

ENGINEERED BY NATURE

# Born Survivors



pilot



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# Built to Survive!

Animals are **engineered** by nature to survive in their **habitats**. Special **adaptations**, or features, help keep baby animals safe while they grow.

Some babies are protected inside **eggs** or their parents' bodies. Others have physical features that help them hide or escape from danger. Some babies' parents keep them safe from **predators**. Other newborns survive by **instinct**. Many baby animals live in groups because it is safer. Some animals even completely change form as they grow!

## DID YOU KNOW?

A baby orangutan stays with its mother until it is about eight years old. She teaches her baby how to find food and stay safe.

A close-up photograph of an orangutan mother with reddish-brown fur, hanging from a tree branch. She is holding her young orangutan baby in her arms. The background is filled with green leaves and branches of the forest.

## FAST FACT

Orangutans have one baby at a time. That way, they can devote a lot of time and attention to it.

# Chicks



A hen lays an egg in a nest. She sits on the nest to keep the egg warm. The egg's hard shell protects the baby growing inside.

In the egg, the baby eats the yellow **yolk**. It uses this food as energy to grow.

## DID YOU KNOW?

Hens lay up to 10 eggs in a nest. The eggs stay in the nest because of their oval shape. If they roll out, they might get lost or break!



## FAST FACT

An eggshell has many very tiny holes in it. This lets air flow into the egg so the chick can breathe!

After three weeks, the chick is ready to **hatch**. It uses its beak to peck through the shell, then pushes its way out. Its damp feathers dry into fluffy, yellow **down**.

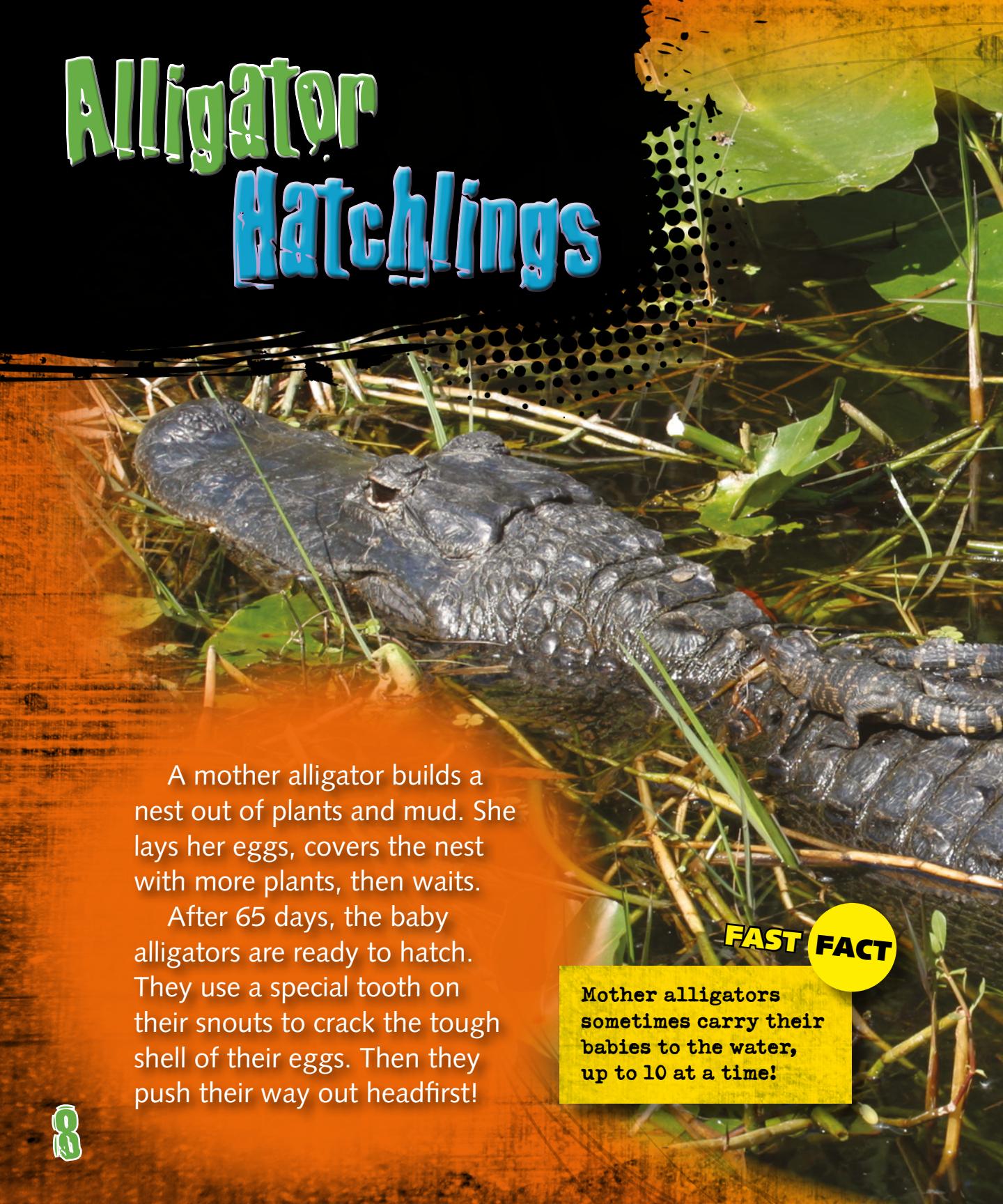
## ACTIVITY

### Engineering in Practice

Try this test to see why eggs are oval in shape!

- Get a hard-boiled egg and a ball that are about the same size.
- Roll each one along the floor, or down a very gentle slope.
- What do you notice? How does the shape of the egg affect how far it rolls?

# Alligator Hatchlings



A mother alligator builds a nest out of plants and mud. She lays her eggs, covers the nest with more plants, then waits.

After 65 days, the baby alligators are ready to hatch. They use a special tooth on their snouts to crack the tough shell of their eggs. Then they push their way out headfirst!

## FAST FACT

Mother alligators sometimes carry their babies to the water, up to 10 at a time!

The babies start to grunt. Their mother hears them and claws away the plants covering the eggs. Then the hatchlings scurry away from the nest and into the water.



### DID YOU KNOW?

Alligators cover their eggs with plants to hide them. Also, as the plants break down, they create heat. This keeps the eggs warm, which helps the babies inside grow!



# caterpillars



A tiny caterpillar bites a hole in its egg, then crawls out. It munches on leaves and grows bigger.

Soon, the caterpillar is too big for its skin. It wriggles out of its skin. The caterpillar has a new layer of skin underneath.

After about two weeks, the caterpillar hangs upside down from a stem. Its skin forms a hard case, called a **chrysalis**. Inside the chrysalis, something amazing happens. The caterpillar completely changes form! When the chrysalis opens, a butterfly emerges!



# Zebra Foals

A zebra foal is born feet first. It flops to the ground, then its mother licks its soft, striped fur clean.



## FAST FACT

Each year, some zebras travel more than 300 miles (482 kilometers) to find water. A foal joins its mother on this long journey.



Within 15 minutes, the foal stands up. It takes its first steps on its thin, wobbly legs. Within an hour, it can even gallop!

The foal follows its mother as she travels with the herd to find food and water. If a predator shows up, it is able to run away!

### DID YOU KNOW?

Each zebra has its own unique pattern of stripes. A foal learns to recognize its mother's stripes right away.

# Sea Turtle Hatchlings

Deep beneath the sand, sea turtle hatchlings break out of their eggs. They use their **flippers** to dig to the surface. This can take up to one week!

On the beach, they race toward the water in groups. It is a dangerous journey. They must make it to the water before predators eat them!

Once they are in the sea, they swim as fast as they can. They must get away from the shallow water, where they are in the greatest danger!

flipper

## DID YOU KNOW?

Some hatchlings wait until nighttime to leave the nest. In the dark, they are less likely to be spotted by hungry animals!



## FAST FACT

Female sea turtles swim hundreds of miles to lay their eggs. They will return to the beach where they were born to lay their own eggs!

# Baby Gibbons



When a baby gibbon is born, it has very little hair. It is helpless and needs to stay close to its mother. This is easier said than done!

Gibbons spend most of their time high in the trees. They use their long arms to swing from branch to branch.

## FAST FACT

A gibbon's long arms help it swing at speeds of up to 35 miles (55 kilometers) per hour.



## DID YOU KNOW?

Gibbons' hands are like human hands. They have four long fingers and a smaller thumb. Gibbons use their fingers like a hook to grasp branches.

As soon as a baby gibbon is born, it uses its long fingers to grasp its mother's fur. It clings tightly to her body as she swings through the trees.

# Polar Bear Cubs



In the fall, a female polar bear digs a **den** deep in the snow. Then she climbs inside.

During the winter, she gives birth to one or two cubs. Inside the den, the mother and baby are safe from the cold **arctic** air.

The cub drinks its mother's milk. It grows bigger and stronger. By spring, it has grown thick fur and a layer of fat to keep it warm. It is ready to leave the den and explore!

### FAST FACT

A newborn polar bear cub weighs about 1 pound (0.5 kilograms).

### DID YOU KNOW?

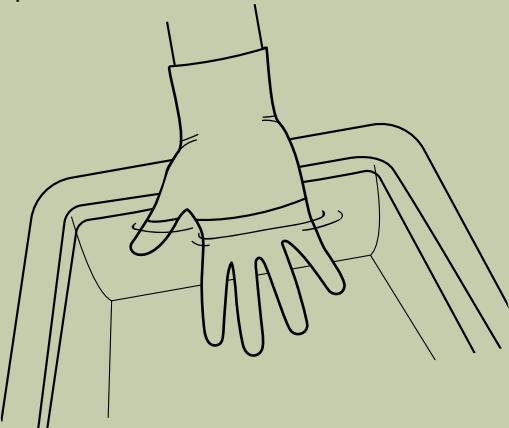
When a polar bear cub is born, it is small and helpless. Its eyes are closed and its fur is very thin. The cub cuddles with its mother to keep warm.

### ACTIVITY

#### Engineering in Practice

Try this cool test to see how a thick layer of fat helps keep a polar bear warm.

- Fill a rubber glove with margarine or shortening, which are vegetable fats.
- Put one hand inside the glove.
- Now place your hand in a bowl of cold water.
- What do you notice? The fat keeps the heat from escaping from your hand. This keeps your hand warm from the cold.



# Baby Boars



Newborn baby boars snuggle into their mother. She stays with the piglets day and night for two weeks. She protects them from wolves and other hungry predators.

When their mother leaves to find food, the piglets stay in the nest. Their striped fur **camouflages** them against the forest floor. Predators cannot see them!

## FAST FACT

Wild boars spend most of the day sleeping. They search for food at night.

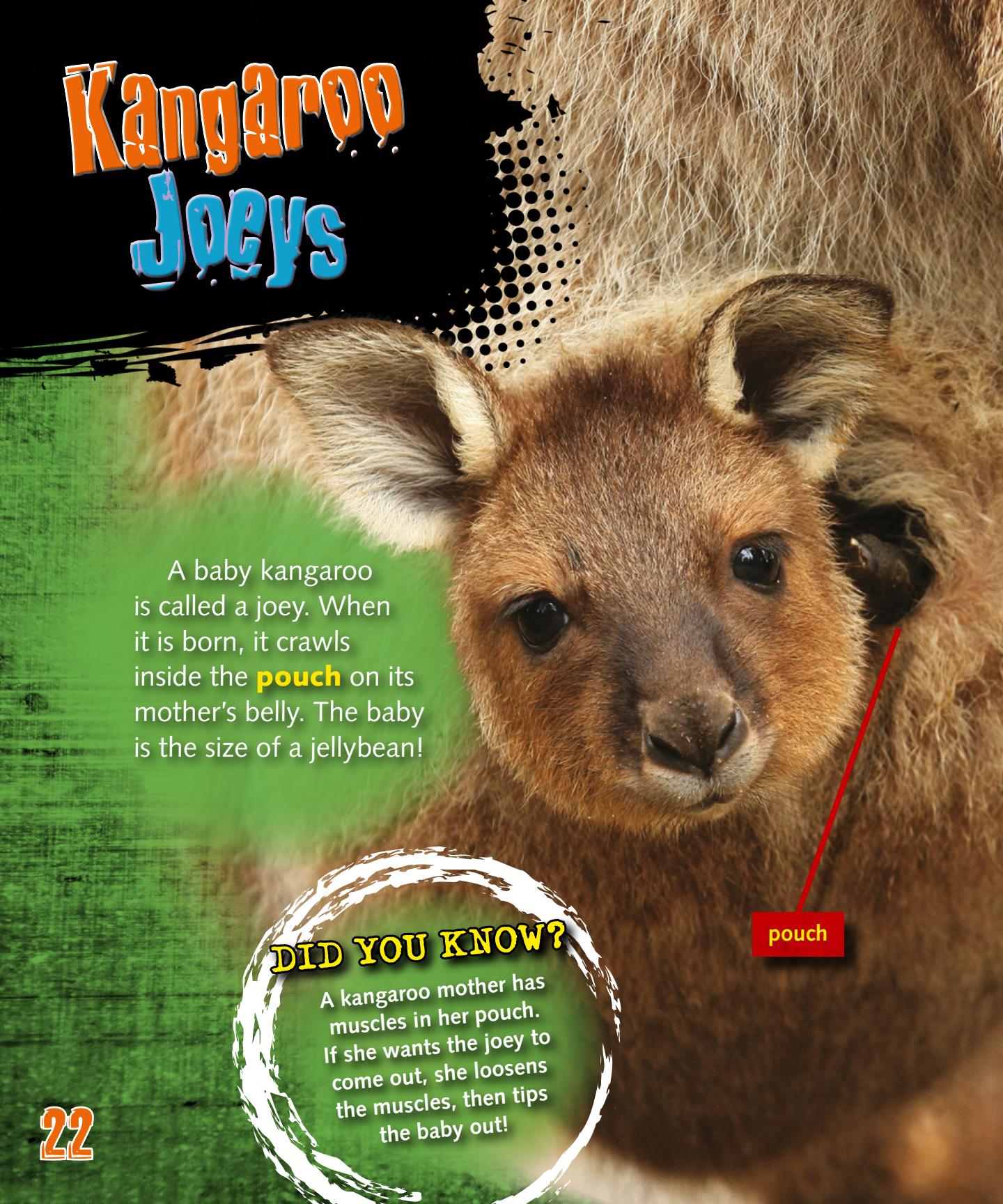
## DID YOU KNOW?

A female boar gives birth to four to six piglets. The piglets will lose their stripes when they are about four months old.



After two months, the piglets leave the nest. As they grow, they slowly lose their stripes. Soon they look the same as adult boars.

# Kangaroo Joeys



A baby kangaroo is called a joey. When it is born, it crawls inside the **pouch** on its mother's belly. The baby is the size of a jellybean!

## DID YOU KNOW?

A kangaroo mother has muscles in her pouch. If she wants the joey to come out, she loosens the muscles, then tips the baby out!

pouch



## FAST FACT

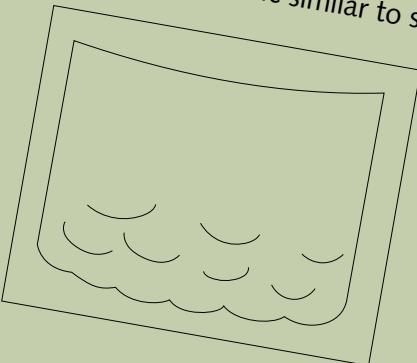
Most joeys stop going into their mothers' pouches by the time they are one year old.

## ACTIVITY

### Engineering in Practice

A kangaroo's pouch stretches as a joey grows. Make your own pouch to find the fabric that stretches best. You will need large squares of denim, cotton, and spandex, plus glue and marbles.

- Fold each fabric square in half. Glue the sides together. Leave the top open.
- Fill each pouch with as many marbles as possible.
- Which pouch holds the most marbles? How is that fabric similar to skin?



The joey stays in the pouch for at least six months. It drinks milk from its mother and grows bigger.

At last, the joey comes out of the pouch to explore. But it still dives back into the pouch for safety, or when it wants to nap!

# Tadpoles



A female frog lays a clump of eggs in shallow water. The eggs are covered with jelly. This jelly protects the tiny tadpoles growing inside.

When the tadpoles hatch, they have no legs. They use their long tails to swim. They have **gills** to breathe underwater.

Over time, the tadpoles change into frogs. They lose their gills, and their tails shorten. The tadpoles grow **lungs** and legs. Now, they can leave the water and survive on land, too!



### DID YOU KNOW?

In the water, a tadpole's long tail helps it swim away from predators. On land, a frog's strong back legs help it hop away!

### FAST FACT

Female frogs lay up to 4,000 eggs at one time!

# Sea Horse Fry

A close-up photograph of a sea horse's body, showing its dark, mottled skin and a prominent white, textured pouch on its ventral side. The sea horse is positioned diagonally across the frame, with its head pointing towards the top left and its tail towards the bottom right. The background is a soft-focus teal color.

A male sea horse has a special pouch on the front of his body. Inside, he carries precious cargo. His **mate** has left hundreds of tiny eggs in his pouch!

He swims to the ocean floor and the pouch seals shut. The eggs stick to the pouch wall. The **fry** inside the eggs get air and food through the wall.

Soon, the babies are ready to hatch. The sea horse opens his pouch, and the tiny fry swim out!

## FAST FACT

Sea horse fry are not much bigger than a piece of gravel or your smallest fingernail.



### DID YOU KNOW?

Sea horse fry spend their first two to three weeks of life drifting in the ocean. Sadly, less than 1 in 1,000 survive to become adults. The rest are eaten by predators.

# Engineered to Survive

Adaptations help baby animals survive. An egg's shape keeps it safe in the nest. Zebra foals are able to run to escape danger as soon as they are born. A baby boar's stripes help it hide from predators.

Some babies, such as turtle hatchlings, are more likely to be eaten by predators. Having many babies at one time helps these **species** survive. With their adaptations, baby animals can grow up and have families of their own!

## DID YOU KNOW?

Adélie penguins use piles of stones to build nests. This keeps their eggs and chicks off the ground. If temperatures rise and snow melts, the nest does not flood!



## FAST FACT

Adélie penguins work together to care for their young. One parent catches food while the other stays in the nest.

# Glossary

**adaptations**—features or characteristics that help an organism survive

**arctic**—related to the icy region around the North Pole

**camouflages**—makes something hard to see because of colors or patterns that blend in with the environment

**chrysalis**—the hard case in which a caterpillar changes into a butterfly

**den**—an animal's hidden home

**down**—soft, fuzzy feathers

**eggs**—oval or round objects laid by some female animals; eggs usually contain embryos that develop and grow and hatch into baby animals.

**engineered**—designed and built

**flippers**—wide, flat limbs used for swimming

**fry**—a group of newly hatched fish

**gills**—body parts that an aquatic animal uses to breathe underwater

**habitats**—the natural areas where living things live

**hatch**—to break out of an egg

**instinct**—the natural ability to do something without being taught how to do it

**lungs**—body parts used to breathe air

**mate**—an animal's partner

**pouch**—a pocket of skin used to carry baby animals

**predators**—animals that catch and eat other animals

**species**—groups of living things that can reproduce with each other

**yolk**—the yellow food part inside an egg

# To Learn More

## AT THE LIBRARY

Conklin, Wendy. *Life Cycles*. Huntington Beach, Calif.: Teacher Created Materials, 2015.

James, Emily. *Do Cows Have Kittens?: A Question and Answer Book about Animal Babies*. North Mankato, Minn.: Capstone, 2016.

Owings, Lisa. *From Egg to Sea Turtle*. Minneapolis, Minn.: Lerner, 2016.

## ON THE WEB

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2. Enter “born survivors” into the search box.
3. Click the “Surf” button and you will see a list of related web sites.



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