

# SURVIVAL MODE

VIDEO GAME SKILLS IN THE REAL WORLD

DAN LETCHWORTH

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by Dan Letchworth



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## For Dad

“When we forget how close the wilderness is in the night, my grandpa said, some day it will come in and get us, for we will have forgotten how terrible and real it can be. ‘Stuff your eyes with wonder,’ he said, ‘live as if you’d drop dead in ten seconds. See the world. It’s more fantastic than any dream made or paid for in factories. Ask no guarantees, ask for no security, there never was such an animal.”

—Ray Bradbury, *Fahrenheit 451*

## Introduction: You Are a Cave Person

WE HUMANS HAVE IT PRETTY EASY. Thirsty? Turn a faucet and clean water pours right out of the wall. Hungry? Fresh, hot food is a button-press away. Air-conditioning and heating keep us in a comfortable climate bubble at all times. And nature? Well, that's the blurry green thing in the background of our internet videos. All this convenience leaves us with a lot of free time for fun activities, like making art, playing video games, and having strong opinions about people we haven't met.

But this "free time" stuff is a modern invention. For the first few million years while we were still cave people, everyone was interested in only one activity: not dying. They had to work really hard at not dying, all day, every day. And since there's no way to succeed at this forever, the best they could hope for was to last long enough to make more humans, and teach those humans what they'd learned about not dying.

About ten thousand years ago we started doing better. We learned how to work the land, grow our own food,

and build nicer places to live than caves. The struggle to survive became a little less urgent. We no longer wrestled constantly with death—now it lingered on the front porch, tapping its foot and waiting for us to make one wrong move. But there still wasn't much time for anything fun.

Then the Industrial Revolution happened. Suddenly new *infrastructures*, or systems for supporting our basic needs, began coming together. Electric power lines, water pipes, highways; even police, fire, and medical protection: These are all infrastructures that support our modern, comfortable way of life. Most of us never have to wonder where we'll get our next meal, or worry that a common flu might be fatal. The problem is, the larger the infrastructure, the fewer people know how every part of it works.

Think about it: Millions of people own smartphones and depend on them for basic tasks every day. But there's not a single person on earth who could make a smartphone from scratch. They require a huge network of people who all have different jobs. Miners, manufacturers, designers, programmers, distributors, all over the world. Even tools as simple as a pencil are made with the expertise of several different people. Every tool and technology you use depends on the accumulated knowledge of all the generations who've come before you.

Imagine if all that vanished. What if you were dropped into the middle of the wilderness—with no people for

miles around, no comforts of civilization. How long could you survive? What if there was no help coming, and anything you needed, you had to rebuild from scratch? Could you take control and become a survival expert?

Of course you could. Without a doubt. You are a human. And beneath that squishy, comfortable exterior is the toughest, most adaptable animal on the planet earth. The same resourceful spirit as those hundreds of generations that have come before. The survival skills of the cave people are in your DNA, just waiting to be unlocked.

The best part is, everything you need to survive is all around you, if you know how to use it. You might be surprised by how much you already know—even if you're more comfortable indoors, playing video games. Your brain soaks up knowledge from all sorts of places, and many of the skills you've been practicing for fun in the digital world have useful counterparts in real life. The trick is to make the connection between the two. And that's where this book comes in.

. . . but one last thing before we start. It's the most important tip in the whole book.

**THE MOST IMPORTANT TIP IN THE WHOLE BOOK**

Don't trust this book.

Or rather, don't trust only this book. There's only so much I can tell you in 129 pages, and there's a lot of important stuff I had to leave out. You may already know that books are more reliable sources than websites, or that firsthand experience is more trustworthy than what somebody told you they overheard while waiting for the dentist. But even books take most of their information from other books (including this one). Just because you read it in a book doesn't necessarily mean it's true.

So how can you tell what's true if you can't even trust a book? Get a second opinion. And a third. Anything worth learning—especially something as important and full of danger as wilderness survival—is worth checking against more than one source. Weigh what one says against others to see where they agree and disagree. Decide for yourself what to believe, and what to be skeptical of.

Maybe you've heard that being a "skeptical" is a bad thing. But all being skeptical means is that you look for evidence that something is true before you decide to believe in it. You try to find different sources that back it up. It's a good life principle, in general, to get your facts from more than one place. Misinformation is worse than no information. And there's a lot of misinformation out there.

## The Indifferent Wild: Health and Inventory

VIDEO GAME WORLDS ARE FILLED with enemies. Hostile mobs and environmental hazards that were put there specifically to kill you. But the real wilderness isn't hostile. It's only indifferent. The wild doesn't care one way or another about you. It's a level playing field, and even the strongest predators aren't monsters. They're fellow players, surviving on instinct, using their skills to find food and shelter the same way you are. They may have sharp claws and protective hide, but you have something that gives you the advantage: Ingenuity.

Your advantage as a human is knowing that you can use everything around you. Find food in the most unlikely places. Craft simple tools out of anything you can find—then craft advanced tools out of those simple ones. Even if you start out completely unprepared, you most likely won't starve to death or be eaten by a bear. Don't waste time worrying about dramatic dangers. (At least, not yet. We'll get to them on page 99.) The real dangers are the small ones you're *not* looking out for. Which is why the

number one rule of wilderness survival is: Be alert at all times. Use all your senses. Pay attention to the smallest details. In real life, the final boss isn't an enemy you can see and touch, like a dragon—it's fear.

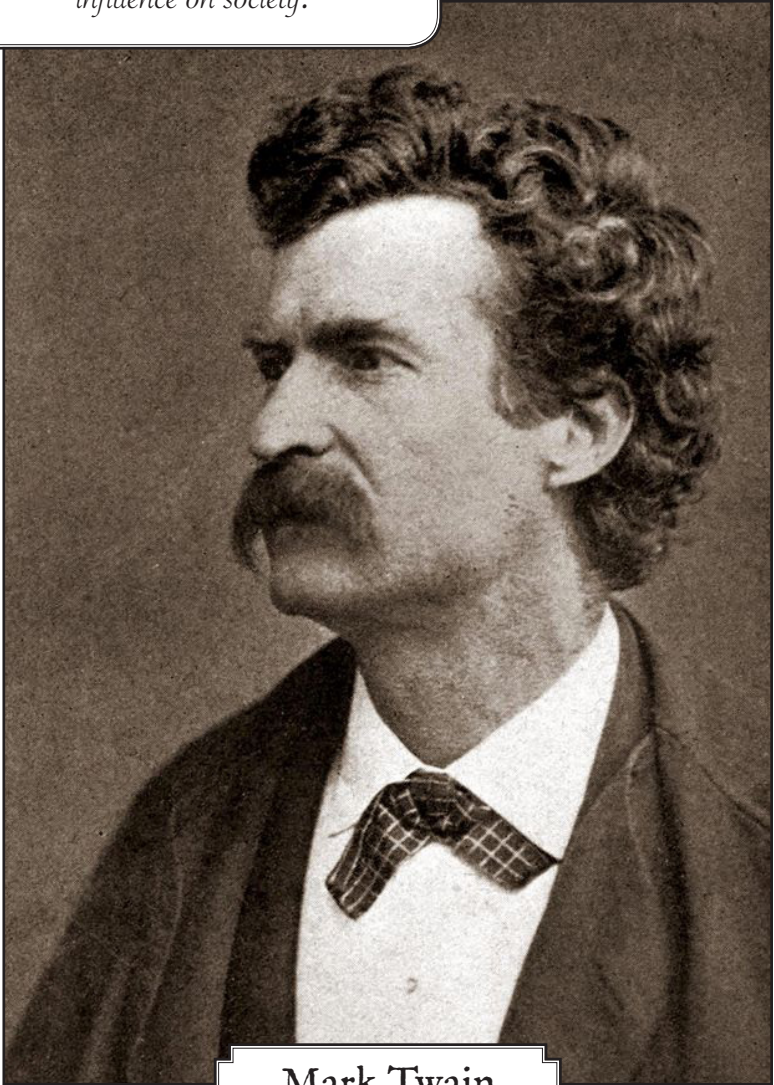
Fear of the unknown can be paralyzing. Fear overwhelms your senses and leads to poor decisions. Far more adventurers have lost their lives to panic and carelessness than to any obvious danger.

So: Arm yourself with knowledge. To banish the unknown, shine a light on it. The more you learn about the elements, the better you can master them.

## MANAGE YOUR INVENTORY

In theory, you could be dropped into the wilderness completely naked and still gather everything you need from your surroundings. Sometimes the wilderness comes to you, after all—if you survive a plane crash or a shipwreck, for example—and you have to make do with what's on hand. But for most situations, you'll start on an easier difficulty setting. The better prepared you are before you take your first step outside, the better your chances. Remember what Mark Twain said:

*“Naked people have little or no  
influence on society.”*



Mark Twain



## INVENTORY CHECKLIST

### **Clothing:**

- Loose, durable pants
- Layers of warm tops
- Waterproof jacket
- Sturdy boots

### **Food and Water:**

- Canteen or plastic bottles
- Ready-to-eat food like jerky, granola bars, and dried fruit

### **First Aid:**

- Bandages
- Aspirin
- Tweezers
- Needle and thread
- Iodine tablets (for disinfecting water)
- Activated charcoal (a poison antidote)
- Sunscreen and insect repellent

### **Tools:**

- Large survival knife
- Smaller multi-tool pocketknife
- Ax
- Fish hooks and fishing line
- Waterproof matches (Dip matches in clear nail polish to make them waterproof)
- Magnifying glass
- Small mirror
- Compass
- Topographical map of the area
- Aluminum foil
- Loud whistle
- Flashlight

### **Shelter:**

- Heavy-duty waterproof plastic tarp
- Lighter plastic sheet for sleeping on
- Nylon cord or parachute cord
- Brightly colored blanket or sleeping bag

## DON'T CUT YOUR ARM OFF

A good knife and ax are some of the most valuable tools you can have in the wild, but only if you handle them with extreme care and respect. So please: Take a minute to read these safety tips.

### **DOS:**

- Cut away from your body, not toward
- Keep tools in their sheaths when not in use
- Sharpen tools regularly: A dull blade is more difficult to control and more likely to slip
- Soak your ax head in water if it gets loose. The wood will expand. This isn't a permanent solution—you'll need a new ax soon.

### **DO NOT DOS:**

- Don't rest your thumb on the dull side of a pocketknife blade—hold it only by the handle
- Don't put a blade in a fire; you'll weaken the steel
- Don't hand a tool to someone else blade-first
- Don't carve writing into a living tree, or chop branches you don't intend to use

Finally, always carry your ax with the head down by your feet and the blade facing away from you. And for heaven's sake don't carry it propped up on your shoulder; I shouldn't even need to tell you why that's a bad idea.\*

\*Unless you're looking for a quick way to get 8–10 inches shorter.

## I CUT MY ARM OFF. NOW WHAT?

Well this is embarrassing. Next time maybe you'll take a minute to read the safety tips. But look on the bright side: Now you can learn some valuable first aid. In any medical emergency, your two top priorities are *stopping blood loss* and *preventing infection*.

### STOP BLOOD LOSS

Just in case this wasn't obvious: Your blood is your hit points, and if you run out, you don't respawn. First, ask yourself what kind of blood you are bleeding.

<b>My blood is:</b>	SLOW and OOZING
<b>I have broken:</b>	My CAPILLARIES
<b>Which are:</b>	Tiny blood vessels near the surface of the skin.
<b>I should:</b>	Rinse with clean water. Put direct pressure on the wound with a bandage.

<b>My blood is:</b>	DARK RED and FLOWING
<b>I have broken:</b>	My VEINS
<b>Which are:</b>	Vessels that return blood to the heart.
<b>I should:</b>	Treat the same way as above. Replace bandages with new ones when the blood soaks through.

<b>My blood is:</b>	BRIGHT RED and SPURTING
<b>I have broken:</b>	My ARTERIES
<b>Which are:</b>	Vessels that carry blood away from the heart.
<b>I should:</b>	Raise the wound above the level of the heart to slow the bleeding. Treat the same way as above. Keep direct pressure on the wound itself. Replace bandages regularly. Apply additional pressure to the artery a few inches closer to the heart than the wound.

You may have seen people in movies tie a *tourniquet* around their arms or legs—like a belt or a strip of clean cloth—to control bleeding wounds. Do this only if you can't stop the bleeding any other way. A tourniquet completely cuts off the blood flow to that part of the body, and this can damage tissue that was otherwise healthy. On the other hand (literally), if you've lost an entire limb, then a tourniquet is probably your only option.

Sorry . . . I should've mentioned that sooner.

## PREVENT INFECTION

Stopping the immediate effects of a wound won't do you any good if you die of bacterial infection a few days later. When you're far from civilization, cleanliness is job #1. Historically, just as many soldiers have died from improperly treated, infected wounds than from the injury itself. Use clean bandages. Sterilize medical instruments

before using them, by boiling them in water or applying rubbing alcohol. Rinse wounds out with clean water to remove dirt or any other stuff that doesn't belong inside your body. Most\* bacteria don't turn you into a zombie; they just kill you.

## KEEP YOUR HP FULL

I know you've heard this before, but it doesn't make it any less important: The best way to stay healthy is to wash your hands. Really. If you take special care to sterilize your water, thoroughly cook your food, and keep your hands clean (especially after going to the bathroom), you can prevent most illnesses before they start.

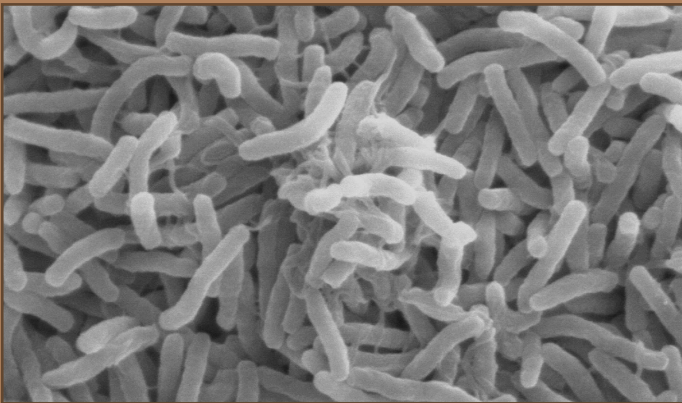
After Preparation, the most important "P" of survival is Priorities. Stay healthy by identifying what essential needs you have to take care of, in what order. You can go a few weeks without food, but only a couple days without water. However, if you're in rough weather, finding shelter might be a more important priority than finding water. No matter how challenging the situation seems, pause for a moment, think about your priorities, and plan on how to take care of them one at a time.

\*Most

## A WORD ABOUT POOP

Speaking of going to the bathroom: A common symptom of many food- and water-borne illnesses is diarrhea. It's embarrassing enough in everyday life, but in a survival situation it can be life threatening, since it causes your body to lose so much water. For example: **Cholera** is a bacterial infection that's killed millions of people throughout history. But cholera itself isn't fatal. Its victims die from dehydration caused by very bad diarrhea.

If you become afflicted, rest up and drink clean water generously. Mix a tablespoon of salt and three tablespoons of sugar into every liter of water to help your body recover. Try changing your diet, too. Sometimes diarrhea is caused simply by eating too much green, unripened fruit.



*Vibrio cholerae*, aka cholera, seen through an electron microscope

## DEBUFFS AND STATUS CONDITIONS

No sarcastic advice is a substitute for professional medical treatment. But here are some general steps you can take to identify and cure yourself of common ailments.

### BURN

First-degree burns leave hot, red-dened skin. Second-degree burns cause blisters. Third-degree burns char and blacken flesh. Wash with cool (not cold) water. Cover the area with a dry bandage. Leave charred material such as clothing in place until professional treatment is available; removal can cause further injury.



### DYSENTERY

Contaminated drinking water can cause diarrhea, fever, and a feeling of weakness. Double-check your water supply: Boil it, as well as any cooking utensils, to kill bacteria. Eat more starchy food, like tree bark, to prevent further water loss.



## DEHYDRATION

If you begin to feel dizzy, lightheaded, a headache, or a tingling in your arms and legs, drink more fresh water as soon as possible. Don't drink sea water; the salt will dehydrate you more.



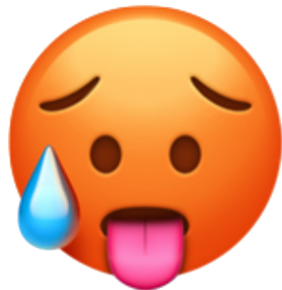
## FROSTBITE

Beware if a body part becomes numb, difficult to move, and loses color. Wash with warm (not hot) water; cover the area and hold it against a warmer body part. Be careful and gentle with it until it's no longer numb; you won't feel pain if it gets injured.



## HEAT STROKE

A rapid heartbeat, hot dry skin, and even brief blackouts may occur if your body temperature is too high. Get to shade immediately, rest, and rinse in cool water. Even if you feel sleepy, don't take in coffee or anything sugary, which will raise your heart rate even faster.







### **IMMERSION FOOT**

Also nicknamed “trench foot,” after soldiers in World War I who spent so much time walking in the cold, wet trenches their feet would swell and ache. Dry and warm your feet and change your socks.

### **INFECTION**

An improperly treated wound will show red streaks or blackness and continue to swell and hurt, and you might have a fever and swollen neck glands. Don’t pick at it. Clean with soap and water. Take antibiotics. Seek professional treatment ASAP.



### **HYPOTHERMIA**

Long exposure to cold temperatures or strong wind will slow your pulse, stiffen your muscles, and make it hard to breathe. Find shelter and build a fire. Take in warm, sweet drinks and immerse your body (but not your limbs) in hot water, or wrap it in hot towels.



## POISONING

Touching poisonous plants or animal skin causes itchy, burning rashes, and sometimes even blisters. Take aspirin, and wash the area with soap and water.



## SNAKE BITE

Depending on the species, you may feel dizziness, muscle spasms, intense swelling and pain, and/or difficulty breathing. Try sucking the venom from the bite. Lie down and don't move around until the symptoms fade.



## TRANSMOGRIFICATION

Sudden replacement of 100% of your body parts with those of a sloth or gastropod may occur if you trespass into a witch's territory. Do not attempt a counterspell yourself. Avoid other humans, who might now consider you food. Ponder that life as an animal may be more fulfilling in the long term.



## THE SEVEN MOST USEFUL KNOTS IN THE WORLD

Replacement parts are hard to come by in the wilderness. How do you expect to repair something if you can't tie a good knot? There are over four thousand different ways to tie a knot. We don't blame you if you haven't learned at least a few hundred of them. But the easiest and most well-known, the square knot, is also the least reliable, because it comes apart so easily. You can't use it for everything. There are specific knots for specific jobs. So it helps to learn some more precise names.

*A bend ties two ropes together.*

*A loop knot ties a rope onto itself.*

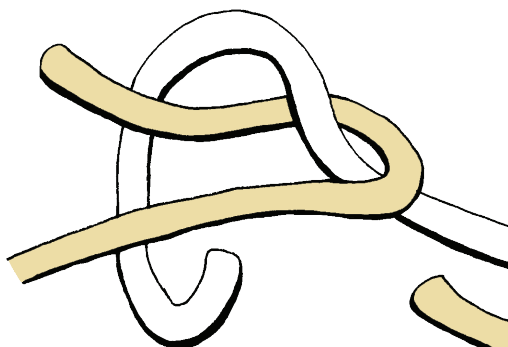
*A hitch ties a rope onto something else.*

You'll find step-by-step instructions for tying the seven most useful wilderness survival knots are over the next few pages. Learn just these seven, and you'll be prepared to hold yourself together when things fall apart.

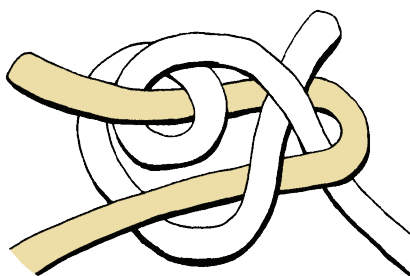
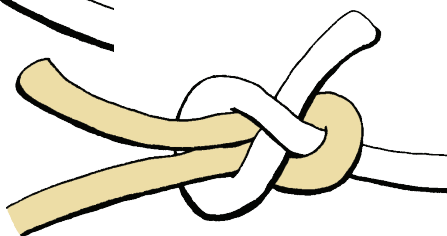
If your rope begins to unravel: For **synthetic rope**, like nylon, burn the unraveling end until it singes and melts together, then douse the end in water to set it. Do this in a well-ventilated space! Burning synthetic materials can create poisonous fumes. Don't breathe them. For **natural fibers**, tie a small, tight overhand knot (one half of a square knot) at the end of the rope to prevent further unraveling.

## SHEET BEND

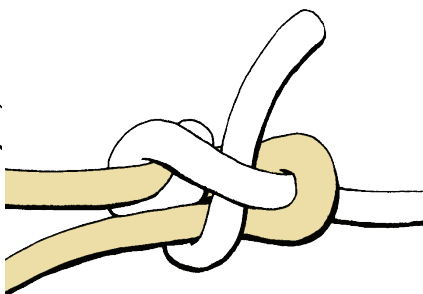
This is a strong yet simple knot for tying two ropes together, even if they are of two different thicknesses. It holds better than the square knot. The doubled version is even more secure.



Single Knot

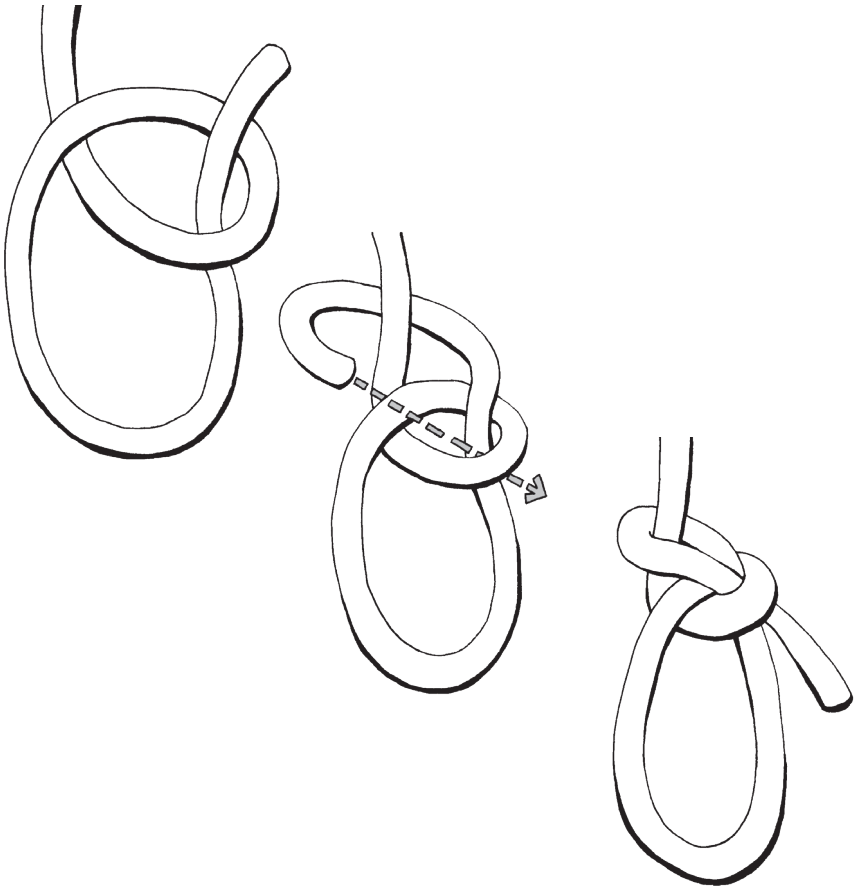


Double Knot



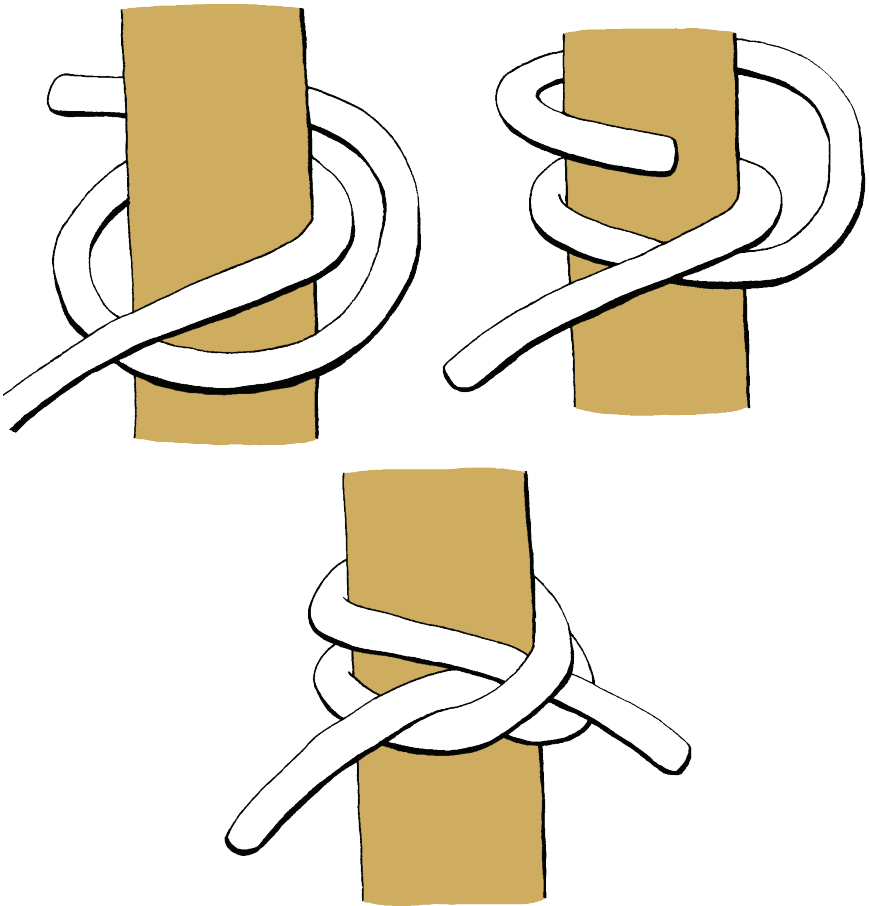
## BOWLINE KNOT

The big loop in this knot won't close once the knot is tight. This makes it perfect for tying around your waist when mountain climbing. With practice, you'll be able to tie it one-handed. To undo it, pull the "collar" at the top. You can also join two ropes together by tying a bowline in both of them, interlocking the big loops like a chain.



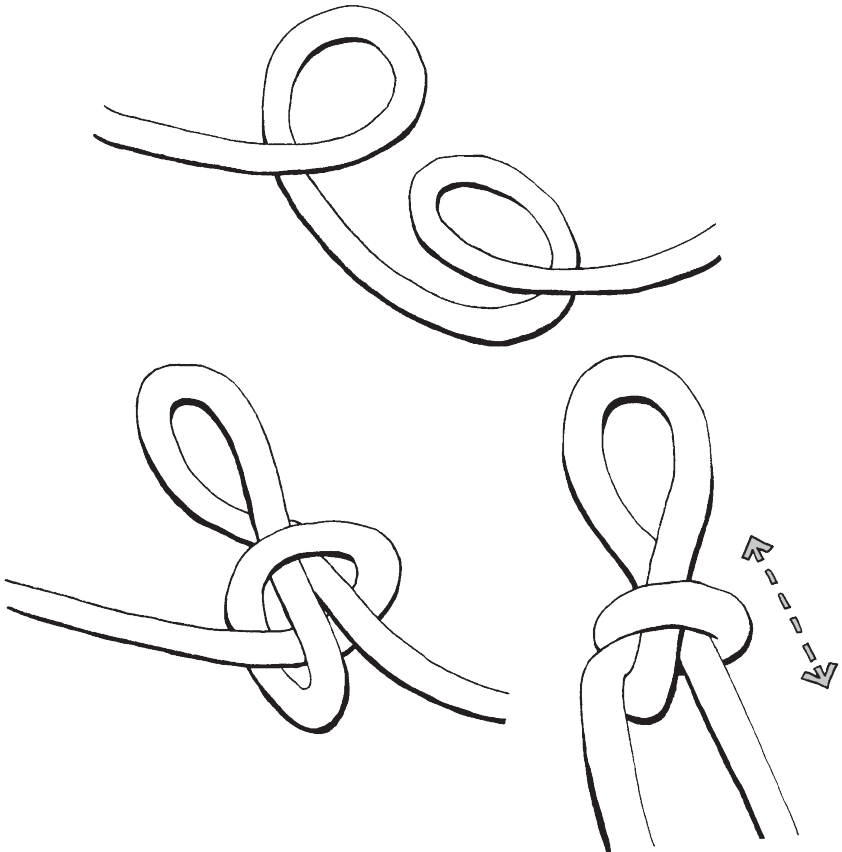
## CLOVE HITCH

If you want to build a teepee, a raft, or anything else made from thin branches lashed together, you'll begin each lashing with a clove hitch. It's useful for tying a rope onto a larger object, but it needs constant tension on the standing end, or it'll slip. Tie both ends of a rope to upright trees with a clove hitch to make a clothesline.



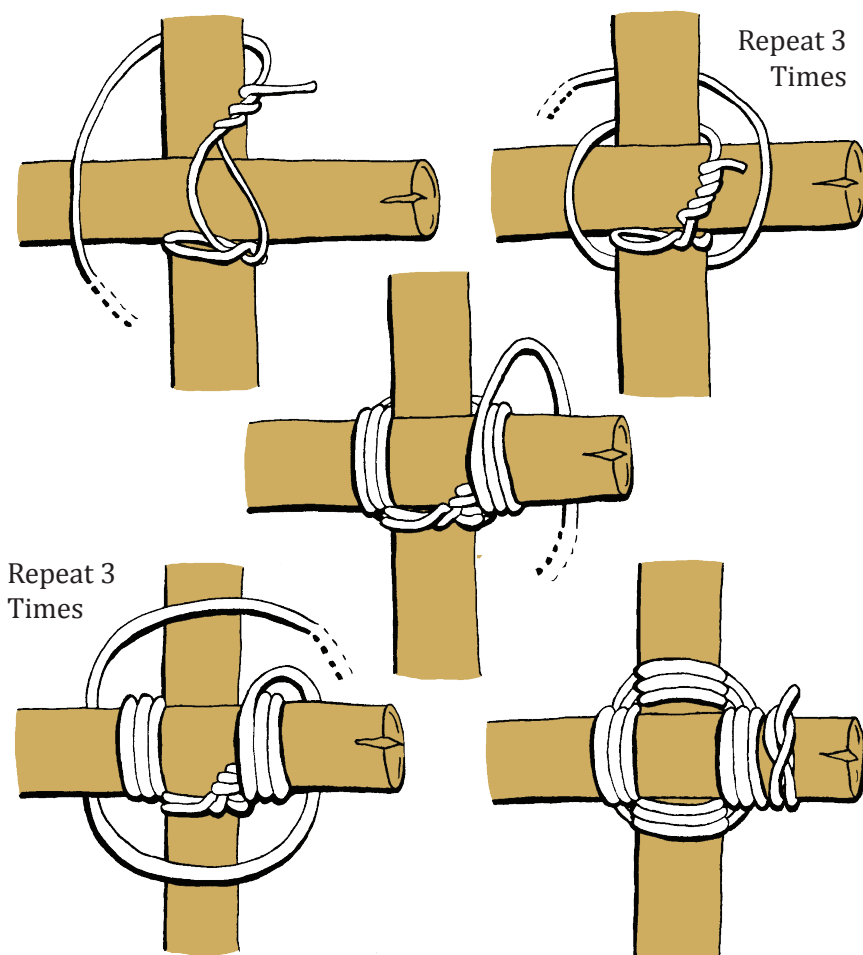
## SLIP KNOT

Unlike the bowline, this is the knot to tie when you want to adjust the size of the loop. For this reason it's sometimes called a running bowline. You'll use it when creating snares for wild animal traps (see p.88). Once an animal gets their neck or leg caught in the loop, pulling on it only makes it tighter. You have to pull on the knot itself to loosen it again.



## SQUARE LASHING

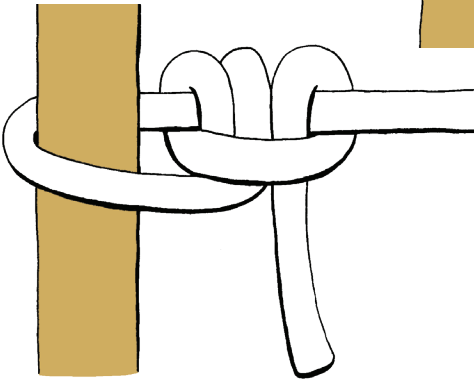
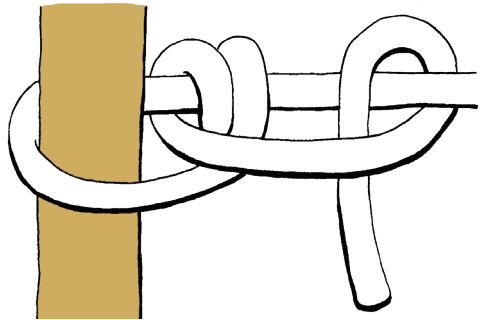
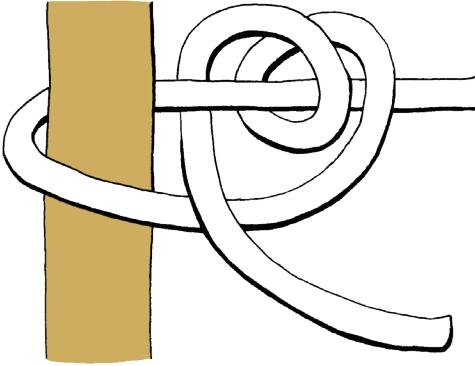
When you need to join two branches together at a right angle, wrap and tie them tightly with a square lashing. It's useful for any kind of camp construction: making ladders, cooking stands, framework to lay tree boughs on for roofs, and especially rafts, for the times you find yourself marooned (see p.122). Start and finish with a clove hitch.





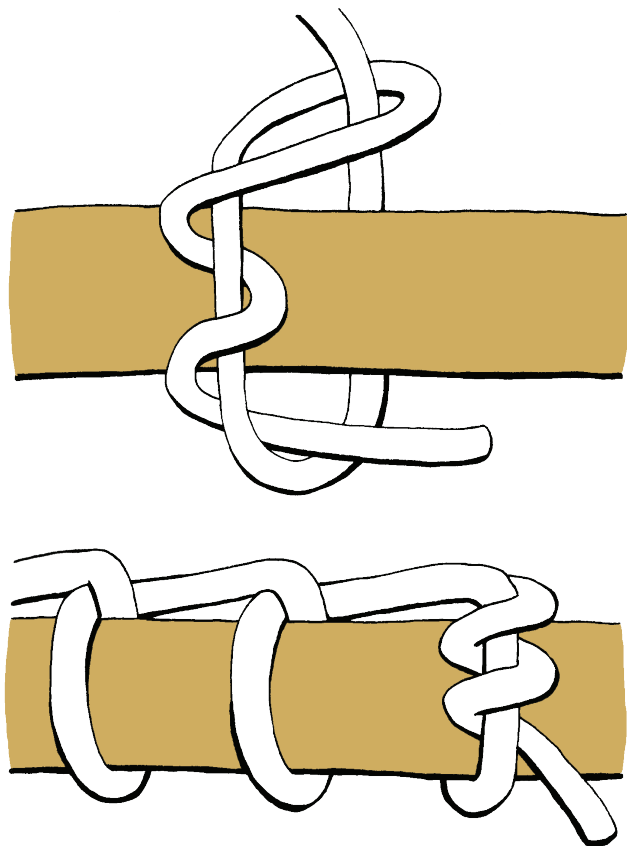
## TAUTLINE HITCH

If you have a tent, use this knot to tie your ropes to the tent stakes. It holds taut when pulled, but if the line starts to sag, you can adjust the amount of slack by sliding the knot up or down.



## TIMBER HITCH

If you want to build something out of logs, you'll make heavy use of this knot. Tighten it snug against a log and use it to drag the log into place. It holds well against slippery wood, and tying more than one hitch on the same log keeps it from digging itself into the ground. Hauling also works best if you pull in one constant direction—the knot might slip if you suddenly pull at odd angles.



## ADVANCED DOWSING: FINDING WATER

You need about three quarts of clean drinking water every day, more or less. Even in biomes with little water, always drink as much as your body needs. If there's no handy water source nearby, use what you have sparingly, but don't ration it to the point that you feel dehydrated.

In the old days, people believed that they could find water sources in the ground by following the movements of a big, forked stick called a *dowsing rod*. It turns out that dowsing was purely random—there was no science behind it. But water isn't usually that difficult to come by. Dig shallow pits at the bottom of hills or in dry creek beds, where groundwater is most likely to collect. Don't tire yourself out digging too deep—if there's no water within a foot of the surface, try another method. (You'll lose more water sweating than you'll find.) Likewise, a lot of moisture can be collected from the green stems of plants, but only if you know for sure that the plant isn't poisonous. (For some especially deadly examples, turn to p. 50.)

Look to animals for clues. Mammals, especially deer, tend to have a favorite watering hole they return to regularly. Of course, finding animals can be difficult in itself when you're trying to hunt. But if you do stumble across them, resist your killer instinct and follow them to water. Likewise, bees and wasps travel back and forth between

their hive and water. If you spot a bee flying with purpose and not just bumbling around, follow her. (Just not too closely!)

Of course, the simplest way to get clean, drinkable water is rain. Start preparing early if it looks like rain is coming—you never know how brief the rainfall will be. Spread out your plastic sheet and tarp and stake them down so they'll funnel runoff into your water containers. Lay out extra sets of clothing and let them soak up water, then wring them out.

Once you've found a good water source, stay awhile before moving on. Stock up on as much as you can carry.

## FILTERING WATER

**You have died of dysentery.**

Never drink water directly from a wild source. Even clear, swiftly flowing water can have microscopic parasites or germs in it that can make you very sick. All the water you take from the wild must be filtered and sterilized before you drink it. Filtering removes visible junk from the water, and sterilizing it kills invisible germs.


An easy way to filter cloudy water is to strain it into a pot through clean clothing like a sock, then let the water stand for an hour, so any remaining particles sink to the bottom. Then you can scoop the clearer water from the top.

If you can spare one of your plastic bottles, make it into a better filter like so: Cut off the bottom and turn it upside down. Fill the bottle with alternating layers of coarse gravel, fine sand, and charcoal. Charcoal is particularly useful for soaking up bad flavor. Now, water poured into your makeshift filter will slowly drip down to the bottom and out the bottle's mouth, rid of most of its dirt and gunk.

## STERILIZING WATER

If you have iodine tablets in your inventory, they'll kill the germs in your water lickety split. (Caution: Do not lickety nor split until tablets are fully dissolved.)

Otherwise, heating water over a campfire until it boils for at least five minutes is the most reliable way to kill all the germs and make it safe to drink. If your camp is high up in the mountains, make it ten minutes.

Boiling is fast, but uses a lot of energy. If you don't have much firewood to spare but do have a bright, sunny day, you can use the sun itself to sterilize your water. This only works if you have clear bottles, two liters or smaller, made from PET plastic. Look for a “1” on the bottom. Fill the bottle with filtered water, shaking vigorously as you go so lots of bubbles form. Cap it and leave it where it'll receive direct, hot sunlight for at least six hours. The sun's heat and ultraviolet light combined will kill the germs inside. If the weather's cloudy, repeat this for three or four days—

UV light still shines through clouds, but not as strongly.

Once you have clean water, keep it covered or in a sealed container to prevent algae from growing. If you've ever seen a swimming pool that hasn't been cleaned, you'll know how gross algae can be and how quickly it can form.

## THE IMPORTANCE OF SANITARY TIME TRAVEL

Most of this book assumes that you've been cast adrift with little better than Stone Age technology to survive. But what if you were transported back in time to the actual Stone Age and found yourself in a primitive society? How could you best help jump-start those early *Homo sapiens*, with all your modern know-how? Fancy electronics aren't going to help them much, because the infrastructures to support that technology won't be around for thousands of years. You could bring some encyclopedias and try to teach them about the universe—but those cave people might be dying too often and too young to care whether the Earth is round or flat.

Take this advice if you ever find yourself unstuck in time: If you can bring knowledge about only one modern invention with you, teach people how to make soap.

Yes, soap. It's kind of embarrassing how long it took humans to learn that fatal diseases are transmitted by infectious beings too small to see. Flush toilets and indoor plumbing didn't become common until the seventeenth

century—up till then, people just threw their waste out their windows into the street. A staggering number of deaths throughout history could've been prevented if people just knew they should be washing their hands.

How do you make soap? It's pretty easy. Pay attention: You might save millions of lives.

## HOW TO MAKE SOAP

1. Let a campfire burn out by itself, without dousing it with water. (Water will wash away the ingredients you're looking for.)
2. Gather up the white ashes left behind and put them into a small pot of water. Let the pot sit awhile. The ashes will naturally separate into charcoal, which floats on the top, and potash, which sits on the bottom.
3. Skim off the charcoal floating on the top of the water. (It's useful for filtering water, so save it separately.) Leave the pot outside in the sun and wait for the water to evaporate naturally.
4. Once all the water's evaporated, collect the potash from the bottom of the pot.



**Do not use an aluminum container for the next steps.**

5. In a separate container in a well-ventilated area, heat some oil or animal fat to boiling.

6. Add the potash to the boiling oil or fat and mix well.

The mixture will slowly gel, or “saponify,” into soap.

Pour into bar-shaped molds if desired. Let it sit until it’s completely cooled and hardened before handling.

**Chemistry time:** The chemical name for potash is “potassium carbonate.” If you’re marooned on a desert island without firewood, it’s still important to keep your hands clean, so burn seaweed instead, and use its ashes to make soap the same way. This method produces soda ash, or “sodium carbonate.”





## Reset Your Spawn Point: Shelter

EVEN IF THE WEATHER SEEMS PLEASANT during the day, the temperature will drop and the wind will pick up once night falls. Wind chill makes already-cold temperatures feel much worse, and the longer you stay exposed to the elements, the greater the hazards to your health—such as hypothermia, frostbite, and death—so you’ll have to learn quick ways to find shelter.

Look for dry, clear ground at least two hundred feet away from water sources or evidence of animal activity. Mosquitoes breed in still water, and you don’t want them to plague you overnight. Then, follow the Goldilocks Campsite Stratagem™ on the next page.

Once you’ve got a good spot, clear it of rocks and twigs, but gather leaves and pine needles where you intend to sleep. Fir tree needles make comfortable bedding and have a lovely aroma. Spread out your plastic sheet over these soft plants, and your sleeping bag or blanket over that. If you packed your own tent, then you’re all set. But if not, read on to see how you can make your own shelter.

<b>THE GOLDBLOCKS CAMPSITE STRATAGEM™</b>			
	<b>Too Much</b>	<b>Too Little</b>	<b>Just Right!</b>
<b>Altitude</b>	Winds become very strong.	You might be caught in a flash flood.	Surrounding rocks shield from the wind; no furrows for water to gather.
<b>Slope</b>	You'll roll out of bed and down a cliff.	Rainwater might gather and create mud.	Rainwater runs out of your campsite naturally.
<b>Tree Cover</b>	Not enough clear space on the ground to create a good shelter.	Strong winds are very cold. A lone tree can attract lightning in a storm.	Some tree cover will create dew in the morning, which you can gather for drinking water.

### **FALLEN TREE SHELTER**

So you didn't pack a tent. Maybe you found it too heavy. Or you're here because you fell out of an airplane. Or you thought you'd dig yourself a cave. Well caves don't just grow on trees, buddy. But you know what does? Trees. Trees grow on trees.

But wait. You've heard of "the campsite rule," haven't you? It goes like this: You should always leave a campsite nicer than you found it. Don't leave anything behind except footprints, and don't take anything except photos. This is

the golden rule when you're camping for fun. Don't kill a tree if there's a more environmentally friendly option, especially if the biome you're in has very few trees. But if you're in a real survival situation and there are plenty of trees to go around, the forest will forgive you for chopping one down to save your own life.

Find a leafy tree that's no more than three times taller than you, and thinner around than the distance between your elbow and fingertips. Before you start chopping, slowly swing your ax around yourself in a complete circle to make sure it won't catch on any nearby branches.

If you've got a clear space, chop a V-shaped wedge out of the tree about chest high. Never stand behind or in front of this wedge—always stand to one side.

When you're nearly through the tree, pull sideways above the wedge to topple it. You want part of the tree to stay attached to the trunk, because the triangle-shaped space that forms underneath it is your shelter. Clear out all the boughs underneath, giving you enough space to crawl in, and leave just the branches that form the new sides and top of your shelter. Stack the boughs you've removed over the ones you keep, for additional insulation. Double-check that the fallen part of your tree rests securely atop the remaining upright trunk and won't budge. You don't want it crashing down on top of you in the middle of the night.

## CAVE SHELTER

No ax? No worries. Get back to your really old-school roots by taking shelter that requires no construction at all. When hard stone shelves sit atop a layer of softer ground, that softer ground can be slowly eroded away by wind, rain, or even the slow but powerful growth of tree roots. Look for hollows that've been scooped out beneath limestone outcroppings. In caves that are so deep you can't see the back wall from the mouth, build a fire and bring a torch with you in case another creature had the same idea.

Suppress the urge to explore a deep cave farther than sunlight can reach. With only a torch for light, you're more likely to suffocate on your own smoke than to find diamonds.



## ANOTHER WORD ABOUT POOP

Your basic bodily functions become much more important when you're surviving in the wild. Without the luxury of running water, you have to pay much closer attention to where and how you do your business. No matter how tired you are or how cold it is, your latrine should be at least 200 feet away from your campsite and from any water source. The last thing you want is bacteria from human waste to get into water you intend to drink.

Dig a hole about six inches into the earth, no deeper. The top layer of soil has its own ecosystem of microorganisms that'll help break down waste faster. If you didn't bring toilet paper with you, use some soft leaves. Afterward, cover up the hole and mark the spot by driving two sticks into the earth on either side so they cross in an X. This will remind you not to disturb that spot later.

To be safe, follow these instructions even for Number One. Pee is *sterile*, meaning it contains no harmful germs that could infect drinking water, but you still don't want it anywhere near your camp or water source. Also, when pee dries, it leaves behind crystallized uric acid that can attract wild animals—especially porcupines, who love salt. So unless you're making a porcupine trap, cover all your corporeal emanations with dirt.

And do I need to say it again? Always wash your hands.

*“People who imagined that life on earth consisted of animals moving against a green background seriously misunderstood what they were seeing. That green background was alive.”*



**Dr. Ellie Sattler,**  
*Jurassic Park*

## Journeyman Herbalism: Know Your Plants

PLANTS DESERVE YOUR RESPECT. Especially trees. They create the oxygen we breathe, they feed us, they shelter us, they make medicine for us, they even give up their bodies to make the paper we communicate with. (Sorry, guys.)

The first land-dwelling plants arrived on the scene 470 million years ago, way before your ancestors bought into this whole “breathing above water” business. Even those progenitor plants are useful to us, their remains crushed under intense heat and pressure for eons until they became the oil and coal many of us use for power.

Of course, those plants did us another huge favor by entombing greenhouse gases in their remains when they died, and we’ve been undoing all their hard work by releasing millions of years’ worth of those gases in the last 200 years or so . . . but where was I?

Oh, yes. Plants. Since most survival situations will have you surrounded by plants, both depending on them and at their mercy, you’d better get to know them. Let’s start with my six favorite trees. Say hello, trees!



## **NORWAY SPRUCE (*Picea abies*)**

“Ho ho ho! You might recognize me as your friendly neighborhood Christmas tree. I’m a *conifer*, which means

I make cones instead of flowers and fruit. My leaves are tiny needles that don’t need a lot of water, so I stay ‘evergreen’ all year round—at least until people cut me down and turn me into pianos and violins.”





**PAPER-BARK BIRCH (*Betula papyrifera*)**

“*Hau!* That means ‘hello’ in Lakota. Long ago, native North American tribes used my waterproof bark to make canoes. My highly recognizable outer white bark peels off horizontally, leaving dark stripes underneath. You can burn it in your campfire even if it’s wet.”



**PONDEROSA PINE**  
**(*Pinus ponderosa*)**

“Is it getting hot in here? Small, seasonal forest fires are a natural part of my growth. My tough outer bark is fire-resistant, and heat encourages my cones to release their seeds, which have plenty of space to grow once a fire has burnt down other, less-hardy plants. If you need tinder for your campfire, gather my fallen branches—they’re softwood, which means they burn more quickly.”



**RED OAK (*Quercus rubra*)**

“Hello way down there! I’m a big, strong tree found all over the eastern United States. You might be familiar with the spectacular red and orange autumn colors of my leaves. I don’t mean to brag—after all, I come from a very tiny acorn. I’m a hardwood, which means I burn slowly.

My wood is used all the time for timber, and it makes good, slow-burning fuel wood in a campfire.”



**SILVER WATTLE (*Acacia dealbata*)**

“G’day, mate! I live mostly in Australia, but you can find me in Africa, too. I’m tough and don’t burn very easily.

Sometimes my leaves are so small I look like a fern.

My tiny flowers are called *mimosa*. I have some pretty famous ancestors: According to the book of Exodus, the Ark of the Covenant was made of acacia wood.”







**WHITE WILLOW (*Salix alba*)**

“Owch! Got a headache? Chew some of my bark or boil it to make medicinal tea—it’s got salicylic acid, which is used to make aspirin! I’m found along riverbanks in damp soil across Europe and western Asia. My leaves have fine white hairs on them when they’re young, so when the wind blows, I look like a curtain of rippling silver.”

## FORAGE FOR ROUGHAGE: EDIBLE PLANTS

Humans can eat a huge variety of wild plants, way beyond the fruits and vegetables you're familiar with from the produce section. If you know where to look, food is all around you.

HOWEVER! *Never eat a wild plant unless you're absolutely, positively sure what it is.* Only a few animals are unsafe to eat, but a ridiculous number of plant species have evolved to be toxic and even deadly. You can't blame them for defending themselves like this. Unlike animals, plants can't exactly run away from what's trying to eat them.

If you're very bad at following directions and do eat something poisonous by accident, scrape a generous amount of fine charcoal powder into a small amount of water and swallow it. The charcoal might be able to soak up and neutralize the poison in your system.

So what is safe to eat? The safest bets are wild counterparts to fruits you already recognize. Wild apples have all kinds of strange shapes and taste very sour, but are still nutritious. Wild carrots are white, not orange, but they taste the same.

In most places you'll have to look a little harder to find edible plants. Luckily, there are three especially useful, easily overlooked ones that might be growing just outside your window.

The **CATTAIL** is a familiar sight in marshy biomes, and every single part of it is edible. Eat the corndog-y seed head raw, before it ripens. After it ripens, you can burn the outer covering away on a hot rock to get the seeds inside. The pollen cluster on top makes for a delicious flour. The bulb can be cooked, and the roots can be peeled and eaten.



Every part of the common **DANDELION** is edible, though it's very bitter raw. Boil it a few times, changing the water whenever it starts to get dark, for better taste.

**BITTERROOT** grows in dry regions where other plant life is scarce. It was an important historical food source for native North American tribes, and Lewis and Clark even relied on it at times during their expedition. Look for the distinctive purple flowers, then dig up the edible roots. Peel them and boil them a few times to lessen the bitterness.





## CAN I EAT THAT?

You're hungry. You've got important surviving to do and there's no time to lose. You don't want a biology lesson—you just want to point at something and ask, "Can I eat that?" Consult this guide for quick answers.

### Nuts and Acorns—YES!



Raw hazelnuts, pecans, and walnuts are all good. Acorns are too bitter to eat raw, so crush and grind them into a fine powder, then boil the powder a few times until you have a slightly more appetizing paste. Don't feel guilty about tracking squirrels to their hidden stashes of acorns and taking them all, either; odds are you'll be eating the squirrel soon, too, and he won't have much use for his stash then, will he?

### Berries—SOMETIMES!



Wild blackberries, blueberries, and strawberries are identical to what you'd buy from the supermarket. Red and white mulberry trees produce tremendous amounts of berries that taste great when dried. But again, be careful—many lovely-looking berries can be poisonous.



### **Mushrooms—GOOD HEAVENS NO!**

The tiniest nibble of some wild mushrooms can kill you. It's extremely difficult to tell the difference between edible mushrooms and deadly ones, and there is no antidote to mushroom poisoning. Seriously. Avoid eating mushrooms altogether.



### **Tree Bark—SURPRISINGLY!**

The inner bark of aspen, birch, elm, maple, and willow trees is edible and sometimes even tastes good, especially in the spring. Scrape the bark to a pulp, then boil it to soften. It can even be made into flour to cook into bread. Plus, willow bark contains one of the chemicals used to make aspirin. Chew it to relieve headaches.

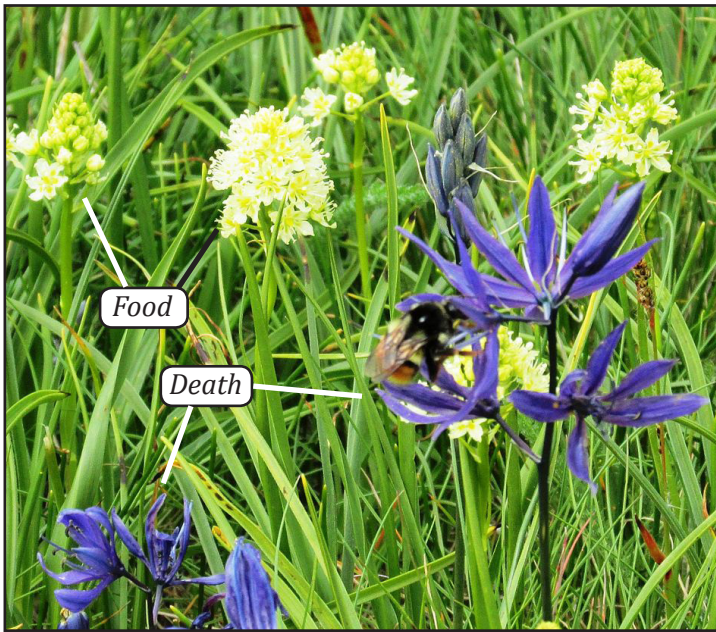


### **Pine Cones—YES!**

If you've gotten your food from supermarkets your whole life, you might never have connected prepackaged pine nuts with the spiky cones found in trees. Wild pine cones are a bounty of nourishing food. Crack the cone open, or lay it beside a fire and the scales will open by themselves. Collect the seeds and roast them over the fire. They contain four times as much energy by weight as steak!

## BEWARE THE GREEN DEATH!

If you've got a good nose, you can identify wild onions and garlic by their smell. They often grow in the same places as lilies. Conveniently, true lilies—like the **camas** plant—are edible too. However, camas has a fatal lookalike, fittingly called **death camas**.



*Don't mix them up.*

Death camas grows in the same places as edible camas, wild onions, and garlic, so look closely. Its leaves are thinner and raspier, and its flowers are paler and only about a half inch wide, compared to the 1.5-to-2-inch flowers of edible camas.

Likewise, the needles of the hemlock tree can be made into a delicious tea. But the **water hemlock** pictured below, which smells similar and also has a pleasant taste, is the deadliest plant in North America. Just one small bite contains enough poison to kill a grown human in less than a half hour, with a whole host of awful symptoms before the end: Brain swelling, kidney failure, hallucinations, and convulsions so violent that victims have been known to break their own limbs.



Nature is full of poisonous plants that are easily mistaken for edible ones. So when in doubt . . . honestly? You're better off eating bugs.



**This shameful waste  
WEAKENS AMERICA !**



*Remember—Only you can*  
**PREVENT THE MADNESS!**

## Pyromancer Training: Fire and Cooking

SO YOU WANT TO MAKE FIRE. But first, maybe you're curious what fire actually *is*. It's not a solid, a liquid, or a gas, like most other stuff in your everyday life. It's a chemical reaction. To impress your science teacher, you could say that fire is "rapid exothermic oxidation of hydrocarbon chains." But if you're cold, hungry, and in the dark, you need some more practical info.

The simplest way to understand it is this:

**Oxygen + Fuel + Heat = Fire.**

Any time there's enough oxygen, fuel, and heat together, there'll be fire. Likewise, take any one of the three away, and the fire will go out.

**Oxygen** is the easiest to find. There might even be some oxygen in your house *right now*.

**Fuel** is also easy: In the wilderness, dead plant matter and fallen branches that burn easily are everywhere.

It's getting the fuel **hot** enough that's the hard part.

### 3 ... 2 ... 1 ... IGNITION!

The quote at the beginning of this book is from a science fiction novel called *Fahrenheit 451*, about a dismal future in which a firefighter's job is to burn books. The title comes from the fact that paper begins burning around 451°F (232°C). Usually you'd reach that temperature by starting with a smaller flame, like from a match. But if it were a really, *really* hot day (say, wintertime on Venus) and the air temperature was already 451 degrees, paper would burst into flame, or *ignite*, all by itself.

So how do we start fire here on Earth? Lucky for us, some materials—like the chemicals in a match head—have a much lower ignition temperature than paper. The easiest way to create heat is with friction, like how rubbing your hands together warms them up.

To recap: Applying a very small amount of friction to match heads makes them ignite. The match flame then creates temperatures hot enough to ignite other stuff.

If you don't have matches, you'll need another way to create high temperatures. That means one of two things: a whole lot of friction, or a whole lot of *radiation*.

### BECOME A NUCLEAR ENGINEER

That's right—nuclear radiation. You can harness the energy of an immensely powerful nuclear fusion reactor to start fires ... as long as it's not a cloudy day.

To start a fire with the sun, you just need to focus sunlight on one tiny spot. If you've got prescription glasses, their lenses will do the trick (but only if you're farsighted). A lens from a pair of binoculars works. So does a simple magnifying glass. A flat mirror isn't enough. The solar method is more useful for signal fires, since the fires you'll be setting for warmth and cooking will be in the evening.

What if you've got no glass, but you did pack a lot of junk food? There's hope even for you, Irresponsible Sam. Polish the curved bottom of a soda can with chocolate or toothpaste until the aluminum is gleaming and shiny. The curve of the can reflects sunlight and focuses it the same way a glass lens does. (If you touch the polished aluminum, wash your hands before eating.)

Lastly, if for some reason you've skipped ahead and gotten some mining done, flint or quartz rock can produce sparks when struck with metal such as your survival knife. Try this method only as a last resort. It's difficult to get these small sparks to grow into a full fire, and you might bend or break your knife in the process.

### **GATHER YOUR REAGENTS**

You need three different kinds of wood for a campfire: Tinder, kindling, and fuel. You can't light a huge log on fire with a tiny match; you have to start small and give the fire time to gradually get hotter so it can burn heavier wood.



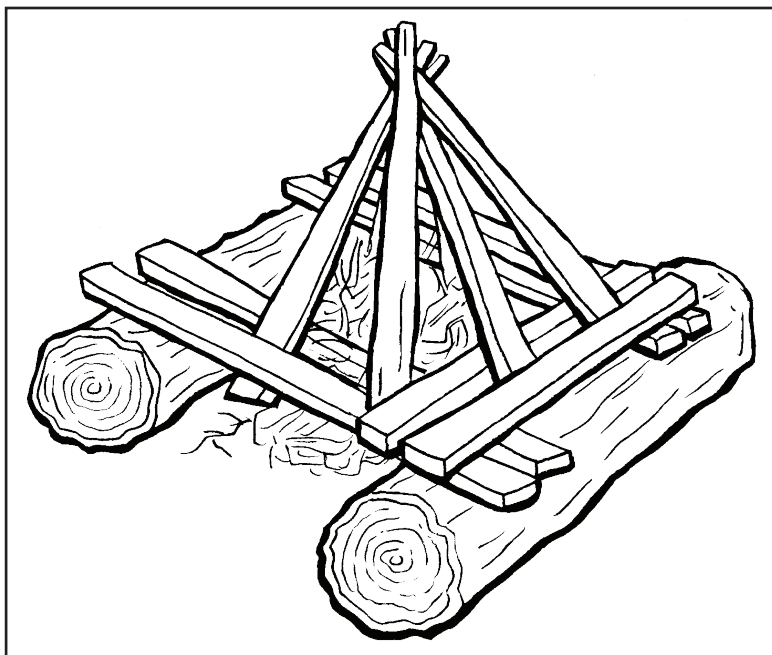
**Tinder** is very light scraps, like needles, dry grass, and willow bark. It ignites easily and burns fast. Gather about two handfuls. Cotton balls are also perfect.

**Kindling** is medium size: light twigs and sticks. Gather twice as much kindling as tinder. Shave little bits off of kindling with your survival knife to make more tinder.

**Fuel wood** is larger sticks and branches. Start with just a couple, but have a supply of extra fuel handy to feed the fire once it gets going.

The best firewood is dry and dead. Living, or *green* wood, still has moisture inside and is more difficult to burn. If it's rainy or damp and all the wood you find is wet, try splitting open branches and logs—the inside might still be dry. Look for dark knots in the wood or in tree stumps; they contain a material called *pitch* that still burns when wet. Willow bark is waterproof. And once you've got a good fire going, even wet wood will burn.

Now to find a good fire-building site. Look for a level, clear area that's sheltered from the wind. If there's no bare dirt anywhere, dig up a two-foot square of grass and use the clear space beneath. Make sure there are no branches overhead that might catch a floating spark.



### **PREPARE A TINY FLAMMABLE HOUSE**

Armed with all three types of firewood, build them like the picture above. Place a few pieces of fuel wood at the bottom to make a frame. Lean your kindling together like a teepee, leaving space in between each piece to let oxygen flow. Last, pile your tinder inside the kindling. Keep extra fuel wood nearby to add when necessary. It's much easier to keep a healthy fire going than it is to start a new one.

Don't start with too much fuel wood. Remember, a fire needs oxygen to breathe, and too much wood can suffocate it. Plus, a small fire you can get close to for warmth is better than a large one you can't control as well.

***INCENDO!***

You're all set. Light the tinder and enjoy the human race's first and best discovery. A nice warm fire is a deep, elemental antidote to fear, going all the way back to prehistory. In addition to all the obvious practical uses, a good fire can restore your sense of security and give you courage to face the darkness, both real and metaphorical.

When you're ready to put your fire out, make sure it's completely out with no embers burning. Douse it with water and stir the ashes until the ground is cool to the touch. Never leave a fire unaccompanied. Like people, they get into more trouble when no one's watching. Fires can return to full strength from even the tiniest smoldering ember, and you don't want it coming back for a surprise visit after you've fallen asleep.



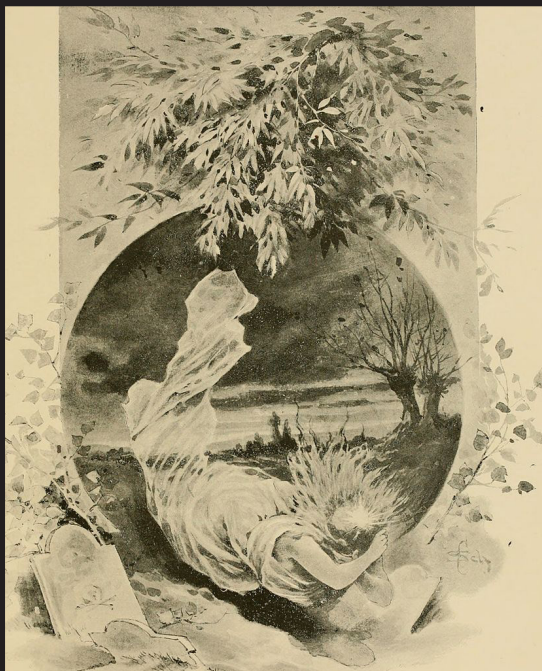
Don't ever put rocks into a fire. Some rocks, especially sandstone and shale, absorb moisture. When they're heated, the moisture turns to steam and expands, which can make the rock explode! You don't want to be hit by sharp rock shrapnel.

## DON'T FOLLOW THE GHOST LIGHTS

Compost heaps, piles of manure, and other mounds of decaying organic matter can burst into flame *spontaneously*, or all by themselves. How? Bacteria living inside the pile release heat and flammable methane gas as they feed. If the pile is packed enough to keep this heat and gas from escaping, but loose enough to let oxygen in, the temperature can rise enough to start a fire. Sudden jets of flame will burst from the ground in otherwise still swamps. This phenomenon has been known for hundreds of years as the “will o’ the wisp.” Another name is *ignus fatuus*,

which means  
“foolish fire,”  
because people  
believed they  
were **ghosts**  
**rising from their**  
**graves to lead**  
**travelers astray.**

In modern times,  
people have  
mistaken these  
eerie flashes of  
light for extra-  
terrestrial UFOs.



## REPLENISH STAMINA POINTS: COOKING TIPS

So you've got some food that you've hunted or gathered (or purchased) and you're super excited to cook it over the fire you're so proud of starting. But hold your horses: Don't just impale the food on a stick-kebab and thrust it into the flames. That way lies a burnt outside, raw inside, and—unless it's green wood—a flaming stick-kebab.

Wait until some of your fuel wood has burnt down to smoldering, red-hot coals, then rake them out a little way from the bigger flames. Cooking is easier over hot coals. If you have aluminum foil, wrap your food in it and put it on the coals. The aluminum won't burn, and when the food's ready, you can eat right out of the foil.

Got some dug-up potatoes or yams? Cover them in a thick layer of mud and bury them beneath the coals. The mud will harden and the vegetable will be cooked perfectly inside. Lay meat directly on the coals and flip it over periodically, just like on a barbecue grill.

If you've got metal pots and enough water to spare, you can boil or steam vegetables over a campfire, too.

What if you don't have pots? Gather some tree bark that's curved enough to hold water, and moisten the underside of the bark so it won't burn.

## MAKE FIRE THE AUTHENTIC CAVE-PEOPLE WAY

No matches, no lenses, no *nothing*? Don't despair. You can still make fire the authentic cave-people way, by creating friction with a bow and spindle. It takes real elbow grease, and might seem impossible, but if the conditions are just right, it can produce sparks hot enough to ignite tinder in less than a minute.

### WHAT YOU NEED

- Wooden spindle 1 foot long, 3/4 inch thick
- Wooden board 1 foot long, 4 inches wide, and 1/2 inch thick
- Hand piece: A chunk of thick hardwood small enough to hold in your hand
- Bow: A stiff, rounded branch 2 feet long
- Bowstring: Boot lace or paracord work great
- Two base branches: About 1 1/2 inches thick
- Tinder
- Soap (optional)
- Sand (optional)

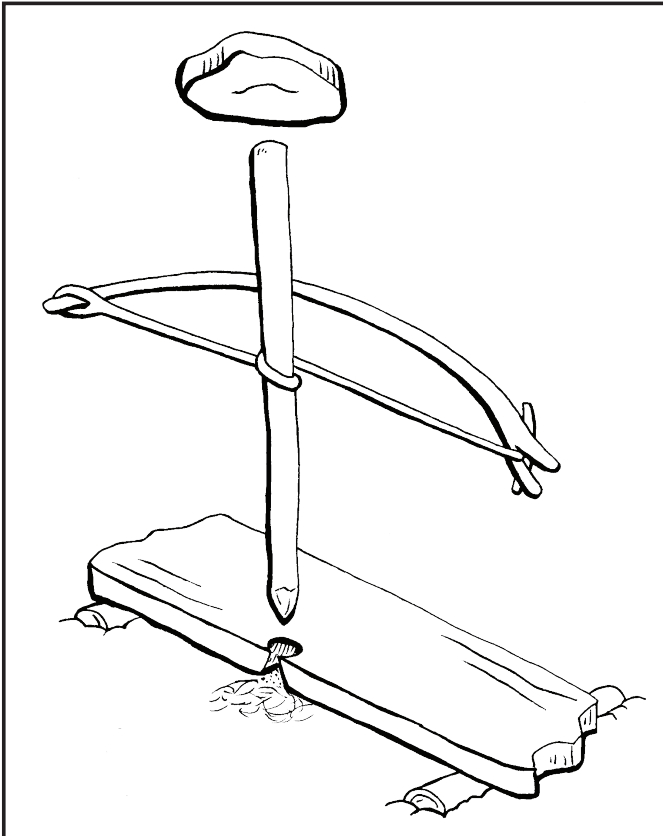
For best results, the spindle and board should be the same kind of wood.

### GET READY

Carve both ends of the wooden spindle till they're rounded. Carve a shallow pit in the hand piece that the spindle fits into. Don't carve all the way through the wood. If you have soap, grease the pit of the hand piece with it. This gives it less friction.

Carve a matching shallow pit in the middle of the board, an inch away from one of the long sides. Cut out a V-shape from the side of the board, so the point of the V just slightly intersects the shallow pit. Put a couple grains of sand in this pit. This gives it more friction.

Tie the bowstring securely to both ends of the bow. Twist the middle of the bowstring around the middle of the spindle once, so it makes a single loop around it.



## **GET SET**

Build your campfire as described on p.57. Set up your fire-starting kit right next to it—once you get a spark, you'll have to move it over to the campfire very quickly.

Lay the base branches parallel to each other, a little less than a foot apart. Put the board on top of them, with the pit faceup and the V-shaped notch facing away from you. Gather your tinder and place it right underneath the V-shaped notch.

Kneel with one knee on one side of the notch and one foot on the other, to keep the board from moving while you work. Place one end of the spindle into the pit in the board. Hold the spindle in place by pushing down on it with the matching pit in the hand piece. Hold the bow in your other hand. Here we go.

## **MAKE FIRE!**

Draw the bow back and forth in a steady, rapid motion as if you were sawing wood. Keep the spindle straight and pressed down with your other hand. The bowstring makes the spindle rotate rapidly in the board pit.

Keep this up as long as you can. It's more important to keep a steady, continuous rhythm without stopping than it is to go super fast.

After twenty to thirty seconds, you should start to see smoke forming from the board pit. Smoke is good, but it's



not enough—you're waiting for a spark. Watch carefully and keep going. Don't give up even if your arm gets tired. Eventually the wood in the board pit will get so hot that a spark will fly out and land in your tinder.

A spark that continues to burn is called an *ember*. Immediately put the bow, spindle, and hand piece aside and blow **gently** on the ember. An ember is combustion, but it's not yet fire. It needs more oxygen to completely ignite. Blow gently in little puffs until a bonafide flame appears. Scoop up your tinder pile, place it underneath your kindling teepee, and rest your poor, tired arm.

Congratulations: You have defeated the final boss of prehistoric survival skills.

## Crafty Mining: Know Your Minerals

A ROCK, BY ITSELF, LOOKS BORING. I'll admit it. So many of them look the same, in those dull gray and brown colors. And they just sit there.

But there's got to be more to rocks than that. After all, the entire earth is basically a giant ball of rocks crammed together. Where do we get all the shiny metals and glittering gemstones from? Why it's rocks, my friend. Nearly all the elements and metals of the universe can be found beneath your feet—the trick is to take the useless, jumbled-together stone and refine it, isolating and extracting only the specific kind of element you want. Once you know how to mine and refine gold, silver, copper, or any of the huge variety of other useful metals, you've got the backbone of advanced civilization: transforming the earth itself into tools and technology.

I'll be honest with you: Mining isn't a one-person operation. It's really hard work, for one thing, and contrary to the simplified process you've probably seen in video games, smelting raw ore takes a machine a teensy bit

bigger than a mini-fridge. We can go over the basics and general principles here, but if you're trying to start your own civilization from scratch, you're going to need a lot more help.

If you would like to try mining for fun, on your own, keep a few rules in mind: Always wear a hard hat, gloves, and goggles for protection. Don't go smashing up the land on someone else's property. A hand-held pickax can help you break off minerals that are visible from the surface or in rock outcroppings, but don't go digging a tunnel big enough to stand in. Sadly, no real-life minerals defy gravity, and a cave-in is a good way to end a mining adventure—and a miner—permanently.

### SMART AS A BAG OF ROCKS

Rocks fall into three different categories:

**Igneous rocks** form when molten rock cools. You can tell how an igneous rock formed by looking at the grains: A coarse grain means the rock formed slowly, from magma deep within the earth. A fine grain means the rock formed quickly, from lava cooling on the earth's surface.

*Andesite*, *diorite*, and *granite* (pictured opposite, top to bottom) are all igneous rocks. Andesite forms from lava cooling on the earth's surface, so its grains are fine. It's a medium-toned rock with about 50 percent silica. Diorite and granite form from magma cooling beneath the earth's



surface, so their grains are very coarse. Granite and diorite have a lot of silica in them and can be very light-colored. Some granite is bright pink.

**Metamorphic rocks** form when immense heat and pressure changes rocks from one form to another.

**Sedimentary rocks** form when fine layers of material gather and solidify in layers. Fossils are found only in sedimentary rocks—they would be crushed or melted in igneous or metamorphic rocks.

Silicon dioxide is a material that goes by many names: Scientists more commonly call it “silica,” but you’d probably call it “sand.” Not all beach sand is pure silica, but silica is found mixed in together with other kinds of rocks. The color of the rock tells you how much silica is in it: A light-colored rock has a lot

of silica, and a dark-colored rock doesn't have very much. *Sandstone* is a sedimentary rock made of compressed sand.

A **crystal** is a particular kind of rock whose atoms are all ordered in a repeating pattern. Crystals form such flat planes, sharp angles, and remarkable geometric shapes because their atoms are arranged in that same shape, from the visible all the way down to the microscopic level. The slower an igneous rock cools, the larger a crystal growing within it can become.

Rocks are made up of minerals: sometimes many and sometimes just a few. For example, granite is made of varying amounts of the minerals quartz, feldspar, and mica.

In turn, minerals are made up of atomic elements; either many kinds or just one. *Quartz* (pictured here) is made up almost entirely of silica, so pure quartz is bright white in color.



Next, I'd like to introduce you to my eight favorite minerals. Say hello, minerals.

## HEMATITE

“Looking for iron ore? It’s very rare as a pure element. It’s common in meteorites, but otherwise your best bet is to smelt it down from me, a common iron oxide. My molecules are made of two iron atoms and three oxygen atoms. I’m harder but more brittle than pure iron, and found in sedimentary layers at the bottom of lakes. The *Opportunity* rover analyzed hematite on Mars, and discovered that it had formed in liquid water eons ago.”





## GOLD

“Eureka! People have used me as money since the dawn of time because of my natural brilliance and rarity. I’m often found mixed up with silver in an alloy called electrum. For centuries, alchemists tried to turn other metals into me. It turns out you can do it with a nuclear reactor, but then the gold is radioactive. (Oops.) If you’re very patient, you can find little grains of me by sifting sediment from riverbeds.”





## DIAMOND

"I'm made entirely of carbon atoms. So is pencil graphite. What's the difference between us? My extremely rare crystal structure, which forms under tremendous pressure deep underground. I'm the hardest mineral on earth—I can be scratched only by other diamonds. I'm usually colorless, but when other stuff gets in, it makes colors: Nitrogen makes yellow diamonds. Alpha radiation makes green diamonds. The rarest gems in the world are red diamonds: fewer than 30 have ever been found, and no one knows how they get their color. Scientists think the skies of Uranus and Neptune are so dense they can crystallize carbon in midair—making diamond rain."





### **LAZURITE**

“No autographs, please. I’m part of King Tut’s burial mask, in the gemstone lapis lazuli. Artists used to grind me into the pigment ultramarine, reserved for the most important part of their paintings, like the Virgin Mary’s robes.

I’m not sapphire, though; those come from the mineral corundum. I was discovered 9,000 years ago in what’s now Afghanistan, and most lazurite is still mined there.”

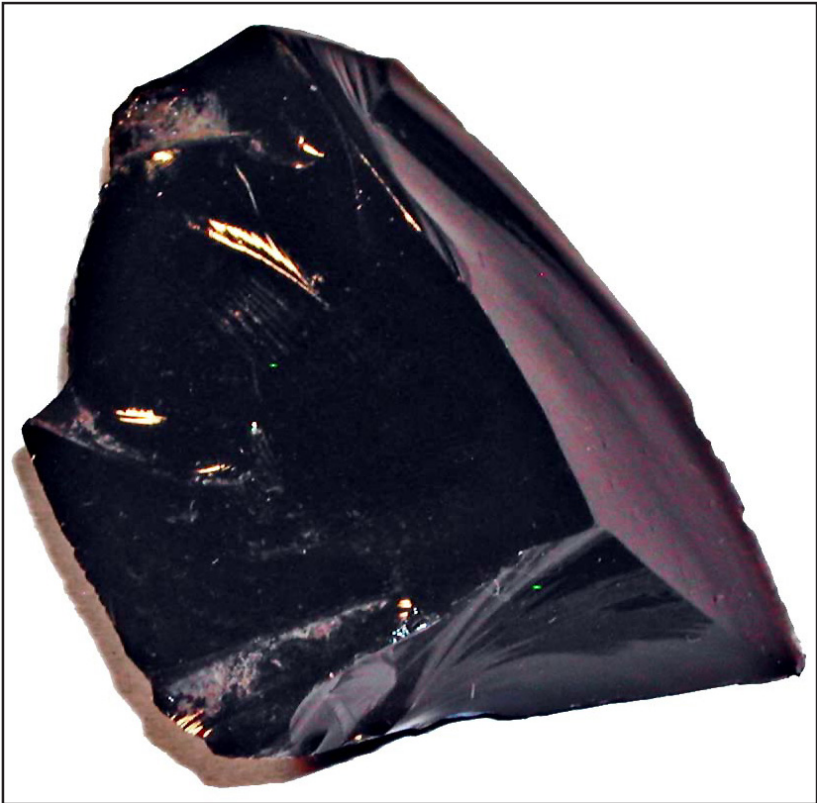
## EMERALD

“I’m just one variety of a mineral called beryl—or to be formal, beryllium aluminum cyclosilicate. I get my lovely green color from chromium ions, but with iron ions instead, I’d be aquamarine; with manganese, I’d be pink. I also have golden and colorless cousins. I’m most often found in granite, and it’s rare to find large specimens, because I’m so brittle. (Don’t tell anyone.)”



## OBSIDIAN

“I’m not actually a mineral; I’m a kind of glass formed when acidic lava cools rapidly. I’m named after Obsidius, a Roman who came upon me while exploring Ethiopia. Scientists can trace any piece of obsidian back to the volcano it came from, based on its composition. Since I have extremely sharp edges, people have used me for cutting tools and arrowheads since ancient times. Mesoamericans made obsidian swords called macuahuitl.”





## GALENA

“You don’t see many cubes in nature, but some ores, like gold—and me—can crystallize into cubes. Mining me is the best way to find lead; in fact, Kansas and Illinois even have towns named after me. Ancient Egyptians used me in a dark eye makeup called kohl to reduce glare from the sun. Early-20th-century “crystal radios” used me as their receiver. They needed no battery or external power source; the energy of the incoming radio wave itself was enough to produce sound.”



## REALGAR

“Though I may look like a fictional kind of red stone you’re familiar with, I’m afraid you can’t make a computer out of me. I don’t even conduct electricity. You can find me in hydrothermal vents and volcanic hot springs, like in Yellowstone National Park in Wyoming. People used me to make fireworks and red pigment for their paintings . . . until they discovered that I cause cancer. That’s right, I’m the pest control industry’s biggest source of arsenic. And when you burn me, I smell like sulfur and garlic—so I’m poisonous *and* I stink! What’s not to love?”



## Passive Mobs: You vs. Animals

SORRY VEGETARIANS, but in a survival situation you'll probably have to eat some meat. (I became vegetarian since I started writing this book, so that includes me. Sorry, me.) Animal meat is your best, safest source of nourishing food in the wild. And unlike plants, nearly every part of every North American animal is safe to eat.

The flavorful meat we're used to eating is the animal's muscle tissue, but the entrails (organs) are nourishing, too. Hunger leaves no room for the squeamish. They may sometimes be stringy and bitter, but cooked animal hearts, kidneys, and livers are considered delicacies worldwide.

There are some important exceptions. Native Inuit tribes traditionally avoid eating the liver of polar bears and seals. It sounds strange, but there's so much vitamin A in them, you can die from vitamin A poisoning. The same goes for the liver of any canine, like coyotes or wolves.

Also, be careful with brightly colored frogs and other amphibians: while their meat might be tasty, their skin can be toxic. Venomous snakes can be eaten, though: Just

cut off the head, where the venom glands are located.

Otherwise, anything you can catch is on the menu. Snails? Cook 'em in the shell and slurp 'em out. Look under rotted wood or in damp soil for earthworms and wriggling insect grubs to eat raw. Avoid brightly colored caterpillars. Ants, termites, grasshoppers, crickets, and locusts are not only edible, in some parts of the US they're sold as snack foods, right next to the potato chips, or used as a topping on tacos. Be sure to cook them first. Grasshoppers and crickets are easiest to catch in the early morning, when they're still sleepy and slow. Remove the prickly hind legs and scratchy wings and toast them over a fire.

### **FAT IS FANTASTIC**

Eating insects might be essential to your survival diet, since some of them are almost fifty percent fat. We tend to avoid fat in our indoor meals, but that's because fat is such an excellent store of concentrated energy that it's easy to eat too much of it. In the wilderness, fat is a very good thing. A person eating nothing but lean meat, like rabbit, will still starve to death without some fat in their diet. This kind of starvation has stricken unprepared explorers so often that it has its own name: rabbit starvation.

## THE UBIQUITOUS FISHING MINIGAME

Shallow bodies of fresh water might very well be the best places to find food. Fish are high in protein and low in calories—which means they won't do forever, but they're filling. No North American freshwater fish is toxic, but they do spoil quickly if you don't smoke them.

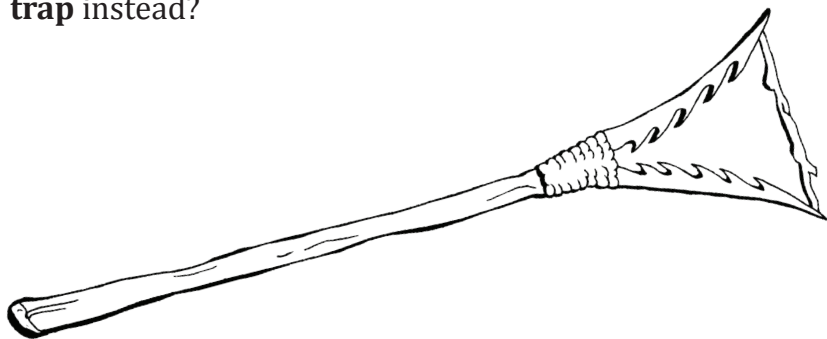
Fish are pretty dumb. (I apologize if any of your relatives are still fish). If you're patient and have incredibly swift reflexes, you can stand still in ankle-deep water, wait for one to swim by, and snatch it up barehanded. If you had the foresight to bring fish hooks and fishing line in your pack, you probably have a good idea how to fish the modern way already. Carve fish hooks from small pieces of bone if you didn't bring any. Use grubs, worms, insects, or even pieces of other fish as bait. Once you catch your first fish, empty out its stomach to figure out what it was eating. Next time you can use those kinds of things as bait.

At night, shining a flashlight into the water can attract some species of fish and prawn to the surface, where they're easier to scoop up. At the very least, the light will reflect off their scales, making them easier to spot.

If you don't have any hooks or line, spearing is an ancient and proven method of catching fish. But don't just start chucking branches into the water. Wooden spear-tips need frequent resharpening. You could lash your hunting



knife to the end of a branch, but if there's a current, your knife might come off and float away. Why not make a **spear trap** instead?



Take a tree branch that's about the same height as your chest, and between one and two inches around. It needs to be living, or "green" wood, which is flexible and springs back into place when bent. Whittle off any twigs or rough bark. Then, split the last eight inches or so down the middle to make the jaws of the trap. Tightly lash some rope around the end of the split to prevent the wood from splitting any further. Along the length of both jaws, carve teeth that point inward, toward the lashing. At the very tip of both jaws, carve small notches. Finally, stick a small twig into the notches so it braces the jaws open.

**YOUR TRAP IS SET.**

Using the spear trap is easy: Thrust it at a fish, and the small twig breaks or slips out, springing the jaws shut around whatever's between them. Finding exactly the right moment to use the spear trap is the hard part. Stand

in one spot, spear poised, completely motionless, until the fish grow accustomed to the big new thing in their habitat (you) and they swim closer. Don't strike until the fish is right where you want it. Make it count! Miss, and you'll scare the fish away and have to start waiting all over again.

## HUNTER CLASS SPECIALIZATION: TRACKER

If there's one thing humans are good at, it's coming up with creative ways to kill other living things. (It's arguable whether we're that good at anything else, but let's stay on topic.) Whether you have the weapons to go on an active hunt, or you prefer to set traps and lie in wait, the most important skill to possess is being able to track and stalk your prey. The world's most ingenious trap does no good if it's laid in the wrong place. Likewise, if you had a super-sophisticated laser-sight rifle but couldn't sneak up on an animal, technology wouldn't fill your stomach for you.

We'll get to stalking on p.96—first, let's focus on tracking. Your first instinct may be to boldly set off and search as much ground as possible. But stop. Take a deep breath. Closely observe everything you can see without taking a single step. You'll see more signs of animal activity in a few minutes of standing patiently in one spot than you would in an hour of blundering around. Think of your eyes like



Squirrel Tracks

Rabbit Tracks

Deer Tracks

a radar scanner. Start right by your feet and s-l-o-w-l-y sweep your vision around you, back and forth in larger circles, gradually looking farther away.

Our brains like to take shortcuts and think in terms of symbols. “I am looking for a rabbit. That’s a tree. I’ve seen trees before and they are not rabbits, so I can ignore it.” It takes real concentration to look specifically at *this* tree and *that* tree, to notice the subtle differences between them. Any given patch of woodland is more than just a pretty green background—it’s a wealth of information waiting to be decoded.

After a while, bent branches, scratch marks, gnawed bark at the base of trees, or even small trails may catch your eye. Look for grass that’s been trampled down, or foliage that seems gathered together. If you’ve already found a water source, there are surely other animals who come there to drink. Small prey animals are creatures of habit and tend to use the same trails back and forth over and over again. Tracks will be easiest to spot in the early morning and late afternoon, when longer shadows help them stand out. Look for them in damp or soft soil.

If you find a potential trail but see no tracks, draw a crisscrossing grid across part of the trail. Come back the next day. Any disturbances of the grid pattern could indicate that an animal has passed by.

If you do come across recognizable tracks, follow them

as far as you can. When the tracks end, put yourself in the mind of the animal. If you were that animal, what would you do next? Get right down to its eye level and scout out what might attract its attention. Would it be looking for water? Returning to its burrow?

Remember to move slowly and stop often. You're much more likely to see clues while you're standing still—and nearby animals are much more likely to move, making them easier to see, if you're not moving.

**DO YOU MIND IF WE HAVE  
JUST ONE MORE WORD ABOUT POOP?**

Poop can be especially helpful in showing you how often an animal comes by a particular spot. Use a stick to break apart animal droppings for a treasure trove of clues within. Poop dries from the outside, so if it's still moist inside, it's fresh, and the animal might be close by. It might also have tiny bits of animal bone or fur, telling you it's from a carnivore—or bits of green plant matter, indicating an herbivore.

## HUNTER CLASS SPECIALIZATION: TRAPPER

Once you've got a good sense of where animals have already been, you can make good guesses about where they're likely to be in the future, and can build a trap that will catch them without you needing to be nearby.

### SERIOUS TIME

**Do not** under any circumstances set a wild animal trap unless you're in an actual life-or-death situation and have run out of all other food. Setting traps is unlawful in most places, and there are always laws governing what time of year it's legal to hunt or what kinds of animals may be hunted. Also, you *must* leave obvious warning signs around any traps you set in case other humans happen upon them. Accidentally killing a search party who's been sent to rescue you is a good way to ensure they send the sheriff instead.

The basis of many wild animal traps is the snare, a loop of rope tied with a slip knot (see p.22) so the loop will tighten when pulled. Animals don't recognize rope made from natural material as a danger, and if they walk through the loop, it's easy for them to tighten it around themselves and not be able to loosen it again.

A warning for animal lovers: You may want to skip to page 99. This section is not for the faint of heart.

### **CATCHING SQUIRRELS**

If you can positively identify a tree that squirrels climb up and down, catching them is easy. Lean a thin branch up against the tree so it forms a triangle over the ground. Make a snare and adjust the loop so it's big enough for the squirrel's head to fit through, but not their whole body. Tie the other end of the cord to a branch on the tree, so the snare hangs right above the middle of the leaning branch.

That's it. Your trap is set. Squirrels always look for shortcuts, and they'll see the thin, leaning branch as an easier shortcut up their tree than climbing straight up the thick trunk. The first squirrel who climbs up the leaning branch will get its head caught in your rope snare and, in its panic, fall off the branch and hang itself.

Unfortunately for squirrels, the sight of a friend hanging dead won't stop others from following the exact same path. You could set a whole row of snares up the length of the branch and catch several in the same spot.

It's heartbreaking, yes. But it's also dinner.

### **CATCHING BIRDS**

You might think it's impossible to catch a bird without a weapon to shoot at them. After all, they can travel very fast

in a direction you can't. But as with any other animal, the better you know a bird's habits and behavior, the better you can catch it. If you find some birds, watch them carefully to see what they're eating. When they're not around, get some of their favorite food to use as bait.

For small birds, dig a shallow pit with steep sides, and spread a generous amount of bait at the bottom. Lay branches over the pit in a crisscross pattern, like a grate, with spaces just big enough for the bird to fit through. Weigh the branches down with rocks at the ends so they won't move. Once you're gone, the bird will hop down into the pit, eat the bait, then find itself unable to get out without spreading its wings—and with its wings spread, it won't fit through the grate.

To catch larger birds who walk, not hop (like ducks and geese) dig a trench that slopes downward, with steep sides just wide enough to fit the bird when its wings are tucked. Spread the bird's favorite bait at the bottom. This trap requires you to wait and hide nearby. When the bird walks down the trench to eat the bait, rush at it! It'll try to spread its wings and fly away, but be trapped by the narrow walls of the trench. You'll have a crucial moment to deliver the killing blow. Don't hesitate; geese bite and are especially mean when cornered. My advice? Bring something heavy.

You can build a less-confrontational trap if you have fish hooks handy. Stick a fish hook into the bait, and tie the



other end of the fishing line to a heavy rock. Balance the rock on a ledge over water. A bird that catches itself on the hook will knock the rock off the ledge and into the water, pulling its head under to drown.

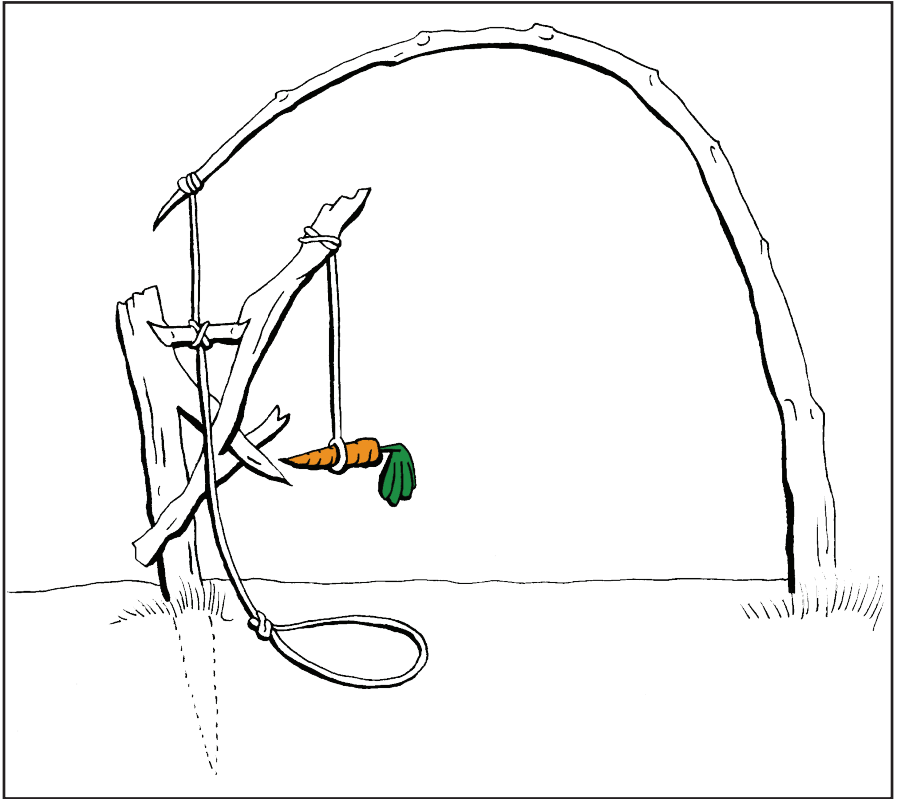
### **CATCHING SMALL PREY: BUILD A SPRING-SNARE TRAP**

In most woodland areas, prey animals like rabbits are likely to be your best source of food. Their small size and quickness make them difficult to actively hunt, but their low intelligence makes them suckers for traps. It takes a little more preparation to make a trap for a small prey animal, but the payoff is well worth it.

#### **WHAT YOU NEED**

- Small forked branch
- Big forked branch
- Tiny trigger branch
- Very flexible sapling tree
- Three lengths of rope or cord
- Bait

The measurements of the materials used in these traps will vary depending on the size of your prey. Rather than building them to an exact measurement, experiment to see which materials work best for your situation.




### **Step 1: The Sapling**

The key feature of this trap is a thin sapling tree close to an animal trail. Find the most flexible sapling you can—you should be able to bend the top of the tree over until it's right above the trail, and it should spring back to a vertical position even after being held down for several minutes. Trim all the branches off the sapling. Mark the spot on the trail underneath where the sapling bends over to reach.

### **Step 2: The Forked Branches**

Next, find two branches in the shape of a Y, one about twice as big as the other. Think of the Y as having two “arms” and a “stem.” Trim both forked branches so one arm of each Y is twice as long as the other, and the stem is the same length as the short arm. Check the picture.

Drive the long arm of the big forked branch into the trail on the spot you marked. Push it in deep and pack the earth around it so it's secure and difficult to pull back up. Then take the small forked branch, long side up, and hook its fork upward into the big branch's fork. It won't stay in place yet, but that's okay; just hold it there. Pick a spot toward the top of the branches and cut a notch into both of them. The notches should be shaped like the number 7 and facing each other on the same level, like this:  7

### **Step 3: The Trigger Branch**

Trim both ends of the tiny branch until you can hook it upward into the 7-shaped notches you just made. Now, if you keep a steady upward pull on the small branch, it should hold the small forked branch in place. Set the branches down for now.

### **Step 4: The Ropes**

Tie two ropes to the top of the sapling. Bend the sapling over until it's above the big forked branch. Tie the other

end of one rope to the trigger branch, adjusting the length of the rope so the trigger branch fits in the notches when the tree is fully bent. Leave the other rope hanging for now.

Carefully set the small forked branch back in place. If the big forked branch is secure in the ground, the sapling will be pulling up on the trigger branch, the trigger branch will be pulling up on the notches, and the small forked stick will be pulling up on the big forked stick.

### **Step 5: The Bait**

Tie one end of the third piece of rope around your bait. Then tie the other end of the rope to the small forked branch, so the bait hangs in midair over the trail just high enough for your target animal to reach on its hind legs. This is the trickiest part of building the trap. If the bait is too heavy, it'll pull the small forked stick off and spring the trap early. If this happens, you can try using less bait, or shortening the rope and tying it lower on the branch. Experiment until the bait will stay in place but the slightest tug sets off the trap.

### **Step 6: The Snare**

Take the other rope that's tied to the sapling and tie a slip knot in the loose end, making a snare loop. Set the snare loop on the ground beneath the bait.

### **YOUR TRAP IS SET!**

Be very careful not to step in the snare loop! You don't want to accidentally snare yourself. Being flipped upside down could seriously hurt, and you might not be able to escape without help. Remember to leave warning signs around it in case other humans come by.

### **How It Works:**

Leave the trap unattended for a while. When a rabbit or other prey animal comes along, it steps into the snare loop and pulls on the bait. The small forked branch slips off the big forked branch, releasing the trigger branch from the notches. The sapling springs back upright, catching the animal's foot in the snare loop, tightening it, and hauling them into the air upside down. You'll come back later with fresh dinner waiting for you.

### **CATCHING BIG PREDATORS: BUILD A DEADFALL TRAP**

This trap is simpler, both in construction and execution.

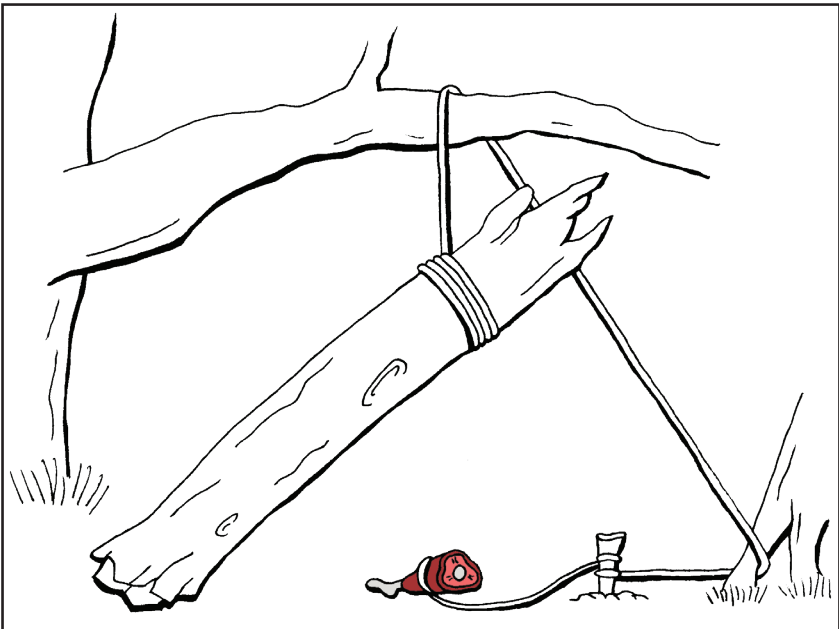
Drive a short stake into the ground underneath a strong overhead branch. The stake should hold firm when pulled sideways, but come loose if pulled straight up.

Lash a long rope to one end of a huge log. Drape the rope over the overhead branch, then run it around a root or thin tree at ground level, so it turns the corner and is

horizontal (see picture). Pull the rope to hoist the log up, then tie the rope securely to the stake. The stake should hold, with the log hanging at a precarious angle in midair. (Don't stand underneath the log . . . obviously.)

Tie one end of a second, short rope to the stake. Tie the other end to some bait (a chunk of meat works well to catch carnivores.) Carefully set the bait beneath the log.

Voilà! When an animal picks up the bait, they'll pull the stake out of the ground, dropping the log right on their head. This trap catches big game more easily than small game, because it relies on the animal being aggressive enough to forcibly tug the bait upward, releasing the stake.



## HUNTER CLASS SPECIALIZATION: MARKSMAN

For game that's too big or too smart to fall for traps, you'll have to go on the offensive. Depending on the culture of your part of the world, you might already be acquainted with hunting as a sport or food source. Or, it might feel frightening and barbaric. Either way, if these skills will keep you alive, you'll do best to know them. Before you set out, GET EQUIPPED with the most deadly weapon you have at your disposal . . . No, not your brain. An actual weapon. What, did you think I was going to use another metaphor? Metaphors don't put food in your stomach.\*

**IT'S DANGEROUS TO GO ALONE!  
TAKE ONE OF THESE.**

### CLUB

A heavy branch makes a fine throwing club. It takes skill to aim accurately. Practice trying to hit a mark on a tree at least 10 feet away. Throw horizontally so the club spins in midair. This helps it fly straight and deliver a harder blow. If you can get within range, it's very effective on small prey and groups of roosting birds, where you're bound to hit at least one of them. Not recommended for anything large enough to fight back.

\*I'm a writer. I would know.

### **SLINGSHOT or BOLA**

Don't try throwing rocks by hand unless you find extremely round ones and already have an expert baseball pitch. Most rocks are too oddly shaped to throw accurately. On the other hand, two or three rocks tied together form an ancient, devilish weapon called a bola\*. When thrown in a horizontal spin, the rocks spread out, increasing their effective range, and when any part of the rope snags on the target, all three rocks whip around at once. Especially deadly against prey with a long neck.

### **KNIFE, AX, or SWORD**

Sorry, but I can't recommend going after animals with your ax, survival knife, or sword. By the time you get close enough to use a blade, the prey will have long since noticed you and run away. Neither should you try throwing a blade and risk losing it. Under no circumstances attack a predator with these, either—you may consider yourself an experienced blademaster, but predators have been practicing their whole lives.

### **BOW AND ARROW**

If you had the foresight to bring along a professional carbon-fiber or aluminium compound bow with sights and pulleys, this is your second-best choice for hunting big

\*Not to be confused with *ebola*. For biological weapons, see page 139.



game. But if all you have is a bendy stick with a shoelace strung on it . . . well, maybe the prey will laugh themselves to death. Arrows must be finely crafted in order to fly straight, and firing them with enough force to kill takes more stored energy than you'll muster from an everyday piece of wood.

### **RIFLE or SHOTGUN**

Of course, the most effective hunting weapon to use at long range is a rifle. But if you have a gun, you probably know how to use it already. Cobbling together a make-shift gun from black powder, bamboo, and shark teeth may be awesome, but my lawyer says I can't tell you how to do that one. Sorry.

### **GO INTO STEALTH MODE: STALKING**

Once you've tracked your prey close enough to catch sight of it, the most crucial part of hunting begins—stalking even closer to get a perfect shot. It can take a very long time just to locate an animal, and all that work will be wasted if they're alerted to your presence and flee. You might get only one shot, so be patient. Harness all your inner super-spy skills and move as slowly and quietly as possible. Remember, this goes for sound and scent as well as sight. Larger game, like deer and elk, are hyper aware of all their senses at all times, so you must be, too. To remain

hidden, control these five crucial qualities of camouflage:

### **COLOR**

Wear colors that blend in with the surrounding environment, whether it's greens in the forest, tans in the desert, or gray and white for snowy biomes. At night, wear dark blue or gray, not black—black isn't that common in nature and will stand out more.

### **SHINE**

Make sure you're wearing no metal or other objects that can inadvertently catch bright sunlight and reflect it toward your prey. If you wear glasses, keep them under the shadow of a broad-brimmed hat.

### **SHAPE**

Camouflage-pattern clothing is effective because it breaks up the recognizable shape of the wearer. Hunch down low with your limbs drawn close. Cover yourself with local foliage to blend in even better.

### **SHADOW**

If you're in a perfect position, disguising your shape, but suddenly cast a shadow that wasn't there before, your prey will notice. Keep the sun's position in mind as you stalk. Stay in the shadow of larger objects.

## MOVEMENT

Move slowly and stop often. Many animals have evolved to be keenly aware of any change in the environment, even if they can't quite make out what it is that moved.

To avoid being scented, stay downwind of the prey. That means the wind is blowing toward you, carrying their scent to you and not vice versa. Don't rely on fluttering leaves to gauge wind direction: stick your finger in your mouth and then hold it straight up. The coldest side of your finger tells you which way the wind is coming from. If you're upwind of the prey, take as long and indirect a path as necessary to get downwind of it. Try getting to a higher level: Animals don't usually suspect danger from above.

If the prey does spot you but doesn't immediately flee, you still have a chance. Freeze. Avoid eye contact. Wait until it resumes what it was doing, then continue approaching indirectly, in a zigzag pattern. Even if it now knows you're there, it may not recognize you as a threat.

When you're as close as you can get without spooking the animal, take careful aim. Shoot for the head, or just behind the shoulders for the heart. Make it count.

If you were successful, congratulations on the new experience points! If this isn't the sort of thing you were brought up doing, consider yourself leveled up, too.

## Hostile Mobs: Animals vs. You

YOU'VE HEARD OF THE FOOD CHAIN, RIGHT? Big animals eat smaller animals, who eat plants, who eat the sun. (Basically.) This system works because for every step down the chain you go, there's more food to go around.

The bottom of the chain, the sun, provides virtually limitless energy. So plants can take in energy constantly and barely even have to move. Plants cover a huge amount of the earth's surface. In turn, since there are so many plants, insects and herbivores never have to travel very far for a meal or eat a whole lot at once.

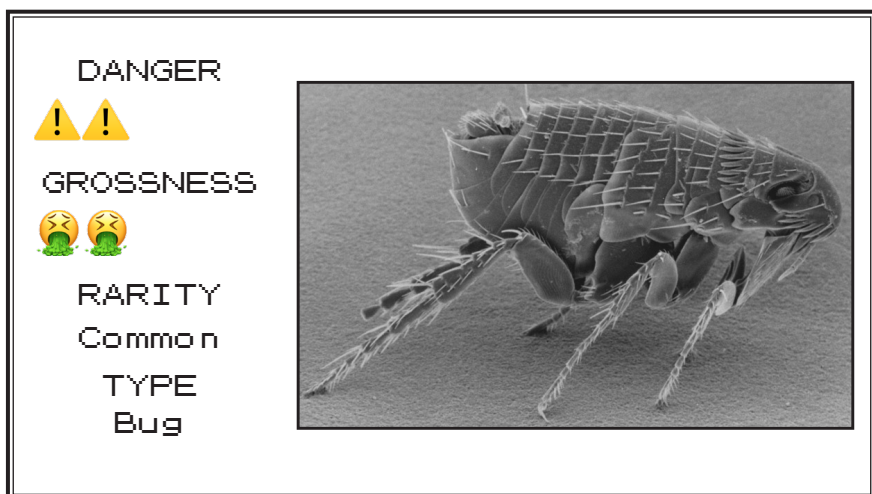
But if you're an animal who eats those insects or herbivores, you have to work much harder to catch them. And the bigger you are, the more you have to eat.

So animals at the very top of the food chain, or *apex predators* like lions, tigers, bears, and wolves, must be big and powerful. They need a bigger habitat to hunt in. That also makes them much rarer. Their rarity is one reason they're our favorite stars of the animal kingdom.

What this means is, you shouldn't worry about being


eaten. You are the only apex predator you're likely to come across. In fact, the animals that will cause you more grief are the small, more numerous ones you might not be as wary of. So which hostile mobs should you watch out for?

## FLEAS



Most flea species have a certain kind of animal they prefer, and they won't jump ship to bite humans. But some fleas spread bubonic plague, a virus that once killed about half of all people in Europe in the Middle Ages. Although it's now treatable, plague-infected animals are still found on every continent except Antarctica. To stay safe, don't handle rodent corpses until they're cold—any fleas will leave quickly once their host is dead—then cook the meat thoroughly before you eat it.

## SPIDERS and SCORPIONS

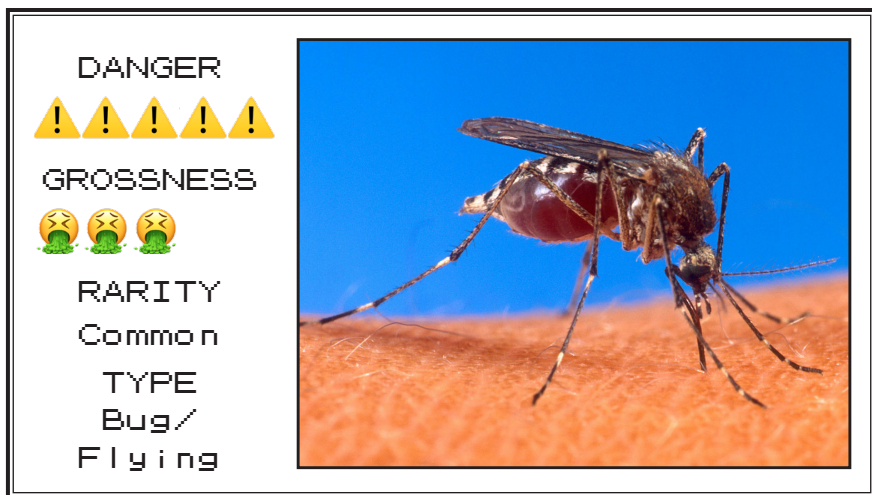
<p>DANGER</p> <p>⚠️ ⚠️</p> <p>GROSSNESS</p> <p>🤢 🤢 🤢 🤢</p> <p>RARITY</p> <p>Common</p> <p>TYPE</p> <p>Bug/ Poison</p>	
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Despite how scary they look, most spiders aren't dangerous to us. Be careful moving old, rotted wood, though, and look out for black widows, whose bites can be deadly.

Scorpions like taking shelter in small, enclosed spaces at night, and their stings are very painful. Shake out your boots in the morning to ensure you've got no hitchhikers.


<p>DANGER</p> <p>⚠️ ⚠️</p> <p>GROSSNESS</p> <p>🤢 🤢 🤢 🤢</p> <p>RARITY</p> <p>Common</p> <p>TYPE</p> <p>Bug/ Poison</p>	
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## MOSQUITOES



Because they spread the infectious parasite *malaria*, mosquitoes have killed more human beings than any other animal in history. The World Health Organization estimates that *half* of all people living in the world today are at risk of contracting malaria. Apply insect repellent during the day and cover your sleeping area with a mosquito net at night if you're in mosquito country. Avoid bodies of still water, where mosquitoes breed. Like most other tiny flies and gnats, mosquitoes avoid breezes and don't fly more than ten feet up or farther than about half a mile from their breeding site. If you're being plagued with bites, move on, and consider building your bed in a tree.

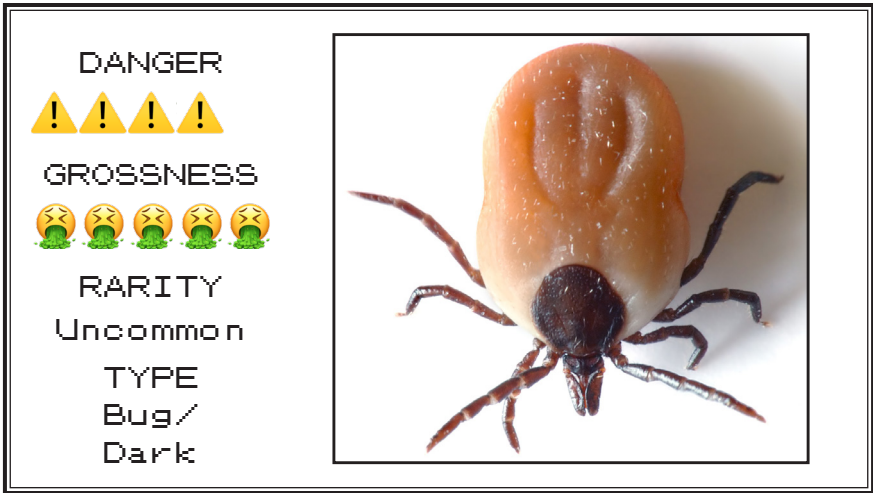
## SNAKES

<p><b>! ! !</b></p> <p><b>GROSSNESS</b></p> <p><b>🤢 🤢</b></p> <p><b>RARITY</b></p> <p>Common</p> <p><b>TYPE</b></p> <p>Ground/ Poison</p>	
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Like spiders, snakes get an undeserved bad rap. (Maybe it was that whole Garden of Eden thing.) They're usually timid creatures and will avoid humans if they can. Most snakebites are the result of careless humans stepping on or otherwise surprising a snake that has no room to retreat. Tap a walking stick ahead of you as you hike: Snakes will sense the vibrations through the ground and slither away. If you have to climb, make sure you can see where you're putting your hands. If you do get bit, see p. 17 for first aid.



## TICKS and LEECHES



These two bloodsucking animals are so disgusting, I can barely stand talking about them. Ticks are tiny *arachnids*, which is the same class as spiders, scorpions, and crustaceans. They lurk in tall grass, attach onto the legs of passing mammals, and **BURY THEIR HEAD BENEATH YOUR FLESH TO SUCK YOUR BLOOD.**

They can stay attached for days, and some even spread infectious diseases. If you're walking through tall grass, cover your legs and feet completely with long pants tucked into your boots. Avoid sitting on fallen logs. Because ticks take such a long time to bite, checking your body a few times a day is enough to see whether you've been bitten. If you find one, don't try to pull it out—you'll just rip the



body off, leaving the head buried. Hold a lit match 2–3 inches below the tick without touching it. The rising hot air will make it so uncomfortable that it'll let go.

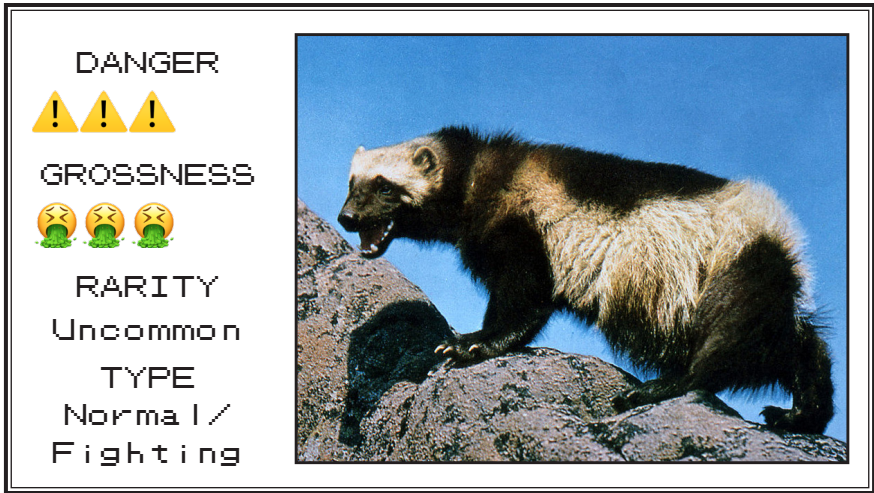
Leeches are even worse. These fat black worms dwell in shallow water and can slip through your shoes if they're not laced tight enough. They attach to your skin with two suckers and suck your blood with three sharp teeth. Don't try to pull them off, either, or they might **REGURGITATE THEIR LAST MEAL INTO YOUR BLOODSTREAM**, which can also cause bad infections. Instead, slip a fingernail beneath the suckers to break the seal and lift them off from beneath.

## PIRANHAS and WOLVERINES



Piranhas have razor-sharp teeth and powerful jaws, and they hunt in packs of up to a hundred. But their reputation as ravenous, frenzied killers is exaggerated. They'll rarely attack something much larger than they are, and thick clothing protects against them just fine. (But just to be safe, don't wade into streams with a bleeding wound.)

Conversely, wolverines look relatively harmless at first glance. They're short, squat members of the weasel family,



and look like little bears. But they have among the worst tempers in the animal kingdom. Wolverines will fearlessly attack animals much larger than them with incomparable ferocity, and will raid your food supply if you haven't strung it up in a bear bag. On top of all that, they secrete a terrible-smelling odor everywhere they go, so if your camp is raided by one, you'll soon find it too nauseating to stick around.

## LIONS, TIGERS, BEARS, and WOLVES



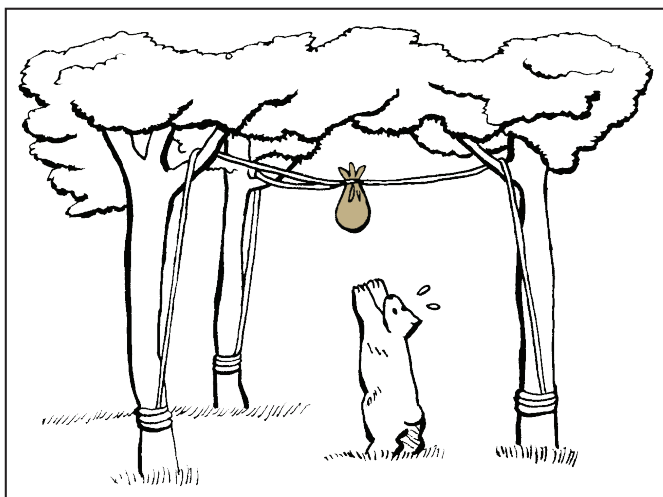
If you happen to run into one of these big, scary predators, do everything you can to make yourself appear more of a threat. Stand up tall, wave your arms, spread out your jacket, and yell as loud as you can. They'll quickly decide you're not worth the trouble and move on. They're usually only a danger when cornered, or if you get in between a mother and her children. Be aware while hiking in the mountains—mountain lions pounce from above.

If you are attacked and can't get away, fight back! Aim for the eyes and throat. I'm not gonna lie and tell you that you have much hope against an enraged bear or tiger, but mountain lions and wolves may give up if you put up a good fight. Most big predators are afraid of fire, too.

## SLIMES



Deadly slime is a familiar enemy to video gamers. It's so strange it seems made up—but slime molds are real creatures unlike any other form of life. They're one-celled organisms in the kingdom Protista, which is separate from animals, plants, fungi, and bacteria. Slime cells gather in tremendous numbers, forming bright blobs visible to the eye. They communicate via chemicals and show eerie signs of intelligence: When chopped up and placed at opposite sides of a maze, slimes can navigate past dead-ends to find each other and re-form. They spread through rotting compost, hunting bacteria by spreading over and devouring them. But are slimes dangerous to humans? Nah. They move at a top speed of 1/25th of an inch per hour, and a little running water will wash them into oblivion.



### SAFEGUARD YOUR INVENTORY

Bears are omnivores (meaning they'll eat just about anything), and can smell human food from far away. It's safe to carry food with you during the day, but to keep bears out of your shelter at night, make a bear bag.

Standing on its hind legs, a grizzly bear can reach up to eleven feet high. And black bears can climb trees. So to keep your food safe, toss a rope over two tree branches at least twelve feet up, spanning an open area like a clothesline. Secure the rope to the trunks at ground level. Put your food into a waterproof bag. Tie the bag shut with a second rope, and toss this rope over the middle of the first one. Hoist it up, then secure the second rope to another tree.

It might take a while to set up, but it's better than having an 800-pound beast with sharp claws and teeth mistaking you for your leftovers.

## Essential Treasures: The Map and Compass

BAD NEWS. THERE'S NO SUCH THING as a "sense of direction." Sure, some people are better at remembering what turns they've made and paying attention to the landmarks they pass. But that just means they're good at picking up on lots of small, subtle sensory clues, and putting them together into reasonably accurate guesses. (Incidentally, this is also how people claiming to be psychics make money.)

But if you were to blindfold them and spin them around a bunch of times, they'd have no better clue which way they were facing than anyone else. Experiments have shown that people can't even walk in a straight line for very long when blindfolded. (See p.115 to try for yourself.)

It's a bad idea to guess at which direction you're facing in the wild. If you need to travel, you'd best rely on science rather than guesses. Your most essential treasures are a good map and compass.

A cheap compass that only tells you which way is north might as well be a toy. And a road map that shows your entire state isn't going to help you through a treacherous



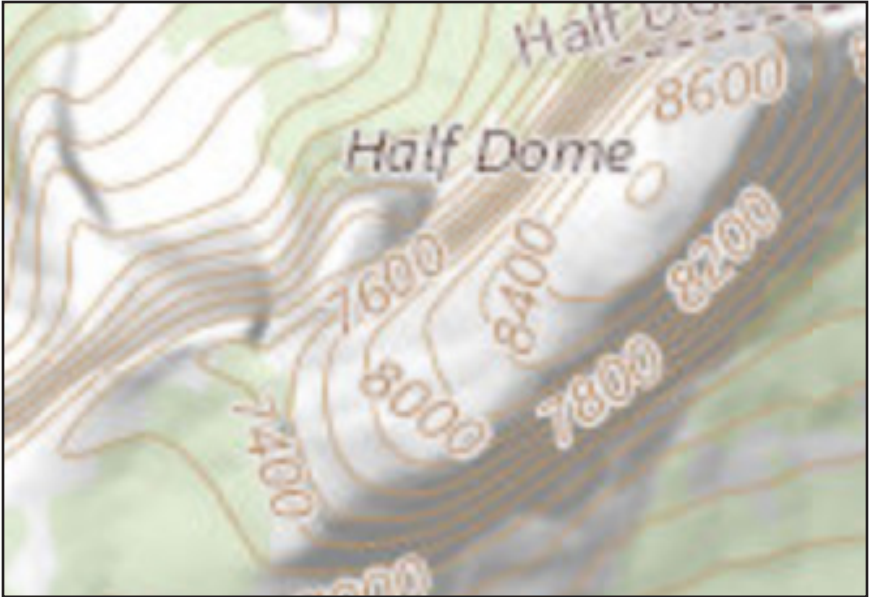
mountain pass. A good orienteering compass has degrees marked in numerals, not just letters, and a base with a “direction-of-travel” arrow that rotates independently of the degree marks.

Likewise, the best map for navigating on foot is a *topographical map*. It shows you the three-dimensional shape of the land—the mountain highs and valley lows—on a flat piece of paper.

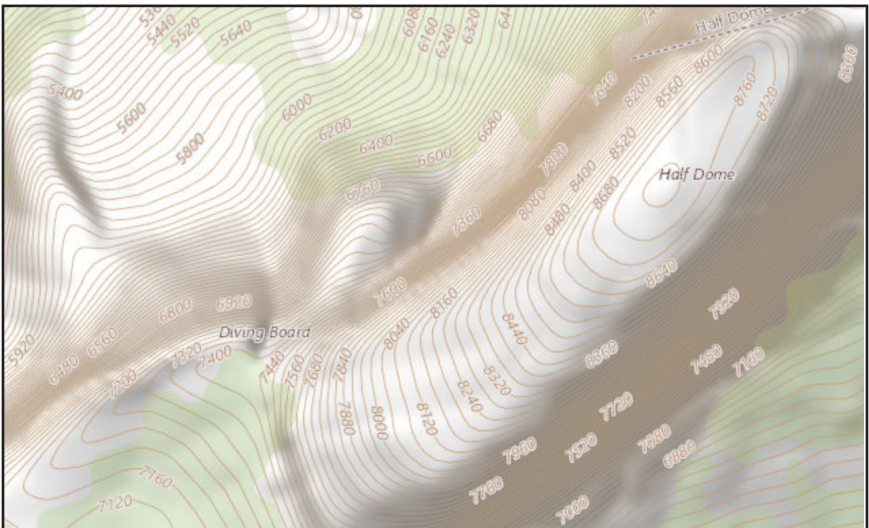
### **ZOOM! ENHANCE!**

The line spacing on a topographical map depends on the map’s *scale*. Think of a map’s scale like pixel resolution on a digital image. Each line on a large-scale map, which covers a bigger area, might indicate a 100-foot height difference. It’s like a low-resolution pixel image. From a distance you can make out the general shape, but up close there might be important details missing. For instance, lines with 100-foot intervals wouldn’t show you a 50-foot chasm in the middle of an open field.

A small-scale map is like a high-resolution image: It covers a smaller area, but shows you more detail. The lines might indicate a 10-foot height difference instead, revealing hills and pitfalls that a large-scale map would overlook. A small-scale map is best for traveling on foot, whereas a large-scale map would be better if you were in a vehicle.



The same area shown by a large-scale map zoomed in, and a small-scale map. Above, each line represents **200 feet** elevation.  
Below, each line represents **40 feet**.



## COMPASS TRIANGULATION: EASIER THAN IT SOUNDS

In general, you can keep track of your location anywhere on earth as long as you know your bearing in relation to three points. Navigators call this principle *triangulation*. If you take a compass reading to figure out the bearing of two prominent landmarks, plus north, you'll always know where you are as long as you keep at least one of those landmarks in sight. Rotate the compass so the needle comes to a rest pointing north, then rotate the direction-of-travel arrow so it points at the landmark. Now you can read the bearing for that landmark. Even if you lose sight of it later, if you check your compass and realign it to that same bearing, you'll stay on course.

## CORRECT CARTOGRAPHIC CONDUCT and CATASTROPHIC COMPASS CALAMITIES

The north pole and south pole on a globe are the two points where Earth's axis of rotation passes through its surface. They're also called the north and south *geographic poles*, or "true north" and "true south."

Earth also has north and south *magnetic poles*, and they aren't in the same places as true north and true south. Compasses don't point at true north: they align themselves along the earth's magnetic field, so the needle points toward the north magnetic pole, which is about seven hundred miles away from true north, in northern Canada.

If you're at a low latitude (closer to the equator), the difference between your compass reading and true north, called the *compass variation*, will be very small. But at very high latitudes, the variation becomes so great that navigating by compass is virtually impossible.

To be an accurate navigator in all the in-between latitudes, you have to perform a little arithmetic to align your compass reading with true north. Topographic maps often tell you the compass variation for that area. To find your true heading, add or subtract the number of degrees indicated on your map to your compass reading.

Always keep your compass level and away from any metal objects, which will make it give a false reading. This also goes for any electrical device, since electricity creates magnetic fields. The only thing reading a compass by flashlight is good for is telling you where your flashlight is.

#### TRY THIS AT HOME (WITH SUPERVISION)

Find a big, open field with nothing hazardous to trip on. Pick a landmark on the horizon, put on a blindfold, and walk in a straight line. After 500 paces, take off the blindfold. It's almost 100% certain that, not only are you no longer facing the same way, you've also walked a path more squiggly than spaghetti. Without a fixed visual point to follow, like the North Star, we'll always end up off-course. Scientists have no idea why we're so bad at this.



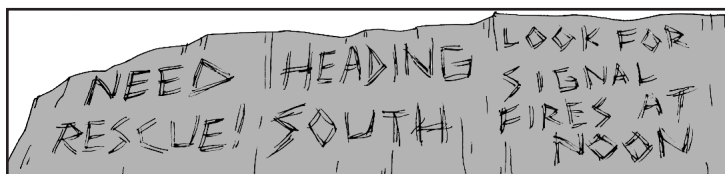
## There Is No Fast-Travel (But That's Okay)

IF YOU'VE FOUND A GOOD PLACE to camp, with access to food, water, and good shelter, don't leave it. The odds of finding an even more perfect site are slim, and you'll have to start over again in your search for basic needs. Plus, if you're not starting civilization from scratch and you intend to be rescued eventually, the farther you travel from where you got lost, the more difficult it is for rescuers to find you. Stay put.

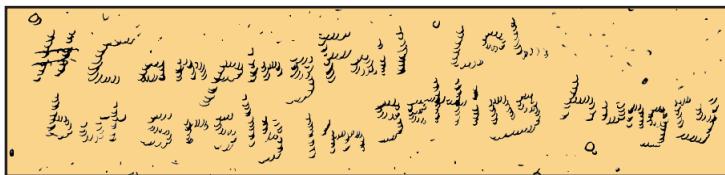
However, if predator infestation or natural disaster forces you to pack up and move, do everything you can to not become more lost. Don't just start wandering blindly; climb a tree and scout out the area first. Pay attention to your surroundings at all times, and check your map and compass often. Watch out for any signs of civilization, like cultivated fields, power lines, or low-flying planes, and follow them. Keep a slow, steady pace, and don't try to hike too far in one day—remember to plan enough time to set up your shelter before it gets too dark.

## NOT-SO-INSTANT MESSAGES

In case that rescue party does come looking, leave frequent signs as you go. In clearings, arrange rocks in the shape of an arrow big enough to be seen by plane, showing which direction you went. For better visibility, choose material that contrasts with the surrounding terrain, like dark rocks on light soil or vice versa. Carve a brief message in fallen wood or stone and secure it someplace it can be seen from all angles, and protected against damage from wind and weather. A good message conveys as much helpful information to your rescuer as possible.



This message conveys helpful information, concisely, and will last.



This message is not helpful.

Don't travel at night, when hazardous terrain is harder to spot and animal predators may be more active—unless you're in a desert biome, where temperatures make it too dangerous to leave the shade in the daytime.

## CROSSING RIVERS

You must cross a river to continue. Will you:

1. Attempt to ford the river
2. Inflate your pants and float across
3. Ask this book for help

If you're lost, a wide and swiftly flowing river is the best sign you can hope for. (Well, aside from a rescue party, obviously.) In frontier land, humans have historically built their settlements along rivers and in bays so they can be easily resupplied by boat. Follow the river downstream and you're bound to encounter civilization sooner or later.

Ever stop to wonder where a river ends up? It's easy to figure out. There are a few imaginary lines across North America called *continental divides* that tell you. (See the map on the next page.) The Great Continental Divide runs along the Rocky Mountains—rivers west of it drain into the Pacific Ocean, and rivers east of it drain into the Gulf of Mexico or the Atlantic Ocean. The Great Divide is the most well known, because it follows such a prominent mountain range, but there are others, too.





This is why it's important to know the exception to the "follow rivers downstream" rule: If you're in Canada north of Ontario and east of the Yukon, follow rivers upstream instead. You're above the Northern Continental Divide, which means the rivers flow away from most settlements, into the Hudson Bay—or worse, the Arctic Ocean.

Use extreme caution crossing rivers. Their current is often more powerful than it looks, and you can be swept off your feet even in shallow water. Even if you find a calm, sandy spot to cross, deadly rapids and rocks may be just around the bend. It's usually safer to travel alongside rivers and look for natural or manmade crossings—but if the way becomes impassable and you must cross, here's how.

**Step 1:** Unbuckle your backpack and let it hang loosely. Its weight will help keep you from being swept away as long as you keep your footing. If you fall in, you'll need to shed the weight before it drags you under. Better to lose your stuff than your life.

**Step 2:** Take off your pants. It's okay, no one's watching. Soaking wet pants, especially denim, become extremely heavy and can drag you down. The current will flow more easily around your naked legs. (Keep shoes and socks on.)

**Step 3:** Find a long, sturdy branch or walking stick. As you cross, keep the stick planted directly upstream of you and brace it against your shoulder. It will help break the current so it doesn't hit you as strongly.

**Step 4:** Cross slowly and steadily, facing upstream at a 45-degree angle. This lets you resist the current, and if your feet get accidentally swept away, you'll fall forward—bracing yourself on your pole, backpack out of the water—rather than helplessly on your back like a turtle.

The same principle goes for roads. Even a simple trail, no matter how old and disused, is a strong sign that civilization is nearby. Follow trails downhill. If you come to a fork, follow the stem of the Y.

In other words, when two roads converge in a wood, take the one more traveled by. It will make all the difference.

# TROPICAL ISLAND ZONE

Most of this book assumes you're fighting for survival in a temperate biome like a North American forest. But what if you were shipwrecked or survived a plane crash in the middle of the ocean, leaving you marooned on a deserted island? As exotic biomes go, the tropics aren't actually that bad to be lost in. (Besides the whole "thousands of miles away from civilization" part.) They come with their own specific set of tips and hazards, but for most of the year, the weather's so nice you could sleep outdoors with a minimum of shelter. Just look on the bright side, and think of it as a free—if indefinite—vacation.

## HAZARDS

In this otherwise-paradisical climate, your biggest danger may be sunburn. Water and beach sand are highly reflective, making burns worse. And because of the cool ocean breeze, you might not feel them until it's too late. Wear a broad-brimmed hat and stay in the shade during the hottest hours, from 10am–2pm.

Always wear footwear when exploring the beach beneath the high-tide mark, or on rocky shores. Spiny sea urchins and anemones innocently going about their sessile

lives can't be blamed if you blunder into them. Likewise, when wading in shallow water, shuffle your feet instead of taking steps; the sand you kick up will alert sting rays to your presence so they can flee. Sting rays are docile creatures, but they have a very painful sting when frightened.

## **WATER**

Never drink salt water, no matter how thirsty you get. It might provide momentary relief by moistening your mouth and throat, but the salt will dry your body's insides much worse than the hydration benefit of the water.

To find fresh, drinkable water, go to the beach during low tide and dig about 3–4 feet beneath the sand, past the high-tide line. Ground water there has had most of its salt reabsorbed into the sand.

Green coconuts hold a good amount of water that you can drink straight from the nut. The trick is climbing up the palm trees to get them, before they fall off and begin drying up. To climb, don't hug the tree like it's your best friend; instead, press inward with the palms of your hands, and use the old leaf scars as toeholds. Collect as many coconuts as you can each time; they make a great backup water supply.

## **FOOD**

Rocky seashores have a bounty of food just waiting to be

scooped up: Look for molluscs clinging to the rocks. They have a tiny bit of edible meat inside, and usually cluster in large groups. You can find burrowing clams by looking for the tiny air holes they leave behind as they dig.

Use your knife to cut the muscle that keeps the clam's shell closed. Don't try to pry the shell open with your fingers; this muscle closes the shell with a surprising amount of force. Clams will open if cooked over a campfire, too.

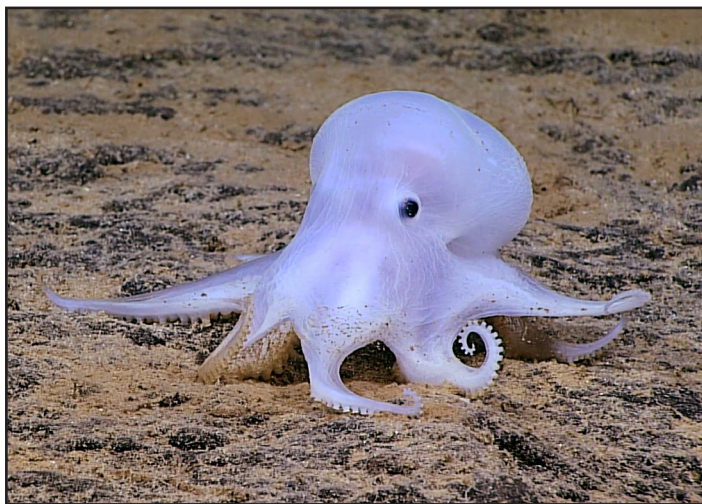
Remember how we said on p.77 that almost every animal is safe to eat? An important exception is tropical fish, many of whom are poisonous. Be extremely wary of fish with unusual shapes or bright colors. If you must eat tropical fish to survive, eat just one tiny bite and wait a few hours to make sure you feel no ill effects before chowing down on the rest.

Crabs and lobsters might be a delicacy back home, but unless you're starving, opening a crab's hard shell is too much trouble for the small amount of edible meat inside. Lobsters have tasty meat in their claws and legs if you're lucky enough to find them in tide pools. Gently prod a lobster toward your pant leg and he'll grab on to it, unaware that his new perch carries him to his doom. (Wear gloves to carry them, though. They're spiny.)

This probably goes without saying, but cook and eat all seafood as soon as possible after you catch it. It spoils quickly in tropical climates.

## NOT FOOD

Calamari may be a tender and tasty meat, but scientists have found increasing evidence that octopuses and squids, or *cephalopods*, possess remarkable intelligence. Octopuses can learn cause and effect, the same way lab rats can learn that a certain lever delivers food and a different one doesn't. They've been observed using broken clam shells as tools. Squids can use color-changing skin cells to flash patterns at each other to communicate; they can even send two different messages to two other squids simultaneously. Not bad for an invertebrate.



*In 2016, marine biologists near Hawai'i discovered this new species of octopus 14,000 feet deep, farther down than anyone thought octopuses could survive. They nicknamed it "Casper."*

*“I was amazed that what I needed to survive could be carried on my back. And, most surprising of all, that I could carry it. That I could bear the unbearable.”*



**Cheryl Strayed,**  
author of *Wild*

## Quit Game Y/N?

HAD ENOUGH SURVIVING FOR ONE LIFETIME? Ready to switch back to an easier difficulty level? Time to get rescued.

Three signals of any kind are considered a universal distress call. One signal could be mistaken as unimportant or even natural. Two could still be a coincidence. But three signals means trouble—that’s why S.O.S. was adopted as a distress call in Morse code: because it’s three dots, three dashes, and three dots, itself a group of three. (Contrary to popular myth, it didn’t originate from the phrase “Save Our Ship,” though that’s an easy way to remember it.)

If you have a whistle, routinely give three short, sharp blasts with it. Same goes for a gun, if you can spare the ammo. Build three fires in a triangle pattern. Unlike fires for cooking or warmth, use some green, living plant matter for signal fires, because they’ll produce more dark smoke. If you can’t find enough material to get three separate fires going, try to send a pattern of smoke signals by covering and uncovering the fire in three short intervals.

Why is this extra effort necessary? Why not just build



one signal fire and let it burn? Well, the good news is that if you're in dry country, especially in the summertime, people will already be watching the area for fire danger. The bad news is, if they see only one steady fire burning and mistake it for a natural occurrence, a firefighting aircraft might just dump water on your head and consider that Mission Accomplished, overlooking you completely.

In remote country without roads, aircraft might be your only chance of signaling for rescue. If you spot an airplane, use a mirror or any piece of reflective material—even unwrinkled aluminum foil works—to reflect sunlight at the plane. Shine three quick flashes at it. Don't despair; keep signaling toward it even if the plane flies out of sight. Reflected sunlight can be seen for miles and miles, even beyond the distance you lose sight of the plane.

If you happen to see the same plane fly over twice, especially if it's flying lower the second time, chances are that it's spotted you. There's rarely enough clear space for a plane to land in the wilderness, but once you're spotted, the pilot will call for a helicopter to come rescue you.

Search-and-rescue helicopters are much better equipped to land among difficult terrain. They have loudspeakers to relay instructions to you, and if there's no safe landing zone nearby, they'll have a rescue hoist to lower down to you. Listen closely to what the crew says. When you've got the hoist secure, indicate to the pilot that you're

ready to go by giving a double thumbs-up; then relax and let the rescue crew do the rest. Don't try to climb into the helicopter yourself or undo the harness once you're inside; the crew knows what they're doing and you're in good hands. (Just picture yourself as a rag doll, or crowd surfing at a concert.)

Congratulations! Your wilderness survival adventure is complete. Assuming you don't have the worst luck of all time and your rescue craft crashes. But let's think positive here. Surviving with nothing but your wits and basic tools is no small achievement to unlock.

**A WINNER IS YOU**

# Acknowledgments

Thank you to my editors at Klutz, especially Pat Murphy and Karen Anderson Phillips, for passing on a wealth of wisdom about how to “Create wonderful things, be good, and have fun.”

Thank you to Stacy Lellos, for taking a chance and giving me the opportunity to write this book.

Special thanks to Kohleun, my love.

Greatest thanks of all to Mom, who took time every week for years to be our Cub Scout den leader, and in so doing instilled in me a love for the outdoors.

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## About the Author



Dan Letchworth (center) first beat *Super Mario World* five minutes after his Cub Scout meeting was supposed to start. He now holds an MFA from Columbia University, has copy edited hundreds of books for young readers, and developed activity book projects for Klutz in Palo Alto and New York. He is the copy chief of *San Diego Magazine*, and his theater review column, *Everyone's a Critic*, was a finalist in the 2019 National City and Regional Magazine Awards.



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