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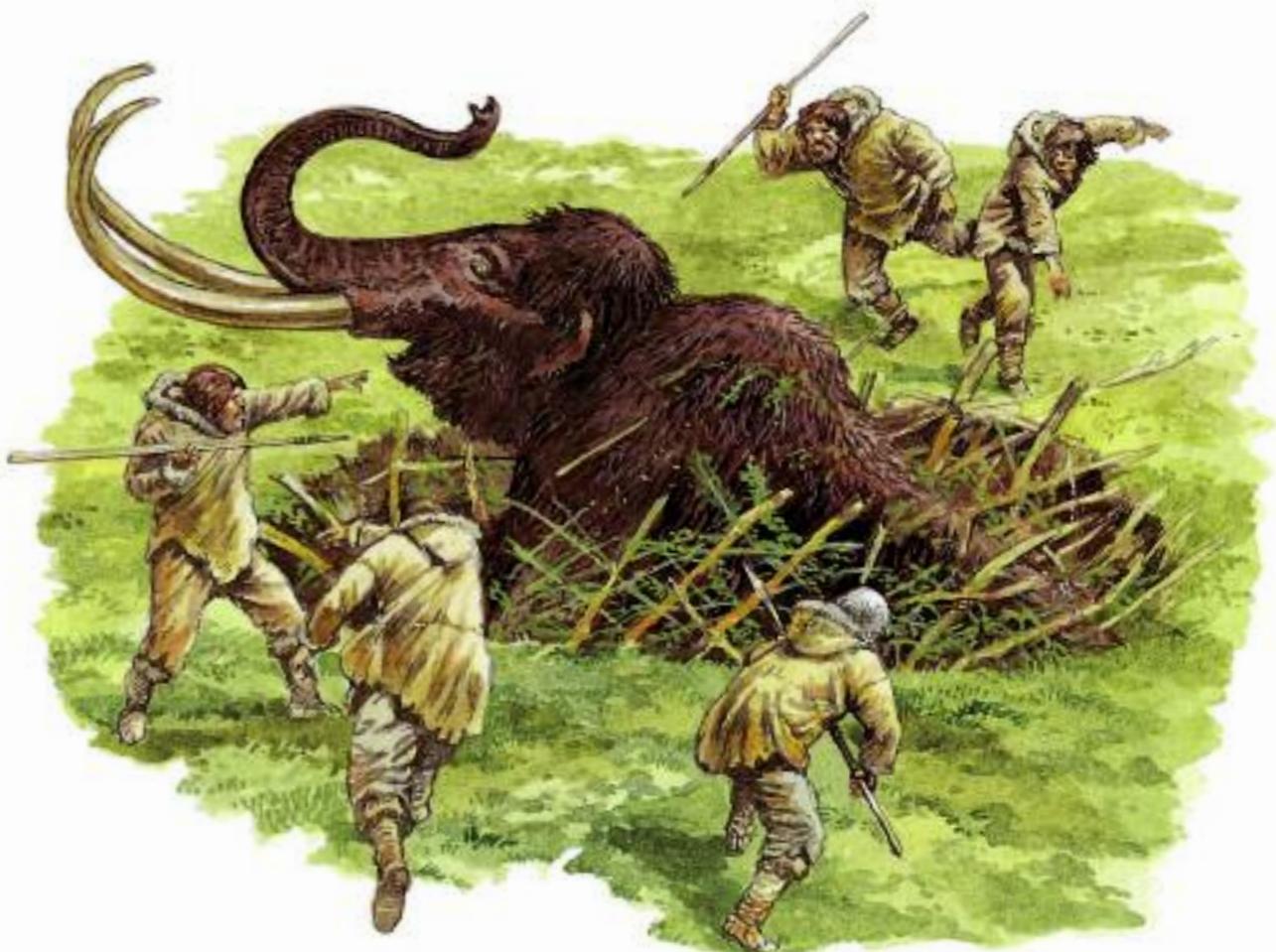
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STONE AGE CHALLENGE



Orpheus

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Your challenge

IT IS 20,000 BC and the Earth is in the grip of a bitter Ice Age. Massive ice sheets cover much of northern Europe, Asia and America. You are the chief of a small clan of humans that lives on the tundra—a frozen region of dry grassland that lies between the ice sheets in the north, and forest in the south. Only mosses, lichens, grasses and low-lying shrubs can grow on this windswept land.

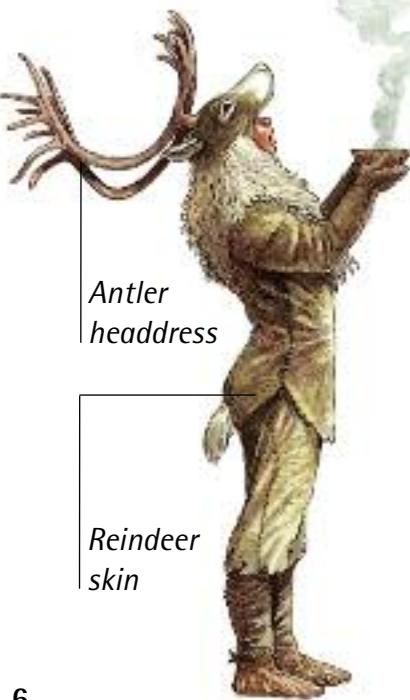
Winter is approaching, and the great herds of reindeer that roam the area are moving south to find food. They feed on lichens and grasses which are covered by snow during the winter months. Your clan relies on reindeer to survive. Their meat is your main food, and your clothes and shelters are made from their thick, warm hides. You also use reindeer antlers and bones to make tools and weapons. To survive the winter, you must therefore follow the reindeer on their long migration. Can you lead your clan on this dangerous journey and bring them safely back to your camp on the tundra when summer, and the reindeer, return?

On the trail

Your clan must be well prepared for the long and dangerous journey ahead. Clothes and boots should be warm and in good repair. You must carry weapons for hunting and defence, materials to make camp, and basic tools and fire-making equipment. Don't forget to bring extra food with you in case hunting is poor. As you move off, post a reliable man at the back of the group to make sure no one falls behind.



A travelling bundle



Antler headdress

Reindeer skin

The shaman is an important member of your clan. Your people believe that the land and the animals upon it all have spirits, and you communicate with these spirits through your shaman. He wears the antlers and skin of a reindeer to mark himself out.



Hunter warrior

The chief's son

The clan chief

Dried meat

Selection of tools

Extra clothes

Spears

Baby carrier

Walking stick



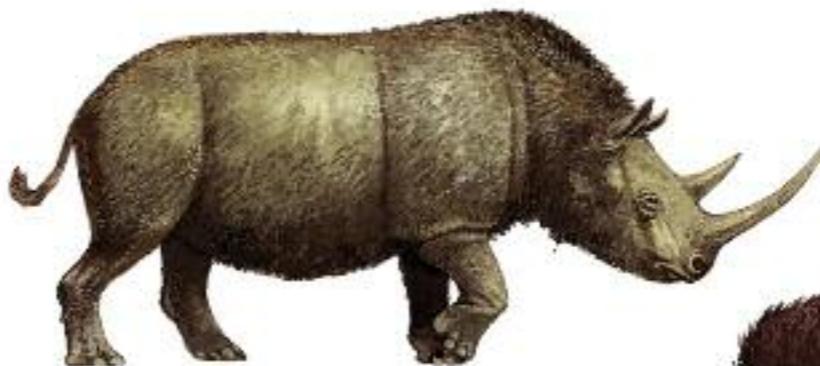
Clan members ready to set out on their journey

A back-pack cradle, such as this, makes it easy to carry babies and small children on your long journey. It is made from animal hide and is lined with fur to keep the baby warm. It also leaves the carrier's hands free for other things, such as bags and a walking stick.

You will come across many animals on your journey. Some will be good food sources, such as fish, duck, lemming and hare. You will need fresh food, so look for hunting, fishing and trapping opportunities as you travel. Other animals are dangerous—a woolly rhino, for instance, can kill a man with ease. Also beware packs of wolves and cave lions.



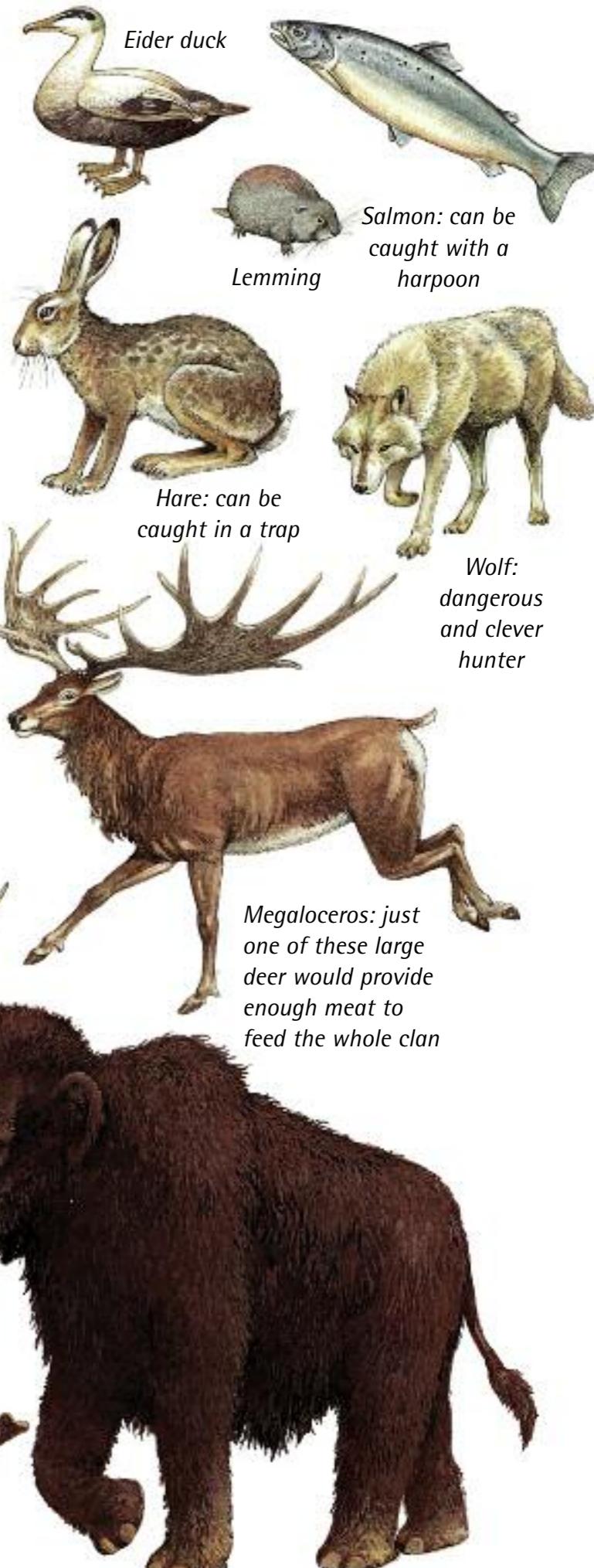
Reindeer: an important source of food and materials such as bone, antler and hide



Woolly rhinoceros: can be dangerous if provoked



Cave lion: will steal your kill if it can



Eider duck



Salmon: can be caught with a harpoon



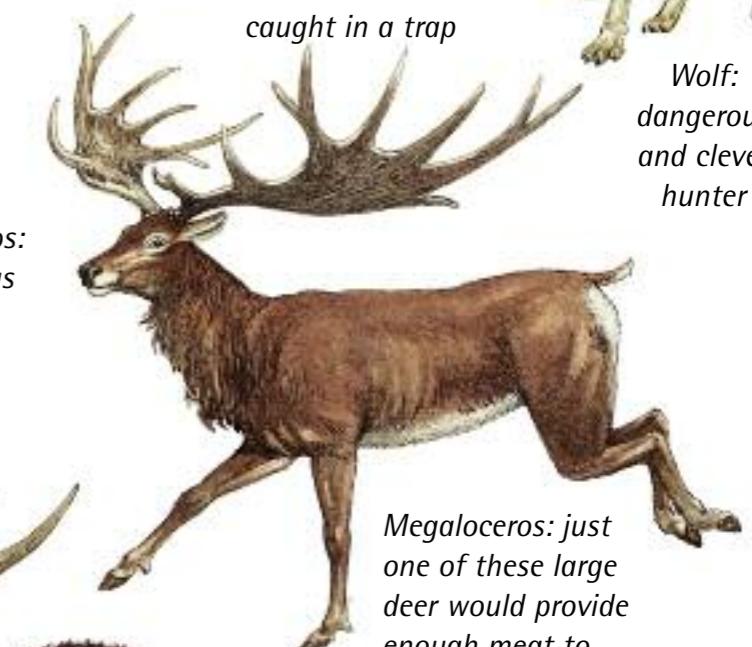
Lemming



Hare: can be caught in a trap



Wolf: dangerous and clever hunter



Megaloceros: just one of these large deer would provide enough meat to feed the whole clan



Woolly mammoth: the largest animal on the tundra

Making fire

Fire is your most important resource. It will keep you warm, cook your food and protect you from marauding animals. Fire-making tools are an essential part of your kit. The best materials for striking a spark in the cold of the tundra are a stone called flint and a metal ore called iron pyrite. The best tinder—fine, dry material to catch the spark—is a type of fungus that grows only on trees, so you must collect this while you are in the southern forest. Let the fungus dry out and then shave fine strips off it with a flint blade.



1. Scrape shavings from the dried fungus into the shell using the flint blade.

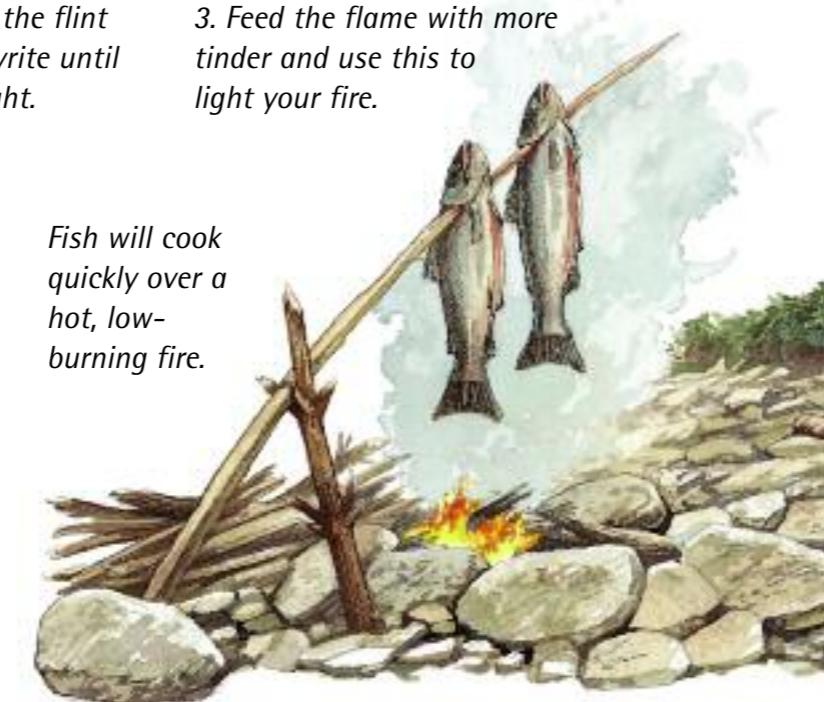
2. Strike sparks using the flint striker and the iron pyrite until the shavings catch light.

3. Feed the flame with more tinder and use this to light your fire.

To make a fire, first build the fuel up in a rough cone shape. Because there are no trees on the tundra you may have to use low-growing shrubs or even animal fat and bones as fuel. Make sure there is dry material at the base of the fire that will catch light easily: this is called kindling. Place your lighted tinder in the heart of the cone to set fire to the kindling. Fan the flames until the fire is properly alight.



Your fire-making kit includes: fire fungus, other light, dry material such as dry grass to feed the glowing tinder, a flint blade and striker, iron pyrite, a shell and a piece of leather to protect you from flying sparks.



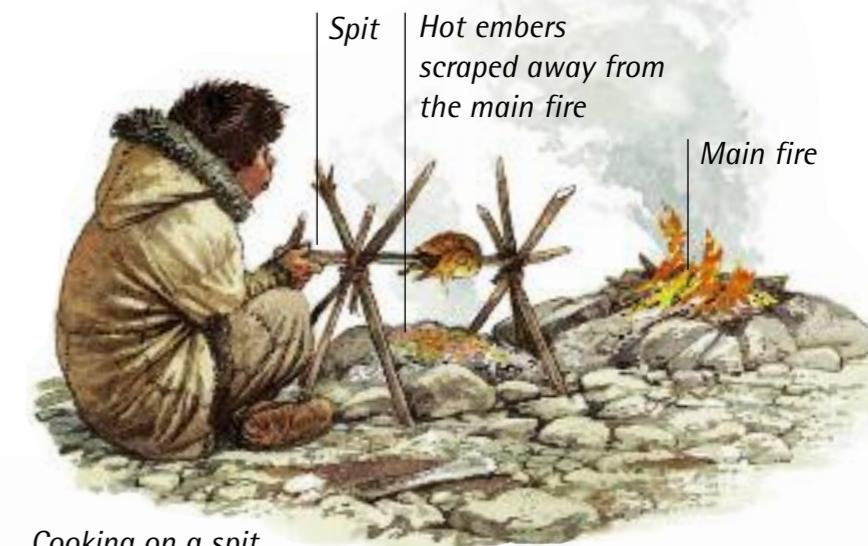
Fish will cook quickly over a hot, low-burning fire.

You can use your fire to cook food on a spit. Skewer a piece of meat on a sharp stick and hold it over the heat, turning it until it is cooked. Hot embers are good for this method. Let your fire establish itself, then scrape some of the red-hot embers to one side and set up your spit above this. The embers will give off an even heat for some time, but not burn the food.



1. Dig a shallow pit and set a fire within it.

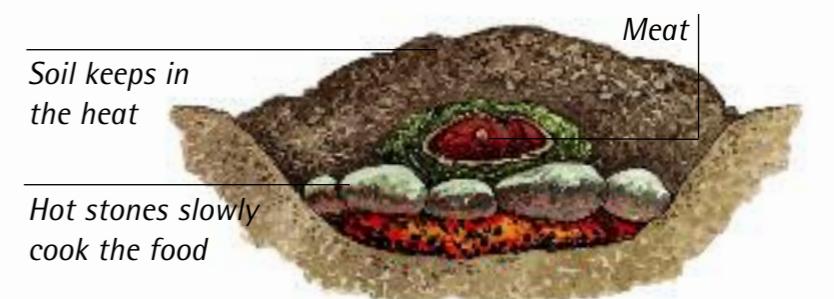
If you are in an area where the ground is not frozen, and you can dig down into it, you can use the pit cooking method. This is good if you are busy during the day. You can set it up in the morning and the food will be ready by



Cooking on a spit



2. Place a layer of stones on the hot embers.



3. Place meat, wrapped in leather or leaves, on the stones and cover with soil. Leave for several hours.

Agood cooking fire should be allowed to burn low and hot. You don't want lots of high flames, as these will scorch the outside of the food before the inside is cooked. Place large stones around the base of the fire. This will help contain it, and they will also heat up and continue to give out heat even when the fire has died down. To keep the fire burning overnight for warmth and security, bank it up with a layer of new fuel. It should then burn slowly well into the night.

Tools and weapons

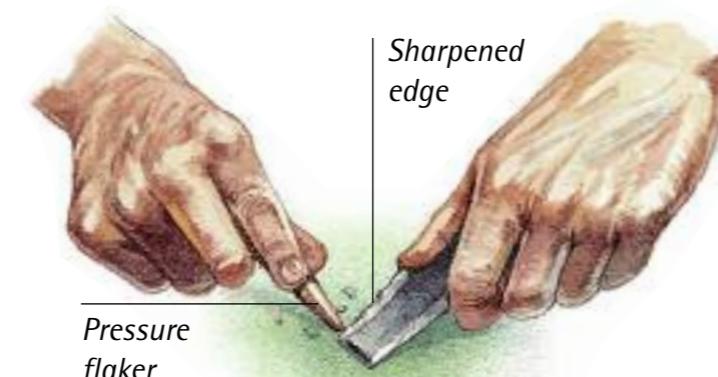
Good tools and weapons are essential for survival. You should have people with you who are especially skilled at making them. Ensure you have a supply of raw materials to make new tools if they are needed. Hard, smooth stone, such as flint, is best for sharp knives and spears. Other useful materials for making tools include bone and antler. You will also need wood and animal gut, or strips of hide, to make harpoons and spears.



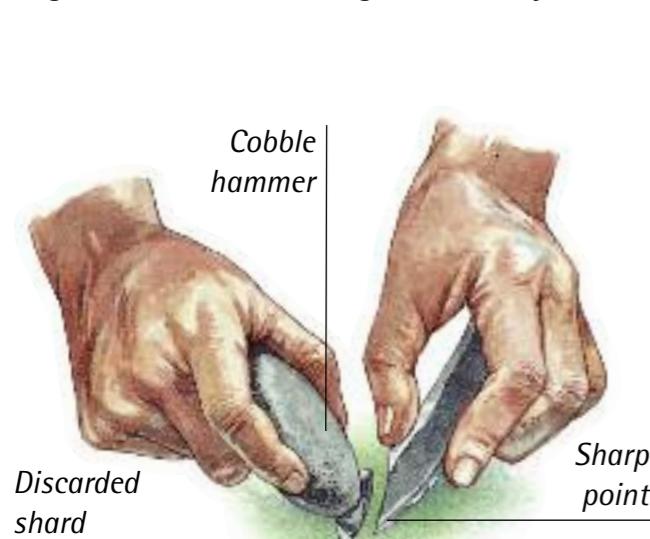
To make sharp tools like knives or pointed burins—tools used to pierce holes—start with a flint core. This is a stone that has already been shaped. Use an antler hammer to knock a flake off the core.



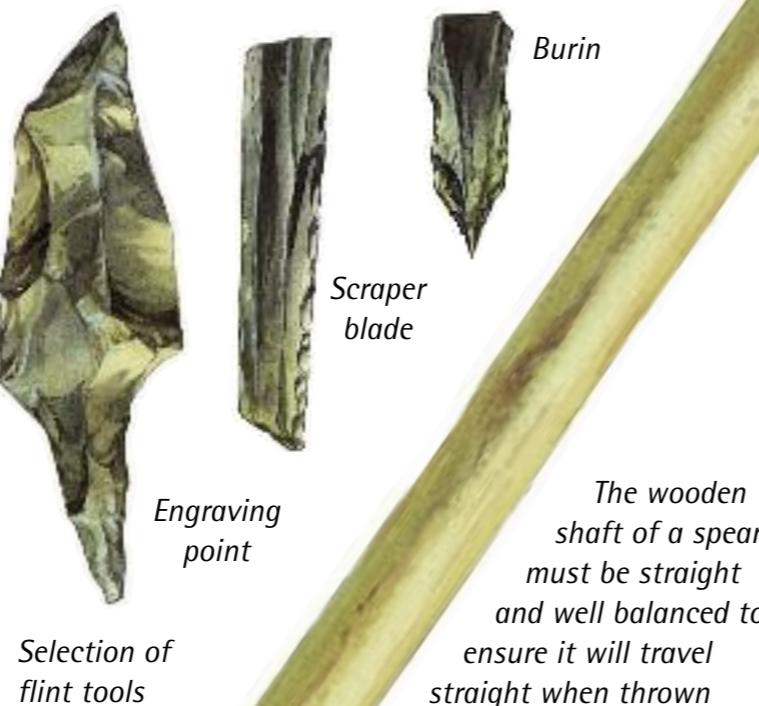
Snap off the end of the flake to give a flat edge. A rounded cobble is good for this job.



For a sharp blade, use an antler tool to apply pressure, flaking off layers along the edge.



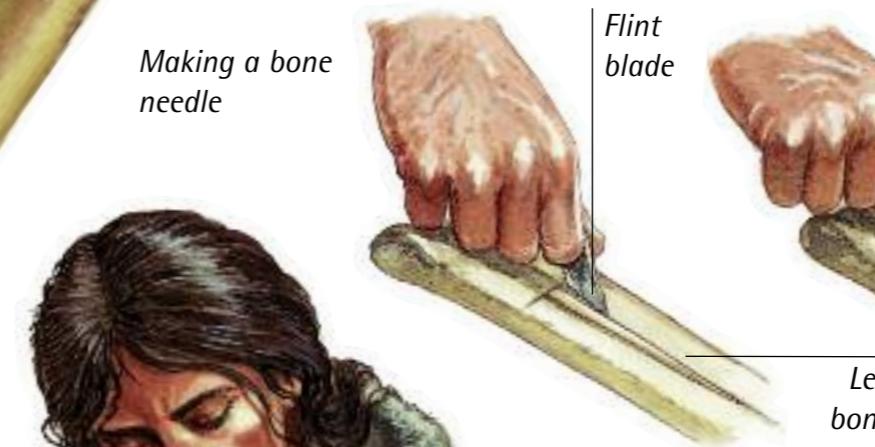
To make a burin, strike the end of the flake at an angle to break off a triangular shard. This creates a very sharp point.



The wooden shaft of a spear must be straight and well balanced to ensure it will travel straight when thrown

This spearhead is sharp and narrow so that it will pierce deeply into the flesh of an animal. If it bulges too much at the base, it might not penetrate far enough, and could even fall out.

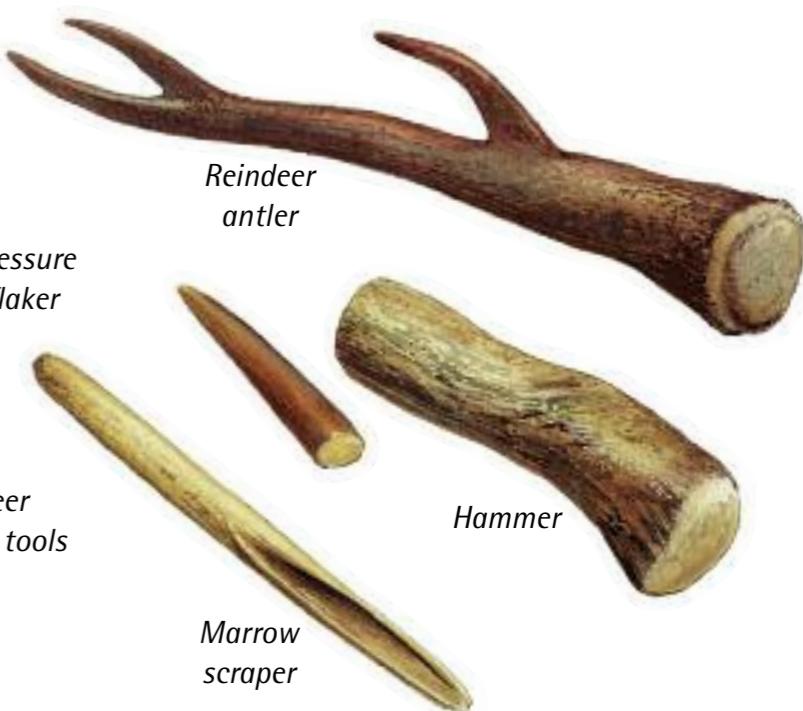
The flint spearhead has been pushed into the split end of the shaft and bound with a thin, damp strip of animal hide. As the strip dries, it tightens firmly around the join.



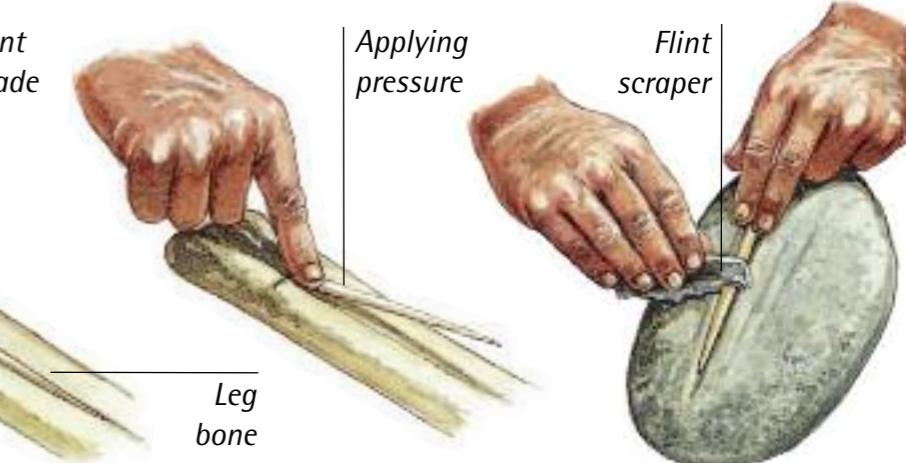
1. Use a sharp blade to cut a needle-shaped splinter from a bone.

2. Press down firmly on one end to lever the splinter out.

3. Smooth the needle in one direction to remove rough edges.



Reindeer antler is very useful for making stone-working tools such as hammers and flakers. You can also use it to make probes and long spoons to scrape rich marrow from inside animal bones.



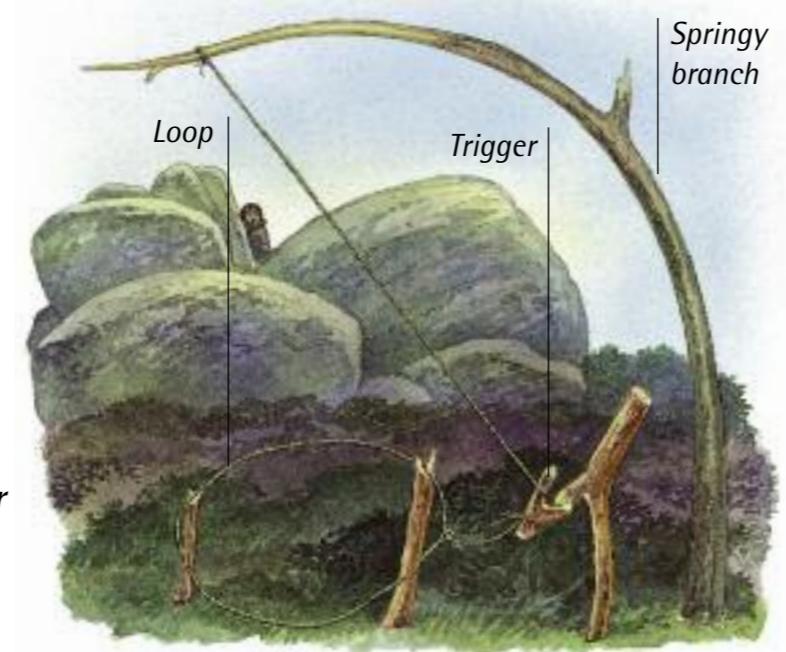
Bone is an excellent material to make needles. It is soft enough to saw through with a blade, but rigid enough to push through hide. To sew two pieces of hide together, first make holes with a burin along the edges you wish to join, then use the needle to help you push through a fine strip of hide or gut. Pull tight as you go along and finish with a firm knot.

Finding food

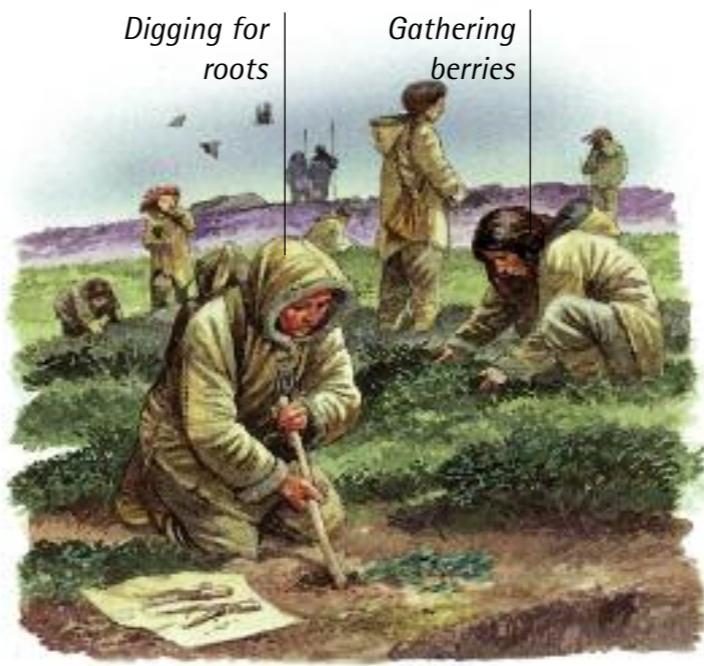
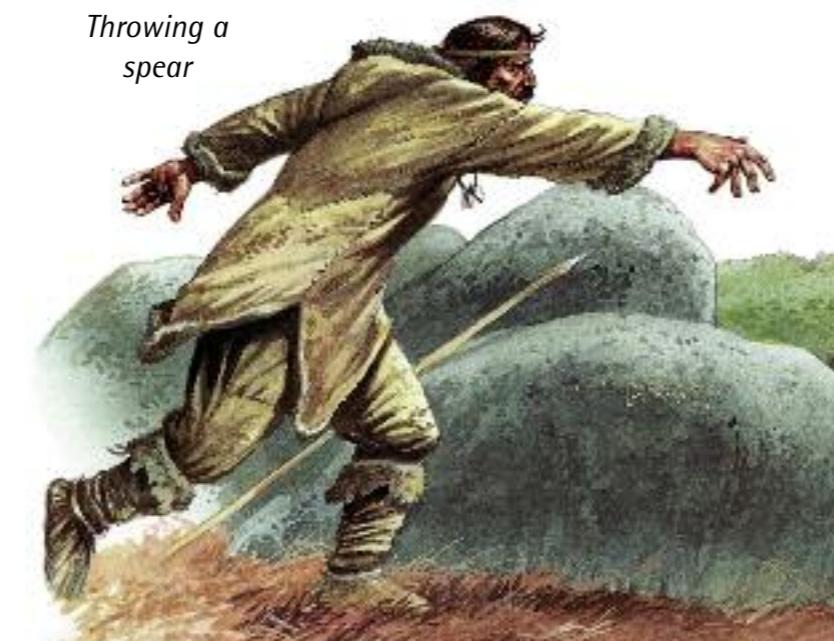
In order to survive on your long journey you must be able to find food. You will need to devote a large part of each day to this. There are plenty of things to eat on the tundra if you know how to find them. Everyone can be involved—you and the men can hunt and trap animals, birds and fish. Take some of the older boys with you so they can learn too. Younger children and women can help by gathering berries, fungi, eggs, shellfish, roots and seeds.



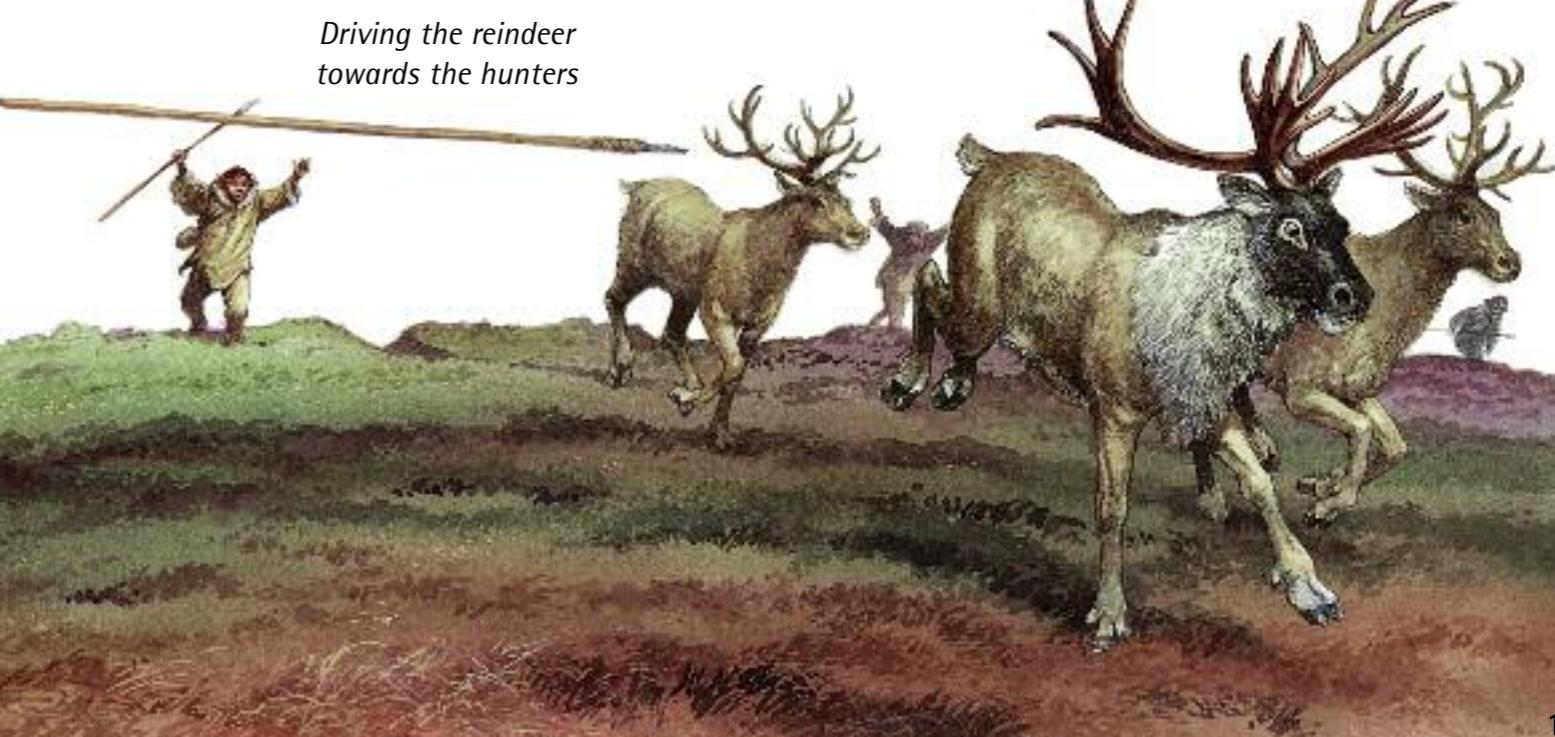
Fish are a very useful source of food—if you can catch them. Spearing them is quite an art, but you can improve your chances by choosing your spot carefully. Narrow points on a river funnel the fish into a small area. Fish also like places where the water gushes over boulders. When taking aim, be careful not to cast your shadow on to the water, or the fish will know you are there!



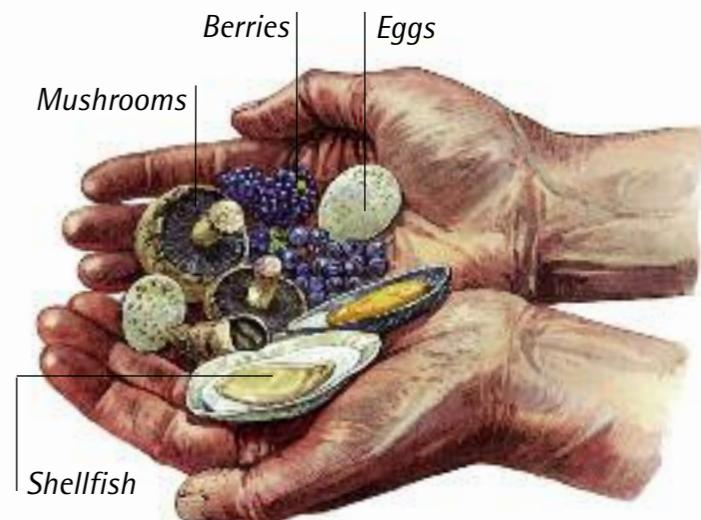
Trapping is an easy way to catch small animals and birds. Set traps overnight and check them in the morning. For a simple snare, make a loop with a slip knot from twisted grass. Set it where you see signs of animal movement, such as tracks, dung, or flattened grass. Push a springy branch into the ground and attach the snare and a trigger to it as shown above. An animal passing through the snare will move it and dislodge the trigger. The branch will spring upwards and tighten the loop around the prey.



Reindeer are your main source of meat, as well as fur, antler and bone. As you follow their migration south, you will have opportunities to hunt them too. The best way to ensure success is to hunt them in a group. Get some of your men to try and separate off a few animals from the main herd and drive them towards other hunters poised ready with spears. Just one or two well-aimed spears should be enough to bring a reindeer down.

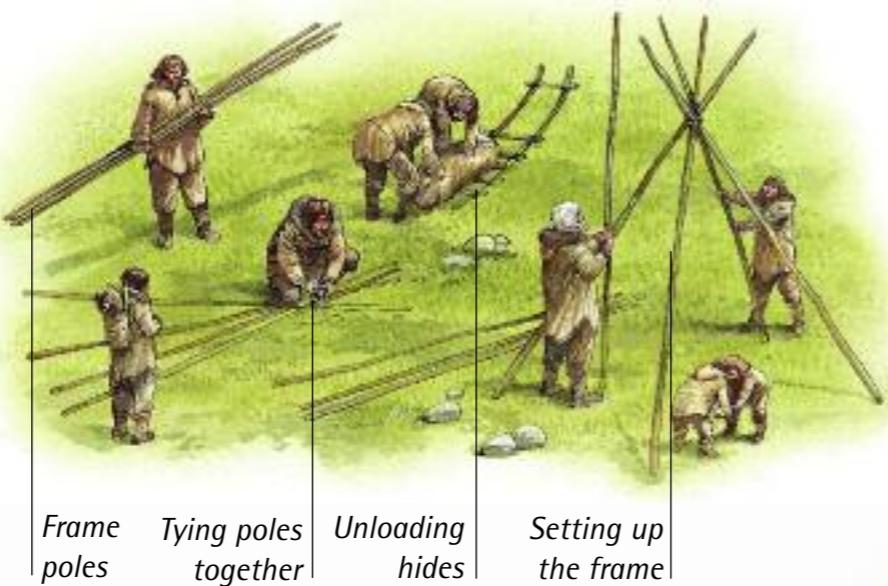
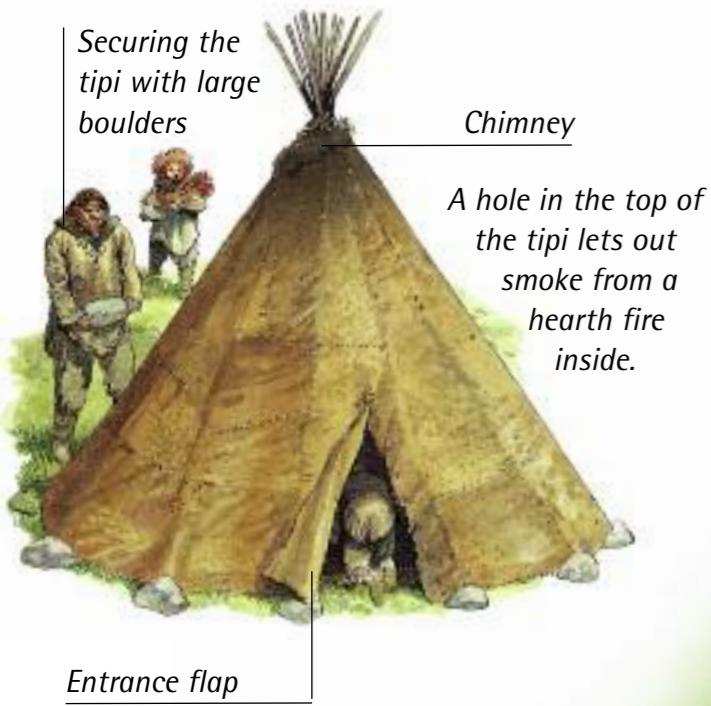


The women of your clan should be skilled in finding food from the land. In late summer and autumn there are berries, seeds and mushrooms aplenty. Remember that some tundra birds lay their eggs on the ground. Look out for their nests and gather the eggs. Freshwater shellfish from rivers and streams are also a good source of food. Don't forget: food can be found under the ground as well. Some plant roots and tubers are good to eat. Finally, if you come across an unfamiliar fruit or fungus, be wary in case it is poisonous.



Making camp

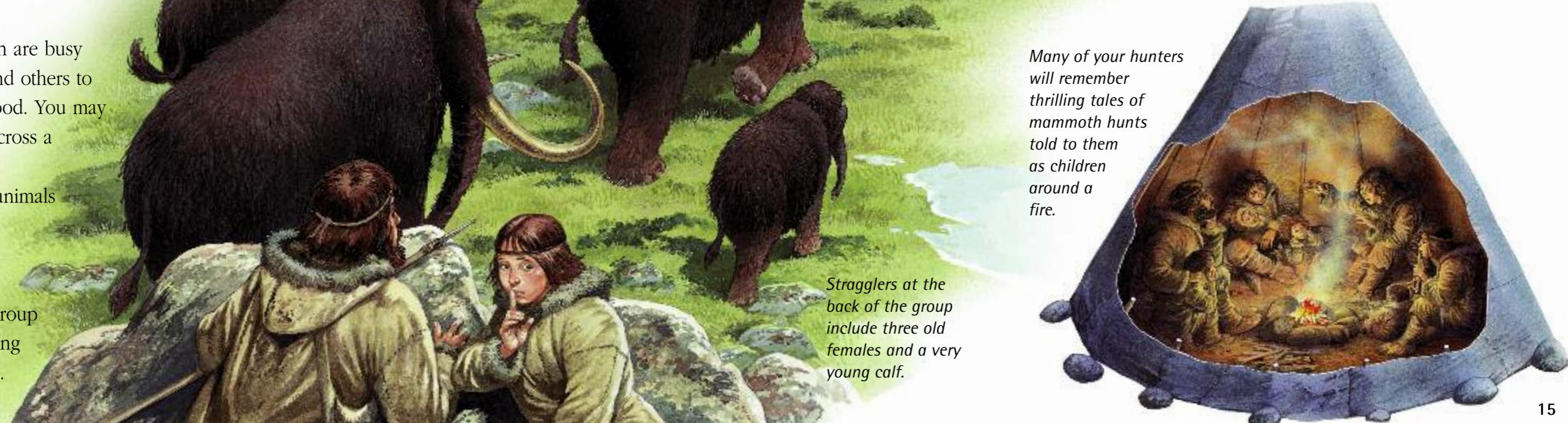
Sometimes you will be able to find natural shelter on your journey, but more often you will need to set up the tents and tipis that you carry with you. Once you reach the reindeers' overwintering ground at the edge of the forest you can set up your winter camp more permanently—for several weeks at least.



Tipis are relatively quick to put up and take down again. First lay the supporting poles on the ground and tie them together near one end. Then lift up the poles and splay them out into a cone-shaped frame. Stretch sewn animal hides over the frame and secure the whole structure with large rocks around the base.

Mammoths move in groups of females and young, led by a wise older female, called the matriarch. She will do her best to ensure the survival of her herd. She will, for example, use her trunk to haul to safety a youngster who has fallen into a freezing bog.

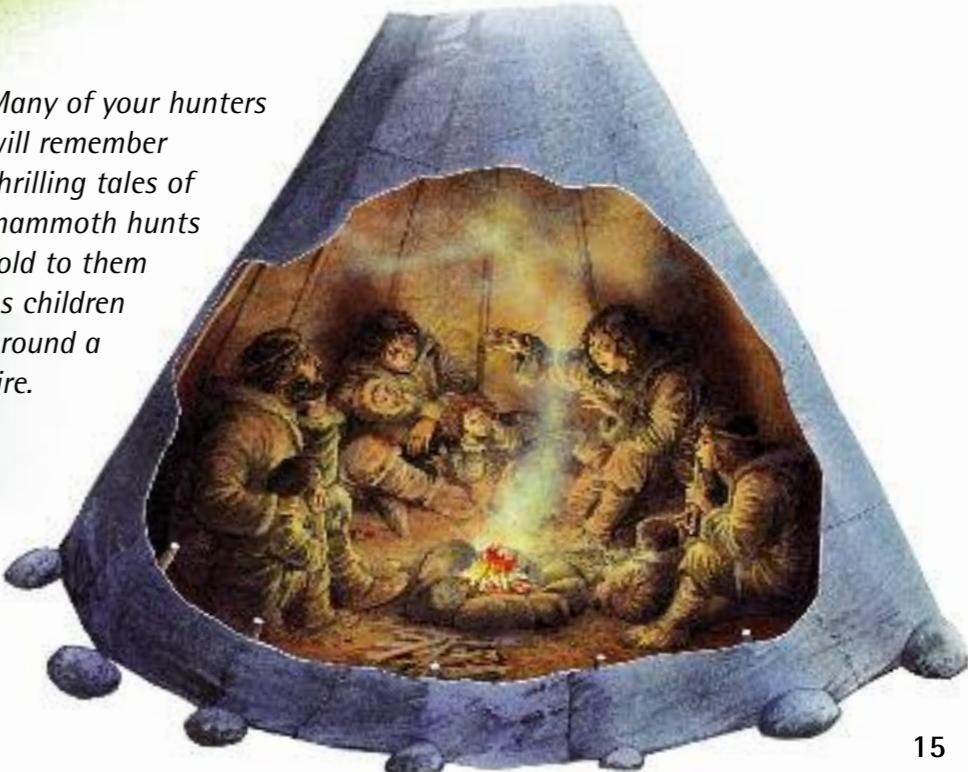
While some of the clan are busy setting up camp, send others to scout around in search of food. You may be lucky enough to come across a group of migrating woolly mammoths. These massive animals also move south during the winter months in search of food. Quite often, the animals at the back of the group are the oldest. They have long tusks and walk more slowly.



Mammoths are the largest animals on the tundra. They are normally far too large for you to hunt and kill. But, if they happen to stray quite close to a cliff edge, a prime opportunity presents itself. With your best hunters, follow the herd and, as they approach the cliff, try to separate the old females at the back of the group and drive them towards the edge with fire and spears.

Many of your hunters will remember thrilling tales of mammoth hunts told to them as children around a fire.

Stragglers at the back of the group include three old females and a very young calf.





Don't underestimate your prey. Mammoths can use their tusks to toss attackers into the air if they get too close.

Throwing spears at a mammoth will not kill it, but will help to drive it backwards.

You have separated the three older mammoths who were lagging behind the rest of the group, and forced them towards the edge of the cliff with spears and torches. Now the rest of the plan is straightforward. Get your men to surround the animals and push closer and closer, prodding them with fiery brands and throwing spears at them. Eventually, one beast will step back too far and stumble over the edge. Remember: you only need one to go over. You can let the rest escape,

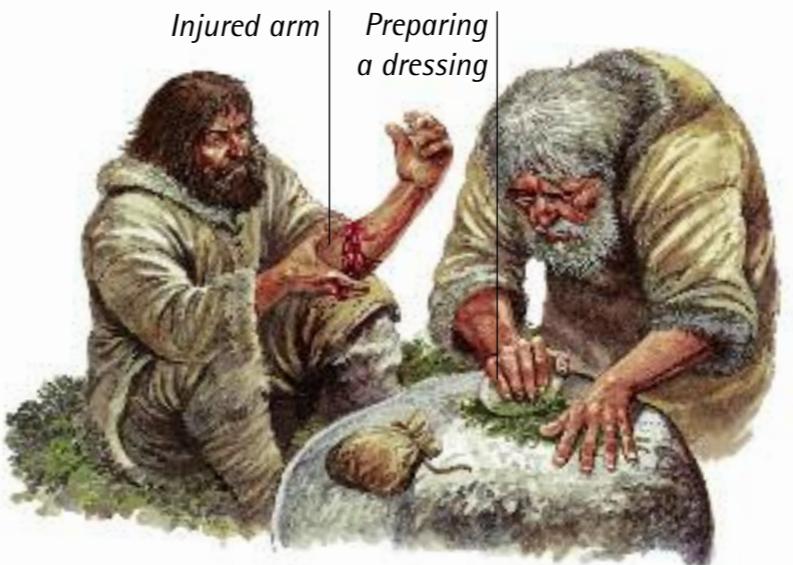
This mammoth is trapped between your men and the cliff edge

You can take advantage of an unexpected opportunity with the herd travelling so close to a cliff edge. But there are alternative ways to kill mammoths and other large animals. In areas where the ground is soft enough, you can dig a pit and trap your prey in it. Identify a place where the animal often passes by. Disguise the pit by covering it with branches and leaves.

Keep watch as the animals approach. If it looks as if they might bypass your trap, rush the herd as you did at the cliff edge, with as many men as you can muster. Shout and use spears and fire to drive them in the direction you need. Once one falls into the pit, it will be unable to climb out and you can dispatch it quickly with spears and knives.

After the hunt

If your hunt is successful, you will now have a large, freshly killed mammoth in your possession. It will provide a large amount of food and much else besides. Now you must work fast; it won't be long before other creatures discover your kill and try and take it from you. Get some of your men to butcher the mammoth. You can find a use for all parts of the kill—your only limiting factor is how much you can carry. Direct other men to build a fire and keep watch for marauding lions and wolves. You must protect your kill at all costs.

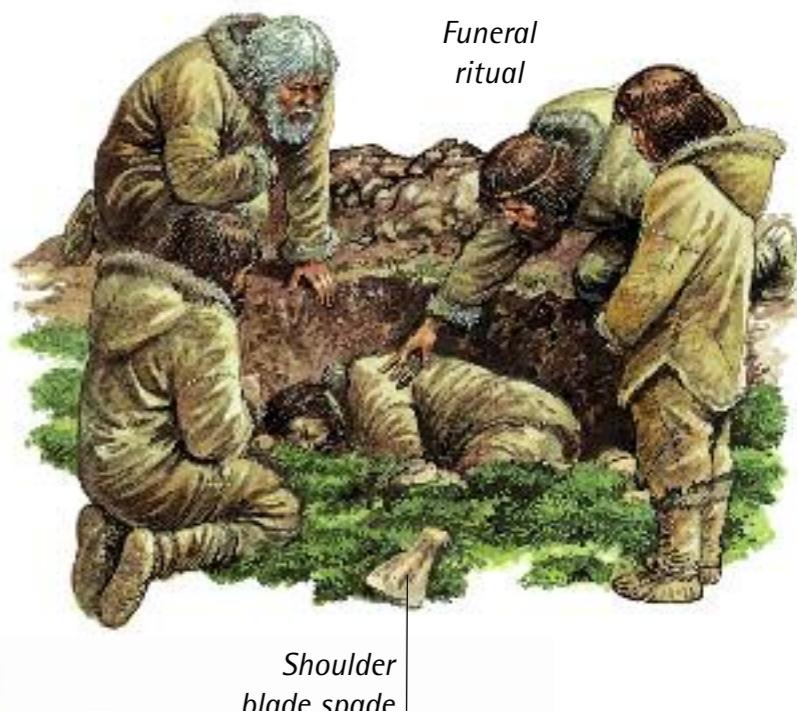


Skin the hide from smaller lumps of flesh—from the legs, for example. The fresh meat will last for a week or two. You can smoke or dry it to preserve it for longer. The small pieces of hide can be patched together for clothes or blankets.

Even on a successful hunt there may be a price to pay. Injuries are common when dealing with dangerous animals such as mammoths or lions. You must ensure that you have someone skilled at healing injuries in your group. He should keep a pouch of medicinal herbs with him and treat any injuries as soon as possible. But even with treatment, be aware that an injured man might still die.



Death is part of the struggle for survival on the tundra. Your men risk their lives when they tackle large prey. A flick of a mammoth tusk, for instance, can prove fatal. If you lose any of your people on your journey you must give them a funeral to ensure their spirit is at peace. Dig a grave as best you can in the frozen earth, or cover the body with rocks if you cannot. Follow your funeral rituals and bid farewell to your brave companion.



Finding food in the winter is difficult for all the animals of the tundra, including cave lions. These large and ferocious animals can sense a kill from some distance away. They normally attack at night, but will venture out in the day if they are hungry enough. A combination of noise, spears and fire is usually enough to frighten them off. But don't lower your guard—they might well come back.

Sacred cave

Following a successful hunt you might wish to visit your sacred cave. For generations your people have come to this place, carved deep into the rock by an ancient river. Here they have recorded things about their world in paintings on the walls. While the artists are at work, the shaman dances to pipe music in celebration of the success of your mammoth hunt. It is here, in this most sacred place, that you can also remember the spirits of those you have lost.



Natural stones and minerals, such as red iron oxide (haematite), and black manganese dioxide are used to make pigments, materials for painting.



The minerals are ground into powder and mixed with water or animal fat in oyster-shell palettes.



Fine detail can be painted using fingers, sticks or brushes made out of bone or wood and animal hair.



Patches of reindeer hide dipped in the pigment are used to colour larger areas.

Playing a mammoth bone pipe

Using a fur sponge to add colour to the wall

Drawing a Megaloceros with a hair and bone brush

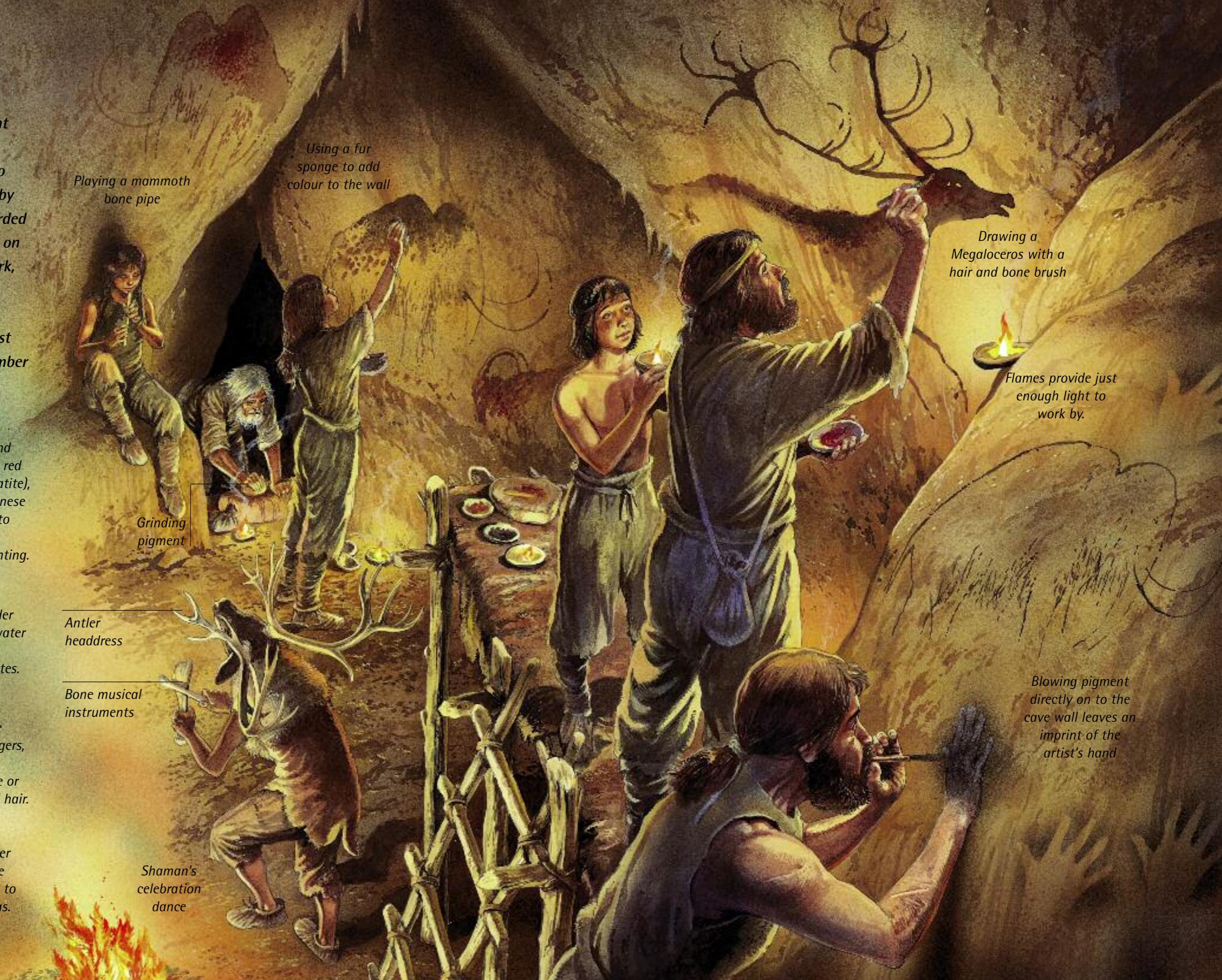
Flames provide just enough light to work by.

Antler headdress

Bone musical instruments

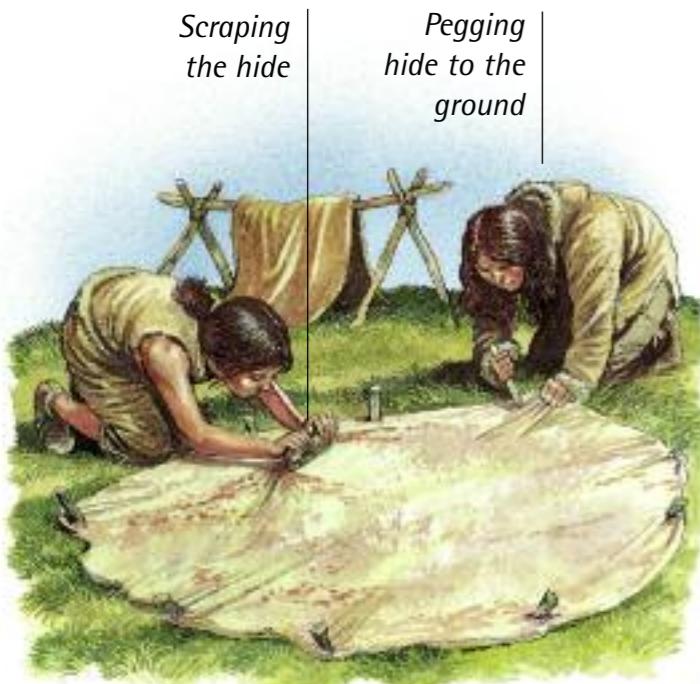
Shaman's celebration dance

Blowing pigment directly on to the cave wall leaves an imprint of the artist's hand



Hide, tusk and bone

Once you reach your winter camp you can put to use some of the raw materials you obtained from the mammoth kill. Its meat will have already provided you with food, and its fat is a useful fuel. You will be at your winter camp for several weeks, so you will also have time to find uses for the mammoth fur, hide, bones and ivory, as well as resources from other animals.



Hides from animals such as reindeer and mammoth are a vital resource, but they need to be properly prepared. First they should be pegged out, fur side down, and stretched taut. Any remaining flesh should be removed with sharp flint scrapers and the hides then left to dry. They can be softened by rubbing in animal fat. Hides can be used whole, or cut into pieces for sewing together into warm clothes and boots.



Even the bones of the mammoth can be a source of food. If you smash them with a stone hammer you can get at the rich marrow inside. You can cut some of the meat collected from the kill into strips and dry it out in the air or over a fire. This will keep for a long time and be light and easy to carry on the eventual journey home. It is good to teach children these jobs, as they need to learn such skills to help them survive as adults on the tundra.



Mammoth bone and ivory can be made into other objects too. Now you have safely arrived at your winter camp you can take time to create beads, toys and figures. Bone toys made into animal shapes make good teetherers for babies and toys for small children. Use flint tools to carve your figures, and animal hide to polish them.



Mammoth tusks and bones can be used to build sturdier dwellings. The huts in your summer camp should be made this way. Tusks make a good framework, and you can build up the walls with the massive thigh and jaw bones. You need the bones of many animals to do this, but these can be scavenged from other mammoth skeletons on the tundra. Cover the tusk and bone framework with tough mammoth hides to make a cosy hut.



Bone and ivory are both good materials from which to make musical pipes. A particularly pure note can be produced from an ivory pipe. Smooth a length of ivory as straight as you can, then saw it in half and gouge out the middle. Gouge out finger holes then fuse the two halves back together with tree-sap glue.



Summer camp

Once the weather begins to warm up with the onset of spring, the reindeer and mammoths turn north again, signalling it is time for you to do the same. Food and clothing obtained from a mammoth kill will make a great contribution to your clan's survival on the long journey. The dried meat will keep you well fed while the mammoth's thick hide makes sturdy new boots for many people in the clan.



When you return to your camp on the tundra, you will need to get the clan back into their summer routine: weapon-making, food preparation, hide-drying and so on. One of the first things to organize is the repair work on your huts. The animal hide roofs will most likely need attention after the ravages of winter blizzards. You still need to be watchful for wolves and lions, but at least you can now relax in one place for the short summer months.

Timeline

6 million years ago

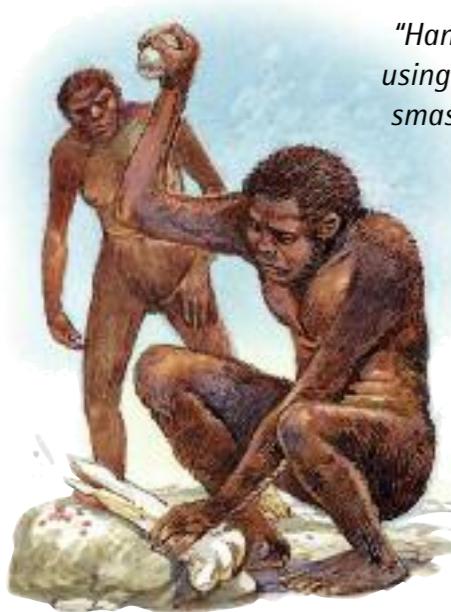
The earliest known human ancestors live in Africa.



Afarensis was about 1.5 m tall.

3.7 million years ago

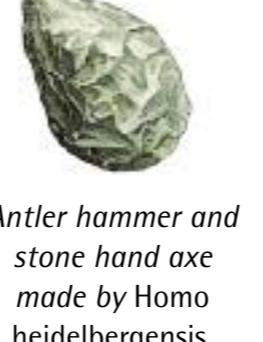
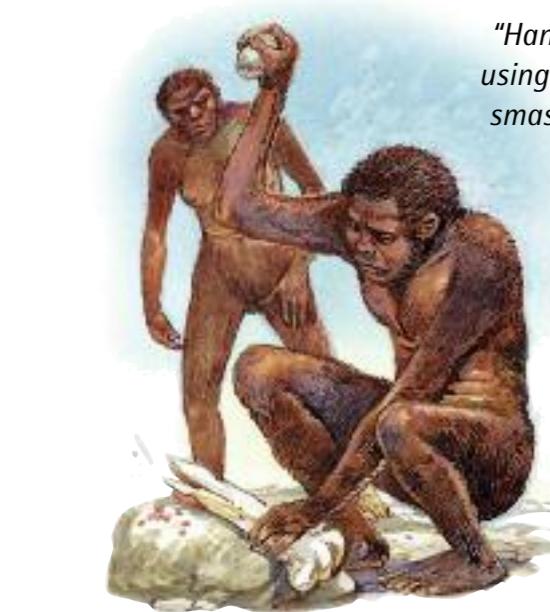
Hominids called *Australopithecus afarensis* live in Ethiopia, Africa. Scientists have found the bones and fossilized footprints.



"Handy man" using a rock to smash bones.

2.5 million years ago

Homo habilis, the first known true humans, evolve in Africa. Their name means "handy man" as they use very simple stone tools. This is the beginning of the "Old Stone Age" or Palaeolithic.



Antler hammer and stone hand axe made by *Homo heidelbergensis*.

2 million years ago

Homo erectus evolves in Africa, probably from *Homo habilis*. These humans are thought to be the ancestors of all later humans. They walk upright and are very like modern humans, but their brains are a little smaller. They make about 12 different types of stone tool.



Neanderthal hunters lay a trap for a woolly mammoth.

1.8 million years ago

The earliest known humans living outside Africa. Human fossils have been found in Georgia, on the borders of Europe and Asia.

1.6 million years ago

Homo erectus spread east into China and on into Southeast Asia. They probably travel in search of new hunting grounds.



800,000 years ago

A new kind of human called *Homo heidelbergensis* evolves from *Homo erectus* and lives in Europe, where the weather conditions are quite warm. They make tools from animal bone and antler as well as stone. They are expert hunters and have begun to use fire.

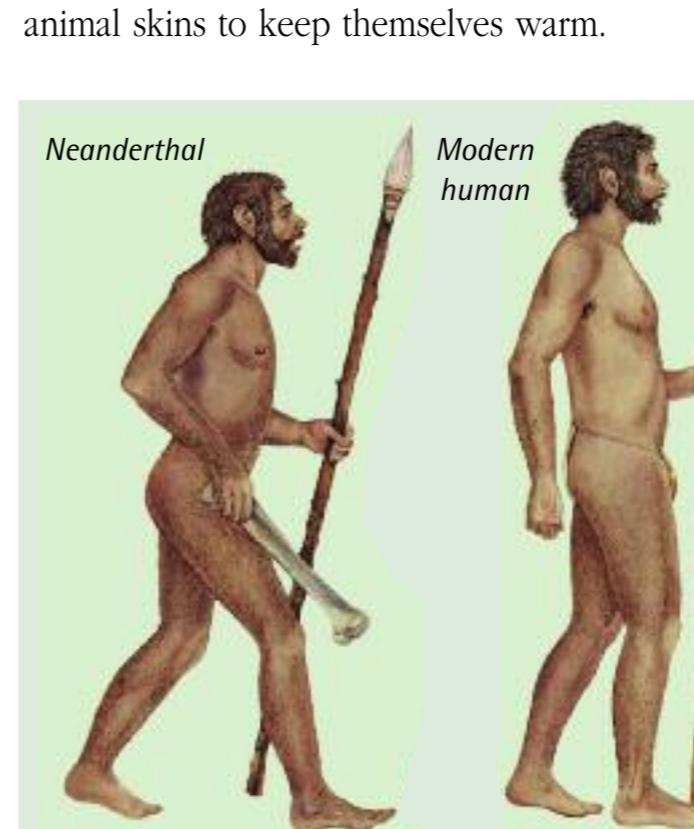
480,000 years ago

The beginning of a very long cold period, called a glacial stage, that will last 60,000 years. The ice cap at the North Pole spreads until it covers much of northern Europe, Asia and North America. Humans have to learn how to survive in these new colder conditions.



Neanderthal

Modern human



200,000 years ago

Homo sapiens (modern humans) evolve from *Homo erectus* in East Africa.



A selection of Neanderthal tools.

120,000 years ago

The climate has warmed up again. Modern humans move into the Middle East from Africa.

60,000 years ago

After a long period of warmer weather, the world's climate cools down once more.

60–50,000 years ago

Modern humans reach Indonesia and then Australia. They use boats to "island hop" across the ocean.



Modern humans and Neanderthals

Modern humans lived alongside Neanderthals in Europe for about 10,000 years. Modern humans were taller than Neanderthals, and looked very much like people do today. By contrast, Neanderthals were shorter and stockier, with a heavier brow and larger jaw. Neanderthals' brains were slightly bigger than those of modern humans, but modern humans still proved to be more adaptable. They were more successful hunters, made better tools and clothes, and developed a much more complex language.

Timeline (continued)

38,000 years ago

The first modern humans from Africa have begun moving in to Europe. They adapt well to the cold and eventually start competing for hunting and shelter with the Neanderthals.

35,000 years ago

Modern humans in Europe have begun expressing themselves with art. They produce cave paintings, illustrating themselves and the animals they hunt. They also make beads and carvings of human and animal figures in bone, antler and ivory.



This tiny mammoth-ivory carving is called the *Lady of Brasempouy* after the place in France where it was found.

Ice ages

Ice ages have occurred frequently throughout the Earth's history. They are times when the climate cools down so much that ice caps



Extent of the polar ice caps 20,000 years ago during the last glacial period.

35,000 years ago, modern humans have begun painting on cave walls.



30,000 years ago

The numbers of Neanderthal people fall as modern humans spread across Europe. Eventually, Neanderthals are found only in southern Spain.

28,000 years ago

In Gibraltar, a rocky headland attached to the southern tip of Spain, the last known colony of Neanderthals finally dies out.

20,000 years ago

The last glacial period is at its coldest. So much water is locked up in ice sheets covering North America, Europe and Asia that sea levels are at least 60 metres lower than they are today. This exposes an area of land about 1500 kilometres wide that today lies under the Bering Sea, between Siberia and Alaska.

form at the poles. During an ice age, the ice caps can become larger (glacials) or smaller (interglacials). We may be currently living in an interglacial of the most recent ice age, with the polar ice caps being relatively small. During the last glacial period ice covered much of Europe, Asia and North America.

Scientists still debate what causes ice ages, but it is probably due to a combination of factors, including changes in the Earth's orbit around the Sun, the position of the continents and the chemical composition of the atmosphere.



Cave paintings

Stone Age cave paintings have been found in many caves in Europe. They were painted between 35,000 and 18,000 years ago by modern humans called Cro-Magnons, named



12,000 years ago

Modern humans, following their prey animals, such as reindeer and mammoth, cross the Bering "land bridge" from Siberia into Alaska. From there they spread southwards, eventually reaching the farthest tip of South America.

Possible routes taken by modern humans as they crossed from Asia into North America and from there down to South America.



11,000 years ago

The last glacial period comes to an end. The Earth's climate warms up once again, the ice caps melt back and sea levels rise. Land once covered in ice starts to recover. New plants grow, especially trees. Animals, such as bison, horses and reindeer, move into these new areas, closely followed by human hunters.

after the place in France where they lived. The paintings are often very realistic and depict mainly large wild animals, such as bison, horses, woolly mammoth, deer and lions. The images were drawn with paints made from powdered rocks and minerals. Sometimes the outline of the animal was cut into the rock first. We cannot be sure exactly why people made these paintings. They may have been "hunting magic"—intended to increase the number of prey animals—or simply to record events in their own lives.

10,000 years ago

Animals that had thrived in the cold, tundra conditions of the last glaciation start to become extinct. The woolly rhinoceros, cave lion and *Megaceros* all die out at this time. Woolly mammoths survive only in very remote areas of northern Siberia.

4000

In Siberia, woolly mammoths are finding it difficult to survive.



The woolly mammoth is one of the last survivors of the Ice Age.