

How Tuatara Use Energy from the Sun



● Cold-blooded And Warm-blooded Animals

Scientists have put animals into two groups to help us understand them better. One of these groups is the **cold-blooded animals**, like tuatara, fish, frogs and snakes. The other group is the animals that are warm-blooded, like birds, whales and dogs. These two groups have different ways of staying warm. They also have different ways of cooling down.

● How These Groups of Animals are Different

How Animals Keep Cool

On a hot day, many **warm-blooded animals** will **sweat** and **pant** to cool down. Some will also lose winter fur or down feathers in the summer. Cold-blooded animals can't do these things. Animals that are cold-blooded go to a cool, shady place when they want to cool down.



A tuatara hides from the sun in its hole (**burrow**).

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Tuatara will hide in their holes if they are getting too hot. Sometimes tuatara will splash in a pool of rain water if they are feeling too hot and dry.

How Animals Keep Warm

Warm-blooded animals have extra fat to help them keep warm. These animals also use fur or feathers to keep out the cold. They can turn energy in food into extra heat inside their body too. This is a bit like the animal's body burning the food to make heat.

The tuatara has no extra fat, feathers or fur to keep it warm. Cold-blooded animals have slimy skin or smooth **scales** on their bodies. The tuatara is covered in scaly skin. Its skin does not keep its body heat in. Cold-blooded animals like the tuatara will move to a sunny spot to warm up. This is the way a tuatara will use the sun's heat to keep warm instead of its body burning the food they eat.



The tuatara's scales let the heat out but keep water in.

⦿ Growing in Summer and Winter

Animals that are cold-blooded do not eat as much in winter as they do in summer. A tuatara will grow more slowly in winter than it does in summer. This is because it is eating less food.

Light from the sun also helps the tuatara grow. In winter, there is less light from the sun so this slows down the tuatara's growing. In winter, the tuatara's body will cool down because the air is cold. This means it will not move around as much.

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Needing Food for Energy

A warm-blooded animal needs to eat a lot of food. It needs the food to keep its body at the same warm **temperature**. Its body burns the energy in the food to make heat. Because animals that are warm-blooded need so much food they spend a lot of time hunting and eating.

Animals that are cold-blooded use the sun's energy to warm up. They do not have to keep warm all of the time. This means they don't eat as much food as warm-blooded animals. Cold-blooded animals do not need to work so hard hunting for food. A tuatara can go without food for months.

How a Tuatara Hunts and Eats its Food

When a tuatara hunts for food it doesn't go far from its hole. It sits still and waits for a smaller animal to come near enough to bite. This is because a tuatara can only move quickly for a short distance. The hungry tuatara waits and waits. It is very still. At last a weta comes close. The tuatara darts out and snaps up its meal. Sometimes the tuatara will eat a big meal. Tuatara can eat chicks, giant weta and other small **reptiles**. If this happens the tuatara may not need to eat again for a while.



A tuatara
eats a
tasty weta.

Cold-blooded animals like to lie in the sun after they have eaten a big meal. The sun's energy warms the tuatara's body. This helps its stomach to break up the food.

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A baby tuatara hatches from its egg.

Baby Animals and Growing

An animal that is warm-blooded will use its body heat to keep its baby warm. But most cold-blooded animals use the sun's energy to keep their eggs warm. When mother tuatara lay their eggs, they bury them in a nest under the soil. Mother tuatara dig their nests in open areas where the sun's energy will warm them up.

The eggs in the sunniest spots are the first to hatch. This is because the sun's energy helps the young tuatara to grow faster inside their eggs. It can take more than a year for tuatara eggs to hatch. But if there is too much heat from the sun, the baby tuatara will die. This happens because they become too hot and dry.

Tuatara that live in warmer areas will grow faster than tuatara living in cooler places. This is because the extra sunlight in a warmer place gives the tuatara energy to keep warm. The tuatara in warm areas won't need to use much energy from their food to help them keep warm. So they can use more of the energy from their food to grow.

Interesting Fact

Scientists have found that if tuatara eggs are kept in cool temperatures then more of the baby tuatara will hatch as females. If the temperature is a little warmer then more of the tuatara babies will hatch as males.

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○ How Tuatara are Different to Other Cold-blooded Animals

Living in Cool Temperatures

The tuatara is different from other cold-blooded animals like snakes. This is because the tuatara can live happily in cold temperatures by slowing their bodies down. This helps the tuatara's body to work at a lower temperature than most cold-blooded animals.

When a tuatara gets very cold it stays in its hole away from the weather. It will not go looking for food but will **hibernate**. This is when it slows its body down. Its body can go so slowly that the tuatara only needs to take one breath every few minutes. The tuatara will also slow its heart down to beat only once a minute. (When a tuatara is hot, its heart will beat once every two seconds.) The tuatara saves energy when it hibernates. This helps it stay alive when it is very cold.

Night-time Hunters

Tuatara are **nocturnal**. This means they come out of their holes and hunt for food at night. This makes them different to many other cold-blooded animals. Most cold-blooded animals like to be busy during the day. This is because the sun's heat helps them move faster. But the tuatara likes the temperature to be cool. Their favourite temperature is between 17 and 22°C. Tuatara could not live in hot places like many other cold-blooded animals. Some snakes live in deserts with temperatures up to 40°C. This would be far too hot for a tuatara.

Interesting Fact

The tuatara has a third eye on top of its head. This extra eye has scales over it, so the tuatara can't see out of it or move it around. But the extra eye can feel sunlight. Some scientists think tuatara use their third eye to let them know if they have had enough sunlight. Check out the image on the next page!

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The tuatara's third eye can only be seen when it is a baby.

Not Staying Long in the Sun

Animals that are cold-blooded like to lie in the sun. The energy from the sun helps them to stay healthy. The sun's energy also helps them to grow strong. The sun's energy keeps them warm. This means the animals don't need to use food energy for warming up. They can use the energy they get from food to help them grow. Tuatara sometimes like to lie in the sun, but not for too long. They have to be careful not to get too hot. A tuatara will die if it gets too hot and dry.

The scales on the tuatara's body help to stop it from getting too dry. These scales help to trap the water in the tuatara's body. If it is too hot or windy, a tuatara will go back into its hole.

Using the Sun's Energy to Move Fast

A tuatara can move faster if it has been in the sun for a while. This is because the tuatara's body needs to burn food to release energy. It can do this better when it's warm. The tuatara can use its muscles better once it has this energy. Other animals that are cold-blooded can also move more quickly when the sun has warmed them up. But the tuatara doesn't need as much sun as other cold-blooded animals. This means it can hunt at night.



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◎ Glossary

burrow	A hole or tunnel that an animal uses to live in.
cold-blooded animals	A group of animals that stay as warm or as cool as the air around them. They use the sun to keep them warm. Fish, frogs, reptiles and insects are cold-blooded animals. Scientists call these animals 'ectotherms'. Note: some fish and reptiles are very nearly warm-blooded (e.g. tuna keep warmer than the surrounding water).
hibernate	When an animal slows its body down into a kind of sleep, so that it is very still for a very long time.
nocturnal	To be busy at night and to rest during the day.
pant	When an animal breathes in short fast breaths to help it cool down.
reptile	An animal that is cold-blooded and has scales on its body. Most of these animals lay their eggs on land. Snakes, crocodiles, lizards, turtles, tortoises and tuatara are all reptiles.
scales	Bony plates that protect the skin on fish and reptiles.
sweat	Water that an animal's skin lets out to help cool the body down.
temperature	The amount of heat.
tuatara	A reptile that lives in New Zealand. It looks like a lizard but it comes from a different reptile group called Rhynchocephalia, or 'beak head'. Tuatara have soft spikes on their backs and a third eye. They come from a reptile group that lived on Earth before the dinosaurs.
warm-blooded animals	These animals keep their bodies warm all of the time. They do this by making heat inside their bodies. These animals also have hair or feathers. The proper science name for these animals is 'endotherms'.