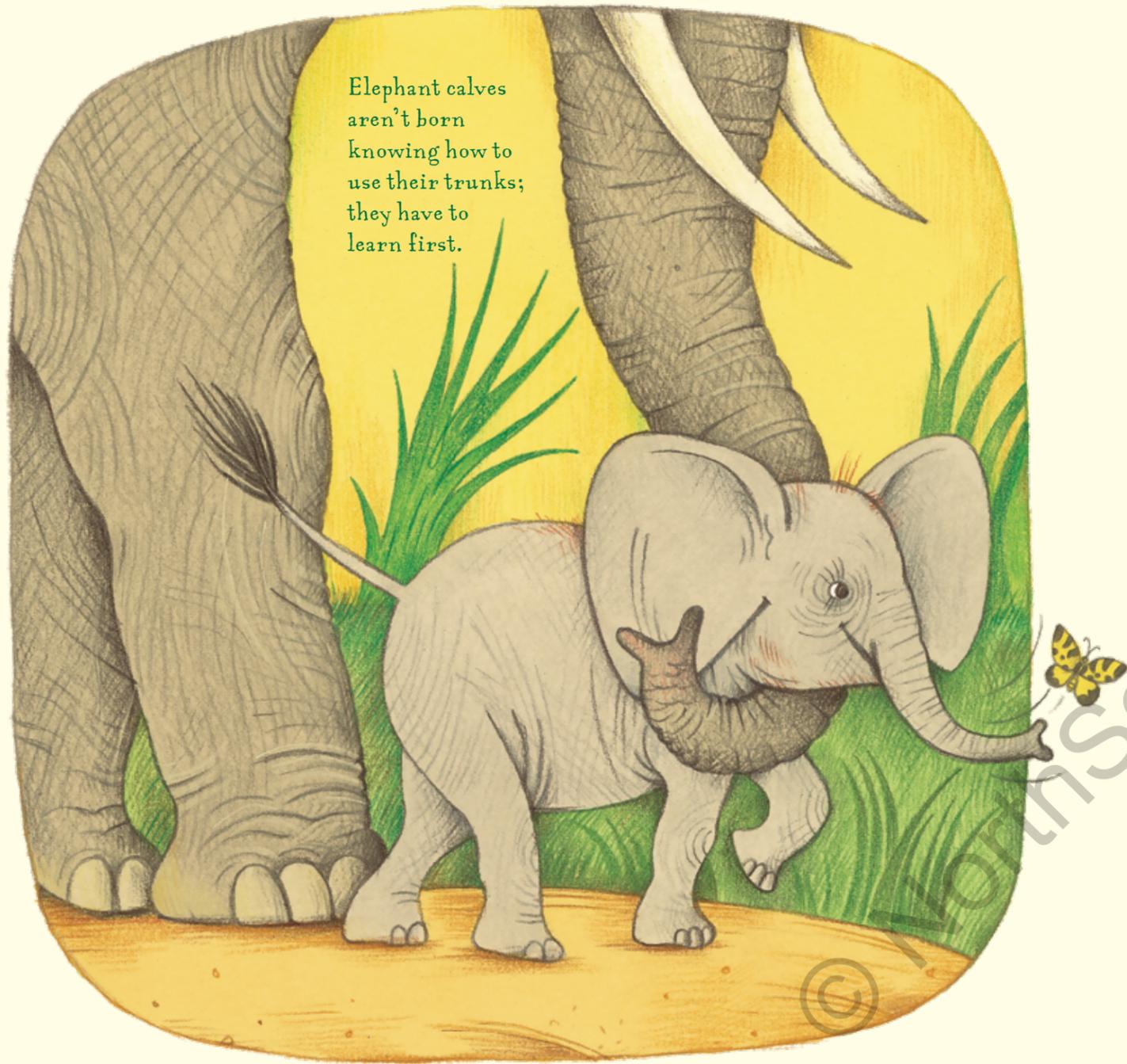


To communicate with one another, tapirs belch, gurgle, squeak, and yowl. For some of their calls, their trunk functions like an amplifier.

South American tapirs live in dense jungles near water. They like to eat underwater plants and are fantastic swimmers. They use their trunks as snorkels.



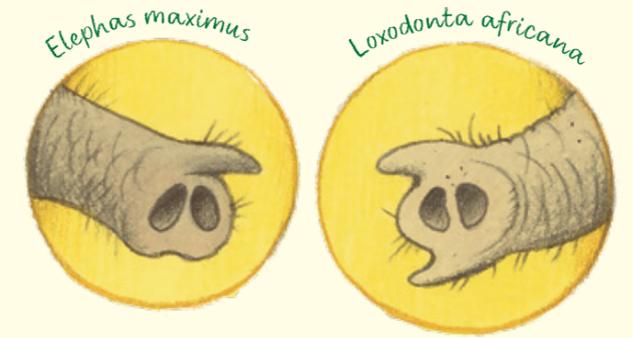
Young tapirs have dark fur with white spots and stripes. These act as camouflage. When fully grown tapirs are very strong and astonishingly fast. Because their habitat is being destroyed by humans, however, tapir populations are nevertheless in danger.



Elephant calves aren't born knowing how to use their trunks; they have to learn first.

 **ELEPHANT** 
Loxodonta cyclotis *Elephas maximus*
Loxodonta africana

Elephants belong to the order of Proboscidea. There are three different species: the African bush elephant, which lives on open savanna; the African forest elephant, which is found in tropical rainforests; and the Asian elephant, which makes its home in different parts of South Asia.

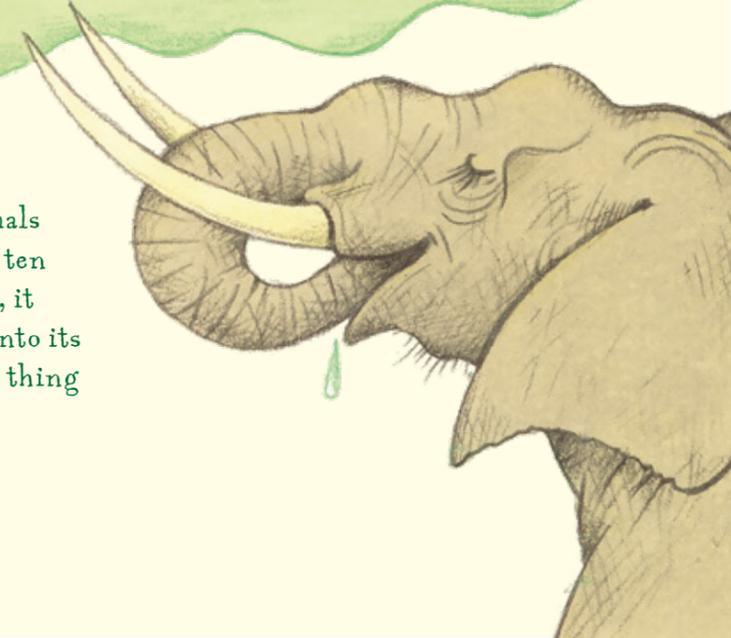


Elephant noses are also used for many kinds of communication: via smells, noises, gestures, and touch. A raised trunk, for example, conveys excitement. And when an elephant is sad, the others pat it soothingly with their trunks, or carefully place their trunks in its mouth. Sometimes they get their trunks lovingly tangled up.

Elephant trunks are boneless and are made up of more than forty thousand muscles. At the very tip of the trunk, the African elephant has two fingers, the Asian elephant just one. These fingers turn their noses into brilliant grabbing tools: they can pick up peanuts and even peel off their shells. Meanwhile they can also use their trunks to lift objects weighing up to three hundred kilograms (660 pounds).

Elephants can exchange messages with other herds using infrasound; especially low-pitched sounds that can travel up to ten kilometers (six miles) over land. To send the messages off, the elephant places its trunk on the ground, since elephants don't just hear infrasound with their ears—they also pick it up with their highly sensitive feet.

The elephant is one of the most highly macrosmatic animals in the world: it can detect water from a distance of up to ten kilometers (six miles) using its sense of smell. To drink, it draws as much as eight liters (two gallons) of water up into its trunk and then sprays it into its mouth. It does the same thing to take a bath—sometimes using dirt instead of water.





Myrmecophaga tridactyla

ANTEATER

60 cm (24 in)

Anteaters live in Central and South America. There are giant anteaters, smaller anteaters known as tamanduas, and pygmy or silky anteaters. Giant anteaters weigh up to fifty kilograms (110 pounds), while silky anteaters weigh only about 250 grams (nine ounces). All three varieties are macrosmatic; they have poor eyesight and hearing, but an excellent sense of smell.



The giant anteater gobbles up about thirty thousand ants and termites per day. This sounds like a lot, but it only adds up to about two hundred grams (seven ounces). That probably explains why the anteater has only enough energy to concentrate on doing exactly one thing. While the animal is eating, a researcher can creep up and observe it from way up close without it noticing.



Giant anteaters are loners, but they leave messages for their fellows on trees, using scratch marks and scent markings they make by pressing the scent glands on their chests up against the bark. Scientists are still not sure what exactly the animals are telling each other. They think that this is the anteater's way of marking its territory or finding a mate.



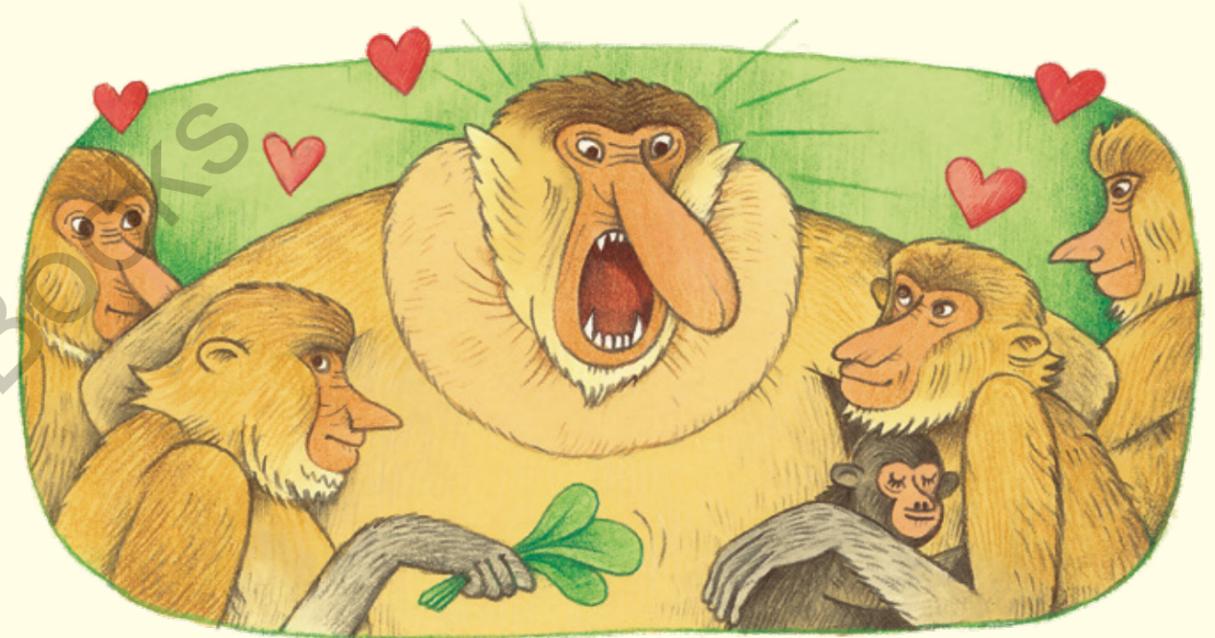
Unlike their tree-dwelling relatives, giant anteaters are usually found in grassy terrain. But if it gets too hot for them there, they're happy to head back into tropical rain forests or swampland. With their sharp claws they can defend themselves against jaguars and pumas. But their population is steadily decreasing as a result of the destruction of their habitat by humans.



PROBOSCIS MONKEY
Nasalis larvatus

Proboscis monkeys, also known as long-nosed monkeys, live on the island of Borneo in Southeast Asia. They are found mostly in swampy mangrove forests near the water. They are considered the best swimmers of all apes and can swim underwater for stretches of up to twenty meters (sixty-five feet). They even have webbed feet.

They are microsmatic and visually oriented. This means that their sense of smell is not particularly well developed, despite their large noses, and that—like all primates, including humans—they find their way around mainly by using their sense of sight. A wide variety of leaves makes up their main source of food.



Juveniles have little noses that point forward, and females later develop sharply pointed olfactory organs. Only the males that grow the giant schnozzles. The nose functions as a resonating body that amplifies the monkey's calls: males with especially long noses have impressively loud and deep voices.

The male's nose get increasingly long and more cartilaginous with age. Some monkeys even have trouble with it getting in the way when they eat. They have to push it to one side.

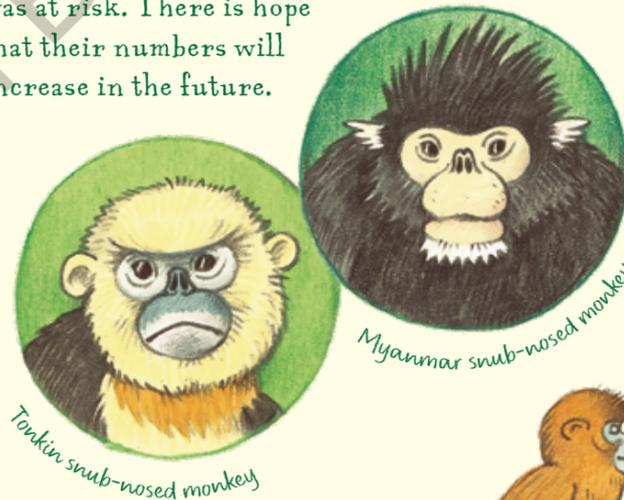
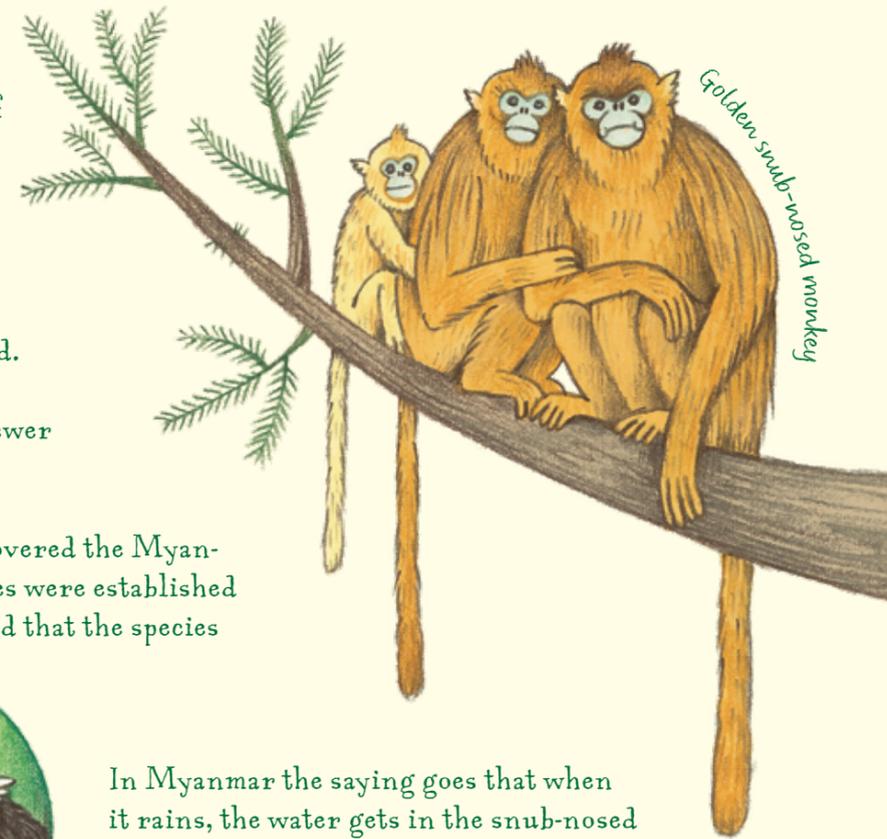
Even though they live on the third largest island in the world, there's barely enough room left for them there. Because of deforestation, their habitat grows ever smaller.



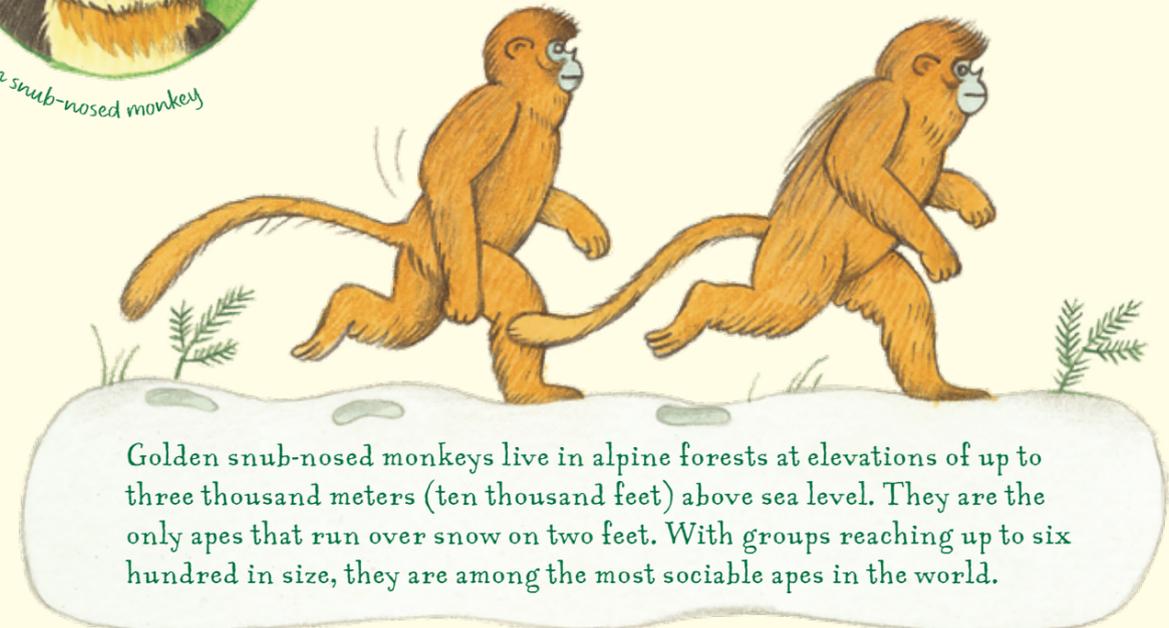
Within the snub-nosed monkey genus there are five different species. They live in China, Vietnam, and Myanmar. There they live off of leaves, fruit, and tree bark. They probably developed their mini-noses because of the icy winters in their habitats. A larger nose would be significantly more sensitive to cold.

All snub-nosed monkey species are endangered. The situation is most critical for the Tonkin snub-nosed monkey: there are thought to be fewer than two hundred of them left.

It was only in 2010 that Swiss scientists discovered the Myanmar snub-nosed monkey. New nature preserves were established to protect it and humans nearby were informed that the species was at risk. There is hope that their numbers will increase in the future.



In Myanmar the saying goes that when it rains, the water gets in the snub-nosed monkeys' upturned nostrils and makes them sneeze. They say that's why the monkeys spend rainy days with their heads between their knees most of the time.





KOALA
Phascolarctos cinereus

Koalas are marsupials that live in eucalyptus groves in Australia and sleep up to twenty hours a day. Even though they can neither distinguish between a lot of smells nor smell things from very far away: their noses are perfectly adapted to their needs.



Eucalyptus



Because of their limited smelling range, koalas have to get very close to each other in order to recognize their fellows by their personal scent. When they do, they look like they're rubbing noses.

Koalas are very picky when it comes to their food: they subsist almost exclusively on eucalyptus, but among all the different eucalyptus species they only like a specific few. By sniffing a eucalyptus leaf, they find out whether it contains too much poisonous oil or has wilted — or if it's a fresh, tasty morsel.



Male koalas in search of a mate bellow loudly to call attention to themselves. They also rub against trees to mark their territory with their pectoral scent glands. To the human nose, koalas smell like eucalyptus candy!

ROOAAAAR
ROAR



You can tell koalas apart by the very specific markings around their nostrils. Every koala nose is as unique as a fingerprint.

Even baby koalas rely on their noses. After just thirty-five days in their mother's belly, blind, deaf, and naked, they have to feel and sniff their way to her pouch all by themselves.





Also called the coitimundi.



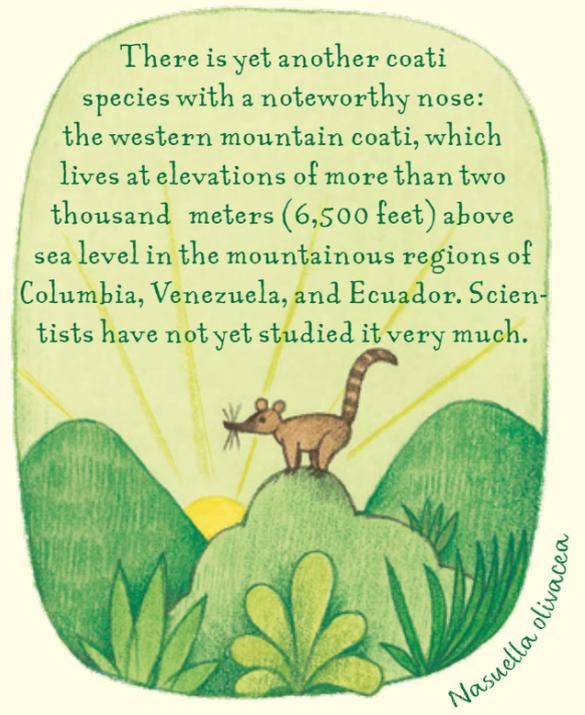
COATI



Nasua nasua / Nasua narica



Coatis live in forests ranging from the southwestern United States down to Argentina. There are white-nosed coatis and South American coatis. The males are for the most part loners; the females live in groups along with their young, which are born in tree top nests made of leaves and don't take long at all to become excellent climbers.



Nasua olivacea

There is yet another coati species with a noteworthy nose: the western mountain coati, which lives at elevations of more than two thousand meters (6,500 feet) above sea level in the mountainous regions of Columbia, Venezuela, and Ecuador. Scientists have not yet studied it very much.



The coati's superpowered nose can turn in any direction, and can fit into tiny cracks and under rocks and tree bark. These omnivores also use their noses to dig through loose soil. They can sniff out their favorite snacks from up to twenty-five meters (eighty feet) away. They really show their smarts when they find spiny or poisonous insects: they use their forepaws to roll them around in the leaves for long enough that they become harmless and okay to eat.

When these small predators are defending their territory or fighting over food, they raise their snouts in the air threateningly, make fearsome grunting sounds, and bare their sharp teeth. Otherwise, coatis talk to each other with squeaking sounds; scents also help them communicate with their fellows.



FLYING FOXES



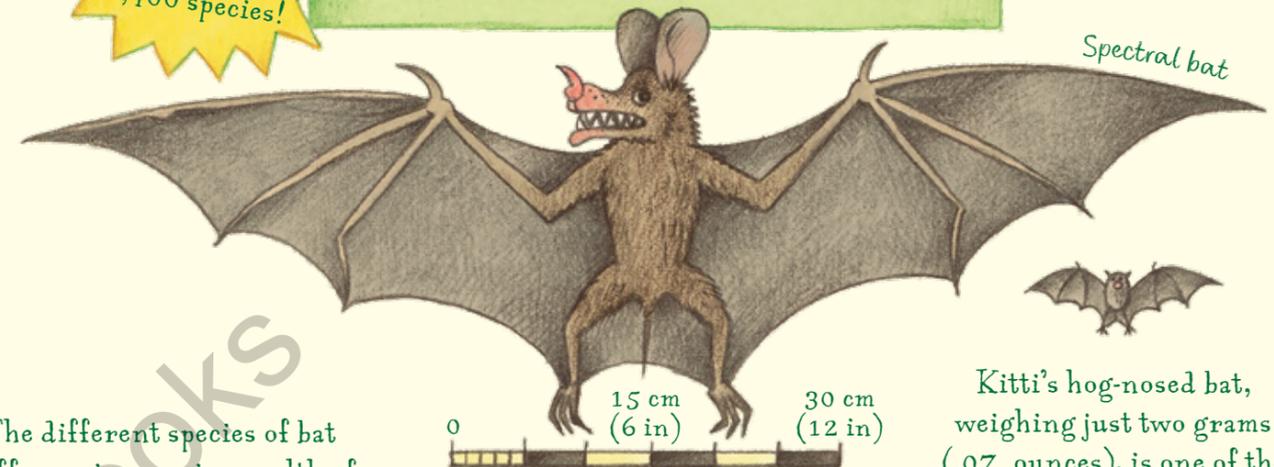
Bats and flying foxes (also known as fruit bats) all belong to the Chiroptera order and are the only mammals that can fly. While bats are found almost all over the world—except for a few remote islands and polar regions—flying foxes live primarily in the southern hemisphere, in Africa, Asia, Australia, and Oceania.



Unlike bats, flying foxes have very good eyesight, but their good sense of smell also helps them find sweet fruit. Usually they only drink the juice and spit out the rest. By doing so these herbivores spread the seeds and help the trees reproduce. What's more, whenever they go nectar nosing, pollen clings to their fur and they pollinate other flowers. The function of the extravagant noses of some species is as yet unknown.

BATS

More than 1,400 species!



The different species of bat offer an impressive wealth of the most varied and bizarre nose shapes:

Kitti's hog-nosed bat, weighing just two grams (.07 ounces), is one of the lightest mammals in the world.



The uniquely shaped flaps of skin that form the nose help bats find their way around: they amplify, focus, and direct the high, ultrasonic calls that they send out through their noses. This way they can better orient themselves by the echoes that result and can nab insects in midair.




ELEPHANT SEAL

Mirounga angustirostris / *Mirounga leonina*

Southern elephant seals are the largest carnivores in the world!



Southern elephant seals swim in the waters around Antarctica. The northern species—somewhat smaller, but with a longer proboscis—lives between California and Alaska. Both are usually found in the ocean swimming alone. They can hold their breath for more than an hour and dive to a depth of up to two kilometers (1.25 miles).

At the start of the twentieth century there were only about a hundred northern elephant seals left. They were given protected status so that their population could recover. Today there are new problems: these giant seals are harmed by pollution and the warming of the ocean caused by climate change.

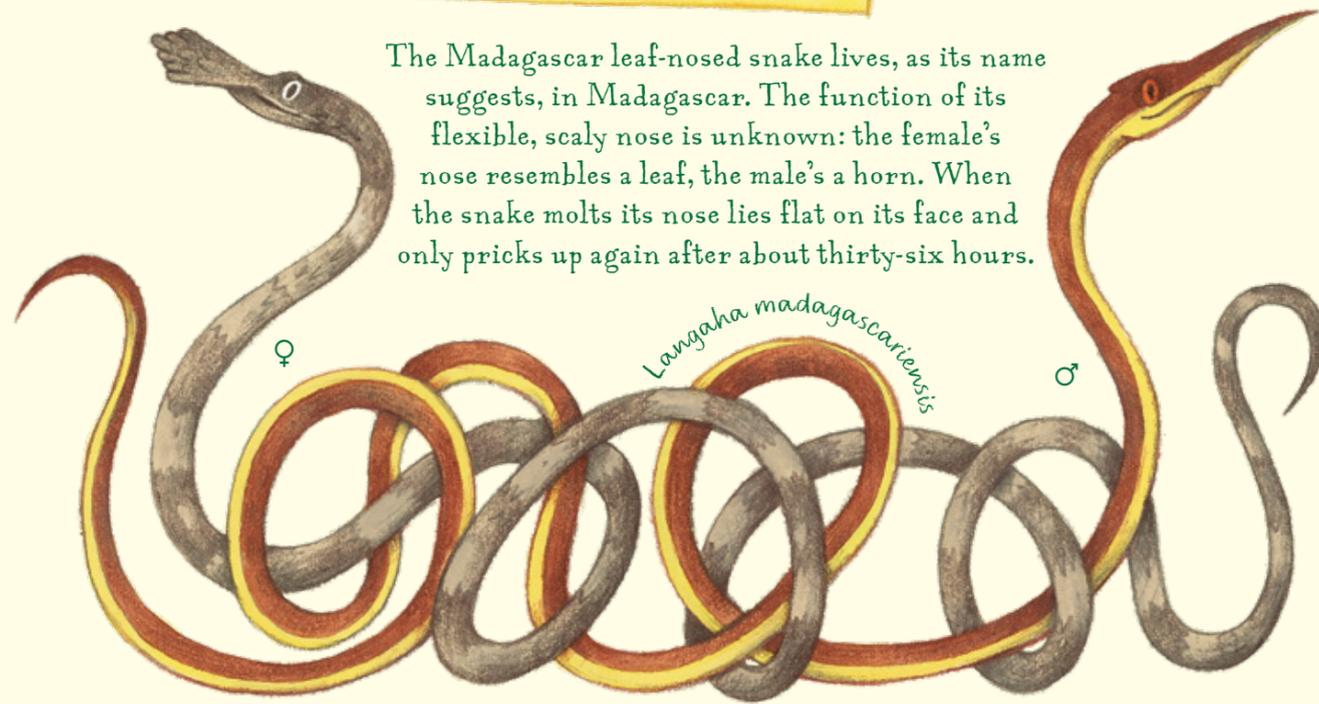


During mating season and when molting, elephant seals meet in large groups on the coast. They can store moisture in their noses for these occasions. A bull looking for a mate can be recognized by his pumped-up proboscis, which he uses to amplify the volume of his impressive mating calls. This attracts females and scares off rivals. Often the rivals end up fighting, which leaves the bulls so exhausted that afterward they fall asleep on the spot.

AMPHIBIANS AND REPTILES

MADAGASCAR LEAF-NOSED SNAKE

The Madagascar leaf-nosed snake lives, as its name suggests, in Madagascar. The function of its flexible, scaly nose is unknown: the female's nose resembles a leaf, the male's a horn. When the snake molts its nose lies flat on its face and only pricks up again after about thirty-six hours.



PIG-NOSED TURTLE

The pig-nosed turtle is also known as the pitted-shell turtle or the Fly River turtle. It lives in rivers in New Guinea and Australia. To breathe, it sticks its nose out of the water like a snorkel. It can smell very well with its sensitive little snout and can also detect the slightest movements under water. This helps this omnivore to find fish and crabs in murky water.



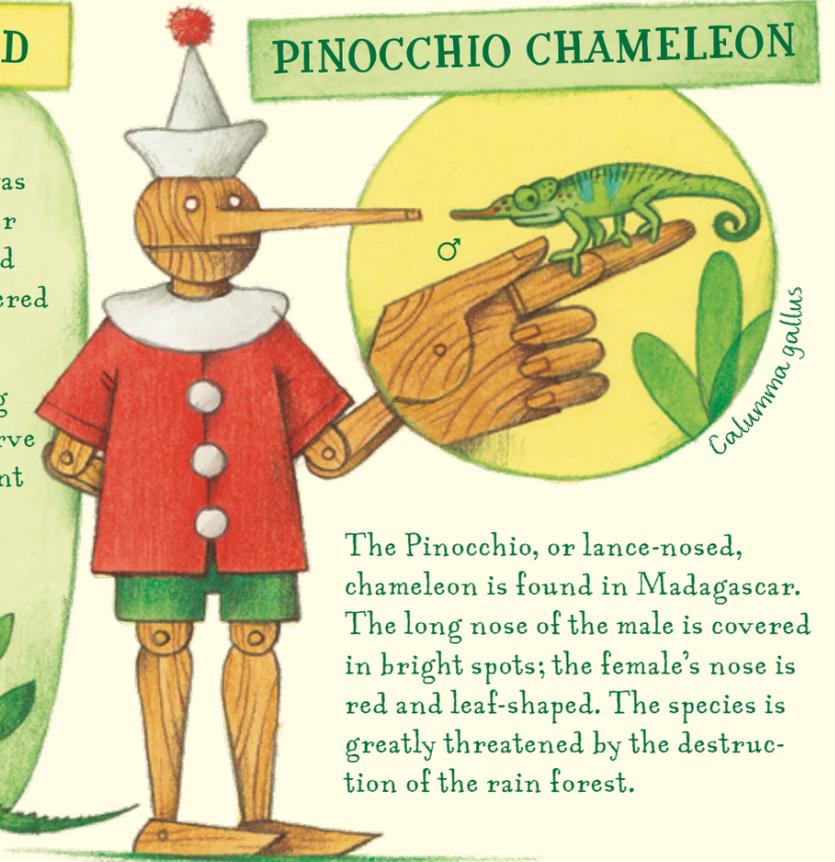
PINOCCHIO LIZARD

The Pinocchio lizard, also known as the horned anole, was discovered in 1953. Soon after that, though, it was considered extinct, until it was rediscovered in Ecuador in 2005.

The purpose of the male's long nose is unknown. It might serve as an ornamental feature meant to impress the short-nosed female.

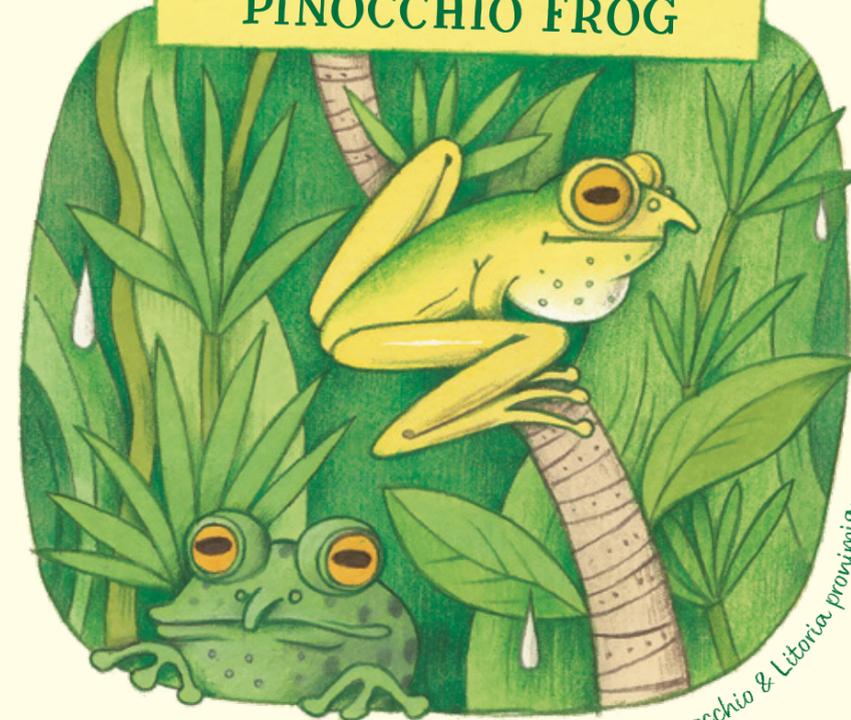


PINOCCHIO CHAMELEON



The Pinocchio, or lance-nosed, chameleon is found in Madagascar. The long nose of the male is covered in bright spots; the female's nose is red and leaf-shaped. The species is greatly threatened by the destruction of the rain forest.

PINOCCHIO FROG



In the alpine forests of New Guinea live various species of tree frog with elongated noses. The northern Pinocchio tree frog was first reported in 2019. When it croaks, its nose points straight ahead; otherwise it hangs down toward the ground. Researchers surmise that the nose helps the frogs recognize others of their species: after all, more than 450 different species of frog live on New Guinea, and there are sure to be more waiting to be discovered.

BIRDS



These seabirds are known as “tubenoses” have very special noses indeed. After fishing in the salt water, they can expel excess salt through their nasal glands. Some of them can also defend themselves by spraying a fishy stomach oil at their predators from several meters away.

For a long time it was thought that birds did not have a well-developed sense of smell. They were even considered anosmatic, meaning that they couldn't smell at all. But more recent research shows that some birds can actually smell quite well. They use their noses to find their way around, and can recognize their mates by their personal odor.

The kiwi is unique in having its nostrils located on the top of its long bill.

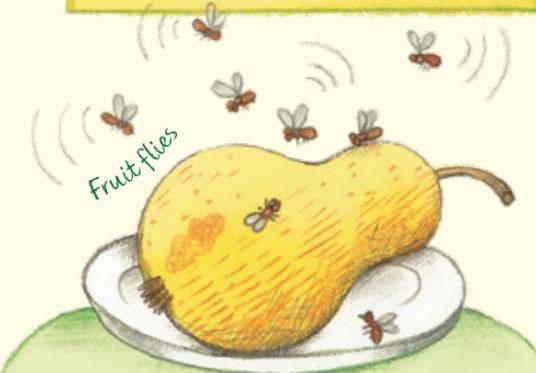


FISH



The European eel possesses one of the best senses of smell in the animal kingdom. It is believed to use it not only to track down prey, but also to find its way around during migration, when it travels several thousands of kilometers. Other fish presumably can't smell as well, but were still named for their long-nosed appearance.

INSECTS



Although certain insects seem to have impressively gigantic noses, their actual olfactory cells are found on the fine little hairs on their antennae or proboscises. Thanks to these receptors, moths like the domestic silk moth can sense the presence of their mates from several kilometers away. The sniffing capabilities of fruit flies are even being studied in order to develop electronic noses. Scientists hope to be able to use these devices to detect certain illnesses by analyzing breath samples.





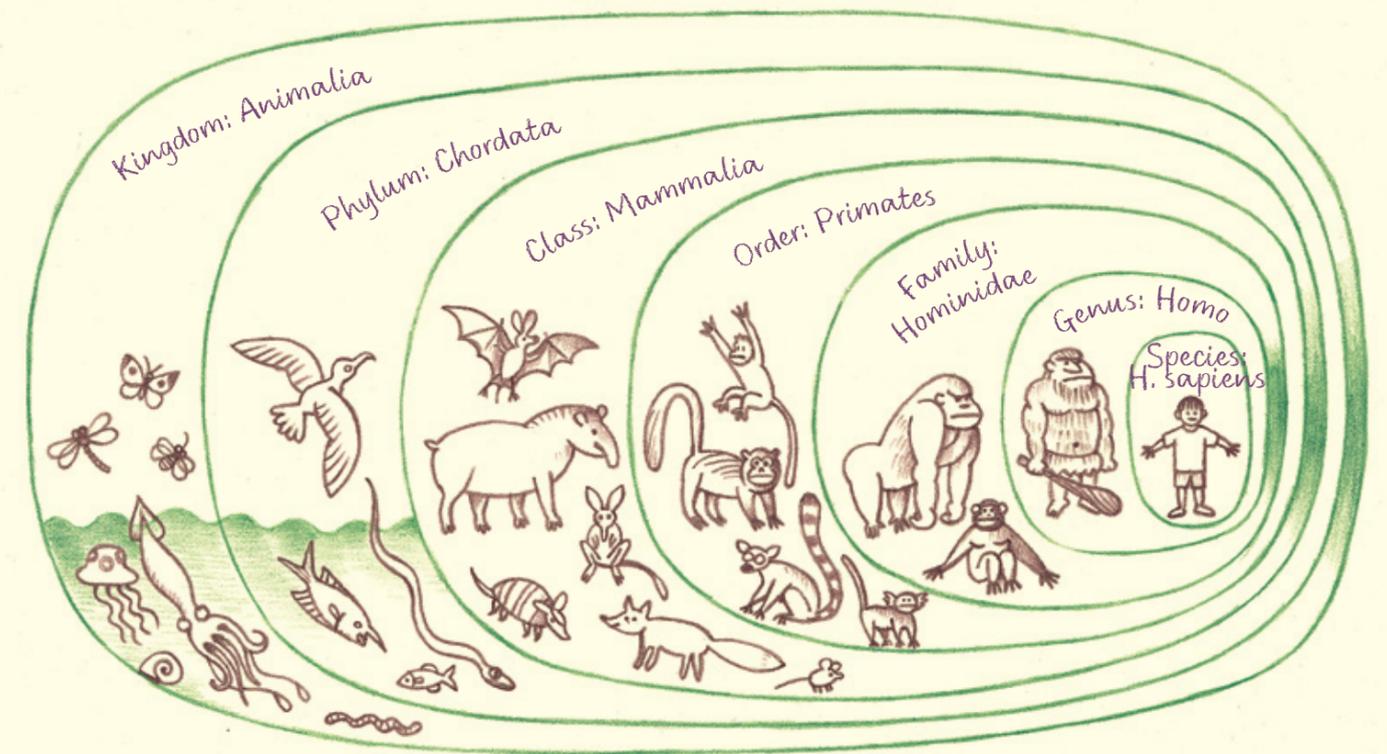
GLOSSARY

Amphibians (class): Land animals that can only reproduce in water—like frogs, which are born as tadpoles.

Binomial nomenclature: This naming system, invented in the eighteenth century by the Swedish naturalist Carl Linnaeus, is recognized all over the world and avoids misunderstandings between people who speak different languages. The binomial name of an animal species is written in Latin and made up of two parts: first comes the name of the genus, and after that the name of the species. If there is a third name, it refers to a subspecies. The person who first discovers a species and documents it for the scientific community gets to choose a name. It

is considered crude to use one's own name, so usually scientists will choose a name that honors an important colleague (*Zaglossus attenboroughi*), thanks a person of influence for their commitment to protecting the environment (*Hyloscirtus princecharlesi*), or pays tribute to their favorite actor (*Conobregma bradpitti*). Some animals are even named after characters from books that the animals' appearance calls to mind (*Litoria pinocchio*). Others describe where the animal lives (*Tamandua mexicana*). The scientists who make the discovery are free to choose whatever name they like, so long as they stick to the international naming rules. Only in a few exceptional cases can a binomial name be changed later on.

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Breed: A domestic animal breed is an animal bred by humans and having exterior and behavioral traits that are distinct from other animals of the same species. The term is a matter of dispute, but is often used to mean the same thing as *subspecies*; the word *breed* is used in a domestic-animal context, while *subspecies* is used in a wild-animal context.

Bull: The name for the male of certain species, for example elephants and elephant seals.

Carnivores (order): Carnivores (Carnivora) are an order within the class of mammals (*Mammalia*). The different species of cat and dog belong to this order. They have strong jaws and often prey on other animals. But not all meat eaters are in the Carnivores order. And some members of Carnivora are omnivores (like the coati) or even herbivores (like the giant panda).

Cloaca: A single bodily orifice for the excretory and sex organs. The echidna and platypus are monotremes, belonging to the order of Monotremata, or animals with cloacae, but some animals in other orders (birds, reptiles, amphibians) also have cloacae.

Ecosystem: The interconnected life of different plants and animals in a particular place. If an ecosystem is in equilibrium, then almost all species are doing well and the plant and animal populations are stable. Many of the animals in this book are important for their ecosystems because they spread plant seeds with their dung or dig up the soil to loosen it and help it become richer in nutrients. What's more, some of them help stabilize the populations of the animals they prey on: without predators, the number of prey animals would increase far too much. The extinction of a single species can sometimes put the equilibrium of an entire ecosystem in jeopardy. Often unintentional human influences can upset the equilibrium of

an ecosystem and put all the living things that are part of it at risk.

Electroreception: Humans are familiar with only five senses for perceiving the world: sight, hearing, smell, taste, and touch. Some animals, such as the echidna, have an additional sixth sense: electroreception. With it they can perceive the electric fields that surround every living organism, which allows them to locate prey or become aware of predators in time to protect themselves.

Gland: An organ that excretes a fluid. Often this secretion has a very particular smell that is meant to mark the animal's territory or attract potential mates.

Locate: To find out where something is.

Mammals (class): As a rule, a mammal is an animal that gives birth to live young and then nurses them. There are, however, a few exceptions, like the egg-laying echidna.

Marsupial (infraclass): A mammal that is born alive but must develop further in its mother's pouch before it reaches viability. Bilbies and koalas are marsupials.

Musk: A strong-smelling fluid that animals in the *Moschus* genus—known commonly as musk deer—produce. Similar animal odors produced by other species are often described as musk-like and are usually meant to attract mates.

National park: A protected area in which nature is shielded from environmental pollution and other negative human influences.

Nose: The name for the olfactory organ of fish, amphibians, reptiles, birds, and mammals. With their noses, animals can perceive smells that

are picked up by sensory cells and processed in the brain. Many animals breathe through their nose. Some even use their nostrils exclusively for breathing. Fish, on the other hand, smell with their noses, but do not breathe through them. Some of the “noses” in this book aren't olfactory organs at all but merely body parts that only look like noses from the outside.

Odor molecules: These are what smells are made of.

Olfactory sense: The ability to perceive certain smells. The number of olfactory cells in the olfactory mucosa determines how many different odors an animal can recognize, but a high number of cells doesn't necessarily mean that an animal can smell extraordinarily well; that also depends on how well-suited the cells are to perceiving certain odors. There is, therefore, no single super-smeller: some animals are especially good at smelling things from far away, while others are good at distinguishing between very similar smells. And, incidentally, not every creature needs a nose to smell: insects smell with the help of sensory cells located on tiny hairs on their body. Other animals get extra help from the Jacobson's organ located in their mouth, like snakes, which collect odor molecules from the air on their tongues. But even some mammals have a Jacobson's organ in addition to their nose for added intensive smell perception.

Organ: A part of the body that performs a certain function.

Osmatic: Animals that have a sense of smell are *osmatic*. The word comes from the ancient Greek word for “smell.” Macrosmatic animals find their way around primarily by using their sense of smell and usually can't see particularly well. Microsmatic animals can smell, but mainly find their way around by sight. Anosmatic animals have a stunted sense of smell and either can barely smell or can't smell

at all. They find their way around by hearing or using some other sense.

Population: The number of living animals of a given species. If there get to be fewer and fewer animals, the population decreases and the species is threatened with extinction. Protective measures can help the population of certain animals increase again and can keep them from going extinct.

Prey: An animal that is hunted and eaten by a predator. Ants are prey: from their perspective, the aardvark is a predator. At the same time, however, the aardvark is prey to its predator, the brown hyena.

Reptiles (class): Reptiles are land animals (with the exception of turtles and sea snakes) that breathe through lungs but have no feathers, hair, or slimy skin. The word *reptile* comes from the Latin word for “crawl.”

Resonating body: A hollow chamber that amplifies the waves that form a sound and makes that sound louder and more impressive—like the body of a guitar.

Rut: The mating season for ungulates, or animals with hooves.

Scent: To detect something by smell. Prey animals will often carefully sniff around before leaving their burrows in order to find out if the coast is clear. Conversely, predators use their sense of smell to pick up the scent of their prey.

Sound: Something that can be heard. We humans only hear sound within a certain range. Extremely high pitches that are beyond our hearing are called ultrasounds. Bats can hear ultrasonic pitches and use their echoes to find their way around. Extremely low pitches that are beyond our hearing are called infrasounds. Elephants and whales, for example,

can communicate with each other over long distances by using infrasound.

Species: Animals that belong to the same species exhibit a multitude of shared traits and can only reproduce with each other. There are, however, a few exceptions to this second rule. When two different species interbreed, their offspring are called hybrids. Often in science there is disagreement, and the way animals are classified is continually updated as more is found out about them. As a result, the names for different species are sometimes confusing: elephant shrews are shrews, not elephants, and the stink badger isn't a badger at all.

Each species belongs to a larger genus, which in turn belongs to a larger family. Several families make up a class, several classes are in an order, and so on. The farther out you go, the fewer traits the animals have in common with each other, until finally you get to kingdom, where the only thing the organisms belonging to it have in common is that they're all animals.

Species conservation: The protection by humans of animals living in the wild, often in the form of laws. The International Union for the Conservation of Nature (IUCN) uses its Red List to show the current risk of extinction for different species and can serve as a guideline for lawmakers, showing them which species are in urgent need of protection.

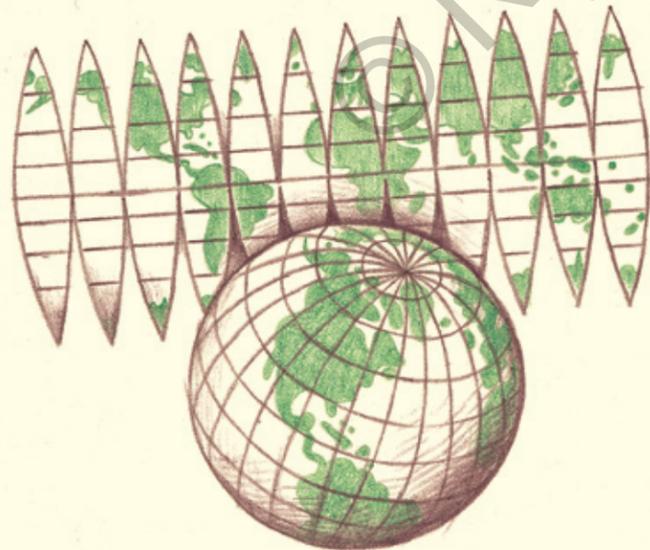
Trunk: An organ that developed from the fusing together of the nose with the upper lip. In this strict sense, only elephants and tapirs have true trunks, but the prominent snouts and noses of other animals are also frequently called trunks. Another word for trunk is *proboscis*.

Zoology: The study of animals.

NOTES

SOURCES: The information in this book is drawn from various sources: *Handbook of the Mammals of the World* edited by Don E. Wilson and Russel A. Mittermeier (9 volumes, 2009-2019), *Bats: An Illustrated Guide to All Species* by Marianne Taylor (2019), and periodicals such as *National Geographic*. The information about the giant anteater comes in large part from interviews with the anteater researcher Lydia Mücklinghoff. Finally, the encyclopedia *Grzimeks Tierleben* (13 volumes, 1967–1972) served as a source of inspiration.

WORLD MAP: The map at the very front of the book is modeled on the AuthaGraph world map developed by the Japanese architect Hajime Narukawa, currently the most accurate representation of the earth's land masses and bodies of water. Narukawa came up with his map because the well-known depiction of the earth based on Gerhard Mercator's rendering from the sixteenth century is far removed from reality. Because the earth is spherical (or close to it), its image appears distorted on a flat map: in the Mercator projection, Greenland, for example, appears to be about the same size as Africa, even though the continent is in fact almost four times bigger than the island.



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LENA ANLAUF was born in the Ruhr region of Germany. Growing up, the Taschen-Brockhaus *Tiere* quickly became one of her favorite books, and she set up snail conservation areas in her backyard. Later on she studied book studies and philosophy in Mainz and Leiden and completed a further education course on pedagogy of literacy and literature as well as a remote course on children's and young adult literature at the STUBE in Vienna. Today she lives in Marburg, works as editorial director and editor at the kunstanstifter verlag, researches historical picture books, and writes and designs her own book projects. *Genius Noses* is her children's book debut.



VITALI KONSTANTINOV was born in Ukraine. As a child he saw the desman at the natural history museum and was fascinated. Vitali studied architecture, graphic art, painting, and art history, and has taught illustration courses at universities in several countries as well as numerous workshops for children. His work has been exhibited extensively, has received many prizes, and has been published in forty different countries. Most recently he was nominated for the Deutsche Jugendliteraturpreis. Today Vitali works as a freelance illustrator and author and lives in Marburg. He drew the illustrations for *Genius Noses* with drawing ink and colored pencil on watercolor paper.

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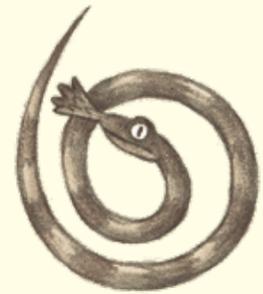
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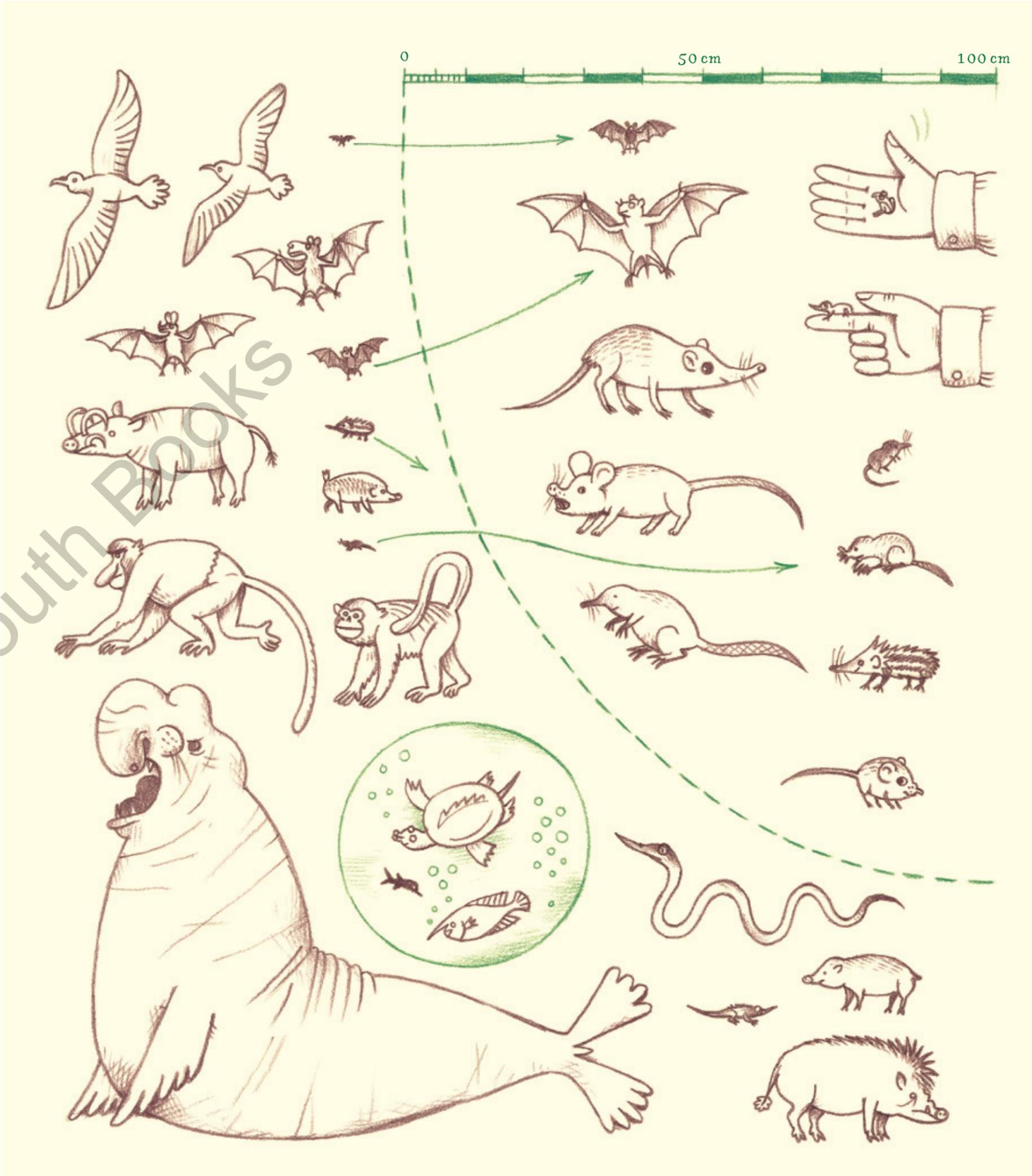
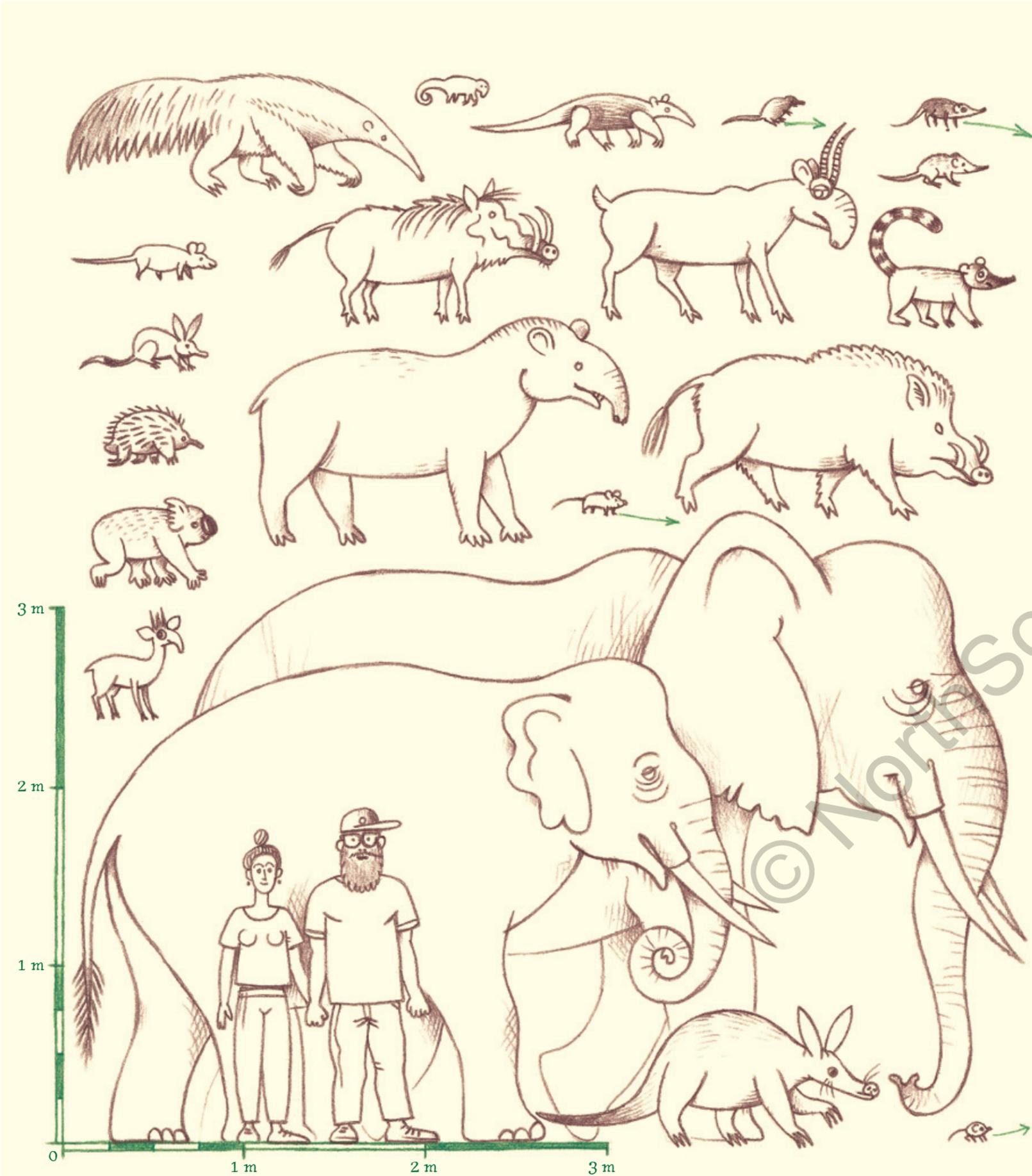
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