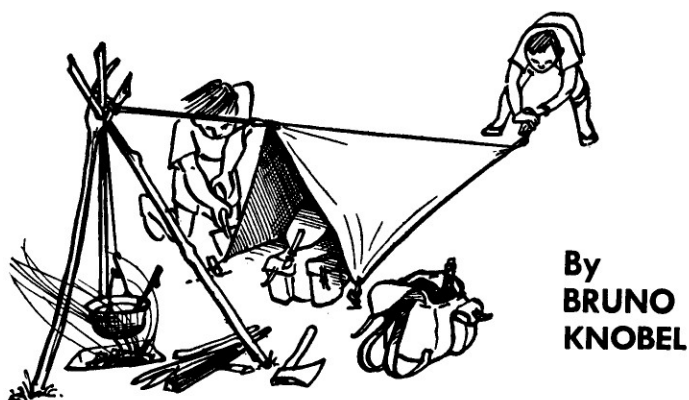


101 CAMPING-OUT

IDEAS and ACTIVITIES



By
**BRUNO
KNOBEL**

Illustrated by GEORGES MOUSSON

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Introduction

Even though the cities grow larger and larger and our natural playgrounds get continually smaller, even though everyone has at his disposal switches and faucets which produce light, water, heat, music, and entertainment, and even though the police protect us from burglars and bad neighbors and the firemen keep us from burning up—there still remains *one* area where we are completely dependent upon ourselves, a place where the laws of the prairie rule, where the enemy lurks, where we have to live like Robinson Crusoe or the Swiss Family Robinson, where we are on the warpath like the Sioux on the Little Big Horn River or the Apaches from Salt River Canyon once were. This place is the camping ground.

Wherever you live, you can find your own place to camp out. It might be a forested wilderness, but it needn't be. A park, a public picnic area—even your own back yard—can be transformed into a deserted island or Robin Hood's glen, and when you go farther afield, during summer vacation, perhaps, the possibilities are limitless.

In any season or in any weather, your Robinson-trapper-pioneer-redskin life begins there. It is there that you can relive the adventures of the last of the Mohicans and blaze your own trails through the wonderful world of the outdoors.

Do you think that playing Indians is not going along with the times ? You're wrong. Even the modern world is still full of people like Sacajawea, the brave Indian woman who guided the Lewis and Clark expedition. Who doesn't remember the gallant crew of the Kon-Tiki, a balsa-wood raft that sailed across the Pacific ? What about the courageous Englishman, William Stanley Moss, and his men ? They parachuted into North Pole territory to see if survivors of a plane wreck could reach the nearest settlements in Greenland across the only usable route, a horrible distance of 600 miles. And there are the Australian aborigines, whose ability to read tracks can shame even a well-trained police troop with all sorts of technical equipment. There are men like Admiral Byrd, and Albert Schweitzer, and the prospectors searching for uranium in northern Canada, and the technicians, scientists, and merchants for world organizations who help the underdeveloped nations and bring civilization to new areas. The age of pioneers and explorers dependent solely on their own skills for survival is still very much with us.

But you have not gotten quite that far. Not yet. For the moment, you are just going to the edge of the woods, or out to your back yard where you will be introduced to the lore of the pioneers, scouts, trappers, and Indian warriors.

Around the Fire



From books and moving pictures we all know that Indians had the ability to maintain smokeless fires, and that trappers could blot out the sites of their fires without leaving the slightest trace behind. But we're not always able to imitate these models. We gaily follow the recipe: take some wood and light it. ... But there's far more to it than that.

FINDING THE RIGHT TYPE OF WOOD

Before you build a fire, you must first have a good supply of firewood on hand. It's embarrassing to realize that there's no more wood when your hot dog is only half done. For a smokeless fire you need completely dry, brittle wood. The driest branches are those that have lost their bark and never feel cold; cold wood is damp and heavy, and it is useless to you unless you want to dry it out at a fire first. You can find dry brittle wood even after a rain. Look for branches under dense shrubbery (that's a bit of old gypsy lore) or find the lowest dead branches of young pine trees, which are especially suitable for starting fires. Only a greenhorn would start a fire with wood that still has green leaves hanging on it. Such wood is usable only if you already have a strong fire. Thick, dead limbs of old oaks, dried roots and trunks make good heating material. In rainy weather, cut away the top layer of wet sticks; the center will be dry.



KINDLING A FIRE

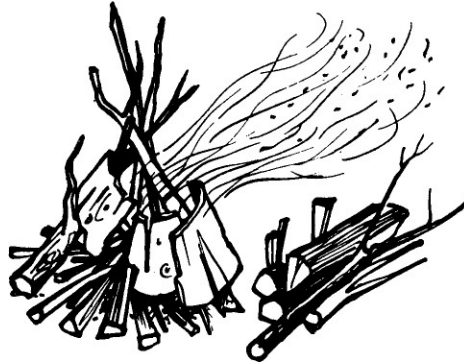
This is almost like a game of skill. First, clean the site where you are going to lay your fire, and scrape the ground all around it so that you leave nothing that may be ignited by a flying spark. Then, start with paper, dried grass or reeds, dried leaves and twigs, birchbark or paper-thin shavings. Set up a little pyramid of the thinnest, driest twigs over this. Then, to get a strong flame, lay brittle softwood branches on top of the pile. Finally, to produce effective heat and a good glow, add pieces of root and thick hardwood sticks.

The hardwoods include oak, beech, poplar, birch and hickory. Hazel, spruce, pine and fir are all softwoods. The paper-thin outer layer of birchbark is ideal for kindling.

Set fire to the core of the pyramid only when it is finished. If kindling piles are skillfully built, it is possible to light them with a magnifying glass—if the sun is out brightly. As long ago as 278 B.C. the inventive Archimedes saved the Sicilian city of Syracuse with this principle. He erected a huge reflector on the city wall and set fire to the enemy fleet with it. Soon the fleet was swimming in bright flames on the sea. I wasn't there myself, but I have often lighted a well-prepared, dry kindling pyramid with my pocket burning glass.

DIFFERENT TYPES OF FIRES

If you need a fire for cooking, add some heavy blocks of wood on top of the thicker branches as a final touch for a pile of strong, glowing heat. The best thing is a few short thick logs laid around the fire in the form of a star or the spokes of a wheel, so that only one end of each stick touches the flame. As the burning progresses, push the sticks further into the center and new glowing ashes will be formed.



Would you like to fry an egg in a primitive way? Use a flat, sun-heated stone from a dry stream bed as a hot plate, or you can even heat the stone in the fire. Remove the soft center from a slice of bread, so that you have a ring in the middle. Then lay this bread on the stone and break the egg into the ring. When the egg has cooked, you can eat it right off the stone.



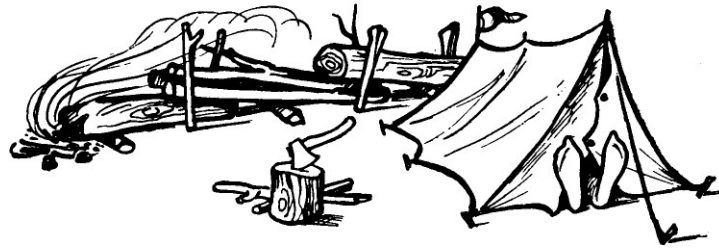
You can slice or notch hot dogs at the ends and spear them on a

green twig, then cook them over the fire or the glowing coals. Don't ever hold meat directly in a flame, or you will char it.

Raw meat should be salted and wrapped up, first in butcher's parchment paper and then in a few layers of damp newspaper or wrapping paper. Shove this package into the glowing coals, and continue to keep the fire going. In about an hour, a piece of beef that isn't too thick will be done. The damp paper keeps the meat from burning.

Even today certain islanders cook their meat this way, except that they use green plant leaves instead of paper. In this case, the moisture of the leaves protects the meat from charring.

A "caterpillar fire" is good for a campfire, because it needs little or no attention. However, you should build this kind of fire only when the wind direction is steady and there is no danger of rain. Build the wood pile as pictured below, beginning the pile in the



direction of the wind. The supports underneath and at the sides should be *green* branches. The thickest support must always be under the middle of a log, and the thinnest under both logs. If there is a little wind, make the pile shorter by pushing the pieces further over each other.

In order to keep a fire overnight or for a longer period, cover it with a pile of ashes. This way it keeps glowing, and even after many hours you can rekindle it by blowing on it.

But only in the rarest cases should you ever leave a fire or glowing embers unwatched. On an empty sandy beach you might leave it untended for a short time, but always keep in mind that a strong rising wind can carry sparks from glowing coals. At best, you

might escape with a few holes burned in your tent; at worst, you could start a forest fire.

For a fire that will dry wet clothing, you need a strong glowing mass of coals. Around it build a pyramid of sturdy, green, branchy tree limbs and hang your wet clothes on this. Turn the garments every few minutes. *And stay there* as long as there is still wood in the glowing mass. Glowing embers will spring into open flames in a rising wind.

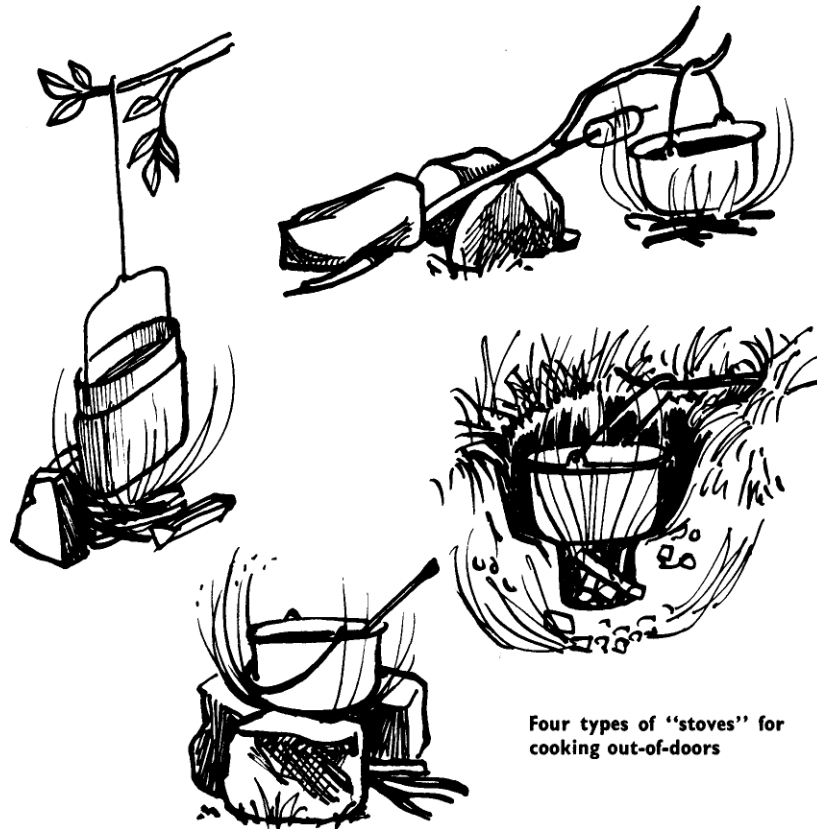


COOKING SITES

In the fall, when there's a tang in the air and the trees begin to shed their leaves, there's nothing so satisfying as a pot of hot soup or tea cooked over an open fire, with the unavoidable taste of wood smoke and the usually unwanted addition of pine needles.

You can invent and construct your stove on the spot. The type you build depends upon the circumstances and the available materials. Four possibilities are shown on the next page.

But whatever kind of fire you use, there are some important precautions to take. Forest rangers and nature lovers do not like to see careless people building fires in the woods. And not without reason. Fires incompletely extinguished or sprays of sparks left unwatched have caused numerous, often devastating forest fires.



Four types of "stoves" for cooking out-of-doors

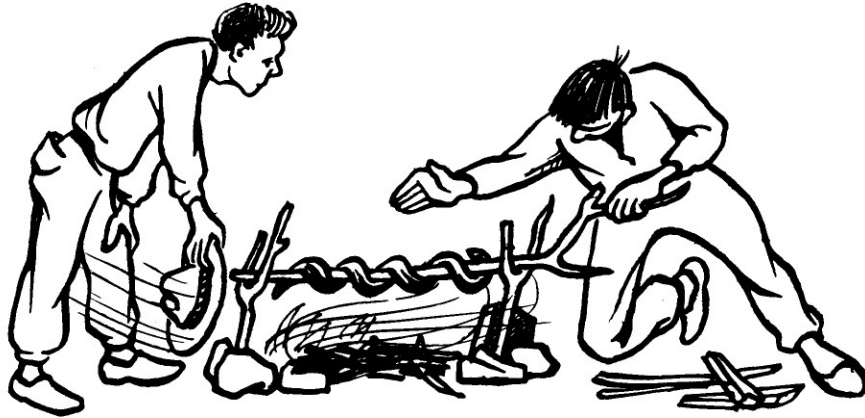
You should build your fire only in the middle of a clearing, in a pit, or on a stony spot. There should be nothing that can burn within 8 to 10 feet all around the fire site. Trees or bushes within this distance from the fire would be damaged by the heat.

You must completely extinguish the fire afterwards. It certainly is not too much for you to get some water for this from a nearby brook. If you merely want to stamp the fire out, at least leave yourself enough time for the job—it's really not so easy or fast. In addition, you are likely to burn your shoe soles doing this, although you may not notice it until later. Never scatter the fire in all directions so that the coals fly under leaves and are hidden from you somewhere. They keep on glowing!

BAKING BREAD

At home, before you set off for your camping grounds, you can make dough with a teaspoonful of baking powder, about six ounces of flour, a pinch of salt, and some water or milk. Knead the mixture into a tough dough and pack it in a clean handkerchief or a can when you are ready to go.

While your fire is building up the strong heat necessary for baking, cut two forked branches and a straight green hazel or birch stick. Set the branches at each end of the fire. Then make a long roll out of the dough, somewhat thicker than your thumb, and wrap it around the green stick in a spiral, keeping the individual turns at a little distance from each other. The dough will rise while it is baking, and the twists should not bake together. Lay the stick across the forked branches, and turn the spit frequently. The bread is done when you can insert a smooth bit of wood and pull it out dry.

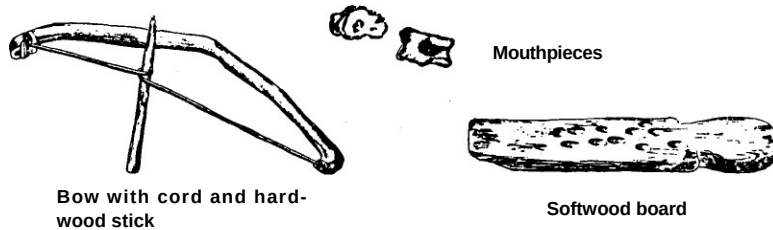


If you want to be even more like a woodsman, and if your camp site has fresh running water, you can mix the ingredients at home without any liquid, and put the mixture into a paper or plastic bag. Then, when you are out at the site, you can add the water and cook your bread on a flat stone.

DRILLING A FIRE

The Indians protected their wigwam cooking fires like prized possessions, for naturally they had no matches or lighters at their disposal. If they had to build a new fire, they could do this only with a fire drill. As a matter of fact, even today many gauchos on the Argentine Pampas, the natives of Samoa, and the Eskimos still make their fires this way, and recently I learned that drilling fires is a part of the NATO pilots' training course, so they will be capable of managing for themselves behind enemy lines without any technical resources in case of emergency.

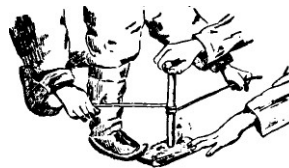
To drill a fire, you need a bent branch, string, a hardwood stick, a bit of wood for a mouthpiece, and, finally, a softwood drilling board and tinder.



The piece of softwood serves as a base. Cut a little hollow in the surface. Then place the hardwood stick vertically in the hollow and twirl it energetically back and forth between the palms of your hands. This drilling produces a hot, fine powder. Make a notch at the side of the hollow so that the powder will fall out, and put some tinder there. You can use shredded bark or fine wood



Eskimo drilling a fire



Fire drilled by two people

shavings for tinder. The hot powder will light the tinder, and you have a fire. In order to increase the friction in the hollow (and thereby the heat produced), put in a few dry grains of sand. In order to speed up the revolving hardwood stick, catch up the stick in a bowstring the way the Eskimos do it. Since the person who is drilling the fire alone has to hold the stick, he makes himself a mouthpiece for this purpose. The mouthpiece is also used when two people drill without a bow.



Other methods of drilling: turning a pliable hardwood stick or scraping vigorously with it

Another way of starting a fire without matches is by rubbing cotton between dry wood until you can smell it burning, then start it glowing with a quick wave through the air, and light a wood fire with it.



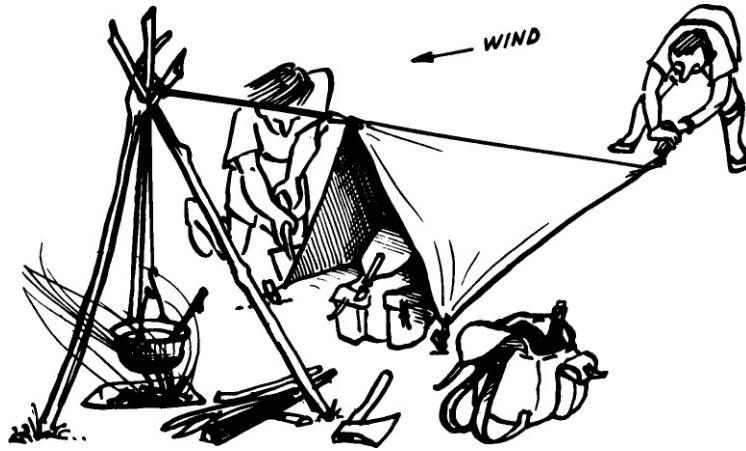
Overnight Shelters

Trapper's bivouac—Sleeping bag, ranger's tent and bivouac fire. These are enough to let you sleep comfortably through a cold night.

RANGER OR GYPSY TENTS AND TRAPPERS' BIVOUACS

If you are to be truly at home in the out-of-doors, you should learn how to build a shelter for yourself. There is no genuine trapper or ranger who has not spent at least one night sleeping under the sky. We've all read stories about the weary traveler who "dug a hollow for his hips in the soft ground and slept until dawn." Even this primitive sleeping arrangement calls for some knowledge of how to adjust to the prevailing conditions. Try lying down on the bare ground to sleep. You will notice quickly enough that the hip bone on whichever side you are lying is in your way. Dig out a depression, just big enough for your hip bone, and you will immediately notice how much more comfortable you are. You can go one step further, and cushion the hole with some fine sand, or you can place some slightly crumpled paper in the hollow for insulation against the cold.

You can be even more comfortable if you put up a ranger's tent,



which requires very few materials. All you need is a rectangular piece of cotton cloth, 6 or 7 feet long. To waterproof it, make a brew from the bark of an oak or birch tree, and let the cloth soak in it for two days. The ranger's tent can then be used as a raincoat too.

In one corner make an eyelet large enough to run a thick cord through. At the other three corners, sew on small leather loops that you will attach to the tent pegs.

With this cloth, a solid cord 10 to 14 feet long, and a few pieces of branches from which you can cut your own tent pegs, you will have sufficient equipment to sleep out pleasantly on even a cool summer night without having to worry about a cloudburst. Set the tent up as pictured in the illustration.

The way you pitch the tent is important. The entrance must remain open and the tent should narrow toward the rear, so you must always be careful to have the opening turned away from the windy or storm side. To keep out the cold, you can hang a raincoat or windbreaker in front of the opening, or put your rucksack in front of it. There's an even simpler way: gather some leafy limbs and branches and, after you crawl into the tent, close off the en-



trance with them, sticking them in the ground like a fence in front of the opening. You can also do as rangers do. In cold weather they just light a fire in front of the tent entrance and lay a few thick, dry branches on the coals before going to bed. If the tent is set up right, the wind will carry the smoke away from it.

Gypsies also use similar tents, but they make theirs somewhat larger because several persons usually share a single tent. For two people the rectangle is about 7 by 10 feet. In this case too, the size and the addition of eyelets and leather loops depend on the particular needs. With this sort of tent, set up more or less like the ranger's tent, the open sides are closed off with bushes. A long branch stuck in a loose stone wall or in a wood pile stands as a roof beam to give the tent a solid support.

A tent of this type needs a little ditch around it just as more modern tents do. This ditch catches the rain water as it runs off the sides and carries it away. Without the ditch the water would seep into the ground around the bottom of the tent, soak it, and then run inside the tent.

It is always important to stretch the sides of the tent tightly, so that there are no folds. Even tightly woven cloth that has not been

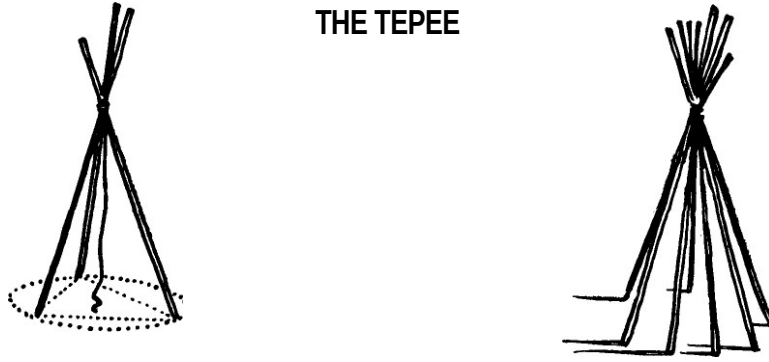
waterproofed will shed the rain if it is stretched taut. An umbrella is an example of this. However, the minute you bump against the side of such a tent during a heavy rain, it will start to drip at the spot you hit. If this happens, just press your finger against the spot and draw it straight down along the side of the tent to the ground—the water will flow off without bothering you any more.

Lay dry grass, reeds or branches on the floor of the tent, or perhaps you can get an armful of hay or straw somewhere. Even a layer of newspapers is useful. This will protect you from the coolness of the ground (unless you have decided to camp in the middle of a swamp—which is not recommended).

The choice of a camping site is important. The earth should not have too much clay, or it will keep the water from being absorbed. And don't camp in the middle of a hollow where the rain water can collect. Loose, sandy ground is warm and comfortable. It is pleasant to have a wooded area or a rise in the ground to protect you from the storm side. In northern latitudes, the storm side is the west, northwest, or southwest.

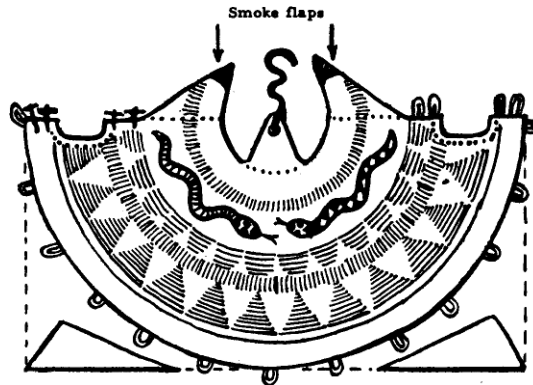


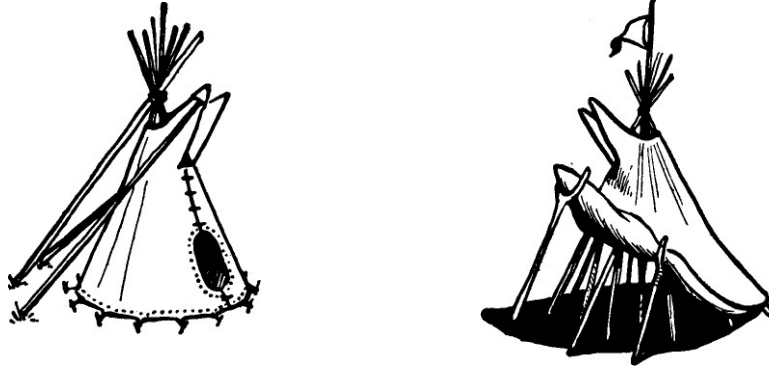
THE TEPEE



A tepee is very picturesque standing in a sunny forest clearing. It is also an exceedingly practical tent, with the advantage of allowing you to have, a cooking fire inside it. And it is not particularly difficult to put up your own tepee.

First get a piece of sturdy cloth at least 7 feet by 14 feet. A larger size is all right as long as the length is twice the width. You can even make it by sewing several smaller pieces together. Then cut out a semicircle. From the cutout pieces make two smoke flaps, and sew them on at the spots shown in the illustration. Now bind all the edges of the cloth with heavy linen, or, better yet, with leather. Run a heavy cord around the bottom edge of the tepee, sewing it securely at about 4-inch intervals. Afterwards you





will stick the tent pegs through the loops created this way to stretch the sides tight. The tent is not closed with buttons, but with wooden dowels and loops like those on duffle coats.

To set up the tepee, you need about ten poles as shown in the illustration, or, if you like, branches cut as straight as possible.

Draw a circle on the ground with a diameter equal to the radius of the semicircle. Then set up three poles on the circle as shown, and tie them together at the height that the peak of the tent will reach. Lean the other poles against these three, putting three aside: two for propping open the smoke flaps and one to tie the top of the tepee to. By narrowing or widening the opening of the smoke flaps, you will get the "chimney flue" to draw. Naturally the opening must always be on the side away from the wind, for otherwise the smoke would be blown back into the tent. Secure the tepee in a strong wind by letting the cord which holds the poles together at the top extend to the ground, and fasten it there in the middle of the tent. In hot weather you can roll the front of the tepee up, holding it with strong forked sticks, to allow breezes to enter.

Painting the Tepee. Cave dwellers decorated their caves with drawings; the Indians painted their tepees, taking the motifs from their lives: hunting and war. They also drew their totem figures, the sun and the moon, and animals. You can decorate your tepee in the same way.

The Design. Designing consists of first making a drawing of, for example, an animal you are going to paint and then simplifying your sketch. If you are drawing a lion, first make a realistic sketch, then reduce it as far as possible to simple single lines, and finally intensify and stylize those lines.



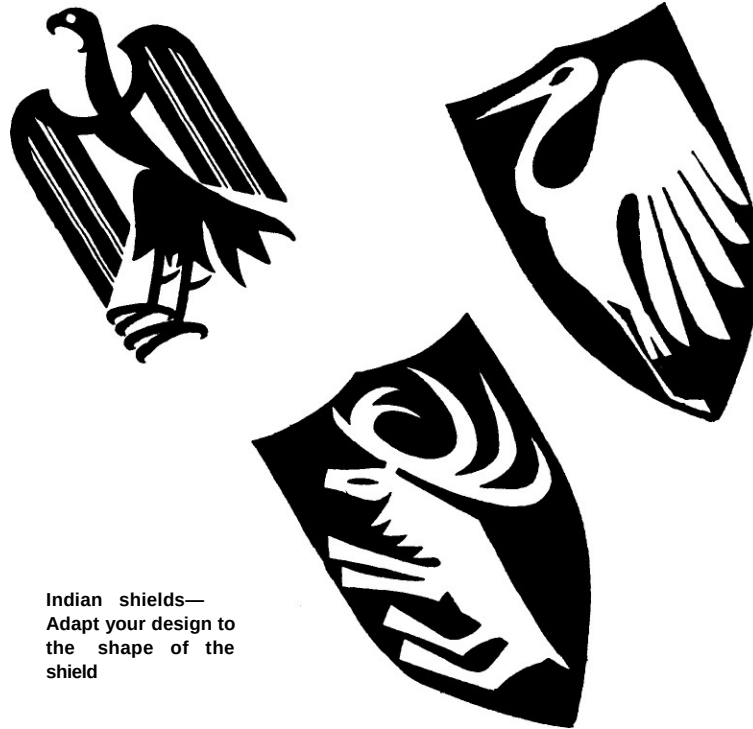
In the same way, if you wish to paint an elk, first draw it. For your tepee decoration you don't need any perspective, so you can simplify the antlers and place the legs decoratively. Then further simplify all the forms, exaggerating those parts of the elk that are typical and distinctive. And you finish with a decorative pattern for painting.



Another method is pure stylization. In the illustration, the "photographic" image of an eagle is intensely simplified and the typical elements are completely exaggerated, but the bird is still recognizable as an eagle.

You might like to make Indian shields, too, and paint them with the same motifs as your tepee. Be sure to adapt the design to the shape of the shield.

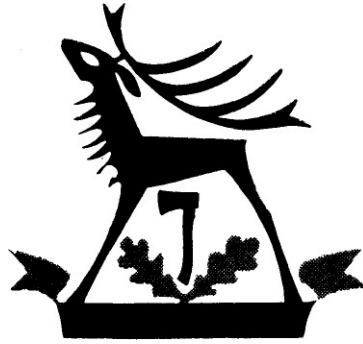
The Painting Process. Use ordinary oil paints, choosing pure tones and avoiding the mixed colors such as gray, purple, brown, light blue, and so forth. Use black, Prussian blue, red, and perhaps even green and chrome yellow. The paints should not be



too thick or they will not penetrate well into the fabric. Thin the paint with turpentine, but not so much that the paint is watery or runs down a vertical surface while you are painting. Add a drying compound, such as varnish, to the paint to speed up the setting. You can wash out any unwanted strokes or drops with turpentine as long as the paint is still wet. Have one brush to use for each color—long-handled brushes with short bristles, of an inch to 1 inch wide.

Fasten the piece of tenting to be painted against a wall, first putting up a heavy underlayer of newspaper to protect the wall from the paint that penetrates through the material. Outline the figure with charcoal before painting. The composition and thickness of the paint determine how long the tent has to dry. It

will probably take at least three days to a week. Be especially careful about putting on too thick a layer of paint—apply it just heavily enough so that the paint sticks together. Otherwise the layer of paint will break and crack when you fold the tepee.



You can even add a bit of humor to your stylized drawings. For example, look at the squirrel. The eye, the pointed nose, and the ear give the whole picture an amusing touch. This is also true of the rooster, with its half-angry, half-proud expression. On the other hand, it's the arrangement of the wings and tail which gives the albatross its dash of caricature.





Building Huts

THE BUSH HUT

The bush hut is the simplest kind of shelter to build in the woods. It may not look like much when you start it, but it improves from year to year. Look for a bush that has long, pliable branches and thick foliage. Bend the branches down in an arch, and fasten the ends to the ground. You might use strong rope or leather thongs attached to pegs. While you are doing this try not to crack any twigs or branches. Now weave other leafy branches in between the arch so closely that the wind will be efficiently kept out. This hut has the advantage of actually growing. The network of branches will get thicker and thicker and will soon look so natural that anyone not in on the secret will not guess the existence of the hut. Unfortunately, the foliage does not completely keep





out the rain, and the hut is a useful shelter only in the summer. Nevertheless, it's a fine secret hiding place.

THE PYRAMID HUT

If you don't want to wait years until your hut gets roomy, and if you want a shelter that will protect you from the rain, you can erect a pyramid hut.

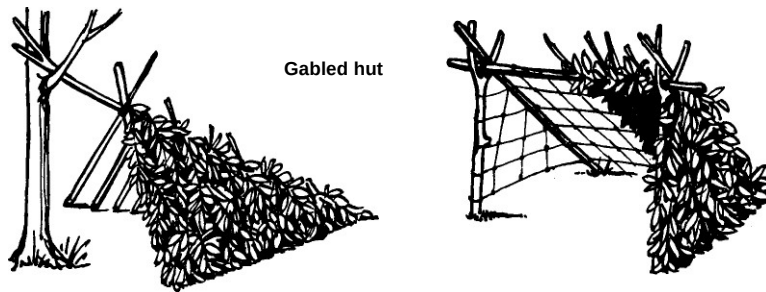
Find some long, solid branches, and set them up in the form of a pyramid. Weave smaller branches horizontally around the framework of the poles. Then weave branches with heavy foliage over this. Beech leaves are the best, for the branches from coniferous (cone-bearing) trees such as pine or fir are not able to keep out the rain. Work from the bottom up, and extend every succeeding layer over the one below it. Only this way can the rain run from the peak down to the ground without leaking in. Be sure the opening of the hut faces away from the storm side. Don't forget to dig a ditch around the hut so that the rain water will run off. You can line the inside with dried moss, and add a couple of thick pieces of log to serve as stools. If you want additional furniture, look around you for ideas. There are many primitive but serviceable things you can build from materials you'll find at your camp site.

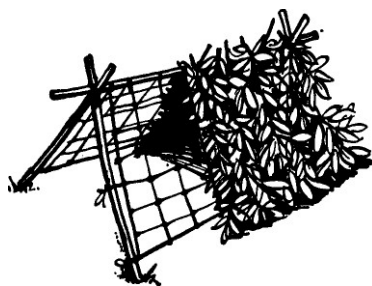
Pyramid hut



THE GABLED HUT

Setting up a hut is often time-consuming because you have to search for the suitable poles and weaving materials for the rough framework. Therefore, experienced hut builders always carry a net of tarred or waxed cord with them. You can easily weave a net for yourself. (See page 122 for instructions on how to weave a net.) The meshes have to be about 8 inches apart, and the whole net should be about 6 feet by 12 feet. With a net like this, you can build a gabled hut very quickly. Weave leafy branches between the meshes, or use grass, hay, straw, ferns, or large leaves if you are



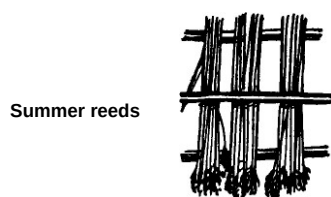


Gabled hut

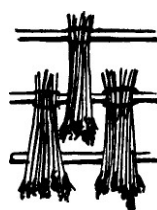
camping in a field—and, again, work from the bottom up and extend each layer over the previous one.

REED HUTS

You can make both the pyramid hut and the gabled hut out of reeds. Reeds have the advantage of being rainproof and very warm as well. To be sure, you do need a great many reeds to make a good covering. The method you use depends on whether summer (green) or winter (dried) reeds are available. If you have pliable summer reeds, take a handful with the cut edges toward the top and the tips pointing down, and bind them, once again starting



Summer reeds



Winter reeds

at the bottom, over the first horizontal support, under the second, over the third, and so forth. Since the fresh reeds shrivel quickly and leave gaps, dry winter reeds are much better. Gather bundles of reeds by the armful, tie bunches together at the end, and then fasten them on the framework of the hut like roof shingles, pushed close to each other and overlapping. Huts covered with dead leaves or reeds dry out quickly in the



sun and become parched. Therefore, it is dangerous to have a fire in the hut or even to light a fire nearby.

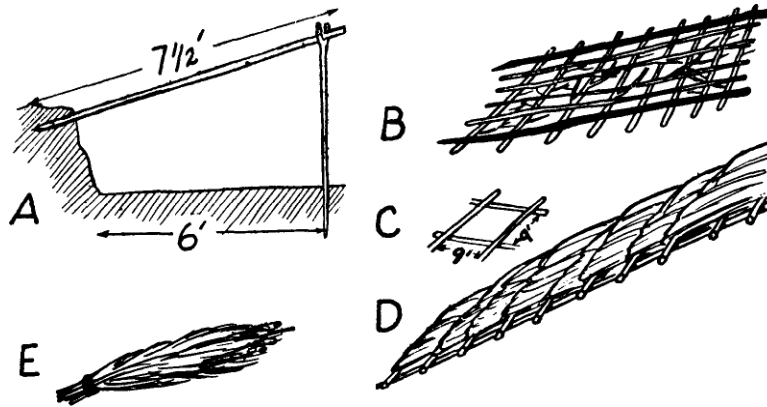
THE TRAPPER'S ROOF

This model of the trapper's roof lies about halfway between the gabled hut and the ranger's tent. It is usually rainproofed with reeds and intended as a nook to slide into on a rainy night—an emergency refuge—rather than a cozy shelter.



You can build a large, roomy trapper's roof in an afternoon, and then gradually improve it until you have built a regular hut.

You can move the trapper's roof around and place it where it will best protect you from the rain. In spite of its simplicity, it still offers good protection. It is also easily adaptable as a movable roof over cooking sites, but you'll have to be very careful that no sparks hit it.



First get two solid forked supports and stick them in the ground, then connect them with a horizontal pole. This is the crossbeam of the roof, where the upper edge will be bound. The lower edge rests on the ground or you can put it on a board, into a wood pile, or against a rise in the ground. The different examples of gypsy tents shown on page 19 may give you ideas for such constructions. The illustrations here show the roof sometimes resting on the ground, sometimes a bit above it.

It is best to cover the roof with reeds, using the same methods as for the reed hut. Complete the frame of the roof with a lattice of branches or cords, and then weave in the reeds. In an emergency, you can also use straw, ferns, and so forth, but you will have to make each layer much thicker than with reeds.

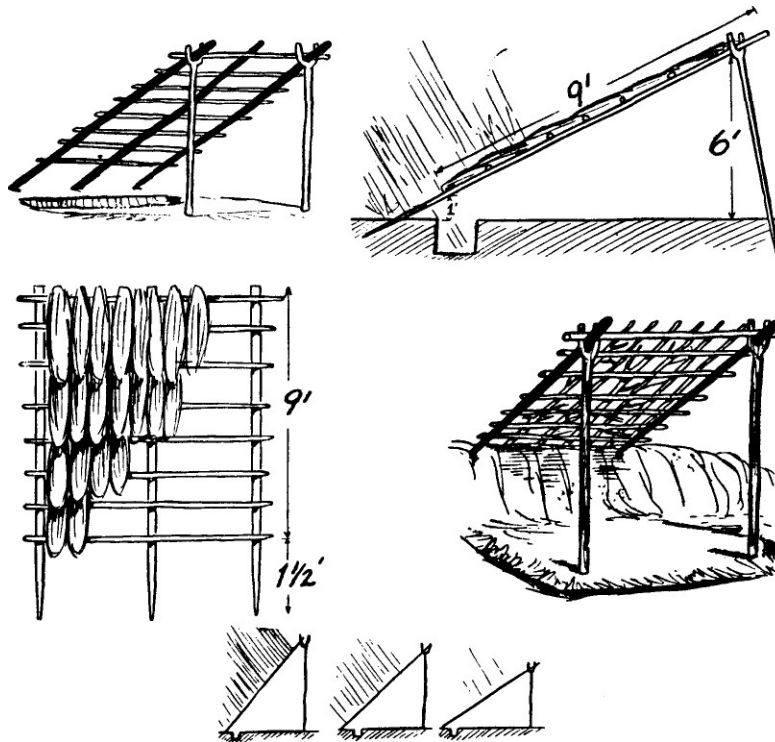
Since the slanted roof lacks side walls, you must carefully place it against the direction of the wind and rain. Set the roof at a steep or a gradual angle according to the angle at which the rain is falling.

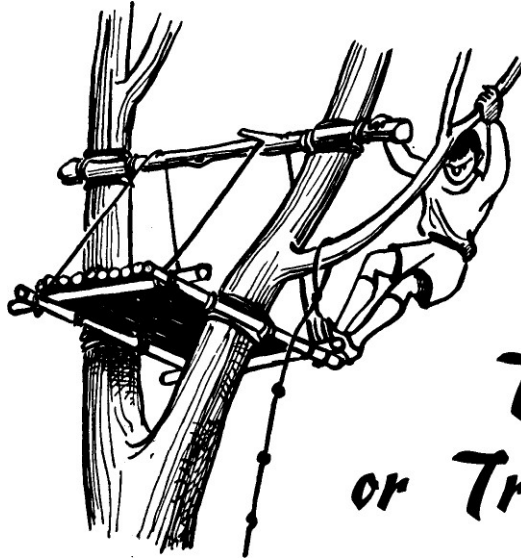
Don't forget the ditches or drains or you'll quickly be flooded out. Since this airy hut has no walls, it's a good place to light a fire; the smoke can draw off freely.

You can spend a comfortable night under this roof with a warming glow next to you. See the illustration of the trapper's bivouac on page 16.

This sort of hut has still another advantage: you can take it apart easily and set it up again in another spot. I know some fellows who cycle out to a river in the country for swimming during the summer. The reed roof they set up there provides shade during the day and shelter at night. Before they start for home, they dismantle their trapper's roof and store it away in a little shed at a nearby farmhouse. The next time they come, they simply pull it out again and set it up.

Very cautious people prepare more than one set of vertical supports so they can immediately shift the roof around in case the wind changes. This is also advantageous when you are using the roof as a sunshade, because you can always adjust it at any time to suit the position of the sun.





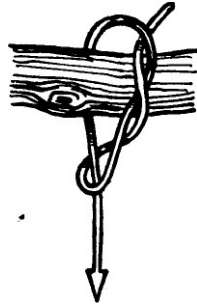
The Aerie or Tree House

Hanging aerie—This type is suitable if you can find a tree with one very thick fork. The floor of the aerie is tied to both sides of the fork. To make the floor more secure, it is hung from a horizontal beam fastened to sturdy limbs above it. Notice the knotted ladder, the simplest form of rope ladder.

Originally the word "aerie" meant a nest of brushwood built by birds of prey. Today the word is also used to mean a lookout situated high in the treetops and used as an observation post. Because of its height, an aerie not only provides the observer with a fine view; it makes him hard to detect from the ground.

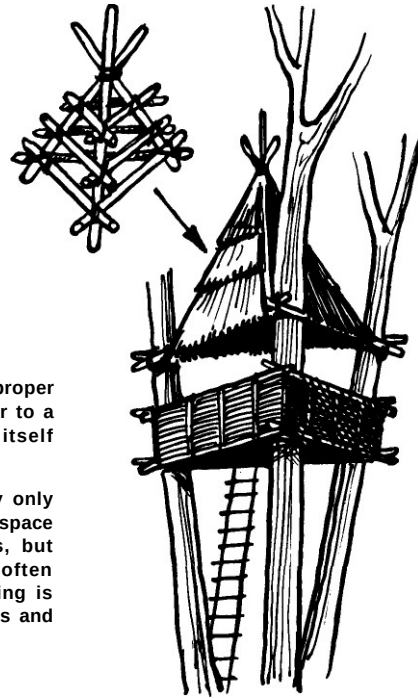
Building an aerie is a challenge to your pioneering ability, but it is an ideal vacation-time occupation. Your first concern is an appropriate site. You can put up your aerie in your own garden or back yard, or that of a friend. Don't erect it on anyone else's property without first obtaining permission.

The type of aerie you build depends on the group of trees that is



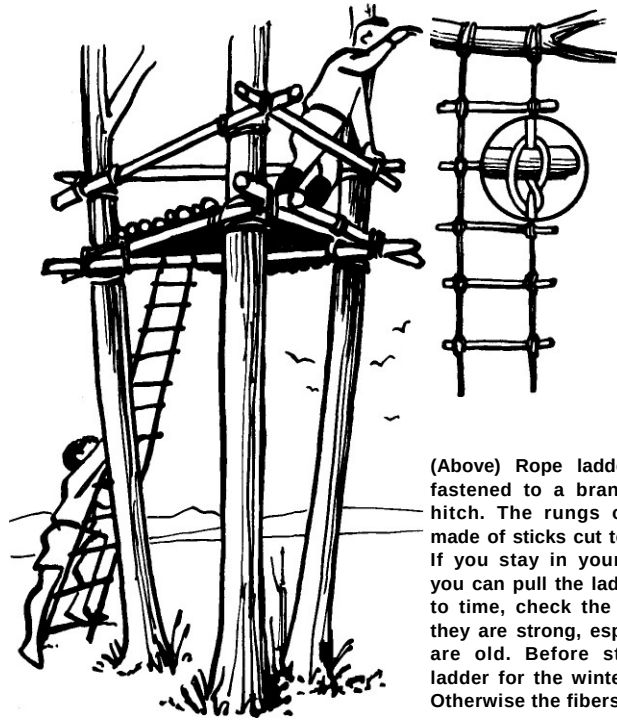
(Above) Timber hitch—This is the proper knot to use for tying a rope ladder to a branch. The timber hitch pulls itself tight by the weight hanging on it.

(Right) This aerie is supported by only three tree trunks. It provides less space than one built around four trees, but finding three trees together is often easier than finding four. The railing is made of branches; the roof is reeds and rushes woven together closely.



available. The illustrations on these and the following pages show some different types.

Before you begin building, gather the necessary materials: ropes, cords, sticks, and so on. While you are still on the ground, practice making the knots that serve to connect the sticks securely. *Never drive nails* into a living tree. To make it easier to replenish your building materials when you are in the tree, attach a rope to the loads you leave on the ground. *Never stand under a swaying load*. If you can climb up to your treetop only with difficulty, put up a secure, professionally made rope ladder before you even begin to build. Incidentally, a rope ladder is easier to climb if it is drawn as taut as possible and anchored by two pegs in the ground.



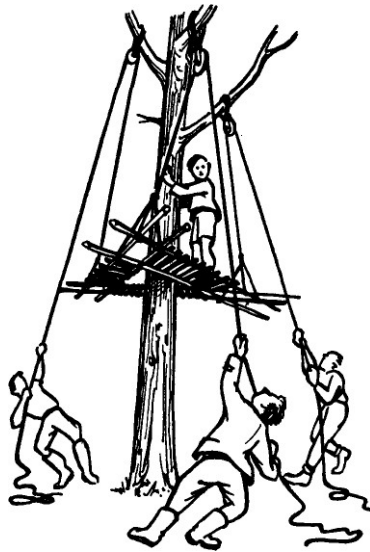
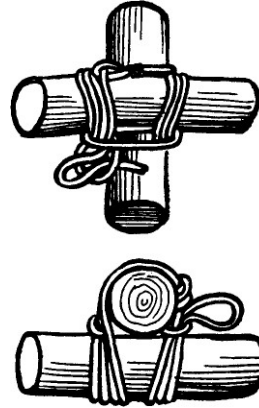
(Above) Rope ladder—The ladder is fastened to a branch with a timber hitch. The rungs of the ladder are made of sticks cut to the same length. If you stay in your aerie overnight, you can pull the ladder up. From time to time, check the ropes to be sure they are strong, especially when they are old. Before storing your rope ladder for the winter, dry it out well. Otherwise the fibers will begin to rot.

(Above) The aerie pictured on page 33 is here being constructed. The floor is finished and three supports have been fastened above it as a base for the roof framework.

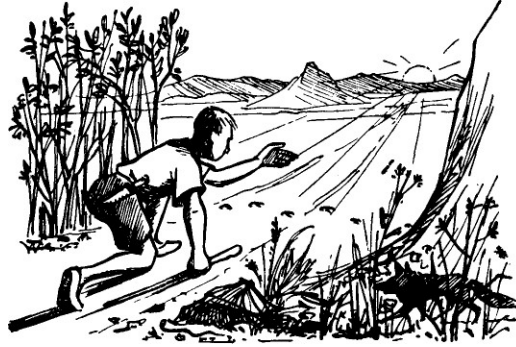
The next step is to build a secure platform on which you can stand comfortably when you are completing the work on your aerie.

To keep strangers from noticing your tree house, it should blend into its surroundings as naturally as possible so it won't stick out like a sore thumb. This is particularly important if you want to use the aerie as a comfortable lookout for watching birds and wild animals. From the vantage point of a well-placed aerie, you can take pictures of wildlife that would be unavailable otherwise. You will want to record your observations in a notebook too, giving the date, time and weather conditions prevailing.

Square lashing—Use square lashing to fasten two poles crossing at right angles. First fasten the rope to one piece with a timber hitch, and lay the crosspiece over the loop. Then work the rope as follows: from the right, under the crosspiece, up over it in front, then down behind the vertical piece to the left and up again, over the top of the crosspiece toward you and down again under the vertical piece to the right, where you arrive at the starting point with the rope. You must repeat this four or five times so the lashing will hold securely. Pull the rope tight after every loop. As you wind the rope, have each successive loop come outside the last on the crosspiece, inside the last on the vertical piece.



The aerie on pulleys—If you have only a single tree in which to build your aerie, pulleys will be a help. Fasten three pulleys to limbs above your aerie site, and build a three-cornered frame around the base of the trunk. Attach ropes to the frame and thread them through the pulleys, and you can hoist the aerie up. You will have to proceed very carefully, for this can be dangerous, and you need strong friends to help you.



On the Trail

READING TRACKS

From the earliest times, reading tracks has been important to man. Animal tracks led him to food and human tracks warned him of enemies or served as a guide, preventing him from getting lost in the wilderness.

Those folks who have remained close to nature and are dependent on nature—today we often arrogantly call them "primitive peoples"—are highly skilled in reading tracks. Most of us, however, no longer have this ability. But while reading tracks is not something we grow up knowing how to do, we can develop and perfect the ability even today.

Begin your tracking lessons on a sunny day and face the sun, so that every uneven spot on the ground will cast a shadow. If you lose a track, mark the last impression, and search in a large circle for the continuation. Notice the peculiarities of the track you are following so you will be able to distinguish it from others you may come across. Mark the path you are following to keep you from losing your bearings in an unfamiliar region while you are concentrating completely on the tracks.

The quality of the tracks depends primarily on the type of earth. Snow, loam and sand hold tracks best. But weather conditions can destroy even the best tracks. If you know what the weather in the

area has been, you can determine when the tracks were made. For example, if it has rained you can examine the raindrops that have fallen on the tracks, or if the wind has been blowing, the sprouting grass seeds or dust in the tracks will give you a clue to when they were formed. Grass which has been stepped on lightly straightens up again after a short time. Sunshine hardens tracks.

TALES OF MASTER TRACKERS

Seeing tracks is one thing; being able to read them is something else again. Understanding the story told by tracks is primarily a matter of drawing conclusions. Here are some anecdotes that illustrate this point.

During the Civil War some soldiers looking for a lost comrade asked an Indian boy if he had seen the fellow they were seeking. The boy replied, "Do you mean a tall soldier riding a lame roan horse?"

But when the soldiers asked him *where* he had seen their lost friend, the Indian answered, "Oh, I haven't seen him at all." Instead, he led the soldiers to a tree where some roan horsehairs stuck to the bark at the spot where the horse had brushed against it. The hoof tracks showed that the horse had limped, because one hoof did not leave as deep an impression as the others, and the steps made with this hoof were not as long. The Indian observed that the rider had been a soldier from the boot prints he left when he dismounted, and concluded that he had been exceptionally tall because a tree branch had broken off at a height that a shorter person could not have reached.

At the turn of the century Lord Robert Baden-Powell, the founder of the Boy Scouts, was the best-known English intelligence officer and spy. One day during the South African War, he was reconnoitering on a broad, grassy plain not far from the Matopo Hills in Southern Rhodesia when he came across almost invisible footprints. Baden-Powell knew that they were still fresh,

because the blades of grass had not yet straightened up. From the blades, too, he discovered the direction in which the unknown persons were marching. He followed the tracks until they finally crossed a sand dune. The soft sand clearly showed that some tracks had been made by small, sharply-outlined feet taking longer steps. The conclusion: the tracks belonged to women and children. They must have been walking, not running, and the depth of the footprints indicated that the people had been carrying loads.

The tracks went in the direction of the Matopo Hills, about five miles from where Baden-Powell's men were. It was in the Hills that the rebellious Matabele tribe was hiding out. As he continued to follow the tracks, the alert man came across a mahobahoba leaf lying near the trail. In the entire surrounding area there were no such trees—but Baden-Powell knew that mahobahoba trees grew in a village that lay about fifteen miles back. Therefore, he could assume that the women and children of this village had gone into the hills. He also noticed that the leaf was wet, and it smelled of native beer. From this he concluded that the women were carrying beer on their heads in clay jugs which they stoppered, according to their custom, with bundles of leaves. Just such a leaf had fallen to the ground. But the leaf had been found several feet from the footprints, so evidently the wind had carried it there. However, at the moment there was not a bit of wind. On the other hand, a fresh breeze had been blowing a short time before. From this Baden-Powell could tell what time the women and children arrived at the Matopo Hills. He realized that the men would drink the beer right away, before it turned sour in the heat of the day, and then they would be drowsy and unobservant. Therefore, he hastened to press forward and continued to follow the tracks, and he was able to make important observations in the immediate vicinity of the rebellious natives.

Australian aborigines even today retain an ability to read tracks that seems to us fantastic.

A recently reported case concerned a lost four-year-old child in

New South Wales. Forty men from the settlement searched in impenetrable underbrush for a whole day, both afoot and on horseback, without finding a single recognizable "footprint." Then a native tracker was sent for, although there seemed to be no discoverable trace on the sun-dried ground. The aborigine circled the house at continually increasing distances. Finally he stopped, and then struck out on a straight path along which he followed mysterious "tracks" which no one else saw: a crushed leaf here, a bent branch there, a little pebble almost unnoticeably moved to one side. He frequently dropped to all fours, and twice he lost the traces on stony ground. But at dusk he led the anxious searchers to the lost child, who lay sleeping propped against a tree trunk.

The keen perceptions of these people can only be explained by their hard battle for existence. Stalking game with stone-age hunting weapons in the Australian wastelands may well have kept their senses awake and sharp, and it probably also enables them to make deductions with such presence of mind. The aborigine does not infer from the tracks merely what animal made them; the traces also reveal to him how large or how old the animal is and whether it is healthy, fresh and in good condition, or sick and tired.

While you may never achieve this skill, handed down through generations, there is much you can learn.

HUMAN TRACKS

The human footprint lets you draw conclusions about many things. Frequently you can decide at first glance whether you are dealing with the print of a man's shoe or a woman's, especially if a woman was wearing high heels. From the size of the shoe you can make a rough guess about the person's height, and his weight may be revealed by the depth of the print in the ground. From the distance between the steps you can tell whether he was walking or running, still another clue to the energy of the person. Short steps and a deep imprint of the front part of the foot indicate that



the person in question was carrying a load. The distance between the right and left foot tells you something about the person's width.

Every shoeprint has its characteristic features: the pattern of a rubber sole, missing nails, repairs or heel plates. A footprint rarely appears in isolation. Nearby impressions show if the person was using a cane or an umbrella. Matches, cigar or cigarette butts, the contents of an emptied pipe, or chewing gum wrappers characterize the person more closely.

Even something as impersonal as a bicycle track can reveal all sorts of things. Pebbles and bits of earth, or water and mud in rainy weather are thrown to the rear, supplying evidence of the direction in which a vehicle went. Similarly, a furrow or ridge of earth is pressed out broadly in the direction a bicycle is going. If a bicycle makes a curve, then the wheel tracks form a narrow angle to each other in the direction the bicycle turns.

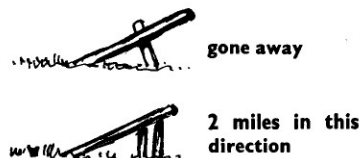


BLAZING YOUR TRAIL

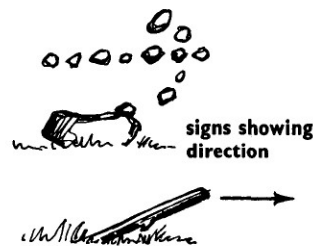
Many tales of adventure and intrigue tell how a prisoner, being led away by the enemy, manages to leave little signs behind to show his friends where he has been taken.

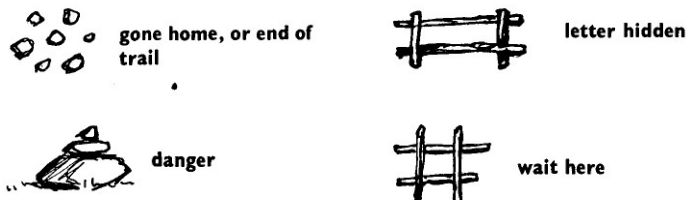
Similarly, scouts investigating a route far in advance of their troops leave certain signs to direct those following them along the right path.

When you are marking your own trail through woods or field, don't make it obvious by leaving behind scraps of paper. Any greenhorn could read a trail like that, and forest rangers are not very pleased with people who scatter paper around. Your signs should be completely inconspicuous, blending into the surrounding



Signs laid with twigs or pebbles





region, and they should be made of materials found in the immediate vicinity: stones, twigs and so forth.

Of course, following such a trail demands close observation. But then you are also sure that those who are not in on the secret will go by without paying attention.

TRAILING ANIMALS

You have to know a great deal about animals, about their habits, and about their individual traits if you want to follow their tracks and come upon them unobserved. First, there are certain rules you must obey at all times:

When following the tracks of game, step lightly and learn how to walk silently on twigs and dried leaves.

Never look an animal in the eye, or it will run away.

Dress inconspicuously so that you do not stand out from the background and make your presence obvious.

Always be careful to sneak up on an animal against the wind. Even when you observe this precaution, don't come too close to an animal if you are sweating a lot. Animals have a very keen sense of smell when it comes to human perspiration. Bathe before going scouting and rub yourself with sorrel leaves to minimize the human scent.

We have talked about animal tracks, but this term is not strictly accurate.

Woodsmen distinguish among traces, tracks and footprints, and only when they have made the distinction do they start to interpret the signs. *Tracks* are the marks left by big game such as a moose,

boar, antelope or a deer, whereas *traces* are the prints of a small game animal such as a fox or a bird.

You may not always be lucky enough to find traces or tracks immediately. Often you will have to be content just to recognize a set of *prints*, as sportsmen call the imprint of all four feet of an animal. A set of prints calls for careful interpretation. Only occasionally do you have such a clear footprint in front of you that from the single impression you can tell with certainty what animal made it. When you are interpreting tracks, first take in the whole picture, looking at them in their entirety, before concentrating on the details.



The tracks or traces animals make clearly show how they walk. Some small game animals, such as foxes and wildcats, are able, because of their size, to place one paw directly in front of the next, as if they were walking along a tightrope. Others, the big game animals, set their feet next to each other. These hoofed animals walk as if straddling a straight line, leaving what are called *cross traces*.



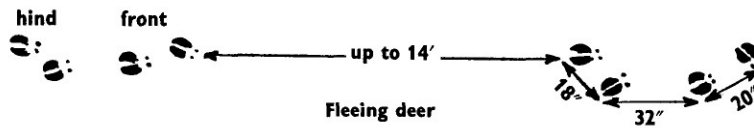
You will find such prints when the animal was moving along at an easy, comfortable pace. If the animal was running away or jumping, you'll find sets of prints at intervals. In the case of stags, the prints may be 25 feet apart. The prints of hoofed big game animals resemble the prints a rabbit makes.



From the type of traces or tracks you find, you can determine whether you are dealing with a big or small game animal, and whether the animal was springing or just walking along easily. The length of the jumps or the side-to-side distance between hoofprints will tell you something about the size of the animal. The bigger, taller and older an animal is, the greater the distance from side to side (the cross trace). In general female animals have a smaller cross trace.

ANIMAL FOOTPRINTS

You are not likely to come across the footprints of whole-hoofed animals—wild horses for example. The cloven-hoofed animals leave prints of their two-toed hoofs.



Small game animals, such as badgers, rabbits and squirrels, have paws. They walk on the soles of their feet as well as on their toes, and often leave clear imprints of the entire sole and toes.



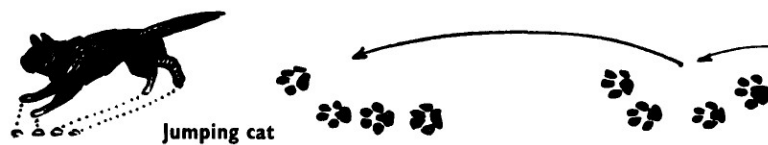
When you find pawprints, look first to see if the animal has "toenails," that is, whether there are prints of its nails. Badgers and porcupines press their claws into the ground as they walk, but cats and lynxes do not.



Of the big game animals, the deer leaves the smallest tracks. If it is walking undisturbed and easily, the two toes of the hoofs leave a closed imprint. If it is fleeing and jumping (up to 15 feet), it leaves a "rabbit-jump" set of prints. The toes are pressed apart by the force of the jump and imprinted more deeply in the ground than usual. In fact, you will usually find an impression of the dew-claws, the "extra" toes or "false hoofs" higher up on the feet.



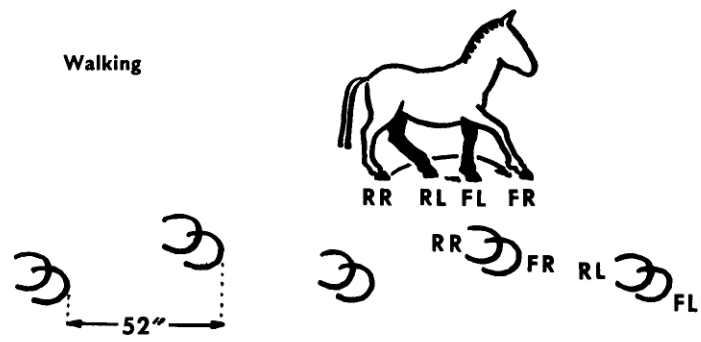
Suppose you find "rabbit-jump" prints. From the size of the set of prints, you can eliminate certain animals, but you might narrow your "suspects" to a fox, a deer, or even a rabbit. If the two front footprints are larger, then it was a rabbit. But if all four prints are equally large, you have to search further. Perhaps you can find a print that is clearly impressed. If you see two toes of a hoof, it was a deer. If you see a pawprint, you have to conclude that it was a fox or a rabbit. The problem here will be solved if



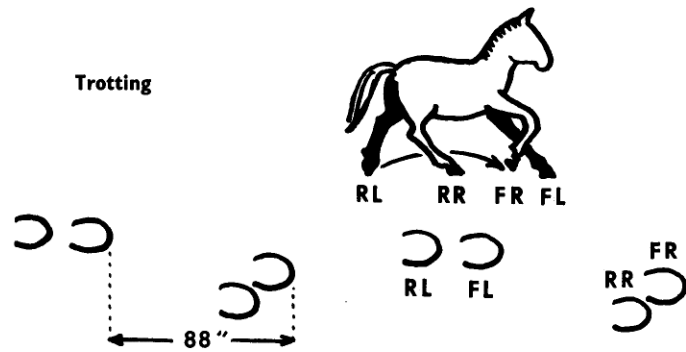
you can find a stretch with either straight line or straddling prints. If that is not possible, examine the individual prints. The paws of rabbits and foxes are so different (see illustrations of distinguishing characteristics), that it should be impossible to confuse them.



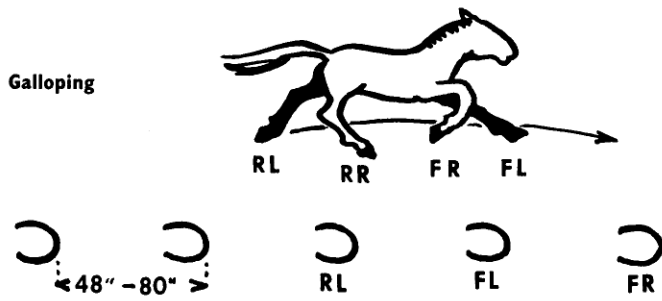
Walking



Trotting



Galloping



rr=rear right

rl=rear left

fr=front right

fl=front left

TRACES OF BIRDS

You can find bird traces and wing marks only in the snow, soft sand, or on moist loam.

The *thrush* usually hops, leaving clawprints in pairs next to each other. Mincing short steps occur when it is waggling along directly toward something. When the thrush takes off from deep snow, it leaves marks with its wings because the large feathers hit the snow as the wings close.

The *crow* leaves larger traces than the thrush and is found more frequently. Since its legs are turned in somewhat, the crow waddles, and this can be seen in the traces. The marks made by the wings are also more pronounced than those of the thrush.

The *jay* leaves traces of about the same size as those of the thrush. They are found in pairs, at intervals of about five to six inches. Usually not many traces are found together, for the jay is not a ground bird. On the other hand, it often does leave traces of scratching, as it likes to dig for the squirrels' hidden provisions. The jay also drops feathers, and the blue plumage definitely reveals its presence.

The traces of the *partridge* approach those of the crow in size, but the toes are spread even farther apart. The partridge leaves cross-traced tracks and also flies up frequently, leaving wing marks which are especially pronounced since it beats its wings strongly when taking off and landing.

A *plucking* is the name given to a pile of feathers on which bits of skin, legs, or parts of the skull are still hanging. If you come across one, you will know that a bird of prey made the killing, since a marten, a polecat or a fox would have dragged its prey into its den. You can guess at what sort of bird of prey it was by the size of its booty and by the feathers lost in the struggle. Larger birds, from the pigeon to the partridge, fall victim to the hawk. The buzzard eats mice.

OTHER MARKS OF ANIMALS AND BIRDS

You may come across skeleton parts, skull bones and jaws. Some are illustrated on the following pages.

When following tracks that you are trying to interpret, droppings will help you determine what animal has gone by. The condition of the droppings also often throws light on the feeding habits of the animal in question. See the illustrations.

Castings and vomitings also give you valuable clues, but these are not easy to notice. Castings are balls of indigestible bits of food vomited by birds of prey, who devour their food with skin and hair, neglecting only the biggest feathers and parts which are found as pluckings. Castings can be distinguished from droppings by the content of mousehair and bits of bone.

Traces of digging or scratching also provide evidence of the kind of animal you are trailing. Every animal has its own manner of burrowing, scratching, or otherwise deliberately destroying certain irregularities in the ground.

Small game animals often dig themselves a home in the ground, and you can learn to recognize the different kinds of tunnels and burrows.

You may find parts of horns or antlers, too.

THE NATURAL HABITAT OF ANIMALS

If a detective were tracking down a criminal, he would first find out about the man's habits and customs of living so he would have some idea of where to start his search. To track animals, too, you must know about their way of life. It would be most unusual to find a fox in a city park or a badger in the deepest forest, nor would you ever suspect a swamp animal of making tracks in a dry, fallow field. Every animal has its own natural habitat, which of course frequently cuts across those of other animals. In general we have a pretty good idea of where different animals make their homes.

Foxes, rabbits, mice, jays, and birds of prey can be found in or over open countryside.

Deer (up to about 6000 feet), rabbits (mountain hares up to 8000 feet), mice, moles, weasels (up to 8000 feet), and woodchucks can be found in the mountains and hills.

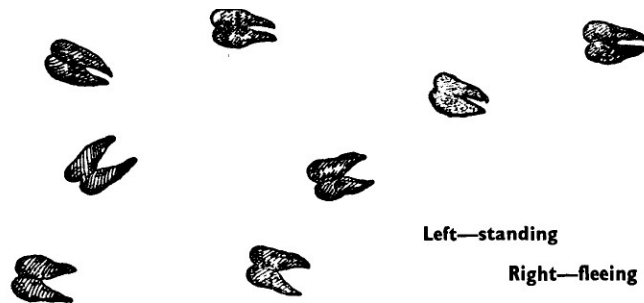
Mice, otters, polecats, mouse-owls, plovers, storks, cranes, wild ducks and geese live near the water.

In the forests and woods you find: Deer, stags, rabbits, squirrels, moles, foxes, badgers, martens, polecats, mice, finches, thrushes, crows, hawks, magpies, pheasants, buzzards, wood-owls, and woodpeckers.

The following live in meadows, fields, and sparsely wooded spots: Rabbits, field mice, hamsters, moles, foxes, weasels, polecats, occasional badgers wandering through, partridges, magpies, buzzards, falcons, crows, mouse-owls, and woodpeckers.

THE DEER

Tracks:



Hoof print: 1/2 natural size.



Shape of Hoof: Oval, smaller than all other hoofed animals, 3/4 "- 1" long, 1 1/8"-1 1/2" wide. Dewclaws visible only in tracks while fleeing.

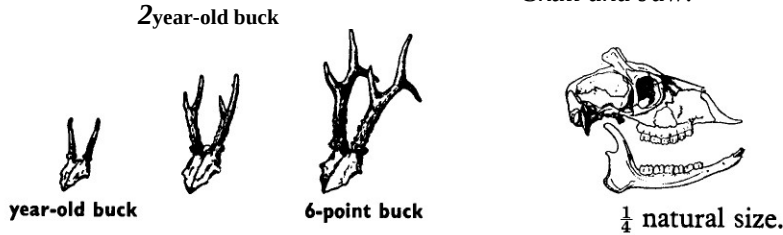
Droppings: Dark brown, longish acorn shape, up to 3/8" thick, 3/8 "-1/2" long, found in sparse woods and forest.



Feeding Grounds: Clearly visible in the winter as trough-shaped spots scraped through the snow in the woods. In the summer: spots dug through the leaves.

Traces on Trees: Strips of bark torn off between 20" and 35" from the ground.

Skull and Jaw:



Antlers of the Buck: The buck deer drops his antlers in the late fall and, beginning in March (April is the high point for this), rubs the velvet off against young softwood trees. The bark is scraped off and branches are broken. In front of the tree you might also find spots where leaves and earth are thrown up and scraped to the rear.

Voice: Deep, loud bellow: "burr, burr, burr, burr" is the scolding of a frightened buck. A lighter, loud "boy, boy" is the doe's cry.

THE ELK AND MOOSE

THE ELK OR WAPITI

Tracks: See those of the deer.



Hoof print: The heavy dotted lines indicate the size of the print, the light dotted lines the extent of the pads. Length—about 3 1/2", width—about 2 1/4"-2 1/2". Females about 1/2"-3/4" smaller. The dewclaws leave no impression when the animal is walking easily. An elk can jump up to 25 feet.

Droppings: Dung-like or disc-shaped masses in hunting season or when stags are in heat.

Acorn form up to 3/4" long, 3/8"-5/8" thick, females 1/4"-3/4" thick. Brown.



Traces of Eating and Scraping: Tree bark pulled off. Peeled spots higher than three feet and with deep tooth marks. Likes to wallow in mud puddles near the "scratching tree" where he rubs himself and where the mud and hairs stick. "Scraping trees," where he beats his antlers first to remove the velvet and later playfully or excitedly when he is in heat, stand along his usual run. The antlers are shed from February to March; the antler scraping time is midsummer. The higher the marks on the tree and the stronger the tree, the larger and more powerful the stag.

Antlers:



2-year-old buck



8-pointer



12-pointer

THE MOOSE

Tracks: See those of the deer.

Hoof print: Much longer soles than the elk, about half the length of the hoof. The tracks are smaller than those of the elk, but the hoofprint can be almost as large. Does not keep to a single run as much as the elk, but instead roams around more and is less shy than the elk.



Droppings: Dung-like or disc-shaped masses in hunting season or when bulls are in heat.

Acorn form about 1/2"-3/4" long, 3/8" thick. Brown for cows, brown and piled in peaked masses for the bull.



Traces of Eating and Scraping: Sheds antlers later than the elk.

Traces of antler scraping similar to those of the elk, but on weaker trees and not as high. The moose does not wallow in the mud and therefore has no trees for scratching. The moose kicks up earth and grass when in heat, but the elk does that all the time. The stamping spots of the moose are much more noticeable, lie closer together, and the ground is completely barren and stamped down solid.

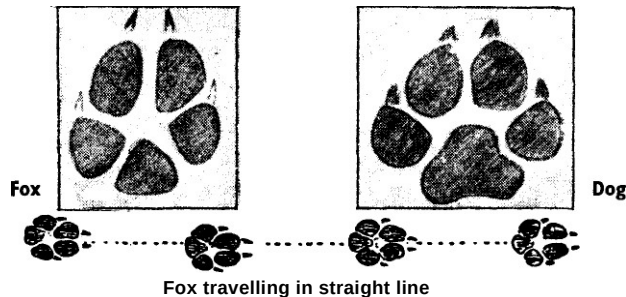
Antlers:



1-year-old 6-pointer two with palmated antlers

THE FOX

Tracks: Four-toed prints. Oval paw about 1 3/4" long. Nails visible. Prints are clearly long as compared to a dog's pawprint. Leaves tracks either in a straight line or a "rabbit jump."





Droppings: Gray, sausage-shaped, about 3/4" thick and 3"-4" long.

Found on rises in the woods or fields. Full of mouse hairs.

Burrow: Earth thrown up in leafy woods. Tunnels are up to 15" in diameter, many openings. Remains of feathers and bones in front of the burrow.



Skull and Jaw:

2/9 natural size.



The tracks of a young fox have a certain similarity to those of a cat. However, the imprint of the cat's toes is less distinct; instead there is the print of the whole hairy paw. The most important distinguishing feature of the pawprint of a house cat is that it shows no claws.

The dog's prints are wider than those of the fox and the toe pads are more distinctly formed.

The cat leaves prints in a straight line or in sets of four.

The dog leaves prints with cross traces or in sets of four.

THE RABBIT

Tracks: Short and long pawprints, the long ones up to 3". The long prints are next to each other, the short ones one behind the other. The long prints often appear in a zigzag or curved form when the rabbit has jumped several feet to the side.



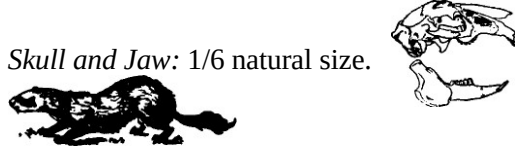


Fleeing rabbit



Droppings

Droppings: Brown (yellow, if old). Flattened on top and beneath, up to 5/8" thick. Found on meadows, paths, and the edge of the woods. *Traces of Feeding:* Tree bark gnawed off from about 8" to 16" over the ground. Pairs of toothmarks. Longish strips of bark ripped off.



Skull and Jaw: 1/6 natural size.



THE POLECAT

Lives in the woods and near watering spots and farms. Eats snakes, frogs, mice, fowl, and eggs.

Tracks: The prints appear in pairs. See those of the badger.



Pawprint: Four-toed, round to oval pawprint up to 1 1/8" long. The claws are faintly visible.



Droppings: Black, spiral form about 1 1/8" long and 1/4" thick, smeary. Found on paths through the fields, in the bushes, and along streams.

THE PORCUPINE

Pawprint: Five-toed print with definitely visible claw marks.

Droppings: Bluish-black, cylindrical form about 1/4" to 3/8" thick.

Found in the bushes, full of bits of insects and berries.

Tracks: Leaves tracks with cross traces like the badger.

Skull and Jaw:



1/3 natural size.

THE BADGER



Tracks: Five-toed, broadly oval pawprints about 1 1/4" long and 2" wide. The claws are clearly visible and are long, the paws being broader than they are long. Leaves tracks with cross traces.



Droppings: Gray to blue cylindrical forms, pasty consistency, about 3/4" thick. Found buried in holes in the woods near the burrow, full of bits of insects and berries.



Skull and Jaw:



2/9 natural size.

Burrow: Burrowed through the earth with an obvious furrow. Tunnels up to 16" in diameter. Many exits.

THE SQUIRREL

Tracks: Long and short pairs of five-toed pawprints next to each other. Long prints about 1 3/4" long. The tracks start and stop suddenly because the squirrel jumps from or into trees. Visible claws.



Droppings: Brown, perfect balls up to 3/16". Found in the woods, parks, etc.

Traces of Feeding: Pine cones are gnawed down to the core by squirrels.



Traces from squirrel gnawing a tree.



Not to be confused with: Traces left by a feeding field mouse.



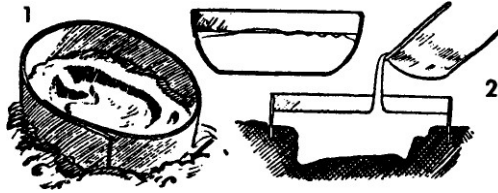
Traces left by a woodpecker.



MAKING PLASTER MOLDS OF TRACKS

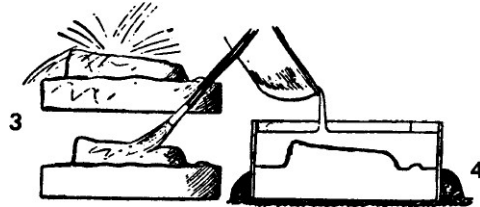
When you come across animal tracks that are pressed into soft ground clearly and perfectly, you might like to preserve your find. If the ground where you find the track is dry and reasonably solid, you can make a plaster mold of the print. This is how to do it.

1. Carefully clear any foreign matter away from the print in the ground. Then encircle the print with a strip of cardboard and clip or tape the ends of the cardboard wall together.
2. Pour freshly prepared plaster of Paris into the area surrounded by the cardboard walls. It may be difficult to judge the amount you will need, but you will learn with experience.



3. When the plaster has hardened, you can take out the whole piece and clean it off. What you then have is a negative of the print, raised or "in relief."

If you want your cast to be indented, as the track was in the ground, you have one more step; making a positive mold. Brush the surface of the negative mold with soapy water, oil or vaseline.



4. Once again take a strip of cardboard and make a wall around the negative mold. Then pour liquid plaster into the greased mold. Smooth the surface of the mixture with a small piece of board

and be sure there are no bubbles remaining. When you have poured in enough plaster to cover the negative mold, let it harden a bit. Then make a loop from a piece of string and embed the ends of the string in the side of the plaster, so that the loop remains on the surface. A few knots at the ends of the string will make it more secure in the plaster. Pour a little more plaster into the mold.



5. When the mixture has hardened, remove the cardboard walls and separate the negative mold from the positive, prying the two casts apart with a table knife. This will be easy if the negative was well greased. Clean the positive well and give it a coat of shellac to help preserve it. If you wish to label the side of the cast, do this before shellacking. Then you can hang the mold by the loop of string.

What the Heavens

Tell Us

WAXING



WANING

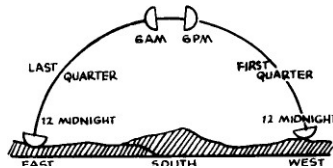


The Indians and woodsmen of old didn't need watches, compasses and barometers. They could get all the information they wanted from the animals and plants, the wind, the stars and the moon. Who today can interpret these natural signs? A passage in a recent magazine read: "Midnight. The tropical heaven arched above in a splendor of shimmering stars. The narrow, barely visible curve of the new moon stood near the zenith. . . ." Someone well versed in reading the heavens would have noticed immediately that this was impossible, for the new moon has to stand close to the rim and therefore could never be "near the zenith."

THE MOON

The waxing moon opens to the left, the waning moon to the right.

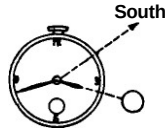
If you know when the moon, in its various phases, rises and sets, you can use it as a watch or compass. Your newspaper or a local observatory can give you this information.



The moon in its first quarter rises in the south at dusk and sets in the west at about midnight.

For the last quarter, it rises in the east at about midnight and sets in the south at dawn.

When the moon is full, hold your watch so that the hour hand points at the moon. South will be at the halfway point between the hour hand and the figure 12.



The waxing or waning moon will serve you as a compass if you first determine:

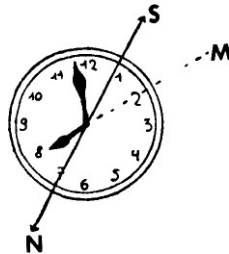
- (1) whether the moon is waxing or waning,
- (2) about how many twelfths of the face of the moon are visible,
- (3) how late it is.

With a waning moon, *subtract* as many hours from the actual time as there are invisible twelfths of the moon. With a waxing moon, *add* as many hours as there are invisible twelfths.

Take the new time arrived at in this manner, and line up the figure on your watch for this hour with the center of the watch and the moon. Then, the halfway mark between 12 and this number on your watch points south.

Find north by reading clockwise from the hour hand before midnight, counterclockwise after midnight.

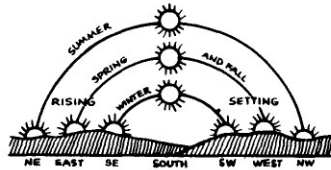
Example: At 8 o'clock in the evening, with a waxing moon (M). About half the face is visible (i.e., about 6/12). Therefore: eight



plus six hours equals 2 o'clock. Align the figure 2, the middle of the watch, and the moon. The north-south line lies halfway between the 12 and the 2.

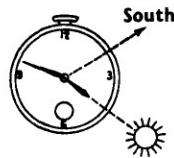
THE SUN

At noon, the sun is always in the south. In winter, it rises in the southeast and sets in the southwest. In the summer, it rises in the northeast and sets in the northwest. In the spring and fall, it rises in the east and sets in the west.



When the sun is visible and you have your watch with you, you can determine where the south lies. Point the hour hand toward the sun. The halfway point between the figure 12 and the hour hand will be pointing directly south.

If you do not have a watch along, but can hear the hour striking somewhere, draw a clock face on a piece of paper and proceed as if it were a watch.



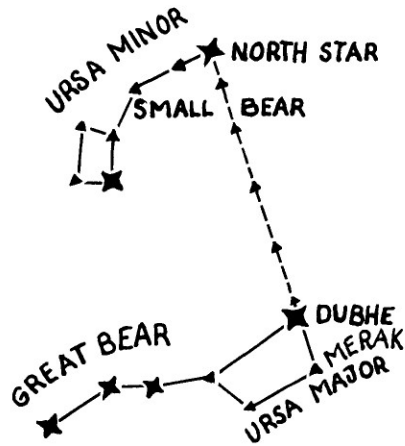
THE STARS

The Indians used the star Alcor in the constellation Ursa Major (the Larger Bear) as a test for good eyesight. Whoever was able to see it had good eyes, and that holds true today.

Incidentally, Ursa Major and the Big Dipper, the seven princi-

pal stars within the constellation, make up one of the most striking groupings of stars. The constellation is easy to locate once you have memorized the form, and it can be very useful to you.

To find the North Star or Pole Star, let your eye travel along the imaginary line connecting Merak and Dubhe (see illustration)



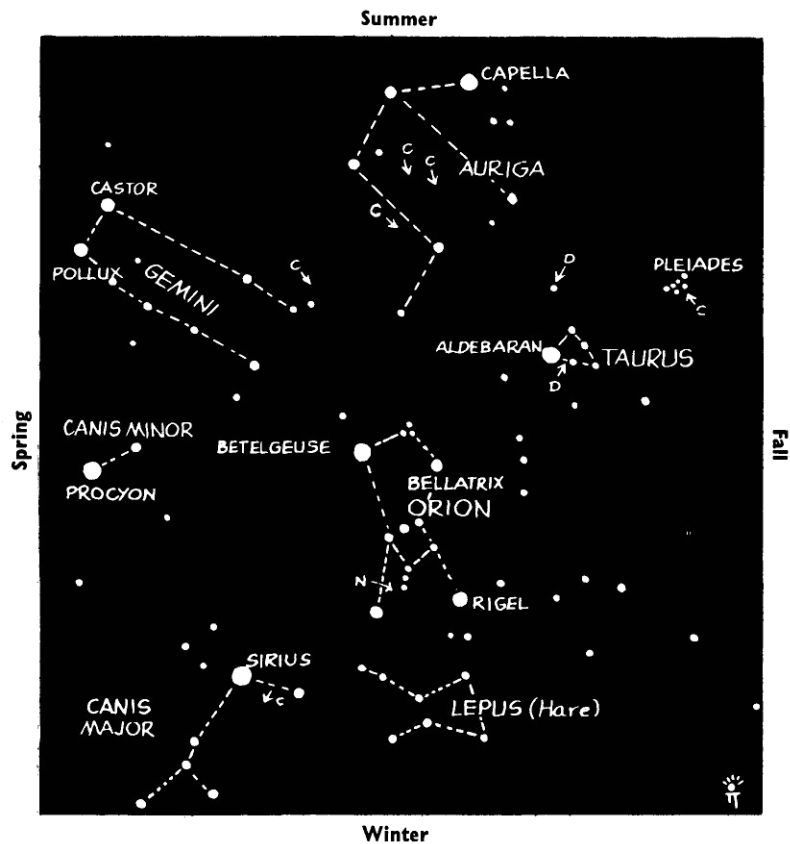
for five times the distance between these two stars. The North Star is at the end of this line. To be sure, it is not a brilliant star, but it stands directly in the north.

The Indians called the Big Dipper the "Seven People." The middle star of the handle, Mizar, was "the old squaw with a papoose on her back," and the papoose was Alcor.

The Big Dipper circles the North Star once every 24 hours. Therefore, as the night progresses, the constellation is always in a different position. When it has moved a quarter of a circle around the North Star, you know that six hours have gone by.

The position of the stars changes with the changing seasons. In the spring the constellations you see are different from those visible in the fall. However, you can see the North Star and the groups of constellations nearest it during the entire year. The surrounding stars form a constant circle around the North Star.

If you hold the chart below so that the name of the present season is at the bottom, you will have a picture of the northern sky as it appears about 10 P.M.



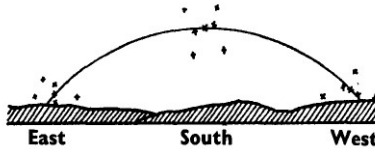
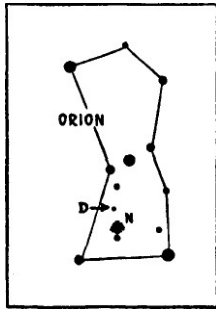
The little arrows indicate interesting formations you can see with the aid of a telescope:

D equals Double Star

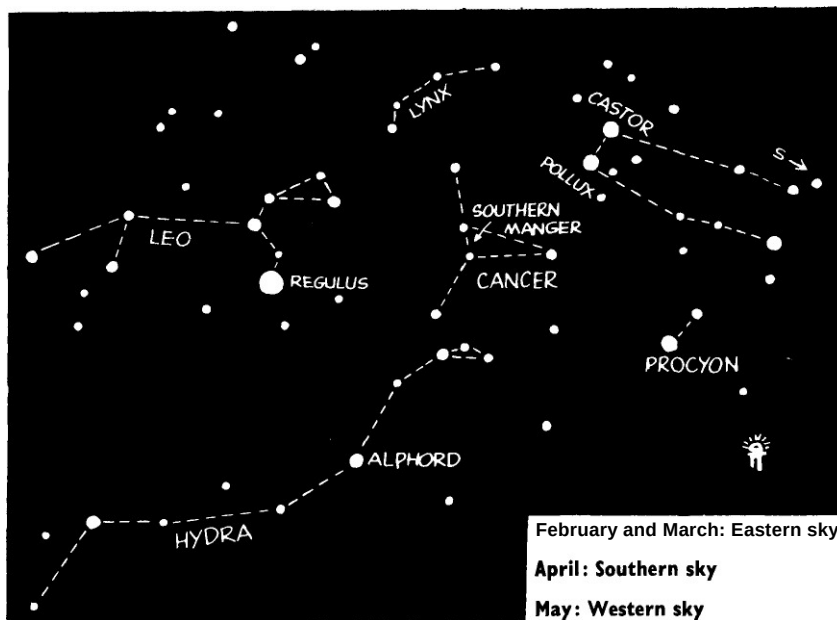
C equals Cluster of Stars

N equals Nebula

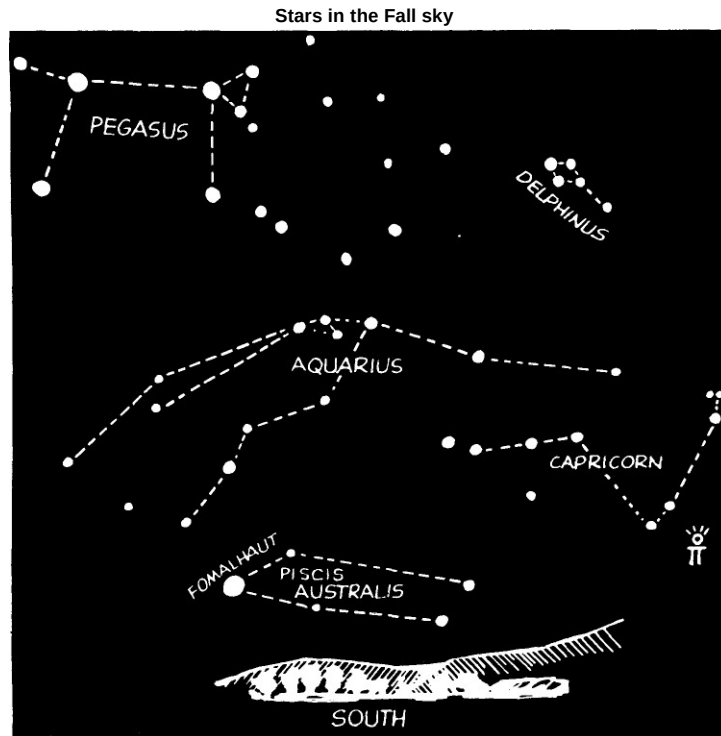
The names in capital letters are constellations, and those in small letters are the brightest stars.



Orion, the "hunter," is probably the most conspicuous constellation in the winter skies. It is also called the Northern Cross. The three central stars represent Orion's belt. The center star in the belt rises exactly in the east and sets in the west. It is in the south when Orion is standing erect in the sky.



Stars in the Spring sky

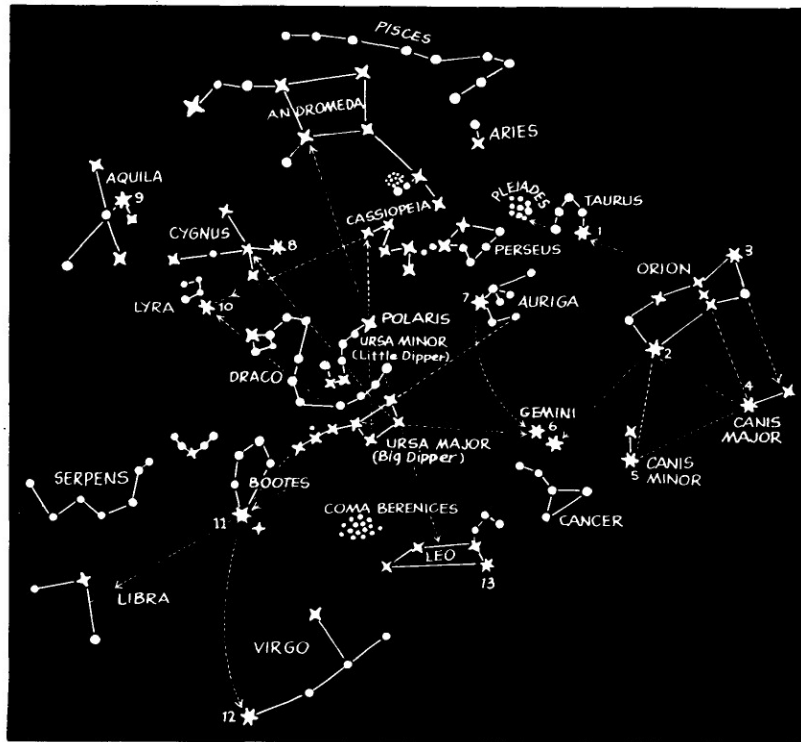


Observation times in the Southern sky: Oct. 1—10 p.m.; Oct. 15—9 p.m.;
Nov. 1—8 p.m.; Nov. 15—7 p.m.

Depending on the season, you can locate a large number of constellations with the aid of the North Star if you follow the connecting lines shown in the illustration on the next page.

The brightest stars are indicated by number:

- | | |
|----------------------|--------------|
| 1. Aldebaran | 8. Deneb |
| 2. Betelgeuse | 9. Altair |
| 3. Rigel | 10. Vega |
| 4. Sirius | 11. Arcturus |
| 5. Procyon | 12. Spica |
| 6. Castor and Pollux | 13. Regulus |
| 7. Capella | |

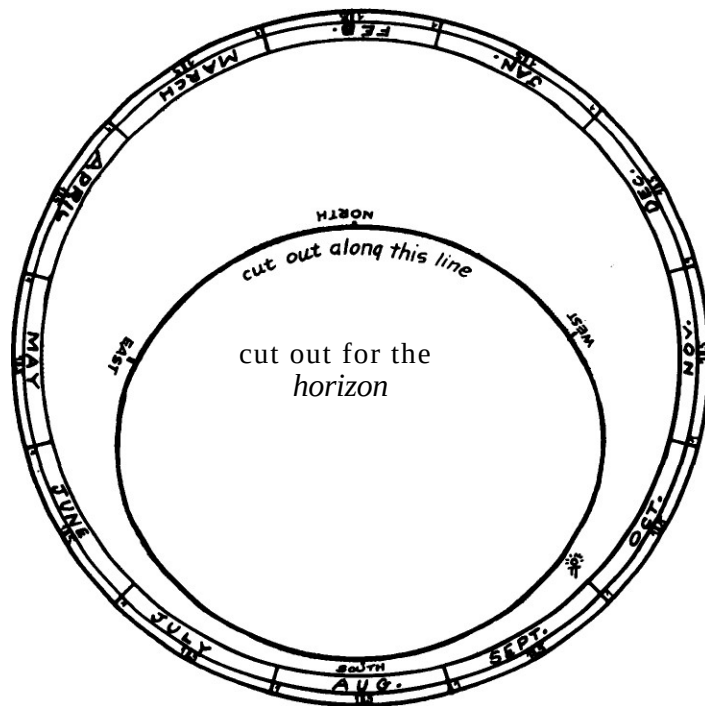


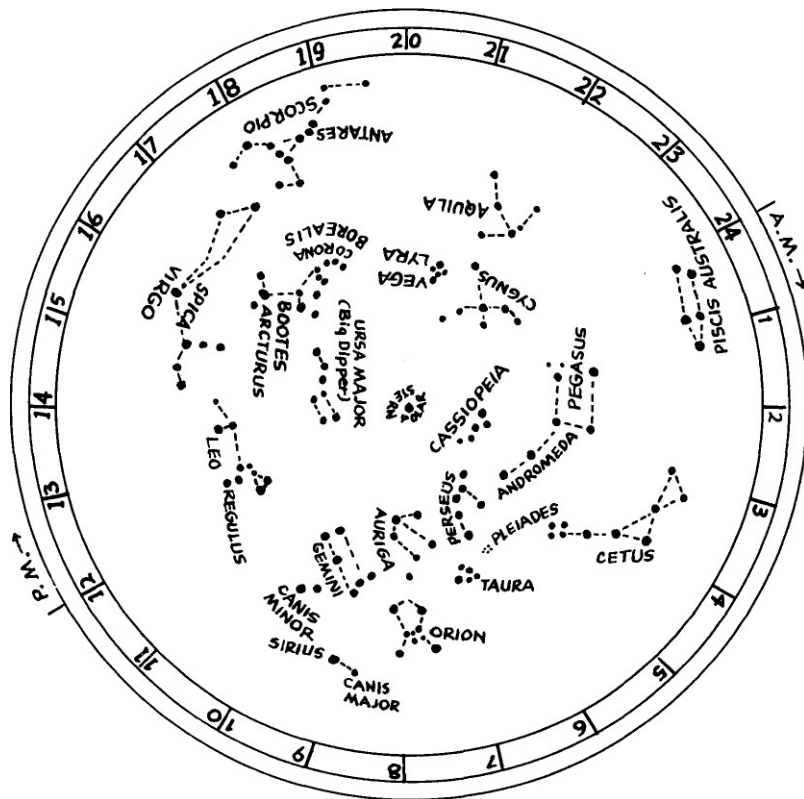
Locating constellations with the aid of the North Star

To make a movable astronomical chart, copy or trace the two charts on pages 67-8. Cut out the two circles you have drawn, and paste them on separate pieces of thin cardboard. Also cut out the inner circle of the top disc to represent the line of the horizon.

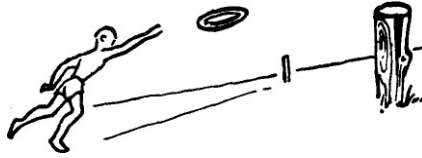
How to use the chart: Lay the disc with the horizon cutout on top of the other disc in such a way that the month in which you are using the chart is on top, and the time of observation is directly opposite it on the bottom. Then fasten the two discs together in this position with paper clips. When you are looking south, turn the entire chart so that the word "south" is at the bottom; when you are facing north, the word "north" should be at the bottom,

etc. Through the cutout section you will see the sky as it appears over you.





Do not forget to reset the chart for the correct time if you are watching the stars for a long period. Store the chart in a stiff envelope when you are not using it.

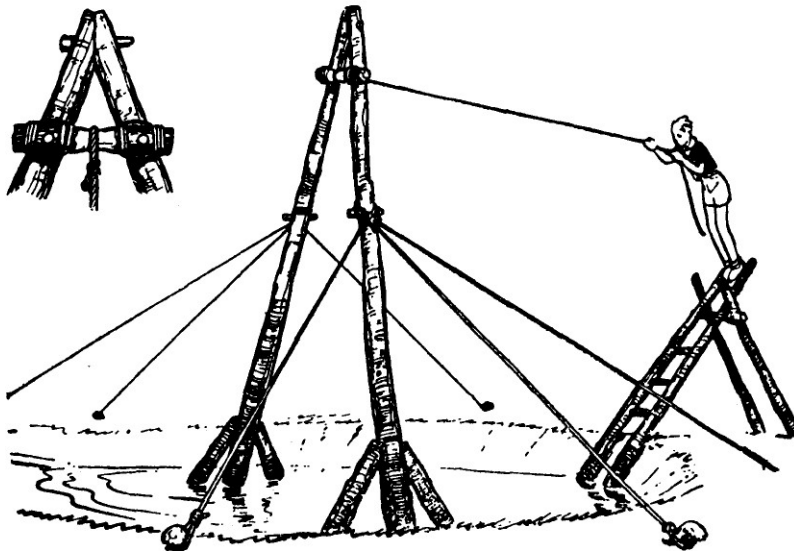


At Water's Edge

The Indians, especially the tribes around the Canadian Great Lakes, were true water lovers and real artists at controlling their canoes, which they made for themselves out of barks and pelts.

The first essential for your activities in or near the water is, of course, knowing how to swim. In addition, you must know and obey all the safety measures that can prevent accidents. For example, never go swimming just after you've eaten or when you are very hot. Wait at least an hour after meals, and when you are overheated from the sun, cool off in the shade before entering the water. Never dive if you get earaches or dizzy spells from diving. If you are enjoying the water with a group of friends, it is a good idea to use the buddy system, that is, to swim in pairs and watch out for your buddy. That way you won't discover—too late—that someone has disappeared.

You should also master throwing a life preserver. On your honor, now, have you ever practiced throwing a real life preserver such as there are at pools and beaches everywhere? That is something you must practice to be ready for emergencies. You should also be able to swim with your clothes on, and that requires practice too. At the pool, or in a river deep enough for swimming, you and your friends should frequently test each other's strength and scuffle around a bit to accustom yourselves to water and be at



home there. A jumping frame, which you can build for yourself, can help you toward this goal. But don't indulge in horseplay in water which is very deep or unfamiliar.

DIVING

James Fenimore Cooper, in *Leatherstocking Tales*, told of Indians who stayed under water for hours to avoid pursuit. They breathed, it was said, through reeds, holding one end above the surface of the water.

Such stunts are no longer restricted to the warpath. Today they have become a sport, as diving masks with snorkels enable us to extend our roving expeditions even to underwater areas.

On the clear, sunlit bottom of a lake, pond or slow-flowing river, all kinds of things can be observed: you might see a pebbled bottom as colorful as a mosaic, growths of algae, and the fishes' hiding spots. There are seashells too, and even if the truly fantastic shells

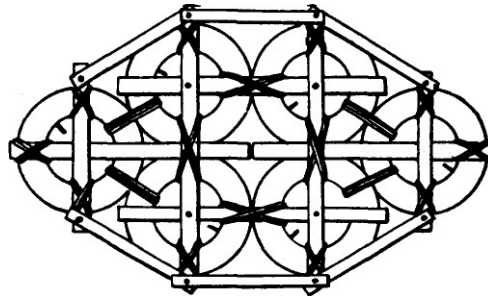
cannot be found in our latitudes, there are still enough snail shells which are equally fascinating.



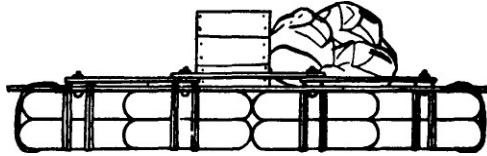
BOATBUILDING

Have you ever dreamed of owning a boat of your own, so that you could explore around the bend of a river, or just float lazily along a lake ? Why not build the boat of your dreams ?

As far as the appearance of your vessel is concerned, you don't have to be too particular. The important thing is its absolute seaworthiness. Perhaps it's too much to call these crafts "boats"; for the most part, they're actually rafts or floats, but they all serve the purpose of carrying you on the water. For example, here is a *tube-boat*. This is made of old tire tubes which are first carefully

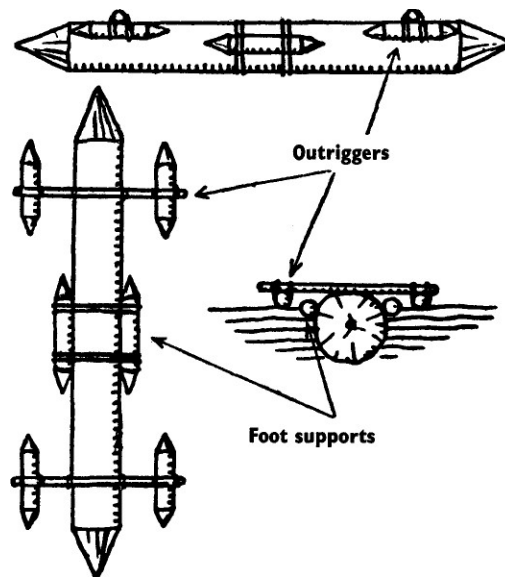


patched, then pumped up, and finally bound together with boards



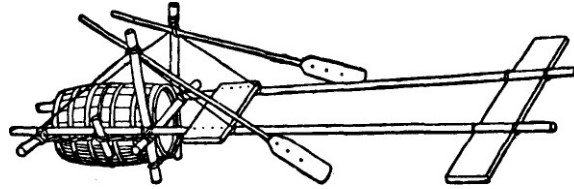
and ropes as the illustration shows. The ropes should be as thick as possible so they will not cut into the tubes. You can make paddles out of small boards nailed to short poles.

The *water-flea* is a different model, and to make it you first need a tree trunk. Fasten a pole crosswise at each end of the trunk and



bind a small log or block of wood to the ends of each pole. This provides you with four floats which prevent the tree trunk from spinning on its own axis. Fasten blocks to serve as foot supports on both sides at the middle of the trunk. In order to reduce water resistance, the blocks and the trunk are pointed.

To make the *barrel-float*, you need a barrel, some poles, and two boards. The result will be a very unusual and individual boat.



A *tin-can raft* can be made in the same way as the tube-boat, with large cans such as oil drums instead of the tire tubes.

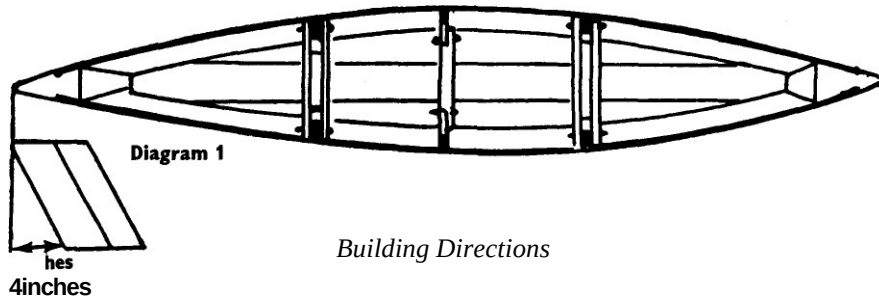
If you're even more ambitious, you can build a regular boat, much like the ones built by some boys in Switzerland, who made a whole fleet. This boat has room for three or four boys.

Measurements

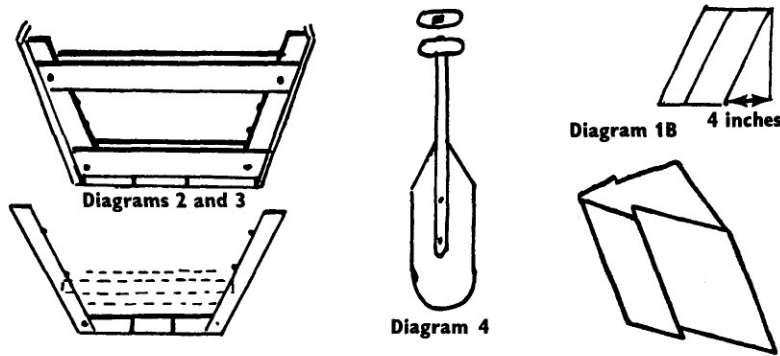
length: about 16 feet
greatest width (must not be in the middle; rather than at the 8-foot mark, have the widest point about 7 1/2 feet from the bow): about 32 inches
width of bottom: about 24 inches
height: about 12 inches

Materials

pine or fir boards as free from knotholes as possible:
2 boards : 3/4" x 12" x 16'
3 boards tongued and grooved: 3/4" x 24" (total) x 16'
2 beam pieces: about 6" x 8" x 18"
laths: about 6" screws, bolts, 1 1/4" nails



1. Cut both sideboards and the two endblocks (Diagram 1b) to shape. In order to give the boat better navigating qualities, the sideboards have to run together and taper at the bottom. By doing this, you raise the floorboards both fore and aft. Therefore, the



endblocks have to be set in at an angle (a slope of about 4") to give the bow and stern racy lines. (The angle formed inside the sidewalls where they meet the endblocks should be a narrow one.) The sides can be screwed down to the endblocks permanently, but because of the flooring take care to let the sidewalls extend about an inch beyond the bottom of the endblocks.

2. Bolt the frames together as shown in Diagram 2 and force them between the sidewalls. Since the boards can still be bowed considerably now, this was the reason for choosing a narrow angle at the ends. Screw the frames tight on one side, but once again have the sidewalls extend beyond the bottoms of the frames by the thickness of the floorboards.

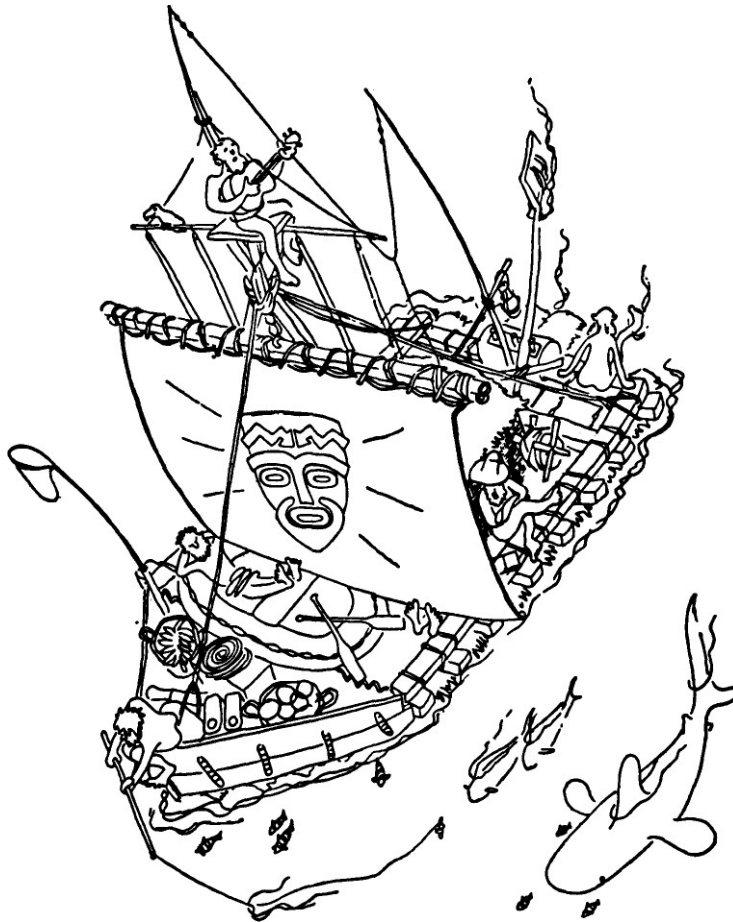
3. The flooring is a little more trouble. Put together the three boards which have been tongued and grooved. Clamp down the sidewall, which has not yet been screwed tight, temporarily with C-clamps. Then place the whole boat on top of the flooring and trace the outline along the inside.

NOTE: YOU must set the flooring in with the sidewalls overlapping it. Only in this way will the boat be watertight when the wood swells in the water.

Cut the floor boards out along the traced outline and screw the flooring tightly to the frames and the endblocks. Now you can also screw the second sidewall down permanently. For stability, insert an auxiliary frame at the middle of the boat (Diagram 3).

4. To make the boat watertight, before you nail the flooring to the sidewalk, you must calk the crack (pack it with oakum). The cheapest outside protection for the boat is tar, and you can paint the inside with an inexpensive oil-base paint.

5. You also need paddles. Canoe paddles (Diagram 4) work out the best. Make them long enough to reach your waist.



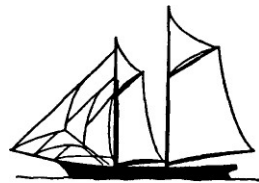
THE RULES OF THE SEA

There are regular traffic rules at sea. In accordance with these rules, at night a ship must display a red lamp on the port side and a green one on the starboard side. When looking in the direction the ship is going—that is, from the stern toward the bow—starboard is to the right, port to the left. The simple phrase, "My left cheek is red," will help you remember this rule. You can easily see why the colored lights are necessary—if one ship sights another at night, the captain must be able to recognize immediately whether the ship is moving toward him. If the ship is approaching, he will see a pair of lights ahead of him, green to the left, red to the right. For a small ship this is sufficient marking. The position of large ships is indicated by the stern lantern (or the top light in the case of steamships) as well as the lights at the sides.

The crew of the *Kon-Tiki* proved that even on a raft a sea voyage is possible. Their primitive raft of balsa-wood logs carried them from Peru to Polynesia—over 5000 miles! The drawing on page 75 was done by a member of the crew and is taken from the book *Kon-Tiki*, by Thor Heyerdahl.

SAILING SHIPS

A real sailor would never call his little boat a ship. There are many types of true sailing ships. Four of them are pictured here.

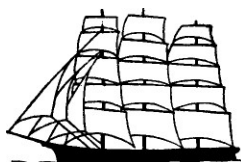
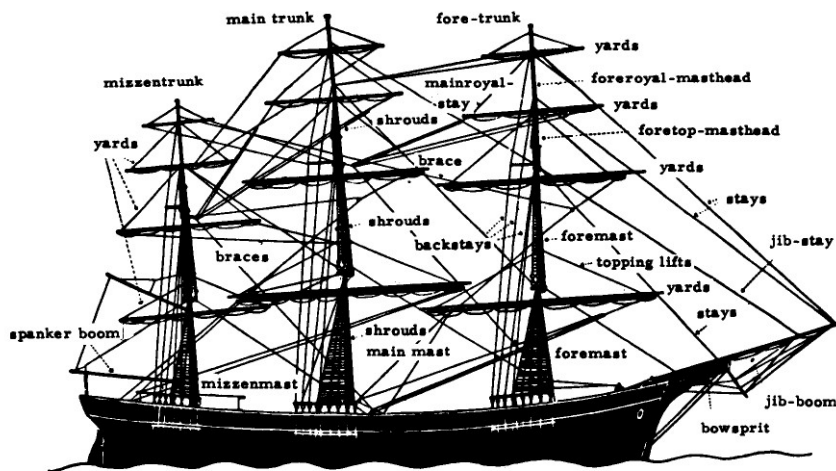


Gaff-topsail schooner



Brig

In the illustration below, you see the complete tackle of a full-rigged ship. The main mast rises up to 120 feet above the deck.



Full-rigged ship



Three-masted bark



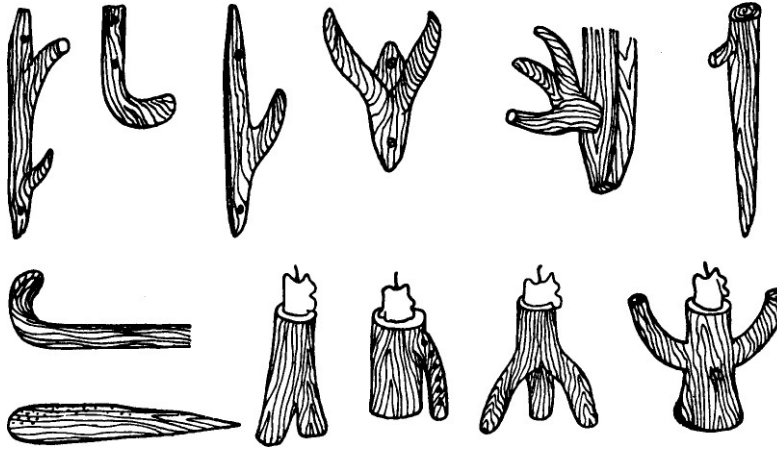
With Knife, Bow and Lasso

WITH YOUR TOMAHAWK IN THE WOODS

There are many constructive things you can do with your Bowie knife or pocket knife. There are just as many things you should never do with it. If you want to practice knife-throwing, make a target of a softwood board propped against a wall. Anyone who uses a living tree as a target is simply destructive and proves that he has less intelligence than a field mouse. It is just as thoughtless to carve a totem pole in a smooth oak trunk or to use the bark as a buffalo hide and leave initials as a memorial.

There is completely different work in the woods for your knife, and using it can become an art. For carving, gather fallen branches

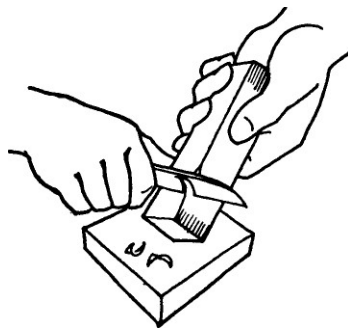
which already have the general outlines of the objects you want to make. Here are a few such objects.



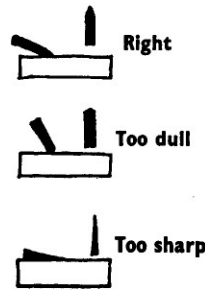
Upper row, from left to right: different clothes hooks, tent peg

Lower row: cane handle, flower planter, candleholders

There is nothing more demanding than the art of making little root figures. Search for suitable pieces among gnarled roots, bits

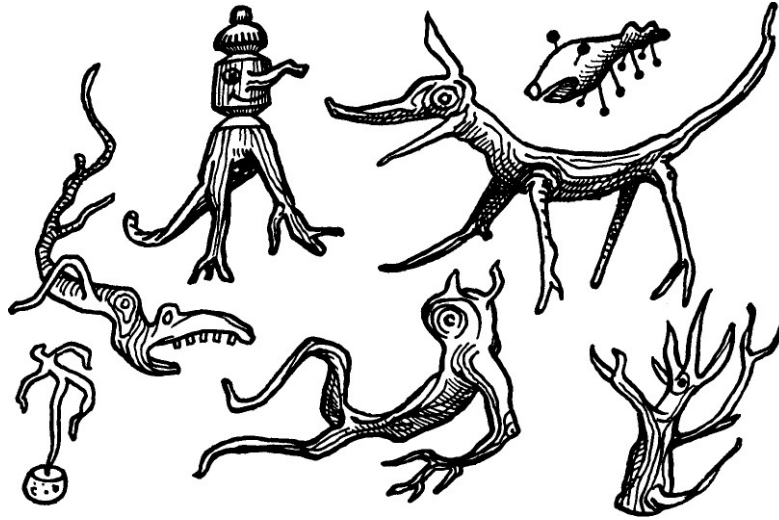


Use a protective block



The right way to sharpen a pocket knife

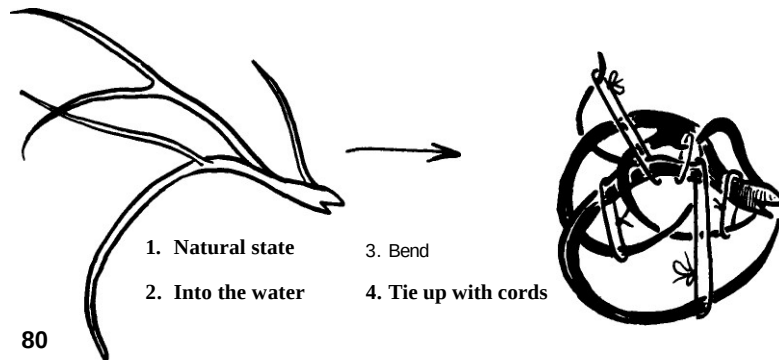
of fallen limbs and branches, driftwood from streams and beaches and so on. In this case "suitable" means that the pieces naturally



have the shape of some figure or some fabulous sort of animal. Your imagination is more important here than your ability to work with the knife. Select the pieces of wood so that you have as little to add or fix up as possible. Perhaps you will have to remove a knob or a growth, or carefully add a limb that nature forgot.

The results of such work are really totem figures and are very desirable today as room decorations. With such fabulous figures as these, you can transform your hut in the woods or your room into a medieval witch's kitchen or a medicine man's tepee.

Keep in mind that too much work with the knife ruins the



5. Fasten the candle-holders with wire

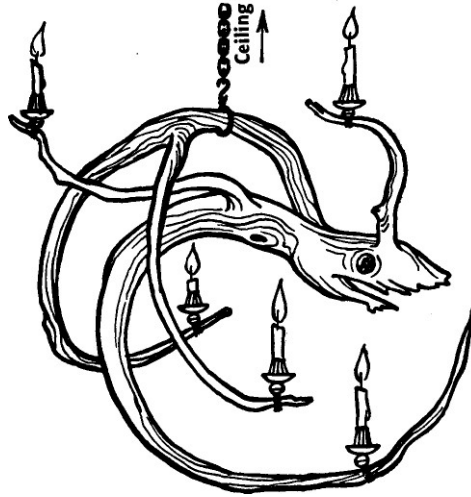


figure. There is a completely natural way of giving one or more branches the form you want. Tie the wood into the desired form with cords. Then lay the figure under water for a day, and afterward let it dry in the sun. Remove the cords, and the shape you want will remain.

THE TOTEM POLE

Carving a totem pole is a splendid thing to do. Ask a forest ranger or the owner of the property on which a tree was felled for the fallen trunk. Then, start to work with your ax and knife, and later with your paintbrush. With careful work and imaginative planning, you should be able to make a totem pole similar to those the Indians made.

Since many of the Indians' totems represented their guardian spirits, each figure had a specific meaning. Some intricately carved figures on the totem poles represented tribal laws, customs, and usages covering kinship, marriage, property and descent. If your totem pole is to be authentic, see that the figures you carve have some personal meaning to you.



Hilunga or Tatooch, the thunderbird. He is the powerful creator and ruler of all the elements and spirits. We recognize the beating of his wings and sparkling of his eyes as thunder and lightning.

If you travelled through Alaska today, you would see totem poles rising in the midst of Indian villages. Many tower as high as 30 to 50 feet and are 3 or 4 feet thick. Usually they stand in front of the owner's house, but they often also serve as cornerposts of the huts themselves. Powerful forms of animals and humans are artfully carved into the wood and painted with rich colors. The Indians prepare these paints themselves according to traditional recipes of ashes, burned colored shells, mosses, and various stones mixed with plant and animal fats.

In British Columbia there are also totem figures standing today which have not changed their forms or meanings for hundreds of years. Some of them are illustrated here.

Eh-Halie, the whale, the personification of evil powers.





Chak-Chak,
the eagle, a
symbol of
great wisdom.



Chet-Woot, the bear,
a symbol of great
strength and noble
spirit



Yelth or Hooyah, the
raven. He gave the
Indians light, fire
and water. He could
assume the form of a
human or an
animal according to
his desires.

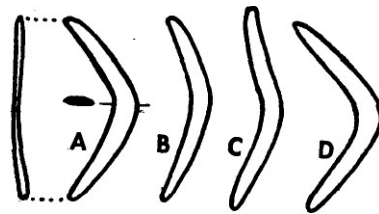


Kwel-Kwel, the owl. He
endowed the medicine
men with their secret
powers.

THE BOOMERANG

The boomerang is a throwing weapon which the Australian aborigines and other primitive peoples even today continue to use in war and for hunting birds. Boomerang-throwing is a very interesting sport, and you can make your own boomerang very easily, but of course you won't use it to kill birds. Even though it isn't difficult, you must work with care and exactness, for a bungled boomerang will not fly any better than a piece of firewood. Make your boomerang of oak or birch according to the dimensions given in the following illustrations.

^a> cross section



a-d: Various boomerangs
from a museum. Boomer-
ang a. is also shown from
the side and in cross
section.*



(Above) Top view and cross
section of a homemade boomer-
ang.

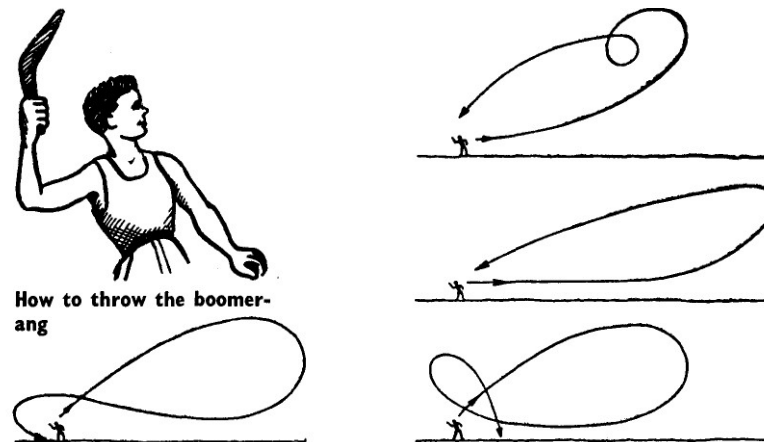
(Below) The short end of the
boomerang stands up about 1 inch
when the long end is lying flat on
the table.



The length of the arms is in a ratio of 4:5. However, the long arm has to be exactly as heavy as the short one, so it must be somewhat thinner. The bend near the middle forms an angle of about 140 degrees.

It is especially important that the fibers of the wood have the same angle as the bend. If you saw or carve the boomerang out of a piece of wood in which the grain is perfectly straight, it will break when it hits.

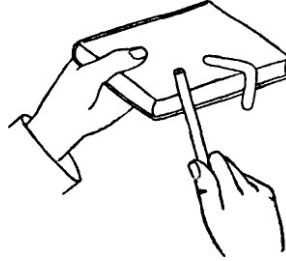
Probably the most essential part of construction is giving the boomerang an angle to the wind. When the long arm is lying flat on the table, the short end should stand about 1 inch away from the table top.



To throw the boomerang, hold one end (it does not matter which one), and then fling it out straight or at an upward angle. It can take several different possible paths of flight. For example, if it is thrown *against* the wind, it might sail along flat for a while, suddenly rise as high as a house, and then finally return to the starting point. If it is thrown *with* the wind, it will not return.

Never throw your boomerang from the midst of a group of your friends, nor when there are people standing anywhere near the spot where it may return. 84

You can make a small model boomerang out of a piece of cardboard and observe its path of flight. In this case it is important to make one arm a little wider and shorter than the other and to twist it at a slight angle to the long arm. To throw a paper model, lay it on the edge of a book, and flick a pencil sharply against the extending arm. It will shoot up, turn rapidly and then approach the starting point in a large curve.

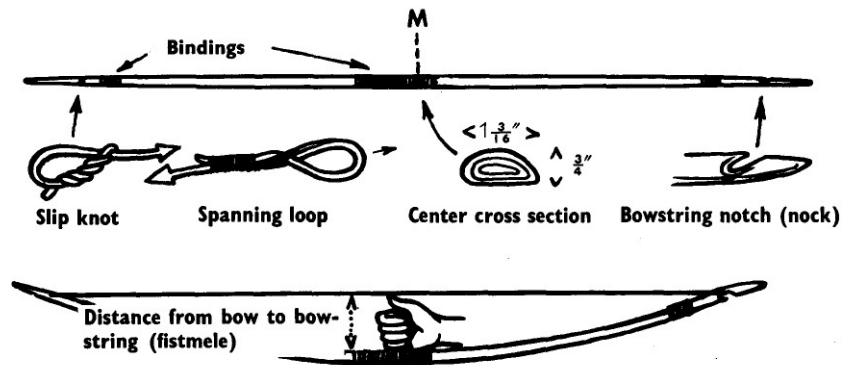


MAKING A BOW AND ARROW

Archery, a popular sport today, has been practiced by man for thousands of years. First used in the deadly pursuit of animals for food, the bow and arrow now provides fun and recreation.

The Indians used yew wood for their bows. Hickory, lemonwood or ash will serve equally well for making a bow.

The Bow Get a staff that is as tough and as evenly grown as possible. Its



dimensions should be about 5 to 6 feet long, depending on the length of your arm span, fingertip to fingertip, and about 1¹/₂ inches thick. The side opposite the bowstring should be sanded smooth, and the thickness should taper off toward both ends. However, the thickest point should not be in the middle (M in illustration), but about half the width of your hand below it. Although you will set the arrow at the exact center of the bow, you hold the bow at the thickest spot. When you are shooting, the lower limb of the bow will be longer than the upper limb.

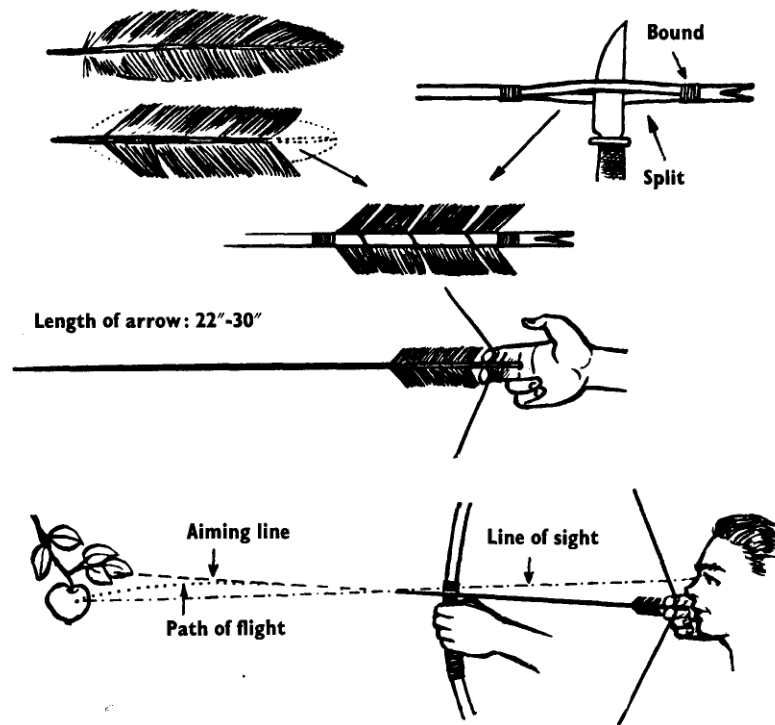
At the ends of both upper and lower limbs are the *nocks*—notches in the wood that hold the bowstring. Make the nocks on the side opposite the bowstring and plane them slightly flat. (See the center cross section.) Now take a cord that is solid but not too thick, fasten it with a slipknot in one notch, and bend the bow to get the correct distance between the bow and bowstring. Then measure off on the other end of the cord where you have to make the spanning loop. When the loop is finished, you can hook up the bowstring. To complete the bow, wind the handgrip and the ends with cord. *The Bowstring*

For your bowstring, use unbleached linen thread.

Get three pieces of No. 12 Irish linen thread, wax each piece with beeswax, and braid the three together. Then twist the braided string and wax it again. *The Arrows*

The length of your arrows can vary from 22 to 30 inches. The longer your bow, the longer your arrows should be. They should not be thicker than $\frac{5}{16}$ of an inch. Hardwood is preferred, but you can use a very tough softwood if necessary. To be sure that they will fly well, stabilize your arrows with feathers. *Aiming*

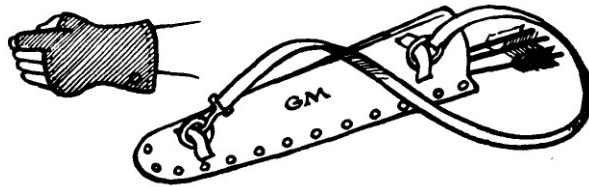
An arrow does not travel in a straight line for more than a very short distance. As it loses speed, it starts to fall in a slow curve. You must aim so that the arrow's path of flight, or trajectory, brings it to the target.



Aim as shown in the illustration.

You can make a target from moist earth or weave one with braided straw. Whenever you are shooting, be sure no one is standing between you and the target, or even in the area in which the arrow can go astray.

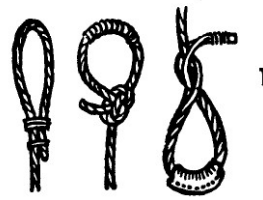
If you take care of your bow and arrows, protecting them from moisture, they will last a long time.



TRICKS WITH A LASSO

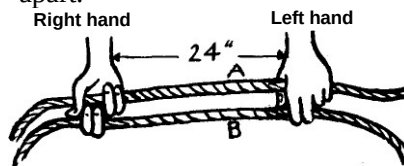
In the movies you've often seen cowboys lasso steers and wild horses. Their lassos have a loop at one end. The South American gauchos use a bola, a thong or cord which has balls of stone or iron attached to one end instead of a loop.

Handling a lasso correctly is a lot of fun. To make one, first get a rope about $\frac{3}{8}$ of an inch thick and 25 feet long. Make an eyelet or noose at one end. This loop should not have a diameter of more than $1\frac{1}{2}$ inches. Fasten the loop with wire. To reinforce the loop itself, use either leather or another piece of wire. Examples of nooses are shown in Fig. 1.



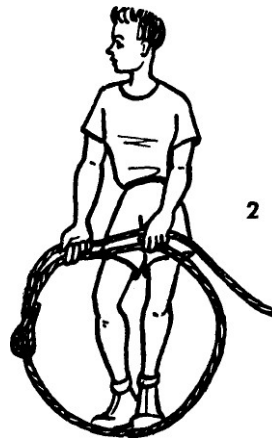
The Basic Position

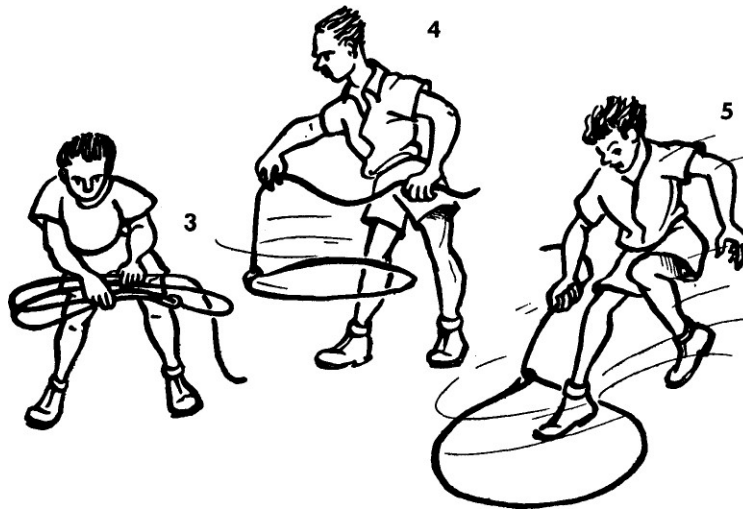
At the beginning, practice in a level, not too grassy clearing. Hold the lasso in the basic position, as shown in Fig. 2, using the first two fingers of both hands to grasp the circle you have made. The palm of your left hand should face your body, while the palm of your right hand faces outward. Hold your hands about 24 inches apart.



A. Loose end of rope

B. Part forming the loop





With a quick swing, throw the sling into a horizontal position, as in Fig. 3, and then start the circling, as shown in Fig. 4. *The Top*

Fig. 4 is called *the top*. When you twirl the end of the rope, the loop should turn in a full circle. Be sure to turn the rope in a counterclockwise direction. Start the circling by moving your hand a few times in a circle which corresponds to that of the loop. Then, reduce the circling of your hand as much as possible to allow you to turn the rope that much faster. *The Hoop*

Another figure, *the hoop*, is shown in Figs. 6 and 7. Lay the loop out on the ground in a circle with a diameter of about 5 feet. Now start to turn, changing the rope from one hand to the other in front of you and behind you. You have to practice changing hands this way, but it is not too difficult to get the loop circling easily and regularly. This switching of hands results in the loop encircling you. When you are in the center and the loop is going around fast enough, suddenly raise the hand holding the rope and bring it above your head. Using only this hand, turn the rope

faster than before. While the loop is swinging around, you will be able to bend down, kneel, and get into various other positions.

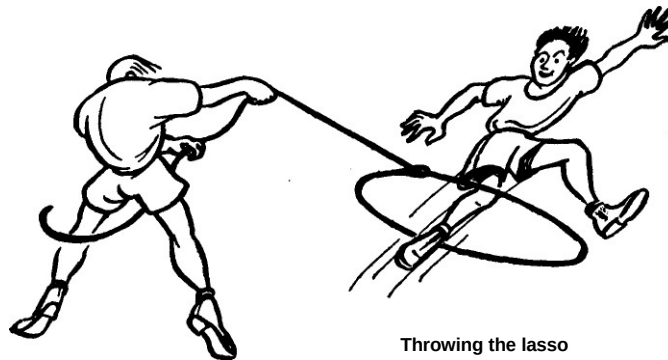
Jumping into the Lasso

Here's a lasso stunt that calls for some practice. Make the top as in Fig. 4, forming a large loop. Then jump into the loop (Fig. 5) and at the same time bring your hand with the rope over your head.



The Standing Hoop

Once you have formed the top, you can gradually go into the standing hoop, shown in Fig. 7. A clever artist with the lasso can turn this into a rolling ring by letting the loop graze the ground and roll along. You have to walk along beside the ring to keep it in motion.



Throwing the lasso

Throwing the Lasso

When you have become proficient with your lasso, you can begin to throw it. For this purpose you need a long rope. Hold the loop in your hand, leaving the long end of the rope neatly coiled at your feet so that it can uncoil without difficulty when you throw it. Put one foot on the loose end. Then throw the loop at the target the way you would throw a life preserver. (A good practice target is a heavy tree limb, about 9 to 12 feet high and without any branches.) After the throw, let the rope run lightly through your hand so that as soon as the loop is around the target you can pull it tight.

Up and at 'em, Buffalo Bill.

Exploring



1



2

Hunting in the woods is not confined to shooting game with a rifle or bow and arrow. You can spend your time in the outdoors far more enjoyably and constructively if you hunt with your head and eyes. All searching, tracking, and interpreting is really hunting, and the most patient and shrewdest hunters today are not those who hang their hunting trophies on the wall in the form of antlers, but rather those who preserve their booty from the hunt in photo albums—hunters with the camera.

Yet even without a camera there are innumerable things to hunt for in the woods and fields, things most people pass by without seeing. As you train your eyes and sharpen your powers of observation, you will begin to notice many fascinating things that you weren't aware of before.



3



4



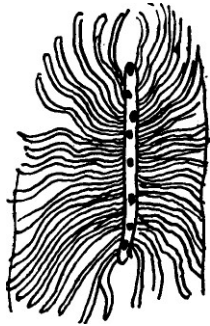
5

LOOKING AT TREE TRUNKS

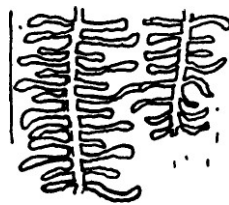
The marks on tree trunks have a story to tell. You might find traces of a mouse feeding (Fig. 1); air holes made by a beetle or other insect (Fig. 2); vertical, scarred tears or frost rips caused as a result of strains in the trunk because of differences in temperature (Fig. 3); traces of a squirrel feeding (Fig. 4); traces of a rabbit feeding (Fig. 5).

BRANCHES AND LEAVES

You frequently find galls, swellings of the tissues, on pine or oak branches and leaves. Galls result from the attacks of certain insects—gallflies, gall midges, and some aphids—that puncture the plant at a certain point and lay their eggs in the wound. The wound then grows into various shapes and the larvae grow up inside, feeding on the rapidly growing plant fibers.



The shot-hole borer:
Vertical main pas-
sage with many air
holes and side pas-
sages eaten out by
larvae



Bark beetle: Passages
eaten out by bark
beetles
Oak branch with
leaves



Longicorn: The
"cradle" in which
the larvae of the
longicorn, a type of
beetle, goes into the
cocoon stage



Pine branch





Two oak leaves. Round, spongy galls at the end of oak branches can get as big as apples, and are often called oak apples. Both the balls and the lens-shaped galls on oak leaves are made by two different types of gallflies or gall wasps. Ink can be made from such galls.



(Right) Small, hard-shelled galls on beech leaves



(Left) Hazel nuts chewed by mice



(Left) Small, round holes in hazel nuts made by nut weevils or long-horned beetles



(Left) Passages in a leaf made by various larvae. They eat the chlorophyll, but leave the upper and lower surfaces of the leaf untouched.



(Above, right) Fine white cobwebs over leaves and branches. Inside, the leaves are already partially eaten. The cobwebs protect and support the caterpillars of different butterflies and moths.

ANIMAL TRACKS AND TRACES

You are already familiar with some tracks and traces of animals and you know that if you want to observe animals or photograph them you first have to track down their crossings, runs, and

drinking and feeding places. Here are some more examples of the traces left by animals.

These are droppings of a buck. The balls are drawn out at one end, pushed in on the other.



These are droppings of a doe—smaller and drawn out at both ends.

Everywhere in the fields and woods, in stone piles, near holes in the ground, and around buildings there are tracks of the predatory weasel. The southern American weasel remains brown all year round, but there are other species whose fur in summer is reddish-brown on top, yellowish-white underneath, and changes in the winter to completely white except for the end of the tail, which remains jet-black. The body of this animal is about 16 inches long, the tail about 4 inches.



You can easily recognize the pawprint of the otter by the webbed toes. Otters, found throughout the United States and Canada, live in burrows that have underwater entrances. Their droppings are full of fish scales.



BIRDWATCHING

Birdwatching is a hobby that many people find absorbing. You too can spend fascinating hours tiptoeing through the woods hoping to glimpse the flash of a wing, or observing quietly from a window as birds cluster round a feeding station.

You can probably recognize a few of the many different types of

birds. There are many more you can look for and learn about. Do you know the difference between swifts and swallows? Swifts are frequently confused with swallows, because the way of life—hunting from the air—and the appearance of the two species are similar, but swifts are more closely related to hummingbirds and goatsuckers. Swifts are good flyers but their feet are weak and serve only for clinging to walls. Swifts cannot take off from the ground, so if you find an uninjured swift that has been "grounded," simply throw it into the air.

Here are a few types of swifts:

The chimney swift—nests in walls, unused chimneys, around towns. Has a shrill cry, "Sril-Sril." Smokey black, light throat, tail feathers ending in bare spines, larger than any swallow.



Chimney swift



White-bellied swift

The white-bellied swift—larger than the chimney swift, nests in cliffs and caves. Cries a piercing "Skree-Skree" or a trilling "Gree-Gree-Gree." Brown on top, white underside with a brown band across the breast.



Goatsucker

The goatsucker (whippoorwill, chuck-will's-widow, or nighthawk)—this is also not a swallow. Soft, mottled plumage. About as big as a thrush. Nests hidden on the ground, stays on the ground or on a branch during the day. Lives on bugs and night moths. Cries "Dag" when flying, "Errrr-Oerrr" when resting.

And now a few swallows:

The bank or sand swallow—nests in holes along steep river banks



(Left) Bank swallow



(Right) Cliff swallow

and in sandpits. Is gregarious (birds of a feather flock together) and generally lives in flocks near water.

The cliff swallow—nests in sunny spots on stony places or cliffs.

BIRDCALLS AND OTHER SOUNDS

In the woods:

Long, drawn-out howling, rising in the middle, then repeated shortly thereafter with a trill: "Hooooo hooohooohooohooo."

Heard in the spring, the mating call of the *brown owl*
Soft, long, drawn-out call: "hooooooo." Heard in the spring.

Mating call of the *horned owl*
"Hoo hoo." Call of the *horned owl*

Loud, penetrating call: "youik-youik" *brown owl*
Bright "koovit-koovit." Often in the neighborhood of houses

barn owl

Loud clapping of wings. Pairing of the *horned owl*
Muffled "quorr-quorr," then a whistling "psee." Repeated at

intervals when flying. Heard in spring from the *woodcock*
Uniform, continuous whirring with a high "airrr" and a short,

deep "errr." Beating wings. Pairing of the *whippoorwill*
Loud, melodious, frequently changing song from the bushes.....

nightingale

Loud, flute-like call: "deedlio,
deedlio" *oriole*



Loud, deep "burr, burr, burr, burr" in scolding tone.....*buck*
 Lighter, bright "boy, boy" in scolding tone *doe*
 Loud, rough, deep screaming or bellowing. Can be imitated by
 blowing into the spout of an empty watering can. Mating call
 of the *elk*
 Short, loud barking, similar to a dog's, heard on cold winter
 nights..... *fox*
 Grunting "grooo" *badger*
 High squeaking and rustling in the leaves *mouse or shrew*

In the fields and meadows:

A hoarse "chway-chway" followed by a fresh, bright
 "pickveevick-pickveevick." Only audible close by *quail*
 Loud "gearhick" (hen) or "geaheck" *partridge*
 Humming, trembling sound: "hoohooohooohoo (very fast)."
 Sound comes from the wing and tail feathers which start a
 buzzing shaking during the pairing flight *marsh snipe*
 Far-carrying, screeching call as if made by a saw: "crayik, crayik,
 crayik" *heron*
 Trilling songs in the air: "deedldeedldeedl-lewllewllewl"
meadow lark

Near villages and buildings:

Cheerful sounding and snorting: "chrioock" *screech owl*
 Loud screaming and mewing in February, March, and April
polecat or marten

Near water:

Loud, varying song in the reeds: "teeree teeree tsayck tserr
 tserr" *reed thrush*
 Bright trilling like an alarm clock, at intervals. Near ponds., *newt*

LOOKING FOR LESSER CREATURES

Most people have little sympathy for frogs, toads, lizards, or even snails. Therefore they do not pay much attention to these creatures and are, in fact, even likely to turn away from them in disgust. Such an attitude is foolish, for these "lesser" members of the animal kingdom are really ideal to observe and photograph.

Crested Newt: The male has a crest in the spring, the female never does. Dark gray. Belly yellowish-red with black spots. Grainy skin. Up to 7 inches long.



Crested newt



Striped or pond newt

Striped or Pond Newt: The male has a crest in the spring. Brownish to yellowish, underside yellowish with black spots. Smooth skin. Up to 4 inches long.

Striped Newt: Back like the pond newt, but without a crest, only a dorsal stripe. Up to 4 inches long.



Striped newt



Mountain newt

Mountain Newt: Back slate gray to blue, underside bright orange.

Larvae



Salamanders: Newt and salamander larvae (as opposed to the tadpoles of toads and frogs).

Fire Salamander: Yellow and black patches. Up to 10 inches long. Deposits its larvae in brooks and springs. Found in leafy woods and under stones in moist valleys.



Fire salamander



Alpine salamander

Alpine Salamander: Black. Slimmer than the fire salamander. Up to 6 inches long. Found in the Alps in damp mountain forests, but not lower than 3000 feet above sea level.

Wall Lizard: Brown or gray with dark designs and a dark horizontal band along the sides. Belly reddish, spotted with black. Sides have horizontal rows of blue dots. Very slender. Tail about twice as long as the body. Throat band not serrated as with all other lizards. About 7 inches long.



Wall
lizard



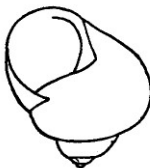
Tree
frog

Tree Frog: Color changes—grass green to grayish-brown. Toes have adhesive pads. Up to 2 inches long.



Brown or Wood Snail: Eyes at the ends of the feelers, as with all land snails (pulmonates). Without shell (limacinidae). Grainy mantle with airhole on the right side of the mantle.

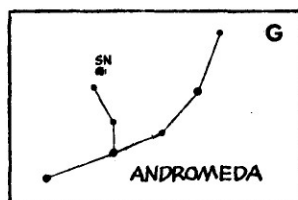
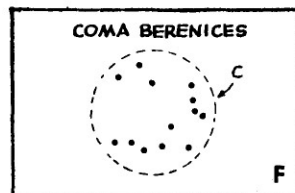
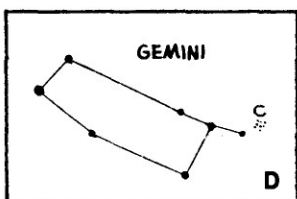
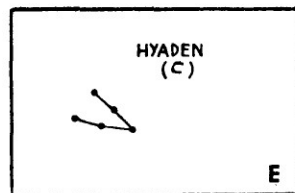
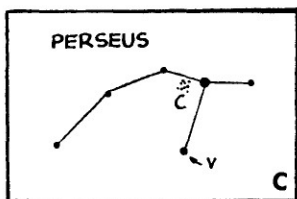
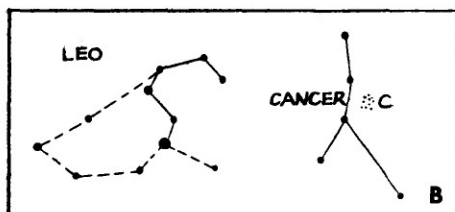
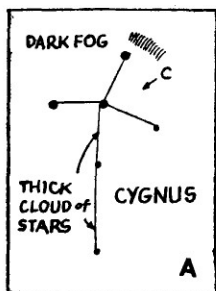
Snail Shells:



STARGAZING

You can also hunt for the constellations and the stars that comprise them. For this you need binoculars or a telescope. Refer to the astronomical charts on pages 62-66 to see where and when the constellations are visible.

The illustrations of the constellations given here show what you can find with the telescope.



C —Cluster of Stars
 SN—Spiral Nebula
 N —Nebula
 V —Variable Stars
 D —Double or Binary Stars

The Message *on the Birchbark*

The Indians, as we know from all the tales about them, drew their messages on strips of birchbark. There is no need for us to be that authentic, and it's far better today to leave the birchbark on the birch trees. Strips of brown wrapping paper will serve as well. And if you carefully singe the edges with a candle, the paper will look positively ancient. After all, the important thing is the message, not what it is written on.

BIRCHBARK STRIPS

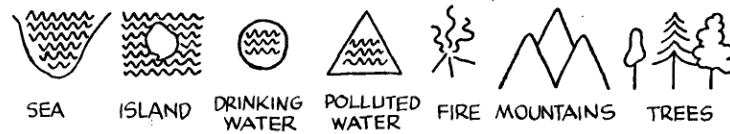
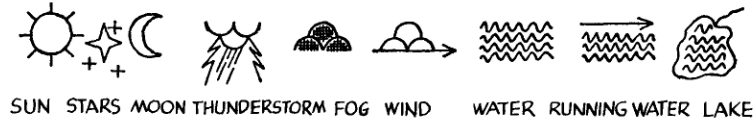
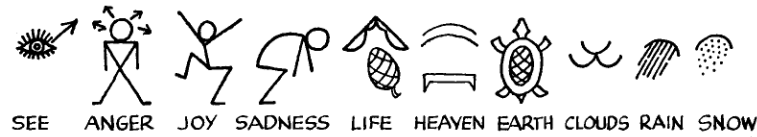
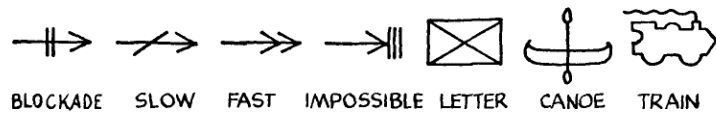
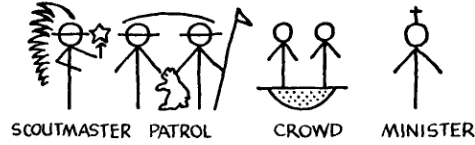
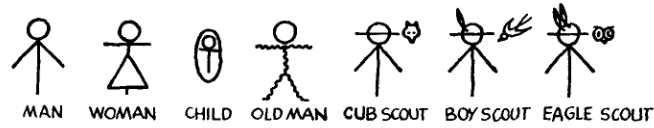
The illustrations on the next page show what Indian birchbark strips looked like. The pictures drawn on them tell stories about the life of an Indian. Since you have not had any practice in reading these picture stories, there is a short text added to each picture.

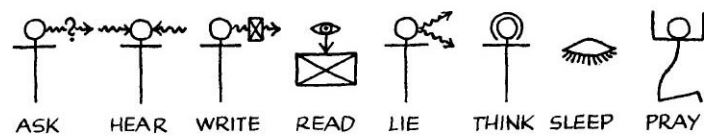
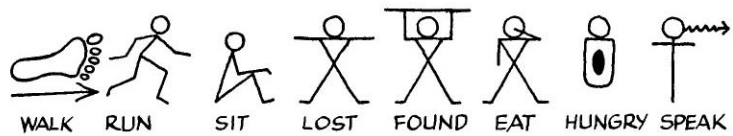
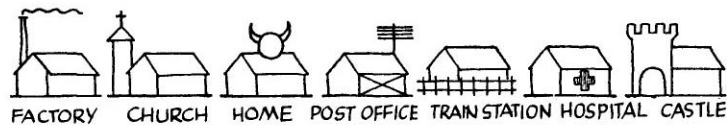
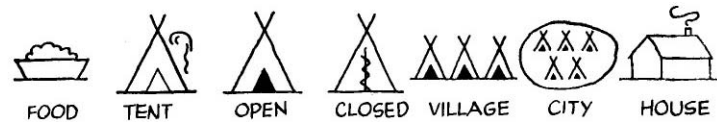
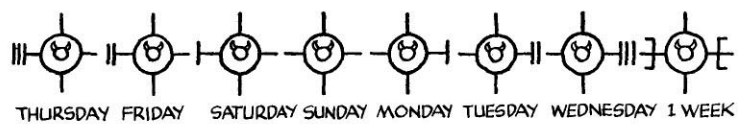
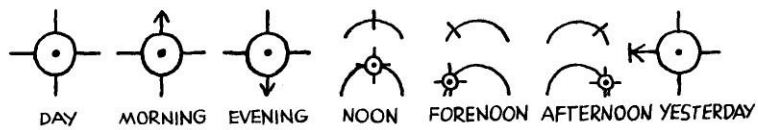
PICTURE WRITING

Unless you can draw fairly well, this kind of birchbark picture story is not for you. (Message-writing on birchbark is not usually practiced during your art class at school.) Instead, you and your friends can make up a picture alphabet. Of course, the meaning will be known only to the insiders. Choose signs that are easy to learn, as illustrated by the examples given here. (See pages 104 and 105.)



PICTURE WRITING





INVISIBLE INKS

You can write clever messages and have a lot of fun using a secret ink that only you and your friends know how to make visible.

To make your ink, use only harmless solutions. On the trail, you can always carry your bottles and writing materials with you so that they will be handy.

Writing with secret ink so that outsiders cannot read your message is not as simple as you might assume. If you use a sharp penpoint your writing will not be as secret as you wish, for the point will scratch the paper slightly with every stroke. Even if the scratches are not visible to the naked eye, they can be seen with a magnifying glass.

Therefore you should use a smooth, broad penpoint. However, this also has a drawback. The writing fluid leaves a slight shine on the paper. If the strokes are too wide, the writing will be perfectly legible when the sheet is held at an angle to the light.

The most suitable writing tool is a soft stick of wood sharpened to a point. Or you can use a toothpick.

Write on light-colored paper that is not too thin, because thin paper wrinkles where it has been moistened. This wrinkling can betray the presence of invisible writing and even make it legible. The best thing is a solid, hard-surface paper. Cautious writers never use blank sheets for their messages. Instead, they write some message with regular ink or pencil which will confuse the outsiders. Then they write the really important message between the lines with invisible ink. This diverts the attention of anyone not in on the secret from any possible traces of the dried invisible ink.

If you want to be really clever, combine the invisible ink with the normal writing. For instance, write a regular message that is confusing or meaningless. Then, using invisible ink, cross out some letters in the false message or put a dot over or under these letters in a way to make them spell out the really important message.

Natural Formulas for Invisible Inks

You can make your invisible ink out of any one of the following liquids:

Onion juice Lemon juice Salt
water Sugar and water Milk
thinned slightly with water

Water in which eggshells have been soaked for a few days. After these fluids dry, they become invisible. To make the writing reappear, carefully warm the sheet by holding the written side over a flame. Lo and behold!—the writing will be visible in a faint brown color.

SECRET CODES

Ciphering or encoding means making a piece of writing incomprehensible to those not in on the secret. Deciphering or decoding is the reverse process. A code is a table of words, abbreviations, numbers, or other symbols which can be substituted for words. You can even combine different symbols according to your needs.

Most people already know some simple codes. Perhaps you're familiar with the code which is created by reversing the alphabet—Z is substituted for A, Y for B, and so on. Or there is the code that simply uses numbers instead of letters, starting at any letter of the alphabet and going backward or forward.

You can make such simple codes more difficult if you combine them. For example, you might replace the first and last letters of a word by the letters immediately following them in the alphabet. It is a good idea to break up long words into two parts when using this code.

WE ARE WAITING FOR YOU

XF BRF XAITINH GOS ZOV

In addition, you could also encode the result with an alphabet of numbers.

Typewriter Code

If you know how to touch type with all ten fingers, you can construct a code by typing from a different basic position. For example, instead of resting your left fingers on *asdf* and the right on *jkl*;, shift them a line up on the keyboard to *qwer* and *uiop*. Thus, when you type

wait for us

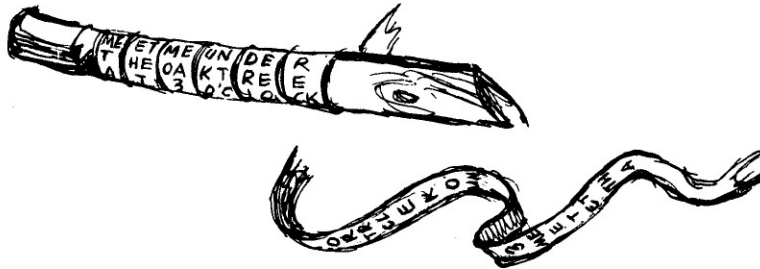
it comes out:

2q85 r94 7w.

Strip Writing

You do not need a key to read or write this remarkable code. All that is necessary is a rod or a stick. However, you have to be careful that the sender's and receiver's sticks are exactly the same size. For this purpose, two pieces of the same broomstick are ideal.

If you are the one who is sending the message, wrap a strip of paper around the rod so that the edges touch each other, and fasten the ends with thumbtacks. Then, write the message along the rod, turning it a bit after each line. To send the message, simply take off the strip and roll it up. Anyone intercepting the message will rack his brains trying to figure it out. But the intended receiver merely has to wrap the strip around his half of the stick, and he can read the message without any trouble.



Chessboard Code

The accompanying illustration gives a key for a code that substitutes two numbers for every letter. The letter "i" has been omitted because it can be confused with the number 1, and you

	1	2	3	4	5
6	A	B	C	D	E
7	F	G	H	J	K
8	L	M	N	O	P
9	Q	R	S	T	U
0	V	W	X	Y	Z

	a	e	i	o	u
b	A	B	C	D	E
d	F	G	H	J	K
f	L	M	N	O	P
g	Q	R	S	T	U
p	V	W	X	Y	Z

may substitute "x" or any other letter of your choice. First find the letter you want, then the number in the column to the left, and finally the number in the row at the top. Always write the number from the left column first. In this code, the words MEET ME AT THE SEASHORE would read:

82656594 8265 6194 947365 9365619373849265.

To make it harder for outsiders to break the code, you can divide the numbers into random groups. The receiver will know that each pair of numbers represents one letter. In this case, a comma was placed between two words:

8 265/6594, 8 265 61-9 4 947 3-65/, 936 5619/ 373" 84 92*65.

The other signs are there just to confuse the outsiders.

Another such code uses two letters for each letter of the message. Use any consonants at the left; put the vowels at the top. Using this key, VACATION would come out RABABIBAGORIFOI. The same sorts of complications to prevent interception of the message can be used here as with the other example.

Pattern Code

Make a pattern of alphabets like the one in the illustration. In addition, you need a code word which should be preserved only in your memory. It should be as long as possible and be kept strictly secret. You should also change it from time to time.

*	abcdefghijklmnopqrstuvwxyz
a	bcdefghijklmnopqrstuvwxyz
b	cdefghijklmnopqrstuvwxyzab
c	defghijklmnopqrstuvwxyzabc
d	efghijklmnopqrstuvwxyzabcd
e	fghijklmnopqrstuvwxyzabcde
f	ghijklmnopqrstuvwxyzabcdef
g	hijklmnopqrstuvwxyzabcdefg
h	ijklmnopqrstuvwxyzabcdefgh
i	jklmnopqrstuvwxyzabcdefghi
j	klmnopqrstuvwxyzabcdefghij
k	lmnopqrstuvwxyzabcdefghijk
l	mnopqrstuvwxyzabcdefghijkl
m	nopqrstuvwxyzabcdefghijklm
n	opqrstuvwxyzabcdefghijklmn
o	pqrstuvwxyzabcdefghijklmno
p	qrstuvwxyzabcdefghijklmnop
q	rstuvwxyzabcdefghijklmnopq
r	stuvwxyzabcdefghijklmnopqr
s	tuvwxyzabcdefghijklmnopqrs
t	uvwxyzabcdefghijklmnopqrst
u	vxyzabcdefghijklmnopqrstu
v	wxyzabcdefghijklmnopqrstuv
w	xyzabcdefghijklmnopqrstuvw
x	yzabcdefghijklmnopqrstuvwx
y	zabcdefghijklmnopqrstuvwxy
z	abcdefghijklmnopqrstuvwxyz

For example, take a code word like ACCOMPLICE. If the message you want to send is MEET ME AT JOE'S CAVE, then write the code word under the message again and again:
 MEET ME AT JOE'S CAVE ACCO MP LI CEA C COMP

From every vertical pair of letters in the original message and the code word, make a single letter by using the pattern. The first pair is M/A. Find the text letter (M) in the left column, and follow

Nhhi zu me mtfv cpoyz.

To decode the message, write the code word under the coded message. Look up the letter of the code word in the left-hand column, then follow the horizontal row to the letter of the coded message. The letter above this vertical column will be the letter of the original message.

With the help of a stencil you can encode a message which can be written and read very quickly. Cut a stencil of thin cardboard exactly according to the design shown in the illustration below.



Writing in stencil position

III

Shifting Alphabets The secret of this code is in shifting two alphabets.

1. ABCDEFGHIJKLMNOPQRSTUVWXYZ—message letters
2. BCDEFGHIJKLMNOPQRSTUVWXYZA—code letters

Take the code letter under the message letter in the first alphabet. For example, HURRY UP becomes IVSSZ VQ. The code can be varied by shifting the second alphabet a different number of letters.

Code Box

Divide the alphabet into nine groups and number them, starting in the upper left-hand corner. ABC=1, MNO=5, VWX=8, etc. In each group the letters are numbered 1 to 3. In this way, each letter of the alphabet is designated with two numbers. In the empty spot in box 9 you can add an *e* the letter which occurs most frequently in English. Thus, you can use either 22 or 93 for *e*, thereby making it more difficult for outsiders to break the code. O, for example, is the third letter in box 5. Therefore 53=0. In this code, BEWITCHED becomes: 12/22/82/33/72/13/32/93/21, or, more simply, 1222823372133293-21.

A B C	D E F	G H I
J K L	M N O	P Q R
S T U	V W X	Y Z E

For a variation, instead of numbering each group of letters in a box from 1 to 3, number them continuously. In this code, *s* is 7/19, for the 7th box and the 19th letter. Then SALT would be 7/19-1/1-4/12-7/20.



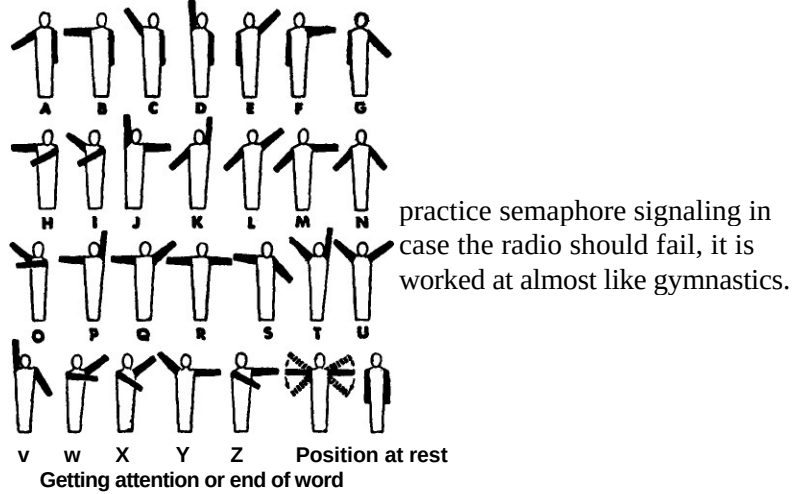
Signaling

THE SEMAPHORE

In the days when ships had no radios, signaling from ship to ship or from ship to shore and back was done with flags. I do not mean the pennants which were run up and down the ensign halyard in a quick succession of different combinations according to the key which the specially designated sailor read out of a thick code book. No, I mean signaling by semaphore.

In this case the signaler on the upper deck held a flag in each hand. Standing in a position as visible as possible to the receiver of the message, he sent the signals, using certain positions of the flags to denote certain letters. The illustration shows the letter that corresponds to each position. In spite of the fact that this is an old-fashioned signaling method, it is still used today by the English coast guard service.

Signaling with the semaphore system demands a very exact position on the part of the signaler—otherwise the receiver will confuse the letters. On British warships, where the cadets still



SMOKE SIGNALS OVER THE PRAIRIE

The Indians had a great number of smoke signals at their disposal. Signals were made to mean various things according to the number, strength, form—balls, spirals, columns, etc.—and color (the column of smoke was colored by the addition of certain herbs to the fire). You have to be a real artist to make good smoke signals, so be satisfied at the beginning with a few signs consisting of dots and dashes which you and your friends agree upon before starting. Throw a lot of leaves and green underbrush on a strong fire so that a heavy, dark column of smoke results. Interrupt this for shorter or longer periods, according to the signal, by holding a solid piece of moistened canvas over the fire. It is best to have two signalers who each hold the cloth by two corners.

The Indians who rode horses—the Apaches, for example—sent a rider to bring messages to friendly tribes. But they also used signal drums and smoke signals just like the Indians who did not ride. And even today, the smoke-signal telegraph is surprisingly well developed among primitive peoples.

Not too long ago an Australian squatter lost his life in a train



accident. The news was sent by telegraph to his relatives on the farm. The farm lay 55 miles from the nearest telegraph station, so the message could not be delivered by mounted messenger until the next day. But the news had already arrived at the farm: 24 hours before this, an aborigine had sent the message in smoke! The aborigines' smoke signal beat the electric telegraph by a full day. And 48 hours after the catastrophe, the news had even reached Brisbane—450 miles away—through the native "telegraph."

Signaling with drums is much more complicated. Today it still plays a big role with the natives in the primitive forests of South America and Africa. The skins of oxen, gazelles, zebras, and other animals are spanned over hollowed-out logs, giant gourds, and so forth. A large drum is beaten with two sticks, one just a simple rod and the other in the form of a hammer. The heavy mallet is beaten on the drumhead near the rim and produces a high tone. The ordinary drumstick is used in the center of the skin, producing a heavy, low sound.

No special codes are used in "telegraphing" with the drums. They actually reproduce the real sound of spoken syllables, and whoever is acquainted with the language being transmitted can understand it.

But let us return to signaling with fires. As a matter of fact, it also played a somewhat important role with the ancient civilized

peoples. Homer, who lived about the 9th century B.C., sings in the Iliad:

"As soon as the sun sank, they lit bundles of faggots on the lookouts, and the rising brilliance climbed so high that the people dwelling nearby looked to see if perhaps the defenders were approaching in ships of battle. ..."

When the Greeks had captured Troy, they announced their victory across the Aegean Sea by fire signals. The stretch from Troy to Mycenae in ancient Greece was divided into eight stages, each between 12 and 110 miles. This was about 1184 B.C.

The Persians, Greeks, Carthaginians, and the Romans also used an optical means of signaling which was superior to the primitive fire signals. The Greek historian Herodotus (484-425 B.C.) wrote: "The Greeks lying at Artemisium received notice from Sciathos by fire signals about the capture of Greek ships by the Persians." And Thucydides, his contemporary, wrote in his history of the Peloponnesian wars: "Towards night, they were signaled by torches about 60 Athenian ships which were approaching from Leucas. ..." A remark by Aristotle about the Persian fire signals shows that this sort of signaling could really transmit any information: "The system from the borders of the kingdom to Susa and Ebbatana was so masterful, especially that of the watchposts which signaled each other with fire signals, that the great king learned everything new which had happened in Asia Minor on the same day."

Morse Code

The one signaling method in use throughout the world is the Morse Code. Even though other faster methods of transmitting messages exist today, the system of dots and dashes has not outlived its usefulness. You and your friends can have fun communicating this way and perhaps some day the Morse Code will prove truly useful for getting help in an emergency. With this signal system you can send any sort of message over long distances



in a very short time. When intermediate posts are set up, the distances covered can be stretched as far as you like.

The principle of the Morse Code is that every letter is made up of dots and dashes, which can be translated into long and short sounds, or long and short light flashes.

The only way to master the Morse Code is to learn the signals by heart. Once you have memorized them, practice sending and receiving messages until it too becomes automatic. You will quickly discover how to impress the numbers on your memory, since they all have five dots or dashes.

When you are camping out, a convenient way to transmit Morse Code is with semaphore flags, swinging the flag to the right for a dot, to the left for a dash.

Now you need to know a few details, and you will be ready to send your first dispatch.

To make connections, that is, when you want to send a message, get the receiver's attention by signaling AAAA, sent as one letter. When he is ready to receive your message, he signals the letter K.

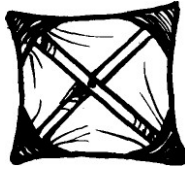
To signal the end of a word, bring the flag down in front of you until it almost touches the ground, then bring it back to the upright position.

If, as can happen, you have sent an incorrect signal by error, send a quick series of eight dots.

If the receiver has understood a word, he notes the fact by sending back a dot, the letter E. If he has not understood it, he sends back the letters *IM/*, in which case you repeat the last word.

When you have finished your message, signal the fact by sending *AR*. If the receiver has understood it, he signs off with the letter *R*.

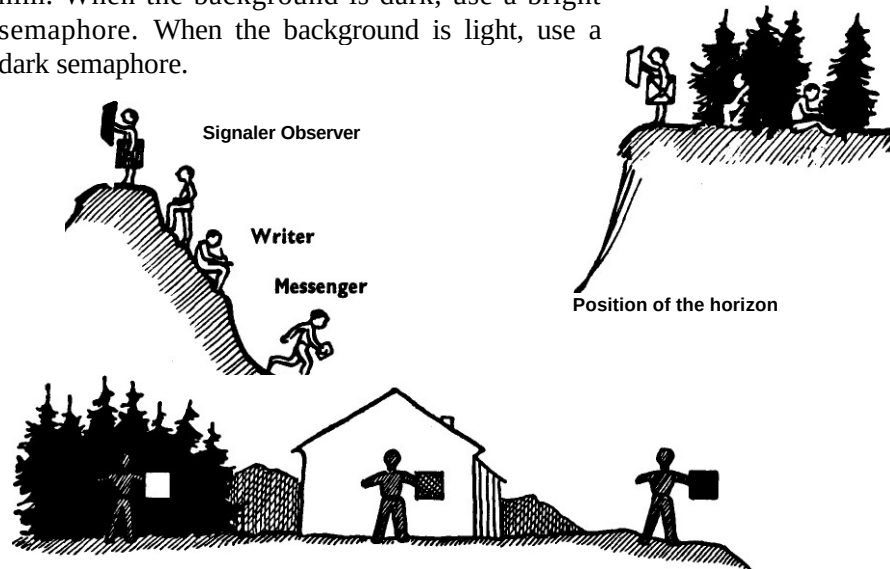
INTERNATIONAL MORSE CODE

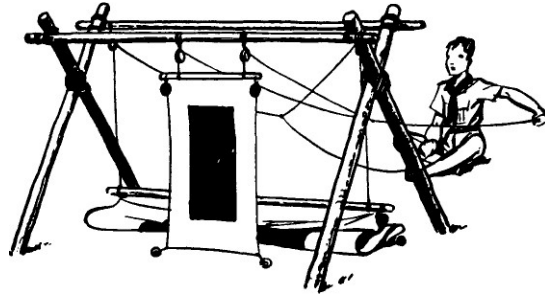


A	— ·	N	— ·
B	— · · ·	O	— — —
C	— · — ·	P	· — — ·
D	— · ·	Q	— — — ·
E	·	R	· — ·
F	· — ·	S	· · ·
G	— — ·	T	—
H	· · ·	U	· · —
I	· ·	V	· · · —
J	— — — ·	W	· — —
K	— · —	X	— · · —
L	— · ·	Y	— · — —
M	— —	Z	— — — ·

Signaling Posts

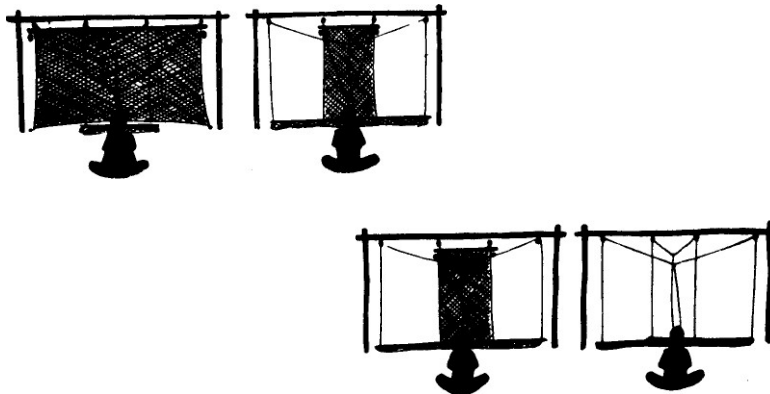
For a well-functioning signaling post, you need three people: a signaler, an observer and a writer. The signaler has to be easily visible to the receiver; the other two can lie flat on the ground near him. When the background is dark, use a bright semaphore. When the background is light, use a dark semaphore.



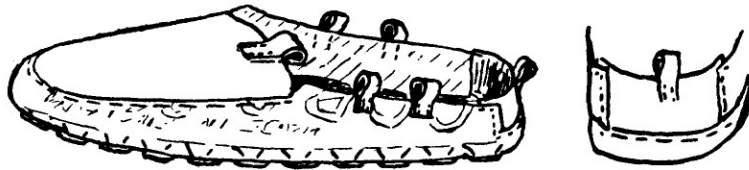


Signaling over Great Distances

When the weather is clear and the countryside is open you can send signals over great distances—if your semaphores are large. Since handling very large flags is awkward, you will need to build an apparatus to rig them up on. The accompanying illustration shows a model for this, consisting of a double scaffold made of sticks. Fasten a pair of pulleys on each horizontal bar for the drawcords to run through. Hang a small signaling cloth on one set of pullies to make the "dot," a large one on the other set to represent the "dash." Fasten the cloths to the ground so that they can be drawn taut when pulled up. Practice to develop your signaling skill. Some boys who used this system were able to send messages over a stretch of 20 miles when the weather was clear.



Moccasins



and Leatherstockings

These were the items of clothing worn by the Indians of old. Leather trousers would be ideal for working in the woods, it's true, but ordinary old pants will do as well. However, you can make cheap, long-lasting moccasins yourself.

You need an old tire, preferably one on which the tread has not been completely worn off. This will make your moccasins skid-proof.

It is really simple to make them. According to your imagination and ability, you can make anything from simple slippers to magnificently embroidered moccasins. Cut out a piece of rubber that is the size and shape of your foot and remove the excess rubber sticking up on the sidewalls. You can use this as "leather" for the tops.



You can either sew the pieces together with twine or tarred cord, or cement or staple them together. Fasten them on your feet with laces drawn through the loops sewn around the top.

But moccasins are not the only thing you can make for yourself. You can make many things that will contribute to your ease, comfort and fun in the out-of-doors.

BACTERIA LAMP

When you've strolled through the woods at night, did you ever come upon faintly glowing pieces of wood? Or have you ever seen a rotting potato that glows? The glow is not really coming from the wood or the potato, but from little bacteria growing on them. These bacteria are called phosphorescent agarics.

You can grow these agarics yourself. Cook a little beef bouillon and add enough powdered gelatin so that it will get hard when it cools. Then take the glowing piece of wood or potato and scrape off bits of it into the lukewarm bouillon. Stir it, pour the whole thing into a wide-necked jar, and leave it alone for a while. With the good culture medium of bouillon and gelatin, the agarics will soon start to multiply, and in a few weeks the jar with the culture will give off a mild, even light. It will make a worthy lamp for your tent or hut.

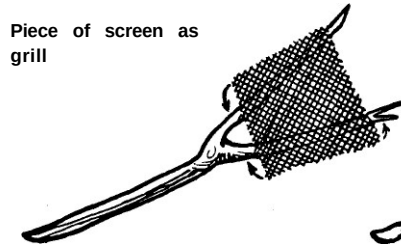
MAKING "SILVERWARE"



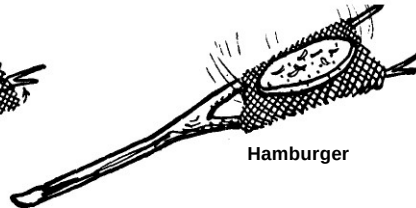
Roasting fork of green wood



Grilled cheese sandwich



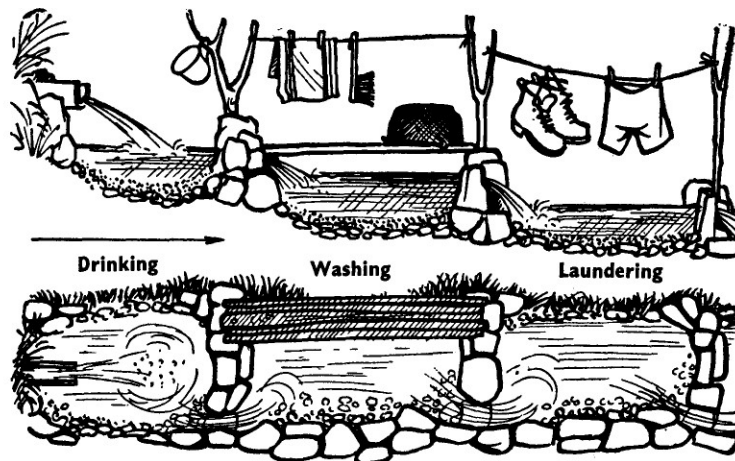
Piece of screen as grill



Hamburger

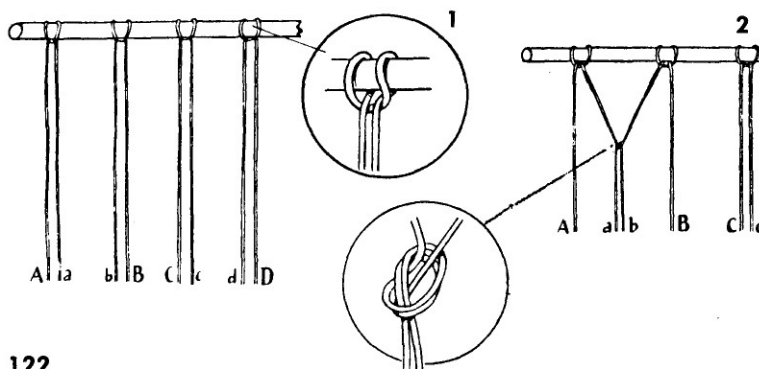
CAMPSITE FILTERING SYSTEM

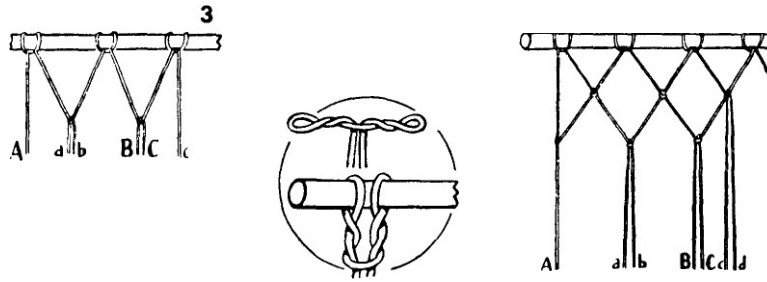
The illustration shows a filtering system set up at a spring. As you can see, it has sections for drinking, washing and laundering. The bottom of each section is lined with pebbles and sand. The flow of water from section to section should not be too strong.



WEAVING HAMMOCKS AND NETS

Follow the illustrations to make a hammock to lie in or a net to carry things or to use as a frame for the gabled hut on page 27. The strength of the cord you use depends on your purpose.





A hammock is very practical for your trapper's bivouac. You can hang it up and set up a trapper's roof or a ranger's tent over it. You will need two blankets for the hammock, one as a support (or you might use a foam rubber mat or a thick pad of grass for this purpose) and one as a cover.

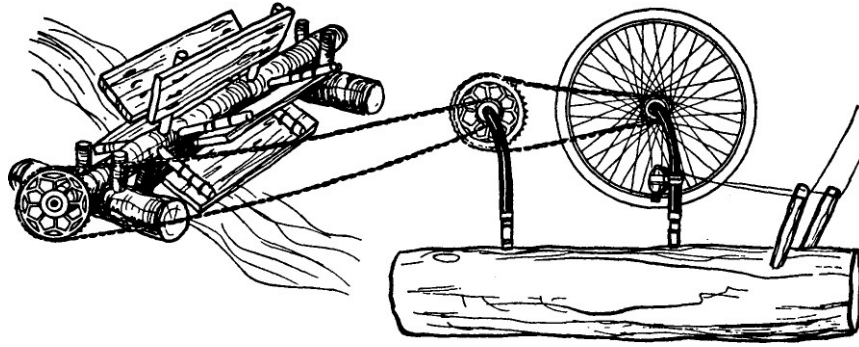
BIVOUAC CLOTHING

At the bivouac, the real coldness always comes from the ground and not the air. Therefore, you should be sure the ground you lie on is well insulated against the cold. Either spread out thick layers of newspaper, or make a bed from dried twigs, hay, straw or leaves.

You do not have to dress like an Eskimo, but it is important to wear woolen clothing next to your skin. In addition, loosen all clothing which is too tight (belts, elastic sock tops, etc.). Before going to sleep always put on dry clothing, including fresh underwear. Even if you have not been drenched in the rain, your skin always loses just enough moisture, completely unnoticeable to you, so that you can get very cold in the early morning hours. A complete change of clothing helps prevent this.

LIGHTING YOUR HUT OR AERIE

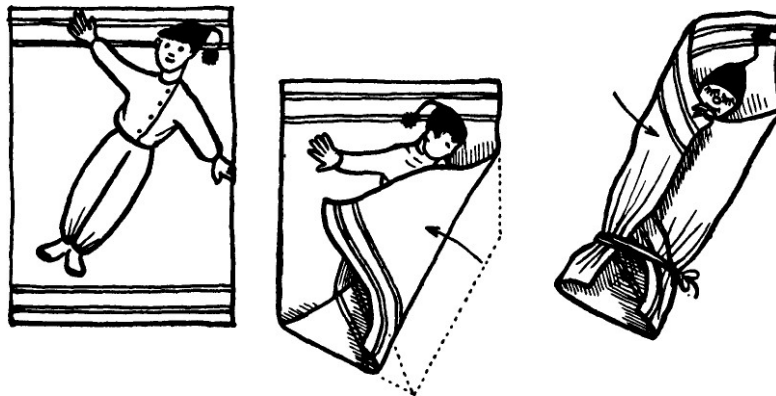
Why not use technical achievements to make your wigwam comfortable ? Make yourself a power generator!



You can see the material needed in the accompanying illustration. Naturally, you can mount several generators instead of one, if you like. In addition, you will need wire, bulbs and sockets. It's worth a try.

YOUR BLANKET

This is the way to wrap yourself up in your blanket: Lie along a diagonal. First turn in the corner over your feet and then fold the two sides. To keep the blanket from coming apart at your feet when you turn in your sleep, tie a cord or belt around it. However, this should not be so tight that it binds you.



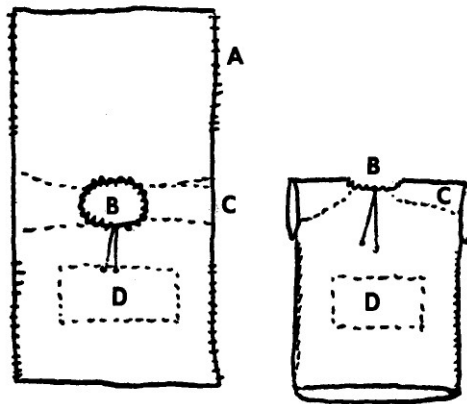
WATERPROOFING

You should waterproof your tenting cloth, rainclothes, and all sorts of other things. You can use a commercial chemical product, or you can use a natural substance such as birchbark or the bark of an oak. Prepare a brew of this, and let the material soak in it for two days.

RAIN PONCHO

Your outdoor adventures are not going to take place only when the weather is good, so you should be prepared for rain too. A raincoat is often clumsy, so why not make your own foul-weather gear?

The rain poncho illustrated here is modeled after a garment made by some Belgian scouts. Theirs was made of leather, but you can make yours of waterproofed cotton.

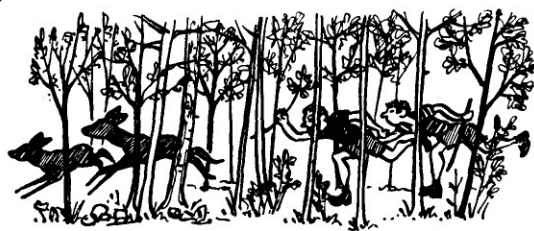


Sew the poncho as shown in the accompanying illustrations.

- A. Sew at these places.
- B. Opening for the head, with a cord for pulling it tight around the neck.
- C. Supports to strengthen the shoulder parts.
- D. Kangaroo-pouch pocket (yours might have a zipper).

Make the armholes large enough so that you can pull your arms back inside the poncho.

The Law of the Forest



In the woods and fields and camping grounds there are certain rules to be obeyed, certain laws to be respected. Like most rules and laws, there is a good reason for them. You already know that you must put out your fires completely and not trespass on private property, nor will you harm a living tree. As you feel more and more at home in the out-of-doors, you will be able to make your own list of do's and don'ts. But here are a few tips to help you improve your camping skills.

The rabbit bears four to five litters of one to five young during the year, the first toward the end of February. The doe has one or two fawns in April. The badger has three to five young in February. Everywhere in the woods the young creatures cower in fear, and the older animals worry about their young. You should not frighten them by making noise and beating the bushes.

Don't close the openings of fox and badger burrows, and don't build a fire in front of the burrow. Closing up the openings means starvation for the young, and they would suffocate in the smoke.

Rabbits and deer bring their young into the thickest part of the underbrush for safety when there is a disturbance. For that reason leave these places alone.

Every Indian knows that animals always flee uphill when there is a disturbance. Therefore, if you have to make a lot of noise, do it along the streams and in the hollows. If a mother is forced to

leave her young, the babies can easily fall victim to dogs and foxes when they are unprotected and helpless.

Be careful of trees of any age. You can damage a tree even by climbing on it with hobnailed shoes.

Woodpiles are the fruit of much hard work. Do not take the result of some stranger's labor.



Light fires only in ditches, stony spots, paths, or sizable clearings.

Route signs and no-trespassing posters were not put up as targets for stones.

Farmers spend a lot of time and money every year to keep their fences in shape, so do not use them for gym equipment.

If you find young animals out-of-doors, leave them where you find them without touching them. Attempts to raise them at home seldom succeed. As soon as you leave quietly, the mother will return to pick up her young.

When you prove, by following the rules of the woods, that you know how to be considerate and sensible, you will have made friends of the farmers, foresters and all the people who love the forest. And this can only work to your own advantage.

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