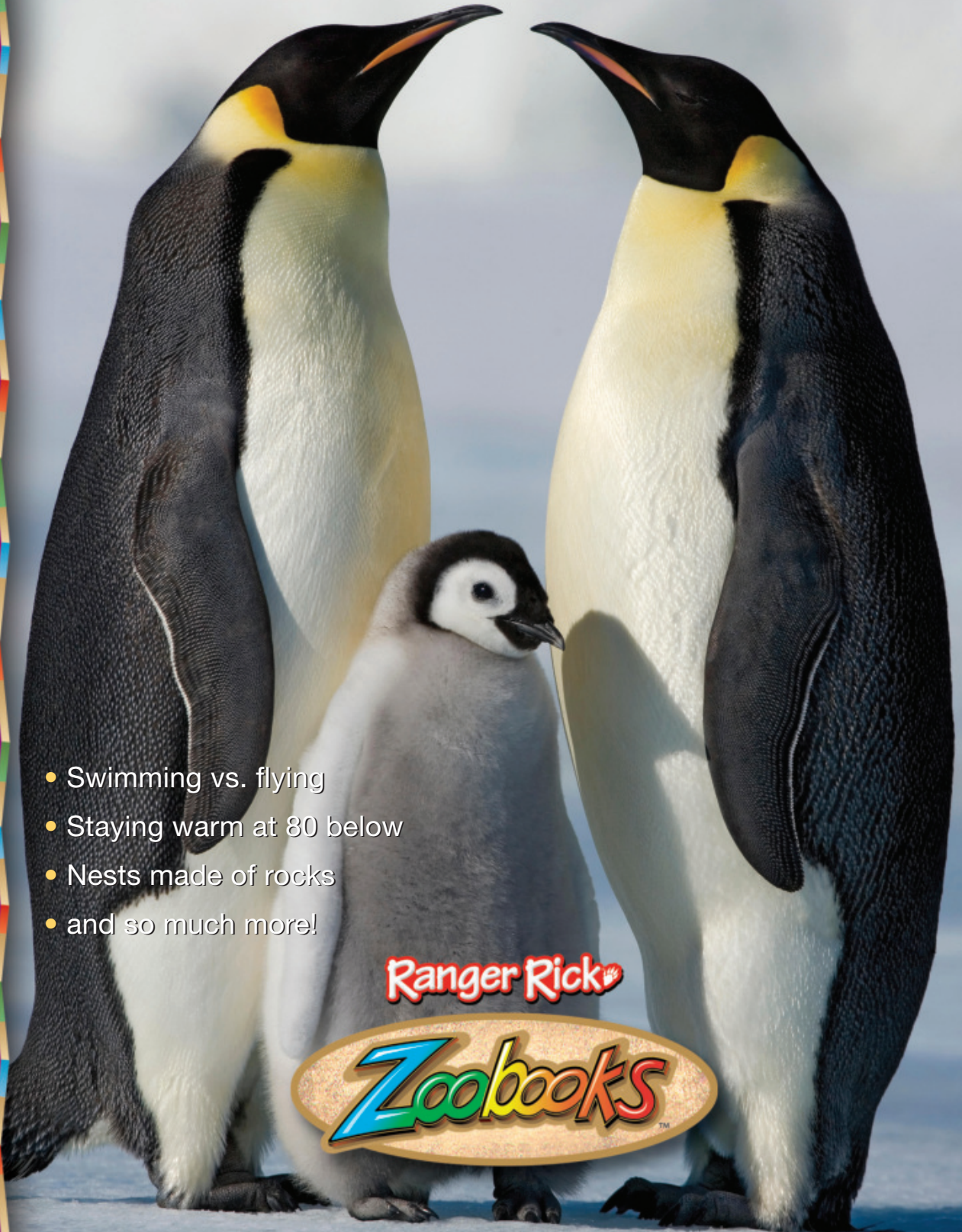




PENGUINS



- Swimming vs. flying
- Staying warm at 80 below
- Nests made of rocks
- and so much more!

Ranger Rick



It's easy to see why people like penguins. Penguins sometimes look like people as they waddle around, and their feathers can look like the black-and-white formal suits that people wear at weddings. Penguins also seem to like people, or at least not to mind them. Instead of running away, they might look a human in the eye, as if to say hello!

Beyond all this, penguins are simply beautiful animals. Their feathers are sleek and shiny. And many have handsome patterns or colorful feathers on their heads that make them look very splendid indeed.

Male and female penguins of each species look very much the same. The males may be a little larger than the females, and their beaks may be a little bigger. But it's very hard to tell a male from a female just by looking at them.

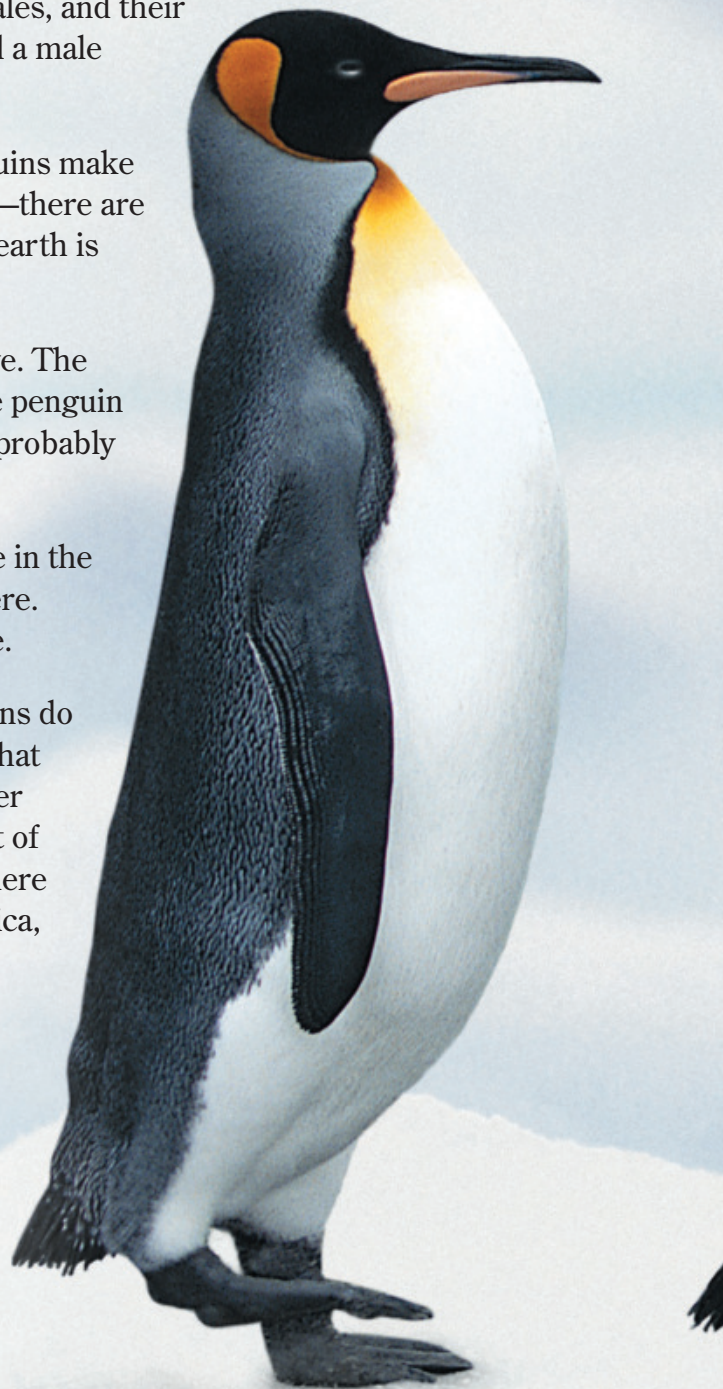
As most know, penguins cannot fly. In fact, penguins make up the largest family of flightless birds in the world—there are 18 living species. The total number of penguins on earth is estimated at over 30 million.

Nobody is really sure how long penguins can live. The average lifespan is thought to be 15 to 20 years. One penguin lived 41 years in captivity. Penguins outside of zoos probably don't live nearly that long.

As the map at the right shows, all penguins live in the southern half of the earth—the Southern Hemisphere. There are no penguins in the Northern Hemisphere.

Many people are surprised to learn that penguins do not always live in cold places. There is one species that lives right on the Equator, where it can get hot. Other penguins live in places where it is warm at least part of the year, such as the coast of South America. And there are penguins living in southern Australia, South Africa, and New Zealand.

Some penguins live on islands inside the Antarctic Circle during the summer, but migrate to warmer places to spend the winter. They may swim thousands of miles. Only two species of penguins (Adelies and Emperors) live in very cold areas all year long.



Orange areas
are places
penguins live.



There's a lot of variety in the penguin family. Many people think that all penguins look alike, but nothing could be further from the truth.

Every species has its own unique markings and colors. And penguins come in many different sizes.

The largest are the emperor penguins, and the smallest are the little blue penguins. (See if you can find them in the picture.) A full-grown emperor can stand almost 3½ feet tall. And it can weigh more than 90 pounds. Little blue penguins are only about 16 inches tall. And they weigh less than 2½ pounds.



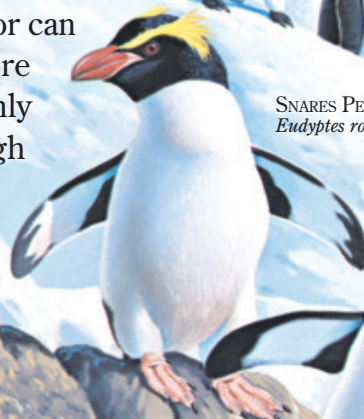
SOUTHERN
ROCKHOPPER
PENGUIN
Eudyptes chrysocome



AFRICAN PENGUIN
Spheniscus demersus



ADELIE PENGUIN
Pygoscelis adeliae



SNARES PENGUIN
Eudyptes robustus



ERECT-CRESTED PENGUIN
Eudyptes sclateri



EMPEROR
PENGUIN
*Aptenodytes
forsteri*



CHINSTRAP PENGUIN
Pygoscelis antarcticus



FIORDLAND PENGUIN
Eudyptes pachyrhynchus



YELLOW-EYED PENGUIN
Megadyptes antipodes



KING PENGUIN
Aptenodytes patagonicus

MACARONI PENGUIN
Eudyptes chrysolophus

ROYAL PENGUIN
Eudyptes schlegeli

GENTOO PENGUIN
Pygoscelis papua

MAGELLANIC PENGUIN
Spheniscus magellanicus

HUMBOLDT PENGUIN
Spheniscus humboldti

GALAPAGOS PENGUIN
Spheniscus mendiculus

LITTLE BLUE PENGUIN
Eudyptula minor



The body of a penguin is made for swimming in the ocean and catching food underwater. Most penguins can swim faster and dive deeper than any other birds.

On these pages, you will see that there is a direct connection between the wonderful swimming abilities of penguins and the fact that they cannot fly. In order to swim very well, penguins had to give up some of the things that make it possible for other birds to fly. For example, penguins

actually need wings that are too small for flying. And they need bodies that are too heavy for flight, as shown below.

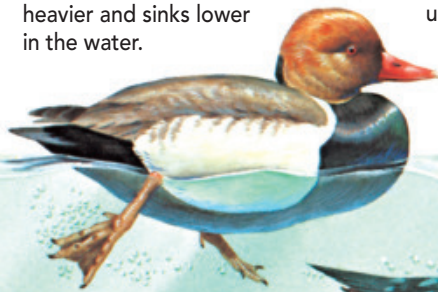


Flying birds need large wings to hold them up in the air. But small wings are better for birds that swim.

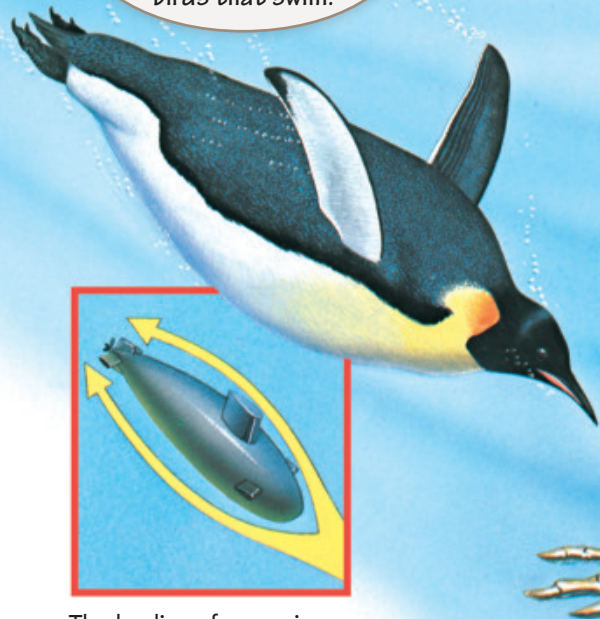


SEE FOR YOURSELF why the heavy body of a penguin is better for swimming and diving than the light body of a flying bird. Put two containers in water. Leave one empty and put some sand in the other. The body of a penguin is like the sand-filled container. It is heavier and sinks lower in the water.

Now push down slowly on both containers, using equal force. You will see that the sand-filled container is easier to push down in the water. In the same way, it is easier for a penguin to dive and stay underwater than it is for a lighter bird.

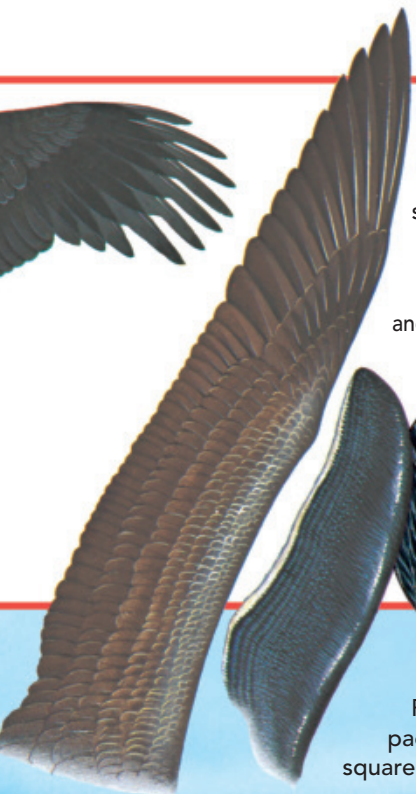


Light birds, like the duck above, float high in the water. They can only use their feet to push them when they swim. Heavier penguins float lower and can use their powerful wings to push them. This is one reason why penguins can swim much faster.



The bodies of penguins are shaped like submarines. This streamlining helps them to cut through the water with ease.

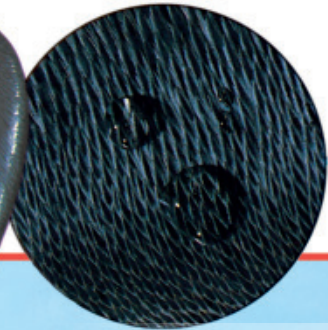
Flying birds often have hollow bones filled with air. This helps to reduce their weight and makes it easier to get off the ground. But penguins have solid, heavy bones. This helps to increase their weight and makes it easier to swim and dive.



Flying Bird Wing

Penguin Wing

Large wings are clumsy in water. The long wing feathers bend and drag. This cuts down the swimming power. The small wings of penguins are stiff like paddles, and they are covered with very small feathers. They push better and provide more swimming power.

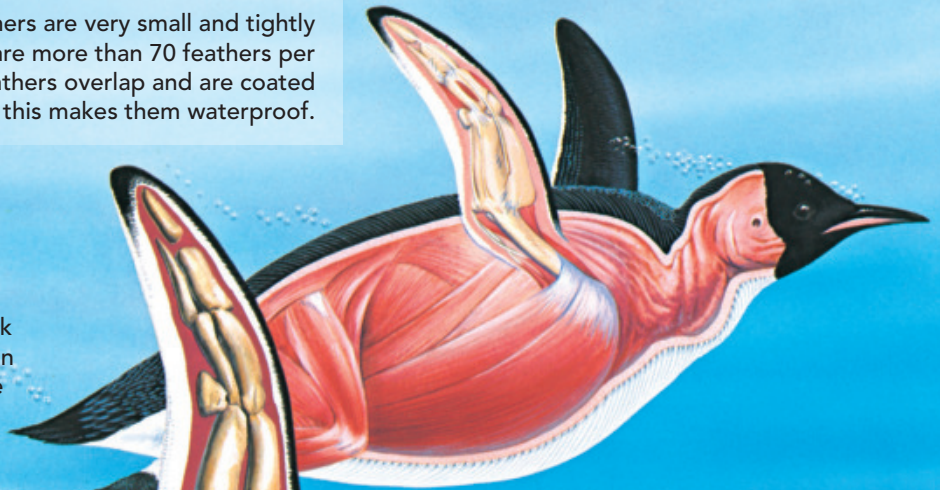


Penguin feathers are very small and tightly packed. There are more than 70 feathers per square inch. The feathers overlap and are coated with oil, and this makes them waterproof.



SEE FOR YOURSELF how a small wing is best for swimming. First, try to paddle water with a large sheet of paper ①. Like the large wing of a flying bird, the paper flops over and doesn't push water very well. Next, fold another sheet of paper five or six times and try paddling with it ②. The smaller and stiffer paper pushes better, like a penguin's wing.

A penguin's wings work like two paddles. They swing back and forth to drive the penguin through the water. They have large flat bones inside them to keep them from bending.



The muscles that move the wings are very strong. They are the largest muscles in a penguin's body.

Flying Bird Bone

Penguin Bone



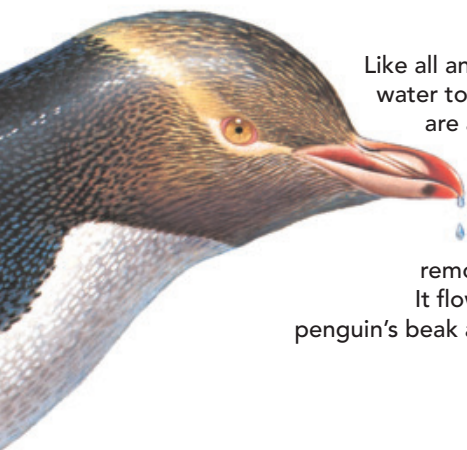
The large body of a penguin has plenty of room inside for holding food. Emperor penguins, like the one above, may eat 30 pounds of food at one time.

Penguins are at home in the ocean. They spend most of their time in the water, looking for food. And they seem to feel much more comfortable in water than they do on land.

Some penguins stay close to the shore and never swim too far from their breeding colonies. They fish during the day and come back to the shore every night. Other species may take long journeys across the open ocean. They even sleep in the water. Some kinds of crested penguins may stay at sea for five months or more. They may swim thousands of miles, and never come within sight of land the whole time.



Penguins are wonderful long-distance swimmers. They don't have to slow down to breathe! As they swim, they pop out of the water to gulp air and then plunge back again. Such swimming is called "porpoising" because porpoises sometimes swim like this, too.

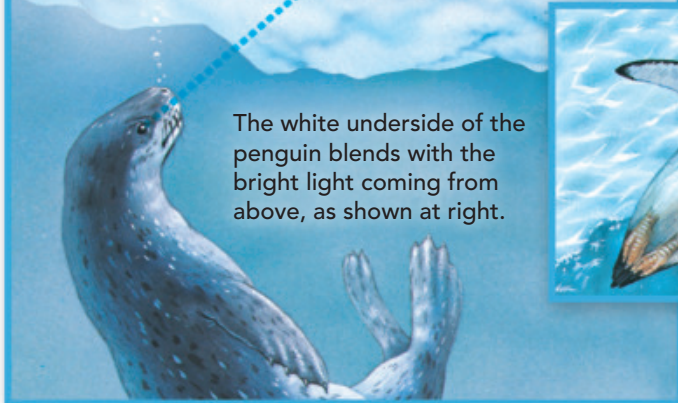


Like all animals, penguins need water to drink. But when they are at sea, the only water they can get is salt water. To remove the salt, they have special glands that remove it in a liquid form. It flows down grooves in a penguin's beak and drips off the end.

The black-and-white "suit" of a penguin is more than just cute. It helps to hide the penguin from predators when it is swimming in the ocean. When a penguin is swimming near the surface, its white underside makes it hard for leopard seals or other predators below the penguin to see it.



The white underside of the penguin blends with the bright light coming from above, as shown at right.





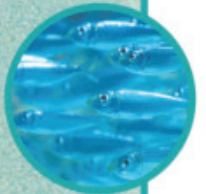
The normal swimming speed of most penguins is about 15 miles per hour. This is *four times faster* than the fastest human swimmer. Penguins swim about as fast as the bottlenose dolphins that many people have seen streaking around pools at oceanariums.

Penguins get all of their food from the sea. They dive to catch fish, squid, and small shrimp-like animals called krill. When they have a choice, each kind of penguin seems to prefer one kind of food. For example, Adelie penguins like krill, and African penguins like fish. But all penguins will usually eat whatever happens to be available.

Krill



Fish



The favorite foods of penguins are found at different ocean depths. So different kinds of penguins usually dive to different depths to find the food they like best. Adelies stay close to the surface, where krill is plentiful. Some crested penguins dive deeper to find fish.

Squid



And emperor penguins can dive over 1,500 feet down to catch large squid. Emperors dive deeper than any other bird.



The ocean can be a dangerous place for penguins.



Many predators in the sea hunt penguins, including sea lions, fur seals, and killer whales. The most dangerous predator of all is probably the leopard seal. Leopard seals like the one above may eat more than 15 Adelie penguins a day. But they usually catch only weak or sick penguins. A healthy penguin can often swim fast and get away.

A gentoo penguin parade.



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On land, penguins are not as comfortable as they are in water. In fact, if they had a choice about it, most penguins would probably never come out of the water. But they don't have a choice. They must come ashore for at least part of every year to have babies and grow new feathers. These things cannot be done in the ocean.

Life on land presents some problems that penguins do not have in water. Often, they must survive in very cold weather. And of course, they must be able to walk.

Of all the penguins, Adelie and emperor penguins have the best systems for controlling their body temperatures. An Adelie can actually be buried up to its neck in snow and still be as warm inside its body as a penguin that lives on the Equator.



Adelie and emperor penguins can stay alive in colder weather than any other animals on earth.

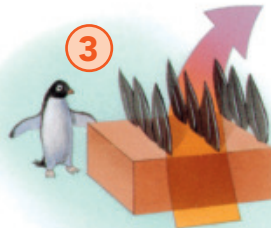


Like humans, penguins are warm-blooded. They make heat inside their bodies. To keep the heat from escaping, their bodies have several layers of insulation. On the outside, there are tightly packed feathers. Under that, there is a layer of air, then the skin, and under the skin a thick layer of fat called *blubber*. The layers of insulation are like the layers of clothing you put on when you want to keep warm.

But the wonderful insulation of penguins can cause problems when the weather turns warmer—as it sometimes does even in Antarctica. Then, penguins must have ways to let heat out of their bodies, or they might fry inside their own skins. One of the best ways that penguins use for getting rid of heat is shown below:



When a penguin's feathers are held tight against the body **1**, they help to keep body heat in—like a door helps to keep heat inside a hot room **2**.



But penguins can fluff up their feathers, so the heat can escape between the raised feathers **3**. This is like opening the door **4**.





To get ashore, most penguins just swim up to a beach and walk the rest of the way. But Adelie penguins have a spectacular way of getting out of the water. They swim very fast under the water and then shoot up in the air like little rockets. They can pop straight up into the air a distance of six feet or more. Because Adelies are only about two feet tall, that means they can jump three times their own height! How tall are you? Can you jump three times as high as you are tall?



Flying Bird

Penguins stand up straight like people because their legs are attached to their bodies at one end. An upright posture is the only way they can balance their bodies over their legs. If penguins leaned forward like other birds, they would fall on their faces.



Penguin



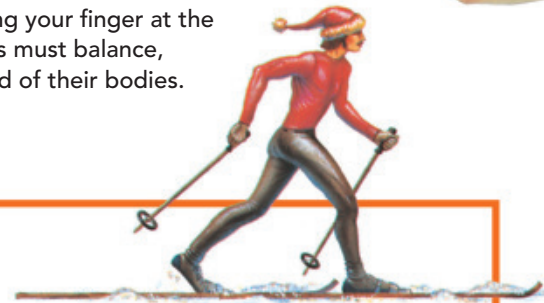
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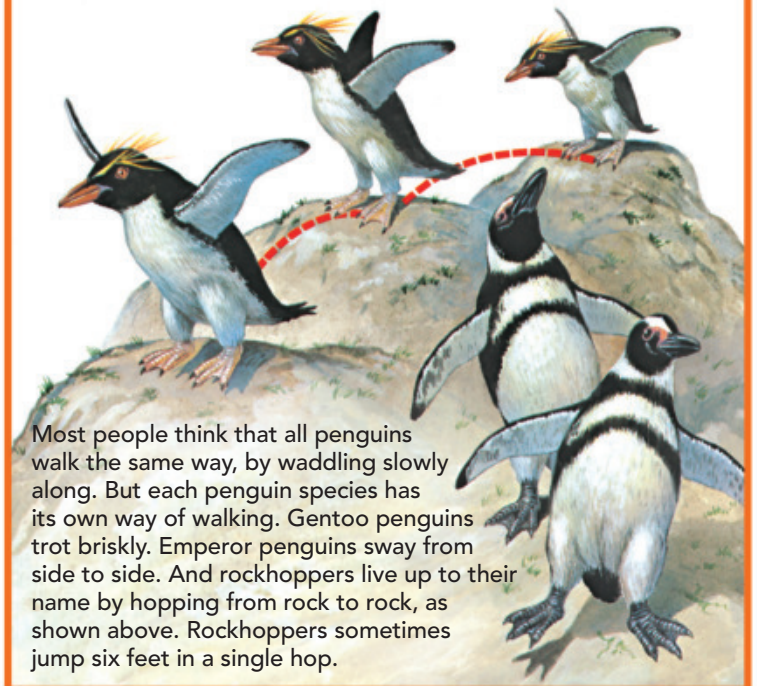
2



SEE FOR YOURSELF why penguins cannot walk like other birds. Take a ruler and pretend that it is the body of a bird. First, balance the ruler by placing your finger in the middle ①. This is the way most birds balance their bodies when walking, because their legs are near the center of their bodies. Next, balance the ruler by placing your finger at the end ②. This is the way penguins must balance, because their legs are at one end of their bodies.



When there is snow on the ground, penguins have a way of moving fast on land. They just fall on their stomachs and slide like little sleds. To keep moving, they push with their wings and feet, like a skier using poles. This is called *tobogganing*. Penguins can toboggan for many miles.



Most people think that all penguins walk the same way, by waddling slowly along. But each penguin species has its own way of walking. Gentoo penguins trot briskly. Emperor penguins sway from side to side. And rockhoppers live up to their name by hopping from rock to rock, as shown above. Rockhoppers sometimes jump six feet in a single hop.





On land, most penguins live in large colonies called rookeries. Some of the largest rookeries have over one million penguins in them. Penguins chatter and fight a lot in a rookery, so the noise can be louder than a crowd at a football game.

Baby penguins come into this world like all other birds. They hatch from eggs. Obviously, bird eggs cannot be laid or hatched in the middle of the ocean, so adult penguins must come ashore each year to have their babies.

Most penguins build nests and lay their eggs in them. Like other birds, they sit on the eggs and warm them until they hatch. And like other birds, penguin parents spend most of their time getting food for the young chicks after they hatch. Most penguin females have two chicks a year, although three eggs are sometimes laid.

As you will see below, king penguins and emperor penguins do things differently.



The males usually get to the nest area first. When the females arrive a few days later, both partners greet each other with a little ceremony. Adelle penguins usually raise their beaks in the air and spread their wings to say "hello."

Most penguins come back to the same place every year to have their babies. Some of them may swim thousands of miles to get there. Like human sailors, they probably use the sun to guide them.



EMPEROR PENGUIN AND CHICK



Emperor and king penguins don't build nests. Instead, they carry their eggs around on their feet. After the eggs hatch, the mothers and fathers take turns carrying the baby penguins.

When it gets cold, both eggs and chicks can be covered with a flap of skin that keeps them warm. Try www.zoobooks.com/learnmore to discover some other penguin family surprises.



Emperor penguin chicks would quickly freeze if their parents did not help to keep them warm.

Small bodies cool faster than big bodies, because they cannot hold heat as well. You can see this when you blow on hot cereal to cool it off. It is much easier to cool a small teaspoon of cereal than it is to cool a big bowl of it.



There are many different kinds of penguin nests. Some penguins that live in warmer places like to make their nests in holes in the ground. The chicks are very safe from predators in these nests.



When nests are built on top of the ground, they may be made of all sorts of materials. It really depends on what the penguins can find. If there is grass in the area, this will be used. And penguins sometimes use sticks, seaweed, feathers, or moss.

GENTOO PENGUINS

In the coldest places, there are no plants. So penguins just gather some rocks together for a nest.



The babies of emperor penguins are hatched in the worst weather on earth. Female emperors lay their eggs during the coldest months of the Antarctic winter. Then the males balance the eggs on their feet and keep them warm for six very cold weeks. The males huddle together for warmth. Blizzard winds of 120 miles per hour may blow, and the temperature may drop to 80 degrees below zero (Fahrenheit).



Baby penguins are hungry all the time. Their parents must make many trips to the ocean each day to catch enough fish to feed them. At times, the parents may feed their chicks two pounds of food per hour.



When they first hatch, baby penguins are covered with soft, downy feathers ①. At about six weeks of age, Adelie penguins start to molt, or shed these feathers ②.

By the time Adelie chicks are eight weeks old, they have shed their baby down. They now look very much like adult Adelies, except that the feathers under their chins are white ③.



The young Adelies grow very fast. By the time they are only two months old, they are large enough to go to sea.

The future of penguins looks good, when you first look at it. After all, there are millions of penguins alive today.

And most of them live in remote areas where people seldom bother them. Nobody hunts or traps penguins. Nobody makes coats out of their skins or carvings out of their beaks. In fact, all penguin species are totally protected by law.

If any animals are safe from extinction, it certainly should be penguins. But scientists are finding that even penguins cannot escape completely from some of the things that people are doing to the earth.

One problem has to do with the ocean. Penguins depend completely on the ocean for life. They get all of their food from it, and they spend most of their lives swimming in it. The millions of penguins alive today need millions of tons of fish, squid, and krill to stay alive every year.

As the human population continues to grow, people are taking more and more food from areas of the oceans where penguins feed. In some places, people have taken so much fish from the sea that there may not be enough food to keep large numbers of penguins alive. Off the west coast of South America, for example, people take billions of anchovies from the sea every year. And the number of Humboldt penguins living in the area has been dropping as a result. A similar thing has been happening to African penguins living in South Africa.

In the Antarctic, some nations have started to harvest krill from the sea. Krill is the major food for many penguins in the area, and for seals and whales as well. If people increase the amount of krill they take each year, this will almost certainly lead to a decrease in the number of penguins and other animals.



Pollution of the oceans is another problem for penguins. People dump so many chemicals into the ocean that some of these poisons are reaching the remote areas where penguins live. And when oil tankers spill oil at sea, the penguins suffer along with all other sea creatures. The birds are often poisoned when they use their beaks to get the oil off their feathers.

Finally, global warming has seriously affected five species of penguins. These five species are currently listed as “endangered” by the International Union for the Conservation of Nature. The population of the northernmost species, the Galapagos penguin, has been significantly impacted by severe weather events. Around 60% of the population has been lost, and only about 1,200 penguins remain. If trends continue, they may disappear before the end of the century.

The loss of sea ice reduces habitat, and forces penguins to travel greater distances in search of food. It is easy to see what must be done to protect penguins. We must simply do what we can to take better care of the world’s oceans. We must try to reduce the amount of trash and chemicals that we dump into the sea. We must be careful that we are not too greedy when we take fish and other food from the sea. And we must continue to strive to reduce global climate change.

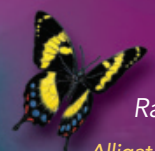
Adelie penguins on a glacier.



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ON THE COVER:
An Emperor Penguin Family
Emperor penguins breed during the harshest part of winter. The male emperor penguin incubates the egg and keeps the chick warm by carrying it on his feet!

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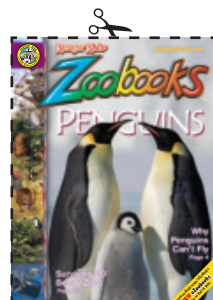
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Penguins, penguins sliding down snow
Splashing in the ocean, putting on a show.
You so swiftly maneuver in the sea,
How I wish I could swim like thee.
I often see you in aquariums and zoos,
You seem so active, never seeming to snooze.
It would be so nice to see you at the South Pole,
Although I would get all chilly and cold.
If I had a penguin as my pet,
I would treat it so nicely, it would never need a vet.
Penguins are definitely one of my favorites,
So I beg you to please not shave it!

Allyson Huang, age 10

Waddling here, waddling there,
I see penguins everywhere!
In their natural habitats they roam:
An icy tundra is where they call home.
They cannot fly, but that's all right—
They're some of the best swimmers in sight!
As they hunt for a fishy snack,
They make sure to watch their backs.
Playfully they slip and slide,
A penguin's life is one wild ride!

Hailey Aeppli, age 13

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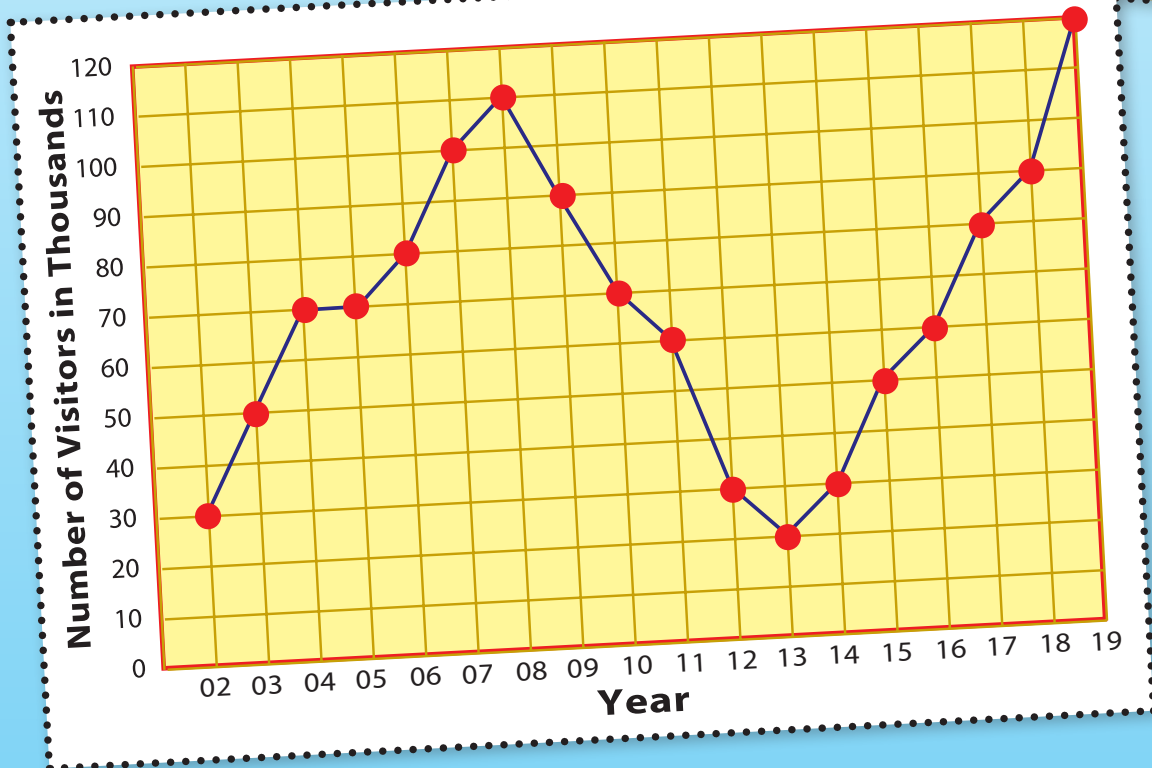


We want to see your original poem, story, or drawing by March 25, 2020 for "Ducks, Geese, or Swans"

Penguin Exhibit

Use the chart below to answer the questions.

- A. In what year did the zoo start to chart the number of visitors to the penguin exhibit? _____
- B. In what year did the penguin exhibit have the largest number of visitors? _____
- C. In what year did the exhibit record the lowest number of visitors? _____
- D. What was the growth in thousands of visitors from '06 to '07? _____
- E. How many thousands of visitors came in '11? _____
- F. What was the decline in thousands of visitors from '12 to '13? _____
- G. There was no change in the number of visitors from '04 to '05. How many thousands of visitors were there in each of those years? _____
- H. What was the difference in thousands of visitors from '14 to '15? _____
- I. In which year did the exhibit have 100,000 visitors? _____
- J. For six years after the exhibit began keeping records, the number of visitors increased. In what year did it start to decrease? _____





Answers:
 A. 2002
 B. 2019
 C. 2013
 D. 20,000
 E. 60,000
 F. 10,000
 G. 70,000
 H. 20,000
 I. 2007
 J. 2009



Penguin Pals

Look at each set of penguins. If the names in each pair of boxes is correct, color the YES box. If the names have been switched, color the NO box. This activity takes a careful eye.



B. YES NO

	
Emperor	King



D. YES NO

	
Galapagos	Peruvian



A. YES NO











	
White-Flipped	Little Blue

C. YES NO

	
Adelie	Blackfooted

E. YES NO

	
Gentoo	Chinstrap

				
White-Flipped	Peruvian	Little Blue	King	Gentoo
				
Galapagos	Emperor	Chinstrap	Blackfooted	Adelie

Answers: A. No B. Yes C. No D. Yes E. Yes

Word Search



A synonym is a word that means about the same as another word.



Penguin Puzzle

Have fun as you use a pencil to find and wind your way through this penguin maze. Good luck!

Word List

- | | | |
|---------|----------|---------|
| rich | gift | light |
| holler | speech | bucket |
| raise | relative | jump |
| exam | midday | hog |
| two | memo | pistol |
| not on | mistake | snooze |
| end | prize | aim |
| cap | canine | tether |
| journey | score | consume |

Try this fun synonym word search. Look forward, backward, up, down, and diagonally. Draw a line through the word in the word search that is a synonym of the word in the list. Find the words in the order that they are listed in the word list.

Hint: The last letter of the word just found is the first letter of the next word to be found. Example: rich—wealthy holler—yell

