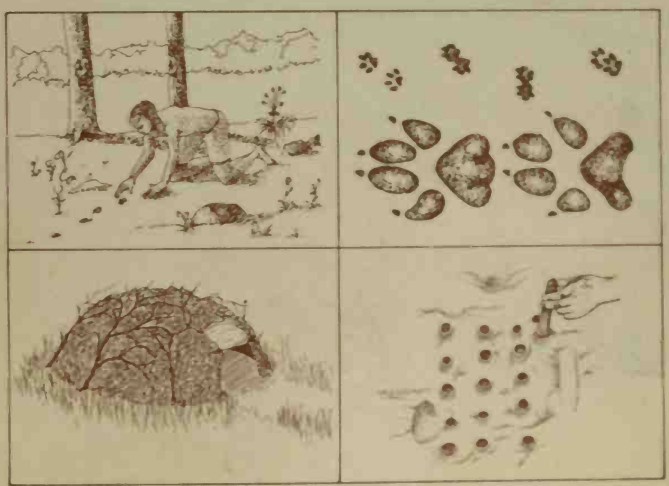
THE SECOND HANDBOOK IN THE NEW SURVIVAL SERIES
BY AMERICA'S MOST RESPECTED OUTDOORSMAN

TOM BROWN'S FIELD GUIDE TO NATURE OBSERVATION AND TRACKING

By the author of THE TRACKER
TOM BROWN, JR., with BRANDT MORGAN



ILLUSTRATED BY HEATHER BOLYN

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"In a very basic way . . . nature observation is the most important of the survival skills. A survivalist cannot build a fire without knowing where to find the necessary materials. He cannot travel safely in a wilderness environment without being alert to the constant changes around him. And he cannot find sustenance without an appreciation for the plant and animal life that dwell in a given area. In the widest sense, nature observation is the basis of all enjoyment and well-being in the outdoors . . . I hope this book helps you to become more aware of nature and to feel more fully the joy of living. I hope it helps you to hear the voices modern man misses—not just the voices that speak to the five senses, but the universal voice that speaks to the heart."

—Tom Brown, Jr.

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TOM BROWN'S DEDICATION:
To Stalking Wolf and the ancient ones that walk close to the Earth Mother.

BRANDT MORGAN'S DEDICATION:
To the members of the Pacific Northwest Tracker Association . . . and "dirt time."

WITH SPECIAL THANKS TO:
Arthur Morgan, Ruth Morgan, Charlie Johnson, Cindy Lewis, Russ Sullivan, Lou Green, Marc Schmitt, Phill Smith, Gail Smith, Dick Wilker, Bruce Hall, Ann Hessel, Craig Hook, John MacDuff, Jim Murphy, Bob Bisschoff, Dick Cinkovich, Earl Kanz, Carolyn Miller, Chris Tabit, Art Vail, Vicki Mills, Dick Mills, Jon Clark, Dave Boyd, Al Moser, Ray Carveth, Jon Wartes, and the members of the King County Search and Rescue Association.

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TOM BROWN'S FIELD GUIDE TO NATURE OBSERVATION AND TRACKING

INTRODUCTION

Exciting and fulfilling as our lives may be, most of us are cut off from our natural surroundings. We live in heated houses, drive automobiles on asphalt highways, work in air-conditioned buildings, and eat processed foods. In the course of a normal day, we encounter a barrage of unnatural sights and sounds—traffic lights, sirens, jackhammers, stereos, billboards, telephones, passing jets, and television screens. To minimize the confusion, we often close ourselves off to the best stimuli and tolerate the worst. Moreover, we live much of our lives by the clock, catering to schedules and worries more readily than to our own inner urgings.

In a world such as this, wilderness recreation has tremendous importance. Every year, millions of people flock to mountains, woods, and beaches to find renewal in nature. Others flock to backyards and city parks. For many of us, such retreats fulfill a yearning almost as basic as hunger. But the shackles of modern society are not easily thrown off. Even when removed from fast-paced environments, very few of us are able to slow down enough to appreciate the full splendor of nature. We often go to the woods burdened with so much anxiety and with senses so battered and dull that we can absorb only a fraction of the message awaiting us beyond the asphalt and concrete. Galaxies around us go unnoticed and unexplored because we have lost our feeling of connection with the earth.

Yet that connection can be reestablished—in large part simply by awakening and nourishing our innate awareness. With a few simple skills and some dedicated practice, any person can open his or her senses to the full richness of nature, regardless of what he or she seeks there. I have seen it happen many times. It happened in my own life more than twenty-five years ago, when I met an old Apache Indian named Stalking Wolf.

Stalking Wolf was eighty-three when his grandson, Rick, introduced him to me, and I have not met anyone since who was so amazingly attuned to the natural world. He often told us stories with his hands, painting pictures of imminent weather changes and fluctuations in the lives of forest residents. He sometimes traced animal tracks to their source without taking a step. In a single track, he could read not only the biography of the animal that had left its signature, but chapters from the lives of all the others that were bound up with it. Like an archaeologist reconstructing an animal from a single bone, he used tracks to piece together elaborate structures of interlocking events. Taken in their entirety, those structures amounted to the entire fabric of the woods.

Rick and I wanted to be able to read the woods like that. We, too, wanted to be able to perceive and understand the flow of life. So we fol-

lowed Stalking Wolf around like two bear cubs, soaking up all the information he would give us.

Fortunately for Rick and me, Stalking Wolf understood our eagerness to learn the "old ways." But he never gave us much straight information. Instead, he led us on like a wily coyote—pointing the way with a riddle, dropping a hint every so often, tricking us into unraveling mysteries through our own efforts and skills. For ten years he goaded us on, demanding mastery of each skill before unveiling the wonders of the next. During these years and afterwards, I absorbed the art of nature observation with such eagerness that I hardly knew how committed I was until I discovered, many years after Stalking Wolf was gone, that it had become my life.

Since 1978 I have been teaching wilderness survival and nature observation classes throughout the country. I do this partly because I want to pass on some skills that will enable people to enjoy the outdoors with more safety and satisfaction. Many of these skills are explained in the first book in this series, *Tom Brown's Field Guide to Wilderness Survival*. In a very basic way, though, nature observation is the most important of the survival skills. A survivalist cannot build a fire without knowing where to find the necessary materials. He cannot travel safely in a wilderness environment without being alert to the constant changes around him. And he cannot find sustenance without an appreciation for the plant and animal life that dwell in a given area. In its widest sense, nature observation is the basis of all enjoyment and well-being in the outdoors.

My ultimate aim, however, is not just to teach outdoor skills, but to suggest a way of being that allows us to live in harmony with the earth and our fellow creatures. It does not take a great deal of perception to see that we have abused our environment. We have littered our Earth Mother and destroyed natural habitats with little regard for the plants and animals that are inevitably destroyed along with them. We have not been good stewards of the earth because we have forgotten our ultimate dependence on it.

Even children, who are so open to nature, are largely unaware of this dependence today. Many of them live into their teens under the mistaken impression that food comes from the supermarket. They seem unaware that an animal has to give up its life so they can have meat on the table. A young friend of mine, after touring a slaughterhouse, was about to give up meat until I told him that the grass we cut with the lawn mower screams as loudly as the cow—that he had just not learned to hear it yet.

Learning such things in school is never enough. The mind alone cannot make the connection. A true understanding of our interdependence with wild things can come only from direct experience. I hope this

book urges you on to such experience. I hope it helps you to become more aware of nature and to feel more fully the joy of living in the moment. I hope it helps you to hear the voices modern man misses—not just the voices that speak to the five senses, but the universal voice that speaks to the heart. Stalking Wolf called it the voice of the spirit-that-moves-in-all-things. It sings the song of our ancient heritage, and for those who listen, it awakens memories of what it is to be truly alive.

Organization of This Book

Part I of this book discusses some attitudes and habits that will help you strengthen your awareness of nature. The first three chapters include many suggestions and exercises for slowing down, clearing the mind, sharpening the senses, and developing a rapport with nature that have proven both enjoyable and rewarding to students in my classes. The last chapter in this first part explains how to walk gracefully in the wilderness, how to use camouflage to best advantage, and how to move so silently and unseen that you can stalk up and touch a wild animal.

Part II of this book is a discussion of the ancient art of animal tracking. It might seem unusual that I have included nature observation and animal tracking in one book. However, the two cannot be separated, nor can their practical and aesthetic applications. Through tracking, the survivalist learns the habits and whereabouts of the animals that are vital to his existence. The hunter becomes more skilled at locating and following the game he seeks. And all those who take to the woods, for whatever reason, are able to do so with more assurance of finding their way out—or of finding others who become lost.

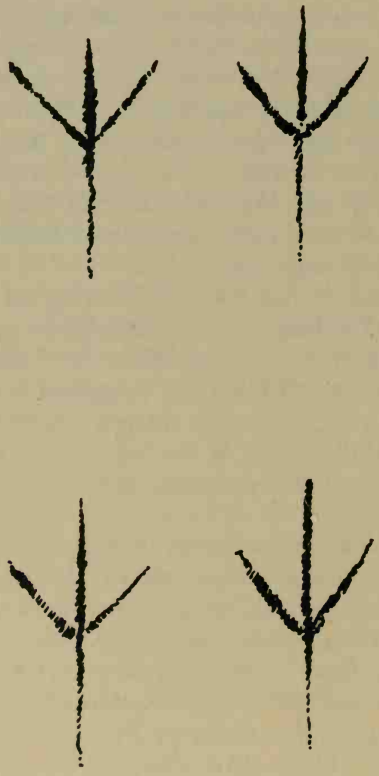
On another level tracking is a fascinating art that opens up new worlds of awareness. Tracking is like unraveling a spool of mysteries. It demands patience, painstaking observation, well-honed senses, a quiet mind and body—in short, all the skills discussed in the first part of the book. Tracking is also a portal to a deeper appreciation of ecology. A tracker cannot successfully follow an animal very far without beginning to realize that its tracks are intimately connected to the tracks of everything else, including his own.

Part II, then, explains how to recognize and follow a wide variety of animal tracks—including human—on almost any kind of terrain. It also describes the skills necessary to "read" those tracks and to answer important questions about them. (How old is the track? What was the animal doing? What was it thinking? Where was it going? How fast was it traveling? When will it be back?) After learning these skills, you will soon begin to recognize the passage of animals by broken twigs, upturned stones, nibbled branches, and telltale hairs. As you become more sensitive to

these signs, you will begin to see the web of life unfolding before you. You will also begin to see more clearly that nature observation and tracking are inseparable, and that the entire landscape is a living manuscript written and rewritten each day with new and ageless meaning.

The Importance of Practice

Finally (and this can never be overstated), I want to emphasize that there is no magic shortcut to learning nature observation and tracking skills. Like all arts, they demand patience, practice, and dedication. And as with all endeavors, the rewards are in direct proportion to the time and effort expended. In my classes, students have the initial advantage of first-hand explanation and immediate feedback on their efforts. But these things alone cannot guarantee that they will become better trackers. Only they can do that, by incorporating the skills into their own lives. The same is true of this book. Like Stalking Wolf, it can only point the way. You must then go the distance and read the ground for yourself.



Field Sparrow

PART I:
NATURE OBSERVATION

1
PATHWAYS TO NATURE

Thomas Carlyle once said, "The tragedy in life is not what men suffer, but what they miss." I often quote this statement when I have a new class of students looking up at me from benches and hay bales in the old barn on my New Jersey farm. To let it sink in, I go on to ask them a string of questions about the immediate area. Their reaction is usually one of hidden embarrassment. Most of my new students have not noticed the wind direction, the scents in the air, the raccoon tracks by the barn, the deer on the far side of the alfalfa field, or the squeaks of mice in the rafters. The realization dawns on them that not only are they shut off from the more profound messages of nature, but even from some of the most obvious ones. Such is the case with most of us; yet the human potential for a keen sensitivity to nature is nothing short of amazing.

Consider, for instance, the native American scout of centuries past. As a protector and provider, the scout served as the eyes and ears for the tribe. He traveled alone or in small groups, wearing little more than a loincloth and moccasins. He moved silently, leaving hardly a trace of his passage. If necessary, he could run for two to three days without stopping. He found his way by the sun and the stars and variations in the landscape. He could stalk as silently as a mountain lion and catch game with his bare hands. He could detect the presence of a fox in the croak of a tree frog and see the coming of a storm in the flight of a mosquito. He knew his environment intimately and felt a deep reverence for all the creatures that shared it with him.

The scout is an example of nature observation at its best. His life was a communion with nature. His skills at times seemed to border on the magical, but they were not. They were an expression of the potential that is in all of us. Each skill was painstakingly learned by each generation and lovingly passed on. Many years of teaching and practice went into the learning, just as our own children go through many years of classroom learning to assimilate the skills our own society considers important.

Since we are no longer hunter-gatherers, it is not as important for us to be so aware of and alert to nature. Our society does not place much premium on nature awareness because modern conveniences have taken away its survival value. But we pay an unseen price for our comforts. Our senses, like unused muscles, either weaken and atrophy or are never developed to their full potential.

Nature is far more colorful and fascinating than most of us can imagine. But our minds are so clouded by modern thought patterns and stimuli that we do not perceive the pure and natural except through a

distorting lens. This state is a little like walking around wearing sunglasses. After a while the world looks a little duller and darker than it actually is. Gradually we come to accept the dullness as normal until we take the glasses off and realize, sometimes with a shock of surprise, just how bright and beautiful the world really is.

Clearing the Mind

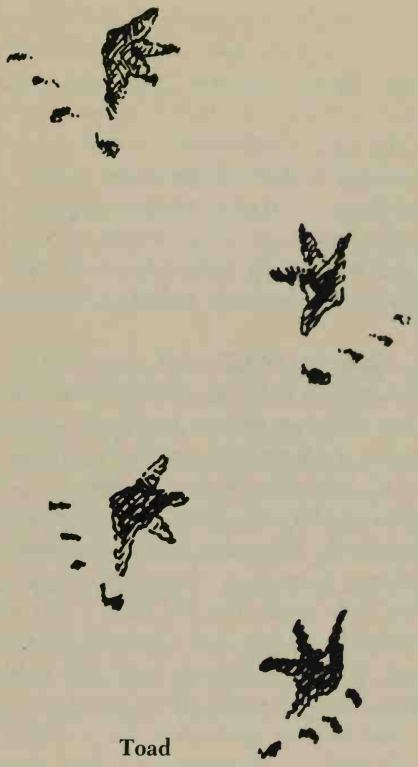
How can we begin to overcome the mental barriers to nature observation? The first and most important step is to clear the mind of all the clutter that has accumulated during the process of daily living. This mental purification actually occurs quite naturally during an extended stay in the wilderness. Like a fountain of clear water, nature keeps pouring into our muddied cup, finally washing away the bothersome elements until we see clearly enough to feel a connection with the environment.

Many times I have watched harried people take to the woods and gradually let down as they absorbed the more natural rhythms around them. But often the trips we take are too short for such a process to occur. For most of us, it seems, Saturday is a mad rush to get to our wilderness destination and Sunday is a mad rush to get back. Very little time is actually spent *being* there. Very little time is spent experiencing.

Let Go of Time

There are several ways of combating this syndrome. First is to consciously let go of time. Begin by thinking of time as a convenience rather than a burden. Know it for what it is—a system concocted by people to help them keep track of where they are in relation to each other and the things around them. Know also that there is a dimension beyond time that can only be reached by letting go of society's schedules and constraints and adopting a willingness to be alone and absorbed in the moment. If you want to observe more in nature, take off your watch and pay more attention to your internal timekeeper. Let the terrain and your interests dictate your schedule.

Certainly you may have a specific time to be back home or back on the job. Maybe you have only an hour to spend in the park. The amount of time doesn't matter. Ten minutes can be an eternity if you are living in the present moment. In the "now," you have no past or future, and everything is experienced freshly. A person without a past has never seen a tree, a mud puddle, or a blade of grass. A person without a future is free of worries and fears and open to whatever may cross his or her path.



Toad

Slow Down

Another thing that will help you escape the "time trap" is to consciously slow down. You can observe very little in the woods when hurrying along a trail. In my frequent wanderings around my farm, I often walk so slowly that it is frustrating even to my students. But there are discoveries that can only be made when traveling at a snail's pace. A slower pace makes it easier for your eyes to pick up the flick of a deer's tail or the claw marks of a bobcat. A slower pace leaves your ears open to the call of the whippoorwill and the rustlings of rodents. A slower pace means a calmer mind, which allows the impressions of nature to register more clearly. All the great naturalists have recognized the value of slowing down, and they have all made their most cherished discoveries in the atmosphere of timelessness it creates.

Sit Down

The only thing better than slowing your pace is to stop altogether and sit down. One Saturday morning before sunup, I drove to the trail-

head leading to Sunfish Pond—a relatively isolated spot along the Appalachian Trail. This trail is one of the nation's most well-traveled mountain pathways. Most summer days (especially on weekends), it is packed with people rambling on their eager ways from one place to another. But under the right circumstances there is much to be seen there, and I was early enough to have beaten the rush. I walked slowly up the trail to a well-used deer run that connected with it and sat down under an old snag to watch the day come alive. I calmed myself and began to blend with the flow of the woods. In time I became part of the dead tree that was my resting place. As the stars faded, I felt peaceful and at one with my surroundings.

Slowly the night sky brightened, and bird voices rose to herald the oncoming sun. Just before the sun glinted over the horizon, a chipmunk scurried over a log and ran across my feet. A moment later a raccoon returned from her night's foraging, ambled up to the tree, and unwittingly used my shoulder to help her up to her den.

The first rays of the sun were marvelous. As they cast their light and warmth on the earth, they also splashed across the rusty coat of a red fox, which dazzled my eyes as it trotted across the trail. Before the sun had burned another two hours into the day, I had seen a buck break cover and was intently watching a doe and her fawn approach along the deer run leading to the trail. The morning air was still cold, and I could see the vapor steaming from their nostrils. They came down the trail very calmly and deliberately, and as they passed in front of my hiding place, I gently reached out and allowed my fingertips to slide along the doe's back.

In the next moment, the woods seemed to have been hit by a shotgun blast. The forest exploded in a frenzy of flying birds and diving chipmunks. Even the flowers seemed to close up. When all the animals had found their hiding places, the only sound left was the raucous scolding of jays. It was a sound I knew very well.

Deciding the day had truly begun, I walked back down the trail and soon encountered several fully laden backpackers. They were walking very fast, and they were excited. They had left their camp before sunup, and they had already covered seven miles. That would put them at their next planned campsite well before noon. If they really hurried, they said, they might even be able to make tomorrow's campsite a day ahead of schedule.

I asked them if they had seen anything interesting, and they excitedly told me about a large buck that had just gone crashing into the forest ahead of them. I asked them if they had seen anything else, and they said no, not really. Of course not—they were too blinded by speed and schedules to really see. They were so intent on getting from Point A to Point B

that they were missing almost everything in between. Don't be like those hikers. Instead of charging off after the illusionary treasure at the end of the trail, stop to pick up the gold pieces along the way. In other words, *sit down!*

John Burroughs once said that if you were to sit under an oak tree for an entire day, you would have enough information to write an entire book. The first time I read that I thought it would be impossible. But since I was also young and curious, I went ahead and tried it. I sat under an oak tree for an entire day, and I was amazed. Had I been able to record it all, I could have filled volumes with the beauty and drama that passed before me.

But I find that many people are bored with sitting. They ask me, "Tom, how can you sit on a trail for four or five hours at a stretch, much less an entire day?" I am tempted to ask them how they can sit in front of a television set for four or five hours watching nothing but a series of flashing lights. The world of nature is at least alive and real, and it's constantly putting on an elegant and dramatic display. As far as I'm concerned, it's the greatest show on earth. People get bored with it because they have not let go of their concept of time and learned the rewards of patience and solitude.

Don't let speed and time rob you of wonder and discovery. Slow down. Better yet, sit down. Become an inconspicuous stump, an all-seeing eye. When you are truly still, both without and within, then nature will begin to unfold its secrets.

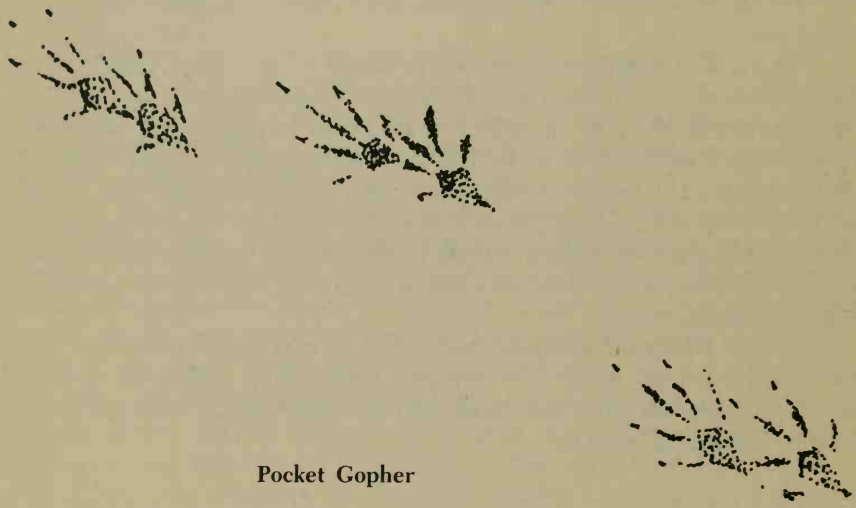
Let Go of Worries

Many times we carry into the woods a load of mental baggage that is far heavier than anything we carry on our backs. We stride along through forest, country, or beachside as though our primary purpose were to fret over the past and worry about the future. An argument with the boss, an unpleasant phone call, an overdrawn checking account, a duty not done—such things preoccupy us in the city, so we unconsciously entertain them in the country. But the heart of nature is not the place to settle these accounts.

A far better approach is to say to yourself, "Listen to me, body, mind, and spirit. I hereby give you permission to take a weekend off. A weekend out of your lifetime. I know there are things left undone. I know there are loose ends and frayed nerves. But for the next two days (or two hours, or however long it is), you are going to give yourself a vacation. You are going to be totally committed to living in the now. You are going to leave the shackles of society behind. Forget about your job, your check-

book, your bank account, your duties and debts, your shoulds and should-nots—and just live."

Henry David Thoreau, one of the greatest nature observers of all time, puts this same thought in a slightly different way. Says he in *Walden*, "If you are ready to leave father and mother, and brother and sister, and wife and child and friends, and never see them again—if you have paid your debts, and made your will, and settled all your affairs, and are a free man, then you are ready for a walk."



Pocket Gopher

Let Death Be Your Guide

The art of nature observation is not separate from the art of living. Remembering this, one of the most valuable things you can do is to live each day as though you would die tomorrow. Difficult as it is to construct such a scenario, it has tremendous power to enhance your perceptions.

I know several people who have had near-death experiences. One was hit by a truck. He spent three months in a coma, and when he regained consciousness, he didn't even remember the accident. When it dawned on him that he had almost died, he was then struck by the realization that he had not really lived. Now it's hard to keep up with him. He has been reborn. He doesn't waste time. He doesn't fret over the past and the future. He doesn't worry about what people think of him. While he used to enjoy nature with well-mannered reservation, he now thrashes through the brush as eagerly as a dog. He stops to smell flowers, hugs trees, and talks freely to animals. Some people think he is strange. I think he is alive.

You don't have to have a near-death experience to come alive. The truth is that we never know when our moment might be. So just realize that. Pretend that you have only a week to live. What would you do? How would you relate to people and the world around you? Most likely you would be even more awake and alive than you are right now. That "aliveness" is an important requirement for absorbing more of nature's messages.

Be Quiet

Another requirement is to keep noise to a minimum. It should be obvious that you will experience more in nature if you are silent. But it bears repeating, partly because most of us are so addicted to chatter. We talk almost constantly at work and at play. We make our livings weaving arguments and advertisements. We fill our lives with social gatherings and general gossip, and we install electronic devices in our homes (and ears) that amplify the sounds we produce. It is as though quiet solitude were a deadly disease that could only be controlled by a stream of noise and confusion.

On the other hand, in nature silence is the rule and noise is the exception. Most animals communicate more by gesture and touch than by sound. Sound in nature broadcasts an animal's presence, and the wrong sound at the wrong time can mean an animal's death. Sound also serves as a warning to animals. Since man is the world's most lethal predator, the human voice is almost always a danger signal that causes wildlife to run or hide. And most animals have a highly acute sense of hearing.

Take care, then, to keep your talk to a minimum. Try to preserve the flow of nature by moving as quietly as possible. If you see something beautiful, communicate it by sign language as the native Americans did. Imagine that your own life depends on remaining quiet, as it might someday in a survival situation.

Don't Analyze

Talking is actually only a part of the problem. We also have to deal with the barrage of thoughts ricocheting through our heads. We are a society of reasons. If we aren't talking, we are usually thinking. And with our thoughts we build elaborate barriers between ourselves and our experience. Some people cannot look at a waterfall without calculating its height, how many gallons per second are flowing over the lip, and how many other waterfalls in the world are larger or smaller. Some people no sooner sit down by a pondside than they begin to wonder why they are there and what the worth of it is. The comparison, the analysis, the reasons—all are walls that fence us off from a deeper reality. Experience

nature without analyzing. See it without labels. Only that way will you begin to experience the beauty that is beyond words.

Let Go of Names

There is a natural tendency in all of us to give names to things. It is a way we have of ordering the world and feeling more comfortable in it. When we are introduced to a new person, the first thing we do is learn a name to associate with the face. If we can remember it the next time we see that person, we feel a bond of familiarity. We feel we "know" that person. In reality, though, we know very little about that person. The name in itself is only a convenience—only the beginning of a familiarity that can go anywhere or nowhere. The depths of love or friendship we finally attain with any new acquaintance will depend on how far we are willing to look beyond the name.

The same is true of things in nature. Since we can't communicate as easily with rocks, plants, and animals as we can with our own kind, there is an even greater tendency to learn the name and be done with it. Most people collect names instead of information and experience. A new bird or mammal is a wonder to behold. But too often, once the gray-cheeked thrush or the thirteen-lined ground squirrel is matched with the illustration in the guidebook, the mystery is gone and the observer goes his or her way with nothing more than a longer list of animals. The list may be impressive, but it cannot contain much real knowledge.

Stalking Wolf knew very well the dangers of naming when he was teaching Rick and me to look at nature many years ago, but periodically I have had to relearn the lesson. Not long ago, for instance, I took some children on a nature walk, and whenever they discovered a new plant or animal, they were overwhelmed with excitement and wonder. Then they would ask me what it was. When I said, "That's a potato bug," or "That's a bull thistle," they would immediately say, "Oh," and go on to the next thing as though there were nothing more to be learned. It finally dawned on me that I was robbing them of the mystery.

Shortly after that, a little friend of mine picked up a small snail from the grass and held it out to me, asking what it was. I said, "Sit down and hold it in your hand."

The boy sat down and watched the snail. Gradually the animal poked its feelers out of its shell and began traveling across the little boy's hand.

"How does it feel?" I asked.

"It feels hard but real slimy. It feels like there's something licking and grasping my skin."

"How does it talk?" I asked.

"Hey, it ain't got no mouth!"

"How does it see?"

"It ain't got no eyes, either!"

Soon the boy was on his own. He and his friends spent the rest of the afternoon making discovery after discovery because their imaginations weren't stifled by names.

When you come right down to it, names are only convenient tags we hang on things to make them identifiable. The name, "oak," may be useful for identifying a particular kind of tree, but it says nothing about how that tree's roots grab the earth, how it sings in a wild storm, how it whispers in a soft wind, or how it rattles after the fire comes into its leaves in the fall. It says nothing of the five foods and the four medicinal parts of that tree, or of the birds and animals that live in and around it. You could just as easily tag your own name onto it; for where you find one name you will often find others.

The mountain lion is also called the cougar, the wildcat, the puma, and the rock cat. But none of these names describes its sleek body, the silence of its footsteps, or the dignity and defiance in its eyes. Everything worth knowing about the animal lies beyond the name. So don't get caught up in names. Concentrate on concepts, feelings, and sensations. Most of all, concentrate on interacting with the things you encounter in nature. Know the soul before you know the name, and you will experience much more.

Nothing Is Commonplace

Many people see a pine tree or a robin and think, because they've seen so many before, that there is nothing new to see. But the newness is always there, lying just beyond the veils of habit and assumption. No two pine trees are just alike. Even the pine tree you looked at a moment ago is no longer the same as it was. Everything is changing. Everything has more to show us than we have yet perceived. The commonplace is only the self-constructed wall that separates us from the marvelous.

True observation goes beyond these artificial boundaries. An observer who really wants to know a robin will not be content to look it up in a guidebook and watch it hop about on the lawn. He or she will be interested in everything about it—what it eats (besides worms), where it sleeps, how it copes with cold weather, how it avoids predators, the range of emotions expressed in its calls, the warmth and softness of its body, its flight pattern—everything from the arrangement of its feathers to the color of its toenails. There is no end to the inquiry involved in really knowing an animal (or anything else); no limit to the depths we can reach if we are willing to create the world anew each day.

Follow Your Heart

When the naturalist John Muir first came to California, he was asked where he was going, and he said with enthusiasm, "Anyplace that's wild!" All his life, Muir followed his heart. He traveled like a butterfly—"sailing on every eddy and dancing compliance to any wind." His spontaneity led him down some of the wildest, leafiest pathways to some of the freshest observations of nature ever recorded.

I like to travel like a butterfly, too. In fact, I cannot help it. One morning I'll tell my wife, Judy, I'm going out to the barn to get something and I'll come back hours later after going miles out of my way. Something catches my eye. Something captures my imagination. When that happens, it is almost impossible to resist following my inclination, wherever it might lead.

More often than not, it does not lead down the beaten path, but along a little-used or nonexistent trail. That's where most of the fresh discoveries are made. First of all, the beaten path is where everybody else goes. The natural flow of life is found in the heart of the woods, away from manmade roadways and trails.

Of course, you'd first better make sure you won't get lost; but wherever you go, go with a sense of adventure and spontaneity. If you are attracted to a thick carpet of moss on an old boulder, stop to run your hand over it. If you have a hunch there are deer in the meadow, slow your pace and take a careful look. If you have a sudden urge to climb a particular tree, climb the tree and discover what it has to teach. Don't interrupt your inner urgings. Such impulses bubble up from the very cauldron of creativity, and they can put you in touch with nature much faster than a car or an inflexible schedule.

Let Go of Inhibitions

In all of my classes in nature observation, there is at first a holding back, a reluctance to let down and become spontaneous. The spontaneity has been stifled by jobs, responsibilities, cares and worries, and above all by the question of "What will people think?"

My answer to that is, "Who cares?" Then, to get my students to loosen up, I do a little exercise with them. I say, "OK, for the next five minutes I want each of you to do something totally outrageous—something not like you, something ridiculous." Once they realize there is no getting out of it, I see students doing a variety of unusual things: climbing trees and yelling at the top of their lungs, diving into swamps with all their clothes on, slithering through the bushes like snakes, hopping across the landscape like frogs and rabbits. Whatever they do, they discover they enjoy it immensely because at last they have permission to act "foolishly."

The point, of course, is not to make a fool of yourself. It is to break down that barrier of rigidity and habit—to tear off the stifling masks of society that cover up your real face, your true self. If you occasionally force yourself to fly off the handle and do something "crazy," it's much more likely that next time you get an urge to follow your heart, you will allow yourself to do it instead of making excuses and staying stuck in the same old rut.

Let Go of Prejudices

Another attitude that severely limits our experience of nature is the preconceived idea of what it's going to be like. There are many people who would immensely enjoy an off-trail exploration or other invigorating adventure but who manage to talk themselves out of it. There might be bugs, snakes, and poison ivy. It might be wet and dirty. The water will probably be too cold. The excuses are endless. Worse yet, these people are so prejudiced that they can hardly experience anything. They actually preprogram their reactions so that they are blinded to the reality of a new experience.

No one really knows what an adventure will be like. That is the nature of adventures. They are totally new experiences. To a certain extent, you just have to trust and stay open to surprise. If you don't allow prejudice to interfere, you will widen your experience and learn some exciting new things. Rick and I used to explore our little corner of the planet as though we were space travelers who had just landed on Venus. Our own cloud-shrouded planet is far more fascinating than Venus or Mars. The only thing that keeps us from being constantly awed by it is the mistaken belief that we've seen it all before. The fact is, we have hardly even begun to see it.

Immerse Yourself in Nature

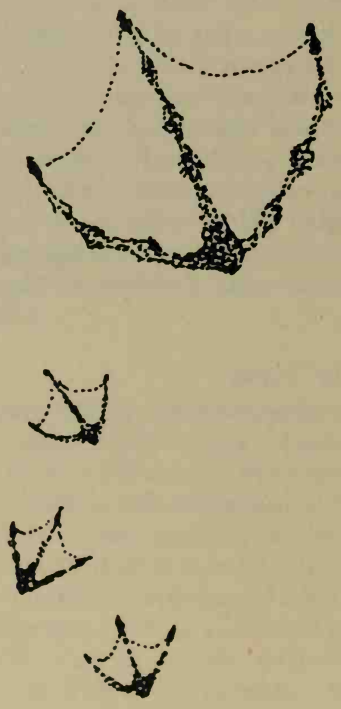
Dive right into nature without telling yourself what it's going to be like. Don't pass a swamp and say, "Nice swamp." Get into it. Sink down neck-deep in the primal ooze. Come face-to-face with frogs. Feel catfish nuzzle your legs. Watch dragonflies dart in front of your eyes. Don't be a spectator. If you are only a spectator, your experience will be little more than that of a person who goes to a museum and reads the plaques on showcase windows. Don't separate yourself from nature. Embrace it and allow yourself to be embraced by it. Then you will begin to feel its beauty and power.

Sometimes this power can be experienced in a very literal sense. Off the New Jersey coast there is a jetty called the Big L. It juts into the ocean like a crooked finger, and whenever I'm near it—especially in a storm—I can't resist going out there to feel the pulse of the ocean. Once

during a raging storm, I stood out on the end of the jetty half-naked. The waves were tremendous, pounding at the rocks and my body in a magnificent concert of surf and spray.

Coincidentally, a concert of another sort had just let out on the beach, and I could see people from the nearby hall bundling themselves against the wind and hurrying along the boardwalk to the safety of their cars. Occasionally someone would look up and point in my direction, but nobody joined me. I had the feeling they thought I was crazy. If I was, I am glad of it. It is a lot better to be crazy than to be cut off from the marvels of nature, mummified with rigidity and entombed in a casket of comfort.

Don't just look at nature from afar—*saturate* yourself with it. Get out on the edge of life and let the waves of the wilderness wash over you. Feel the power, listen to the crashing roar, let the wind buffet your body and sweep the cobwebs from your brain. Immerse yourself in nature's symphony and let your senses burst with joy.



Canada Goose

Ignore Discomforts

What about cold, you say? Of course you're going to get cold if you follow my suggestions. Cold and dirty and smelly and bug-bitten and sweaty. But these are only discomforts. They are the price of admission to the theater of the wilderness. If you allow yourself to really enjoy what you're doing, you'll hardly notice them. Every time I go to the beach in January, I see people riding the waves on surfboards. Clothed only in meager wetsuits, they are so involved in the ecstasy of slicing through the water that the cold is incidental to them.

I also remember sitting at the edge of a partially frozen lake, feeling as cold as the ice, when suddenly a beaver popped up through a hole and began swimming about. Instantly the cold was forgotten, pushed below awareness by the beaver's presence. When the beaver disappeared a moment later, I felt totally alive and free from cold.

I'm not suggesting that you ignore all good sense. But within reasonable limits, if you find yourself getting cold or debilitated when there is no real danger or discomfort, it may mean you're not really involved in what you're doing.

I once asked Stalking Wolf, "Grandfather, how come you're not cold in the winter or hot in the summer?"

He said, "I am, but heat and cold do not bother me."

I asked why not, and after a long pause in which he seemed to be weighing whether or not I was ready for his answer, he said, "Because they're real."

We so often involve ourselves with the illusions and surface features of life that a cold blast of wind comes as a rude awakening. Forget the rudeness and remember the awakening. You cannot shut yourself off from the elemental in nature without decreasing your capacity to experience the rest of it. Welcome and embrace minor discomforts and they will cease to be a bother.

Become a Child

There is no better teacher of nature observation than a child. Children habitually live in the moment. They don't fret about the past or worry about the future. They are more interested in experiences than in names or judgments. They don't mind getting wet or dirty. They throw themselves into every adventure with unbounded curiosity and excitement.

My four-year-old son has taught me almost as much about nature observation as Stalking Wolf did. In fact, watching Tommy takes me back to my own boyhood. "Hey, Dad," he says, "let's go trackin'." And as soon

as he gets outside, he starts tracking everything: beetles, bugs, horseshoes, grass stems, rabbits, pop bottles—everything. He is totally alive and spontaneous. Being around him not only gives me a good excuse to become a child myself, but rekindles the joy of play and the love of the moment that is in all of us, regardless of age.

Once, on the beach, I came across some children rolling in the surf and making sand castles. They were loving it, laughing and giggling, running back and forth from beach to water, gouging great channels and sculpting turrets and steeples in the sand. It looked like too much fun to pass up, so I joined them. A few minutes later a man about my age came by and saw me cavorting in the surf with my new friends. He looked down as he walked by and shook his head as if to say, "Aren't you a little old for that?"

Before he got out of earshot, I said—loudly enough for him to hear: "You *wish* you could do what I'm doing right now."

The man stopped, came back, and stood watching for a moment as he reflected. Then he said, "Yes, I guess I do."

"Well, then, come on!" I invited him.

He hesitated. I could see the child in him just bursting to get out and play, wanting to throw himself into the water and roll in the sand. But at the critical moment he looked up at a woman and an older man sitting on the beach not far off. "I can't," he said, "my wife and father are watching."

Don't be like that man. Shed your adult inhibitions whenever you get the chance. Let the inner voice of your past guide you to more spontaneous living. Feel the joy of the moment. Humble yourself enough to learn from children and you will discover a totally new world—the one you have forgotten.

Learn From Plants and Animals

If you can learn from children, you can also learn from plants and animals. Often Stalking Wolf used to point out a flower or bush and say to Rick and me, "Plant have much to teach." Then he would leave us alone with it until we thought we had exhausted its lessons or discovered what particular thing he wanted us to notice. We never did exhaust the plant's lessons, of course, but in trying to learn them we became absorbed enough to realize just how right Stalking Wolf was. There is more to learn about a single flower than could be contained in a ten-volume encyclopedia, and much of it cannot even be put into words. But to learn these lessons takes a great deal of simplicity and a genuine respect for other life forms.

Such qualities are not common in our society. In creating a world apart from nature (or so we like to think), we have not only made scenery

of the landscape and centerpieces of the plants, but even distanced ourselves from other animals. Henry Beston explains our dilemma in a passage from his wonderful book, *The Outermost House:*

We need another and a wiser and perhaps a more mystical concept of animals. Remote from universal nature, and living through complicated artifice, man in civilization surveys the creature through the glass of his knowledge and sees thereby a feather magnified and the whole image in distortion. We patronize them for their incompleteness, for their tragic fate of having taken form so far below ourselves. And therein we err, and greatly err. For the animal shall not be measured by man. In a world older and more complete than ours they move finished and complete, gifted with extensions of the senses we have lost or never attained, living by voices we shall never hear. They are not brethren, they are not underlings; they are other nations, caught with ourselves in the net of life and time, fellow prisoners of the splendour and travail of the earth.

Though Beston speaks of animals, the spirit of his words applies equally to plants. It is possible to see plants and other animals "caught with ourselves in the net of life and time," but it is not easy to do so. It is difficult because it asks us to humble ourselves. It asks us to descend the ladder of ego and to see our achievements and our place on the planet without aggrandizement. It asks us to have a genuine respect for other life forms, whether or not they have any "practical" use to us.

We can learn much about nature from any animal, but there are two that stand out in my mind as having a great deal to teach us about nature observation in particular. One is the weasel. The weasel is always looking, always listening, always moving. This little cylinder of action-packed energy is like a terrestrial torpedo with cybernetic radar. It flows through the environment like a shadow and is ever-alert to the influx of stimuli. The weasel is the scout and hunter *par excellence* of the animal world. Its energy and alertness were so admired by the Indians that they used it as a model for their own training in nature observation.

The other animal I greatly admire is the chickadee. Very different from the weasel, this gentle and gregarious ball of feathers likes nothing better than to flit from tree to tree, tumbling through branches on its acrobatic way, all the time calling out its enthusiastic greeting: *"Chickadee-dee-dee!"* Even in the vilest of storms the chickadee seems oblivious to discomfort and dejection. When all the other animals have fluffed their fur or feathers and retreated or shambled off to some cozy den, you can still see the chickadee dancing about in the treetops as if to say, "What a day! What an experience! This is spectacular!"

Take a lesson from the weasel and the chickadee. Cultivate some of

the qualities their lives so beautifully express. With the weasel's awareness and stealth, you will become a supersensitive receptor for stimuli in the environment. And with the positiveness of the chickadee, you will be able to endure and even enjoy almost any condition you encounter.

Nature Is Everywhere

Sometimes my students say, "Nature observation is fine for the Pine Barrens or the Grand Canyon. But how can I ever use it in the city?" The answer is that nature is everywhere. Wilderness is a state of mind. You don't need the Pine Barrens or the Grand Canyon to "get into" nature. It would take a lifetime just to explore your own backyard. You can lose yourself in the wilderness of a flowerpot in the middle of Manhattan.

When I was growing up near the Pine Barrens I used to carry a little stone to school with me. It was an oddly shaped stone, covered with unusual dents and facets. I never tired of looking at it—especially during the long hours of school when it seemed we were only repeating things people had already learned a thousand times before. When I put it on my desk and looked at it, it would take me back to the Pine Barrens. I could see the stream I had plucked it from, feel the current rushing over my hand and curling around my fingers, watch the water creatures scuttling and swimming around it. When I looked at that rock, I could feel the sun on my bare back and the wind whispering through the pines. That rock created a world for me. It was the key that unlocked my spirit when I was away from the world that was most real to me. Each facet was like a looking glass that either reflected some past wonder or opened the door to a new one.

Any natural thing can serve as a "key" like my rock. It might be a flower, a tuft of grass, a shell, or an old skull. Everything in nature is connected. Why do green plants grow in homes and offices far removed from the soil if not to comfort us with the memory of our own ties to the earth? Why do we keep pets such as dogs and cats if not to allow us to express our natural love and attachment to other beings on the planet?

Today, when I sit in a doctor's office, a bus terminal, or an airport, I look for a flower, a plant, or a small wild thing that most other people ignore. As I gaze past the commotion to such little reminders, my spirits are renewed. It is not the size of the wilderness that is important. It is the quality of the involvement with it that makes the difference. One of the great challenges of nature observation is, as William Blake puts it, "To see the world in a grain of sand, and heaven in a wildflower, hold infinity in the palm of your hand, and eternity in an hour."

Cricket

2

FINE-TUNING THE SENSES

In the previous chapter I suggested some ways of reorienting the mind so that it would be more open to the imprint of nature. Now I would like to discuss some ways of sharpening the five senses.

Seeing More in Nature

We all know what it's like to grope through the darkness on some unexpected midnight errand, clumsily feeling our way about the house. Even the familiar becomes strange and uncertain during these brief trips into the world of the sightless. Once in the light again, we have a new appreciation for our eyes and for the wonderful variety of form and color they make visible to us.

This variety is particularly fascinating in nature. Flowers, birds, animals, and changing landscapes all have the power to keep us visually occupied for hours or days on end. The question is whether we are able to realize that power with our own perceptions. Too often we are not; but with practice we can be. In most cases, it is just a matter of looking at things in a different way.

Look at the Unfamiliar

You can always tell the tourists in town. They walk along the street staring at everything as though they had never seen it before—because they haven't! Everything is fresh and new, and this newness makes life more exciting. Yet as tourists get used to a new place, they tend to gawk less and less, until finally they seem as complacent as though they had lived in the "new" place all their lives.

The reason for this is habit. Our natural tendency is to look at the same things over and over again. This is one of the ways the mind reassures itself of its surroundings. Even more important, we tend to see the same things in the same way each time. The key is to force the eyes to look at new things, and to see familiar objects as though looking at them for the first time.

Take a Different Path

When I give classes in the Pine Barrens, most of my students habitually follow the two or three most trodden and convenient trails. When we walk down to the swamp, they follow at each other's heels in a closely packed herd and usually come back the same way. On the second day I ask them, "Why do you always follow the same trails?" They realize that

there is no good reason other than habit and convenience—the same reasons we always follow the beaten path. It is little wonder we so seldom see much wildlife. If the animals are not standing (a) on or near our habitual paths of travel and (b) in our habitual fields of vision and (c) on or near an object our eyes habitually pick out as familiar, we are going to miss them.

Exercise 2-1: The Same New Thing

Begin to combat the "same old thing" syndrome. Think of some visual rut you've gotten into and get out of it by forcing yourself to look at unfamiliar objects or to take a different path. A good place to start is in your own neighborhood. When approaching or leaving your home, ask yourself, "Am I looking at the same old things? Am I seeing this area the same way I've seen it a thousand times before? Does it look boringly familiar to me?" If the answer is yes, then stop. Go out of your way. Approach it from a different viewpoint. Shift your gaze so that you focus on something you don't habitually see. Get into the habit of doing this everywhere you go.

A New Viewpoint

About ninety percent of the time, we look at the world from the same viewpoint. It is actually quite a rare occasion when we see a familiar object from a new angle. Given this, it's not surprising that most objects seem dull and boring after a while. Yet almost anything can take on fresh form and perspective from a new vantage point.

For example, a beautiful flower seen from the same angle on a forest trail no longer looks unusual after a while. If you get down close to that flower and look at it from an ant's point of view, suddenly it takes on another reality. If you look at it from directly above or below, it again changes its aspect, even though it is obviously the same flower.

To see the world from ever-new vantage points is one of the most basic lessons in nature observation. Whenever you are out in nature, vary your angle of vision. Don't just walk along with your eyes on the ground ahead. Look up, down, sideways, and back. Look where you're going, but also look where you're *not* going. Most important, explore places you would normally not go and look at things in ways you would normally not see them.

Avoid Tunnel Vision

Another problem experienced by many observers of nature is tunnel vision. This is the preconditioned tendency to look for one thing or set of things in the environment to the exclusion of all others. One of the reasons so many hunters get shot every year is that many of them have

conditioned themselves to seeing deer and nothing else. They have set their minds so intensely on seeing deer that almost any movement registers as something to shoot at. In moments of high expectation such as this, it makes little difference to the unthinking person whether the animal is a deer, a cow, or a human being in a red coat.

Another example of this is the birdwatcher or botanist who has trained him- or herself to detect the smallest sign of a particular specialty but lets almost everything else go by. I often take my instructors (those who help teach my classes) on nature walks, and it is always interesting to me that, if I tell them in advance that we are going on an edible-plant walk, all they see is edible plants. I have to keep reminding them not to have tunnel vision.

On one walk, I pointed out a number of edible plants and got the usual quick and cocksure answers on their names and uses.

"What's that?" I asked. "Garlic mustard," answered my instructors.

"What's that?" "Burdock," they answered. But they did not see.

Finally in frustration I said, "Take a closer look."

They went up closer and still saw only the burdock.

"Closer," I said.

They went closer still, until finally they were standing only a few feet from the plant. Then, just as they bent over, a rabbit jumped out from beside the burdock and scampered away.

The rabbit was not the first thing they had missed. Every one of the edible plants I had pointed out had something unusual about it—an animal in its shadow, buds nipped by a deer, a birdnest at its base—something anyone could have seen if they had not been blinded by tunnel vision.

Tunnel vision is very much like looking at something the same way each time. But it is even more extreme because you go out with the intention of seeing a particular thing, and that intention shuts the mind off from everything else. The antidote for this malady is the same as that for dealing with familiar objects: Vary your vision!

Don't Try So Hard

Have you ever noticed how difficult it is to get to sleep when you are *trying* to get to sleep? Or how difficult it is to be on time when you have told somebody you'll *try* to be on time? The same is true of nature observation. So much effort goes into the trying that there is very little doing. Strange as it may seem, you can see more birds, more deer, and more flowers if you don't try so hard. The very act of trying negates the intention. You don't need the spectacular to enjoy a wilderness outing. Nature is all one. Go into the field with the intention of opening yourself

to anything and everything. Then at moments when you least expect it, you will be blessed with surprises.

Seeing the Expected

Familiarity can be a real curse, but it can also work to your advantage. In some classes I ask my students to keep their eyes open for animal scat. Depending on the geographical area, the majority of my students come up with the most common kinds of scat—deer, elk, rabbit, and so forth. But in one of my classes a student found fox scat almost everywhere she looked. It turned out that she was a graduate student who had been studying foxes for her thesis. Her familiarity with the animals and their habits told her just where to look and just what to look for.

This kind of familiarity and focused expectation is very different from untutored "trying." It is very positive and is only acquired through study and experience. The more familiar you become with the habits of wild animals (see "Animal Tracks and Habits," page 136), the more you're going to see them. I see mice in the corners of my barn partly because I know where they are likely to be. I see deer in certain parts of the field largely because I know their daily rounds and what they are likely to be doing at any given time.

Seeing More Animals

There is no magic formula for seeing more animals. However, there are some general guidelines about where and when to look for them.

Where to Look. (See also "Animal Highways and Signs," page 187.) The cardinal rule is to look for animals in transition areas that offer plenty of food, water, and cover. Most often these areas are found on the fringes of forests, meadows, and waterways, and they usually contain a variety of succulent vegetation. Such vegetation not only supports large herbivores such as deer, but an abundance of "indicator animals" such as voles, mice, and rabbits. These animals in turn attract predators such as hawks, owls, weasels, and foxes—as well as the scavengers that clean up after them.

Time and Season. The time of year and time of day or night have a great bearing on the kinds and numbers of animals you'll see on a given outing. Most animals are quite habitual in their movements. Many are about during the day, but many are also nocturnal. Some animals either migrate or hibernate during the winter months. All these things make it important to become familiar with animal lifestyles.

Weather. During bad weather most animals do just what humans do—get under cover. Don't expect to see a lot of wildlife during a storm. However, immediately before and after a storm you'll often see an unusual amount of activity, as various animals scamper about trying to stock their

larders. If animals continue feeding after the onset of bad weather, it's a pretty good indication that the storm will last for at least a few days.

Heat and cold also have an important effect on animal activity. Most animals avoid extremes of temperature. Not only do heat and cold cause discomfort, but they tend to dull an animal's sense of smell, causing the animal to be more wary. Most animals prefer to stay in the shade during the hottest parts of the day and to hole up in some warm spot during the cold. At times like this, they cut down their activity considerably to conserve energy.

Wind, too, has a great bearing on what animals you'll see, as it facilitates the movement of sounds and smells. Remember that most animals' senses are far more acute than ours. You can expect to see more of them upwind than downwind—and you can expect to see many more if you move quietly, carefully, or not at all (see "Movement and Camouflage," page 89).

How to Look. Most people make two mistakes when looking for animals. They look too high and they expect to see the animal in a classic textbook pose. Looking high is natural, since it is easier for us to look over a small bush rather than into it. But ask yourself this: If you were an animal, where would you spend most of your time? Most animals spend the majority of their time in low spots that afford protective cover. So get into the habit of lowering your gaze and looking *into* the brush and grasses instead of above or around them.

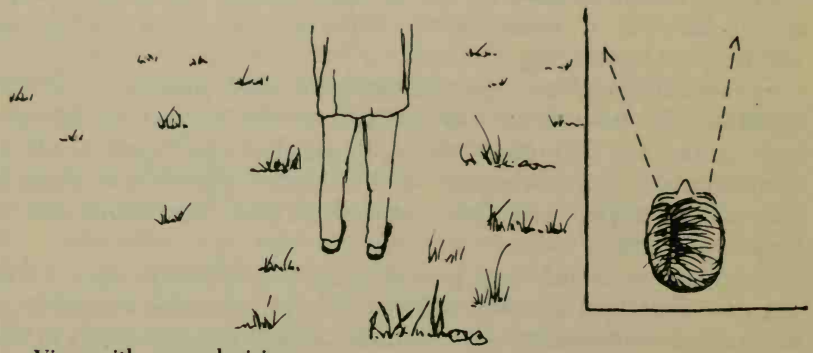
It is also helpful to "look small." Most animals are not as large as we imagine them to be. When anticipating deer, for example, don't be prejudiced by the ten-point buck you saw majestically posing on the cover of *Field and Stream*. Those views are very rare. You'll have better luck if you expect to see a smaller animal—or better yet, a small *part* of an animal such as an ear or a tail.

Looking for Movement. Many times you can detect the presence of an animal through movements in the vegetation. Keep your eyes open for moving branches, grasses, and bushes whose rhythm is out of step with the surrounding vegetation. The tops of tall grasses and small trees often circle when there is an animal sitting at their bases. Vibrating vegetation is almost always a sign of animal contact, whether it is a scampering squirrel, a flitting bird, or an alighting grasshopper.

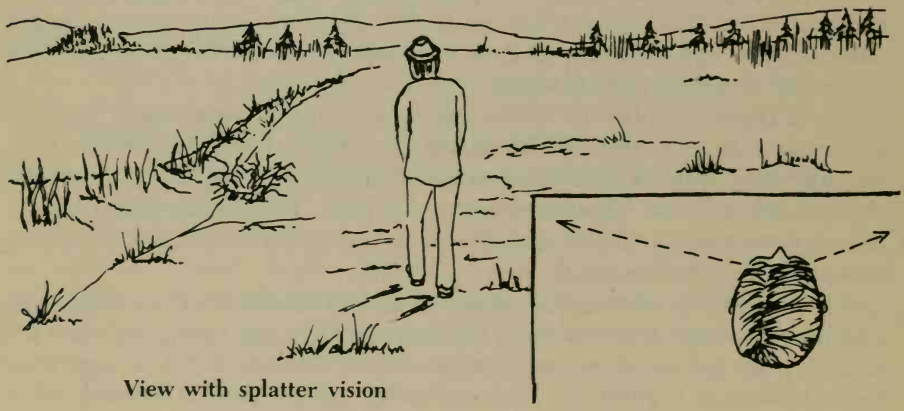
Splatter Vision

The best tool for detecting animal movement is called splatter vision. This technique was used by the native Americans to spot game, and is also used by most animals to spot danger. It is done by simply looking toward the horizon and allowing your vision to "spread out." In other

words, instead of focusing on a single object, allow the eyes to soften and take in everything in a wide half-sphere. The effect is a little like putting a wide-angle lens on a camera. Suddenly your field of vision is greatly increased. Everything in your "viewfinder" is a little fuzzy because your eyes are not focused, but they are much more sensitive to movement. To identify a movement, all you have to do is focus on it.



View with normal vision



View with splatter vision

Exercise 2-2: Wide-angle Seeing

To get a feeling for how much more you can see with splatter vision, gaze toward the horizon (or the farthest wall), spreading your arms wide to the sides and behind you. Then, wiggling your fingers, bring your hands gradually forward until you detect the first flicker of movement out of the corners of your eyes. That is your potential field of vision laterally. (With most people, it is nearly 180 degrees!)

Next, wiggle your fingers while holding one hand high over your head and the other at your side. Your vertical field of vision will probably include almost everything in a 150- to 160-degree arc from ground to sky. As you can see, splatter vision is a phenomenal improvement over our normal way of detecting movement.

Exercise 2-3: Splatter Vision in Nature

Stand on a hillside or in a meadow and survey the landscape with unfocused vision. You may see waving grasses, fluttering leaves, flying birds, and buzzing insects. The earth and sky may be filled with movements you have not noticed before. The environment may seem more alive. If you watch long enough, you are bound to notice something unusual—the flick of a deer's tail, the hop of a rabbit, the tree-trunk wanderings of a nuthatch or woodpecker. Whatever you see, it should be more than you have noticed before, because you will have multiplied your ability to detect movement by several hundred percent.

The secret of making splatter vision work is to slip in and out of it at frequent intervals. Soon this shifting of focus will become habitual. You'll start out with splatter vision, detect movement, focus on it, then move back into splatter vision all in a second or two. In time you will be able to process a great many things without even coming out of splatter vision (see Exercise 2-4, below). It is all a matter of practice.

With practice, you will also be able to observe things at close range while still keeping track of the larger picture. For example, while talking to a group of students, I am usually aware of what is going on throughout the section of the barn that is within my range of vision, as well as the movements beyond the open door. As I lecture I can see mice scurrying along the rafters and swallows darting for flies above the field. As I talk to someone just in front of me, a corner of my attention notices the cat playfully stalking the golden retriever and another corner picks up the deer just outside the distant treeline. The key is to tell your brain to be aware of things *beyond* the object you're focusing on.

Initially you should use splatter vision only when standing or sitting still. As you become more proficient, you may want to try it while walking along a trail or drifting in a boat on a calm stretch of water. Eventually you may find you can pick up animal movements while walking at a relatively rapid pace. If so, fine, but don't push it too far beyond your level of ability. Take your time and construct a sturdy foundation.

Exercise 2-4: The Edge of Sight

Walk slowly through the woods with your head up and your eyes on the horizon. As you walk, direct your attention to the edges of your

vision. Try to pick up the things that are passing on the outermost fringes—trees, bushes, logs, etc. Then notice that, without moving your head or your eyes, you can be aware of almost anything in your field of vision just by choosing to see it! If you want, you can direct your attention to the ground passing beneath your feet. Or to the trail directly in front of you. Or to any combination of items within your view. It's a little like watching a movie, being aware of everything on the screen of your mind. This is splatter vision at its best.

Take a Closer Look

Looking more closely at things is a fascinating exercise that can very graphically show you how much more there is to see in nature. Once, when Rick and I were having trouble tracking in leaves, Stalking Wolf said to go look at the grass. At first we thought this would be very boring. We couldn't imagine finding anything exciting or improving our tracking abilities in the middle of a patch of grass. But because we believed in Stalking Wolf, we got down on our bellies and did as he suggested.

First we looked at the ground from a distance of about one foot. As we began to notice movements in the grass, we poked our noses into the topmost blades and peered into a new world. As we opened our minds, that world came alive. It was a world we had never really seen. It contained a forest of miniature plants. It was a jungle inhabited by beetles and ants, a place where wolf spiders prowled like mountain lions and moles scraped and lumbered through subterranean tunnels. It was a treasure chest where we discovered lancelike pine needles, mouse teeth curved like mammoth tusks, and grains of sand glittering like precious stones.

In my mind I became an explorer about two inches tall. I armed myself with a straight pin and slid down an embankment. At the base of the embankment, I thought of how I would build myself a leaf hut out of bits and pieces of plants the way Stalking Wolf had shown us in the woods. I felt I could live down there for a long time.

Apparently I did. Rick and I lost complete track of time. After what must have been more than an hour, Stalking Wolf finally thrust an old bony finger into my dreamworld. It looked enormous and out of place. It was pointing to the embankment I had "slid" down to get into Wonderland, and Stalking Wolf was saying, "Old man walk, two days."

It was a track! My little cliff was actually the heel mark of a human being! For so long I had been trying to look at tracks and all the minute forms of nature from five feet above the ground. It was no wonder I had been having trouble tracking in leaves. Getting down on my belly opened my eyes to the details I had been missing—to the worlds I had been walking over every day.

Ever since that time I have been fascinated by exploring the miniature wilderness where the earth meets the sky. Wherever I go now I find fairylands in flowerpots. Even more, once I have really immersed myself in that small world, everything in the "normal" world takes on a beauty and intensity it never seemed to have before.

Exercise 2-5: Small World

Mark off a single square foot of ground (grass, woods, field, desert, seashore, etc.) with string or sticks. First, look at it from a standing position. Notice what you see, and describe the area. Then kneel down and describe it from that vantage point. Notice the things that you missed when you were standing. Notice how the square patch of ground begins to take on more interesting aspects as you get closer to it.

Finally, lie on your belly and explore the enclosed area in detail. Look at it as though you were an astronaut on a strange planet. If you find something in that square foot—an insect, worm, or plant—that captures your imagination, follow it for as long as you like. Then "wander" somewhere else.

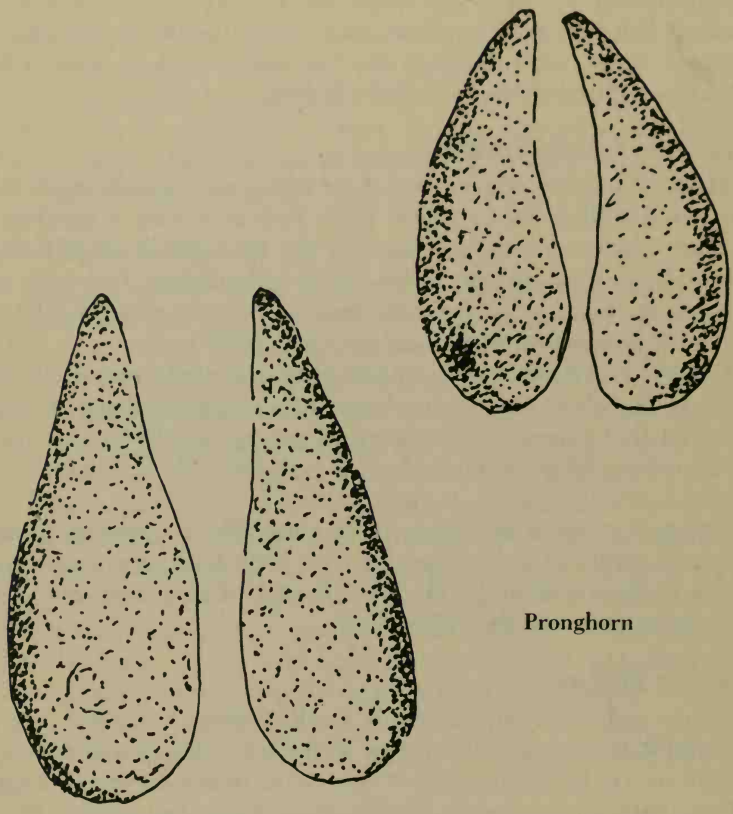
Stay with your exploration for at least fifteen minutes. Once you have become really absorbed, get up and return to your usual vantage point. The landscape should look different now. Don't analyze it, just experience and appreciate the difference.

The Larger Picture

When you focus on something small or close up, there may be a strong temptation to concentrate on it to the exclusion of everything else. This is fine in the beginning, but it can cause problems in the long run. When I was very young I became so fanatical about tracking that I focused mainly on the surface of the earth, and I missed many fascinating things because of it.

One day I became so involved in following a deer's tracks that I failed to look up and notice that the deer had circled around behind and had begun stepping in my own tracks. When Stalking Wolf found out, he asked me to track him. As I followed his footsteps, he backtracked and hid behind a tree, and I passed right by him. I was so intent on the tracks that I didn't look up to take in the larger picture.

I didn't really appreciate the larger picture until I got shot and nearly lost my legs. I was tracking a criminal, trying to read his thoughts and actions in the disturbances left by his shoes. While I was concentrating on his tracks, the man, like the deer before, circled around behind me. Just before the shot rang out, I remembered to look up, and I turned around just in time to catch the bullet in my side instead of my back. Never since have I focused on any one thing for a great period of time.



Pronghorn

Camera Vision

One of the greatest compliments you can pay a photographer is to say he or she has "a good eye." What this means is that the photographer is able to see something unique in a scene that most of us would consider commonplace. He or she has developed the habit of seeing the way the camera sees—of blocking out large portions of the landscape and focusing only on those parts that can be transformed into an interesting subject with a pleasing composition. The limited range of the lens and the flatness of the picture make it important to get rid of confusing elements, and to "see" the scene in a fresh and exciting way.

Photography is excellent practice for nature observation, and I recommend it very highly. I don't suggest you buy a lot of expensive equipment, but if you already have a camera or can get an inexpensive one, you

can use it to help you see nature more freshly. Taking pictures forces you to pay more attention to lines, patterns, lighting, and composition; to search out interesting subjects; and to find the fascinating in the commonplace.

Another exciting aspect of photography is the variety of lenses available. If you look through a "normal" 50mm lens, the world appears much as it does through the naked eye (except for the frame). If you look through a wide-angle lens such as a 28mm, suddenly your field of vision curves, deepens, and broadens. A telephoto or closeup lens, on the other hand, brings you into a much narrower and more detailed environment—sometimes an area too small or far off even to be perceived with the naked eye. Super wide-angle and telephoto lenses literally boggle the mind. We can hardly conceive of the world as it is seen through the eye of a fish or the multifaceted eye of a fly; but certain lenses of weird sizes and shapes also give us access to these visions. Through microphotography we can even see the bacteria on the back of a flea!

Exercise 2-6: Close Framing

Even without a camera you can practice picking out the unusual in your surroundings simply by "framing" your vision through a small hole. When you see something you want to concentrate on, look at it through the hole created by curling your index finger. Move your "lens" around, trying to create interesting patterns. Look at small things close up. Examine surfaces, textures, patterns—whatever interests you. Looking through this narrow "viewfinder" not only concentrates your focus, but cuts out all confusing elements in your peripheral vision. It forces you to look at familiar things outside of their usual context.

Magnified Vision

Another inexpensive way to enter new worlds—in this case, the world of the very small—is to look at things through a magnifying glass. If you view an ant through a magnifier, for example, it's not long before you can actually imagine what it would be like to be that small. You can imagine yourself being the insect as it stumbles over pine needles, drops into inch-deep abysses, and dead-ends on leaves and twigs. What's more, you can see the animal in such wonderful detail—the translucence of the honeydrop abdomen, the rigidity of the encasing armor, and the power of the pincers closing on an insect carcass. The visual wonders seen through a simple magnifying glass are so exciting that I'm surprised people don't carry them around in their pockets all the time.

Exercise 2-7: Ant's-eye-view

With a four-power magnifying lens, look at different animals, plants, and minerals in their natural surroundings. If you are looking at a fallen leaf, get down on the ground to examine it on its own terms. Let your eyes explore its lacy veinwork, its fringes and borders, its serrated edges, the stoutness of its stem. Look at the quality of light reflected from its surface. See how it changes as you move over it with the glass. Then look at the leaf in a different light—perhaps from the underside facing the sun. Finally, let time slip away. Just explore the leaf for as long as you like. Then look at it without the magnifier and notice how differently you feel about it.

Binocular Vision

While magnifying glasses draw us into smaller worlds, binoculars catapult us into larger and more distant ones. The thrill of watching birds through binoculars is not just seeing them more vividly and being able to identify them more easily; it is also the sensation of being out on the end of a branch, paddling through the water, or riding the air—feeling a little of what it's like to be a bird. Regardless of what we are looking at, binoculars offer a unique point of view.

The Eye of the Artist

It is always an exciting experience to discover an artist at work with easel and brushes. Almost invariably when I come across an artist at work, I am treated to a new vision of the world. Where before I had seen only trees, grass, water, and buildings, now I see an original arrangement of colors, textures, shapes, and shadows. Seeing a three-dimensional scene in two dimensions almost gives the scene a fourth dimension. After I have delved into the artist's perception, I can return to the original scene and say, "Yes, I see that now. That's really beautiful."

To a newborn baby or a newly sighted person, everything in the field of vision has equal meaning—that is, none at all. Until we tag names and values onto specific objects, we see everything purely. We cannot tell shadow from substance or color from texture. Everything is seen as a marvelous collage. Once we begin to define our places in the world, it is almost impossible to go back to seeing purely. But we can relive this fresh vision if we calm our minds and allow the veneer of society to dissolve. See the world as it really is—without values, judgments, or preconceptions.

Exercise 2-8: Artistic Observation

Practice seeing things with the eye of the artist. Next time you look at a familiar scene, blot out the context in which you usually see it. Blur your eyes a bit and forget the objects themselves. Look instead for shadows, shapes, textures, colors, and lighting. Let meanings seep away. As soon as you have an inclination to name something, let it become color-shape-pattern-shadow again. See how long you can keep this exercise going without getting caught in names and old perceptions.

Exercise 2-9: Shadows and Spaces

Look at a scene in nature imagining that the shadows and spaces are solid. Instead of focusing on the substance, look at the "emptiness." If you are looking at a woodsy scene, ignore the trees and concentrate on seeing the spaces between the branches and leaves. If you are looking at a bird, notice how the sky wraps perfectly around its head, wings, legs, and feet. If you are looking at a landscape, pay attention to the place where the sky meets the ground and to the qualities of darkness that grow from objects when they are exposed to the sun. Let empty spaces and shadows take on more importance, and see how the objects themselves stand out more boldly.

Seeing Brighter Colors

Colorfulness is one of the most amazing aspects of nature. Anyone who has visited New England in the fall has been delighted by the fiery dance of the turning leaves. Anyone who has visited a rocky seashore on the Pacific coast has probably been treated to the pastel shades of starfish and sea anemones strewn like flowers in tidepools. In the quiet forests we find endless shades of green, varying from the deep hues of pines and firs to subtly colored mosses and the pale translucence of flowing water. Everywhere we go, in everything we see, there is a richness of color for the eyes to feast on.

Exercise 2-10: Appreciating Color

Look at a scene or collection of natural objects with the intention of appreciating its colors. Do not try to understand the scene or associate it with any past experience. Just see the colors for themselves alone. Let your eyes absorb their richness and variety.

Pick out individual colors in the scene and describe them to yourself. You may find this impossible without resorting to emotions, sensa-

tions, and past experiences. You might find yourself using words like warm, cold, light, dark, bland, metallic, earthy, and so on. If so, fine. As you discover your own personal adjectives, the richness of the colors will become even more apparent, as will their beauty and power.

Exercise 2-11: The Dance of Light

In the end, all of the separate aspects of sight—including color, texture, shadow, form, and many others—depend on the quality of available light. This is fundamental to all the visual arts, including nature observation. You must not only be able to see objects more clearly and completely, but also appreciate how they change under different lighting conditions.

Pick an area and watch the dramatic changes it undergoes as it reflects the fast-changing light of a sunrise or a sunset. If you are patient enough to stay in one place long enough, you will witness a complete transformation in the appearance of the area. You will see shapes loom into light or disappear into darkness, colors brighten or blend, shadows grow or fade, and textures deepen or flatten. Use what you learn to become more sensitive to the creations of light at different times of the day. Nothing appears the same from moment to moment.

Listening to Nature's Voices

There is hardly a place on the globe where true silence exists. A "quiet" place is only quiet in relation to a place we consider noisy. Even in a dark forest, if we do not add our own noise to it, there is a symphony of sounds to be heard: the trickling water in a spring, the distant rush of a creek; the falling of leaves and needles; the snapping of twigs; the hum of insects; the calls of birds; the restless wind. All these voices have messages for us. They are heralds of the latest events. All we have to do is listen and learn to interpret what we hear.

Open Your Ears

Unfortunately, sound in the modern world is more often an annoyance than an expression of important news. Most of us, with good reason, have shut down our hearing in order to protect ourselves. We walk down city streets wincing at the sounds of sirens and horns. We wear earplugs at night to weaken the sounds of rock bands and barking dogs. In extremely noisy surroundings, we clap mufflers on our heads to protect us from permanent hearing loss. In short, we concentrate on hearing less rather than more.

I don't blame city people for turning down their eardrums when

they're assaulted by the rattles and screams of "progress." In fact, I can't honestly suggest that you not tune out. What is important is to remember that you can tune in again. A lot of times in the Pine Barrens people think I am hard of hearing when I ask them to repeat something they've said. It's not that I'm going deaf; it's just that while I'm there I am open to the whole array of sounds coming from all directions. Just as my eyes don't stay focused on one sight, my ears don't stay tuned to one sound.

The New Jersey Garden State Parkway, for example, is usually several miles from most of my Pine Barrens camps, but it sounds deafening to me sometimes because I have "turned up the volume" on my hearing. I don't do this because I want to hear the parkway or the dragsters on the fringes of the Barrens, but because I want to hear everything else. If I tune out the four-wheel drives and dune buggies, I also miss the night birds, the deer, the wild dogs, and the rodents that tell me about the flow of life in the area. So the first rule in hearing more in nature is to open your ears to everything.

Exercise 2-12

Pick a natural environment—the woods, a field, the seashore, a grassy park, your backyard—any place you can relax and open up. Sit down, close your eyes, and listen. Concentrate only on hearing. If the area is relatively quiet, listen to the quality of the silence. What do you notice about it? How would you describe it? Is it really the absence of sound, or only a relative quiet? If the area is full of sounds, focus on them one at a time and notice their different qualities. Try to expand your range of hearing to pick up sounds even beyond the faintest one you think you can hear. Do this exercise in varied environments. How would you describe the basic differences between the sounds of a seashore, a meadow, a forest, and a mountain?

Exercise 2-13: The Ear of the Musician

In previous exercises you began to see with the eye of an artist. Now try to hear with the ear of a musician. Instead of saying, "Oh, yes, that's a white-throated sparrow," listen to how beautiful it sounds. Listen to the music it makes. Listen to the wind in the pines without saying, "Wind," and let it be the song that it is. Then you will discover that each tree has a different song each day, and that the so-called "wind in the forest" is not just wind, but a gorgeous array of beautifully orchestrated sounds.

To clarify this idea, sit beside a waterfall or a rushing stream. Relax and close your eyes. Notice even more clearly the variety, subtlety, and complexities of sounds. Listen to them both as combinations and as iso-

lated entities. Hear the sounds-within-sounds and the nuances of tone, pitch, and rhythm that you may have missed before. If you are beside a rushing creek, notice that it is not a single rushing sound that meets your ears, but a symphony of sounds. Within the overall rush, listen to the water also gurgling, flowing, seeping, splattering, and dripping. You may even hear the occasional clack of rocks in the creekbed. The more voices you can hear, the better.

As you become better at picking out sounds-within-sounds, you will better appreciate the complexity of "common" sounds such as wind and rain. You will also begin to notice the sounds of animals you may have missed before among the background noise.

Locating and Amplifying Sounds

After you have really opened your ears, you will want to be able to pinpoint the location of important sounds. The abilities of other animals to do this sometimes verges on the fantastic. Bats thread their ways through the sky on the echoes of their own voices. Whales communicate with each other for distances up to a hundred miles. Even closer relatives such as rabbits, deer, and bear have a hearing ability we cannot begin to match.

However, we can learn from them and artificially recreate some of their natural abilities and techniques. The faces of many owls are shaped like parabolic reflectors to zero in on the subtlest of night sounds. Most mammals (humans being a notable exception) are equipped with relatively large, cup-shaped ears. Some of these ears are enormous in proportion to the animals' bodies. Moreover, they can usually be moved independently in almost any direction. The advantages are obvious. The greater the ears' surface area, the greater the sound-catching capacity. And the greater its mobility, the faster the animal can react to different sounds.

We don't have the native equipment of a fox or a rabbit, but we can use our hands to simulate the actions of a large set of ears. The system is simple: When you hear a sound you want to isolate or amplify, just cup your hands behind your ears and push them forward with the index fingers and thumbs in the direction the sound is coming from. Barely audible sounds will be amplified just as though you'd turned up the volume on a stereo. A distant hum may become a chorus of frogs. A muffled call may turn into a sequence of distinct words. You will actually feel closer to the object making the sounds. And for most practical purposes, you will be.

Orientation

By experimenting with various ways of cupping the ears, you will soon get a sense for how to determine your position relative to a particular sound. You'll probably find that the more you cup your ears—that is, the more you push them forward—the more easily you'll be able to amplify

and orient yourself to sound. When someone calls a dog's name, the dog first looks in the direction of the sound, then perks up its ears. Even if it can't see the person who's calling, it can calculate their location. You can do the same thing by pushing your ears forward with your fingers.

Exercise 2-14: Distance and Range

Determining the distance and range of a sound is a little more complicated; but, as usual, the animals have taught us how to do it. Large-eared animals such as rabbits, coyotes, and deer solve the problem by moving their ears in different directions—one cupped forward, the other slightly down. Owls' ears are automatically oriented in these different directions. Humans can achieve a similar orientation by cupping and moving the ears with the hands—one ear forward and one down.

Pick out a repetitive sound that you can't exactly locate. Turn toward it, cup the hands behind the ears, and slowly push them forward until you have achieved maximum volume and determined the general area the sound is coming from. Then, with one ear cupped forward, slowly cup the other downward and notice the difference. Finally, when the sound seems to be registering in the middle of your head, cup both hands around one ear (almost in a closed circle) and focus on it. This should give you maximum volume and pinpoint the sound's origin. Try this exercise in a variety of places and with a number of different sounds until you can pinpoint them exactly.

Using Natural Echo Chambers

You can hear a lot of faint sounds by placing your ears next to natural sound catches such as trees, rocks, logs, and even thick brush. Sometimes you can even find natural troughs that collect and channel sound. Solid objects are better conductors of sound than liquids or gases. Anytime you go past a big tree or a flat stump, put your head down next to it. Walk around such objects and listen. Like echo chambers and megaphones, they will transmit the messages of the woods, effectively enlarging your ears many times over.

Identifying Sounds

Although you should begin by experiencing the purity of sounds, eventually you will gain much by being able to identify them. As with animal tracks, the best way to learn to identify sounds is to "watch" them being made. You probably know the sound of a robin because you've seen the bird chirping or singing. Most likely you can distinguish the different voices of your friends because you have an association with them that goes beyond the voice. In general, the stronger your associations with a sound, the easier the identification.

Keep this rule in mind as you listen to unfamiliar sounds in nature. Whenever possible, investigate them and uncover their sources. Mentally catalog the sounds of birds and animals you don't know. Notice the specific sounds associated with wind and weather. Sit down and listen at different times of the day, comparing the sounds of morning, midday, and evening in various environments. Learn to stalk (see "Stalking," page 96), and sneak up close enough to the sources of unfamiliar sounds to find out what is making them.

Interpreting Sounds

Stalking Wolf had an uncanny sense of hearing. We could be sitting in camp over a hundred yards from the swamp and he might suddenly grow very quiet and say, "Snake down by water." At first when this happened I would try to mask my skepticism, asking, "Really, Grandfather? What kind?"

Invariably, Stalking Wolf would tell me what kind of snake it was, how big it was, and just where I would be likely to find it. Then I would stalk quietly down to the swamp, sneak up on whatever was supposed to be there, and invariably find just what Stalking Wolf said I would find. He was always right. It seemed that nothing passed him. In fact, every time Rick and I left home for the Pine Barrens we were sure Stalking Wolf could hear us coming as soon as we slammed the back door.

For a man in his eighties, Stalking Wolf's hearing was exceptionally good. But even more amazing was his ability to interpret what he heard. He did not actually hear the snake in the swamp. But he did hear many of the birds and other animals that were affected by it. He heard which birds were scolding and how they were scolding. He heard which animals had grown silent and which ones made sounds that indicated they were intimidated or frightened by something in the area. Sometimes he didn't even hear what was going on in the swamp but could sense the reverberations from an event down there that showed up in the animals around him. The snake, for example, affected not only the croaking of the frogs, but also the activities of the pine squirrel in a nearby tree. And the chattering of the pine squirrel altered the nest-building activities of the warblers and towhees next to our camp. Stalking Wolf could trace this "domino effect" all the way back to its source.

As an Indian scout, Stalking Wolf knew that nothing happens that does not affect everything else, that every animal sends ripples of reaction through the other residents in its neighborhood just like a rock thrown into water sends concentric waves to the far corners of a pond. Some of these signs are auditory and some are visual. But it takes a lot of dedication and practice to be able to read them accurately. I cannot hope to

teach these things in a book. I can only say that if you stay open and curious, listening with an ear for the whole "orchestra," you will eventually piece together the puzzle of sound in the wilderness.

Appreciating Natural Smells

Like sight and hearing, our sense of smell has suffered a great deal from the effects of our lifestyles. Not only are our olfactory nerves "clogged" with soot and noxious gases, but we no longer make as great an effort to distinguish and appreciate smells as we once did. Smell is one of the least necessary skills for modern survival and therefore one of the most neglected of all the senses.

This is really too bad, especially for nature observers, because the wilderness is a veritable treasure chest of aromas. The perfumes of wildflowers, the dank, musty scent of the earth, the sweet smell of evergreen needles, the cool freshness of water—there are endless combinations of molecules dancing in the air, each with the signatures of the animals, plants, and minerals that produced them.

Exercise 2-15: Smells Good

As you begin to rehabilitate your sense of smell, notice that it is tactile as well as olfactory. Breathe in through your nose and feel the air pouring through your nostrils. Sense not only the smells around you, but also the temperature and humidity of the air. How would you describe this sensation? Without naming them, experience the variety of smells in the air. If you can't detect any, explore the area and investigate objects that are likely to produce interesting smells. Notice these different aromas, and notice your reaction to each one.

Exercise 2-16: Good Smells

Gather up a good collection of more or less aromatic items. Foods are always good candidates—lemons, oranges, bananas, peanut butter, and so on. Other pungent things like perfumes and cleansers are also good. But don't go overboard on these. Be sure to include objects that produce more subtle smells like leaves, bark, dirt, grasses, books, paper, and clothing materials.

Now close your eyes and smell these objects, one at a time. For best results, alternate subtle smells with powerful ones, or start with the faintest smells and go on up the scale. If you begin with the strongest, you may overload your olfactory system and be less able to detect the fainter ones later.

This exercise should give you a better idea of the variety and rich-

ness of smells and suggest that your nose is capable of detecting fainter smells than you thought. However, don't be satisfied to do it once. Let it serve as a reminder to use your nose constantly. Let it prompt you to get down on all fours, to smell the ground, to crumble a few aromatic fir needles between your fingers, to forage through animal runs on your belly, and to sniff through caves and hollows like a bloodhound.

Exercise 2-17: Identifying Plant Smells

Repeat the last exercise, this time using only the wild plants found in a single area. Do not pull up whole plants. Use only enough of the plant (a leaf or strip of bark, for instance) to capture its smell. After you have described the smell, open your eyes and identify the plant. When you have done this with enough plants, you should even be able to identify them in the dark.

Identifying Animal Smells

Most animals are very smell oriented. They explore the world as much with their noses as they do with their eyes and ears. I've seen city dogs go half crazy with delight during a drive into the country. If the car window is open just a crack, they lift up their noses and sniff excitedly, taking in all the fresh scents with closed eyes, as though they were savoring the memory of some adventurous past. Who knows what instincts are aroused at these moments? All I know is that it is sometimes all they can do to contain themselves, and I wish that for even a moment I could smell what they smell.

To most animals, smell is also a means of personal identification. Dogs almost always smell each other as they greet and get acquainted, and they can tell a great deal about each other by doing so. Most mammals identify their young through smell. If a cow is separated from her calf, she finds it again with her nose. Humans also have individual smells, though these are often masked by deodorants and perfumes, and it is likely that smell as an identifier used to be a lot more important to us than it is now.

Exercise 2-18

Begin to familiarize yourself with the odors of different animals. Each time you find a den, burrow, or other animal indicator, get down and smell it. How would you characterize the odor? Is it musty, pungent, weak, sharp, or noxious? Is it strange or familiar? Can you identify the animal that left the smell? If you can, then you will be able to detect that animal's presence next time you smell it, just as if you had found a clear track in wet sand.

Make this exercise a long-term habit. As you progress, you will begin to understand just how critical a nature observation and tracking

device the nose really is. You will discover some basic patterns to animal smells—for instance, that all the members of the weasel family (including badgers, weasels, martens, etc.) leave traces of a rather sharp, skunklike odor wherever they go. Bears have a powerful "barnyard" smell. And these odors often linger for a long time after the animal is gone.

Exercise 2-19: Tracing Smells

Get into the habit of tracing smells to their origins. The most rudimentary form of this exercise is when you come home in the evening and smell a pie or a pot roast cooking. You naturally go into the kitchen to take a look. There are lots of different things "brewing" in the woods, too. Next time you're wandering down a leafy path and catch a whiff of some wild fragrance, follow in the direction it seems strongest, and see if you can uncover its secret. Think of yourself as a bloodhound on the trail of some captivating mystery and turn the exercise into a real adventure.

Touch the Earth

Most of us have a real misconception about the sense of touch. We tend to associate it primarily with the fingers, as though the rest of our bodies were inert and unfeeling. The fingers are important sensors, of course, but touch is so much more. Touch is the feel of grainy sand against your feet as you run along an ocean beach. It's the wet and cold that permeates your skin during a downpour. It's the sense of well-being that sinks into your bones when you're lying in the warm sun. It's the rush of exertion and the wind in your face as you thread your way down a ski slope. It's also the sudden shock as you dive into an alpine lake—and the invigorating tingle of nerve endings come alive as you dry off after your dip. It's the oozy feel of a swamp as your legs descend into the rich mud. It's the bite of a fly, the prick of a mosquito, and the brush of a feather. Touch is more than skin deep. It embraces the whole body, creating sensations as violent as an earthquake and as gentle as a summer breeze.

Exercise 2-20: Exploring Body Sensations

Begin to experience the full range of sensation by closing your eyes and mentally exploring different parts of your body. Notice what you feel in your feet, legs, torso, arms, and head. Discover both external and internal sensations. What does the air feel like against your skin? Is it warm or chilly? Do you feel a draft? When you breathe in, what does the air feel like inside your nostrils? Does the place you're sitting feel soft or hard? What does the ground feel like under your feet? What do your clothes feel like against your body? Don't analyze—just relax, explore, and feel.

This exercise is an excellent one that can be done almost anywhere

and anytime. If you are out in nature, though, I also recommend that you shed as much clothing as possible. As I mentioned earlier, most people keep themselves cut off from all but the grossest sensations of nature for fear of discomfort. Part of this is that they wear too much clothing and carry too much gear.

Exercise 2-21: Baptism in Nature

Pick a situation in which you can expose your entire body—without clothes—to the sensations of a natural environment. Use your imagination and do not be overly concerned for your comfort. In fact, choose an experience that you think might be decidedly *un*comfortable. One of the best is to just lie in the rain and let the water splash and wash over you. Try to relax completely. Feel the initial chill, the reaction of the body as skin tightens and goosebumps form. Don't resist your feelings. Don't try to make them different. Just accept them without judgment; and when you have truly given in to them, notice how invigorating it is to be free from limiting thoughts.

There are many other possibilities for this exercise. You might try diving into an alpine lake, sitting under a waterfall, or rolling in a meadow. One of the reasons I recommend this is that anything short of a complete baptism in nature is only armchair observation. If you are truly interested in rehabilitating your sense of touch, getting your feet wet will not be enough. Do this exercise frequently, even at the risk of being thought a fool. The real fool is the person who stays encapsulated and comfortable and misses the feeling of connection with the earth.

Exercise 2-22: Touching Objects

Once you have experienced the body as a total receptor, experiment with tactile sensations in different parts of the body. Wherever you are, close your eyes and reach out to a nearby object. Really *feel* the sensations generated by that object against your hands. Notice its texture, temperature, smoothness or roughness, symmetry or irregularity—everything. Describe these sensations as though you'd never felt the object before.

Now feel the same object with other parts of your body. What does it feel like against your arm, your neck, your cheek, your feet? What parts of the body are most sensitive to touch, and how do the messages from those parts differ from one another?

Once you have thoroughly explored one object, pick another and do the same. If you chose a hard object the first time, this time try a soft one, or even a liquid. Try the exercise with a variety of things, each time realizing more fully the potential of your sense of touch.

Touching Animals

Whenever you get the chance, allow yourself to touch and be touched by animals. Small animals such as beetles, worms, slugs, fish, frogs, turtles, and snakes may be quite easy to touch, and you can learn a great deal from them. Let a beetle, spider, or slug crawl up your arm. See if you can drop your prejudices and just experience the sensation of the animal's "feet" grasping and moving against your skin.

Larger and quicker animals will be much more elusive, and you may not be able to touch them without either gaining their trust, coaxing them with food, or perfecting your stalking technique (see "Stalking," page 96). Some birds, such as the gray jay (also known as the "camp robber" because of its fearless habit of raiding campers and picnickers in broad daylight), will descend very quickly to grab a beakful of granola or peanut butter from your hand. Most often, though, it will take a lot more patience and practice. Rick and I succeeded in feeding small birds only after hours of lying motionless on the ground with outstretched hands. But what we learned when the birds finally descended and pecked at the seeds was well worth the wait.

There is something mystical about touching animals. Just as when we reach out to comfort or shake hands with a friend or to pet an animal, there is magic in a touch if it is done with the right attitude. If we touch an animal with a sense of brotherhood and curiosity, we get back much more than a sensation. At its best, a touch is a mingling of spirits that reaffirms the common bond between all living things.

Feeding the Taste Buds

It might seem that taste would have little to do with nature observation. But just as the woods are filled with varied sights and smells, there are also a wide variety of wild edible plants for the tasting. I hope you have already had the opportunity to sample the lemony taste of lamb's quarters, the spice of wintergreen and wild ginger, and the carrotlike taste of Queen Anne's lace. A multitude of common and easily identifiable treats are available in nature, from delicious wild blackberries to surprisingly sweet grasses and clovers. You can even brew aromatic teas from evergreen needles. And these foods, being fresh, are usually more tasty and nutritious than those we buy in the store.

Even with the great variety of foods available, most of us don't use our taste buds very much. We tend to eat with our teeth, bolting down delicacies as fast as burgers and fries. How can we cultivate our sense of taste? By really savoring our food and staying mentally open to new tastes.

Our attitudes toward food reflect our attitudes toward life. In the Western world we often eat with great haste, consuming food as our cars consume gasoline—rapidly, on the way from one activity to another. In the Orient, eating is more a kind of prayer. There, people often get together for "tea ceremonies" in which the entire purpose of the meeting is to savor and enjoy the taste of the tea. There is wisdom in such a gentle pace. It not only provides for richer taste sensations, but for relaxation and deeper communion with family and friends.

Exercise 2-23: Blindfold Bites

Blindfold yourself and try some familiar foods. Notice how much your taste depends on touch. See how you distinguish different foods and drinks almost as much by texture, thickness, and hardness as by flavor. Notice also how much your taste depends on smell. Plug your nose and taste a few foods. Throughout the exercise, treat each food as a new experience. Finally, do the exercise with the eyes open and notice any differences in sensation.

The Power of Blindfolding

You have probably noticed by now just how much your sensory experiences are affected by your eyes. Most of us rely so heavily on sight that we tend to dampen or disregard the other senses. In this way we allow them to become dulled. One of the most powerful ways to enliven the senses of touch, smell, hearing and taste—and your sense of balance (see "Stalking," page 96)—is to shut yourself off from the world of sight for a while. Without the eyes, your other senses automatically gear up to compensate. Every sense strains, "reaches out" into the darkness to bring you news of what lies in your path.

When Rick and I were boys, Stalking Wolf had us blindfold ourselves for about a week out of every year. During this time, we did everything as blind people do. We built shelters, made fires, tracked, fished, and foraged for food. We not only survived these ordeals, but sharpened our senses tremendously. Each time we got our sight back, we saw the world through new eyes—and afterwards we felt like walking radar towers. Nothing passed us—not the call of a bird or the snap of a twig. Our food tasted delicious. The air smelled more fragrant. The creek seemed to flow more gaily. We felt more alive.

Exercise 2-24: Blindfold Walk

Unravel about one hundred yards of string and establish a "guideline" through an interesting natural environment such as thick woods. Make the course challenging. Attach the string to trees, run it low through

bushes and bogs, stretch it across a small creek—whatever will give you the greatest variety of sounds, smells, and obstacles. When the course is set up, blindfold yourself and move slowly through it, holding onto the string with one hand. Don't grasp the string—just let it run lightly through your hand. Go as slowly as necessary to keep your balance.

The object of this exercise is not to see how fast you can move through the course, but how much you can experience along the way. Take your shoes off and feel the earth with your feet. Stop to explore a tree trunk with your hands. Put your nose into a patch of mosses. Let yourself get tangled in spider webs. Explore everything as though experiencing it for the first time. Notice how discomfort disappears as you begin to trust your senses. Notice how your gait becomes smoother and more flowing. Take your time and enjoy yourself.

I recommend doing this exercise frequently and sharing it with others. It's most effective if those who go through the course have no idea where the string is leading. Then they can experience it without expectations. If you go through it with a group of people, though, emphasize no talking and space the people out far enough so that no one will be distracted by another's movements.

Variations. There are many variations of the blindfold walk. If you're working with a group of people, you can combine the string walk with a quiet experience of smelling, tasting, hearing, and touching. An unblindfolded person can put various natural objects in the hands of the others, or touch them with feathers, sticks, and such. Rocks, leaves, and other forms of vegetation are always interesting to explore with touch and smell. Fruits and vegetables work well when held under the nose or popped into the mouth. Use your imagination!

Combining the Senses

For the most part I have treated the senses independently so you can concentrate on them one at a time. There is value in this at first, just as there is value in drilling on different movements while learning tennis or Tai Chi. But in the full experience of nature, there is no separation. The senses are all bound together.

Combining the senses is a little like finger painting, in which you allow the colors to blend into an all-encompassing image or emotion. Even in the simple act of biting into an orange section, you sense the shape and color of the fruit, the smell of the orange, its soft feel on your palate, the sounds and sensations of the juice in your mouth, the sweet citric taste, and so on. What you experience is not just taste, but a gamut of senses—a blending of taste, touch, smell, sight, and hearing that is much more than the sum of its parts.

Exercise 2-25: "Sensible" Eating

One of the best ways to experience the whole realm of senses is to mix up a big salad with a wide variety of vegetables. Include such things as lettuce, spinach, cucumbers, zucchini, tomatoes, cauliflower, sprouts, and sunflower seeds. Make it a combination of color, smell, texture, and taste that will keep your senses hopping.

As you prepare the salad, pay attention to the colors, patterns, smells, and textures of the various vegetables. Feel the roughness of the cauliflower, the juiciness of the tomatoes, the firm, cool surface of the cucumber and the thin, leathery greenness of the spinach. Look at the vegetables closely after you have cut them and examine their internal patterns. Notice the arrangement of seeds, the texture of the pulp, the differences in the layers, and so on. If you like, use a magnifying glass to look even more closely. Also appreciate the smell of each food and begin to imagine what it will taste like in the salad.

Finally, when the salad is prepared, sit down and enjoy it in a leisurely way. Do not bolt it down as you might be tempted to do at a fast-food establishment. Make it a deliberate, delicious ritual. Notice how the vegetables have been transformed and how their combination in the salad makes them look even tastier. Savor the smells and flavors of each bite. Listen to the different sounds as you chew, and pay attention to the different sensations on your tongue. Most important, realize you can eat this way anytime you want.

Pet Rock

Some years ago a small group of people made a fortune selling "pet rocks." It wasn't so much the rocks that people were buying as the novelty of looking at them as pets. Exploitative as the idea was, thousands of people got acquainted with rocks as never before.

Nobody has to tell a rock climber what it's like to know a rock. His life depends on it. When scaling a cliff or perched on some airy ledge, the climber is acutely aware of every crack and fissure in the rocks around him; and if he is an expert, his movements bring him into a very personal harmony with them. Most of us don't have the ability or inclination to get to know rocks in this way, but we can all get to know a "pet rock"—without paying money for it.

Exercise 2-26: Pet Rock

Find a rock that appeals to your senses and sit down with it in your hands. Explore it with all your senses. Roll it over in your fingers. Look at it, hold it up to the light, examine every dent and bulge. Hold it to your cheek and feel its coolness and texture. Hold it to your nose and smell it.

Tap it on the table and listen to what it sounds like. Get to know it so well you could recognize it anywhere. Then, for good measure, mix it with other rocks of about the same size and see if you can pick it out by feel. When you're done with this exercise, pick a much larger rock—say, a boulder that you can scramble up—and spend an hour or more exploring it.

Exercise 2-27: Total Observation

As a final sensory exercise, pick a natural object in some quiet spot and sit down beside it. Choose a common object such as a rock, a leaf, a branch, or a clump of grass—something you might normally pass by. When you are comfortably seated beside it, explore it with all the senses. Scan its surface with your eyes. Appreciate its colors, textures, and lines. See it with the eye of the artist, noticing its shape, shadows, and hollows. Look at it from different angles until you are familiar with it in all its aspects.

As you look at the object, imagine what it would feel like. Then close your eyes and explore the object with your fingers, face, arms, feet, etc. Next, imagine what it might sound like if you tapped it or stroked it. When you have an idea, put your ear to the object and listen. Touch it in different ways to produce different sounds. Notice what parts of the object sound hollow, soft, hard, or rough. Appreciate the "music" of the object, and notice how touch and sound are bound up together.

Next, put your nose to the object and smell it. Take in its aroma and allow it to permeate your mind. If the object is something you can safely taste, do that, too, noticing again the close bond between taste and touch. If not, just "taste" the object with your imagination.

Now expand your awareness of the object to include its surroundings. Connect it with its environment by closing your eyes and listening to the sounds around it. See it in your imagination surrounded by these sounds. Then feel the air—its temperature, humidity, and movement. Smell the natural scents around your object, and imagine them encircling it.

Finally, open your eyes and allow your view to spread into splatter vision. Take in all the movements around your object, from insects and birds to branches and leaves. Glance at other objects in the area and see their connection with yours. Place your object visually within a wider context. Imagine how it came to be where it is. Give it a good home. See how it relates to the air and the earth and the plants and animals around it, including yourself.

Night Awareness

A number of sensory exercises are especially useful for improving

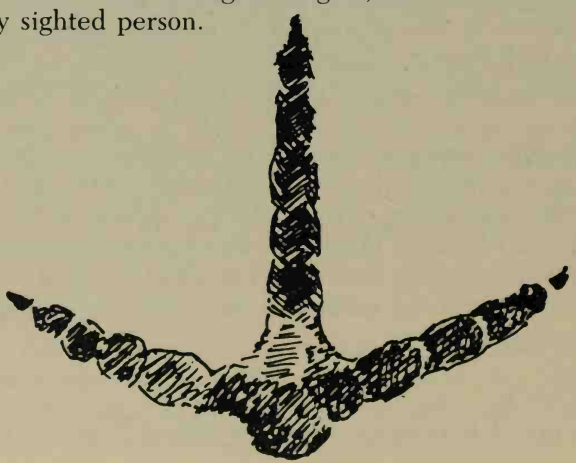
your ability to travel, see, and understand nature at night. One of the greatest is the blindfold exercise. Not only does it improve your balance and stalking ability, but it also enables you to travel through the dark with much less effort. Instead of groping for the next step, your body becomes sensitive to every little branch and tuft of grass.

Another useful exercise for night awareness is splatter vision. Unfocused peripheral vision is such a help in identifying things in the dark that it's phenomenal. Part of the reason for this is that the area of the retina most sensitive to dull light is located outside the area of sharp focus. By glancing across the landscape with splatter vision, you maximize the use of that area.

In conjunction with splatter vision, the use of the horizon at night is also very important. While trying to find your way or to see animals in darkness, bend down low and try to silhouette everything against the horizon. That way, you can pick out animals, trails, and other important landscape features much more easily.

In dull light, the sense of hearing becomes much more important, so focused hearing should be used frequently during your night travels and nature studies. One thing that will help you with this is to first determine which way the wind is blowing. Like smells, sounds flowing with the wind are carried more easily, whereas you'll have to listen more intently for sounds coming against the wind.

Finally, don't neglect the sense of touch. A person who has gone through many blindfold exercises can much more easily pick out trails and identify trees and plants at night. Even the blind need not feel handicapped in observing nature. A blind student in one of my survival classes started a fire without matches using a bow-drill, made himself a shelter from sticks and leaves, and learned to identify many trees and edible plants by touch and smell. Using his fingers, he could also track almost as well as a fully sighted person.



Wild Turkey

3

TOWARD A DEEPER AWARENESS

In the previous chapter I mentioned the idea of "finger painting" with the five senses—letting them all blend together to form images and emotions that cannot be experienced through one sense alone. Another idea I mentioned was thinking of the body as a giant receptor. Useful as these concepts are, they do not even begin to suggest our potential for absorbing more of nature's messages. A human being is not just a body with sensors and a central switchboard. It is also a mysterious fountain of emotion, intuition, and imagination. In this chapter I want to explain how you can dive beneath the surface of the five senses into the ocean of the subconscious, gaining access to even deeper levels of awareness.

The Four Veils

When Rick and I were still quite young but had begun to understand that there was a lot more to nature observation than meets the eye, Stalking Wolf tried to explain to us the idea of oneness. Using his hands, as he so often did to express things beyond our understanding, he spoke of oneness almost as a physical place we could get to if we had the patience to travel far enough. He described it as a place where we would feel intimately connected to everything around us, where nothing could move without our sensing it, and where we could do nothing without feeling how it affected everything else.

"Grandsons," he began, "for the gift of oneness you must pass through four veils." His hand moved softly in the air, painting the veils on an invisible canvas. From what I could tell, they were like curtains or weeds—fragile passageways separating four levels of consciousness, each one deeper than the one before. "You live now," he said, "in the world of the first veil, the world of the altered."

In other words, what Rick and I considered a normal state of consciousness, Stalking Wolf considered abnormal. He explained that seeing things from our current point of view could only give us a very limited picture of reality. He said we could get a full picture only by passing through all four veils to the deepest level. As far as Rick and I could understand, moving through the first veil would put us in a state of peaceful relaxation. The second would take us beyond the physical body. Beyond the third veil we would begin to sense the harmony and balance in all creation. And once we had passed through the fourth, we would feel no separation between ourselves and anything else.

It has taken years for me to understand the implications of Stalking Wolf's lectures on the various levels of consciousness. Trying to teach oth-

ers what he taught me has been one of the most difficult challenges of my life. However, the explanation has become easier in recent years because of the discoveries of modern science. It is now widely recognized, for example, that there are four basic levels of consciousness—called Beta, Alpha, Theta, and Delta—and these, I believe, roughly correspond to the levels of awareness that Stalking Wolf was talking about.

Conveniently, each level has certain characteristics. First is Beta, which most of us consider a normal waking state. To my way of thinking, though, Beta is quite abnormal. It is characterized by movement, activity, and surging thoughts. The mind is preoccupied, often agitated and in a state of flux. In the extreme, Beta is aggressive and belligerent. It would be very difficult to fully experience nature in such a state. A person who is agitated may be prepared for sudden action, but he or she cannot concentrate on shifting patterns and sounds or absorb subtle nuances of smell and bodily sensations. Such things can only be experienced when the mind is relaxed.

This relaxed state is called Alpha. It is characterized by internal calm and quiet. It is a state in which one is free of tensions and anxieties, unconcerned with the body, and alert to new stimuli. Science has found Alpha to be the mental state that is most conducive to learning. The mind is concentrated and sensory perceptions are greatly heightened. The body is relaxed. Healing powers are increased. Although most of us probably experience Beta more often, I consider Alpha to be the most natural state of waking consciousness. Not coincidentally, it is also the state of relaxed alertness that most people reach after several days in the woods.

The third state of consciousness is called Theta. Since it is normally reached in the moments just before sleep, most of us don't experience it vividly enough to remember it. But with discipline it can also be attained while fully awake. It is characterized by extremely heightened senses, intuitiveness, and even paranormal activity. It is the state of awareness in which artists, philosophers, scientists, and inventors make their greatest creations and discoveries. It is also the state in which you may automatically solve various problems of daily life. In nature observation, Theta is the state in which a person opens up to wordless communications and intuitively senses the patterns and connections in the flow of life.

Finally, there is Delta, the deepest state of consciousness. Very little is known about this state, since very few people are able to reach it while remaining awake. Modern science describes Delta as a deep, dreamless sleep, but yogis and other masters who have reached it through deep meditation have described it in much the same way Stalking Wolf described the vision of oneness. I believe it is the area of consciousness approached by a shaman. For those who have experienced it, there is no sensation of separateness, but a blending of the self with all things. The

vision is powerful and overwhelmingly beautiful, and it is only reached through extreme sacrifice and asceticism.

It is interesting to catalog these different levels of consciousness, but it should be remembered that they are not entirely separate from each other. Like the five senses, they operate simultaneously and are bound together so intimately that it is often difficult to tell them apart. It is very possible, for example, for the mind to be deeply relaxed or even to experience an intuitive flash while the body is engaged in physical activity. It should also be remembered that it is not necessary to understand these different levels of consciousness in order to experience them. They are the birthright of every human being, and what they have to offer is beyond words.

Relaxation

In the simplest terms, deeper awareness begins with relaxation. In my classes there are always people who walk through the forest and seem to see every moose, bear, opossum, and flea that happens by. These same people can sit down on a stump, blend in with their surroundings, and within minutes have animals of all description scrambling over their feet. Other students seem out of touch. They sigh and fidget, feel agitated and bored, and see almost nothing. These people have not cast off their Beta mentality. They wear it like a heavy cloak. Surging from one thought to another, they are unable to slow down and settle on their surroundings.

There are many general techniques that are used by modern physicians and psychologists to help people slow down. Some are physical, some mental, and some are a combination of the two. I have tried many of these and would like to pass on a few that I have adapted for nature observation.

Exercise 3-1: Tension Release

Lie down on the ground (on an insulated pad, if it's cold or wet out) and close your eyes. Now systematically tense all the different parts of your body. Tense the feet for three to four seconds and immediately let go. Next tense the calves, then the thighs. Work on up the body, tensing and relaxing each muscle group. Imagine you're squeezing the anxieties out of your body like water from a sponge. Do the stomach, chest, neck, and back—all the way up to your scalp and facial muscles. Finally, after you have attended to each area, tense your whole body rock-hard. Then allow yourself to "sink" into the earth. Feel that there is no beginning or ending, no difference between your own skin and that of the planet. Relax so completely that you feel every dent and fissure beneath you. In your mind, melt into the ground and become one with Earth Mother.

Exercise 3-2: Body Onceover

Go over the body in much the same way as with the previous exercise, but this time without flexing any muscles. Start by imagining your left foot. Explore it mentally, noticing any tensions or other sensations. Monitor both internal and external sensations. When you have finished with the left foot, do the same with the right. Then move to the left ankle. Imagine the bones, ligaments, and tendons coming together there, and allow yourself to feel the sensations coming from that area. Don't try to evaluate or resist these impulses; just notice and allow them to be.

When you are done with the ankles, do the calves—again, one at a time. Then concentrate on the thighs, hips, and buttocks. When you've finished with these, concentrate on your internal organs—intestines, liver, kidneys, heart, lungs, and so on. You should find yourself getting new impulses from many of these areas.

Next, do the fingers and hands, then the joints and bones of each arm. Also mentally travel up the spinal column from the base to the neck. Then explore the neck and throat, both inside and out. Let your imagination penetrate each section slowly and completely, like a soothing liquid. Finish up with the face, scalp, eyes, and brain. Notice how much more relaxed you feel when you're done.

Exercise 3-3: Countdown

Pick a natural environment that you find pleasing and sit or lie on the ground. Relax and close your eyes. Feel the comforting earth beneath you, and feel your connection with it as though through an invisible umbilical cord. When most of the tension has left your body, take a few deep breaths and sigh deeply as though deflating a balloon. Let all limbs go limp. Then—very slowly—count backwards from twenty-five to zero. With each successive number, allow yourself to drop into deeper and deeper levels of relaxation. Follow the numbers in your mind as if they were markers leading to the bottom of the ocean.

The effectiveness of this exercise depends a great deal on your ability to imagine yourself becoming more relaxed, so include little suggestions along the way. Count very slowly and use relaxing imagery to help you go deeper. Imagine yourself lying on an ocean beach, sinking into an ocean of calm, or into a pile of soft feathers. Or imagine your body becoming one with the earth. Whatever helps you let down is fine. When you reach the number zero, you should be completely and totally relaxed. (If you want to go even deeper, you can either repeat the exercise or start from fifty and count backwards.)

Now, while you're "down there" in a state of total calm, without

any thoughts, just experience the sounds and sensations around you—the pattern of the wind or rain, the scents in the air, the feel of the ground. If any thoughts come into your head, don't fight them. Just acknowledge them and let them go.

Finally, when you are completely relaxed and feel ready to come back, count slowly to five and open your eyes. There should be no tension, and you should feel a deeper attunement. In this state, gaze at your surroundings. Allow your eyes to fall on grasses, trees, sky, and flowers as though you had never seen them before. Don't label or describe anything. See the environment clearly, like a reflection on the surface of a glassy lake.

When you are comfortable with this exercise, try it with your eyes open. As you get better at it, you'll be able to use it to relax even while walking or involved in other activities (see "Walking Attunement," page 90). With frequent practice, it will put you quickly into the Alpha state anytime you choose.

Meditation

The most effective way of attaining a deeper awareness is through meditation. Meditation is not religion, though it is often an important part of religious practices. It is simply a way of calming the mind and body to achieve a greater feeling of oneness with the self and the world. There is nothing complicated or difficult about it; in fact, it is the ultimate in simplicity. It is a peaceful release—a letting go of the cares and concerns of modern living and a return to the core of one's being from which one gains increased power, wisdom, and direction.

Whatever form it takes, experts have found that there are four simple elements to effective meditation. First is a comfortable body position; second is a receptive attitude; third is deep relaxation; and fourth is concentration. The previous three exercises are partly a means of introducing you to these elements. Usually it's easier to relax when you're sitting comfortably on the ground. However, this isn't always necessary. You can meditate effectively while walking or even running (see "Walking Attunement," page 90). "Receptive attitude" in this case does not mean passiveness or mindlessness, but an openness and desire for deeper realms of experience. Meditation has nothing to do with falling asleep!

Concentration. The fourth key ingredient in meditation is a point of focus, something to affix your mind to. Without focus, the mind wanders and the emotions follow aimlessly behind. A classic example of this is the sudden realization that you've been reading a book but can't remember anything about the last two paragraphs because you began thinking about something else. In our living rooms, we can easily go back and

reread the missed section, but in nature the "paragraphs" we pass over cannot always be read again. We miss once-in-a-lifetime wonders while our minds are wandering over their own personal landscapes.

There is no depth the mind cannot reach if it stays focused for a sufficient length of time. Like a magnifying glass in the sun, if its rays remain concentrated on a point, it is capable of creating great warmth and light. But concentration is a fragile thing, and most of us cannot hold it for very long.

One of the most delightful stories I have heard about developing the powers of concentration comes from a wonderful book called *Beyond Words*, by Swami Satchidananda. In this story, a man asks a sorcerer to produce a demon that will do anything he wants. The sorcerer agrees, but warns the man that if he does not keep the demon busy, it will devour him. Convinced that he has enough work for a lifetime, the man asks the sorcerer to summon the demon.

Soon the demon arrives, and the man asks it to build him a huge palace with the finest furnishings. In a few minutes the demon is done and awaits the man's next command. The man then asks the demon to provide the palace with scores of servants and a fleet of fancy cars. In an instant the work is done and the demon is back asking for more work. Next the man asks for food, and the demon instantly produces a gourmet meal fit for a king.

At this point the man begins to get upset. He realizes that he may not be able to think of enough things to keep the demon busy.

"Quick!" says the demon. "Give me some work, or I'll devour you!"

The man thinks of some other things, but only enough to buy him some time. Then he rushes out the door. In his flight, he comes upon a holy man and begs him to keep the demon from devouring him.

Unperturbed, the holy man plucks a curly hair from his head and hands it to the man, saying, "Give this to the demon and tell him to keep it straight."

Just then the demon arrives, demanding more work. The man gives him the hair and tells him to keep it straight. The demon straightens the hair between his fingers. But no sooner does he let go than it springs back. Each time he straightens it and lets go, it curls up again, keeping him endlessly occupied. Thereafter, when the man has some work he wants done, he takes the hair from the demon and gives it back to him again when the job is done. That way, the demon is always under control.

The demon, of course, is a symbol for the human mind with all its surging passions, preoccupations, worries, and regrets. Like a monster, in moments when it is not productively occupied, it threatens to devour us, tearing apart our lives by chewing on past and future events and destroy-

ing the purity of our "now" moments with its incessant ramblings and interruptions.

To see nature clearly, we must learn to control our "demons." One of the best ways to do this is to provide them with curly "hairs" such as that provided by the wise sorcerer. A "hair," or mantra, is any repetitive thought that allows the mind to drift into a state of receptive neutrality and relaxation. One such tool is the sequence of numbers used in *Exercise 3-3*. Another might be a calming word repeated over and over in your mind, such as "relax" or "peaceful." It might even be a simple prayer you find particularly soothing. It hardly matters what you use, as long as the repetition of it frees your mind from random thoughts. Remember, though, the mantra is not an end in itself. This repetition should not be done in a mindless way, but with a sincere desire to make contact with deeper levels of awareness, or the "higher self."

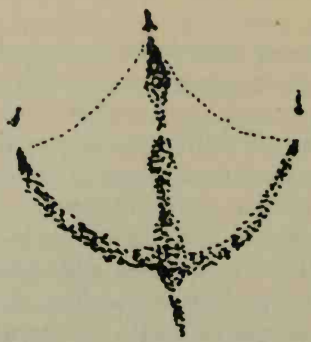
Exercise 3-4: Concentration Through Repetition

Choose a word or phrase that you find especially relaxing. Sit in a comfortable position with your eyes closed and concentrate on mentally repeating that word or phrase for at least fifteen minutes. Pay attention only to the words, allowing yourself to drift into a deeper state of relaxation as you concentrate. If thoughts come into your mind and you discover the "demon" taking over, let them pass and gently nudge yourself back to your word. Notice how often your mind tries to interrupt. Do not be impatient, though. If you do the exercise regularly, it will become increasingly pleasurable. More than that, it will develop the powers of concentration that are so critical to a deeper connection with nature.

Exercise 3-5: Concentration Through Observation

Now let's apply this concentration technique more directly to the natural world. Find a flower, plant, rock, or other interesting natural object and sit down comfortably with it in front of you. Relax your body and look at the object. For the next fifteen minutes, let the object be your only occupation—your point of focus. If your concentration is broken by wandering thoughts, simply notice them, let them go, and return to the object.

As with the previous exercise, at first it may seem almost impossible to keep your mind on a single object for fifteen minutes. It will probably put up a terrible resistance, bucking and rebelling like an untamed colt. If so, notice how it tries to gain control. Don't resist it. Just treat it gently and nudge it back to its task. Finally, when the stream of words has stopped, you will pass almost imperceptibly into a new realm of consciousness—a realm of peace and silence in which words have no meaning.



Herring Gull

Subconscious Perceptions

Once you begin to control your mind, you will be amazed at your ability to "shut down" the mental turmoil and increase your concentration. You may even begin to pick up messages that go beyond the five senses—for example, detecting the presence of a nearby animal before actually seeing or hearing it. Many is the time I've been walking quietly through the woods and felt suddenly compelled to look in a particular direction, only to stare into the face of an owl or a deer or a weasel. For me, these are fascinating moments. It's as though the animal had reached out with the long arm of its spirit and tapped me on the shoulder.

Yet I do not consider such things supernatural or even particularly unusual. In fact, most people at one time or another have "had the feeling" that somebody was watching and turned around to discover it was true. Many have even had what they consider to be psychic, extrasensory, or mystical experiences. I believe the only reason we consider these things strange is that most of us are so cut off from our natural roots that we no longer experience our full sensory potential.

Brain waves have been monitored for years on various machines, and I believe they are also transmitted through space. It is a scientific fact that matter and energy are interchangeable. Even physical bodies are composed of energy bundles. Animals and other living things, I believe, are like beacons of vitality that cast the light of their presence far beyond their physical bodies. Such "light" can be detected by anyone who is sensitive to its wavelength.

Our ancestors knew the importance of subconscious perceptions in nature, just as animals know their importance. In fact, anyone who spends much time in the woods in situations where his or her life is on the line will very quickly begin to trust these deeper feelings. In the Pine Barrens,

for example, where Rick and I grew up dealing with wild dogs that would happily have torn us apart, we became so sensitive to their presence that we sometimes knew they were around even before anything logical gave them away. Even today, when I start trembling in the Pine Barrens for no good reason, I immediately suspect that dogs are near. Only later do I hear the confirming rustles of other animals, and only after that do I hear the stealthy approach of the dogs themselves.

There is an increasing body of scientific evidence to support the idea that our subconscious minds have access to an almost unbelievable panorama of experience. I have read numerous accounts of patients whose subconscious "reservoirs" were accidentally stimulated during brain surgery and who recounted—in amazing detail—events that occurred many years in their past.

One account in particular sticks in my mind because it has such powerful implications for our potential to sense the unseen in nature. A man whose brain was stimulated during surgery (while under local anesthetic) suddenly remembered a fishing trip he had taken with his father some twenty years before. Since the operation was long and tedious and required the patient to be conscious and talkative, the surgeon encouraged the man to recount his experience.

The man relived the whole episode with the same emotions he had had as a boy. He described the boat, his feeling about being on the water with his father, the smells and birdsongs in the air, the clothing he and his father were wearing, a book his father was reading—right down to the button missing on his father's shirt. When asked, he was even able to count the number of planks in the boat and to "read" passages from the pages of the book. In fact, he recounted everything just as if he were actually there experiencing it firsthand. Most amazing of all, he described things he had not even consciously experienced, including three deer that he "knew" were coming down to the shore to drink—in spite of the fact that he could not see them! After the operation, the amazed father confirmed the story in every detail, and his son's account brought back to him many things he thought he had forgotten.

One of the important lessons in stories like this is that our subconscious picks up and stores incredible amounts of information that do not register on our conscious minds. Our every experience is imprinted there, just as though it were all photographed in living color and stored in film canisters in hidden archives. All we need to do is open the right doors and the projectors start running automatically.

Another way of looking at this is that the Beta mentality, our "normal" waking state of consciousness, is like the choppy surface of the sea, buffeted by rapidly shifting winds. Most of the time we're so busy dealing

with the winds and waves that we think that's all there is. We don't stop to look into the deep ocean beneath. But once we reach into those waters through meditation, we suddenly have access to both past and present moments in a fullness we may never have experienced.

The second important lesson in these operating-table accounts is that impressions of past experiences don't come back in words, but in pictures and feelings. That's why I so often tell my students when they are trying to recall an experience, "Don't think back—*feel* back." That's a good thing to remember. Allow your entire being to recall the experience and the emotions that went with it. If the picture is tied to powerful feelings, you will be able to relive the event almost exactly as it originally happened.

The "sixth sense" has far deeper applications than just detecting the presence of other animals. While experimenting with deeper states of awareness in my nature observation classes, I have discovered that about seventy-five percent of those students who can relax sufficiently are actually able to determine the edibility and medicinality of unknown plants—even with their eyes closed.

I do these experiments in a very systematic way. First I take my students through a guided meditation in which I indicate that they are going back to the land of their ancient ancestors, to a place and time where their instincts were finely honed survival tools. While my students continue to relax their minds and bodies, I go out and pick a variety of plants—some edible, some poisonous. I then put plants into the hands of those who seem to be in the deepest states and ask each one in turn, "Is this plant edible?" "Is it medicinal?" "What part of the body does it affect?" In asking these questions I purposely divert my own mind to an entirely different subject—say, purple elephants or subterranean whistle pigs—to avoid influencing their reactions with my own thoughts.

The results are almost always the same. An average of three out of every four answers are correct, and some groups get all the answers right. Once in the Pine Barrens, in fact, I picked plants that were exotic to the United States and my students correctly answered every question about them.

Afterwards I sometimes interview students to find out what sensations they experienced. They are almost identical to my own. The answers come not in words, but in feelings. With the poisonous plants, there are unmistakably strong impulses such as nausea or high anxiety. With those that are edible come sensations of warmth, calm, and well-being. If the plant is also medicinal and I ask what part of the body it affects, my students usually have a sensation of warmth in the eyes, stomach, or whatever part of the body the plant would actually benefit.

Of course, I finish these sessions with a warning that such meditation is no substitute for positive identification of a plant with reputable guidebooks. I also warn my students, as I do here, that the exercise itself is potentially dangerous and should not be done by anyone who is untrained. Nevertheless, the point is made: We have not even begun to tap our mental resources.

The implications of experiments like this are amazing to most people. Yet to me they are logical extensions of the senses given to all animals. How do herbivores such as woodchucks and rabbits so infallibly feast on succulent herbs and grasses and avoid poisonous plants? How do dogs and cats know they will get the vitamins and minerals they need by chewing on particular plants? Of course they are guided by their senses (which are usually far more attuned than ours), but they are also guided by instinct and intuition. So are we. It's just that most of us are so removed from the soil that we don't even know we have these powers—until we're faced with life and death situations that draw them to the surface again.

Imagination and Intuition

As some of the above exercises might suggest, two more important ingredients in attaining a deeper awareness of nature are imagination and intuition. Imagination is nothing more than the ability to form mental pictures. Sometimes those pictures are entirely made up. More often they are bits and pieces of reality fitted together in new and unique ways. Children, with minds unbound by society, are especially imaginative. They love to "make believe," and they often create wonderful worlds of fantasy. But imagination is not just fantasy for fun. Professional artists such as painters, writers, dancers, and musicians are also blessed with active imaginations—or more commonly have managed to hold onto them. Inventors and scientists also use their imaginations to make new discoveries and perceive deeper realities.

This last fact has especially important implications for nature observation. Albert Einstein, one of the greatest scientific minds of this century, used to say, "Imagination is more important than knowledge." Einstein's own imagination allowed him to penetrate so deeply into nature that he revolutionized our way of looking at the universe. By mixing knowledge with vision, he launched himself on an intuitive journey that took him light-years beyond human perceptions. Inventors, by tinkering and concentrating on a problem long and hard enough, eventually create things previously unheard of—incandescent light bulbs, internal combustion engines, wireless communicators, and computer chips containing whole libraries of information.

Scientists and inventors make their discoveries in strikingly similar

ways. They often spend weeks, months, and years gathering information about a problem and trying out possible solutions. With each attempt they learn something more, and each time they change their methods or ingredients in a way they think might solve the problem. Sometimes they hit on the answer by accident. But far more often the solution comes almost unasked for in a moment of calm. Out of the blue, it seems, they are hit with a sudden insight.

The same thing happens with nature observation. For example, one of my instructors had been trying for days to identify a certain bird with a high-pitched, repetitive call. He gathered all the information he could about the bird. He made a mental note of where he heard it, listened to the changes in its voice, and tried unsuccessfully to stalk up and see it. Finally, after he had almost given up, he dreamed about the bird in his sleep. He saw it on the ground, pecking for ants and grubs. He noticed its long bill, the black "whiskers" on its face, the rust-colored feathers in its wings and tail, and the undulating pattern of its flight. In his dream, my instructor recognized the unknown bird as a flicker—a bird he had seen many times before, both in books and in the wild. He might have logically figured out its identity while he was awake. He had all the necessary knowledge. But in this case he had to let the facts simmer in his deeper consciousness before the answer would come through.

Most often such insights will come through while you are in a state of deep relaxation or in a dreamlike state where the subconscious is free to express itself without the static thrown up by the conscious mind. However, if you are attuned well enough, intuitive thoughts will bubble up even while you are active and awake. That is one of the goals of relaxation and meditation.

Partly through such exercises—but more through the sheer act of living in the wilderness for so many years—Stalking Wolf became a master at shutting himself down mentally. He was able to relax into very deep states while retaining full awareness of what was going on around him. Often when I looked at him he would seem very far away, as though he were lost in some distant world. Yet he never used drugs to achieve such states, and he was never so far away that he didn't hear what I was saying. I now believe that what he was doing was periodically going "inside" to check himself against the flow of everything around him. And at other times he would allow his awareness to "spread out," as though he were merging his own thoughts and feelings with the impulses of the surrounding woods.

I believe Stalking Wolf could consciously drop into a Theta state of consciousness whenever he wanted, and I have no doubt that he often drew power from the Delta state. Although I don't believe I can dive as

deeply as Stalking Wolf did, I have often experienced nature without the constraints of the body, and it is one of the most exhilarating experiences a person can have. The first time was when I was twelve years old, lying in a field under the stars with Rick, waiting for the deer to return and feed. I described that experience in my first book, *The Tracker*, as follows:

We lay for an hour looking up into the black, star-filled sky until at some point, although I never closed my eyes, I was no longer lying in a field. I had become part of a pattern that the stars and the breeze and the grass and the insects were all part of. There was no awareness of this until I heard the first deer coming through the grass. Then I was suddenly aware that I had been lying there without thoughts or sensations other than just being.

I had felt like that before, but I had always reasoned that I had just dozed off, but it had been hours since I had been aware of myself, and yet I knew everything that had gone on around me. I had heard the rushes and lulls of the crickets and had seen a bat and a nighthawk go across the stars. But I had not made the distinction between what was happening and myself. It was the second wonder of the night, and I felt my body tense with the anticipation of the third.

. . . Above me the stars seemed to be singing, weaving spells of invisibility. I believe now that while we were lying there in that field, we had so immersed ourselves in the pattern of nature Stalking Wolf always seemed to be watching that we were truly invisible to the deer and could have lain in the same position at high noon without being seen.

Many times since that night I have become so relaxed that I have lost track of any bodily sensations—and so can you. You will know when you reach this "place." It is like slipping beyond the bounds of time into a dreamlike but paradoxically hyper-conscious state in which you feel like an all-encompassing eye. But it is much more than a sensory awareness, because there is no feeling of a "self" that is separate from the things you are observing. You feel one with all. Sensations too distant for bodily awareness begin to sift like winds through the recesses of your consciousness. The mind "dissolves," and like molecules dancing on the air, the awareness drifts and spreads into the sky.

At times the "I" seems to be lost among the stars, and you feel from your vast new vantage point that you must be sensing as complete a oneness with nature as any human can. Even after returning to a more "normal" state of consciousness, you continue to feel the environment as an extension of yourself. The animals, plants, trees, and rocks are not the separate entities they were before. Instead, they seem more like the limbs

of your own body. You feel a natural respect and love for them. You feel their joys and pains as your own. You feel the scars on Earth Mother that have been inflicted through thoughtless deeds, and you are moved to do what you can to heal them.

Empathy and Humility

If the above experiences seem strange and far afield, let me express them in simpler terms. Any time we put ourselves in another person's shoes, we know a little of what it is like to be that person. Any time we share in the joy or pain of another, we go beyond the bounds of our limited selves into the universal realm of oneness.

In nature observation, before you can reach such a state of understanding with animals (much less with plants or minerals), you must have a certain humility. You must respect other life forms for themselves rather than for their human uses. You must become selfless enough to see that other living things have wants, needs, and rights not so different from your own. You must be willing to acknowledge the connection between you and that plant or you and that animal—and from there, to embrace the inescapable conclusion that whatever is done to the earth is also done to yourself. In its highest form, this awareness asks you to be responsible not only for your own property and your own family, but to the entire planet and the family of all living things.

Learning humility and empathy is not an easy task, especially in our industrialized society. Rather than nurturing these gentle values, we are encouraged to feel proud and superior, to use the gifts of nature without giving back, to cultivate our separateness from Earth Mother, and to exercise our "dominion" over plants and animals. At best, we are taught to "appreciate" nature, as though it were merely a scenic attraction and not the source of life itself. Contrast these values with those of the native American, who literally worshipped the earth, who knew its creatures so intimately that he could mentally "change places" with them, and who understood in his heart and soul that his own survival depended on their continued well-being.

The values of pride and separateness are deeply woven into the fabric of our society, and they are not easily challenged or uprooted. Nor do I believe we should try to attack them or tear them out, for that would only give them more power. As with any mental habit, it is best to change slowly and gently, nudging in a new direction without being too judgmental.

I have found that the most effective antidote to pride is an extended stay in the wilderness, living on its own terms. There is no way that false pride can stand up to the demands of survival. Paradoxically,

such an experience can instill a healthy respect for one's human powers while also teaching the values of humility and empathy.

There are other things you can do, too, whether you're in a vast wilderness or a city park, that will help to nourish these values. One is to let animals be your teachers. The best way to do this is to stay in an area long enough for the animals to get used to you. Then they will begin to trust you and resume their normal activities. Many wildlife photographers have discovered they can get much better photographs if they concentrate on gaining an animal's trust rather than chasing it down. In fact, I have heard of several cases in which photographers have been accepted as members of herds of bighorn sheep and allowed to mill about among the animals at will. This does not surprise me, but such respect for animals cannot be faked. They can always sense your real feelings.

Another thing you can do is talk to animals. It does not matter what is said; it is the feeling that is important. A pair of barn owls habitually roosts at the top of the silo in my barn, and sometimes I climb the ladder to talk to them. I don't go up very often and I don't make them any offers of food, because I don't want to take away their wild instincts. But after many visits I can now get almost close enough to touch them. I move very slowly and talk to them gently and they know that I mean them no harm. They sit together on the cross beam watching me, sometimes cocking their heads 180 degrees so that one eye is directly over the other. Then they turn to each other curiously as if to ask, "Do you talk to humans?" There is no doubt that you can have meaningful conversations with animals if you keep an open heart.

Exercise 3-6: Tree Sit

Another humbling experience is to sit in a tree for a while. Pick a sturdy tree—preferably one that is close to water and animal feeding areas (see "Seeing More Animals," page 38). It need not be a tall tree, and I don't recommend that you go any higher than you can safely climb. The important thing is to get to a place where you can wrap your limbs around the trunk and take it easy. (Be sure to secure yourself to keep from tumbling out.)

The tree sit is a powerful exercise for several reasons. It gets you up off the ground into a very different world. It changes your vantage point. It also makes you less conspicuous to animal residents and gives you a good view of the surrounding countryside. From a tree you can detect movement to a far greater radius than while standing or sitting on the ground. But most important, it gives you a chance to imagine what it's like to be a tree.

Sit in the tree for at least half an hour—better yet, an hour or even

an entire day. While you are there, concentrate at first on relaxing. Close your eyes. Feel the wind carry you back and forth. Allow your mind to become disembodied and blend with the tree. Let the wind sift through your own limbs and imagine the "sap" moving through your own veins. "Become" the tree. Become timeless and aware of everything around you.

Exercises such as this are especially effective while trying to hunt or photograph animals at close range. If you can successfully "become" the tree (or rock or bush or stump), you will be invisible to most animals in much the same way that Rick and I were invisible to the deer in the field. In fact, I once read a journal account of a cavalry lieutenant whose men were attacked by Indians they had seen and mistaken for small boulders on an open prairie!

Most animals are so highly attuned that they can sense a person's intentions from quite a distance. This is not magic, nor is it all extrasensory. In fact, we are fairly good at it ourselves. We can easily tell the difference between a troubled, anxious person and a person who is at peace with him- or herself. Facial muscles, body carriage, skin color, and brightness of the eyes all speak volumes about a person's state of mind. If even civilized, sense-battered humans are alert to such things, you can safely assume that wild animals are even more sensitive to them.

I also believe that many animals (partly because they are incapable of sophisticated thought and mental turmoil) spend most of their time in relatively deep states of consciousness. This gives them access to even sharper perceptions. Unless you can enter into and blend with their world, you cannot hope to get closer to them. On the other hand, if you can treat animals with the love and respect that comes from truly knowing them, you may experience some amazing things. A case in point is Sally Carrighar, a nature writer who developed such a rapport with wild animals that they regularly gathered outside her cabin and came to think of the area as a kind of sanctuary. One day, when a hawk swooped down to grab a grouse, a number of birds and animals actually took refuge inside her cabin.

Exercise 3-7: Animal Role Playing

It stands to reason that, if you want to know where to find deer, one of the best things you can do is to imagine you're a deer and ask yourself where you would get the things you need. Go ahead and try it—survey the landscape and imagine what things you would do if you were a deer, rabbit, grouse, or frog. Better yet, actually get down and "be" that animal. Listen, see, and smell from the animal's point of view. Imagine what predators you might have to fear, and what differences that would

make in your movements and activities. You can discover tremendous amounts about animals this way. Adaptations and habits that were once mysteries will suddenly jump into the light of understanding simply because, for a few moments, you had the humility to cast off your human skin.

Ruffed Grouse

Exercise 3-8: Journey With a Blade of Grass

As a matter of fact, you have the imaginative power to "become" anything you want. Look, for example, at one of nature's most humble creations—a long blade of meadow grass. Notice how it rises out of the ground and curls over toward the top. Notice its color, how the stem enfolds the blade, how it sways in the air, and what other plants and animals live nearby.

When you have examined that blade of grass in fine detail, allow yourself to close your eyes and "become" the plant. Let your consciousness relax and flow into the blade of grass. Let it fill the plant completely. Now gradually explore your new body. Become conscious of your roots sinking deep into the soil. Be aware of your stem supporting its long green leaf. Feel the fluids and nutrients being absorbed, rising and spreading to every part of your body. Feel the exchange of gases with the air and the chemical processes going on inside.

Still playing the plant, take a trip through the seasons. It is springtime. Everything around you is fresh and green. You can feel the morning sun evaporating the dew from your body, and you sense the stirrings of animals in the warming soil around your roots. A breeze sifts through the meadow, brushing over you and the other grasses like a gentle, giant comb. You sway with them in a concert of movement, first one way and then another, back and forth with the whims of the wind. When the breeze quiets down, you sense more secretive movements—rodents in nearby tunnels, and the scuttlings of spiders and insects.

It is summer. A tassel of seeds now adorns the top of your stem. A grasshopper lands, gets a foothold on your stem, and begins climbing up-

ward. You bend slightly as the insect makes its way toward the seeds. Finally, with a sudden jerk, it jumps, spreads its wings, and is gone.

In the next moment, a large animal approaches. You can hear it padding lightly through the grasses as it comes closer. It is a fox. Its feet come down on either side of you as it trots through the field. Its body pushes you over as it brushes by and disappears. In the direction of travel it leaves a narrow swath of bent grasses, and a single reddish hair now clings to your blade.

It is fall, and it is raining. Everywhere the heavy droplets descend. They patter down relentlessly on the meadow, and you can feel them hitting your body. Some of them roll to the tip of your blade and hang there for a moment before dropping to the ground. Others hit your stem and spread downward, coating you with a soothing coolness. Suddenly the wind picks up, sending you bending and swaying in the midst of a violent gust. But you have no fear of breaking. You flow with the force of the storm, exulting in its power, singing like an instrument as the sky whistles on through the seasons.

Finally it is winter. The earth is frozen, and your energies burn like cool embers in your roots alone. Under a gray sky, the first snowfall begins. The flakes tumble down in a flurry, covering the meadow with a thin film of translucent cold. At first the crystals melt as they hit your body. Then they accumulate and you bend under their weight as they collect on your blade and stem. Slowly the flakes build from the ground, rising upward as you are weighted down from above. The cold bed grows thicker until you and the other grasses are completely covered with a blanket of snow. All is quiet. Now only the scurrying and scratching of rodents can be heard as the meadow animals make their final adjustments to the onset of winter.

Obviously, a blade of grass does not sense all of the things suggested in this exercise. We don't know for sure just what it does sense. But we do know what we can see of it—that it is rooted to the meadow for life and that such things as I mentioned do happen to it in the course of a normal year. To some extent, then, we can imagine what it might be like to be a plant. The point of all this is not to play a childish game, but to use your imagination. The object is to become childlike enough to drift into a different state of consciousness.

The Sweat Lodge

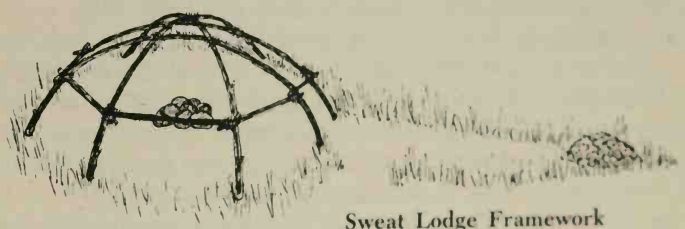
One of the most powerful tools for attunement that I know of is the native American sweat lodge—a small, dome-shaped hut once used by Indian tribes everywhere for purification and religious ceremonies. The lodge consists of a simple framework of saplings with an opaque covering

to keep in the heat and make it completely dark inside. A number of large, red-hot rocks are placed in a central pit, and hot steam is created by pouring water over the top of them.

On one level, the power of the lodge comes from the steam itself. Like a sauna, it is both relaxing and purifying. But on a deeper level, the power of the lodge comes from the mental and spiritual attitude of the individuals within it. Without exception, the tribes that used the sweat lodge treated it not just as a bath, but as a sacred ritual. In my classes I use an "unblessed" lodge primarily as a pathway to purification and deeper awareness. In this way, it can be of benefit to anyone, regardless of his or her spiritual convictions. However, the lodge should always be built and used with the utmost respect for the traditions behind it. (One explanation of the ritual of the sweat lodge can be found in *The Sacred Pipe: Black Elk's Account of the Seven Rites of the Oglala Sioux.)*

Traditionally, the framework for the sweat lodge is made with six to eight pairs of eight- to ten-foot saplings about an inch in diameter at the thick end. (Willow is best, but many others will do.) These are first placed upright in the ground around the circumference of a seven-foot circle. One approach is to clear a circular area and mark it in the center with a stake; then use a string from the stake to determine the positions of the saplings. Holes for the saplings should be about six inches deep and can be made with wooden stakes.

The first two saplings mark the entryway. These are placed in the ground about two feet apart on the east side of the circle—the side of the rising sun. Two more saplings are placed on the west side in identical fashion, and two hoops about four feet high are formed by twisting or tying together the ends of each sapling pair. After the entry corridor has been formed, the framework is completed with four to six more pairs of saplings joined at varying angles to the first two. These can be lashed to the original two pairs to give the structure more stability.

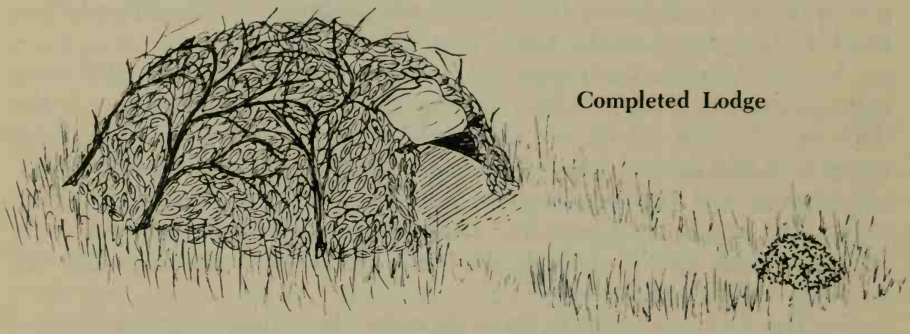


Sweat Lodge Framework

Next, a pit is dug in the very center of the circle—about a foot deep and wide enough to accommodate a two-gallon bucket of rocks. (Traditionally, of course, a bucket is not used.) The central hole symbolizes

the center of the universe, the abode of the Great Spirit, and the soil taken from it is used to make a "Sacred Path" or "Good Road" that ends in a large mound about six feet from the entrance. This mound symbolizes the earth. A few feet beyond this mound is the sacred fire, which is used to heat the rocks.

Once the pit is completed, cover the framework with canvas, old blankets, or a thick sheet of opaque plastic. Secure the cover well around the base of the dome so the lodge will be completely dark and no steam will escape. To insure a well-insulated lodge and absolute darkness inside, add a layer of straw, hay, leaves, or forest debris—but do not use live materials if at all possible. You may also wish to add an interior matting of boughs, grasses, or leaves for more comfort on the floor.



Completed Lodge

The ceremonial rocks (symbolizing both the earth and the indestructibility of the Great Spirit) are gathered from a high, dry place—never from a riverbed or any other water source. Rocks that have been immersed in water for a period of time sometimes explode when heated. For the same reason, it is also wise to stay away from quartz and flint. When you find a good source, gather about two dozen grapefruit- to cantaloupe-sized rocks and bring them back to the lodge site.

The rocks are heated on a carefully laid, very hot fire. Traditionally, this fire is made from eight to ten feet east of the "Earth Mound" and symbolizes the life-giving power of the Great Spirit. It is usually made with two layers of logs. The first layer is laced with kindling and combustible material, and the second is laid crosswise over the top of the first with another lacing of kindling. A dozen or more rocks are placed on top of the second layer, and the whole structure is finally enclosed with more logs, forming a tipi structure. The fire is lit from the east and is allowed to burn for an hour or more until the rocks are red- to white-hot and ready for use.

To place the rocks in the central pit, the Indians used a sturdy wooden fork, adding each rock with great reverence and ceremony. Bear-

ing this in mind, I hope I may be forgiven for suggesting the use of a pitchfork or shovel and a sturdy-handled, untreated steel bucket. Though less ceremonial, it is more convenient for nonreligious purposes, and it allows the rocks to be placed quickly and with less danger of anyone being burned. With this method, the rocks are transferred directly from the fire to the bucket; then the bucket is carried to the lodge on a pole (by two people) and lowered carefully into the pit.

Once the rocks are in place, participants enter the lodge with little or no clothing, taking special care to remove any jewelry that might get hot and burn the skin. On entering, they crawl clockwise ("sunwise") around the pit until all are comfortably seated. (A lodge six feet in diameter can comfortably accommodate four to six people.) An attendant on the outside hands in a bucket of water and a sprig of cedar, sweetgrass, or sage to serve as incense. The leader checks to see that everyone is all right, then has the assistant close the entry flap so that it is completely dark inside. After a moment of silence or an offering prayer, the leader produces a blast of steam by pouring the first dipper of water on the glowing rocks. More water is added at regular intervals until the rocks have cooled or until the attendant outside says that time is up.

Cautions: While inside the lodge, take great care not to touch the rocks or to allow flammable materials to touch them. If a burning material fills the lodge with smoke, open the entryway and allow it to clear. Check often to make sure everyone is all right. To protect your health, do not take a sweat bath if you have high blood pressure or if you have recently taken drugs of any kind, including alcohol. Do not stay in the lodge longer than twenty minutes, and do not take more than three sweat baths per week until you are used to them.

There are many ways of taking a sweat bath. However, the only way I can recommend in all conscience is the way of the Indians—treating the lodge as a place of thanksgiving and prayer. Leave your cares behind. Discard your problems with your clothes and enter the lodge wearing a weightless cloak of humility. As you experience the darkness, think of the womb of creation. As you gaze at the glowing rocks, think of the warmth and joy of life. If you talk, speak softly of things that will bind you and your friends more closely together. Listen to the hissing of the rocks. Feel the steam penetrating your body and draining away all that has blocked your vision. Chant a little or sing a quiet song. And when the rocks have ceased their talk, leave the lodge quietly and relish the vision they have given you.

Whenever possible, I locate my sweat lodges beside a stream or swamp so that those who enter can go for a refreshing dip afterwards. Alternatively, you can use a bucket of water to cool off and wash away the

perspiration. In any case, you will probably feel very relaxed after the sweat. You may even feel a glow beyond words. Take time to savor that feeling. Stay quiet and calm. Sit down, take a slow walk, look up at the stars—whatever seems right for you. Let your heart be filled with the spirit-that-moves-in-all-things.

Vision Quest

Another powerful tool used by the native Americans to achieve deeper levels of awareness was the vision quest. Like the sweat lodge ceremony, it was far more than a tool. It was a sacred rite of passage in which young Indians searched for their protective spirits and their lasting relationship to the tribe. It was also used by medicine men and shamans to search for answers to tribal problems. In this ritual, the participant reached into the deepest realms of his or her mind and heart. Sometimes the visions gained were very powerful and important, such as Plenty Coups' dream of the eventual disappearance of the buffalo. More often they were simpler realizations having to do with personal identity. But whatever visions might be attained, the experience of the quest itself was very profound.

Many Indian tribes called the vision quest the "little death," because to them it symbolized dying to an old way of life and beginning a new one. The individual typically found a "good medicine area"—a spot that felt good to him in his heart—and spent four days there within a "sacred circle" about ten feet in diameter. He would have no extra clothing, no diversions, no friends (although quests were often guided by the elders of the tribe), and no food. He would have only the circle and himself. Cut off in this way from most outside stimulation, the individual was forced to look within.

I have experienced and guided many vision quests, and although each one is unique, I have noticed a general pattern with most of them. At first the eyes focus on the beauties of nature and the mind delights in the unknown. But with no place to go and nothing to do, the circle soon becomes monotonous. The day grows boring and tedious. Hunger sets in, but there is nothing to eat. The mind shuffles through all the old thoughts, but there is nothing that truly entertains or satisfies. The emotions run in fright through a series of ruts and depressions in an attempt to hold onto familiar bearings.

But finally these hungers weaken and die. Old shackles loosen. There comes a time when the body no longer calls for food, and the mind grows weary of the same old thoughts. Finally the mind makes way for a confrontation with the true self—the self without pretense, without habits, without memory, without chains and restrictions. The outer husk of

life, with all its trappings and pitfalls, finally breaks open and falls away, exposing the light of the inner being. And it is such a beautiful light that all negative thoughts are cast into the realm of illusion.

Before reaching this stage, people often feel a very strong temptation to end the vision quest. Afterwards there is no such urgency. Time and place are all one. The greater reality is within. As the world outside is illuminated by that inner light, the smallest things become precious—the song of a bird, the visit of a mouse, the waving of a branch in the wind. There is no longer any need for entertainment. Everything is sensed freshly, without the blinders and mufflers of society. The illusions of life are replaced by a new sense of identity and purpose, as well as the power to fulfill that purpose.

The vision quest should not be taken lightly, nor should you embark on it without the guidance of an experienced teacher. But you can experience many of its fruits—without fasting for four days inside a ten-foot circle—just by using its general principles.

One of these principles is solitude, an experience that few people allow themselves these days. Most people fear aloneness because they do not want to face their inner selves. Instead, they busy themselves with entertainment and trivia. Yet it is only by being alone with ourselves that we can begin to find the inner peace and harmony that leads to a sense of oneness with nature.

Another aspect of the vision quest that you can easily experience is the "good medicine area." Whenever you visit a wild place, keep your heart open to spots that may "call out" to you. It might be a mossy rock, an inviting tree, or a shaded glen. Wherever you get a good feeling, stop and sit there a while. I have never regretted doing so, and I have come away with some precious and fascinating gifts.

Exercise 3-9: Night Sit

As a means of tying together the concepts presented in the last two chapters, there is nothing better than a lengthy "night sit." Just before sunset, go out and pick a "good medicine area" and watch the day come to a close. Listen to the afternoon move toward evening. Watch the clouds travel as the light grows dim. Feel the wind pick up and listen to the bird voices.

As the sky darkens, relax and tune in with all your senses. Notice the first stars. Feel the embrace of the night air. Look and listen for the signs of animals making their night rounds. See if you can become so relaxed that you sense their presence before you hear them.

If you stay long enough in one spot, you will probably experience some of the early sensations of the vision quest—boredom, anxiety, and

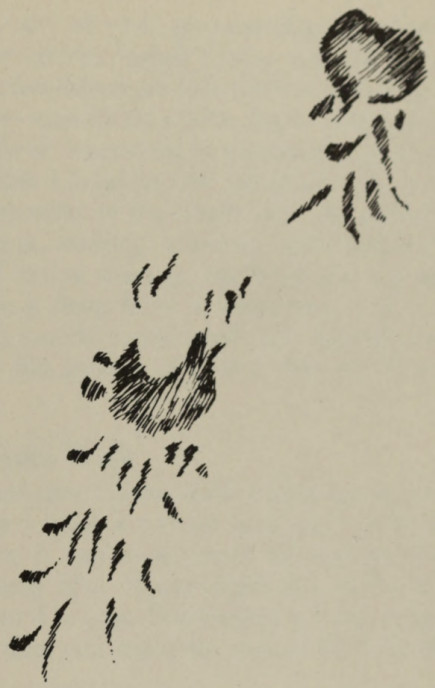
fear. If so, allow them to come and go. Watch the kaleidoscope of emotions as though you were only a spectator. Stay long enough in your area to feel enmeshed in the web of life—the animals, plants, minerals, and winds that populate your little part of the planet. Stay long enough to feel your connection to them and the wonder of your journey together as the earth continues its endless spin among the stars.

Spiritual Observation

In this chapter I have outlined some ways of reaching a deeper attunement with nature. While reading and doing the exercises, I hope you have begun to discover more of your own mental potential and to feel its deeper spiritual roots. I do not talk of spirituality here in a traditionally religious sense, but as a natural capacity we all have for a closer connection to life. Such a capacity is by far the most important tool in nature observation, and it is impossible to teach, for it is our birthright and only waits to be awakened.

It does not matter how the awakening comes. Many things may help. But no philosophy or set of exercises should be taken as a prescription for deeper awareness. Truth is all one. The traditions of the native Americans are very helpful because they grow out of a long and intimate contact with nature. But I could just as well focus on the traditions of many other peoples. In fact, I believe that almost anyone who lives close to the earth for a long time must eventually arrive at the same foundation. Whatever form his or her philosophy may take, it must reflect the simplicity and oneness that are the roots of all existence.

Finally, I want to emphasize that spiritual observation is not some mystical, magical thing that is peculiar to medicine men and shamans, but something latent in all of us. Many great writers, artists, and religious leaders have turned to nature for solitude and inspiration throughout the ages. Yet those who have expressed it so freshly—people like Emerson, Thoreau, Muir, Burroughs, Carson, and others—are basically no different from you and me. The thing that empowers them is not so much their genius as their joyful awareness of life and their ability to see nature as it is, reflected clearly in the deepest levels of the mind and heart.



Grasshopper

4
MOVEMENT AND CAMOUFLAGE

In nature, many of your greatest discoveries will be made while sitting still, but it would be foolish to stay sedentary all the time. There's too much tempting landscape on this earth to spend your life sitting on a stump. Besides, you may be on a hike, hunt, fishing trip, or in any number of situations where movement is a necessary part of your experience.

In this chapter I want to talk about ways of moving in the woods that are logical extensions of the quiet "sits" described in previous chapters—ways of walking, stalking, crawling, and climbing that will not only keep you from frightening animals, but heighten your senses while allowing you to maintain a deep level of relaxation. I also want to show you how, by combining careful movement with natural camouflage, you can blend so well with the pattern of nature that you become practically invisible.

Exercise 4-1: Coyote Walk

Let's ease into this chapter with a little coyote walk. (The coyote is the Indian trickster.) Find a natural area and stride through it at your normal walking pace. If you're on a trail, follow it just as though you were starting out on an easy hike. If you're off-trail, walk through the area in a way that seems natural to you. Don't pay any more or less attention to the things around you than you normally would. Walk for about two minutes and stop.

That's half the exercise. The second half is almost as simple. Take a deep breath and relax your body. Then return by the same route—at *one tenth* the pace you went out. If you were walking four miles an hour (a rapid but very common city gait), slow to less than half a mile an hour on the way back. If you were walking two miles an hour (a "normal" gait for most trail hikers), slow to less than one fourth of a mile an hour. At this pace, it would take an hour to walk once around a patch of ground only slightly larger than a football field.

When I start this exercise in the Pine Barrens with my students (most of whose gaits are halfway between the speed of sound and the speed of light), I can hear not only the closeup crashing of their feet through the scrub oak and pines, but I can see all the birds and squirrels and other forms of wildlife dive for cover as the stampede begins. Sometimes I can even hear the distant sounds of deer that have been bedding down by the swamp. Even they are alarmed at the rumbling confusion and have taken off in sudden flight.

By contrast, as my students relax and return more slowly, the

frenzy subsides and the woods again take on their normal routine. Towhees poke their heads out of the leaves. Warblers resume their trilling. Pine squirrels peek curiously from tree branches. More than that, my students seem absorbed in their surroundings. They begin to notice things like the dance of the sunlight on the leaves, the colors of flowers, the fragrances in the air. They notice how the earth feels beneath their feet and how leaves lick at their legs. They begin to meet the flow of the woods.

The reason for this is so simple that I sometimes feel like shouting it from the rooftops—and I would if I thought it would do any good. The flow of the woods is not the flow of the second hand on a watch or the flow of traffic on a highway. Roaring down a highway at sixty miles an hour, you're not going to experience the countryside no matter how frantically you try to see it; you're only going to experience what it's like to be roaring down the highway at sixty miles an hour. Similarly, if you're racing along a trail or crashing through the brush, you can only experience the blurred swath directly in front of you.

Fortunately, most of my students get the message. On the return leg of the coyote walk, they realize they've tricked themselves into seeing how much they miss by moving so fast. I greatly enjoy watching them come back into camp after this walk because it is so clear from their faces that they have lost something (namely, their habitual frenzied pace), and thankfully they do not spend any great amount of time trying to find it again until they return to the city.

Use this exercise as a frequent reminder in the woods. Do it especially when you get to a trailhead or fishing spot or other wild area after traveling in an automobile. Remember, the car may have brought your body to the area, but you're not really there until your senses and spirit arrive—and they may be several hours behind.

At first it won't be easy to walk at a snail's pace, but if you force yourself to slow down when you enter the woods, you'll be richly rewarded. Ask yourself, "What do I see?" "What do I hear?" "What do I smell?" "What do I sense?" Take the time to experience your surroundings. When you feel the highway ringing in your ears and the clock nagging you on, fight that civilized frenzy. Become a tortoise. Remember: With nature observation, the fastest way to get there is to slow down!

Exercise 4-2: Walking Attunement

Once you've slowed to a snail's pace, you'll be partway into the next step: walking attunement. Relaxation will do you little good if you can only keep a sense of calm while sitting or lying on the ground or while visiting the peaceful recesses of your mind with your eyes closed. You

should carry that attunement with you wherever you go.

One way to practice doing this is to try a walking variation of the Countdown (see Exercise 3-3, page 66). Walk slowly and count backwards from twenty-five to zero as you go. Get into a quiet rhythm, letting a new number flash into your mind's eye every three or four footsteps. Concentrate on becoming more and more relaxed. Dwell on every number, letting each one represent a stepping stone to deeper awareness. Visualize the numbers boldly and brightly to keep them foremost in your thoughts. Don't let anything get in the way of your counting and relaxing.

Walking attunement is more difficult, since you have a lot more distractions than when your eyes are closed. But don't be discouraged. Just let the distractions dissolve as you did with the unwanted thoughts, nudging your mind back to the numbers. Then, when you have a calm, centered feeling, allow the moving world to enter your consciousness again and see how differently you perceive it.

If this exercise seems too mechanical, there are many other ways you can trigger a dynamic attunement. Concentrate on feeling the air against your skin, or the ground underfoot. Mentally repeat a calming word or phrase as in Exercise 3-4, page 69. It also helps to remove constricting clothing and to walk in bare feet or very light footwear.

The City Shuffle

Just as a domesticated horse walks and runs much differently than its wild counterpart, we move much differently than our aboriginal ancestors. Evidence for this can be found in the following statement from *The Gospel of the Redman*, by Ernest Thompson Seton:

In 1882, at Fort Ellice, I saw a young Cree who, on foot, had just brought in despatches from Fort Qu'Appelle (125 miles away) in 25 hours. It created almost no comment. . . . The Tarahumare mail carrier runs 70 miles a day, every day in the week, carrying a heavy mailbag, and he doesn't know that he is doing an exploit. . . . A Hopi messenger has been known to run 120 miles in 15 hours.

These feats were not unusual. In fact, it was not uncommon for an Apache boy to be able to run three hundred miles nonstop.

Even many aged Indians had an endurance that makes our modern day marathons seem like child's play. When Rick and I were about fifteen years old, we left with Stalking Wolf for a campground about twenty miles away. We didn't think the distance was particularly great, so we decided to run. We started off at a healthy jog, and Stalking Wolf (then in his nineties) jogged right alongside us. Not only did he keep up with us, but

occasionally he berated us about how sloppy and citified our gait had become after spending so much time in school.

After ten miles, Rick and I were getting very tired. At sixteen miles we had to sit down, and Stalking Wolf passed us giggling. We got up and started walking after him. We watched his footprints, hoping they would slow down or stop somewhere. A few times they did, but only in places where he had detoured to pick a few herbs. Three miles from camp, we saw plumes at the toes of his footprints, indicating that he had broken into a fast run. The plumes never got smaller. By the time we got to camp, Stalking Wolf had built a shelter and a fire and was already cooking the greens he had picked.

Part of this amazing ability, of course, is conditioned endurance. But a lot of it is also technique. Since removing our feet from the soil, we have spent most of our time on flat floors and sidewalks. We no longer have to concentrate on the landscape because there's not much to trip over and no vegetation that forces us to refine our movements. In adjusting to these flat surfaces, we have developed a lurching, unbalanced gait that is very tiring and unhealthy. I call it the city shuffle.

The city shuffle is not as easy as it might seem. Consider: First, we hold our heads down, looking toward the ground. Very rarely do we look up; and when we do, it's usually to make sure we don't walk into a building. Second, we lean forward and commit our weight long before we take the step. Consequently, our legs are constantly trying to catch up with our bodies. Third, we clomp along the pavement in a wide stance—heel first, feet splayed, ankles inward. Moreover, we do most of the work with our calves, pushing off heavily with each step and lunging forward in long, jerky strides. The result: flabby thighs and buttocks, low-back problems, fallen arches, aching feet, and very little seen other than the stretch of concrete directly ahead.

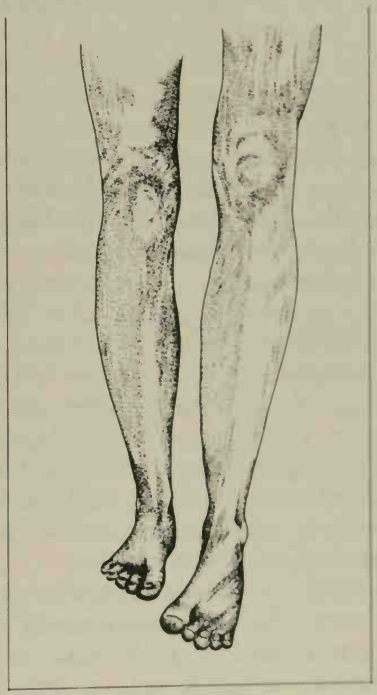
Mother Nature did not mean for us to walk this way, and it becomes strikingly evident as soon as we leave the sidewalk. When we take the city shuffle back into the woods, we suffer all kinds of unexpected mishaps, from bumping and tripping over roots and rocks to sprained ankles and broken legs. Even more commonly, we clomp along a trail this way expecting to see some wildlife and then wonder why nothing shows up. Not only do we blind ourselves to what's there by looking down all the time, but we scare all the wildlife with our thrashing and pounding.

The Fox Walk

The healthiest and quietest way of walking in the woods is what I call the fox walk. The fox is a very confident, energetic walker with an almost cocky spring to its step. If you ever look at its tracks in snow, you'll

see that they are strung out in a delicate line, one paw placed almost directly in front of the other. This is a gait well worth imitating. By doing exactly that, the Indians learned to walk so lightly that they were hardly more conspicuous in the woods than the fox itself. With practice, you can do the same thing.

To do the fox walk, hold your body upright instead of leaning forward. This way you can easily maintain balance and stop quickly at any time. Face the horizon instead of looking down. Let your feet become your eyes on the ground, and use splatter vision to take in the rest of the landscape. Take short, easy strides, feeling the ground with each step. Lift and place each foot gently, one almost in front of the other. Instead of coming down heel first, come down on the outside of the foot and roll to the inside before committing your weight. Lift the feet with the thighs rather than pushing off with the calves.



Fox walk: come down on the outside of the foot and roll to the inside.

The fox walk is a little like prancing, and it has lots of benefits. It strengthens the feet, straightens the back, gives added stability, and allows you to walk much more quietly. No longer do you plow a one- or two-foot swath through the countryside; instead, your path is narrowed to

little more than four or five inches, allowing an easy, flowing passage through thick vegetation.

It is no accident that the fox walk (or a variation thereof) is the walk most universally recommended by martial arts experts, practitioners of yoga, and those who deal with body alignment in the modern health professions. That's because it's natural. It is the way we were designed to walk. It is the way our ancestors walked for millions of years before we came out of the forests onto the sidewalks of the modern world. Back in the woods you almost have to walk that way in order to get through uneven terrain. And the more time you spend there, the more natural it will seem—especially if you concentrate on improving it.

I use the fox walk almost everywhere for general travel except when approaching animals or when I want to conceal myself. As I stroll down a forested trail, I usually fox walk at about a mile an hour or less, gazing in a relaxed way at everything around me. My eyes become beacons, flashing in and out of splatter vision in a wide half-sphere. One moment I see raccoon tracks down by the creek, the next moment a jay hopping on a tree branch. I may sweep over to where a fox spent the night in the grass, then up to the clouds above the treetops.

If I'm off-trail, I do the same thing, only more slowly. At night, the fox walk leaves me free to ramble while I watch for the movements of owls, nighthawks, and the thousands of animal signs that cannot be seen or heard by day. I don't worry about obstacles or tripping or losing my way. My feet have learned to "see," and so can yours.

Exercise 4-3: Trail Walk

Take a fox walk along a trail without looking down at your feet. Gaze up at the horizon and move as slowly as necessary in order to maintain form and balance. Imagine you have a bowling ball between your legs; that will get you walking on the outsides of your feet. Carefully lift and plant each foot, coming down gently on the outside and rolling inward before you take the next step. Keep a narrow stance, placing the feet almost directly in front of each other.

If you ever feel insecure about taking the next step, or if you hit an obstacle with your foot, "feel" your way ahead without looking down. Even though your gaze is fixed on the horizon, you should be picking up an impression of the trail ahead. As your walk improves, your body will "remember" these impressions and move in response to the changing landscape. Do this exercise until you are confident you can maintain the fox walk on almost any trail without looking down.

Exercise 4-4: Off-trail Walks

Now try the fox walk away from all trails and thoroughfares. Do it on varied terrain with an assortment of vegetation. I suggest you do this with bare feet. Get a good feel for Mother Earth. Walk through sand, dirt, mud, brush, pine needles, desert, meadow, and forest. Really feel the ground, and let the terrain dictate your pace.

Exercise 4-5: Fox Run

When you are comfortable with the fox walk, try the fox run. Lift the feet even higher while maintaining an upright body position and looking straight ahead. Hold the arms in close to the body without swinging them, and keep the upper body as motionless as possible. You should eventually be able to run so smoothly that you feel like you're gliding, without bouncing up and down.

Weasel Walk

When you're approaching a promising observation spot or sense animals nearby, that's when you should go on to the next stage of movement: the weasel walk. Technically, the weasel walk is not much different from the fox walk. You still look up, still lift and place the feet, and still roll from outside to inside with the same grace and care. But now you go into a crouch, and you walk a little more on your toes, with your arms held more closely to the body. Your movements are also slower—looser, lighter, more fluid. And most important, there's a shift in your attitude. Suddenly you become a hunting animal. Your senses are hyped. You look, listen, and move with extreme sensitivity and caution. You blend with the environment, using the landscape and the vegetation to mask your movements (see "Cover," page 101).

The best example of the weasel walk is the weasel itself. Unlike the fox, which often trots along with a rather jaunty air, the weasel is a hunting machine. It's always looking, always thinking, always flowing. Probing and smelling as it goes, it moves through bushes, trees, and burrows like a shadow and flows around obstacles as easily as water. Think of the weasel when you do this walk. Call on your ancient hunting instincts and you'll know just how to move.

As you approach an animal area, listen for unusual sounds and pay particular attention to the wind direction. Approach upwind, and keep in mind that with a high pressure system (good weather) the animals can't smell as keenly as they can in a low pressure system (bad weather) because scents are not released as easily. Temperature also affects an ani-

mal's sense of smell. At around sixty degrees, a deer's scenting capacity is very sharp; but it diminishes gradually on either side of that point. At or below the freezing point, it is very difficult for a deer to pick up human scent. The same is true on very hot days when it's hard to breathe.

Exercise 4-6: Weasel Sneak

Do the weasel walk for a distance of about a hundred yards in a low crouch. Bend your knees as you flow across the landscape. Maintain proper form, keeping your arms close to your body and your head up so that you can see and hear everything going on around you. Also, don't spin, twist, or slide your feet when you turn. Pick them up and place them in the proper direction of travel. If you pivot, you may grind and rasp the ground, alerting the animals.

It should take you a long time to go a hundred yards in a crouch, and it should be strenuous exercise. If your thighs are not burning by the time you're done, chances are you haven't done it right. Either that or you're already in excellent condition!

Stalking

Stalking is a way of moving so slowly and soundlessly in the woods that your presence goes completely undetected. The native Americans were so skilled at stalking that they frequently confounded white people by appearing in their midst, apparently out of nowhere. Even John Muir, who was hardly a stranger to the woods, was amazed one morning when he looked up from his notes to discover that an Indian had sneaked into his camp unseen and now stood only a few steps from him—"as motionless and weatherstained as an old treestump that had stood there for centuries."

Muir wondered at the ability of the Indians to move so silently and unseen, and he speculated that this method of walking had become almost instinctive with them after centuries of hunting and fighting. Stalking is not an instinct, though. It is as fine an art as ballet or kung fu; and like any art, it can only be learned through dedicated practice. Stalking Wolf practiced it so religiously that, even in his nineties, he could run through a bed of dried leaves without making a sound.

With Stalking Wolf, Rick and I never knew when we were going to be put to a test. Sometimes we would be sitting by a campfire at night when he would smile a big toothy grin, roll over backwards, and disappear. When he did that, it was understood that we were supposed to try to find him without getting touched, but we never did. Sometimes he stalked up behind and gently took our legs out from under us. Other times

he reached down from a tree limb and grabbed us by the hair. He seemed invisible. Even when he climbed a tree, it was more like floating.

I doubt that Rick and I could ever have moved as skillfully as Stalking Wolf, even with a lifetime of practice. But to know that the things he did were humanly possible gave us something to shoot for, and I hope they do the same for you. If you give it your effort, I can promise you one thing—you will move more quietly and see more wildlife than you ever imagined possible. That in itself should be enough to make the effort worthwhile.

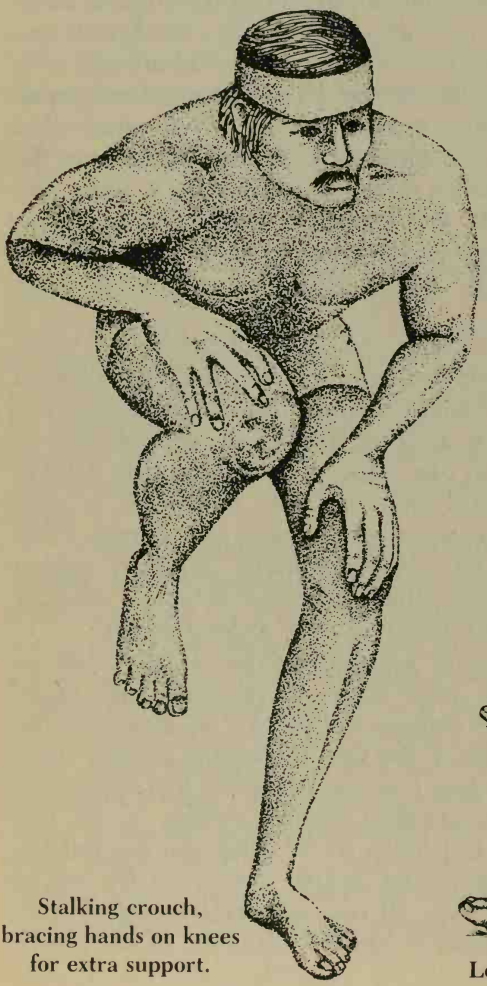
When to Stalk. Many things may signal the need for a stalk. A snapping twig, a sudden movement, the distant alarm call of a bird or animal—anything out of the ordinary should put you on the stalking alert. More generally, you should stalk any time you approach a feeding or watering area. These are usually transition areas—burned-over acreage with lots of succulent growth, edges of forests and fields, streamsides, pondsides, trail junctions, and so forth. In such areas you'll find many other signs, including trails, droppings, and gnawed vegetation that indicate the presence of animals. Once you become skilled at reading these signs, and once you know the animals' habits well enough to predict their whereabouts, you'll have a much better feel for when to stalk. (See "Animal Tracks and Habits," page 136, and "Animal Highways and Signs," page 187.)

How to Stalk. Stalking is a logical extension of the weasel walk. Watch a cat stalking a bird or a heron stalking a frog and you'll have a good idea of how it's done. Your body should conform to the landscape and the vegetation. If you're stalking a deer in thick woods, you may be able to stand upright and imitate a tree. In low brush or grass, you may have to crouch, crawl, or even inch forward on your belly. Regardless of your posture, follow these general rules: Keep your eyes on the animal. Keep your arms and hands close to the body. Most important, avoid any sudden movements. Move each limb with the utmost care and patience, pressing each step into the ground so slowly that it doesn't make a sound.

For starters, let's assume you're walking upright. If so, it's best to fold your hands in front at about waist level and to bend your knees slightly. Lift one foot slowly off the ground and bring it up alongside the other leg to at least knee level. Point the toes downward so they don't catch on anything. Then, balancing on one leg, bring the foot downward in a short, slow step. Try to move smoothly, without jerking. As the foot descends, bend the toes upward and touch down lightly on the outside ball of the foot. Now, without applying any weight, roll across the ball of the foot as you feel the ground beneath. (If you encounter a twig or some other obstacle, lift your foot and place it somewhere else.) When you've

found a safe landing spot, slowly bring your heel to the ground, then finally the toes.

Only when your entire foot is safely and soundlessly on the ground do you shift your weight. Do this by sliding your upper body forward, just like a heron. As you do this, your back heel will lift off the ground and a little to the side. When all but the toes have left the ground, lift your back foot and begin the next step. Follow the same process with each step: (1) outside ball touches first; (2) roll to the inside; (3) heel down; (4) toes down; (5) apply weight; (6) glide forward. Remember: Don't push off with the back foot. If you do, you're likely to scuff the ground or snap a twig that will give you away.



Stalking crouch, bracing hands on knees for extra support.

STEPS IN STALKING

Lift foot high and maintain balance.

Come down on outside ball of foot.

Roll to inside ball of foot.

Lower heel and toes, then apply weight.

Exercise 4-7: Stalking Form

Using the illustrations as a guide, practice stalking until you can move over flat ground in an easy, flowing manner. Lift your feet high. See if you can bring your knee all the way up to your chin. Try holding your leg up and standing motionless for a few minutes. Practice stalking while crouching low. (This can be made easier by bracing the hands on the knees and lifting up on the pantlegs.) Then practice stalking forward, backward, and sideways, keeping your eyes fixed on a single point. Do not look at your limbs. Feel the ground and work on your balance.

As you begin stalking in natural areas, the need for balance will become even more evident. Your feet will wobble and your legs will tremble as you encounter the first irregularities in the ground. Your mind may boggle as you realize how many obstacles there are to overcome. This is natural; just be patient and keep practicing.

Other Tips. Always time your movements to those of the animal. If you're stalking a deer, move when its head is down. When its head comes up, freeze and wait for it to begin feeding again. Soon you'll get used to the deer's pattern of movement and its typical reactions to stimuli.

Most animals are used to the occasional sound of snapping twigs and rustling brush, as long as it's part of the natural flow. They are usually scared off by loud or repetitive sounds. If you make a sudden noise, freeze and remain motionless for thirty seconds. The animal may go on the alert, but if you imagine you're a tree or log or some other lifeless object, most likely it will return to its business and you can go on stalking as before.

Overcoming Obstacles. Normally when stalking, you'll take the easiest route that affords adequate cover. But at some point it will probably be necessary to go over or around an obstacle. This is done using the same principles explained above. If you have to step to the side, over a low bush, or work through thick vegetation, keep moving smoothly and slowly. Come down on the ball of the foot and roll to the inside before applying weight. Never pivot your foot on the ground; turn it in the air so you come down in the direction you want to travel.

If you have to part some bushes or push a branch aside, do so in a flowing manner, keeping your hands close to your body and taking infinite care not to jiggle anything. Vibrating vegetation is a sure tip-off for animals; they know immediately that it wasn't the wind.

Exercise 4-8: Upright Stalk Through Woods

Have a friend imitate a feeding deer or other large animal and see if you can stalk close enough to touch that person without his detecting any sound or movement. Use all the skills described above. Move when

your friend is looking away and freeze when he turns in your direction. Use wind, rain, shadows, and vegetation to mask your movements. Step over obstacles in a careful, flowing manner. As you go, have your friend critique your stalking ability by telling you when he detects sounds or movements.

Exercise 4-9: High-stepping

Practice stalking over a variety of obstacles. Start out with things in your own home such as pillows and chairs; then try your technique on bushes and tree stumps. Try to clear small obstacles without touching them at all, and work your way over larger things with as little contact as possible. Items such as pillows and small bushes should present little problem other than balance and strength. Chairs and stumps will be more difficult. Tables and logs may take a fair amount of body contact.

Crawling. There will come a time when you'll have to get down on your knees or belly to stay hidden. If so, do it in a stalking manner. Never step back when you get onto your knees, as you may hit something behind you. Kneel down and keep your eyes on the animal. Compress the ground slowly with one knee until you're sure you won't snap anything. Then do the same with one hand, coming down on the outside and rolling to the inside before putting weight on it. Move forward gradually, lifting one limb at a time. Keep the toes pointed so they don't catch on anything, and make sure that the whole lower leg clears the ground.

Bellying Down. Here's how to move from knees to belly: With your hands well out in front, rock forward until you are stretched out but still supported on your hands. Then descend slowly from the knees, allowing hips, abdomen, and chest to curl quietly onto the ground. Keep the arms and elbows in close and keep your eyes on the animal. Then inch forward on hands and toes, lifting the body slightly in a modified pushup. Avoid scraping or shuffling sounds. Lift the hands and toes high enough to clear any obstacles, and flex the feet inward before you bring the toes down. To get up, carefully reverse the whole process.

Exercise 4-10: Stalking Gymnastics

Stalking takes a great deal of strength and agility, but you don't have to be in the woods all the time in order to improve your skill. As the previous exercise suggests, you can do any number of stalking gymnastics right in your own home. For example, you can increase your leg strength dramatically by stalking up the stairs two at a time. As you gain strength, you may even be able to take three without lurching.

A number of balance exercises can be done while standing on one leg. For starters, lift one leg slowly to your chin, then straighten and hold it at waist level. Try bending your leg into various positions that test your

balance. Then lean forward and stretch one leg straight behind you, still maintaining balance. Use your imagination!

Attunement. You can't be a good stalker if you're tense or anxious. You can't touch an animal at the end of a stalk if you're feeling separate from that animal. No matter how careful you've been, it will sense your eagerness and bolt at the last second. To stalk well, you have to be relaxed and aware of everything around you. Nothing is separate from your movements while you're stalking—not the slightest sound or breath of wind. If you're stalking a deer, you also have to be aware of the jay and the squirrel. You have to be aware of the rhythms of wind and rain and the play of your innermost feelings (see "Toward a Deeper Awareness," page 63).

Patience. You also have to be patient. It may take six hours to stalk up and touch your first deer, even after tracking and living with it for days. But the end justifies the means, and patience wins out in the end. What you learn during those hours of stalking is priceless. After all the time and effort spent approaching an animal, the final touch is like a mingling of spirits.

Exercise 4-11: Touching Animals

There is no better stalking exercise than trying to touch an animal. When we were learning, Rick and I practiced on almost everything. We stalked dogs, cats, birds, lizards, snakes, frogs, insects, and each other. We confounded friends and relatives by walking like shadows in their footsteps and popping up out of nowhere. This can be maddening, of course, so I suggest you do it sparingly. Concentrate your greatest efforts on wild animals. They will understand.

Cover

Generally, there are two kinds of cover: primary and secondary. Primary cover is anything that conceals your whole body, whereas secondary cover just breaks up your outline. If you're stalking upright in thick woods, you may use trees as primary cover, occasionally peeking through the secondary cover afforded by leaves and branches. If you're crawling or on your belly, try to conceal most of your body behind the primary cover offered by bushes and grasses, while keeping an eye on the animal through the secondary cover near the tops of the vegetation.

A general rule of thumb is to stay behind primary cover whenever possible, and to utilize secondary cover mainly for observation. However, this is not always necessary and in some cases not even possible. If you move carefully (using wind, shadows, and other forms of camouflage), you can get by with just enough cover to break up your outline.

Before you even start to stalk, scan the terrain and decide how you

can best approach the animal without being seen. Decide what trees or bushes will hide you or at least break up your outline, and think about how much effort it will take to get through them. If you're stalking through an area with very thin cover, such as a grassy meadow, you're probably going to have to be down on hands and knees most of the time. Thick brush affords good cover, but it's often next to impossible to work through it without getting tangled or causing a lot of noise. Try to find a middle ground between these two extremes.

If you have to stalk through thick brush, do so with the utmost care. Don't jar any branches or leaves. Step over small obstacles and go around large ones. If you can't do either, look for holes in the vegetation and slide your limbs through them. If you have to stalk upright through an open area, go carefully, paying particular attention to sound, movement, shadow, and sunlight.

Clothing Suggestions

For nature observation in general, and especially for stalking, it's best to wear as little clothing as possible. In warm weather, a loincloth or a pair of shorts and a snug top will do. But different seasons demand different outfits. Wool and buckskin are almost soundless, whereas cotton, nylon, and denim make a lot of noise. Plaids and checks will help to break up your outline, but solid colors will make it easier for animals to spot you. Stay away from bright colors; wear muted browns, greens, and other earthy tones. Also stay away from hats or anything you might lose in the underbrush. Whatever you wear, make sure it's not binding or restricting—but also make sure it's not so loose that it catches on branches and briars. You should be able to move freely and comfortably at all times.

Crow

The best footwear for stalking is none at all, but a good second would be moccasins or some other light wear such as well-worn tennis or running shoes. These conform well to the feet and are thin-soled enough so you can really feel the ground. It's better not to wear wire-rimmed glasses, bright belt buckles, or anything that will cause reflections. If you do, smudge them first with charcoal.

Body Camouflage

Charcoal is one of the best things for camouflaging exposed body areas. Don't cover yourself with it; just blotch it on to create an overall dappled effect. Use it especially on the bony areas of the face, but don't rub it in dark around the eyes or you'll only accentuate their whiteness. Just smudge in a few marks above, below, and to the sides. A good rule of thumb is to darken the ridges and leave the hollows.

You can camouflage hair and beards by decorating them with a few sprigs of pine needles or leaves. However, don't let the camouflage stick up like you see in the war movies; make it look like it's growing there. If you use long sprigs, you can let them come down over your face, as long as they don't block your view. Small branches can also be used to camouflage clothing by sticking them in belts or buttonholes and letting them hang naturally. Remember, though—don't cover everything. A little camouflage goes a long way.

Keep in mind that the whites of your eyes and teeth are dead giveaways. If you have any doubt about this, have a friend sit in some brush watching you with narrowed eyes and closed mouth; then have that person stare and smile and see how his or her face "jumps out" from the landscape.

I tend to smile a lot when I'm stalking because I see so many funny things. Once I saw a deer trip himself by getting a hoof caught in an antler while trying to scratch his ear, and I nearly fell over laughing. If you want to keep from scaring animals, keep your mouth shut and your eyes narrowed. And if you can't keep from opening your mouth, smudge a few teeth with a little soot before you go out.

De-scenting

Most animals have a very good sense of smell, so it's always a good idea to camouflage your scent before stalking or observing animals at close range. The native Americans took great pains to rid their bodies of telltale odors before a hunt by staying away from strong-smelling foods, fasting for several days, and taking sweat baths.

These methods are all useful. However, a quick way of getting the same effect is to bathe with a natural soap such as pine tar or peppermint. You can also rub your clothes and the exposed parts of your body with

skunk cabbage, catnip, sweetgale, spicebush, pine needles, or whatever aromatic herb you can find. You can even brew a tea from one of these plants, put it in a spray bottle, and mist yourself with it before you go out. The only drawback to this system is that the plant must also be growing naturally in the area where you're going to stalk. Otherwise the animals may get suspicious and move away.

The easiest method I know of for de-scenting the body is to sit in front of a campfire for fifteen or twenty minutes and let the smoke permeate your clothing. Animals are rarely alarmed by the smell of smoke, unless it's accompanied by heat and flames. Almost every forest has been burned by a fire at one time or another. Almost every day animals run across charred pieces of wood or pick up the scent of smoke. A smoke-stained human (cigarette smokers excepted) can usually stalk across the landscape without ruffling any fur or feathers. As for camouflaging your breath, you can chew on mint leaves or pine needles.

Hiding

One of the best ways to observe animals is to find a hiding place and wait. It's not enough just to jump into the brush. To hide effectively will take all of the skills mentioned in the first four chapters of this book—and then some.

As I mentioned before, most animals are found in transition areas that provide plenty of food, water, and cover. Ideally, before you go into an area, you should already know where to find the animals that live there. You should know their favorite feeding, watering, and bedding areas, be familiar with their trail networks, and understand their habits (see "Animal Highways and Signs," page 187, and "Animal Tracks and Habits," page 136).

Regardless of your familiarity with the terrain, walk quietly and slowly (using the fox and weasel walks) to within sight of the area. Use splatter vision and focused hearing to learn more about what's going on there. Then scan the area at a distance, picking a spot for your hide well in advance.

For general observation, choose a spot close to a popular trail junction or a well-used watering or resting area where you're likely to see a variety of animals (see "Animal Highways and Signs," page 187). For a specific animal, try to locate habitual pathways between resting or watering areas and position yourself right beside them. (Feeding areas are generally so large that it's difficult to predict where to hide.) Whatever spot you choose, make sure it offers good cover and a good view. Don't cover yourself so well you can't see anything!

If you want to see nocturnal animals, move into the area during the

light of the afternoon or very early evening. If you want to see animals by day, it's best to move into the area by night, or even on the afternoon of the previous day. Give the animals plenty of time to forget you're there.

Approach your hiding spot from downwind and take a route that is not used by other animals. This will minimize your scent and other signs of your passage. Always approach the hide in a stalk, never walking or running. Crouch low and be infinitely patient. Look and listen, being especially cautious whenever you sense animals nearby. Once the alarm goes out that you're around, it spreads very fast, and it may take several hours for the area to return to normal. If you're patient, though, most animals will soon forget your presence and resume their normal activities.

The hide itself should offer enough primary cover to protect and camouflage most of your body, and enough secondary cover for you to see through. Enter the hide with as little disturbance as possible. Decide in advance what position you want to take, then use your best stalking technique to get into it. Flow into it like a snake.

If you plan to be in the hide for a long time, lie flat or choose a comfortable sitting position. Generally, the lower the better. If you're hiding from large animals, try to make yourself look small; for smaller ones, spread out. Once you're in position, make sure your body is well camouflaged. Carefully arrange the brush and sprinkle a few leaves or needles on your clothing to help break up your outline. Then get comfortable and wait.

The wait is probably the most difficult aspect of the hide. You may have to lie or sit for hours before you see any animal movement. (The more disturbance you've caused, the longer it will be.) Use this time for attunement. Open your senses to the flow of the woods and relax yourself so that you'll be alert to the slightest animal signals. Listen to the rhythm of the wind or rain. Look out at the stars. Feel the quality of the space you're in and allow yourself to become a part of it.

If you feel like moving, go ahead; but do it slowly and soundlessly. If you have to scratch your nose, do it in a stalking manner. Before long you'll probably become so attuned that you lose track of time. If not, the sudden appearance of a wild animal will probably cure the minor aches and pains that have developed from sitting in one spot.

Other Hiding Techniques. There's no rule that says you have to hide in the brush. Trees make excellent hides, too. So do natural depressions. In the Pine Barrens I sometimes bury myself in the mud at the edge of the swamp, and I've had some fascinating experiences there. Once when I poked a finger out, it was attacked by a weasel. Other times I have confounded deer by rising up out of the mud beside their favorite feeding spots. No animal expects a predator to hide in the mud.

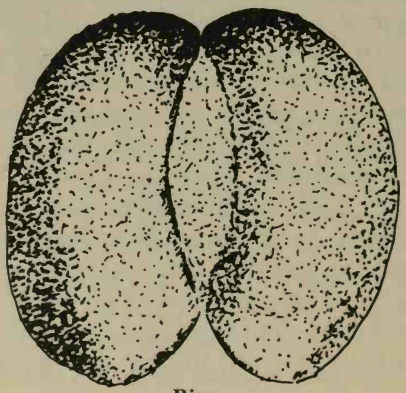
You can also attract animals to your hide. By sucking on the back of your hand or by sucking with your upper front teeth over your lower lip, you can produce a variety of squeals that sound very much like wounded rodents or agitated birds. This may attract both predators and prey. You can usually get a small animal to freeze by imitating a hawk. And there's no telling what you'll attract by lightly scratching the vegetation to imitate the footsteps of a mouse. Listen and watch to see what effects sound and movement have on animals. Then imitate them.

To lure predators such as bobcats and foxes, a feather dangling on a bush is often effective. Birds are especially difficult to stalk because of their excellent eyesight and quick movement, but you can often get close to them by using a hide—especially if you sit near a nest or roosting spot. The native Americans lured birds in many ways. One was by camouflaging themselves as small trees and putting food in the branches. Another trick that I have often used is to tie a bunch of reeds around my head, which allows me to float into the middle of a flock of ducks like a dislodged clump of marsh grass. Use your imagination to come up with other ideas.

Exercise 4-12: Disappearing

Pick a hiding spot beside a trail and camouflage yourself there. Have someone come by and see if you have hidden yourself well enough to go undetected. If not, ask what part of your body stood out and try to conceal it next time. To make your disappearing act more real, try it occasionally along a well-traveled trail. See how close you can get without being seen.

Another challenging game is to pick a small area and give yourself five minutes to "disappear" within it. Then have a friend survey the area and see if he or she can tell where you are. Finally, try the hide on wild animals, utilizing all the skills you've learned in this chapter.

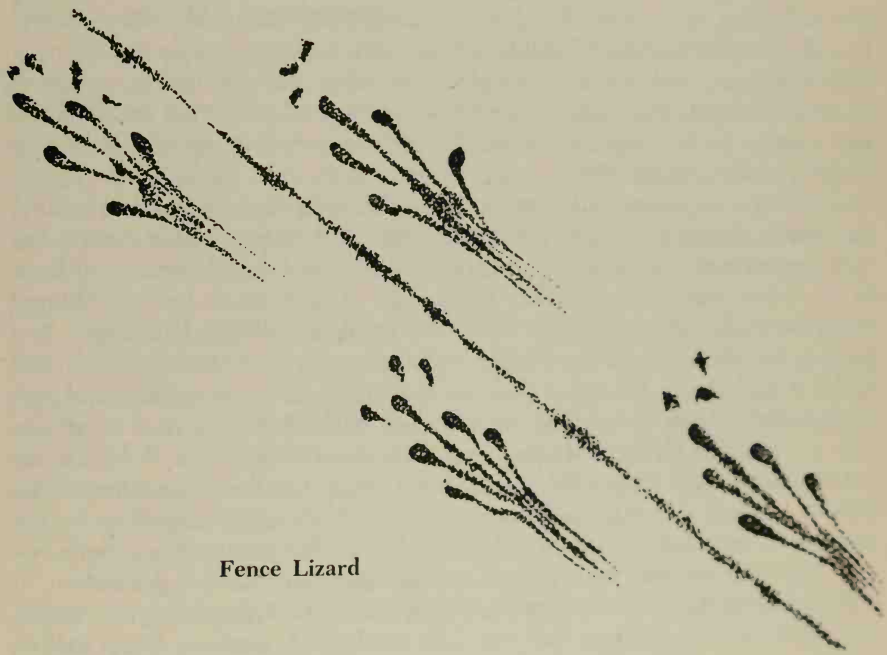


Bison

PART II:
ANIMAL TRACKING

5
TRACKING ATTITUDES

In 1874, John Muir was walking toward the Sierras along a sandy road, gazing at the beveled furrows created by passing wagonwheels. In *The Wilderness World of John Muir*, Edwin W. Teale recounts that, in a letter to a friend, Muir wrote, "Upon the smooth slopes of these sand furrows I soon observed a most beautiful and varied embroidery, evidently tracks of some kind. At first I thought of mice, but soon saw they were too light and delicate for mice. Then a tiny lizard darted into the stubble ahead of me, and I carefully examined the track he made. . . . I was excited with delight in seeing an exquisitely beautiful strip of embroidery about five eighths of an inch wide, drawn out in flowing curves behind him as from a loom . . ."



Fence Lizard

Soon after that, Muir discovered an even more delicate pattern interwoven with that of the lizard, and after some frustrated searching he was able to trace it to a small grasshopper. Ecstatically, he wrote, "I glowed with wild joy as if I had found a new glacier—copied specimens of the precious fabric into my note-book, and strode away with my own feet sinking with a dull crunch, crunch, crunch in the hot gray sand . . ."

As Muir's description suggests, tracks hold a compelling fascination for some people. I know that fascination well. I first felt it when Stalking Wolf showed Rick and me a dog track in the Pine Barrens when I was eight years old, and I have felt it every day since for more than twenty-five years. For me, tracks are an obsession. They have taken me down endless trails in search of countless mysteries, and I do not believe they will ever cease to fascinate me.

But tracks also hold a beauty that is difficult to keep to oneself. They open up worlds of awareness that beg to be shared. Because of my obsession, I have uncovered some secrets about tracks. And because of an urge to see others appreciate wild things, I gladly offer these secrets to anyone who is curious about nature.

Tracking and Observation Are One

Most people today mistakenly believe that tracking is identifying and following an animal's footprints. This is partly true, but not entirely. In a single clearly defined print, a good tracker sees not only the identity of the animal, but its size, weight, age, sex, state of health, when it passed, where it came from, where it was going, which way it was looking, and a host of other details—some of which cannot even be discovered by looking at the animal itself.

Even an animal's thoughts are written in its tracks: the stutters, half-starts, hesitations, and turns that show as telltale ripples among the more prominent waves of its movement. In order to read them, you have to be more than just a tracker of animals. You have to be a tracker of *everything*. You have to see how the tracks fit in with the landscape. You have to be able to read the stories written by winds, waters, grasses, and trees. You have to be as sensitive to the grand as to the small. And you have to be able to blend physical evidence with knowledge and intuition.

Tracking is the ultimate in nature observation, and it cannot be learned separately from other observation skills. On the second day of my six-day nature observation classes, some students seem impatient to get started on tracking. What they don't realize is that the tracking skills began with the awareness exercises on the first day. A firm grounding in nature observation is critical to the art of tracking. Without it, you may be able to follow an animal, but you will never be a tracker. Keep this in mind as you read on. Return frequently to the first part of the book. Review and practice what you have learned. Build a good foundation.

Every Mark Is a Track

To an experienced tracker, every disturbance and irregularity on

the landscape is a track. Every mark is the signature of an animal, plant, mineral, or some atmospheric, geologic, or mechanical force. A glacial valley is as much a track as the footprint of a fox. So is a canyon, an oil well, a sand dune, a mountain, or a mud puddle. There are almost as many tracks above the ground as there are on its surface. A charred stump may indicate a forest fire. A fallen tree may speak of a woodcutter's axe. A bruised leaf may indicate the passage of a deer or a mountain lion.

Most tracks dwell on the interface between the earth and the sky, and many are not easy to see. Weather and gravity conspire to erase them. The earth tries to be flat. Yet there is hardly a square foot of ground that is absolutely flat. Every depression, every bump, every fissure, and every scratch on the landscape was made by something. Whether it was made by a rabbit, mouse, bulldozer, fish, frog, or volcano, it is the tracker's job to notice and interpret it.

The Ground Is a Manuscript

To the accomplished tracker, each day's new landscape is like a new page, alive with the writings of animals. Some of these writings are left by bear and deer. Some are left by squirrels and chipmunks. Still others tell of the movements of birds or the wanderings of worms and insects. Everything that moves on the earth leaves a story. As you read the story of one animal, you will begin to see how it connects with others. You will discover that the separate scrawlings of each day are interconnected, and that similar themes run through chapters reaching many pages back.

Some track stories are easily legible, while others are almost impossible to decipher. Some are repeated daily with only minor variations, their authors leaving well-worn grooves in the ground. Others are as faint and fleeting as a puff of wind. Some stories last for months, while others disappear in moments. Sometimes whole pages may be missing, or the manuscript may be too difficult to decipher. But with time you will be able to tell yesterday's writing from today's. And with the proper attunement, you will even be able to read between the lines.

No story in nature exists independently. Everything is related. The theme of wilderness is oneness, and the ultimate measure of a tracker's skill is not how much detail he is able to read in a given track, but how clearly he is able to see how one track fits with all the others. Ultimately the tracker sees the drama of the woods as a blending of lives in which each life adds substance to the next. He sees the book of nature as a succession of chapters that flows as smoothly and relentlessly as the seasons.

Be a Detective

The ideal attitude of the tracker is that of a detective. One of the reasons I love to read Sherlock Holmes is that he thinks like a tracker. He lets nothing go unexamined. He is constantly observing, sifting through facts and evidence, piecing puzzles together, solving mysteries.

Tracking is just that way. You look for evidence and you ask yourself questions. As you follow a coyote through a field, you watch for flattened grasses, misplaced stones, broken twigs, and telltale hairs. You listen for animal sounds. You feel the coolness of the air and notice the low-flying bugs. You wonder what forces shaped the area and why the ground is carpeted with grass. You notice that some buds are nipped while others are not. You see the connection between snakes, grubs, and grasshoppers. And you constantly try to link these things with the trail of the coyote.

A trail is like a string of clues. Every time I kneel to examine a track I feel like I'm bending to pick up a precious stone. Each "stone" is attached to the next one by an invisible thread. Each track is a new clue, and each one is unique—sparkling with hints that lead me to the next one. Always at the end of the string, I know, a being is moving, adding more clues in a logical progression that began with its birth and will end only with its death.

Tracking produces a kind of communion. Each clue draws you closer to the being that left it. With each discovery, your own tracks become more deeply entwined in the mystery you are following. Eventually, you absorb so many clues that the mystery and its answer are bound up inside you. The animal comes alive in your imagination. You can feel it moving, thinking, and feeling long before you come to the end of the string.

If you track fast enough, you eventually reach the end and find a set of prints with the animal's feet still in them. This happens more frequently as you get better, but it is not the primary object of tracking. The object is to learn as much as you can from each track.

Watch Animals Making Tracks

The only way to learn to read tracks is to watch them being made. Rick and I did this constantly. We watched everything from animals, plants, and people to birds, insects, and automobiles. Sometimes we smoothed out a patch of ground and waited for something to come by. As soon as a print was made, we rushed up to see what it looked like. Our appetite for tracks was insatiable. Our minds couldn't swallow enough of them. And as we digested them, they gradually became imprinted as

forms of meaning. By doing this with animal after animal, person after person, time after time, day after day, we gradually learned how to read tracks. There is no other way.

As you study tracks, don't be too analytical about it. Watch how a track is made and then go up and look at it. But don't try to catalog and classify every little detail. Don't clutter your mind with file drawers of information. There is no way you can adequately describe a track in words. But if you study it in a relaxed way, a faint imprint will be filed in your subconscious. When you have done this enough times with enough similar tracks, that pattern will be solidly impressed in your memory.

You *Can* See It

One of the biggest problems I notice with beginning trackers is a kind of self-inflicted blindness. They earnestly want to track animals, but they just as earnestly believe they cannot see the tracks. The result is a frustrating situation in which the student looks directly at the track without seeing it, even though it is as clear as day.

Just so you'll recognize it when it happens, I'll recount the usual scenario: You discover a faint track and say to yourself, "Hey, there's a deer track!" Then a friend or a little voice in the back of your mind says, "But how do you know?" With that, the analyzing begins and the doubts creep in. In the next moment, you're not so sure, and you say, "Well, maybe it's not a deer track." In time you convince yourself that it wasn't a track at all. And finally you give up, thinking it was just a figment of your imagination.

Every tracker I know has experienced this syndrome, and it can be very discouraging. Part of it is the result of overanalyzing. But part of it is what psychologists call the "reticular activating systems" in our brains, which automatically screen out any images we have been conditioned to believe do not exist. Being cut off from our natural instincts, the majority of us walk around with quite a few of these mental blocks. Most of us can't imagine being able to track a porcupine over hard-packed ground because we tell ourselves we're not supposed to be able to see things like that.

On the other hand, if we clear the channels to a deeper awareness, we suddenly discover that we can. In the October 1982 issue of *Pacific Northwest* I read about a Special Forces officer who had been sent to Vietnam to teach modern warfare to the Montagnard tribesmen. Before he left, he had been taught that it was impossible to see the tripwires to booby traps. Accordingly, he never did; but his Montagnard bodyguard spotted them every time.

After returning to the States, the soldier tried an experiment. He mentally conditioned himself to seeing golf balls. After that, he found golf

balls almost everywhere he went. As of the date of the article, he had collected a total of 38,514 lost golf balls, some of them more than thirty years old.

What is true of golf balls is even more true of tracks. They are *everywhere*. As soon as you relax, shut down the internal dialogue, and attune your mind to seeing them, you will. (See "Toward a Deeper Awareness," page 63.)

Patience and Practice

As you know, learning to read is a long process. You start off in the first grade with your ABC's. Then you begin putting simple words and phrases together. Gradually you learn to read sentences, and you combine these into paragraphs. With many hours of study, you build your vocabulary and learn the rules of grammar and punctuation. Finally, after years of practice, you can pick up a book of almost any difficulty and pore through it with real appreciation.

It's almost the same with tracking. Before you can track, you first have to learn the alphabet—the sizes and shapes of various tracks. Then you begin to combine the tracks into patterns of meaning. You start tracking on easy terrain, reading slowly and haltingly. In time you can string tracks together into longer segments with deeper meaning. Gradually you build your skill until you are able to read whole "paragraphs" of movement over increasingly difficult terrain. But only after months and years of practice can you clearly "see" an animal moving in its tracks and read the book of nature with full understanding.

Most people get discouraged in the early stages of tracking. They become impatient and don't stick with it long enough to get the real rewards. Some of my students expect to be able to follow a squirrel track over pine needles after the first few hours of lecture. This is like a third grader expecting to be able to read Carlyle or Thoreau. There is no shortcut to tracking. You literally have to walk before you can run, and you have to crawl before you can walk.

Tracking was an obsession with me. I wore out pants crawling on my knees, and I spent hours trying to read individual tracks. I came home with tattered clothes and pockets filled with animal droppings. At one point, my parents thought I needed psychiatric help. They couldn't understand my passion. Whenever I got out of a car, I would rush over to the nearest tree or patch of ground, sniffing and exploring as excitedly as a dog. I spent most of my boyhood and youth on my belly and knees. I learned very early that there is no such thing as a clean tracker. Even today I think nothing of spending an entire day and sacrificing a clean set of clothes to unravel another mystery.

I have probably said it a thousand times, but fifty thousand would not be too many: The only way to learn how to track is by practicing—by putting in the "dirt time". Dirt time is time spent in the field surveying the landscape; time spent thrashing through bushes; time spent watching the weather wear a track into oblivion; time spent on hands and knees examining pocks and waves in the soil. In tracking, as in anything else, you have to pay your dues. But it's worth it, because it's all learning. Tracking is fascinating every step of the way.

With that, I invite you to read on and begin learning your "ABC's."

6
IDENTIFYING THE TRACK

No two tracks or sets of tracks are the same. Each one is as unique as a human signature. Yet there are similarities in track shapes and patterns that make it relatively easy to classify them into family groupings. Once you have done this, species identification is usually only a matter of taking accurate measurements and matching them with the averages for a particular member of that family.

However, in some cases measurement may not be enough for positive identification. You may also have to know a little about how the animal lives, whether it is found in your area, and what it might be doing there. To read and follow a track with any skill, you will also have to be familiar with an animal's movements and the motivations behind them.

For these reasons, this chapter is divided into two areas of emphasis: track descriptions and animal habits. The first part explains the basics of track identification for various families of animals. The second part deals with representative species of each family, listing measurements, patterns, gaits, and habits that will help you to interpret their movements with more understanding. Also included are occasional tips on how best to observe many of these species.

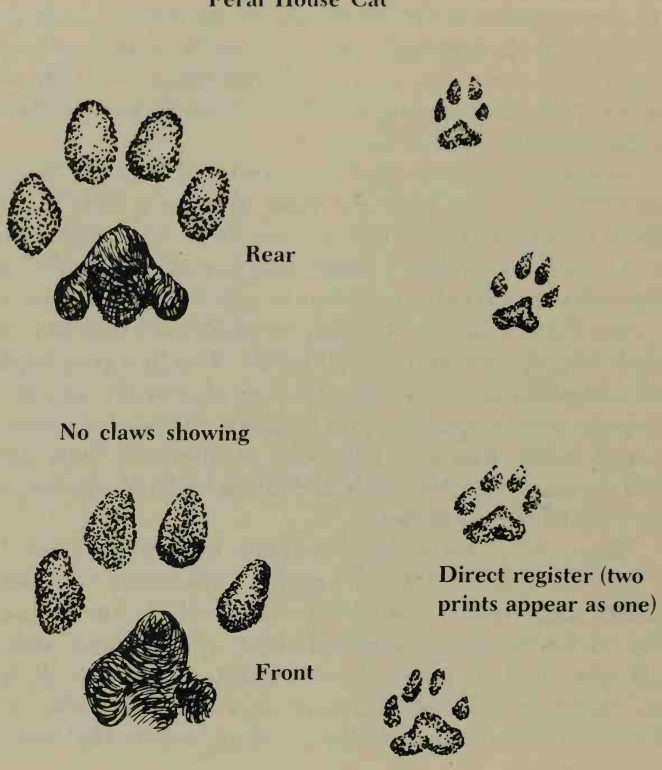
There are thousands of animals that might have been included here, but I have limited this discussion to the most common North American mammals. These animals are some of the most fascinating trackmakers, and observing them and their "embroidery" will quickly teach you all you need to know about the art of tracking. It is my hope, of course, that you will not stop here, but that the tracks of these animals will lead you to explore the lives of many others that cross their paths.

Fundamentals

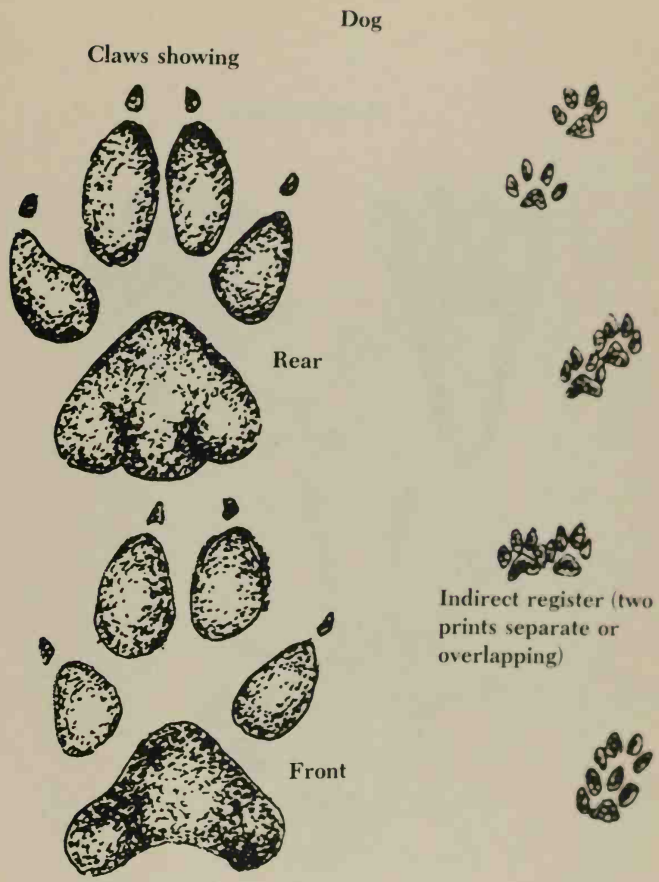
Toes, Claws, and Shapes

When you come across a clear track in mud, sand, or soft soil, one of the most useful things to do is to count the number of toes and claws. This information alone is often enough to place the track in a given family. Then, by analyzing the track's shape and size, you can usually identify the species.

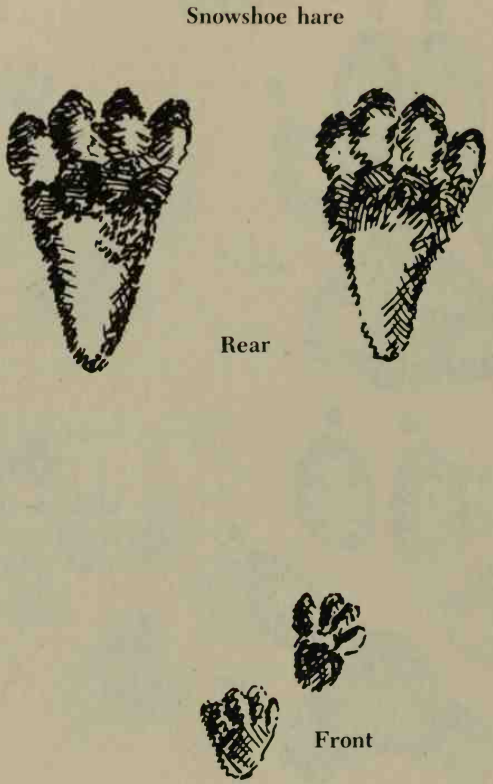
Following are track classification keys for the major families of mammals. Unless otherwise indicated, the tracks described are for animals moving at their normal slow rate of speed—which is just the way you'll find them most of the time (see "Gaits and Patterns," page 125).



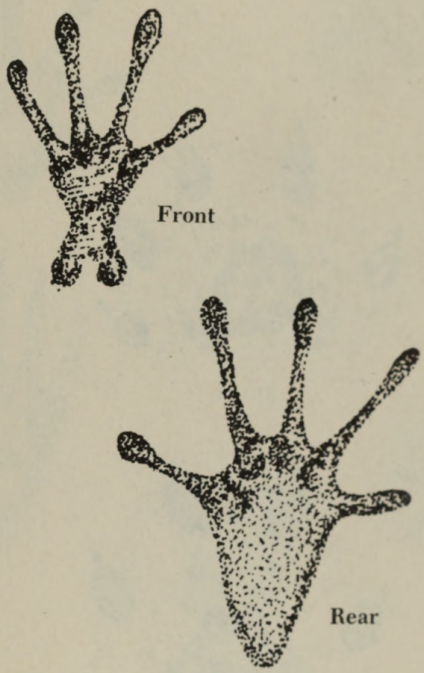
The Cat Family (see also page 136). All members of the cat family (including the house cat, bobcat, lynx, and mountain lion) make very round, delicate prints showing four toes on the front feet and four on the rear feet. The claws are usually retracted and rarely show up in the print. Cats also directly register when they walk. This means that as the front foot is picked up, the hind foot comes down directly into the front print, leaving a double print that appears as a single track. Cats' heel pads are distinctly triple-lobed and much larger in reference to the toes than those of most other animals. Their front feet are also markedly larger than their rear feet.



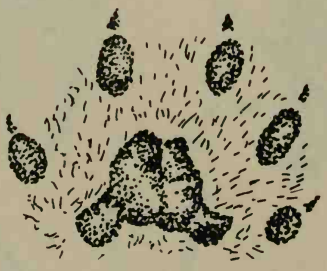
The Dog Family (see also page 143). Members of the dog family (dogs, foxes, coyotes, and wolves) make tracks with four toes up front and four in the rear—with claws usually visible. This and the "maple leaf" shape of their tracks makes them easy to distinguish from the more rounded tracks of the cat family. The only member of the dog family that directly registers is the fox, which sets it apart from the domesticated dogs, coyotes, and wolves. All the others show indirect register, which means that as the front foot is lifted, the hind foot comes down a little behind and to the right or left of that print.



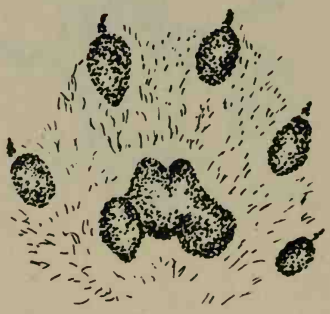
Rabbits and Hares (see also page 150). These animals are often mistaken for rodents, but they belong to an order called Lagomorpha. They all show four toes up front and four in the rear. The clawmarks and even the toe marks are often indistinct; however, the tracks are easily distinguished from those of most other animals by the relative sizes of the feet (the rear ones being from two to four times longer and wider than those in the front) and by their characteristic "galloping" gait, which leaves a Y-shaped pattern with the hind feet coming down ahead of the front feet (see "Gaits and Patterns," page 125).



The Rodent Order (see also page 154). These animals (including voles, mice, rats, chipmunks, squirrels, woodchucks, muskrats, beavers, etc.) usually show four toes up front and five in the rear, most often with some claw registration. Their tracks vary greatly in size, and it is often difficult to determine the species from a single track—especially with small rodents that leave little more than faint scratchings. In such cases, it helps to examine the entire track pattern—again, a typical galloping gait (see "Gaits and Patterns," page 125).

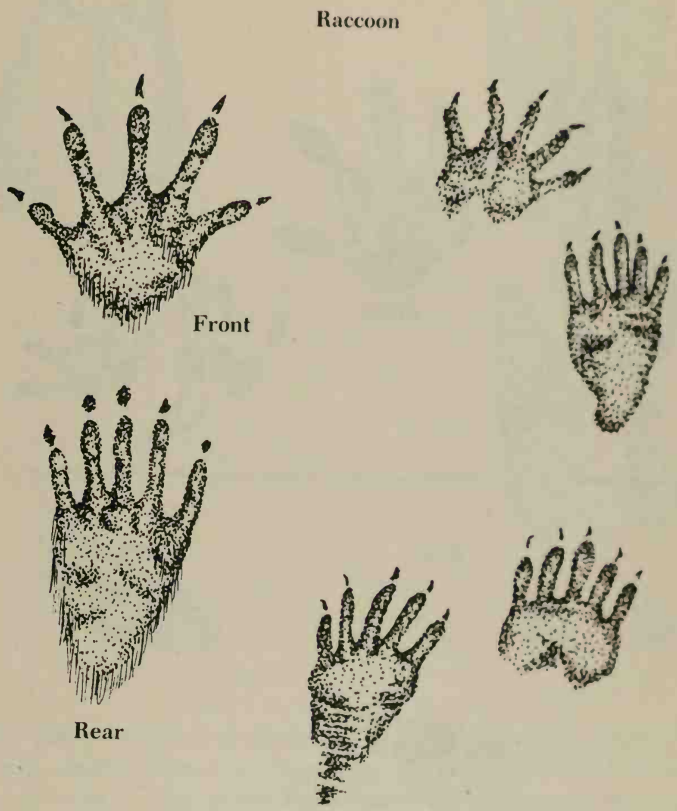


Front

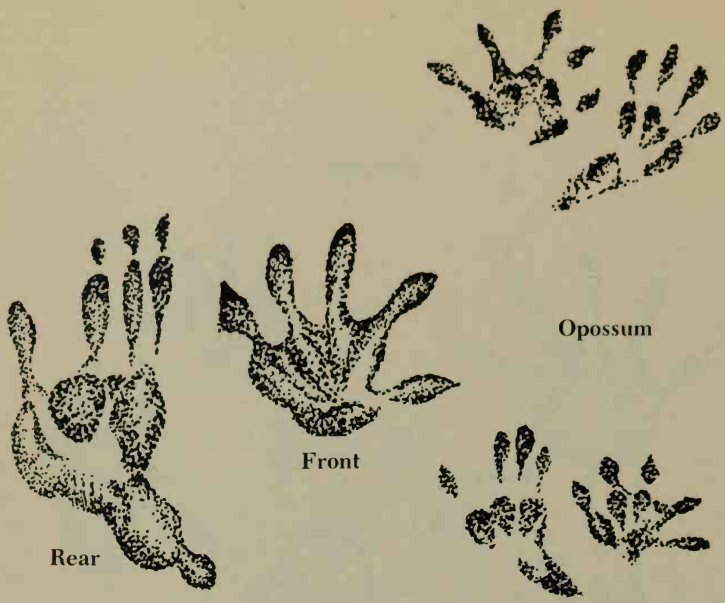


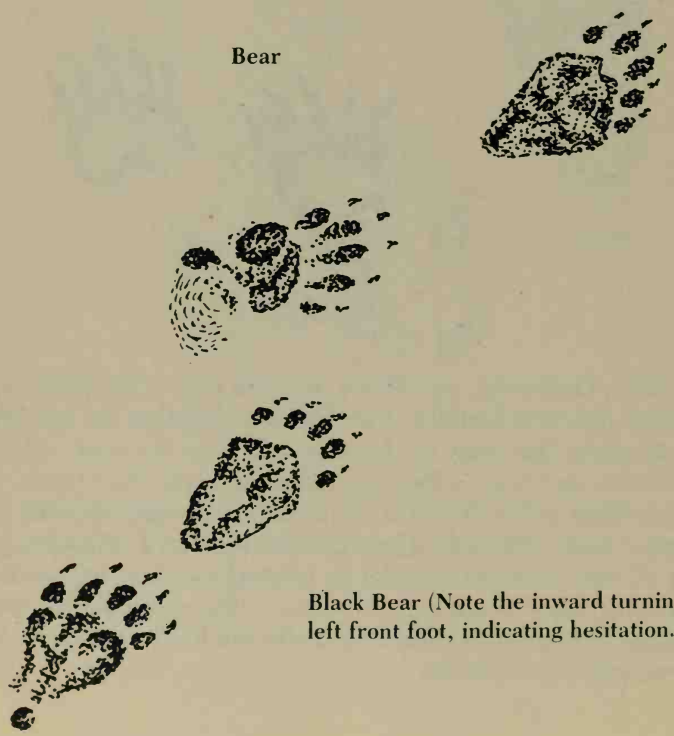
Rear

The Weasel Family (see also page 167). The members of this family (including weasels, minks, martens, fishers, skunks, otters, badgers, and wolverines) show five toes up front and five in the rear, usually with visible clawmarks. Tracks vary widely in size and shape, from the tiny rounded paws of the least weasel to the huge, long-clawed digging feet of the badger. Gaits and patterns are very helpful for identification.



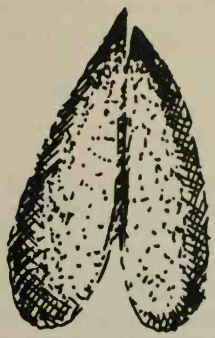
Raccoons, Opossums, and Bears (see also page 177). These animals represent three different families. I group them together for two reasons. One, they all show five toes up front and five in the rear, often with visible clawmarks; and two, unlike most other animals, their tracks appear almost human. Those of the raccoon are reminiscent of a baby's hands; the opossum's print looks strikingly like a gnarled hand with a double-jointed thumb; and a bear's hind prints, though generally wider and shorter, are shaped very much like human feet. All three of these animals have a plantigrade walk, meaning that they usually bring the heel of the back foot all the way down just as we do.

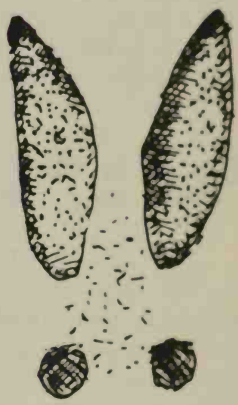




Black Bear (Note the inward turning left front foot, indicating hesitation.)

White tail Deer





The Deer Family (see also page 181) includes all the hoofed mammals—goats, sheep, deer, elk, moose, etc. The tracks of these animals are heart-shaped with a ridge down the middle and are among the easiest to identify and follow. They press sharply into the ground, frequently leaving broken twigs and other signs of disturbed vegetation. Careful measurement is usually enough for positive species identification.

Gaits and Patterns

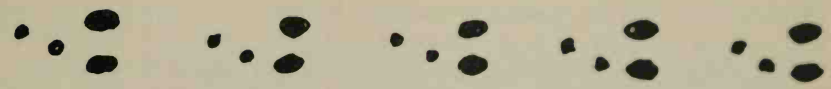
Ninety percent of the time you will find tracks that were made by an animal moving at its normal slow rate of speed. However, there are four very different "slow" gaits, and each one leaves a characteristic track pattern. Learning these gaits is critical not only for track identification but also for reading tracks, as these same four gaits are also used by different animals when moving at different speeds (see "Gait Variations," page 127).

Following are descriptions of each of the four primary gaits and the animals that use them as their normal slow rate of speed. (These gaits do not always hold true for domesticated animals or for wild animals that have been caged, penned, fixed, or altered in any way.)

Diagonal Walkers include all dogs, cats, and hoofed animals. These animals walk exactly like a baby crawls, moving limbs on opposite sides of the body at the same time. As the right front foot moves forward, so does the left rear foot; as the left front foot moves forward so does the right rear foot. If you've forgotten how to do this, take a lesson from a toddler. Then imitate the gait yourself, using your knees as your hind "feet."

Pacers include all the wide-bodied animals—bear, raccoon, opossum, skunk, wolverine, badger, beaver, porcupine, muskrat, and marmot. Instead of moving opposite sides of the body at the same time, these animals find it easier to move both limbs on one side of the body at the same time. That is, they lumber along, shuffling both right legs, then both left legs, alternating sides as they go. (Try this one, too. "Pace" on hands and knees in wet sand or soft soil and observe the results.)

Bounders include most of the long-bodied, short-legged animals—that is, most members of the weasel family. (Wide-bodied weasels such as skunks, badgers, and wolverines are pacers.) Bounders walk by reaching out with the front feet and bringing the back feet up just behind them. The result is a series of hops reminiscent of a sewing machine needle. The track pattern itself is usually square-shaped or rectangular, the feet coming down in two closely spaced double prints.



Gallopers include all rabbits, hares, and rodents, with the exception of the wide-bodied beaver, muskrat, marmot, and porcupine (all pacers). As these animals move, they push off with their back feet (sometimes flying through the air), hit with their front feet, and bring their back feet all the way through. On your hands and knees, this would be the same as reaching forward with both hands, then sliding your knees all the way past your hands on the outside of your forearms. Try it.

An interesting sidelight on the gallopers is that if the front feet hit side by side, it indicates a tree-dwelling animal, whereas if they hit on a diagonal, it indicates a ground dweller. For example, the red squirrel is a galloper that spends most of its time in trees, so its front feet hit side by side. But the ground dwelling rabbit hits with its feet on a diagonal. The same is generally true of birds. Tree dwellers such as woodpeckers and sparrows hop on both feet at the same time, while ground dwellers such as quail and pheasant alternate footsteps. Other birds such as robins and crows (equally at home on the ground and in trees) do a little of both.

Gait Variations. Now that you have a clear picture of the four primary gaits and what animals use them at their normal slow rate of speed, here is what happens when these animals pick up speed: As the diagonal walkers pick up speed, they become bounders, then gallopers. For example, if a fox is startled, it will probably move from a diagonal walk into a bound; but if it is truly frightened, it will run away at a gallop. The same is true for members of the cat and deer families, one notable exception being the mule deer, which bounds at high speeds.

To complicate matters a bit, the diagonal walkers have many other gaits. For example, between the diagonal walk and the bound comes the trot, and between the bound and the gallop comes the lope. In fact, there are about thirty-two different recognizable gaits, each indicating a particular speed and state of mind. However, it is not necessary to memorize all these variations. If you find a gait you can't identify, don't be discouraged; just learn the primary ones and you'll soon be able to read the ones in between. More important, watch animals walking, trotting, bounding, loping, and galloping—then go examine the tracks!

Most pacers, as they pick up speed, move from a pace into a diagonal walk, then to a bound, and finally to a gallop. In other words, they

follow the same sequence as the cats, dogs, and hoofed animals once they get going. This information can be extremely useful, not only for species identification, but for reading an animal's actions. For example, the diagonal walking pattern of a mountain lion would indicate a normal walk, whereas the diagonal walking pattern of a badger would indicate that the animal was in a hurry.

Bounders rarely change their gait. You can tell their rate of speed primarily by the distance between patterns, or sets of prints. For example, if you find a weasel track that shows a typical bounding pattern every six or eight inches, you can safely assume the animal is moving at its normal slow gait. If the distance between double prints suddenly increases to a foot or more, you know the animal has picked up speed. Just how fast it is going—and why—you can best determine by observing that animal in a variety of situations.

Gallopers, like bounders, usually maintain the same gait regardless of how fast they go. An antelope jackrabbit moving at its normal slow rate of speed may put down a set of Y-shaped galloping prints every nine inches. But with a coyote on its tail, the distance between sets of prints may jump to twenty feet or more.

Unusual Gaits. There are some situations in which animals move more slowly than their normal slow rate of speed, and these activities visibly affect their gaits. When threatening or feeling antagonistic, most animals switch from their normal slow gait to a pace. Pacing makes an animal look broader and more imposing. (Humans do it, too—moving one whole side of the body in a threatening swagger.) When stalking or moving with caution, most animals use a gait called the slow walk.

The track pattern of the slow walk looks just like a diagonal walk, but in movement it is about halfway between a diagonal walk and a pace. It works like this: First, the right rear foot moves forward, shifting the animal's weight ahead. Just before it comes down, the right front foot starts forward. Just before the right front foot hits the ground, the left rear foot starts forward. Just before this one hits, the left front foot moves forward . . . and so on. Animals use this gait for stalking, casual walking, and sometimes for feeding. Deer use it almost as much as the diagonal walk.

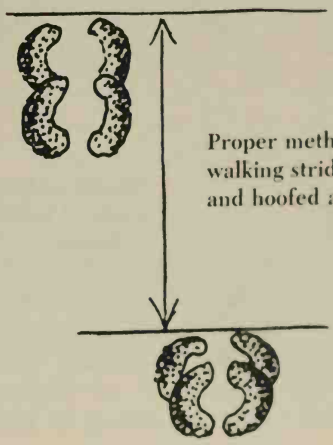
Measurements

Once you've found a track and narrowed it down to a given family, your next step is to determine the species. This may already be apparent if you're familiar enough with the animal to identify it by "eyeballing" the tracks. If not, you'll have to take careful measurements.

The most important tool for this job is a good metal tape measure. You'll use it not only for measuring the length and width of individual tracks but to determine the trail width (see page 13) and the distance between sets of prints when animals change their gaits. The best tape measure is one that fits easily in your pocket and can quickly be stretched out to ten feet or more. A sturdy, six-inch metal ruler is also helpful for finer measurements.

Length and Width. If the track is large and distinct, first measure its length and width (not including claws) and compare the results with the species averages listed in the "Track Comparisons" chart on page 269.

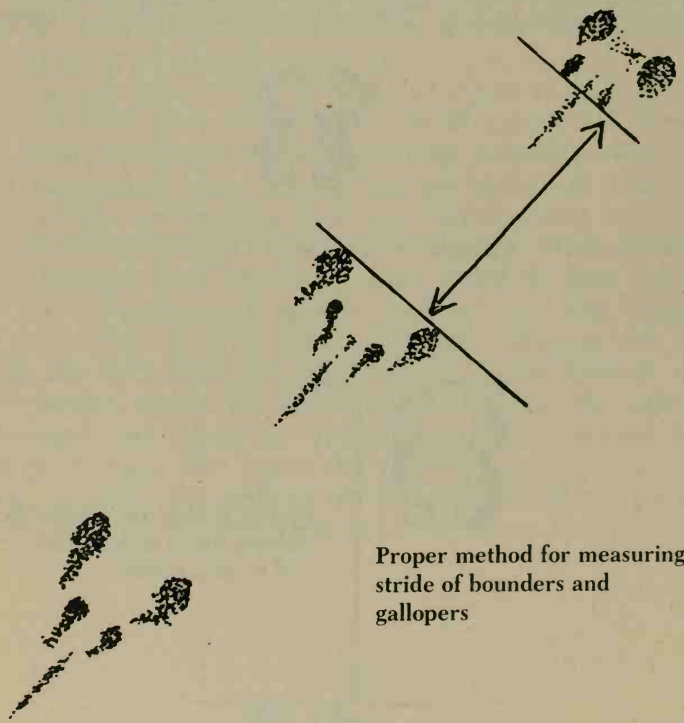
Caribou



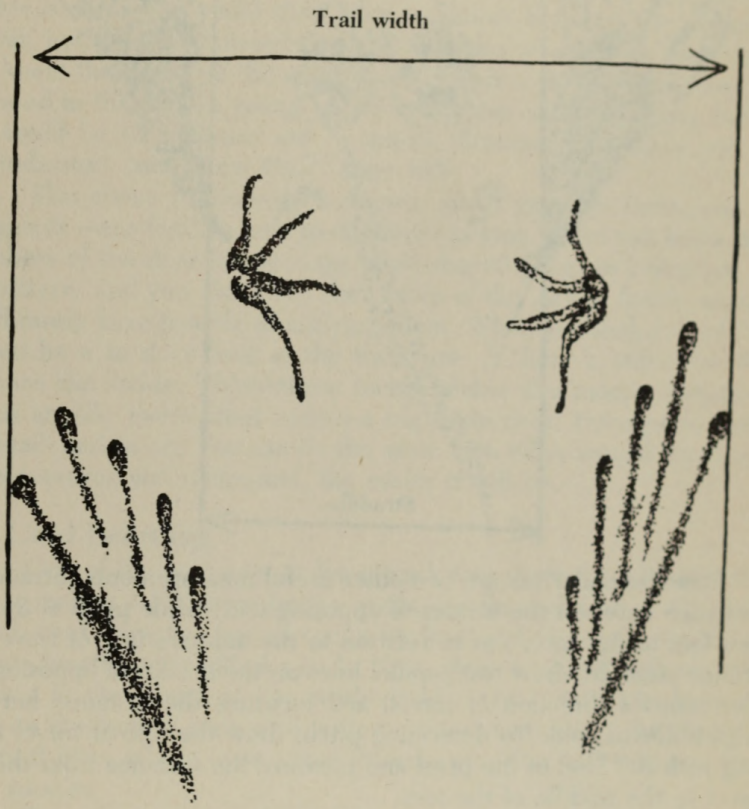
Proper method for measuring walking stride of dogs, cats, and hoofed animals

Move to one side of the trail, taking care not to alter or destroy the tracks. Measure across the *bottom* of the track, as tracks left in mud, snow, or other soft mediums tend to widen toward the lip. With deep tracks, either hold the ruler over the top of the track and estimate the length and width along the bottom, or carefully place thin vertical rods (broom bristles are good) in the track and measure the distance between them.

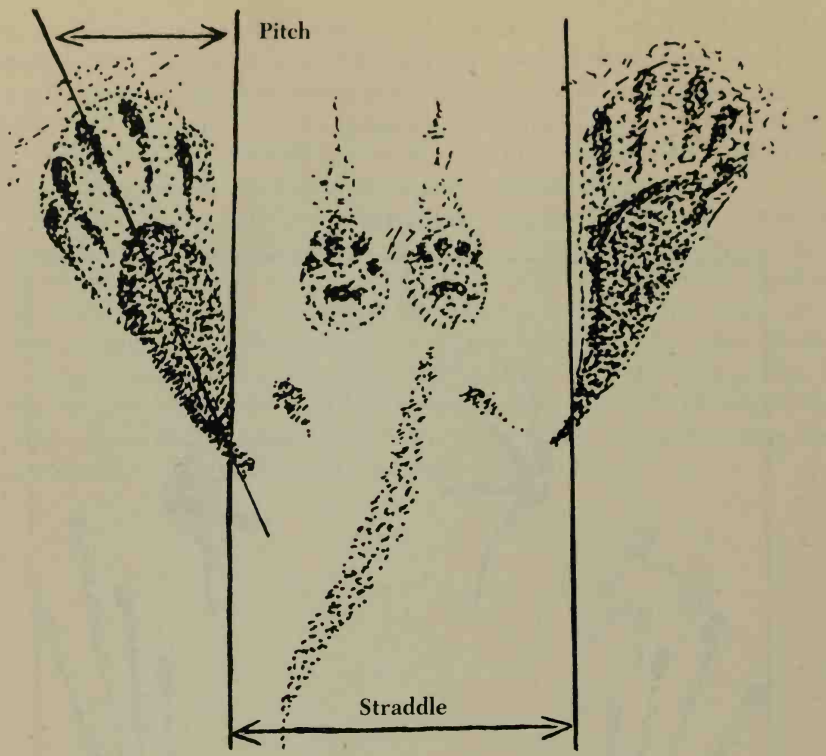
Stride. Next, measure the animal's stride. The "slow stride" is measured in one of two ways. For a diagonal walker or pacer (for example, a lynx or a wolverine), it is measured from the foremost toe of one print or double print to the foremost toe of the next print or double print. In a bounder or galloper, such as a mink or a snowshoe hare, the "slow stride" is the distance between track *patterns* rather than individual footprints. It is measured from the front foot of the first pattern to the back foot of the next one. Since most animals either bound or gallop when they run, the "running stride" is measured in this same way.



Proper method for measuring stride of bounders and gallopers



Trail Width. If the track is very small or indistinct, it may be more useful to measure the trail width and the stride. This is particularly true with small rodents and weasels that leave little clusters of disturbance every few inches. The trail width is simply the distance between the outermost prints in any one pattern. With normal slow movement, it is constant enough to be almost as good a species indicator as track size.



Straddle and Pitch are two other useful measurements. Straddle is the distance between the insides of opposing feet, while pitch is the distance a foot angles in or out in relation to the animal's line of travel. To determine straddle, draw two parallel lines on the insides of opposing feet (in the animal's direction of travel) and measure the distance between them (see illustration). To determine pitch, draw the line of travel intersecting with the heel of the print and measure the distance from the line of travel to the middle of the toes.

Interpreting Measurements and Gaits. Let's say you find an interesting set of pock marks padding across a stretch of windblown sand. Initially you have no idea what animal made them—and there is no point in even trying to count toes or look for claws, since the wind has left nothing to count. But you can see by the arrangement of the marks that they were made by a diagonal walker. Except in unusual circumstances, this eliminates all of the rabbits, rodents, and weasels (including the wide-bodied members of these groups), leaving only the cat, dog, and deer families as possibilities. The pock marks are too distorted for accurate foot measurements, but you can measure the stride, and you find that it is sixteen

inches. You measure several different strides to get an average, then check the "Track Comparisons" chart and discover that the only remaining animal with an average slow stride of sixteen inches is the coyote. You confirm this by measuring the trail width, which is about five to six inches—close enough.

It is not always this easy, of course. For example, if the stride were twelve inches, you would then have to choose between the fox and the bobcat, both of which directly register. But this would be no great chore if you knew the habits of the animals and which of them would most likely be found in the area. A young animal might also cause confusion, but even this could be straightened out by paying attention to straddle and other age indicators (see "How Old?" page 135).

The above basics—track shapes, sizes, gaits, patterns, and measurements—are fundamental to effective tracking. Once you know that all members of the deer family make heart-shaped prints in a diagonal walking pattern, and you also know the strides of the various family members, you'll rarely have trouble identifying them. When you find a set of tracks, all you have to do is look at the track size. If there is still some doubt, measure the stride. Thirty-three inches makes it a moose; twenty-eight inches an elk; twenty-four inches a big mule deer; twenty-one inches a whitetail; and so on. You can do the same with other animal families. The more averages you memorize, the easier it will be.

File Card Learning

One of the best ways to learn track measurements and animal habits is to make a set of three-by-five cards, one for each animal. On one side of each card draw the typical tracks for front and rear feet, including the average length and width for each. Next, draw a typical walking pattern, marking in the length of the stride. Add other gaits if you have room. Then on the back of each card write pertinent facts about the animal's life (where it lives, what it eats, when it feeds, etc.) that will help you identify each species.

Take these cards with you wherever you go and look at them at odd moments: while waiting in line at the checkout stand, during a coffee break, or while relaxing on a wilderness outing. Gradually you'll memorize the pertinent information for each species.

Attracting Animals for Study

Another excellent way of familiarizing yourself with animal tracks is to make a "tracking box." This can be anything from a cleared and baited patch of ground in the woods or a park to a baited box of soft soil placed just outside your own home. When an animal comes in to pick up the bait,

it leaves its footprints in return. You can then practice measuring and identifying the prints.

If you make your tracking box in the woods, choose an area that is well traveled by a variety of animals and clear a spot that is large enough so you'll be able to see the animals' track patterns as well as their individual prints. Dig into the soil and fluff it up well first. Then soften and smooth it with your hands, leaving a clean, flat surface for clear print registration. Bait the box with peanut butter (which most animals love), meat, bread, or whatever you think will attract the kinds of animals you want to study.

Identifying Individuals

Before we go on to study track sizes and animal habits, I want to mention a few hints that will help you to recognize individual animals.

Male or Female? There are many misconceptions about how to determine the sex of an animal from its footprints. The most common error is to assume that a large track must be that of a male. Unfortunately, some of the largest animals on record are females. However, there is a very simple way to determine the sex of any indirect registering diagonal walker. Males are usually broader at the shoulders than at the hips, so their hind feet register a little to the inside of the front feet when they are walking. With females, which have larger pelvic girdles, the hind feet register a little to the *outside* of the front feet.

Let's say you've found the tracks of a walking deer (a pair of closely spaced or overlapping heart-shaped prints) and you want to know the sex of the animal that made them. First determine the animal's line of travel and decide whether the track pair falls to the right or left of that line. (You may have to find the next track pair in order to do this.) If it falls to the left, you're looking at tracks made by the left side of the body.

Next, decide which is the left front foot and which is the left rear foot. This is easy to do if you remember that the rear foot of a diagonal walker usually falls a little behind and to the right or left of the front foot. If the two prints overlap, the rear track is the one that was made last. Finally, apply the rule: If the rear foot has fallen to the outside of the front foot, it's a female; if it has fallen to the inside, it's a male; and if the two prints are in a direct line, it's probably an immature animal.

This "outside-inside" method of sex determination is useful but far from foolproof. First, it only works for diagonal walkers. And second, it only works while they are walking. Fluctuations in an animal's gait change its track pattern, sometimes leaving a print on the outside when it "should" be on the inside, and vice versa. So if you use this technique, check several good sets of walking prints before making a final decision.

There is another method of sex determination that can be used for any animal. It is based on the fact that all male animals, to make room for their external sexual organs, tend to walk a little more on the outsides of the hind feet, while females tend to walk more on the insides. This pressure difference shows up especially in the heel; however, it is often very slight, and reading it correctly requires a great deal of skill (see "Feel Tracking," page 246, and "Reading Pressure Releases," page 209).

Determining Weight. Weight is another basic identifier. Though it takes a lot of practice, the principles are simple. Most mammals have four legs. This means that each walking print takes about one-fourth of the animal's weight. If you can determine how much pressure it takes to produce a single track, you can estimate the animal's weight by multiplying by four. To do this, make a similar track with knuckles, fingers, or feet, and estimate how many pounds or ounces of pressure it took to make it. (It helps to practice at home with a small box of dirt and a bathroom scale. For smaller animals you can use a postage scale.) Another way is to watch animals of different sizes and examine the relative depths of their tracks on similar terrain. Eventually your subconscious will begin feeding you weights and sizes automatically.

How Old? Age is another individual characteristic that can be read in tracks. Young animals are often distinguished from mature ones by their smaller tracks and shorter strides. Both very young and very old animals tend to walk with a wider stance because they are not as steady on their feet. There are many other indicators of age, including regularity of gait, telltale wobblings and rockings, and even the texture of the heelpads. But again, this is fine reading, and I would not expect anyone to master these methods without having studied thousands of tracks (see "Reading Pressure Releases," page 209).

Other Signs. Just as every species has its certain patterns and habits, every individual has little quirks in its movement that set it off from all others. As an example, think of three different friends of the same sex and picture how they walk. Even if all three have the same size and type of shoe (which is very unlikely), no two can possibly have the same walking habits. One may walk a little duckfooted, while another is slightly pigeon-toed. One may scuff his heel while another scuffs his toe. There are endless variations, and all of them will show up in the tracks. So will less obvious traits, from shyness and fear to boldness and aggression. The tracks of animals are as telling as fingerprints.

Animal Tracks and Habits

Below are track measurements and habits for some of the most common North American mammals. Most of these measurements were taken in the field during twenty-five years of compulsive tracking. Some were written in notebooks; others were scribbled on leaves and sticks; a few were etched by knifepoint into whatever was available. It is a great relief to finally average and set them all down in one place.

I must emphasize that word, "average." Track sizes, strides, and other measurements vary greatly with the animal and the terrain, so don't expect to find tracks that perfectly match these dimensions. For example, I have listed the average running stride of the mule deer as from six to fifteen feet, but mule deer on occasion can bound up to twenty feet or more. By the same token, a young bobcat has smaller feet than an average adult, and a wolverine walking in deep snow takes a shorter stride than when walking over hard-packed ground. Don't take these averages as the last word. Use them along with other evidence as logical starting points for track identification.

The habits mentioned in this section are meant to give you a general familiarity with some of the representative members of each animal grouping. For further information, I recommend more specialized references. Three of the most useful guidebooks to North American mammals are *A Field Guide to Animal Tracks*, by Olaus J. Murie (including hundreds of tracks, patterns, and signs), *A Field Guide to the Mammals*, by William H. Burt and Richard P. Grossenheider, and *Mammals of the National Parks*, by Richard Van Gelder.

The Cat Family *(Felidae)*

North American members of the cat family include the house cat, bobcat, lynx, and mountain lion. Again, their tracks show four toes up front and four in the rear—without claws—and when they walk they directly register. Cats are diagonal walkers and are therefore capable of trotting, bounding, loping, and galloping as they increase speed. However, they prefer to bypass the intermediate stages, going directly from a walk to a gallop. They can also drop from a gallop to a walk without any intermediate change of gait. When pursuing game, they usually bound during the last few strides before the kill. They also pace when threatening and slow walk when stalking.

Cats are very stealthy and secretive. They are excellent hunters, almost exclusively carnivorous, and have fairly large territories, which they mark periodically with "scent posts" of urine and scat. (The scat is

usually tubular, somewhat pointed on the ends, and contains the hair and bones of the animal's prey.) These piles are most often partially covered with dirt, sand, or other materials, and often show the scratch marks of the animal's claws. Cats also like to scratch trees and occasionally chew on herbaceous plants for their vitamin content. Such vegetation shows sharp puncture marks as opposed to the duller marks left by the teeth of dogs.

Cats are primarily nocturnal but can sometimes be seen by day. Unlike dogs, they do not excavate ground dens, but prefer to hole up in rock caves, hollow logs, trees, and even brush piles. You can often find the hair of cats on trees, though seldom on or near the ground, since they are very careful walkers.

Most cats are best seen in the evening or early morning when leaving or returning from the night's hunt. Cats are very curious, and you can attract them in a number of ways. One is to suspend a feather from a bush so that it dangles and spins freely. Another is to camouflage yourself in a hide some distance from the cat's trail and imitate a wounded rodent or bird by sucking on the back of your hand.

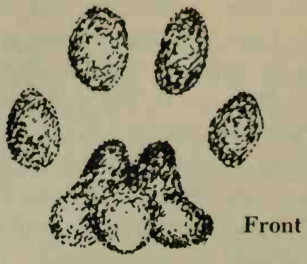
Feral House Cat *(Felis domestica)*

Rear

Front

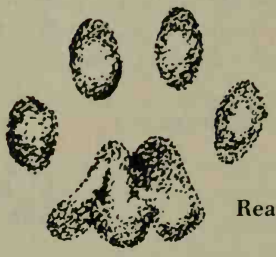
Front Foot:	1½ (L) × 1½ (W) in.
Rear Foot:	1⅜ × 1⅜ in.
Trail Width:	3 in.
Slow Stride:	7 in.
Running:	12-40 in.

Bobcat *(Lynx rufus)*



Front

Front Foot:	2 (L) × 1⅞ (W) in.
Rear Foot:	1⅞ × 1⅝ in.
Trail Width:	5 in.
Slow Stride:	10-13 in.
Running:	15-45 in.



Rear

The bobcat is 2½ to 3 feet long from nose to tip of tail and weighs between 15 and 35 pounds. Found throughout the mountains and woods of North America, it is very solitary, very nocturnal, and one of the most secretive of all the cats. It is an excellent stalker and hider, and sheer poetry in motion. Though numerous, bobcats often escape detection and are even thought to be extinct in some areas where they still thrive. They hardly ever leave their tracks on well-worn trails, preferring to jump over the trails instead.

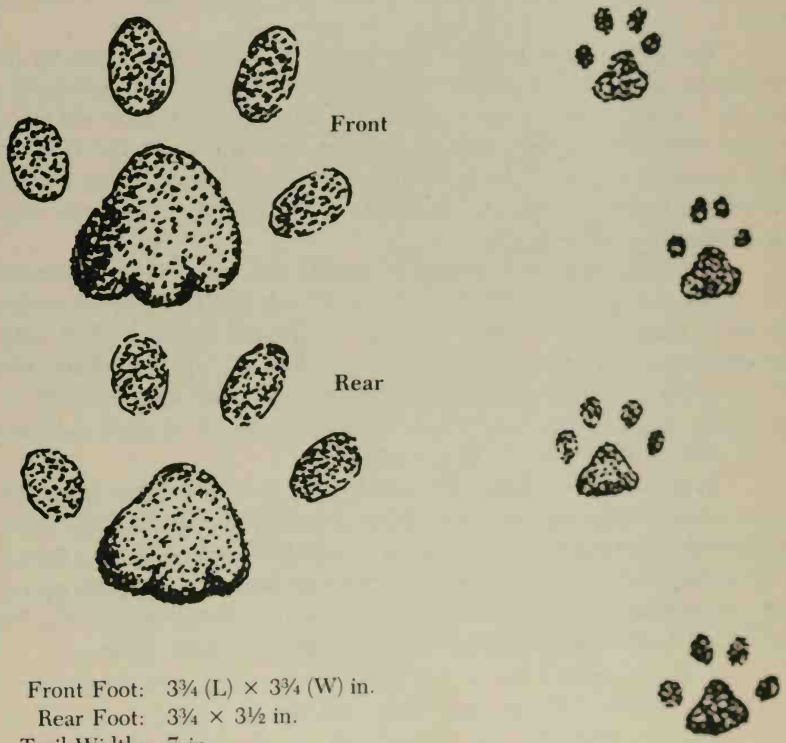
The bobcat's primary food is rabbits and rodents, though it eats whatever it can find. In areas where food is plentiful, its range is usually about 5 square miles; in poor areas it may range up to 50 miles. It loves rough, brushy areas with plenty of cover, but it can also be found in rocky, sandy, and semi-arid areas.

Bobcats are extremely territorial. There is nothing more dramatic and hair-raising than to sit by a lonely fire at night and listen to two male bobs fight it out. Their fury is spectacular. Though bobcats and lynx often inhabit the same areas in the far north, they usually leave each other alone. Bobcats are sometimes mistaken for lynx where their territories

overlap, but they have shorter ear tufts, shorter legs, and smaller paws in reference to their body weight, since they are not as well adapted to walking on snow.

The best time to see bobcats is morning and evening. You can use their natural curiosity to good advantage, attracting them with any number of animal calls or moving objects. Once in broad daylight I cast a stuffed mouse into a field with a fishing pole and reeled it in slowly when a bobcat came by. The cat began its stalk, but each time it was about to spring, I yanked the mouse just out of reach and each time the cat recoiled in surprise. About halfway to my hiding place, it finally heard the noise of the reel and looked up. It looked mortified. Instead of running away, it walked slowly back down the trail, feigning indifference with little scrapes of its feet.

Lynx *(Lynx canadensis)*



Front Foot: 3¾ (L) × 3¾ (W) in.
Rear Foot: 3¾ × 3½ in.
Trail Width: 7 in.
Slow Stride: 12-14 in.
Running: 30-50 in.

The lynx weighs 15 to 35 pounds and measures about 3 feet long from its nose to the tip of its short tail. Though its size is comparable to that of the bobcat, its feet tend to be bigger than those of a mountain lion and its stride is halfway between that of the bobcat and the cougar. The large foot size and long legs are determined by its primary habitat, the snow country of the far North. It uses its feet much like showshoes and can float like a whisper even through deep powder. The feet also spread out as it increases speed, giving it even more surface area. I have measured the front foot of a galloping lynx at as much as 5 inches wide.

The lynx follows the same gait pattern as the other cats, preferring to go directly into a gallop without bounding. However, in deep snow its fast gait is more a combination of a gallop and a bound.

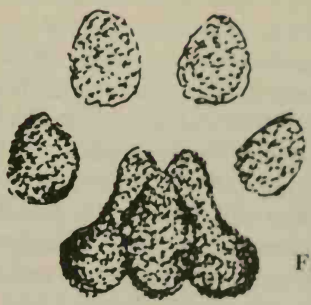
The lynx ranges up to 100 square miles. It loves open pine and fir forest—particularly those bordered by transition areas. Here it often has a favorite sitting tree where it watches over its domain. Usually such trees are worn or abraded on one side where the animal has climbed up and down.

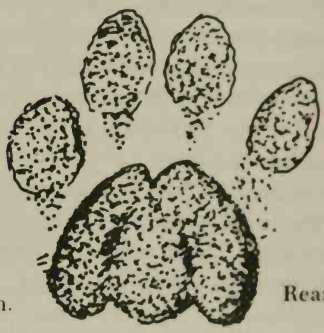
The primary food of the lynx is the snowshoe hare, and its population fluctuates in direct proportion to that of its prey. The presence of the hare in northern latitudes—especially Canada and Alaska—is an almost certain indication of the presence of lynx. In lean times the lynx kills almost anything it can catch, including snow-bound deer. Lynx mate in the winter and one to four young are born in the spring. These may stay with the mother for up to a year.

The lynx is a very powerful cat. Once I was preparing to climb a tree when one of them attacked me from behind. It must have mistaken me for a deer because I was wearing buckskins and a buffalo robe. Although I was well braced, the impact smashed me up against the tree and left me with a split lip and a bloody nose. I felt like someone had just hit me in the back with a two-by-four. The lynx ran off as soon as it realized its mistake, but it left a lasting impression.

Lynx are very solitary and nocturnal. The best time to see them is either very late in the day or early in the morning as they are returning from the hunt. One of the best places to watch them is from a tree in one of their established hunting areas. They can be called in quite easily with various imitations of animal sounds. However, they are heavily trapped and hunted (and therefore especially elusive) in some areas.

Mountain Lion *(Felis concolor)*





Front Foot: 3¼ (L) × 3½ (W) in.
Rear Foot: 3 × 3¼ in.
Trail Width: 8 in.
Slow Stride: 14-17 in.
Running: 3-6 ft.

The mountain lion, or cougar, is the largest North American cat. It is a tawny gray animal weighing from 60 to 230 pounds and measuring from 6 to 9 feet from nose to tip of tail. At one time the mountain lion ranged over most of North America. Now its range is considerably smaller, consisting mainly of isolated areas of the Rocky Mountains and the Pacific Northwest states and California. It can also be found in small areas in Florida. Except during the mating season, it is very solitary and secretive, appearing furtively in deep forests, around rocks, chaparral, and rugged, cliffy areas. It avoids people if at all possible and will not attack them unless cornered, injured, or diseased.

The lion's range is about 25 square miles. Most of the time, especially on the hunt, it moves at a fast trot. After a kill it tends to diagonal walk. Its primary food is deer, though it often kills smaller animals such as porcupine, raccoon, marmots, and rabbits. It attacks from behind, jumping on the animal's back and biting its neck.

From the kill area, the mountain lion drags the carcass to a safe place. If it kills a deer in the middle of a field, it usually drags the animal to the edge of the field before eating. It eats about eight pounds of meat at a sitting, beginning with the heart and liver. Later, it caches the food in a hidden spot, often camouflaging it with leaves, sticks, and other debris. Some cougars urinate near their kills, returning to them frequently until the meat begins to spoil; but they do not eat carrion or tainted meat unless near starvation.

The mountain lion mates almost any time of the year, depending on the area. In colder climates it mates in early winter and the female gives birth in the spring. The cubs stay with the mother for one or two years. (Many people who see a mother with nearly grown cubs mistakenly conclude that mountain lions hunt in packs.) When mature, the young animals travel up to 100 miles from their original den. They are sexually mature in about two years.

The best way to observe the mountain lion is to hide near one of its established trails. Once hidden, attune yourself both physically and mentally, "becoming" a rock or a tree (see "Toward a Deeper Awareness," page 63). If you are calm and patient, you may see one of nature's most elusive animals.

Once I was blessed with the sight of a cougar I will never forget. I was watching a herd of deer move slowly through some Rocky Mountain snow. I knew there were lions in the area because I had seen their signs. As I watched one of the deer cross a mountain meadow, I caught sight of a lion stalking it from the other side. The animal walked slowly until it got within range; then without warning it took off in a tremendous explosion of snow. It was like a keg of dynamite going off. One moment the cougar was absolutely still; the next it was charging after the deer like a locomotive.

It caught up quickly. With a final series of explosive bounds, it jumped onto the deer's back and brought it down in a flurry of snow. I was stunned at the sight. Later I measured the plumes thrown from its tracks. Some of them were twelve feet long and spread out like mushrooms.

The Dog Family *(Canidae)*

Members of the dog family include domestic dogs, foxes, coyotes, and wolves. To review, these animals show four toes up front and four in the rear, usually with claws visible. The only member of the dog family that directly registers is the fox. All dogs are diagonal walkers, though some prefer to trot. They also bound on difficult terrain, gallop at high speeds, pace when threatening, and slow walk when stalking or casually "moseying" from one place to another.

The tracks of the dog family vary greatly in size, and it can be difficult to tell a coyote from a spaniel or a wolf from a German shepherd. There are certain clues to look for: The inner two toes of the coyote are smaller than the outer two; the inner two toes of the dog are slightly larger than the outer two; and a wolf's toes are all about the same size. The heel pads of most foxes are thin, calloused ridges shaped roughly like a boomerang. The front heel pads of dogs and wolves are large and crescent-shaped, while their rear heel pads look like rounded triangles. For a final determination of species, it may be necessary to rely on your knowledge of animal habits and habitats.

Like the cats, the dogs are predators and primarily carnivorous, though they do eat some vegetable matter. Their vegetable gnawings are easily told from those of the cats by the mashed appearance. Since they do not have the chisellike molars of the cats, they leave blunter tooth marks.

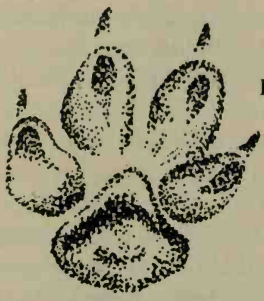
Dogs hunt singly, in pairs, or in packs, depending on the species and time of year. Their territories range from a few square miles for the fox to a hundred square miles or more for the wolf. Dogs mark their territories almost daily with scent posts consisting of urine or scat. These are usually left in prominent places around the perimeter of the territory and randomly within it. Dog scat varies greatly in size and shape. Like that of the cats, it often contains hair and bones, though it is more often blunt on the ends.

Dogs generally don't maintain permanent dens unless they are mating. Most of the time they rely on temporary bedding areas with scant protection provided by brush, stumps, rocks, or logs. Foxes often sleep right out in the open with their bushy tails curled around their legs and noses. Sometimes they even allow themselves to be buried by snowstorms.

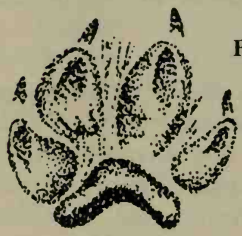
Dogs do a lot of digging—to excavate animals from their burrows, to follow promising scents, or to leave their "signature" after defecating. Their scratch marks are usually left on the ground, though they are also found on tree trunks where a dog has treed a squirrel or chipmunk and is looking longingly upward. Dog scratches are easily told from those of cats

by the closely spaced, dull claws. Dogs may also leave hairs, as they have more of a tendency to bump into projections and scrape their bodies against obstacles than cats do.

Red Fox *(Vulpes fulva)*



Front



Rear

Front Foot:	2⅜ (L) × 2 (W) in.
Rear Foot:	2⅛ × 2 in.
Trail Width:	4½
Slow Stride:	10-14 in.
Running:	18-36 in.

The red fox weighs between 10 and 15 pounds and measures about 3½ feet from nose to the tip of its long bushy tail. It lives throughout most of the United States and Canada, preferring farmland and treeline areas to heavy brush or thick forests. Its home range is about 2 square miles, and it sometimes travels up to 5 miles in a night. When hunting, its normal gait is a half-walk, half-trot. When chasing an animal, it prefers to bound rather than gallop. All foxes show direct register when walking—the only member of the dog family to do so.

The red fox is primarily nocturnal, though I have also seen it during the day in areas isolated from people. Its food, in order of importance,

includes rodents, rabbits, and ground birds. It sometimes caches excess food. It hunts very efficiently, choosing its prey as deliberately as though it were grocery shopping. Unlike domestic dogs, which tend to wander a great deal, foxes are very deliberate about their movements. They often travel in a straight line from one objective to another.

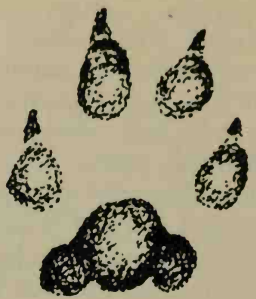
Foxes stalk like cats. Just before attacking their prey, they often back up momentarily and then pounce in a single bound. Instead of killing the animal outright, they often play with it, jumping back and forth and batting it around for quite a while. I've even seen well-fed foxes pounce on mice and play with them for half an hour before finally letting them go.

The red fox likes to den in hillside burrows, where the female in spring gives birth to an average of six young. These stay with the parents until fall. Fox territories often overlap, and the same animals frequently mate with each other year after year.

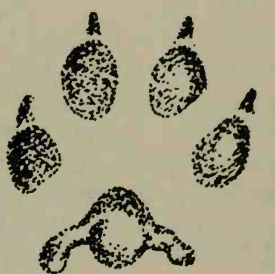
The best way to observe a fox is to find a transition area where you've seen its tracks and hide yourself well. You may choose to sit beside a fox run in the early morning or evening. If you're lucky, you may even catch one while it is watching over an open field. In moments like this, you'll find the fox in total concentration—ears forward, tip of tail twitching back and forth, scanning the field as though daring something to move. It is then, when its attention is riveted, that you may be able to stalk up close enough to get a good look. But be careful; a fox can hear a watch ticking at forty yards!

Foxes are very playful, but most of the time they try to maintain a rather sophisticated air. Once I was paddling around the bend of a river in a canoe and spotted a red fox on the bank. It was jumping around, playing with butterflies. As soon as it saw me, it sat down and pretended to be licking itself. Another time I managed to stalk to within a few feet of a fox while it was watching over a meadow, only to have it turn around and pounce on my shoe. It hit the shoe once and backed off, somewhat astonished to see what it was connected to.

Gray Fox *(Urocyon cinereoargenteus)*



Front



Rear

Front Foot: 1⅝ (L) × 1⅜ (W) in.
Rear Foot: 1½ × 1¼ in.
Trail Width: 3¾ in.
Slow Stride: 8-12 in.
Running: 18-36 in.

The gray fox is found in open woods and chaparral country throughout most of the United States, with the exception of Washington, Idaho, Montana, and Colorado. Rusty gray with a black stripe on the tail, it is about 3 feet long including the tail and weighs about 10 pounds. The habits and lifestyle of the gray fox are very similar to those of the red, except that it also climbs trees. It eats any animal it can catch, from insects to rabbits, supplementing its diet with eggs and fruits.

The range of the gray fox is smaller than that of the red, except where there is a scarcity of food. It dens in logs, rock caves, and sometimes underground. An average of five young are born in the spring.

One of the best ways to attract the gray fox (or any fox) is to hide near one of its runs and rustle some leaves or bushes with a long stick. Do this with one hand while "squeaking" your lips against the back of your other hand.

Coyote *(Canis latrans)*

Front

Rear

Front Foot:	2⅝ (L) × 2⅛ (W) in.
Rear Foot:	2⅜ × 2 in.
Trail Width:	5 in.
Slow Stride:	13-16 in.
Running:	16-50 in.

The coyote is the most widespread wild member of the dog family, with a range that covers most of continental United States, Canada, and Mexico. It prefers open rangelands but seems able to survive almost anywhere, making regular appearances around human habitations and even thriving in some city parks.

Coyotes vary greatly in size. Montana whites are huge, and some of the coyotes I've seen around the Pine Barrens are so large it's difficult to tell them from gray wolves. In fact, there is some suspicion that coyotes have interbred with wolves, and there is no doubt that they sometimes interbreed with domestic dogs, producing a strain called the coy-dog.

Generally, coyotes average from 3½ to 4½ feet long, including their long bushy tails, and weigh between 20 and 45 pounds at maturity. (Coyotes in the Southwest are quite small, averaging around 20 pounds,

while those in the North are comparatively large.) Males are generally larger than females by 5 to 15 pounds.

Contrary to popular belief, coyotes are solitary. (The so-called "bands" of coyotes that are sometimes seen are almost always family groups composed of a mother and her young.) They are also nocturnal for the most part. Their home range covers about 16 square miles but may extend up to 100 square miles in poor areas.

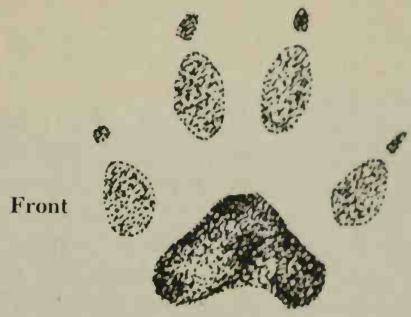
Coyotes have amazing endurance. They can run over thirty miles an hour, trot up to twenty miles an hour, and maintain a steady trot for hours at a stretch. Most of the time, unlike any other member of the dog or cat family, coyotes choose to trot rather than diagonal walk. (The trot pattern is very similar to that of the diagonal walk, but with the feet in more widely separated groups of two. See "Track Classifications" chart, page 268.)

Coyotes eat almost anything they can catch, though they do not usually kill calves or sheep unless their other food sources are depleted. A typical meat diet includes fifty percent rabbits, twenty-five percent small rodents (mostly voles), and twenty-five percent carrion. The mode of kill is usually a neck bite, but they will attack almost any part of the body to bring an animal down. They also eat birds and a variety of fruit, nuts, and leaves. Coyotes are not as omnivorous as bears, but they often ingest quite a bit of trash. Once, in fact, I found a coyote scat containing a whole set of pink lace underwear!

The coyote dens in almost any hollow it can find—rocks, tree stumps, logs, or earthworks. Either the mother or one of her offspring use the same birthing den year after year unless it is discovered. Males usually stay with their families for about three months after the birth of the pups, but coyotes don't form the same strong pack bond that keeps wolves together.

Coyotes have good eyesight and especially good hearing and smell. They are excellent stalkers and very adept at camouflaging themselves. To observe them, simply establish one of their habitual runs or dens and wait. Like clockwork, they'll come down that run or return to that den at almost the same time every night.

Gray Wolf *(Canis lupus)*



Front Foot: 4¾ (L) × 4¼ (W) in.
Rear Foot: 4½ × 4⅛ in.
Trail Width: 7 in.
Slow Stride: 16-18 in.
Running: 25-54 in.

The gray wolf is the largest member of the dog family. It is 4½ to 5½ feet long, including the tail, and weighs from 60 to 120 pounds. (Females are smaller than males.) Wolves diagonal walk at about 5 miles an hour and can run over 40 miles an hour. Their home range is anywhere from 50 to 100 square miles, and their territory is the open forest and tundra country of Canada and the far North, where they feed on deer, caribou, moose, and small mammals and birds.

Wolves travel in packs of up to twelve. These are usually extended families. It is very difficult for an outsider to become accepted into a pack and almost impossible for a lone wolf to establish a territory. Only the dominant male and female mate, and the size of the litter (usually six) is controlled by the availability of food.

The best places to observe wolves are near large concentrations of deer and caribou. There the pack stakes its claim, periodically culling out the sick and weak animals and thereby keeping the herds strong.

Once I sat at the edge of a meadow watching a sickened moose work its way toward the water when a wolf pack came up and began its attack approach. This was the first wolf kill I had seen, and I didn't know

what to expect. If anything, I thought the wolves might attack randomly. But the operation was done with amazing teamwork. First, two of their number rushed up front to cut it off. Then the rest surrounded it from behind, snarling and barking.

The moose was terrified, but it was a knowing terror. The animal seemed to sense that its time had come; and though it fought for its life, the battle seemed part of a ritual that both hunter and hunted knew would end in death. The wolves started with the back end, going for the hocks to try to cripple it. They steered clear of the front hooves, rushing in to bite the sides and neck as the animal neared the edge of the water. Finally, when the moose was so weakened that it could barely kick anymore, they ripped open the neck and abdomen. It toppled over and died as the wolves began feasting on its viscera, but it had long since gone into shock and probably felt little pain after the initial attack.

I have heard a few stories of wolves attacking humans, but it is usually when the animals have been threatened. Normally wolves go out of their way to avoid people. Once when walking back to camp I encountered a wolf pack coming in my direction over crusty snow. I was very tired that day and I expected them to attack without a second thought. Since I was unarmed, they could have taken me more easily than they had the old moose. But when they saw me, they stopped and veered off to a respectable distance. They continued on their way without so much as a growl.

The Rabbit Family *(Leporidae)*

Hares and rabbits, though they have chisellike gnawing incisors, differ from their rodent cousins in several respects. For tracking purposes, they all show four toes up front and four in the rear and have relatively enormous hind feet.

The main difference between rabbits and hares (which include the jackrabbits) is that rabbits are born almost hairless and with eyes closed, while hares are born with a thick coat of fur, open eyes, and an ability to run very soon afterwards. Once I stumbled onto a nest of blacktail jackrabbits that couldn't have been more than four hours old, and they scattered pell-mell, bounding and galloping in all directions.

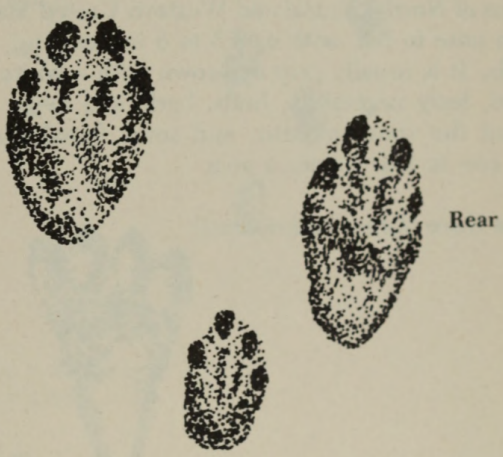
Though hares and rabbits are primarily gallopers, they sometimes bound on difficult terrain. They also diagonal walk or slow walk when sneaking and pace when threatening. Generally, hares travel in a straight line while rabbits like to zigzag. Both will zigzag when pursued by a predator. When tracking these animals, be prepared for tremendous variations in stride.

Most rabbits and hares choose thick tangles of brush for their

lairs—places where they can completely conceal themselves. However, you'll often find egg-shaped depressions in tall grass or vegetation where some species customarily spend the day or part of the night. They can also sit well camouflaged in the shadows of bushes.

The summer feed of rabbits and hares consists of grasses and leafy vegetation. Their home range is about 10 acres. Cottontails prefer thick tangles of brush in transition areas, while hares and jackrabbits love open country and fields. The scat of these animals is a spherical or disk-shaped pellet varying in size from ¼ to ½ inch in diameter. Rabbits also dig a little, and sometimes on hard-packed ground you can see the four well-defined scratch marks of their claws. They also have well-defined trails and runs leading to bedding and feeding areas (see "Animal Highways and Signs," page 187).

Blacktail Jackrabbit *(Lepus californicus)*



Front Foot: 1½ (L) × 1⅛ (W) in.
Rear Foot: 2⅜ × 2 in.
Trail Width: 7½ in.
Slow Stride: 9-12 in.
Running: 5-12 ft. (max. 15 ft.)

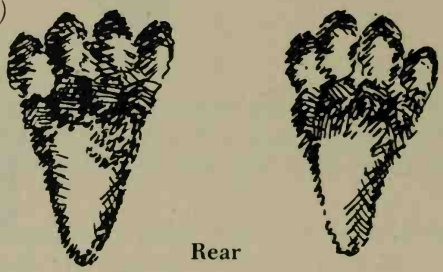
The blacktail jackrabbit is smaller than the whitetail (from 3 to 6 pounds) but with slightly longer, black-tipped ears and a black streak on the tail. It lives mainly in the plains, grasslands, and deserts of Western and Southwestern United States. Its full galloping stride varies greatly, partly because of terrain and partly as a means of eluding predators. Most of this animal's habits are similar to those of the whitetail jackrabbit.

Whitetail Jackrabbit *(Lepus townsendii)*

Front Foot:	1½ (L) × 1 (W) in.
Rear Foot:	3½ × 3 in.
Trail Width:	8 in.
Slow Stride:	10-15 in.
Running:	3-9 ft. (20 ft. max.)

The whitetail jackrabbit is a large hare that lives in the grass and sage plains of North Central and Western United States. It is almost 2 feet long from nose to tail, with ears 5 to 6 inches long, and weighs from 5 to 10 pounds. It is usually gray or brown with a white tail. It feeds at night on grasses, leafy vegetation, buds, bark, and twigs. The jackrabbit mates throughout the warm months, and some females raise as many as four litters of two to four babies a year.

Snowshoe Hare *(Lepus americanus)*



Rear

Front Foot:	1½ (L) × 1⅛ (W) in.
Rear Foot:	3 × 2 in.
Trail Width:	8 in.
Slow Stride:	10-12 in.
Running:	3-7 ft.

Front

The snowshoe is a rather small hare about 1 to 1½ feet long and weighing about 4 pounds. However, it is easily recognized by its large, snowshoe-shaped feet and by its striking seasonal changes of color—brown in summer and snow-white in winter.

The snowshoe hare prefers the cold North country, though it also lives in the New England states, the Pacific Northwest, and parts of the Rockies. It inhabits thick woods and forests where there is plenty of succulent vegetation in the summer and lots of low-growing, tender bark and buds in the winter. It feeds mainly at night, spending the day in protected lairs beneath trees or brush.

Snowshoe populations are cyclic and greatly variable, depending on the availability of food. A female hare may have two or three litters a year, anywhere from early spring to late summer. Like other hares, the young are born furred and open-eyed and can run within a few hours.

Cottontail *(Sylvilagus spp.)*

Front Foot: ⅞ (L) × ⅝ (W) in.
Rear Foot: 2¾ × 1⅛ in.
Trail Width: 6 in.
Slow Stride: 7-12 in.
Running: 15-36 in.

There are four main species of cottontail (mountain, desert, eastern, and New England), their ranges together covering almost all of the continental United States. These are all relatively small rabbits with white, cottony tails. They range in length from 12 to 17 inches and weigh from 2 to 4 pounds.

The species have similar habits. They are all nocturnal, feeding heavily at dusk and at dawn. During the day they hide in grassy depressions, brush piles, or burrows. Most cottontails prefer thickets and open forests with an abundance of succulent vegetation in the summer and bark, twigs, and buds in the winter. They range from 1 to 15 acres.

Cottontails may have several litters of two to six babies a year, usually in a grass-lined depression in the ground. Unlike the hares, the young are born blind and remain helpless for some time.

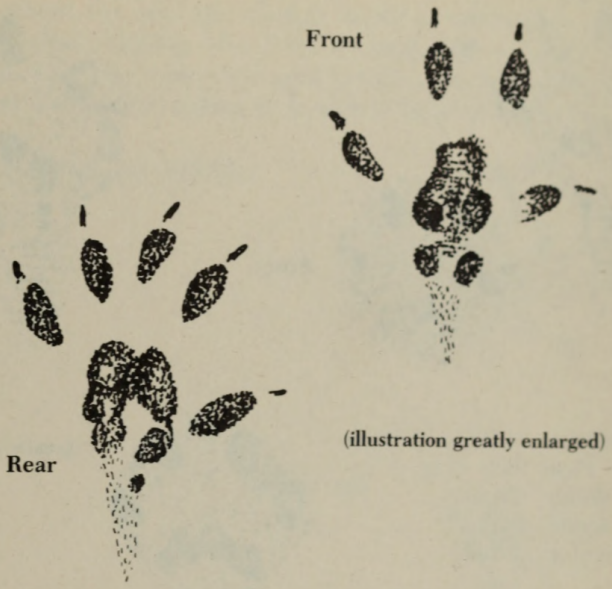
One of the most common cottontail signs is the "rabbit hollow"—a little depression in the ground found in any area that offers cover. You'll also find numerous hairs and saucer-shaped scat from ¼ to ⅓ inch in diameter. Especially in winter, these are circular and very fibrous.

The Rodent Family *(Rodentia)*

The rodents make up a very prolific order that includes many diverse families and hundreds of species. Some of the more common are voles, mice, rats, chipmunks, squirrels, woodchucks, porcupines, muskrats, and beavers. Aside from their four- and five-toe configuration and their usual galloping gait, they all have in common a set of chisel-sharp incisors that are used for cutting and gnawing vegetation. Rodents also bound on difficult terrain, pace when threatening, and slow walk when stalking.

Rodent tracks vary greatly in size, and it is often difficult to determine the species from a single track. This is especially true with the smaller rodents, which often leave little more than faint scratchings, even in well-prepared dirt or sand. In such cases, it helps to concentrate on patterns rather than individual tracks. The typical gait pattern of these gallopers is a wide U or V shape. You can often determine the species by measuring trail width and stride and combining this knowledge with habits and other evidence such as scat and gnawed vegetation.

Meadow Vole *(Microtus pennsylvanicus)*

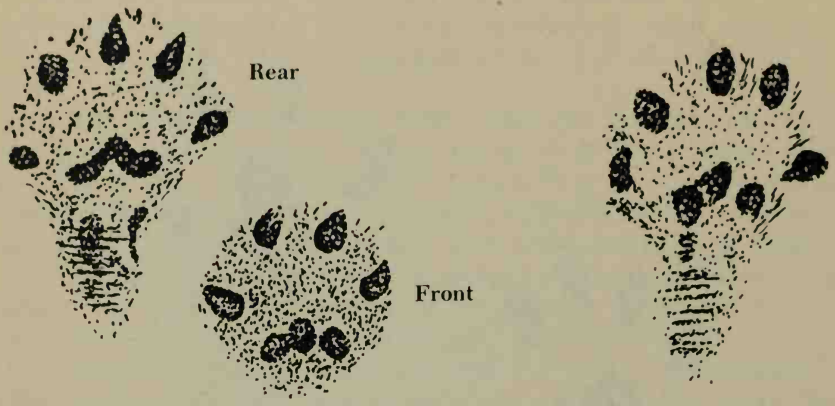


Front Foot: 3/16 (L) × 3/16 (W) in.
Rear Foot: ¼ × ¼ in.
Trail Width: 1¼ in.
Slow Stride: ½-1½ in.
Running: 1½-4 in.

The meadow vole is one of the most common rodents, found tunneling in thick, grassy meadows throughout most of Northern United States and Canada. It is anywhere from 3 to 5 inches long and varies from gray to dark brown. Though the tracks are hard to distinguish unless they're in mud, you can usually find distinctive vole runways, a little over an inch wide, just beneath the grass cover. Within these runways you'll probably find gnawed grasses and tiny pencil-lead-sized droppings. The vole ranges up to 1 acre and is very prolific, producing litters of one to eight babies several times a year.

Voles are easily seen almost any time of the day or night if you're patient; but they're awfully quick. One of the more fascinating ways to watch them is to put your face to a promising runway and wait for one to come by. Another is to sit quietly beside a stump or other vole "apartment complex" and watch for activity.

White-footed Mouse *(Peromyscus spp.)*



Front Foot: ¼ (L) × ¼ (W) in.
Rear Foot: ⅝ × ⅜ in.
Trail Width: 1½ in.
Slow Stride: 2½ in.
Running: 4-6 in.

(greatly enlarged)

The white-footed mouse, or deer mouse, is the most common and widespread of all the mice, and the genus includes many similar species. Without the tail it is about 3½ to 4¼ inches long, brown with white feet and underparts. It lives primarily in thickly wooded areas, using stumps, logs, bushes, bird nests, and holes in the ground for burrows. It is a great seed and nut eater, often storing large quantities for future use. Its droppings are about as thick as the lead of a drawing pencil and less tubular than those of the voles.

The white-footed mouse breeds from spring through fall (and all year long in warmer climates), producing several litters of two to six babies a year. The young are sexually mature at five weeks.

House Mouse *(Mus musculus)*

Front Foot: ¼ (L) × ¼ (W) in.
Rear Foot: ⅝ × ⅜ in.
Trail Width: 1 in.
Slow Stride: 2½ in.
Running: 4-6 in.

Most mice are small nocturnal ground dwellers, but some of them also climb. They eat seeds, nuts, leaves, grasses, bark, buds, and insects. The house mouse is primarily adapted to human habitations and can be found throughout the country, though rarely in wilderness areas. It is a gray-brown rodent, slightly over 3 inches long, with a scaly tail of almost equal length. Like the vole, it is very prolific, producing litters of up to ten babies at almost any season and several times a year.

Norway Rat *(Rattus norvegicus)*

Walking gait

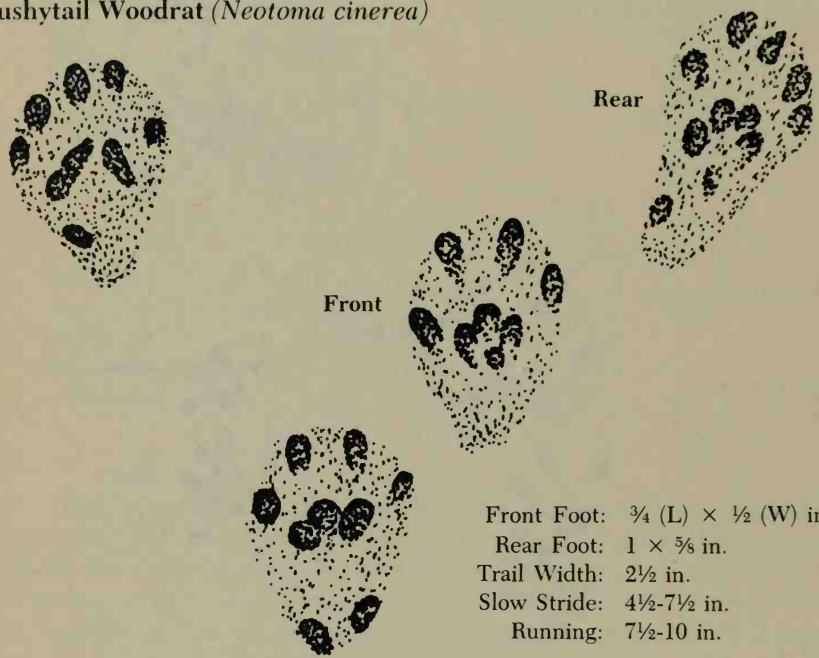
Front Foot: ⅝ (L) × ¾ (W) in.
Rear Foot: ⅞ × ⅞ in.
Trail Width: 3⅛ in.
Slow Stride: 2½-5 in.
Running: 5-8 in.

The Norway rat is a familiar and little-loved rodent of towns and cities. It is brownish gray, measures about 14 inches long (including its scaly tail), and weighs about half a pound. It frequents old buildings and garbage piles and feeds on meat and vegetable matter of all kinds. Like most rats and mice, it is nocturnal and rarely seen during the day. Under favorable conditions it is even more prolific than mice, producing as many

as ten litters a year, each averaging eight or nine babies. Its droppings are shaped like those of the mice but are much larger, averaging ¾ to 1 inch long.

The tracks of the Norway rat look like little four- or five-fingered hands. The animal is a classic galloper most of the time, though it bounds when chasing prey such as insects, slow walks when stalking, and paces when bored or threatening another animal.

Bushytail Woodrat *(Neotoma cinerea)*



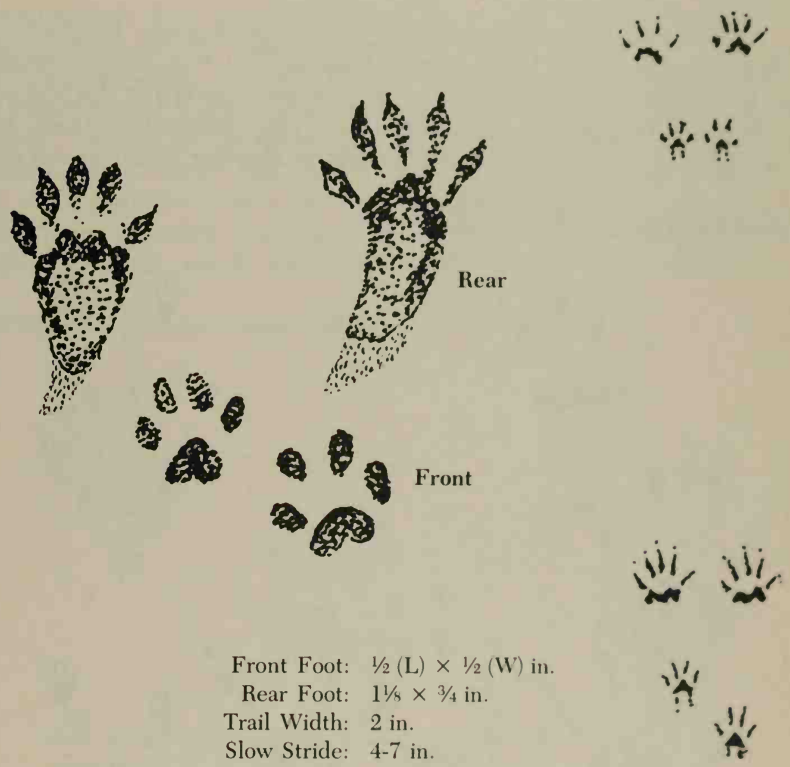
Front Foot: ¾ (L) × ½ (W) in.
Rear Foot: 1 × ⅝ in.
Trail Width: 2½ in.
Slow Stride: 4½-7½ in.
Running: 7½-10 in.

This is the common packrat—one of the most delightful of the rodents. It is 7 to 9 inches long (not including the tail) and averages from half a pound to about a pound in weight. It is gray to black, with white feet and a distinctively bushy tail about 5 to 7 inches long. It lives primarily in rockslides and mountainous areas of the Western states, but other species of the same genus can be found throughout the country.

The woodrat feeds on leaves, seeds, nuts, fruits, and large insects. Most characteristic of all, it has the habit of collecting odds and ends. In its nest, which may be a bulky pile of sticks in a rock crevice, bush, or corner of a forgotten cabin, you may find anything from watches and keys to pop cans and candy wrappers. Sometimes these nests are huge, reaching a height of 4 to 6 feet.

The range of the woodrat is about 5 acres. It produces an average of three young each summer. Its tracks have relatively short, stubby toes. As with the mice, the heel mark of the hind foot does not usually show. The droppings average ½ to ¾ inch long.

Chipmunk *(Tamias spp., Eutamias spp.)*



Front Foot:	½ (L) × ½ (W) in.
Rear Foot:	1⅛ × ¾ in.
Trail Width:	2 in.
Slow Stride:	4-7 in.
Running:	7-9 in.

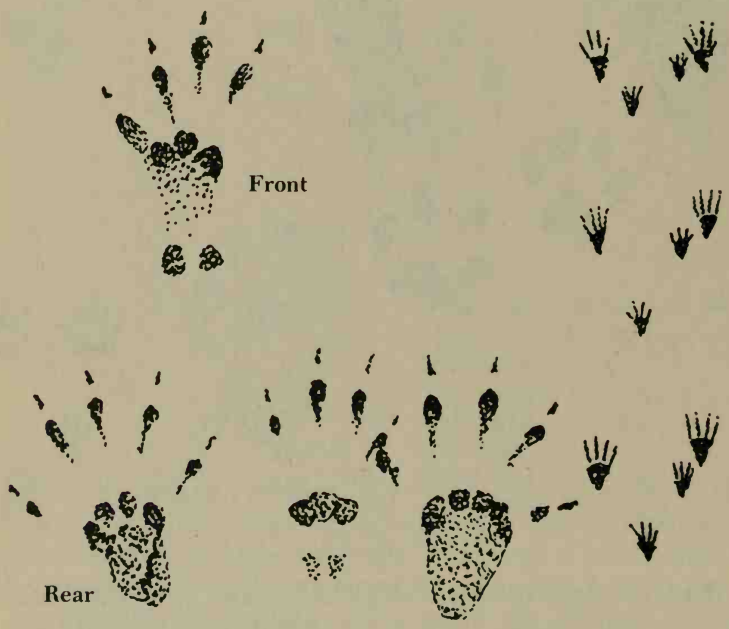
There are many species of chipmunks found throughout most of the United States and Canada. These perky rodents are frequently seen along roadsides and in campgrounds. Most species are about 4 to 6 inches long, weigh from 2 to 4 ounces, and are various shades of brown with distinct body stripes and long, moderately bushy tails. They can be distinguished from the ground squirrels by their facial stripes.

Chipmunks are generally diurnal and terrestrial, living in self-dug burrows up to 15 feet long and 3 feet deep. These seldom show any dirt mounds on the outside, as the chipmunk is very fastidious. Chipmunks

also climb trees, particularly when harvesting seeds and nuts, which are their primary foods. These they store in their burrows, sometimes by the quart. They also have a real love for berries and mushrooms and will actually hang them up to dry so they don't spoil. They also eat beetles, slugs, snails, eggs, and even baby birds—and they have an undying passion for butterflies and grasshoppers, which they chase while chattering with great excitement and frustration.

The home range of most chipmunks is 1 to 2 acres. They are very territorial and solitary. Most species have one or two litters averaging three to six babies each—the first in early or mid-spring and the second in late summer. The tracks usually show the typical galloping pattern, leaving a modified U or V shape. The droppings average ¼ to ½ inch long.

Ground Squirrel *(Citellus spp.)*

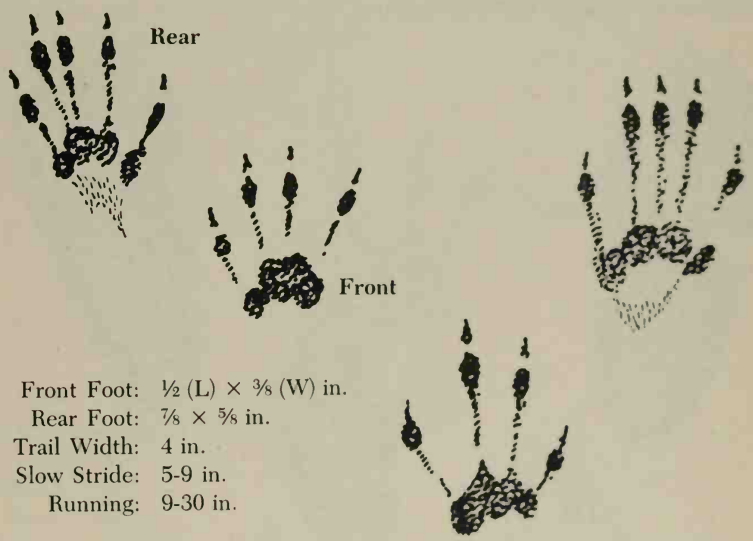


Front Foot: ⅝ (L) × ⅜ (W) in.
Rear Foot: ⅞ × ⅝ in.
Trail Width: 2-3¼ in.
Slow Stride: 2-7 in.
Running: 7-15 in.

There are many species of ground squirrels throughout the prairies, grasslands, deserts, and mountainous areas of the Midwest and Western states. They vary greatly in size and appearance, but they all have similar habits and track patterns. (The dimensions given above are for the thirteen-lined ground squirrel.)

The ground squirrels are somewhat larger than the chipmunks, averaging from 5 to 9 inches without the tail and weighing from 4 to 12 ounces. They live in self-dug ground burrows that usually have sandy mounds around the entrance. Sometimes they have a shallow burrow for the summer and a deep one for winter. Ground squirrels are daytime animals, feeding mainly on grasses and seeds, but they also love larvae, grasshoppers, crickets, and other insects. In the hottest areas of the desert they sometimes aestivate up to seven months. Their home range is 2 to 3 acres. Some are active throughout the year, while others hibernate during the winter. They usually have a single litter of five to ten babies.

Red Squirrel *(Tamiasciurus hudsonicus)*



Front Foot: ½ (L) × ⅜ (W) in.
Rear Foot: ⅞ × ⅝ in.
Trail Width: 4 in.
Slow Stride: 5-9 in.
Running: 9-30 in.

The red squirrel usually runs along tree trunks and limbs in a modified bound, reserving the gallop for most of its ground movement. However, it also slow walks in difficult places and paces as a threat gesture.

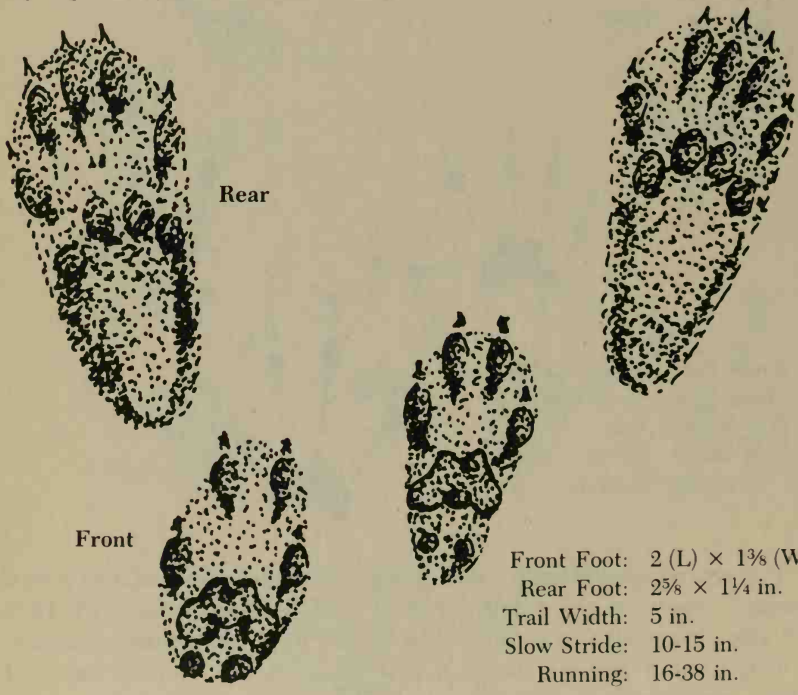
This animal and its Pacific Coast counterpart, the chickaree *(T. douglasii)*, are found in forested areas throughout most of the United States and Canada. They are incredibly vigorous and noisy little animals.

They scamper about in their arboreal homes like balls of fiery fur, scolding all trespassers with an energy and intensity unmatched by any animal but the weasel. They are rusty or reddish in color, about 6 to 8 inches long (not including their 4- to 6-inch bushy tails) and weigh a little less than half a pound.

Most red squirrels are daytime animals, though they also forage occasionally at night. They are very territorial and range only about 200 yards from their nest. They live in hollow tree trunks, in tree-bound piles of sticks and leaves, or in well-hidden ground nests. Their main foods are cones and nuts, though they also enjoy mushrooms, fungi, insects, larvae, and even eggs and fledglings. One of their most characteristic signs is the "midden," a pile of cone scales or nutshells left after one or many feasts in a favorite feeding spot.

The red squirrel is active all year long, tunneling in snow and caching large amounts of food to tide it through the winter. It has two to eight young twice a year, in spring and fall.

Gray Squirrel *(Sciurus carolinensis)*



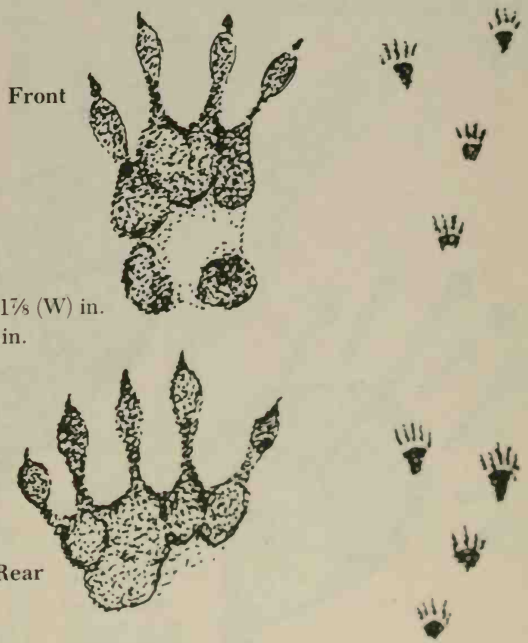
Front Foot: 2 (L) × 1⅜ (W) in.
Rear Foot: 2⅝ × 1¼ in.
Trail Width: 5 in.
Slow Stride: 10-15 in.
Running: 16-38 in.

The eastern gray squirrel and its western counterpart, *S. griseus*, are gray with white bellies and long bushy tails. Their bodies are 8 to 12 inches long, and their tails are almost as long again. They live mainly in deciduous forests, feasting on nuts, seeds, fruits, fungi, and tender bark. They often cache nuts in the ground, many of which they forget to uncover; hence they are responsible for the planting of many an oak tree.

Gray squirrels are primarily daytime, tree-dwelling animals. Though they often forage on the ground, they like to stay close to the safety of their treetop homes. There they build nests either in cavities or in elaborate, leafy domes high enough to discourage most predators. Their home range is 1 to 7 acres. They have one or two litters of three to five babies each year, and the babies stay with the mother for about eight weeks.

Since the gray squirrel is primarily arboreal, you can often find evidence of its tracks in the trees. Most squirrels eventually establish an elaborate system of branching skyways, which they mark with scent and travel habitually day after day. If you climb such trees, you can often see the bark worn off certain limbs and sometimes find the tiny scratch marks and punctures left by grasping claws.

Woodchuck, Marmot *(Marmota spp.)*



Front Foot: 2⅛ (L) × 1⅞ (W) in.
Rear Foot: 1⅝ × 1⅜ in.
Trail Width: 5 in.
Slow Stride: 6-8 in.
Running: 12-20 in.

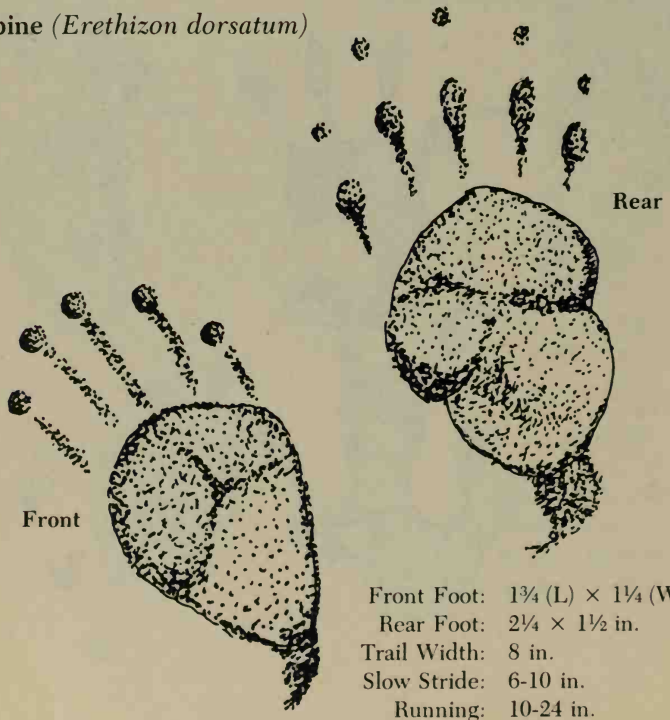
Woodchucks and marmots are wide-bodied, burrowing rodents measuring 18 to 30 inches from nose to tip of tail and weighing 5 to 20 pounds. Various species are found among rockslides and open woods throughout most of the United States and Canada—some at altitudes up to 12,000 feet. Their general color varies from yellowish brown to grayish.

Woodchucks are mainly daytime animals. They dig extensive burrows, often 4 to 6 feet deep and up to 45 feet long with several entrances. These are usually found among well-protected rockslides near a good supply of succulent vegetation, which the animal sometimes harvests and stores for future use. The droppings are variable in shape and consistency and about as large as those of a cat or small dog.

Most woodchucks hibernate through the fall and winter, and some also aestivate during the hotter weeks of the summer. This leaves only about four months each year when they are not in a state of torpor. When fully awake, they are quite perky and some of the mountainous Western species let out a shrill chirp or whistle to warn of danger.

Woodchucks are solitary and territorial. They may let other chucks come within their home range, but not usually inside their dens. Their range is anywhere from 2 to 160 acres, depending on the environment. They have one litter of two to six young in the spring.

Porcupine *(Erethizon dorsatum)*

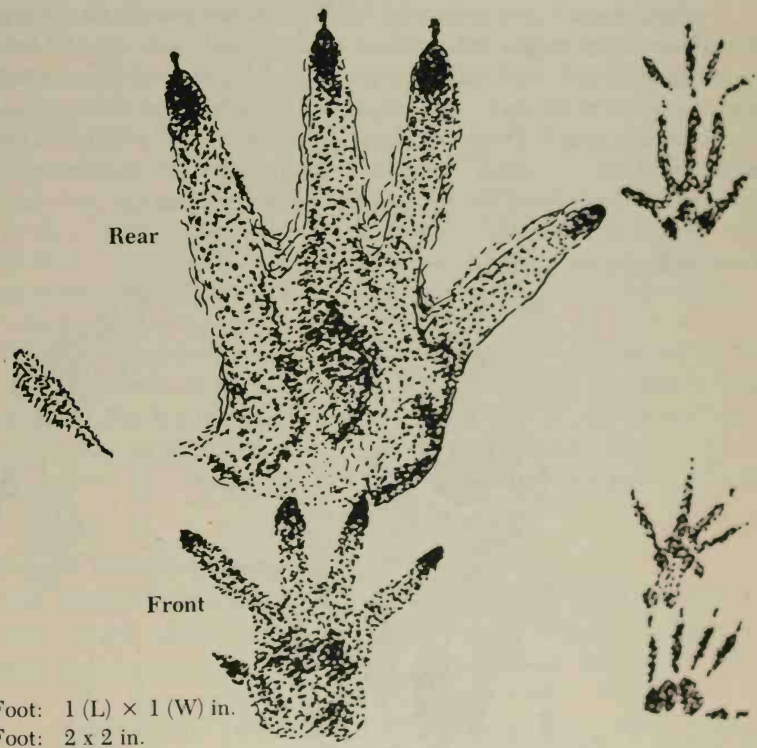


Front Foot:	1¾ (L) × 1¼ (W) in.
Rear Foot:	2¼ × 1½ in.
Trail Width:	8 in.
Slow Stride:	6-10 in.
Running:	10-24 in.

The porcupine is the familiar bristly rodent of the forests of Canada and the northern and western portions of the United States. It is 1½ to 2½ feet long from nose to tip of spiny tail, and it weighs from 10 to 30 pounds. It spends most of its time shambling through the woods or clinging to treetops, feasting on tender bark, buds, and twigs. The large patches in tree bark left by its gnawings are often visible for quite a distance.

The porcupine is solitary during the warm months but often dens with others of its species during the winter. Its den is usually a rock cave or hollow tree, where it frequently leaves long, pellet-shaped droppings as signs of its passage. Its tracks are quite distinctive, since it paces with toes pointed inward and drags its tail behind. Often the tracks show traces of the tail "sweeping" like a whisk broom over the top. The porcupine mates in the fall, and the female gives birth to a single baby in the spring.

Muskrat *(Ondatra zibethica)*



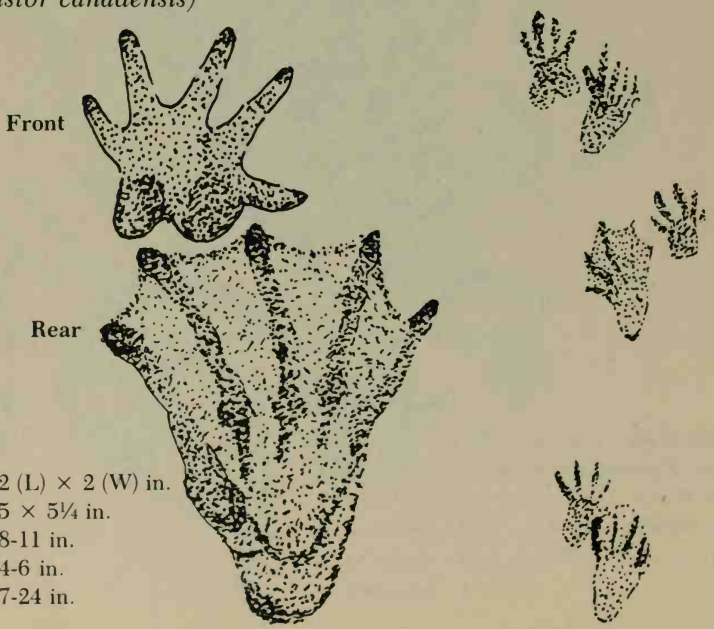
Front Foot: 1 (L) × 1 (W) in.
Rear Foot: 2 x 2 in.
Trail Width: 3½ in.
Slow Stride: 3-6 in.
Running: 7-15 in.

Muskrats are 10 to 14 inches long (excluding their long, vertically flattened tails) and weigh 2 to 4 pounds. They are found in marshes and along stream- and pondsides throughout most of the United States and Canada. Their tracks usually show the typical rodent pattern, four toes up front and five in the rear, but in soft mud they sometimes show five and five. Like the woodchuck, muskrats pace most of the time, changing their gait to diagonal walking, bounding, galloping, and slow walking depending on the circumstances.

Most often muskrats live in excavated bank burrows or beaverlike houses made of sticks and other vegetation. Sometimes they even live quite amicably with the beavers themselves. They eat cattails, reeds, rushes, pondweeds, and occasionally clams, crayfish, frogs, and turtles. They also construct floating platforms of grasses and sticks on which to rest and feed, and during the winter you can often see little snow-covered mounds of matted vegetation on the ice that mark the "plunge holes" where they come up to feed and take a breather.

Muskrats are nocturnal and solitary except during the mating season and in winter when they gather in dens and burrows to stay warm. They are territorial, especially in the breeding area, and leave small scent piles composed of stems, leaves, and mud that give off the pungent odor of their scent glands. They may have as many as three litters a year, the average number of babies being five. Their scats are collections of little vegetative pellets about 3/16 inch wide and 3/4 inch long.

Beaver *(Castor canadensis)*



Front Foot: 2 (L) × 2 (W) in.
Rear Foot: 5 × 5¼ in.
Trail Width: 8-11 in.
Slow Stride: 4-6 in.
Running: 7-24 in.

The beaver is the largest of all the North American rodents, measuring from 2 to 2½ feet long (excluding the tail) and weighing from 30 to 70 pounds. The tail is hairless and paddle-shaped, 8 to 10 inches long, and 6 inches wide.

Beavers usually register four toes up front and five in the rear; but in soft mud they register five and five. In harder mud they register four and three, mainly because the dragging tail wipes out part of the back prints. The beaver paces most of the time, but it also slow walks when cautious, bounds in thick vegetation, and gallops when running from an enemy.

The beaver is nocturnal. It makes its home on the edges of lakes and streams, where it either burrows into a bank or builds an elaborate mud-and-stick lodge with a dam to regulate the water level. It feeds on the inner bark of trees—willow, aspen, and cottonwood being its favorites.

With its sharp, chisellike incisors, the beaver can cut through a five-inch tree in three minutes. The evidence of these gnawings and the prominent dens and dams make it easy to spot a beaver habitation. A less obvious sign is the scent pile—matted bunches of mud and grasses exuding the pungent smell of its castor glands. The scat, found only occasionally because of the beaver's watery domain, consists of pellets about ¾ inch thick and 1 inch long.

Beavers are very territorial and don't readily accept strangers, with the exception of an occasional muskrat lodger. The females usually have one litter of three or four babies in the spring or early summer. The young can swim within a week and stay with the parents in family dens for up to a year before leaving the area.

The best time to observe beavers is very early in the morning, after they've put in a hard night's work and are more likely to be tired, cranky, and incautious. I've had the best luck by finding their feeding areas during the day and stalking back just before sunup. Even so, you have to be very careful. Beavers can surface and disappear again as quietly as waterlogged stumps.

The Weasel Family *(Mustelidae)*

The weasel family is a highly diverse group of mammals that includes the weasels, minks, martens, fishers, otters, skunks, badgers, and wolverines. As mentioned earlier, these animals show five toes up front and five in the rear, usually with visible clawmarks. The feet of the weasels are very large in reference to their bodies. This makes them especially efficient at swimming and traveling on snow. Most of these animals are also bounders—with the exception of the wide-bodied skunks,

badgers, and wolverines, which are pacers. The tracks of the weasels usually show up as a square-shaped double print, the hind feet coming down just behind or on top of the front feet. Members of the weasel family also leave a skunklike odor wherever they go, making it easier to identify their presence. Their scat is somewhat longer and stringier than that of the rodents, varying from 3/16 inch thick with the shorttail weasel to about ½ inch thick with the river otter.

Shorttail Weasel *(Mustela erminea)*

Front Foot:	¾ (L) × ⅜ (W) in.
Rear Foot:	1 × ½ in.
Trail Width:	2¾ in.
Slow Stride:	7-12 in.
Running:	12-16 in.

Tracks similar in shape to those of longtail weasel (see figure on page 169).

The shorttail weasel lives in wooded areas throughout Canada and the American Northeast and West. It is a very sleek, slender animal—dark brown with white underparts and feet in summer, changing to snow-white in the winter. It is 5 to 9 inches long (plus a 2- to 4-inch tail) and weighs 1 to 6 ounces, males being markedly larger and heavier than females.

Ounce for ounce, the weasel is the most energetic and effective hunter I know. It swims, climbs trees, goes down mouse holes, slinks through runways and tunnels, and dives into snowbanks. A nocturnal hunter, it moves like a silent lightning bolt, incessantly searching, sniffing, and exploring. It feeds mainly on voles, mice, birds, eggs, and sometimes seeds, though it can take animals as large as a duck or rabbit without any trouble. Its usual mode of killing is a neck bite just behind the skull. Sometimes it kills more than it needs and caches its prey.

The weasel lives in ground burrows or protected rock crannies. Often it takes over the nest of an animal it has killed and lines it with the animal's own fur. It ranges up to 50 acres, sometimes covering 6 acres in a single night's foraging. There is one litter of four to eight babies each year, usually born in mid-spring.

Longtail Weasel *(Mustela frenata)*

Front Foot:	1⅛ (L) × ½ (W) in.
Rear Foot:	1½ × ¾ in.
Trail Width:	2¾ × 3¼ in.
Slow Stride:	10-13 in.
Running:	14-18 in.

The longtail is the most common of the weasels, found throughout the United States and Southwestern Canada wherever there is water. Like the shorttail weasel, it is primarily brown in summer and white in winter, but it is larger, measuring up to 10 inches long (plus a 4- to 6-inch tail) and weighing from 3 to 12 ounces. Males are almost twice as heavy as females.

The longtail weasel is active day and night, feeding on mice, rats, chipmunks, ground squirrels, birds, eggs, rabbits, and anything else it can catch and kill. It also eats berries, seeds, and forbs. Its droppings are about ¼ inch thick.

This species dens in old burrows of other animals, preferring logs. Its home range is about 50 acres. The young (usually about six) are born in mid-spring and are independent at about eight weeks.

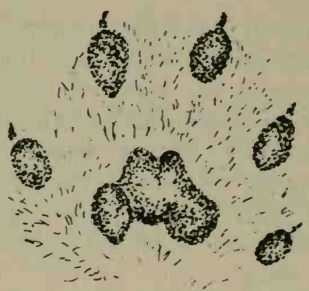
Least Weasel *(Mustela rixosa)*

Front Foot:	⅜ (L) × ¼ (W) in.
Rear Foot:	⅝ × ⅜ in.
Trail Width:	1 in.
Slow Stride:	6-8 in.
Running:	8-12 in.

The least weasel ranges through North Central to Northeastern United States and almost all of Canada and Alaska. Measuring only 6 inches long and weighing less than 2 ounces, it is the world's smallest (and probably most savage) carnivore. Mice and voles are its main diet, though I have seen it kill a grown duck. It is nocturnal, frequenting brush and meadows. It rummages through small rodent tunnels absolutely terrorizing the inhabitants. If you're sitting on the edge of a meadow some evening and you suddenly see voles jumping out of the grass like popcorn, screaming at the top of their lungs, you can be assured that one of these little bombshells has invaded a rodent apartment complex. The species mates at almost any time, producing at least one litter of four to six babies each year.

Mink *(Mustela vison)*

Front



Rear

Front Foot: 1 (L) × 1⅜ (W) in.
Rear Foot: 1⅛ × 1½ in.
Trail Width: 3 in.
Slow Stride: 9-20 in.
Running: 20-30 in.

The mink is found throughout most of North America, with the exception of the Southwest. It is dark brown with a white patch on its chin. Its size varies greatly, and so does its track pattern. Most individuals are about 2 feet long (including the 7- to 9-inch tail) and weigh 1½ to 3 pounds.

The mink is nocturnal, solitary, and very territorial. It loves the shorelines of lakes, streams, and ponds. I've even seen mink at the ocean on the outer fringes of estuaries. They eat primarily mice, rats, frogs, fish, crayfish, birds, and muskrats. The scat is about ⅜ inch in diameter.

As you might guess from its habitat, the mink is an excellent swimmer and diver. It loves to play in the water, splashing, turning, and pin-

wheeling with the agility of an otter. Its shoreline territory may extend over several miles. Sometimes it excavates its own burrow in a bank, while other times it takes over a muskrat or beaver lodge. It moves its den frequently. The young (four to six) are born in mid-spring.

The best way to see mink is to sit in a likely hunting area where you've found tracks and thrash the water with a wispy stick. This often draws their attention, as it sounds much like pickerel or bass.

Marten *(Martes americana)*

Front Foot:	1¾ (L) × 1¾ (W) in.
Rear Foot:	1⅜ × 1⅝ in.
Trail Width:	5-6 in.
Slow Stride:	6-9 in.
Running:	10-23 in.

The marten is a medium-sized weasel that lives in the coniferous forests of the Pacific Coast states and Canada. It is about 2 feet long, including the bushy tail, and weighs about 2 to 3 pounds. Secretive and mainly nocturnal, it is very difficult to see. It spends most of its time in trees, feeding on rodents and birds, though it also travels on the ground foraging for berries and nuts. The marten tends to dig more than most weasels, being unopposed to a little manual labor if it will help to get into a chipmunk burrow. Its droppings, which measure about ⅜ inch thick, are often confused with those of the mink.

The marten dens in hollow logs and tree cavities and is very territorial. Its average range is about 1 square mile, though it may travel much farther. Its two to four young are usually born in April.

The best way to observe the marten, as with most weasels, is to locate a likely den (often marked with scat and a skunklike odor) and wait for the animal to return. There is not much you can do to attract these elusive animals.

Fisher *(Martes pennanti)*

Front Foot:	3 (L) × 3 (W) in.
Rear Foot:	2⅞ × 2⅝ in.
Trail Width:	4-8 in.
Slow Stride:	12-18 in.
Running:	19-30 in.

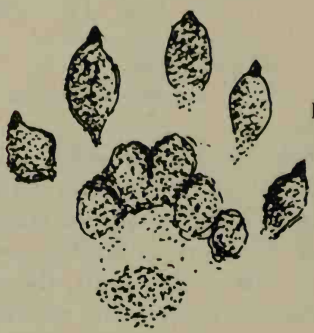
The fisher is a very rare weasel whose habitat and territory overlap that of its smaller cousin, the marten. The fisher averages 3 feet long,

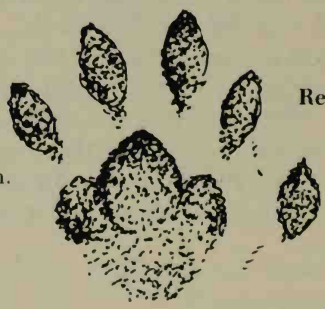
including the bushy tail, and weighs from 3 to 12 pounds (females being about half the weight of the males).

Like the marten, the fisher is nocturnal and solitary, but not as territorial. Most of its border disputes are settled with minimal threat gestures rather than fights. Its diet consists mainly of hares and porcupines and its home range is about 10 square miles. Its scat, averaging ⅝ inch in diameter, is easily distinguished from the smaller scat of marten and mink.

The fisher dens in tree cavities or ground burrows. Its two to four young are usually born in April. It is sighted very rarely, though most often by using the same techniques as for the marten.

River Otter *(Lutra canadensis)*





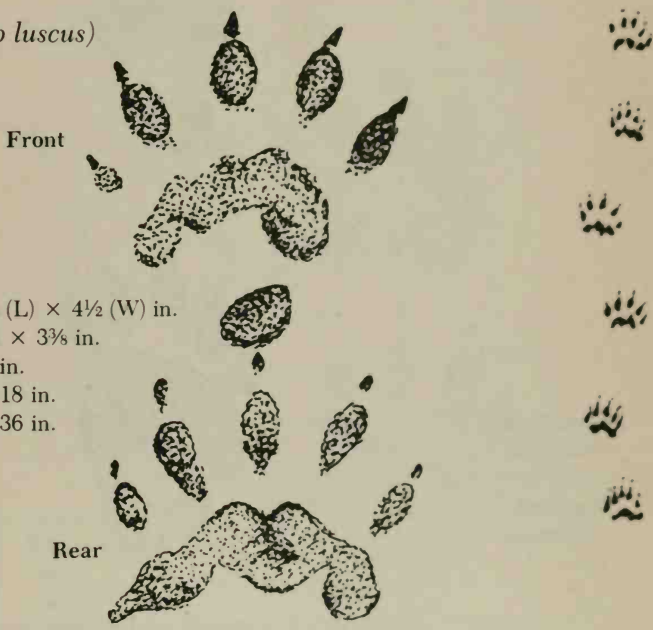
Front Foot:	2⅝ (L) × 3 (W) in.
Rear Foot:	2⅞ × 3⅛ in.
Trail Width:	6 in.
Slow Stride:	15-18 in.
Running:	18-30 in.

The river otter can be found throughout most of North America along the margins of lakes and streams. It is a large brown weasel a little over 3 feet long (including its tapering tail) and weighs about 15 to 20 pounds. It spends most of its time near or in the water, feeding on fish, frogs, crayfish, and other aquatic animals. It is very gregarious and playful, sliding with equal delight on snow, mud, and ice for no other reason than the sheer joy of it.

The otter's feet are webbed, and make distinctive tracks on soft surfaces such as mud. In snow, most often you'll find a trough the width of the animal's body where it has plowed its way along. The otter leaves a scent post with the musty weasel odor, plus droppings about ½ inch thick. It dens in banksides but often ranges many miles from its home base. The young (usually three to four) are born in mid-spring.

To observe the otter, find its lodge—usually marked by a mudslide into the water or a well-defined den with tracks around it. Approach at a stalk from a great distance, and stay well camouflaged. The weasels are extremely wary, and the otter is no exception. It can sense humans a long way off and is also very sensitive to signs of pollution. In recent years, it has been moving into increasingly remote areas.

Wolverine *(Culo luscus)*



Front Foot: 4½ (L) × 4½ (W) in.
Rear Foot: 3½ × 3⅜ in.
Trail Width: 10 in.
Slow Stride: 16-18 in.
Running: 19-36 in.

The wolverine is a powerful, bearlike weasel found in the scrubby treeline and brush tundra country of Canada and the far North. It is about 3½ feet long and weighs 40 to 60 pounds. Active by day or night, it is primarily a carrion feeder but will eat any animal it can kill, including snowbound caribou and deer. It also eats eggs and berries. Its scat is about ⅝ inch thick.

Fast and deadly with its raking claws and ripping teeth, the wolverine is very territorial and one of the most vicious of fighters. In spite of its relatively small size, this animal can fight a bear to a draw, and

many native American tribes tried to imitate its tenacious ferocity.

Wolverines climb well and are excellent swimmers. They den on sheltered ground or in brush or under logs. Two to three young are born in early spring.

Spotted Skunk *(Spilogale putorius)*

Front Foot: ⅞ (L) × 1 (W) in.
Rear Foot: 1⅛ × 1¼ in.
Trail Width: 6 in.
Slow Stride: 4-6 in.
Running: 8-12 in.

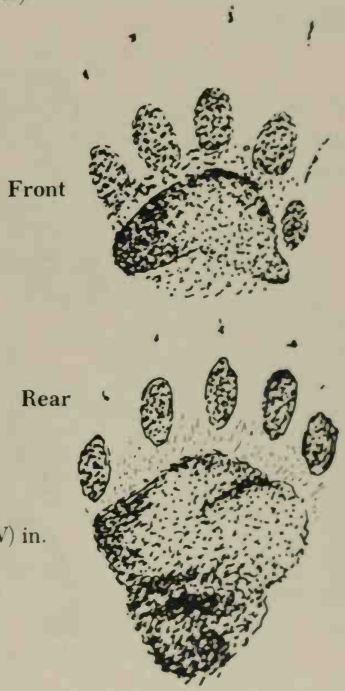
The spotted skunk is found in woods and plains throughout most of the United States. Except for its smell, it is an attractive animal—black with a festive variety of white stripes and patches. It is about 1½ feet long, including the bushy tail, and weighs between 1 and 2 pounds.

This skunk in many ways resembles a fat weasel. It is solitary, exploratory, an excellent climber, very agile, and the most carnivorous of all the skunks. It feeds on rats, mice, insects, grubs, and fruits. Its favorite habitats include brushlands, semi-desert areas, and the open areas of the West. It prefers to den in very dry places, including rock piles, beneath buildings, and sometimes in tree cavities. (Occasionally several skunks

den together.) Its home range is about 150 acres. The young, usually five or six, are born in late spring.

The spotted skunk has little fear of humans and is quite easy to observe if you remember that it will spray and fight viciously if cornered. The easiest way to find it is to look for carrion within its home range and sit there until a skunk wanders by. An individual skunk may wander different trails at random or even shuffle down the same trail several times in one night. Half the time it paces, the other half it diagonal walks. When threatening, it does a handstand with its tail draped over its back. If it does this when you're around, beware; it can spray up to 20 feet!

Striped Skunk *(Mephitis mephitis)*



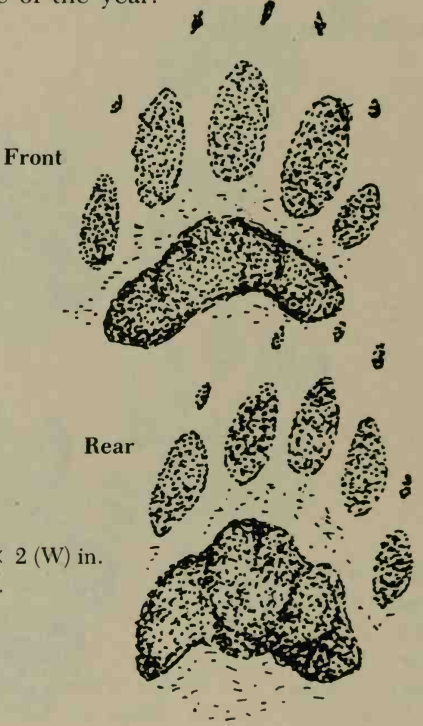
Front Foot: ⅞ (L) × 1⅛ (W) in.
Rear Foot: 1½ × 1½ in.
Trail Width: 7-9 in.
Slow Stride: 5-8 in.
Running: 10-18 in.

This common, wide-bodied weasel with a white body stripe and a powerful scent can be found in mixed woods and prairies throughout the United States and Canada. It is quite a bit fatter than its little brother, the spotted skunk. Including the tail, it is only about 2 feet long, but it weighs up to 12 pounds. It is mainly a nocturnal scavenger, feeding on almost anything—carrion, mice, rats, insects, grubs, fruits, and vegetables. Its scat measures about ⅝ inch in diameter.

The striped skunk prefers to den underground or beneath buildings, though sometimes it holes up in a hollow log or hides in a rock pile or brush pile. Like the spotted skunk, this species is not very territorial and several may share the same den. Except in the summer, it seldom ranges more than a hundred yards from its den, which is almost always located in a good feeding area. There are usually five to six young, born in late spring. The little ones may be seen following the mother during the summer.

Normally the skunk is a pacer, though it slow walks when stalking and bounds when running. Rarely does it gallop. You can expect to see its tracks at almost any time of the year.

Badger *(Taxidea taxus)*



Front Foot: 2⅛ (L) × 2 (W) in.
Rear Foot: 2 × 2 in.
Trail Width: 9-11 in.
Slow Stride: 9-12 in.
Running: 1-2 ft.

The badger is a chunky-bodied weasel of the West, well adapted for digging with its long claws and powerful limbs. It makes its home on the prairies, plains, and deserts, where it burrows into the ground in search of rodents. It often leaves the landscape peppered with large holes and mounds of dirt. A little over 2 feet long with tail, it weighs from 12 to 30 pounds. It is active either day or night, searching out delicacies—squirrels, prairie dogs, pocket gophers, rats, reptiles, birds, and lots of insects. Its scat measures about ⅝ inch in diameter.

The badger is solitary and very territorial and has a reputation for belligerence toward intruders, including humans. It dens in the ground, digging a new hole virtually every night. Although it doesn't hibernate, it tends to stay underground in the winter. Its home range is about 3 square miles. The young, usually two to five, are born in the spring.

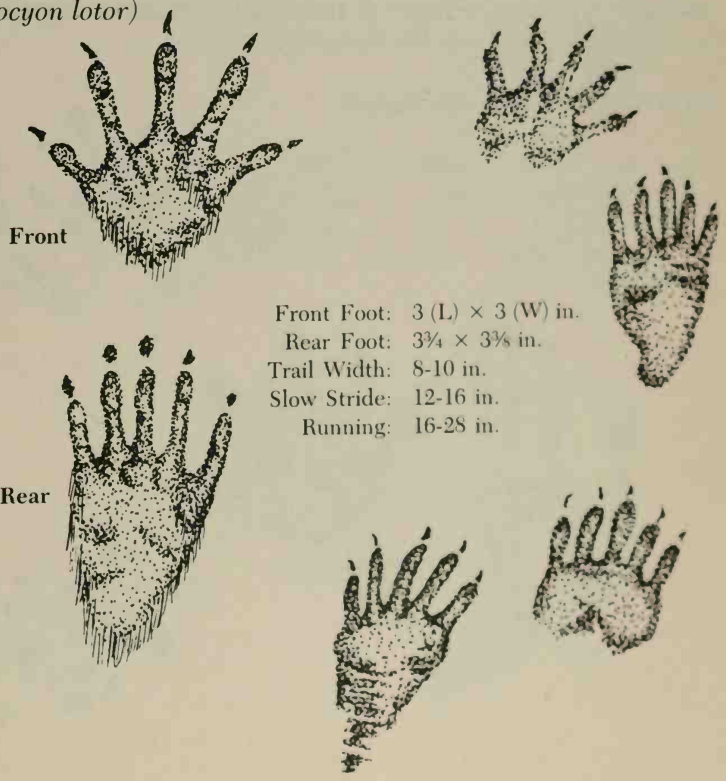
The best way to observe badgers is to identify an active den, take cover, and wait for it to emerge. Sometimes you can even wait successfully beside the hole if you're attuned well enough. Just imagine you're a rock, and soon the badger will probably be out again.

The badger's primary gait is pacing, though it is also capable of diagonal walking on occasion and can gallop somewhat if pursued by dogs. Its tracks are very distinctive, with long claws pointing inward in an extremely pigeon-toed shuffle.

Raccoons, Opossums, and Bears

Though these animals represent separate families, they, like the weasels, all show five toes up front and five in the rear. They are all wide-bodied pacers and their tracks (though of widely differing sizes) appear almost human.

Raccoon *(Procyon lotor)*



Front Foot: 3 (L) × 3 (W) in.
Rear Foot: 3¾ × 3⅜ in.
Trail Width: 8-10 in.
Slow Stride: 12-16 in.
Running: 16-28 in.

The raccoon is one of the most common and successful of the mammals, inhabiting streams and lakesides throughout most of the United States, even in urban areas. This familiar masked mammal is about 3 feet long, including its ringed tail, and averages 15 to 25 pounds.

The raccoon is a nocturnal scavenger, feeding on crayfish, crabs, frogs, turtles, baby muskrats, nesting birds, berries, seeds, and nuts. It dens in hollow logs, trees, rock piles, and other animals' ground burrows. The scat is elongated, tubular, and about ½ inch thick.

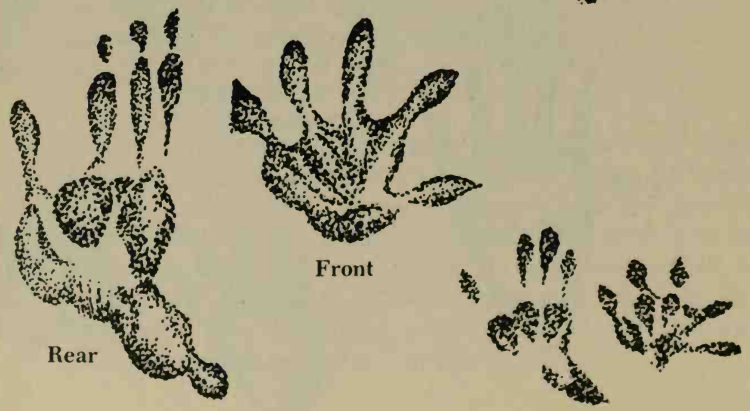
The raccoon has many resting places, including secondary dens that it sometimes uses within its 10-acre to 1-mile home range. Coons are not very territorial, though old boars and sows can get quite nasty if they find another animal hunting in their area.

An average of four young are born in the spring. These stay with the mother throughout the fall, often trailing behind her, and they may even overwinter with her the first year. It's not uncommon to look into a tree cavity and discover three or four raccoons peering out, all about the same size. During cold winters the raccoon sometimes sleeps for several days at a time, but it does not hibernate.

The raccoon is an expert pacer, often continuing to pace whether lumbering or running. It is also capable of diagonal walking, bounding, galloping, and slow walking as the situation dictates. Typically, the front and rear tracks fall side by side, or close to it.

Opossum *(Didelphis marsupialis)*

Front Foot:	1⅞ (L) × 2 (W) in.
Rear Foot:	2½ × 2¼ in.
Trail Width:	6 in.
Slow Stride:	7-10 in.
Running:	10-15 in.



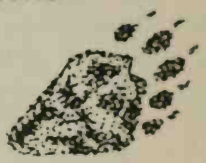
The opossum is a gray animal with a pointed nose and a prehensile tail, about the size of a large cat. Including the tail, it measures about 2½ feet long and weighs about 5 to 10 pounds. It inhabits farmlands and woodlands throughout Central and Eastern United States and the Pacific Coast.

Like the skunk, the opossum is a scavenger, eating a tremendous amount and variety of things—fruits, nuts, seeds, insects, grubs, carrion, and anything else that is remotely edible. It is a very slow animal (often hit by automobiles), but very few predators will attack it because of its acrid scent. (Even crows can't stand it!)

The opossum dens up in much the same type of places as the raccoon—hollow logs, brush piles, old buildings, tree cavities, and the like. Its home range is usually about 25 acres, but at times it wanders up to 60 acres. There are commonly eight or more young to a litter, with two litters per year. The tiny newborns are carried for a time in the mother's pouch, and when old enough they travel on her back.

The opossum's rear feet are very unusual, the tracks showing what appears to be a disjointed thumb. The gait is almost the same as the raccoon's—characterized by pacing at very different speeds.

Black Bear *(Ursus americanus)*



Rear

Front

Front Foot: 4½ (L) × 4 (W) in.
Rear Foot: 6¾ × 3½ in.
Trail Width: 14 in.
Slow Stride: 18 in.
Running: 2-5 ft.

The black bear is a large, chunky carnivore of the forests and mountains of the United States and Canada. It averages 5 feet long and about 300 pounds. Bears put on a tremendous amount of weight just before hibernation. They are rampantly omnivorous. They eat grasses, buds, leaves, bark, bulbs, roots, berries, nuts, insects, eggs, birds, mice, rats, chipmunks, ground squirrels, marmots, woodchucks, fawns, carrion, and fish, to name a few things—and in bear droppings I have personally found such items as tin cans, watches, tent screening, zippers, a crumpled hubcap, a motorcycle chain, and a pizza box. In other words, the bear is a walking incinerator—especially just after it comes out of hibernation. Once I saw a newly awakened black bear eat a whole bush to the ground and then shovel up everything around it, including the dirt!

The black bear is usually solitary and nocturnal, though it is often seen during the day. It dens in rock caves, hollow logs, and in excavations beneath fallen trees, and it ranges from 2 to 15 miles. Generally it sticks to established trails but changes feeding grounds often. In cold areas during the winter it sleeps off and on rather fitfully. During this time the female gives birth to one or two young, which stay with her for up to a year.

Bear signs are numerous and quite obvious. Their tracks cause quite a disturbance, even on difficult terrain. They rub themselves and rake their claws against tree trunks, sometimes leaving long hairs caught in the bark. The droppings, when firm, are tubular and about 1½ inch thick.

Grizzly Bear *(Ursus horribilis)*

Front Foot:	5½ (L) × 5⅛ (W) in.
Rear Foot:	9⅞ × 5⅝ in.
Trail Width:	18 in.
Slow Stride:	18-20 in.
Running:	3-6 ft.

The grizzly is restricted to Alaska, British Columbia, and a narrow tongue of land extending south through western Montana, Wyoming, and Colorado. It is half again as big as the black bear, averaging 6 to 7 feet long and 300 to 800 pounds.

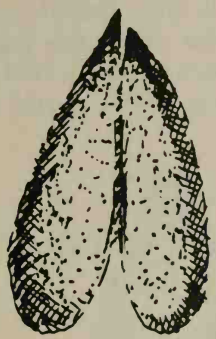
The grizzly's feeding habits are very similar to those of the black bear, though its diet also includes lots of salmon and even an occasional deer or elk. It forages any time of the day or night, often denning up in hillside excavations. It ranges from 25 to 50 miles, following the same trails over and over. Often it steps in the same prints, too, leaving a characteristic zigzag walking pattern. Its scat is variable in shape and consistency. When firm, it is tubular and about 2¼ inches in diameter.

The Deer Family *(Cervidae)*

The most common hoofed animals in North America are the goats, sheep, deer, elk, caribou, and moose. These animals are diagonal walkers and their heart-shaped tracks are very easy to identify and follow. Track measurements can be confusing, especially among the intermediate-sized animals, but when combined with stride measurements and habits, they provide fairly definite species identification. The droppings are usually oblong pellets, indented on one end and pointed on the other. (In the summer, while browsing on succulent plants, the deer tend to leave softer droppings like those of a cow.)

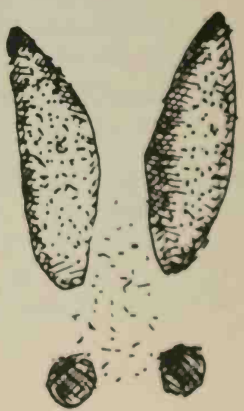
Being diagonal walkers, the deer also trot, bound, lope, and gallop with ease. They pace when threatening and use the slow walk when stalking and feeding. Most members of the deer family also have dewclaws—two sharp projections above each hoof that register in soft mud or sand or when the animal is running. The measurements below do not include the dewclaws.

Whitetail Deer *(Odocoileus virginianus)*



Toes spread when running

Dewclaws



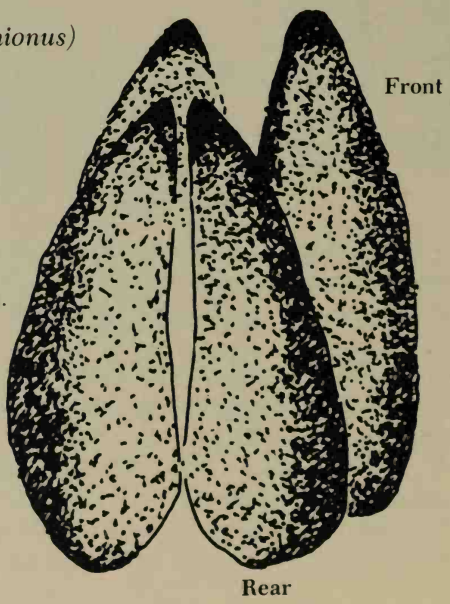
Front Foot: 3 (L) × 1⅞ (W) in.
Rear Foot: 2⅝ × 1½ in.
Trail Width: 6 in.
Slow Stride: 18-21 in.
Running: 6-9 ft.

The whitetail deer is found in transitional forest areas throughout most of the United States, with the exception of large parts of California, Nevada, and Utah. It varies greatly in size, from the tiny Key deer of Florida (about 50 pounds) to the large Borealis, which may weigh up to 300 pounds. Its most distinctive characteristic is the white tail, which wags frequently when it moves. It has a thick coat of fine, light brown hair in summer, which blends with the vegetation and protects it from insects. In the winter it grows a coat of hollow grayish-white insulating hair that blends with the winter colors and keeps it warm. It feeds on grasses, aquatic plants, leaves, twigs, buds, bark, and nuts—about ten to twelve pounds of browse per day. Its winter scat pellets average ½ inch long.

The whitetail is very habitual, normally feeding at dusk and dawn, with an intermediate feeding between midnight and 2 a.m. It follows the same trails almost every day. It has a variety of scent glands with which it marks its passage. All deer are excellent hiders, concealing themselves beautifully with scant cover. One reason they are not seen more often is that most people look for a standing animal rather than one that is curled up on the ground. If you listen carefully, you can also hear them chewing their cuds, sometimes at distances up to 75 feet.

In summer the padding on a deer's hoofs is quite thick to give it better traction and protection on soft ground. In the winter this padding recedes, leaving the sharp edges of the hoofs more exposed for better traction on snow. In the spring one to three calves are born, and these stay with the mother for four months to a year.

Mule Deer *(Odocoileus hemionus)*



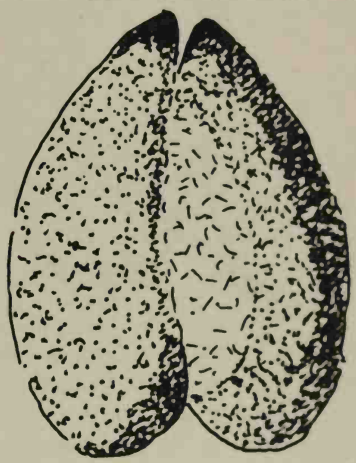
Front Foot:	3¼ (L) × 2⅝ (W) in.
Rear Foot:	3⅛ × 2½ in.
Trail Width:	6 in.
Slow Stride:	21-24 in.
Running:	6-15 ft.

The mule deer is found in mountainous forest areas and plains throughout the western half of the United States and Canada. It is 3 to 3½ feet tall at the shoulder and weighs up to 400 pounds (females rarely over 150 pounds). Its tail is rounder than that of the whitetail, and black-tipped. It feeds on a variety of forbs and grasses in summer, switching to twigs, bark, and buds for the winter. It also eats berries, mushrooms, acorns, and cactus fruit. Its scat pellets average about ⅝ inch long.

The mule deer, like all hoofed animals, is a diagonal walker. Its running gait is a stiff-legged bound in which all four feet come down at the same time. With this gait—reminiscent of a bouncing Ping-Pong ball—it is able to reach speeds up to 35 miles an hour. It also has a stiff-legged trot, called stotting, but it tends to gallop only when tired.

The mule deer is most active in the morning and evening hours, resting frequently between feedings to chew its cud. It sometimes migrates with the seasons, but only in mountainous country. The young (usually two) are born in spring and accompany the mother for several months or more.

Elk *(Cervus canadensis)*



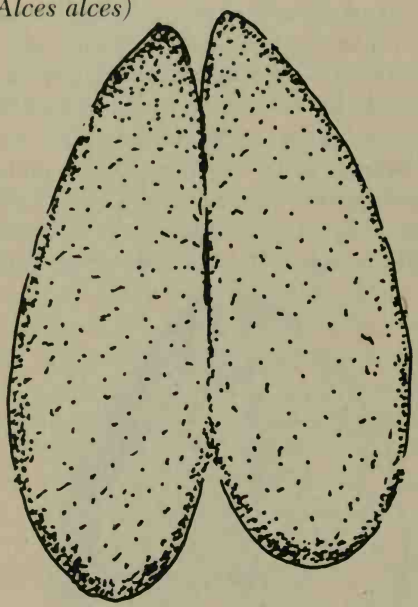
Front Foot: 4¾ (L) × 3 (W) in.
Rear Foot: 4¼ × 2⅞ in.
Trail Width: 8 in.
Slow Stride: 26-28 in.
Running: 6-9 ft.

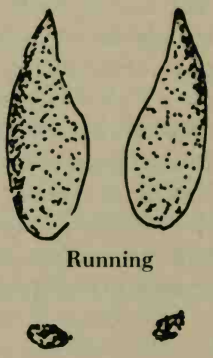
The elk is one of the larger members of the deer family. It is a rich brown, reaching 5 feet tall at the shoulders and weighing up to 800 pounds. The male has spectacular, wide-spreading antlers, and both sexes show a distinctive, light-colored rump patch.

This species lives in transitional forest areas, mainly in the Rocky Mountains and mountainous areas of the Pacific Coast states. It migrates up to mountain meadows in the spring and down to the valleys in the fall. It feeds mainly on grasses and forbs in summer and buds, bark, and twigs in winter. Its scat pellets are about ¾ inch long. When pressed by the daytime presence of people, it is nocturnal. Otherwise it feeds at dusk and dawn, which are the best times to see it.

Elk often travel in large herds, and their tracks are easy to identify and follow. They also leave a number of other signs, including scrape marks in the snow where they sometimes paw for food, gnawings on tree trunks, stripped bark, antler rubbings, and signs of lounging or wallowing in mud and water. Females usually give birth to a single calf in late spring. The young are able to walk almost immediately.

Moose *(Alces alces)*





Running

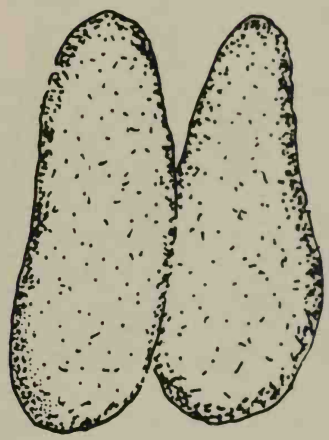
Front Foot:	6 (L) × 3½ (W) in.
Rear Foot:	5⅝ × 3½ in.
Trail Width:	9-10 in.
Slow Stride:	30-33 in.
Running:	8-10 ft.

The moose is a very large deer of Canada and the far North, though a few also live along the northern fringes of the United States. It reaches a height of 7 to 9 feet at the shoulders and weighs up to 1800 pounds. (The average is about 6 feet and 1000 pounds.) It is easily recognized by its solid dark brown color, large rounded snout, and the long fold of skin hanging from its neck. The males also have wide-spreading, palm-shaped antlers.

Moose love coniferous forests, especially around water. Their prime food is willow, but they also eat the bark of many other trees, as well as aquatic vegetation. They leave many of the same signs left by elk and deer, including gnawings, pawings, rubbings, and wallowings. Their scat pellets are usually about 1¼ inches long.

Usually the female gives birth to a single calf in late spring, which accompanies her after a few days. Many people mistakenly think that a moose with her little one is as harmless as a deer. In fact, she is as dangerous and aggressive as a grizzly with cubs.

Mountain Goat *(Oreamnos americanus)*



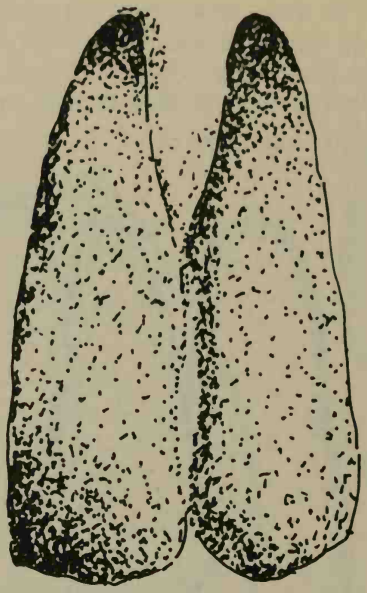
Front Foot: 3 (L) × 1⅞ (W) in.
Rear Foot: 2⅝ × 1½ in.
Trail Width: 6½ in.
Slow Stride: 15 in.
Running: 4-6 ft.

The mountain goat is a stocky, bearded mammal of the Pacific Northwest and British Columbia. White with short black horns and black hooves, it is about 3 feet high and weighs from 100 to 300 pounds. Its favorite haunts are the mountain crags around and above timberline, where it forages for vegetation (grasses, sedges, forbs, mosses, and lichens) with all the skill of an accomplished mountaineer.

The goat's tracks are easily confused with those of the deer, though they are usually more square-shaped and less pointed. Even so, it is fairly easy to tell the animals apart just by habitat. The goat dens in caves and sometimes beds down on rocky ledges, where it leaves pellet-type droppings slightly smaller than those of deer. It also leaves tufts of white hair clinging to branches along its trails.

Goats are gregarious and often gather in small groups. The animals mate in fall and the female gives birth to one to three kids in the spring.

Bighorn Sheep *(Ovis canadensis)*



Front Foot:	3½ (L) × 2½ (W) in.
Rear Foot:	3 × 2 in.
Trail Width:	7-8 in.
Slow Stride:	18-23 in.
Running:	6-9 ft.

The bighorn sheep is a medium-sized brown mammal with a cream-colored rump and massive, spiraled horns. It stands about 3 feet high and weighs from 75 to 250 pounds (males are much larger than females). It lives on mountain slopes throughout most of the American West (not including the Pacific Coast states).

Sheep are quite gregarious, often grazing together in small herds. Like goats, they enjoy a certain mountaineering prowess, and they spend a great deal of time around rocky cliffs and ledges, where they often bed down in the same place night after night. Their pelletlike droppings are very much like those of the deer and goats. In winter the sheep move to lower elevations, sometimes browsing on twigs, buds, and bark. They mate in late fall and the female gives birth to one or two lambs in the spring.

7

ANIMAL HIGHWAYS AND SIGNS

In the last chapter we dealt mostly with tracks that could be identified by foot shape, size, and pattern. There are many other animal signs—some large and some small—that are equally diagnostic. Among these are trails, dens, depressions, droppings, gnawed vegetation, telltale hairs, broken twigs, and upturned stones. Finding and reading these signs are as important as recognizing individual footprints.

Landscape Tracking

If you are a beginning tracker, you will probably look for tracks in soft soil that is frequented by a variety of animals. As you improve, you will search out increasingly difficult terrain. As a general rule, the best places to look for tracks and signs are transition areas that offer plenty of food, water, and cover (see "Seeing More Animals," page 38).

Before you go into an area, first do a little "landscape tracking." Appraise it from a distance and ask what animals it might support. (See "Animal Tracks and Habits," page 136.) Thickly forested areas support little wildlife because they lack a variety of vegetation. Much better are areas that include a good mix of grasses, brush, trees, and forbs. This combination guarantees food and cover for a variety of animals—and usually a good water source. Even if there is no large reservoir, don't discount the importance of puddles, seeps, and springs.

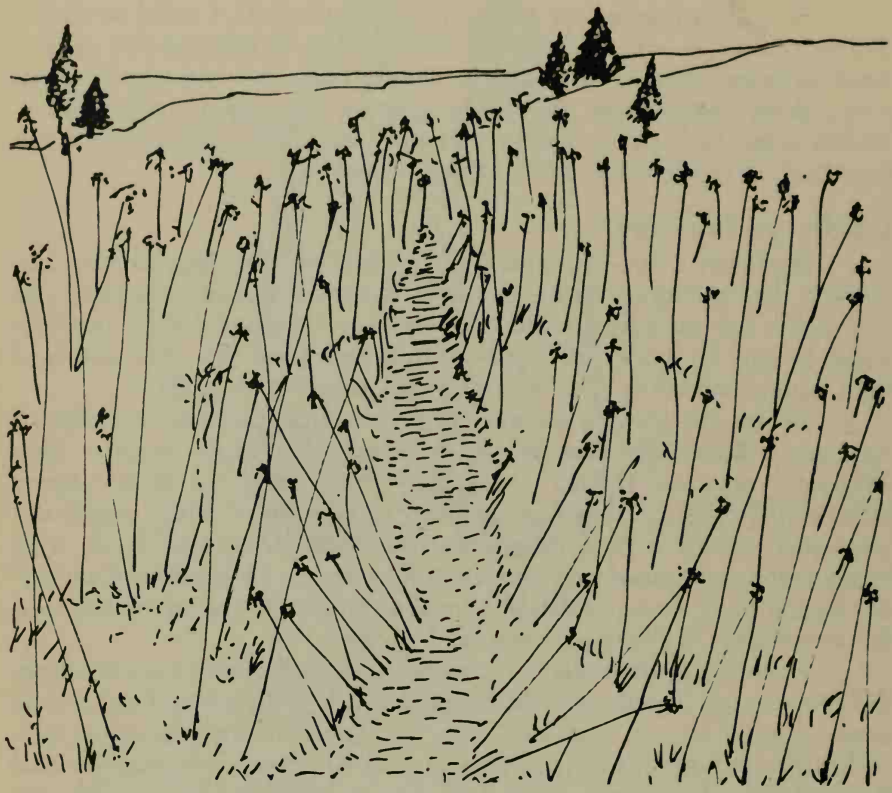
Once you have located a promising area, stalk slowly toward it from the downwind side. Appraise the landscape with as little sound and disturbance as possible (see "Stalking," page 96). Look first for large-scale signs of disturbance such as furrowed ground, matted grasses, and major animal thoroughfares. These in turn will draw your attention to smaller signs such as scat, hair, and occasional well-defined tracks.

Large-scale Signs

Trails

In any promising transition area, you'll find a wide variety of animal thoroughfares. The most obvious are trails. Trails are frequently used paths of travel linking large feeding, bedding, and watering areas to other large feeding, bedding, and watering areas. They are changed very infrequently and are indicated by matted and worn vegetation. Sometimes a trail is so new or infrequently used that it is almost flat. With repeated use it gradually deepens and takes on a U shape. After many years of use, its sides begin to square out. (In the Pine Barrens I have found old deer trails

that, from their depth and shape, appear to have been used for more than two hundred years.)



Trails are well traveled thoroughfares.

Seasonal Trails. Some trails are seasonal, changing with the availability of food or water. "Summer" trails are used from early spring until fall and are characterized by a lack of vegetation. The constant patter of footsteps does not allow new plants to germinate. "Winter" trails are used from fall until early spring. In contrast, these usually show signs of annual plant growth—fresh and green in summer or recently trampled in fall or winter.

General Trails are ones used by many different species. They are usually very wide and prominent, allowing passage for animals from the size of a deer to the size of a mouse. The diversity of animals is often indicated by signs such as scat, hair, and connecting trails or runs (see "Medium-scale Signs" and "Small-scale Signs").

Singular Trails are those used by a single type of animal. They can usually be identified by size, shape, and the presence of other signs (see "Animal Tracks and Habits," page 136). A singular rabbit trail, for example, is typically tube-shaped, four to five inches wide, well worn, and contains chiefly rabbit scat. A singular vole trail is typically a tunnel beneath the grass containing only vole scat and bits of gnawed grasses.

Size-group Trails. Many trails can be classified according to the size of the animals that could use them. For example, a small mammal trail may be used by animals such as mice, chipmunks, and squirrels but not by larger animals. A good example of this is a fallen tree of narrow diameter, which might be used by weasels and squirrels, but which would be too difficult for a larger animal to negotiate. A medium-sized mammal trail is used by animals such as rabbits, raccoons, and opossums, but not by larger animals such as coyotes and bobcats. The signs found along such trails—especially hair, scat, and gnawings—will either confirm or deny your suspicions about which animals use them.

Directional Trails. Many trails are directional, meaning that animals tend to travel along them only in one direction. There are many reasons for this. Sometimes the prevailing wind direction makes the scents easier to smell from one direction than another. Sometimes the topography in one direction affords better visibility. Certain animals (cats, dogs, deer, and raccoons, to name a few) also tend to travel in a daily or nightly circuit that leads them on a round trip. Directional trails are identified by the orientation of the matted vegetation and the tracks found within it.

Runs

Runs are infrequently or intermittently used thoroughfares that connect trails to specific feeding, bedding, or watering areas. If trails are like highways connecting cities and towns, runs are like arterials providing access to the gas stations, supermarkets, and neighborhoods within those centers of population. Since every animal has its own needs for food and cover, each one also has its own particular runs.

Runs are sometimes used year after year, but they are very subject to change. For example, an animal may use a run to reach the succulent buds of a particular plant in early spring, abandon it for the summer when the buds are gone, and return to it again in the fall to eat the ripened fruits of the same plant. Similarly, an animal may use a watering run to reach a rain puddle and then abandon it for another when the water source dries up.

Types of Runs. Like trails, runs can be classified according to season, size group, species, and direction of travel. They can also be broken down into other categories. The runs leading to general feeding areas I

Runs are less obvious than trails.

call "primary feeders." Those leading to less important or temporary feeding areas I call "secondary feeders," and so on. The same is true for runs leading to watering and bedding areas. There is also a "time run," which is used by a specific animal at a specific time of the day.

Two other types of runs deserve mention. One is the "cluster junction"—a place where a number of runs converge. Another is the "manifold junction"—a short section of trail with many runs branching off both sides. Both these junctions are typical of popular feeding areas.

Initially the most important determination is whether a run has been recently used and when it's likely to be used again. The best way of doing this is to follow the run to its end and find out what the attraction is. If it's food, examine the vegetation to see what has been eating it (see "Gnawings and Bitings," page 197). If it's water, find out whether it's habitually used or whether there is a more accessible water source nearby. If it's a bedding area, check for evidence of recent use—droppings or

fresh depressions (see "Scat," page 202, and "Beds and Lays," page 192).

Again, the most valuable aid for this work is a ready knowledge of animal habits. If you know where and when an animal habitually eats, sleeps, or drinks, you can almost assure yourself a view of it by hiding in the right place at the right time.

Pushdowns show vegetation bent in the direction of escape.

Pushdowns, Escape Routes, and Hides

Animals almost always take the easiest route of travel (an established trail or run) unless they are chasing or being chased by another animal. In such cases they usually abandon the established route and smash through the brush, leaving matted vegetation in their direction of travel. This is what I call a pushdown, and it is a fairly obvious sign because the animal takes no care whatsoever in its movement.

An animal may also establish an escape route that looks like a run. An escape route usually ends in a hide, where the animal finds temporary

safety from a predator. Hides fall into one of two categories: heavy cover and occlusive. A heavy-cover hide is one in which the brush hides the animal but does not necessarily prevent the predator from entering and continuing its search. An occlusive hide is one that shuts a predator out completely, such as the ground burrow of a chipmunk or a rabbit's favorite briar bush.

Beds show well matted vegetation.

Beds and Lays

Beds are frequently used sleeping areas. These may be found in hollow logs, trees, rock piles, brush piles, grass, thickets, or even out in the open. Regardless of their location, they are characterized by well-worn depressions that conform to the size and shape of the animal's body. They frequently contain large amounts of hair (the animal's own or another's) or other soft lining such as leaves.

A lay, on the other hand, is an infrequently used resting or sleeping spot. In fact, it is rarely used more than once—even though the general resting area may be used by the same animal again and again. For example, rabbits spend a good part of the night feeding and at intervals they plop down in the grass for a rest. Wherever they rest, they leave egg-shaped depressions that conform to the outline of their bodies. Deer and elk do the same thing when they lie down to chew their cuds. The imprint of their bodies is often so clear that you can trace around it from antlers to hooves. The vegetation in a lay is not worn away but only matted, looking somewhat like it would if you sat down for a picnic lunch.

Feeding Areas

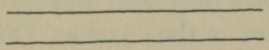
There are four main kinds of feeding areas: (1) the general feeding area, where a run terminates in a very large area that offers many different kinds of edible plants; (2) the single plant feeding area, characterized by a run terminating at a single plant or group of plants of one kind; (3) the eat-through, where an animal or animals have literally eaten their way through a patch of vegetation and come out the other side; and (4) the patched feeding area, marked by irregular nibblings along the edges of established trails and runs.

As with trails and runs, these categories can be broken down even further. For example, if a single species uses a general feeding area, I call it a "singular general feeding area," and then specify which animal uses it. For the moment, though, it is enough just to learn the major distinctions and how to identify the nibblings within them (see "Gnawings and Bitings," page 197).

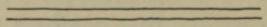
Exercise 7-1: Mapping

Choose a well-traveled transition area and explore it systematically with a notebook in hand. Draw trails, runs, pushdowns, hides, beds, lays, and feeding areas. This will give you a much better idea of what animals inhabit the area and how they interact with each other. It will also suggest the best places to return later for animal tracking and nature observation. Below is a suggested set of symbols to use for mapping an area.

MAPPING SYMBOLS



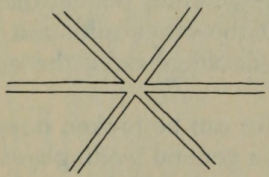
Primary Trail



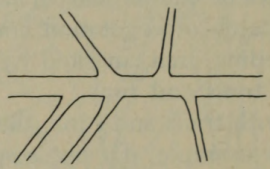
Secondary Trail

Primary Run

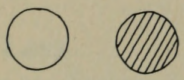
Secondary Run



Cluster Junction

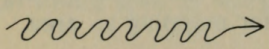


Manifold Junction



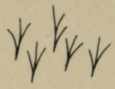
Beds Burrows

Lays

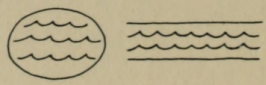


Pushdowns

Hides



Feeding Areas



Watering Areas

Medium-scale Signs

Rubs and Nicks

There are many places where animals leave signs of rubbing. Some of these are accidental and some are deliberate. One accidental rub is the "burrow rub," where an animal going in and out of its burrow smooths the bark or soil with its body. Noticing this, you can measure the width of a burrow entrance to help you determine what animal lives there.

Another is the "trail rub." This is most often a projection such as a branch or log that has been worn smooth by the bodies of passing animals. By examining the location, size, shape, and height of such rubs, you can gather clues that will help to determine the species that made them. In many cases, you can also determine when they were made (see "'Aging' Tracks and Signs," page 229).

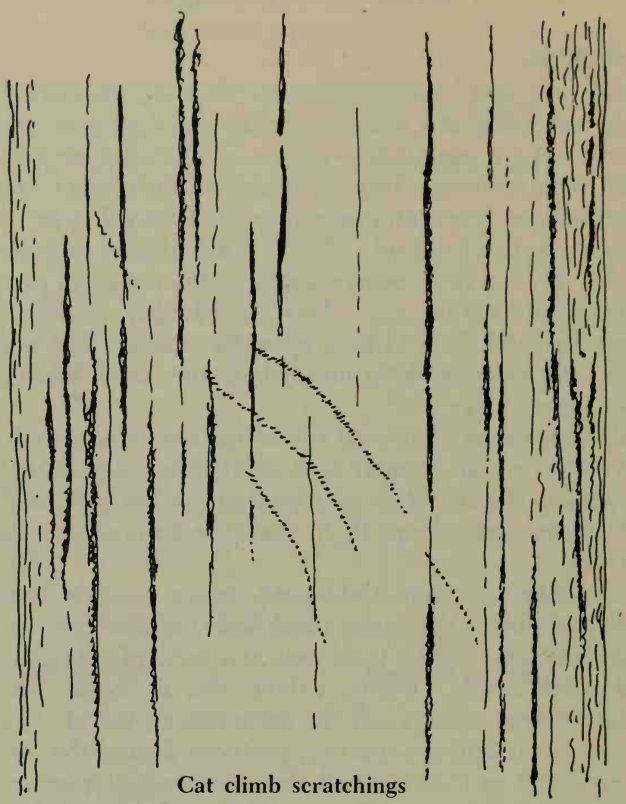
A third common accidental rub is the "over-under tree rub." When a tree falls across a trail, animals have to go either over or under, depending on their size. Those that go over tend to rub the bark off the top of the log; those that go under leave their marks (and sometimes their hairs) on the underside.

Many rubs are more deliberate. Some animals scratch hard-to-reach parts (most often their necks and backs) against tree trunks, leaving telltale hairs and wearing the bark away at a particular height. Other times you'll find "antler rubs," where a deer, elk, or moose has scraped its "rack" against a tree to clean off the accumulated velvet. Hoofed animals also use trees as inanimate sparring partners during the rutting season. Remembering that an antlered bull chooses a tree proportional to its own size, you can gauge the size of the animal from the size of the tree and the extent of the damage.

Finally, there is the "wallow." This is a general term that includes the rollings, thrashings, and flutterings of animals in mud, sand, or any other medium that leaves evidence of such baths.

Scratches

Scratches are closely related to rubs, and they may also be accidental or deliberate. Accidental scratch marks may be left on a log where an animal has also left a belly rub. Scratches are also left by animals while climbing trees. Some of these are gashes, indicating a temporary slip, but more often they are indistinct puncture marks that correspond with the number of toes on front and hind feet. You'll also find the deliberate scratches of dogs, bears, and other animals at the bases of trees where they have reached up the trunk and raked their claws downward for any number of reasons.



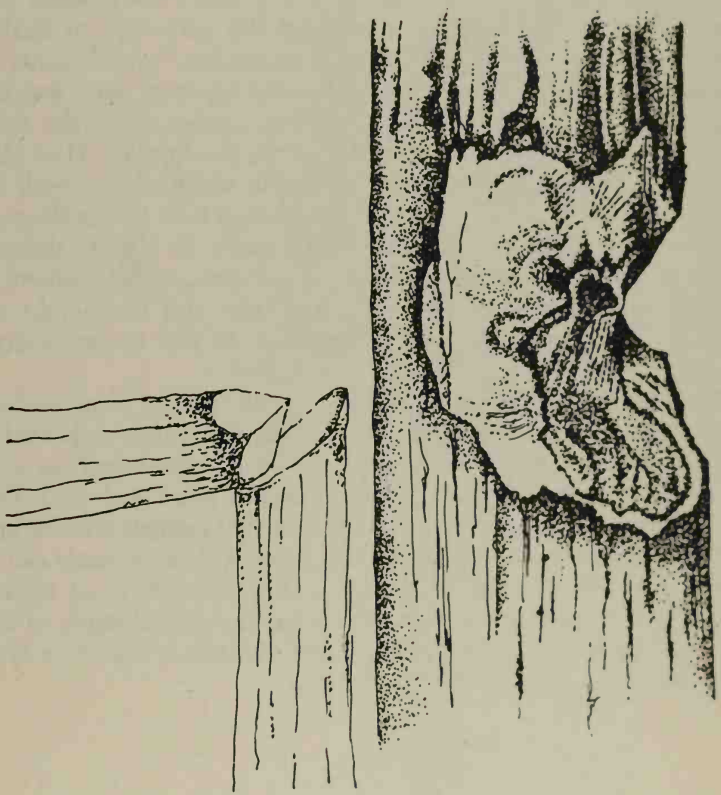
Cat climb scratchings

Scratches are often left on the ground. Some are accidentally left by animals that have lost their footing, increased their speed, or braked in mud or soft soil. Other land scratches are more deliberate, such as those left by the members of the cat family when they bury or cover their scat, by squirrels when caching nuts in the ground, or by skunks when digging after a promising scent.

Though I generally classify scratches as medium-scale sign, they can be very small and sometimes require the use of a magnifying glass. Look carefully for them. Familiarize yourself with animal habits and the places where scratches most often occur (see "Animal Tracks and Habits," page 136). When you find a set of scratch marks, note their location, size, sharpness, and the relative distance between the toes. From this and other nearby evidence such as scat, burrows, trees, etc., you will be able to determine what animal left the scratches and just what it was up to.

Gnawings and Bitings

Some of the most distinctive animal signs are left by teeth. By noting the type of cut and the size of the teeth, you can almost always determine the species. One of the most obvious examples is the beaver, which leaves the wide marks of its chisel-shaped incisors on the trunks and branches of trees. A slightly less obvious example is the porcupine, which girdles the upper trunks of trees as it feeds on the inner bark. Bears, too, leave their toothmarks on trees, where they rake the cambium layer for feed in the spring.



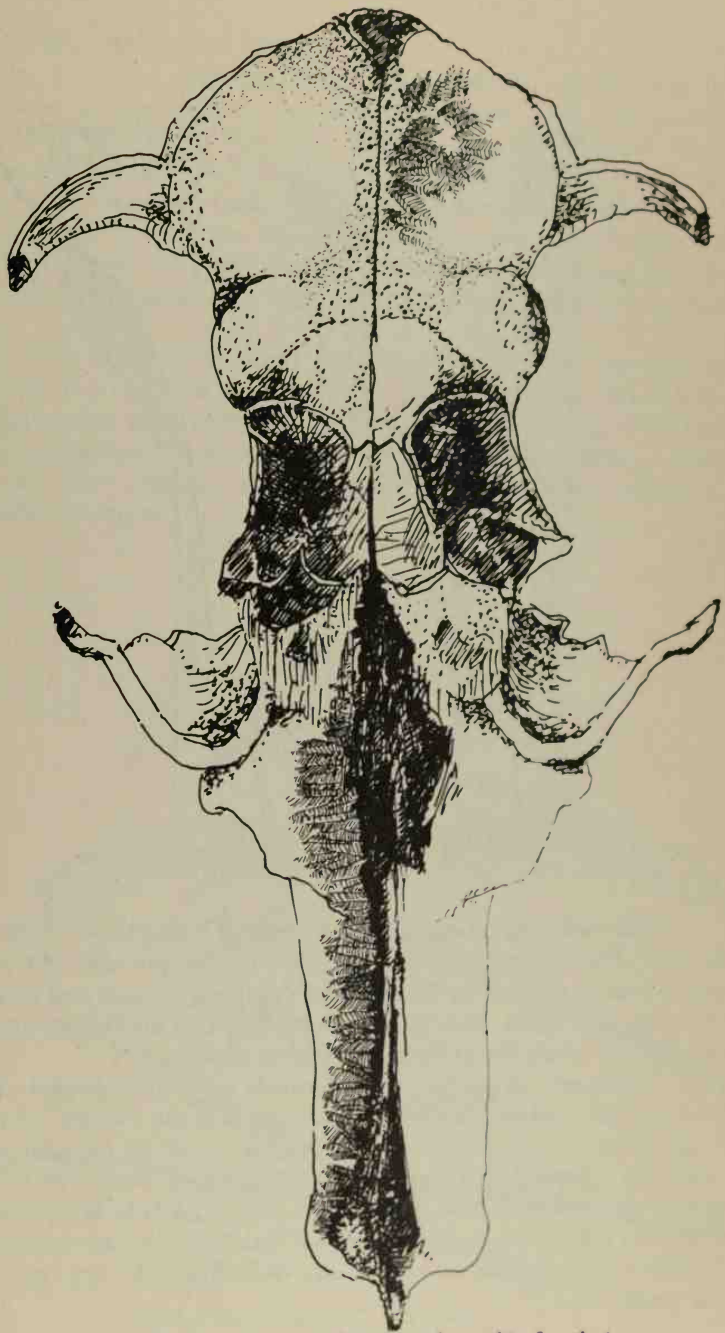
Beaver gnawings, showing evidence of sharp chisel teeth

Gnawings are not always on trees. They are also found on cones chewed by squirrels, on antlers and bones chewed by rodents for their calcium content, and most of all on the buds, twigs, grasses, and greens that provide the bulk of most animals' diets. Among such forms of vegetation there are three distinct types of gnawings or bitings you should be able to recognize: incised, serrated, and chewed.

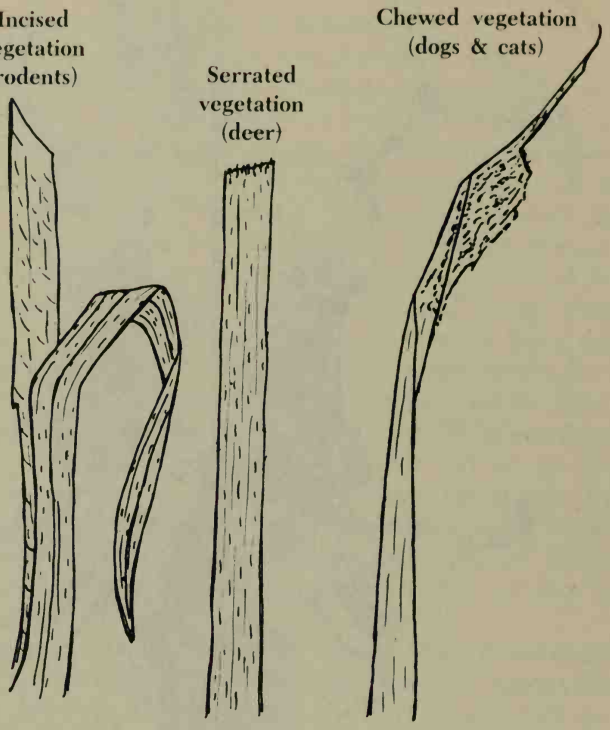
Incised Vegetation. Incised gnawings are sharp, knifelike cuts where the vegetation has been clipped at a distinct angle—usually forty-five to sixty degrees. Such cuts indicate the chisel-type incisors of the rabbits and rodents. To determine the animal, first examine the height of the cut. What does the height say about the size of the animal? (Be careful here; winter snows can lift an animal many feet above the ground, leaving the gnawings of small terrestrial animals at the very tops of bushes or trees. Also remember that small animals sometimes "mow" plants down with their bodies before gnawing or biting the topmost parts and letting them spring up again. Look for signs of stress farther down the stalk.)

Next, examine the size and shape of the toothmarks. How thick is the twig, bud, or leaf? Can you determine the width of the teeth in the vegetation? If so, how many bites did the animal take to cut through it? With the answers to these questions, you'll easily be able to distinguish the marks of a white-footed mouse from those of a ground squirrel. This information, combined with the vegetation type and the height of the gnawing, should narrow the possibilities down to one or two species of similar size.

Serrated Vegetation. The second type of biting is blunt and somewhat serrated on the end, as though the vegetation had been pulled apart rather than cleanly cut. This indicates a hoofed animal such as a deer, which, lacking upper front teeth, has to grab a plant and yank until it breaks. Height is an indicator, but with the hoofed animals a knowledge of feeding habits is more important because most of these animals can bend very low and reach very high. Sometimes they even stand on their hind feet to get to the tenderest leaves. (For a more detailed study of animal diets, I recommend *American Wildlife and Plants—A Guide to Wildlife Food Habits*, by Martin, Zim, and Nelson.)



Rodents gnaw on bones such as this for their calcium content.



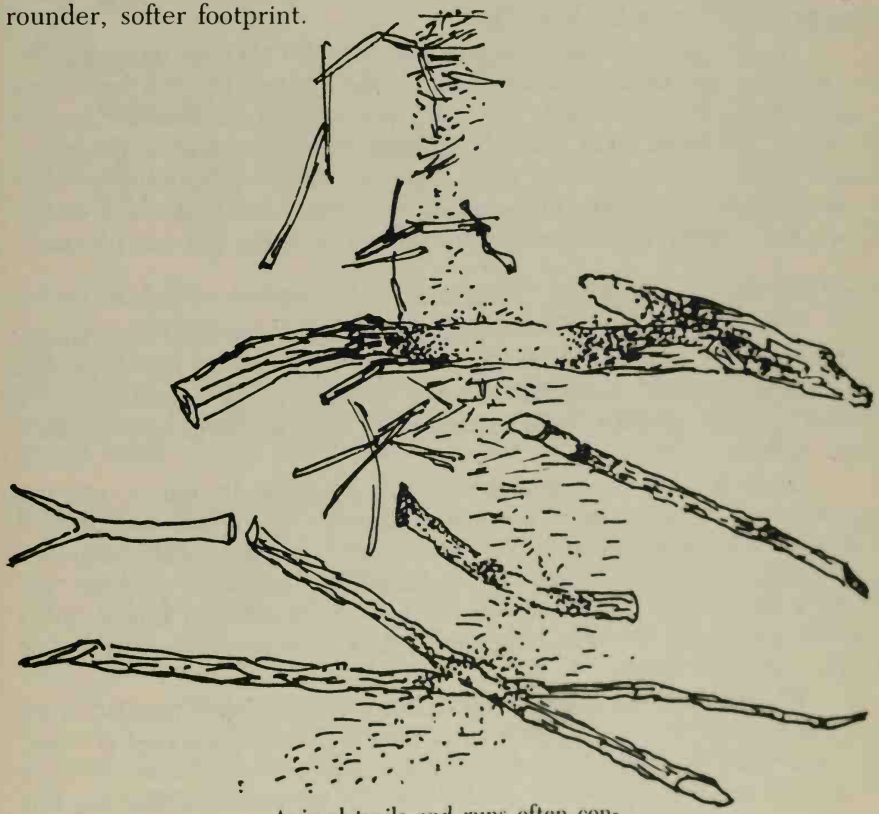
Chewed Vegetation. The third type of biting shows definite signs of chewing. This indicates a carnivore (most often a member of the dog or cat family) that is getting its vitamins by crushing a plant and swallowing its juices. In such cases, look for mashed vegetation and blunt, conical tooth-marks rather than sharp cuts or serrated ends.

There are, of course, many animals with cone-shaped canines, and there are many objects in which you may find the "tracks" of their teeth. In one of my survival classes, a student successfully stymied many of his fellows by displaying an aluminum, quart fuel bottle with a perfectly round, half-inch puncture mark in one side. The hole looked like it might have been made by a bullet or a spike, yet there was no exit hole, no sign of sudden impact, and no sign of any pounding. The answer: a bear's canine tooth.

Signs on Twigs, Sticks and Logs

Breaks, abrasions, and batterings in twigs, sticks, and logs can tell you a lot about passing animals (see also "Rubs and Nicks," page 195). Sometimes you'll find twigs that have been unnaturally scraped. Other times you'll come across nicks or troughs in sticks or logs. If such logs are found along a well-trodden trail, eventually the trough will take on a U shape as more and more of the decaying wood is worn away by feet and hooves. You may even be lucky enough to find the "drumming log" of a grouse that has been abraded by the repeated battering of whirring wing tips.

Large animals such as deer, bear, and humans are notorious for breaking twigs and sticks as they walk. By examining these breaks, you can often determine what animal passed by. Breaks made by a deer are quite sharp, suggesting the angular edges of hard hooves. Those of a bear may show only a bending or a series of closely spaced cracks, indicating a rounder, softer footprint.



Animal trails and runs often contain broken or abraded sticks.

If you don't know what caused a break or abrasion, study it carefully with a magnifying lens. Notice where the sign occurred, whether it was sharp or dull, and the direction and amount of pressure that was applied. Then ask yourself how big an animal and what kind of foot might have made such a sign.

Exercise 7-2: Breaks and Abrasions

In a natural area, search out dry ground twigs of various sizes. Leaving them on the ground, observe the effects of different kinds of pressure. Simulate the impact of a sharp hoof with the edge of a knife handle, a blunt break with pressure from your thumb, and so on. Apply various weights, pressures, and scrapes—all the time keeping the habits and walking methods of specific animals in mind. Most important, watch animals in the wild and examine the breaks and abrasions caused by their natural movements.

Upper Vegetation Disturbances

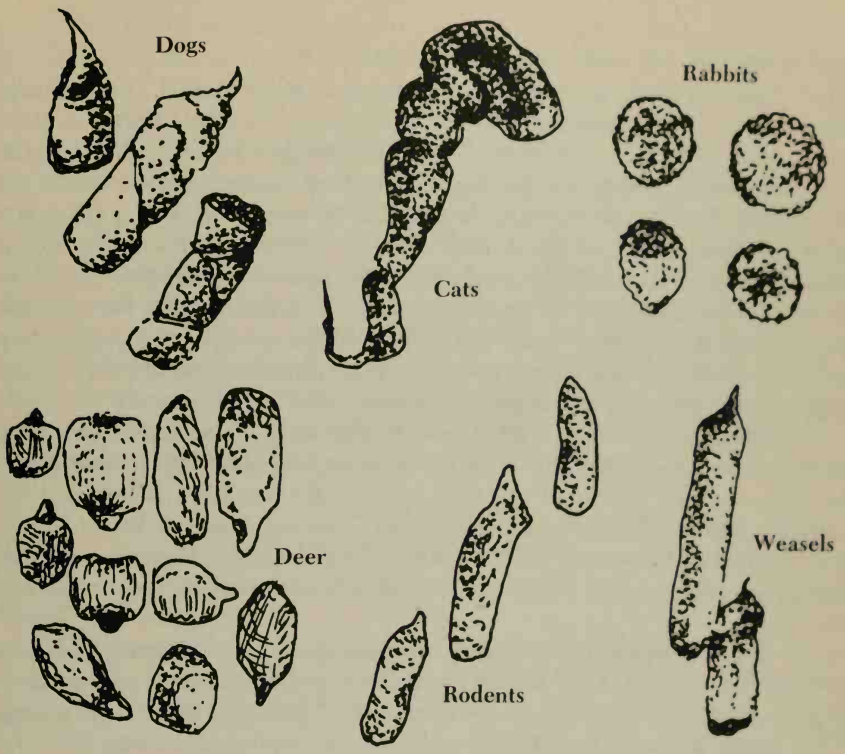
As an animal passes, it leaves not only the signs of its footprints, but a whole corridor of disturbance above the ground. In thick vegetation especially, look for bruised, bent, or twisted leaves, bent or broken branches, displaced vines, and other unnatural-appearing growth. Sometimes you'll find such subtle signs that you may wonder whether they were made by an animal. Perhaps not; but remember that every disturbance has a cause. If it wasn't an animal, try to figure out what it was.

Scat (see also "Scat Analysis," page 204)

Droppings are excellent animal identifiers. From their size, shape, and consistency, you can determine not only what species left them, but what the animal was eating, where it was eating, when it passed by, and a wealth of other pertinent information (see "Animal Tracks and Habits," page 136).

Even if you're not familiar with most animal droppings, you can determine a lot about them through reasoning. Size is one indicator. If you find a tiny scat the width of a pencil lead, you can safely assume it wasn't a deer. If you find a pile of droppings that would fill a quart jar, you know it wasn't a mouse. Thus you can quickly classify the animal into a general size group. You can then narrow down the possibilities by noting shape and other factors.

Members of the dog and cat families usually leave tubular droppings of a width that is proportional to their size. Cat droppings are usually somewhat pointed, while those of the dogs are more often (but not always) blunt on the ends. As a rule, the scat of predators also contains hair and/or bones. Rabbit scat is easy to identify, being flattened, disklike



pellets of highly compacted vegetation. Throughout most of the year, members of the deer family leave similar pellets that correspond to their size, but these are usually indented on one end, pointed on the other, and left in larger quantities than those of the rabbits. The scats of rodents and weasels may be difficult to distinguish by size and shape, but those of the weasel family almost always have a characteristic "skunky" smell.

Exercise 7-3: Scat Collection

The variety and quantity of scat in a given area is directly proportional to how well the area meets animal needs for food, water, and cover. Using the "landscape tracking" guidelines suggested at the beginning of this chapter, find a promising transition area and collect and identify as many different kinds of scat as you can. This will force you to look "small" as well as "large"—to search out animal thoroughfares and rummage through feeding and watering areas while keeping your eyes out for medium-scale signs at the same time. As you collect the droppings, note on your area map where you found them and place them in plastic bags for later study.

Scat Analysis (see also "'Aging' Scat," page 236)

You can learn a great deal by taking a closer look at animal droppings. First, you can determine the species by the size, shape, consistency, and content of the scat. (For this I suggest you read about the general scat characteristics and feeding habits of various animals described in "Animal Tracks and Habits," beginning on page 136. For a more detailed understanding, study *A Field Guide to Animal Tracks*, by Olaus Murie and *American Wildlife and Plants: A Guide To Wildlife Food Habits*, by Martin, Zim, and Nelson.) Second, you can determine how old the scat is (see "'Aging' Scat," page 236). And third, by analyzing the location and content of the droppings, you can determine the animal's diet, territory, and a good deal about its interactions with other animals.

Whether you're analyzing scat in the field or at home, it's very important to take notes. First, write in your notebook where you found the scat. Second, look at it carefully and briefly describe its external appearance (grainy, fibrous, wet, damp, dry, mucous-covered, brown, gray, etc.). Next, cut the scat in half and observe the interior. Describe it in the same way, taking special note of the differences between the inside and the outside.

Scat Contents. Once you've made a good age determination (see "'Aging' Scat," page 236), take a closer look at the contents of the droppings and try to identify them. (I recommend putting the scat on a large white piece of paper and using a 10- or 20-power magnifying glass for this.) If the scat is fibrous, cut it in half again and carefully pick apart one small section, examining the vegetable matter with a magnifying lens.

The summer browse of most herbivores consists of soft, succulent vegetation and is very loose and mushy. As summer turns to fall you'll more often find evidence of nuts, seeds, and fruits. In winter the browse becomes quite hard and compact, consisting mainly of the more woody buds, twigs, and bark. Bark fibers found in scat are usually very fibrous and stringy. Bud fibers are most often sandy-looking. All others look like various forms of mush. With time you'll be able to make finer and finer distinctions and begin to determine where the animal has been feeding.

Predator droppings are fascinating. The treasures they contain (including the "pellets" of the owls) are sometimes amazing. It's not unusual, in a single coyote scat, to find parts of the skeletons of several mice, a chipmunk, and a bird. Often you'll discover the tiny incisors and minutely toothed jawbones of the rodents. In great horned owl pellets, which are regurgitated rather than passed through the intestines and are very clean, I've sometimes found whole rabbit skulls. The best way to analyze such droppings is to make four piles—one each for hair, bones, vegetable matter, and miscellaneous oddities.

From the relative numbers of animals, nuts, seeds, etc., found in the scat, you can tell what an animal's diet is at any time of the year and also how and where the animal spends its time. For example, if you find a coyote scat composed mostly of mouse hair and bones with some apricot seeds and apple peelings, you know it's been doing most of its hunting in a meadow, occasionally stopping by an orchard to pick up some ripened fruit. If you know the location of the meadow and the orchard and the habits of the coyote, you know just where and when to look for the animal.

Preserving Scat. To preserve scat, first poke two pin-sized holes in the top and bottom to let the moisture escape. Then place it in the sun to dry. After it has dried, hold the scat on the end of a pin and saturate it with alcohol. Let it soak for ten minutes; then leave it outside in a dry, sunny location for about eight hours. After it is completely dry, spray it with a matte or dull gloss varathane solution. It may need two or three coats to become completely sealed.

Small-scale Signs

Hairs

Most people look in the wrong places for animal hairs, and most people mistakenly look for large tufts of hair rather than the single strands that are most often pulled free during an animal's travels. Look for hairs especially on or near beds, lays, rubs, obstacles, or projections in an animal's path. In such spots I strongly suggest that you get up close and use a magnifying lens to help in the search.

When you find a hair, examine it with a lens. Note its color, length, thickness, and texture and compare it with other hairs you are familiar with. Notice where it was found and ask yourself what part of the animal it might have come from. Could it be a belly hair, a side hair, a back hair, a leg hair, a neck hair? Be a detective.

Familiarize yourself with the hair of various animals, and with hairs found on different parts of their bodies. The hair of rodents and rabbits is very soft and fine. The hair of dogs is coarser than that of cats. Deer have long winter hairs that are actually hollow inside. The hair of every species has distinctive qualities, and hairs differ depending on what part of the body they grow on.

It's illegal in many parts of the country to examine or tamper with road kills, but many museums have displays or collections of animals that you may be allowed to study at your leisure. This can be a great help—especially if you bring along some hairs you've found for comparison. Simply stick them on a piece of Scotch tape and put them in a vial or plastic bag.

Stone Disturbances

While you're tracking, look for sand grains, pebbles, or stones that have been moved, scratched, or disturbed. One of the most common signs is the "stone roll," where a rock or pebble is actually kicked out of its bed. From the stone's size, position, and distance from its bed, you can confirm the animal's direction of travel and get a good indication of its size. The same is true of sand grains that have been brushed out of place by a passing animal.

Since most stone rolls are quite small, it is important to use a magnifying glass. Dislodged stones usually have contrasting dry and wet parts that correspond with their exposed and buried surfaces. They may also contain scratches caused by an animal's hooves or claws. Even if the underside has dried, you can usually see dirt on the previously embedded part until after the first good rain.

Stones are not always rolled away. Just as often they are partly dislodged, rotated, pushed along, or pressed into their beds. A stone pressed into its bed often leaves a sharp edge around its circumference. A partially rotated stone leaves soil disturbances much like a twisting footprint (see "Reading Pressure Releases," page 209). Another key to disturbed stones is that there is almost always a visible crack between the stone and the surrounding soil.

Leaf Disturbances

In areas where lots of leaves have fallen it may seem impossible to track. Often the only visible signs left in leaves are tiny breaks and punctures or a slightly ruffled appearance. These can be detected only with practice (see "Reading and Following Tracks," page 239). In general, notice how the leaves are folded and cracked, and look for patterns. View the patterns from different angles and try to find tracks within them.

If the leaf cover is thin enough and the animal heavy enough, you may spot a distinct crease or depression. In this case, carefully lift away the underlying leaves and you'll often find a perfect print in the soil beneath. Because of their protective coverings, such prints are often preserved for a long time—sometimes weeks or months (see "'Aging' Tracks and Signs," page 227).

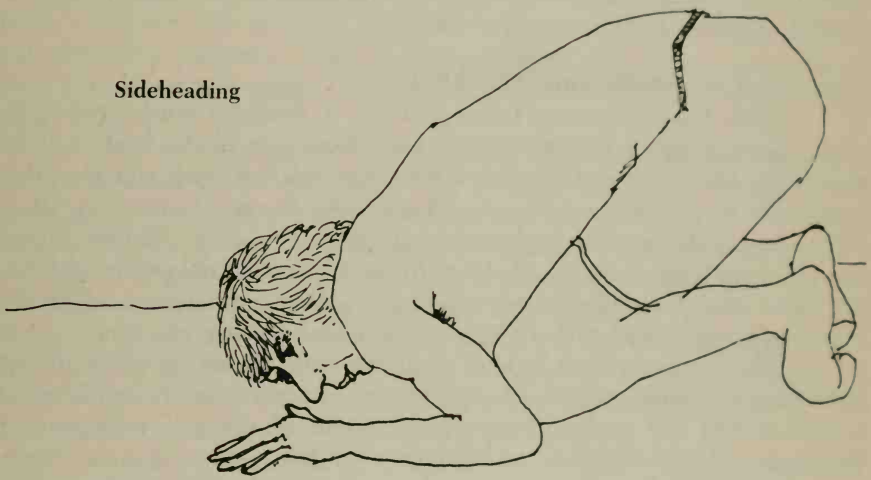
Compressions and Sideheading

To track an animal over open terrain, you'll often have to be able to detect and read faint compressions in the soil. Unlike the distinct prints, craters, and depressions left by animal feet in mud, sand, or soft soil, compressions are mere flattenings of surface dirt or dust particles. They

always occur on hard surfaces, and they may be very faint indeed. In order to see them, you will have to get down on hands and knees, bend your head low to the ground, and use what I call "sideheading."

Sideheading is the most effective technique for reading difficult tracks. You should use it to get a clearer view, even on easy terrain. The first rule in sideheading is to keep the tracks between you and the source of light. If possible, rest your head right on the ground in line with the track and close your top eye. Scan the ground with your bottom eye. If there is the slightest sign of a compression, you should be able to see the track, marked by dust and dirt particles that have been pressed flat.

Sideheading



Try this on a linoleum or hardwood floor sometime. As long as you're standing, you can see very little. But as soon as you get down in the sideheading posture, tracks seem to pop up everywhere. If you have a pair of binoculars, you can use a similar method to make a whole line of tracks stand out. Look through the lenses as you lie flat with your chin on the ground. The depressions will look deeper and closer together because of the foreshortening effect.

Shinings

When grass or other low-lying vegetation is very dry (typically mid-morning to evening), it appears quite dull in direct sunlight because the angle of its growth tends to parallel the sun's rays. However, when the vegetation is compressed or pushed down, the sun's rays bounce directly off it, causing a reflection, or "shining." Shinings are signs of an animal's recent passage and they are very ephemeral. As the vegetation recovers,

they disappear. You have to look carefully to see them, since they are visible only if you keep the tracks between you and the source of light. But a good set of shinings viewed from the right angle may allow you to trace a faint trail clear across a meadow in a single glance.

Dullings

Low-lying vegetation that is wet with dew or raindrops tends to shine in direct sunlight. When an animal passes, however, it knocks away the droplets, leaving dull spots wherever it steps. Like shinings, these tracks are very short-lived and depend a great deal on the quality of the light; but if you remember to keep the tracks between you and the source of light, you can read them quite easily.

Exercise 7-4: Small-scale Tracking

Often I see beginning trackers trying to decipher tracks and signs while standing up or sitting on their haunches. One of the best ways to break this habit (and to become more aware of the small signs on the landscape) is to get down on your hands and knees—better yet, your belly—and systematically explore a small patch of ground. Do this often, and leave nothing unexamined. Look for prints and partial prints, old depressions, scat, hair, disturbed vegetation—all the medium- and small-scale signs mentioned earlier. Make a list of everything you find.

When you are done looking at all the visible signs, carefully lift up bits of ground covering with your fingertips. Buried signs are much more abundant than you might imagine, and their depth gives an indication of their age. One such micro-archaeological digging of mine in a single square foot of the Pine Barrens turned up, among other things, two-week-old deer tracks, a fresh squirrel gnawing, raccoon tracks, rabbit nibblings, vole droppings, squirrel and fox hairs, and seed fragments from the meal of a white-footed mouse. Start digging and see what you can find!

8

READING PRESSURE RELEASES

Now that you've learned how to identify the most common animal tracks and signs, you're ready to start looking at tracks in more detail; to begin reading the nuances that go beyond measurements and patterns. It never occurs to most people that they might be able to "read" tracks like words on a page. Yet tracks are just as telling as words and sentences. Each one contains the story of its creation, and each one is a window into the actions and thoughts of its creator. As Sherlock Holmes once said to Watson while discussing some evidence, "No doubt to you it appeared a mere trampling line of slush, but to my trained eyes every mark upon its surface had a meaning." That is the true spirit of tracking, and nothing embodies that spirit more completely than a tracker's ability to read pressure releases.

Pressure releases are the visible deformities within and around a track left either by the pressure of the animal's foot as it was making the track, or by the release of that pressure as it lifted its foot. For example, when a child jumps into a sandbox, it first causes a deep depression and an explosion of sand—much like jumping into a mud puddle. Then, as the child lifts its feet, some of the sand caves in around the edges, leaving the footprints partly covered with rubble. All of the visible signs in the sand, from cracks and mounds to cliffs and plumes, are pressure releases. If these are read correctly, they tell exactly how the tracks were made and just what the animal was doing when it made them.

Several times people have shown me what they thought were the tracks of Bigfoot, the legendary Sasquatch of the Pacific Northwest. It took very little study to discover that they were fakes. Why? There was no life in them. There was no variation in the pressure releases. I'm not saying Bigfoot doesn't exist—I hope it does—but so far all the "Bigfoot" tracks I've seen were made by pranksters (usually large men) striding through the woods with stamps strapped to their feet.

The difference between a stamp and a normal footprint is phenomenal. When a live animal's foot comes down, it ripples, clenches, twists, and deforms the soil in so many wonderful ways that the track itself seems alive long after the foot has left its mark. Pressure releases are the stamps of life in a track, and reading this life is the greatest joy in nature observation.

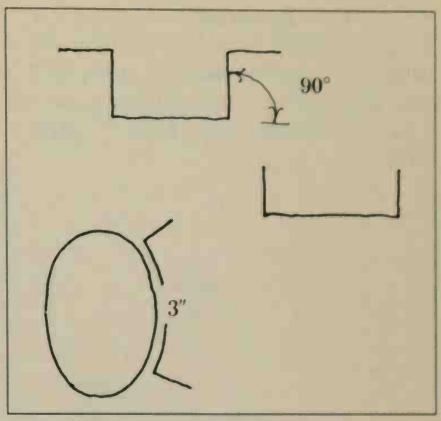
Common Pressure Releases

There are two major categories of pressure releases: indicator and fluctuating. An indicator pressure release is much like a fingerprint. It

indicates the animal's identity or condition. For example, the toe pads on a dog's feet make depressions that identify it as a dog. If that dog has a hip injury, it makes depressions that identify it as a dog with a hip injury. Other pressure releases (or combinations thereof) may show what sex the dog is, how old it is, and so forth. These are all indicator releases. Fluctuating releases, on the other hand, show that dog's actions—its turns, jumps, hesitations, stops, etc.—as it moves across the landscape.

Following are descriptions and illustrations of the most common pressure releases. Each illustration includes (from top to bottom) a cross section of the pressure release, the symbol for the pressure release, and how to draw it in your notebook. This list is by no means complete. (There are some eighty-five different pressure releases in all.) Nor are these illustrations (taken from prints made in wet sand) typical of what you will find on most landscapes. However, by studying pressure releases in sand, you will quickly learn how footprints deform the ground and much more easily read tracks on difficult terrain.

1. Cliff: A vertical edge where the soil is compressed downward at a right angle. A cliff usually occurs at the sides of the feet and indicates an animal traveling in a straight line. It is seldom seen at the back or front of a print unless an animal brings its foot straight down. (When drawing, include length in inches as shown.)



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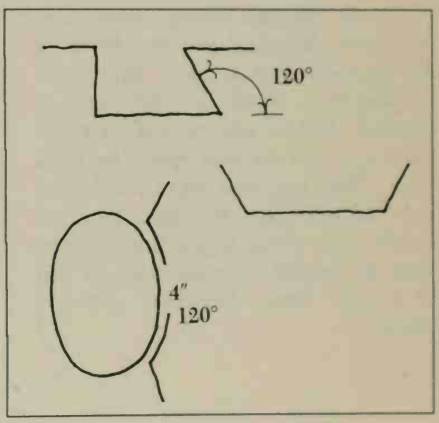
2. Overhang: An inward-sloping cliff (more than 90 degrees). This is very common with hooves, but it can also indicate a sudden stop or sidestep where the animal has pushed off in the opposite direction (see also "Cave," page 215).



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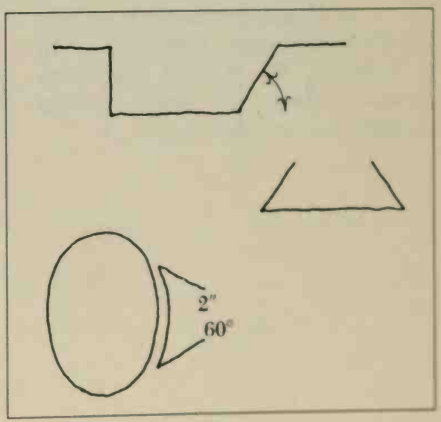
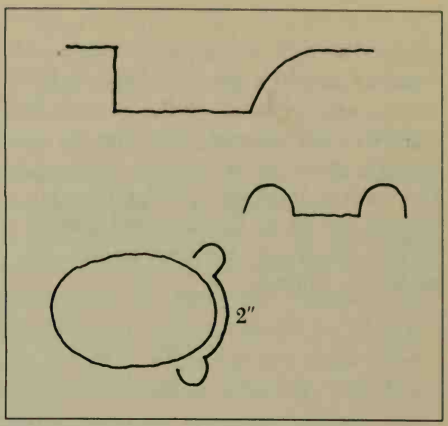
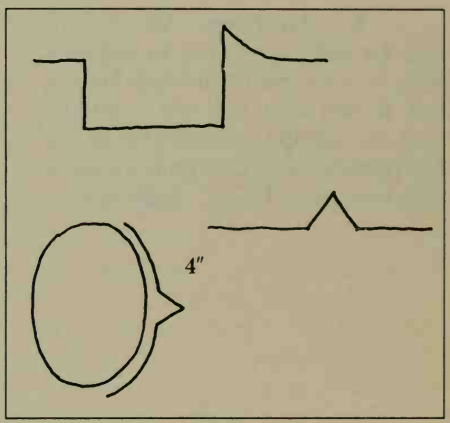
3. Slope: A straight edge sloping at an angle of less than 90 degrees. A slope usually indicates where a foot came in or went out. It almost always occurs at the front and back of the print and is usually longer in the direction of travel. When found at the side of a print, it indicates a sharp turn, sidestep, or lean. (When drawing, include length in inches and approximate angle of incline as shown.)



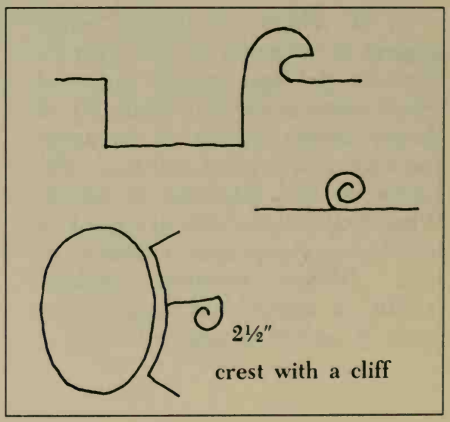
4. Rounded Slope: A rounded edge that is less than 90 degrees. Usually shows a turn, but can also indicate an old track (see "'Aging' Tracks and Signs," page 227).



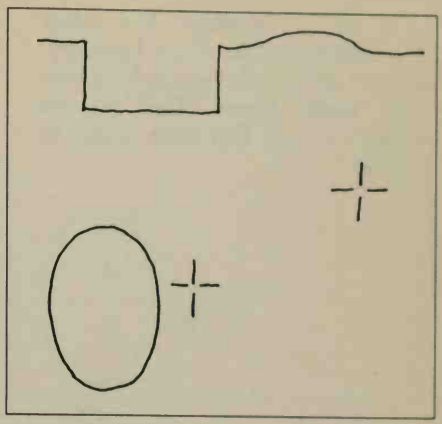
5. Ridge: Sharp edge that has been lifted above the level of the surrounding terrain, usually in conjunction with a cliff and a mound. Ridges are caused by pressure exerted to one side, as in a turn. They can also occur on the inside of a track—for example, between the toes, along the median line in hoofed animals, and as the dividing line between double tracks.



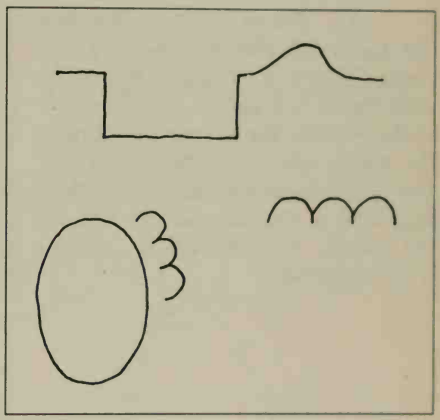
6. Crest: An inward- or outward-curving ridge, sometimes with a wavelike lip. Crests are often formed when an animal turns sharply to one side.



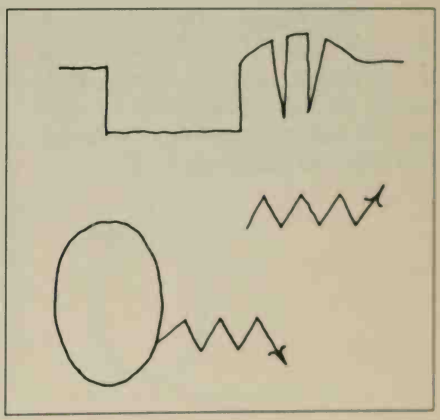
7. Dome: Smooth, shallow hill, outside the print. This indicates general pressure exerted both downward and in the direction of the dome. It occurs most often just behind the print as the result of a sudden pushoff (a jump or leap).



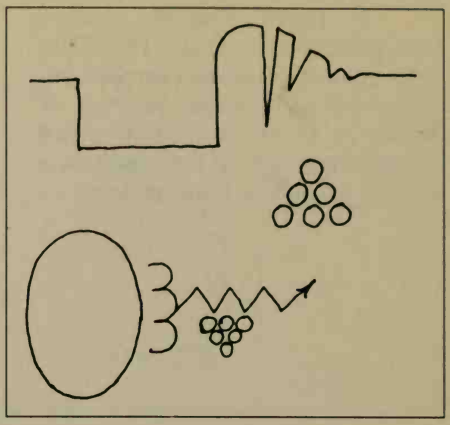
8. Mound: Prominent hill either outside or inside the print. It is usually caused by twists and turns, eroded by further foot movement, and accompanied by crevasses on the outside.



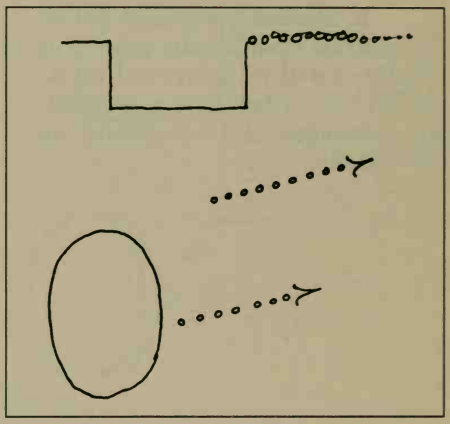
9. Crevasse: A crack in the ground outside the track. Crevasses indicate extreme and sudden pressure exerted both downward and sideways. They are usually caused by sharp impact during a run, sudden stop, or twisting turn; and they are often accompanied by mounds and crumbling. The ground is actually "torn" apart in the direction of greatest pressure (indicated by an arrow).



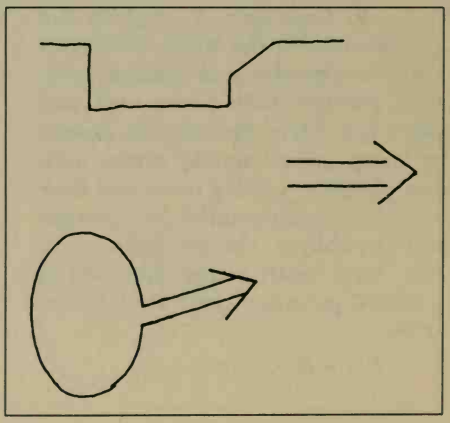
10. Crumbling: Any place where small chunks of soil have broken and fallen—for example, a crevasse under heavy stress or the peaks of a track that have begun to weather.



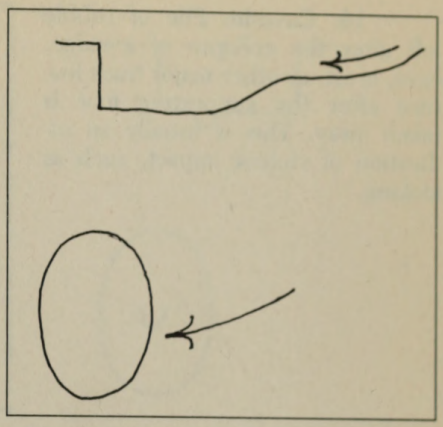
11. Plume: Dirt spreading out for some distance beyond the track. If this is in front, it usually indicates a fast gait in the direction of the plume (the longer the plume, the faster the gait); if behind the track, it indicates rapid acceleration; and if in a circular pattern around the track, it indicates a sudden whirl or pivot.



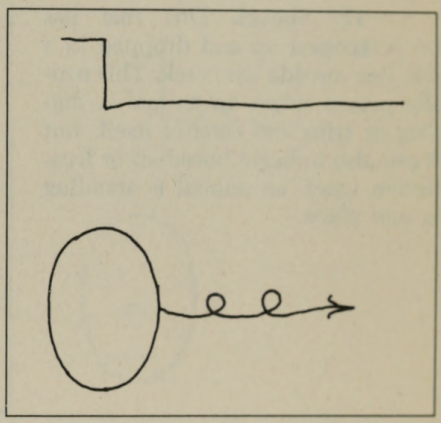
12. Gouge: Drag mark at front or back of track, indicating heavy weight, fatigue, injury, high speed, or foot protrusions. Gouges are also left in deep snow as an animal lifts and plants its feet.



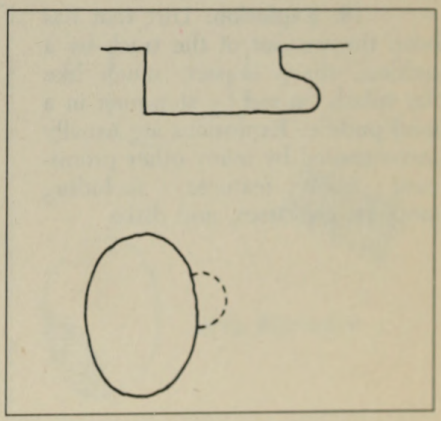
13. Slide: Gouge marks made by an intentional skid, such as an animal sliding to a quick stop. These are often accompanied by mounding, and the marks may show footpads, claws, or both.



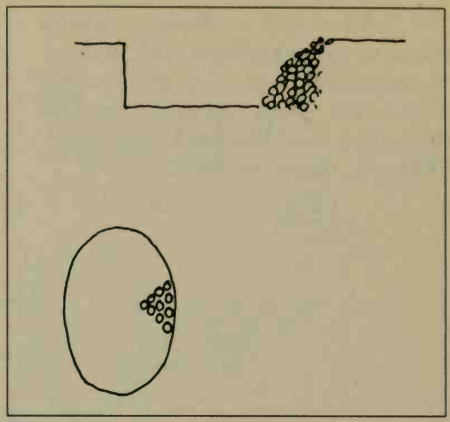
14. Slip: Gouge marks made by an unintentional skid, such as an animal slipping on a muddy or icy surface. The next track either shows a recovery or a fall.



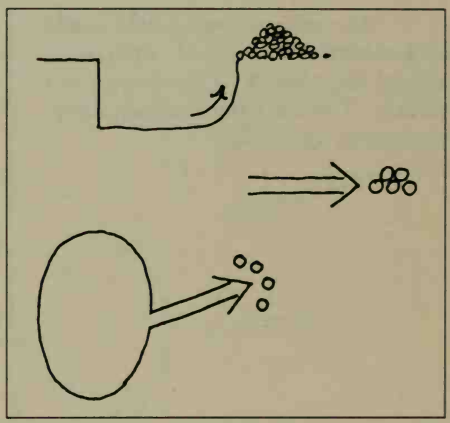
15. Cave: Large indentation on the inside wall of the print indicating extreme pressure both downward and inward. Caves are usually left by the front part of the foot during a sudden stop or jump to one side.



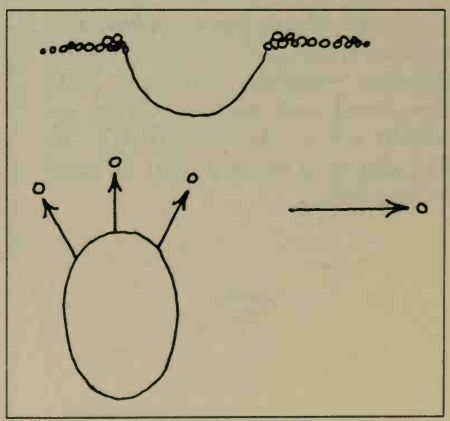
16. Cave-in: Pile of rubble left after the collapse of a ridge, cave, crest, or other major track feature after the supporting foot is taken away. This is usually an indication of violent impact, such as kicking.



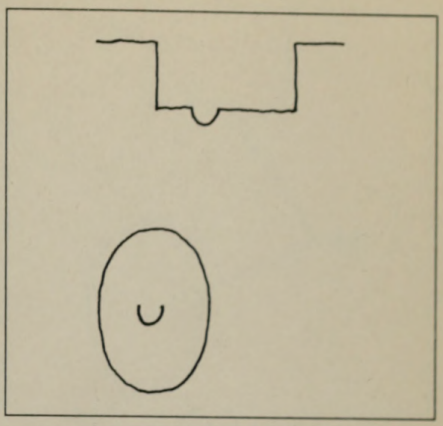
17. Shovel: Dirt that has been scooped up and dropped in a pile just outside the track. This usually occurs when an animal is digging or trips and catches itself, but it can also indicate boredom or frustration when an animal is standing in one place.



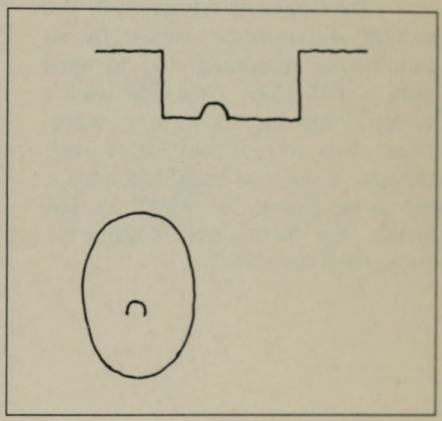
18. Explosion: Dirt that has been thrown out of the track by a sudden, sharp impact, much like the splash caused by stomping in a mud puddle. Explosions are usually accompanied by many other prominent track features, including mounds, crevasses, and disks.



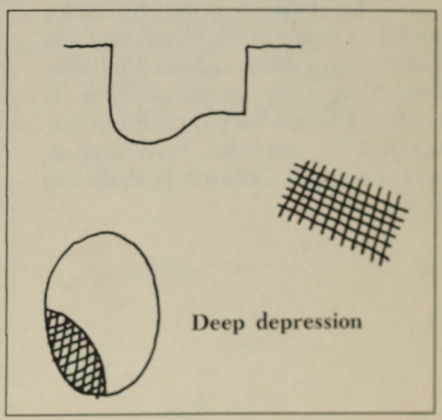
19. Pock: Tiny indentation (usually round or oblong) within the track caused by a protrusion on the foot. An example on human footprints would be cleats. On animals, pocks usually indicate growths or abnormalities that may be a key to their gait.

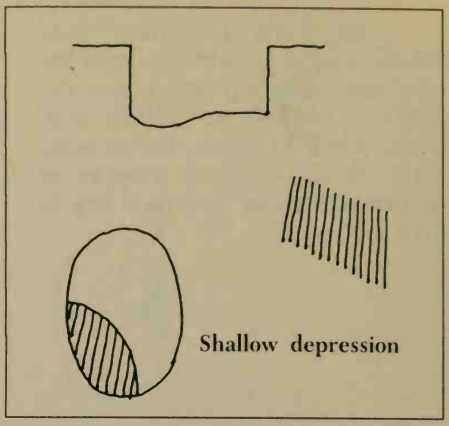


20. Reverse Pock: Tiny protrusion (usually round or oblong) within the track caused by indentation in the foot. This usually indicates an injury, such as that caused by stepping on a sharp rock.

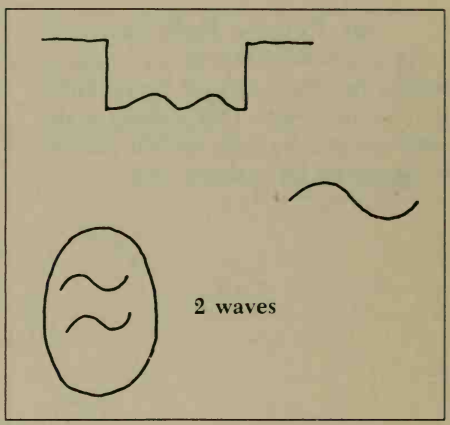


21. Depression: Any area in the bottom of the track (commonly in heels, toes, and sides) that is deeper than the average depth of the track. Depressions indicate where the animal put its weight during various stages of the step. There may be many depressions within one track, each indicating a different body movement. Tiny depressions in the heels indicate the sex of the animal (see "Male or Female?" page 134).

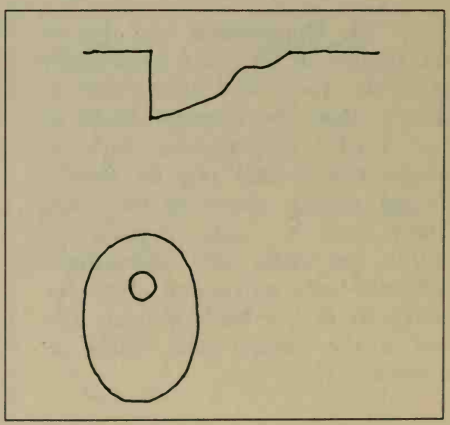




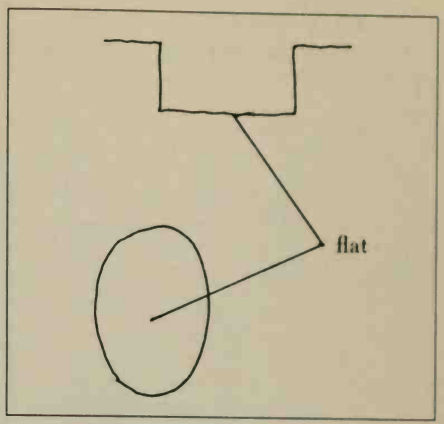
22. Wave: Undulation in the bottom of the track caused by simultaneous spreading and forward motion of the foot. At a slow walk a human footprint shows one wave; faster, two waves; and faster still, one gentle wave in back with a large one overlapping in front. At fast speeds, the front wave is often accompanied by a disk.



23. Disk: A relatively large, round or ovoid patch of soil that has been compressed, lifted, and dislodged from its normal position. It is often pushed back during the formation of a secondary wave and almost always indicates a pushoff at a fast speed.



24. Flat: Any relatively flat and featureless part of a track. This can mean many things, depending on where it's found. It is usually used as a reference point from which to gauge depressions, pocks, etc., and to read other track features. It has no symbol other than white space.



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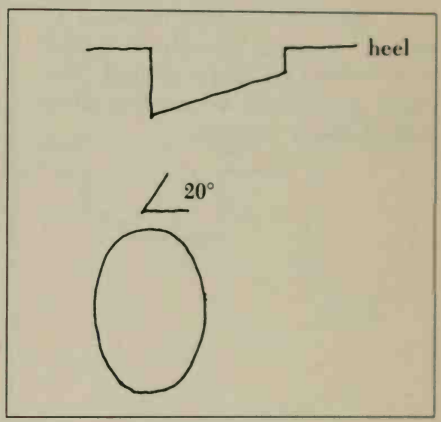
25. Pitch: Overall lengthwise angle of the track with respect to the ground. "Even pitch" means the track is level with the ground; "forward pitch" means it is angled toward the toes; and "backward pitch" means it is angled toward the heel. (Specify the approximate angle in your drawing.) Pitch shows how an animal's overall weight was distributed when it made the track. For example, the feet of an animal bending down to walk under an overhanging limb would be pitched forward because it would have more weight on the toes.



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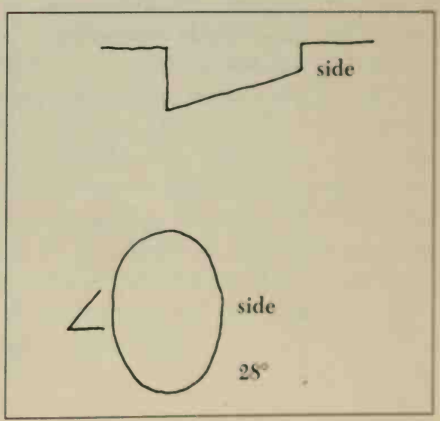
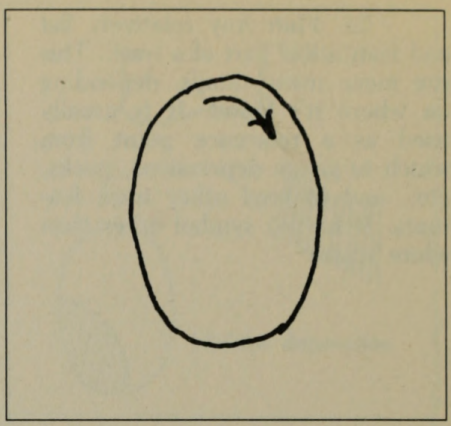
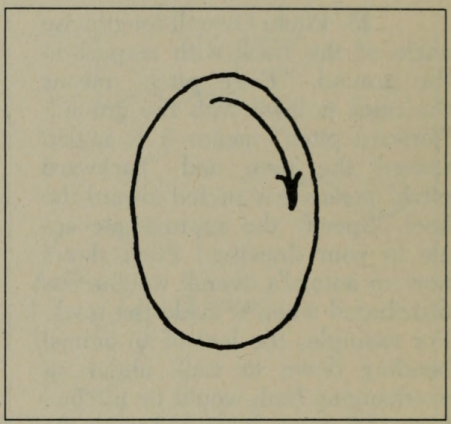
26. Roll: The overall lateral angle of the track with respect to the ground. "No roll" means the track is laterally level with the ground; "right roll" means the track is tilted to the right side; "left roll" means it's tilted to the left. Roll can indicate anything from a gentle turn to a sideways fall, depending on the angle.



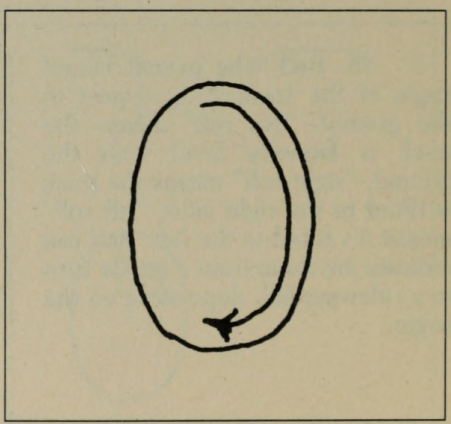
27. Twist: A turn between 0 and 45 degrees, leaving a smooth arc in the soil.



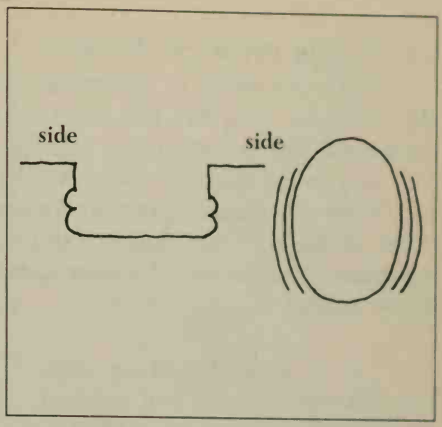
28. Pivot: A turn between 45 and 90 degrees, usually indicated by a smooth arc and a mound. The single symbol can be used to show both of these features.



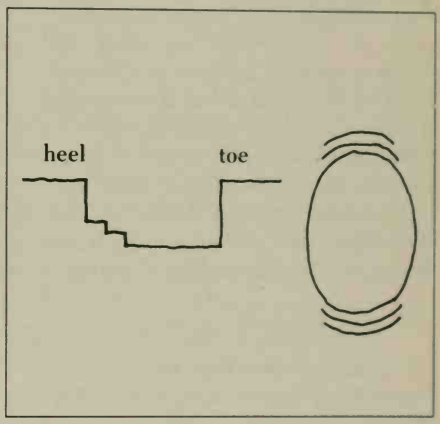
29. Spiral: A turn between 90 and 360 degrees, usually accompanied by considerable mounding, crevassing, and crumbling.



30. Wobble: A widening and deepening of the track caused by repeated sideways movements of the foot. This indicates loss of balance, indecision, or hesitation.



31. Stutter: Lengthening and deepening of the track caused by repeated and rapid forward movements of the foot. This usually indicates extreme anxiety, fear, or excitement. (Do not confuse with double tracks.)



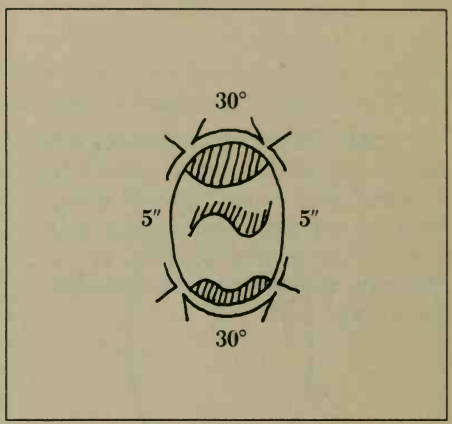
Exercise 8-1: Coffee Cup Tracking

The best place to learn pressure releases is in wet sand, but you don't need a whole beach to do it. You can start with as little as a cup- or canful, studying your own thumbprints. Coffee cup tracking is excellent practice because it teaches the basics and you can do it anywhere. Simply fill a cup or container with wet sand and smooth it over with a straight edge. Then, with your thumb or index finger, recreate and draw in your notebook the common pressure releases described above. Most important, notice the movements that cause them, and notice the different combinations of disturbance that occur with each movement.

Combining Pressure Releases

It's one thing to understand and memorize the symbols for pressure releases, but, like the letters of the alphabet, they will do you little good until you can put them together into meaningful combinations. The only way to do this is to watch tracks being made—*thousands* of them—and learn to connect pressure releases with particular movements and states of mind. Following are drawings showing some common human footprints in sand, with the accompanying combinations of symbols as they might appear in your notebook.

1. A normal walking step. The diagram indicates that the heel came in at a 30-degree angle and that the toe was lifted out at a 30-degree angle. The single wave indicates a slow walk, as does the absence of any gouges or plumes. Most of the track edge is composed of cliff, showing that there were no turns or twists. The areas of heaviest pressure show on the heel, toe, and just in front of the wave; yet even they are relatively light, as shown by the single-line shading.



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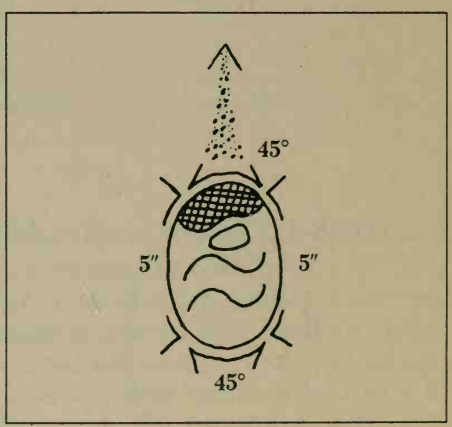
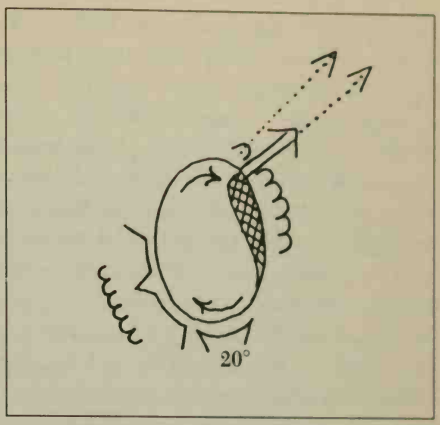
2. A very fast walk. Here, the feet are being picked up more, indicated by the greater angles of entry and exit. Extensive cliffing again shows that there were no turns. But this time there is a double wave, a small disk, a short plume in front, and a deep toe pushoff. All these things indicate the increased pressure that comes with speed. If the person were running, these things would be even more pronounced.



3. A twisting turn to the right. The heel came in at a 20-degree angle, indicating slow speed. There is no wave, which suggests that the foot did not follow through, but stopped momentarily. The ridging and mounding, plus the clockwise movement of sand grains, indicate a sharp twist to the right. This was followed by a shift of body weight to the right front of the foot. The gouge and plume marks show that the next step was taken rapidly to the right, as though the person had made a sudden decision.



The Extended Tracking Box

Another excellent way to study pressure releases is to make an extended tracking box. These can be almost any size, but the most useful ones are large enough to accommodate a variety of animals—from mice to men and women. The one in my barn is about four feet wide and eight feet long, though twelve or even sixteen feet long would be better still. If you're going to use the box mainly for pressure releases (which require a lot of concentration), it's best to place it inside or under cover where you can take notes in comfort without having to worry about the weather.

The construction is simple: (1) Form a rectangle with four two-by-sixes. (2) Join the boards at the corners with braces and screws. (3) Put a large sheet of heavy plastic in the middle. (4) Fill the box with fine sand.

That's all there is to it. After you've dampened the sand with a garden hose, fluffed it up, and smoothed it over with the edge of a board, you're ready to start tracking. Use any animal you can get into your basement. (I once tried to get a donkey down the stairs.) Dogs and cats are obvious possibilities because they're so numerous, but you may also know someone who owns a pet raccoon, opossum, or some other unusual animal. If so, by all means ask if you can borrow it for a while.

You can also learn a great deal about tracks by studying your own prints. It's sometimes difficult to get an animal to do much besides walk across a sandbox. But if you make the tracks yourself, you can create whatever patterns you want. You can walk, run, jump, turn, stagger, fall, crawl, dig, and so forth. Then you can draw and study the tracks at your leisure. Since similar pressure releases are caused by similar forces, what

you learn about your own tracks will teach you a great deal about those of other animals. In this way, you'll gradually develop your tracking "vocabulary" to the point where you'll be able to read the pressure releases of any animal, even on more difficult terrain. (For further information on the study of human tracks, see "Search Tracking," page 251.)

Whatever animal you choose to study, here's how to get the most from the time you spend. (1) Before the tracks are made, take note of the animal's height, weight, and other important factors. (2) Watch the animal's movements—not its feet—while the tracks are being made. (3) Study one track at a time. To overcome the temptation to look ahead, cover other tracks with a board or an opaque sheet. (4) Get up as close to the track as you can. Use sideheading and a magnifying glass. The more detail you observe, the more deeply the track distortions will become embedded in your memory. (5) Observe the track from different angles and notice how the distortions look under different lighting conditions. (6) Feel each track with your fingers and practice creating visual images of it with your eyes closed (see "Feel Tracking," page 246). (7) Draw the pressure releases in your notebook. Spend enough time with each track to get a clear picture of its prominent distortions and to link them up with the movements you observed. (8) Try to predict where the next track will be without looking at it. (9) Step back and notice how all the tracks are logically linked. Then read them slowly from beginning to end, noticing how they recreate a moving picture of the animal in your mind.

Aids for Seeing Disturbances

Sometimes ground disturbances are so faint and difficult to see that they are hardly distinguishable as tracks. However, there are ways of making these disturbances more clearly visible. For a solid surface, one of the best ways is to sprinkle a little flour or chalk dust over the area, then turn your head to the side and blow on it. Most of the dust will be blown away, but some will be left in the crevices and depressions, making the track stand out in bold relief. Another method, used especially for fragile tracks such as those in sand or dust, is misting the area lightly with a spray bottle. As the water seeps into the ground, it firms up the track and emphasizes its variations. Finally, my favorite way (also for soft soils) is sweeping around the disturbed area with a soft-bristled brush. This flattens the surrounding area and removes confusing variations in the ground so you can see the track more clearly.

Preserving Tracks

It's sometimes difficult to study ground disturbances in the field because of unfavorable weather or lighting conditions. To overcome this,

and to take interesting tracks home with you, you can make plaster castings of them. All you need is plaster of paris, water, and a container to mix them in.

Plaster Castings. Here is the procedure to follow: (1) Carefully remove leaves, pine needles, sticks, and other debris from the track with fingers or tweezers. If you like, spray the track with varathane or lacquer to prevent sand and other small particles adhering to the casting. (2) Add water to a quantity of plaster, stirring with a stick until the mixture is about as thick as motor oil. For very delicate tracks, use a thinner mixture. (3) Pour the mixture into the track slowly to minimize the risk of bubbles or gaps in the casting. Fill the track completely, until the plaster overflows slightly and forms a lip around the edges. If part of the track overflows before it is full, carefully shore it up on that side. (4) With a stick, carefully dab the plaster into all parts of the track. (Do not damage the track!) (5) If the casting is delicate or especially large and thin, reinforce it by embedding sticks in the topmost part before the plaster sets. (In a similar manner, you can make a single casting of several tracks, using sticks or wires to hold them together.) (6) Protect the casting from rain (with a piece of bark or a plastic bag) and allow the plaster to set for ten to fifteen minutes. In humid or cold weather, allow more time. (7) Tap the plaster to see if it's dry. It should feel hard and have a solid ceramic sound to it. (8) Free the casting from the ground by digging all around it, then pry upward from below with a stick. Do not try to lift it by the edges. (9) To be safe, let the casting dry a little longer. Then very carefully clean off the debris with a toothbrush and water. (10) To preserve the casting, coat it with varathane or lacquer.

Once you've got a good clean casting, study it with your eyes and your fingers. By holding a "track" in your hand, you can examine it from any angle and feel every nuance. Use a flashlight and a magnifying glass to highlight and make details stand out. Remember, however, that you're not really holding a track, but a foot casting. Everything will look and feel just the opposite of the way a track would look and feel. To recreate the track itself, simply press the casting into a bed of wet sand.

Using a Camera. Although photographs do not provide as accurate or substantial a record as castings, they can preserve the semblance of a track or track pattern if taken with care. For best results, use black and white film without a flash, and do not take the picture while looking straight down on the track. Take the picture from the angle that produces the best shadows (with the track between the camera and the source of light). For best results, use a tripod or place the camera on an immovable object (such as a rock) with a beanbag beneath it. If you want to show a series of tracks in sharp focus, use a high f-stop (f-16 or f-22) and focus on

the track in the middle of the frame. To be able to determine track size later on, place a six-inch ruler or some familiar small object beside the track before taking the picture.

Cross-section Tracking

To understand pressure releases, it helps to be able to visualize them from angles you can't normally see. One way of doing this is to study cross sections of plaster castings. To make one, simply fill a small container (a pot, pan, bowl, pie plate, etc.) with wet sand and turn it upside down on a piece of newspaper. Carefully remove the container and, taking care not to destroy the mounded sand, press the casting into it. Then, with a sharp straight edge such as a knife or ruler, slice straight downward just behind the track and pull away the sand. Gradually slice away more of the sand until you begin to notice the pressure releases in cross section. You will find many faint disturbances that were not clearly visible from above. By noting the locations of these depressions, cracks, waves, ridges, etc., you can more accurately see how the animal was moving when it made the track. Continue slicing and studying along the length of the track. When you're done, do the same with lengthwise slices.

It is impossible for anything much larger than a beetle to make a variety of natural tracks in a small container, so you'll have to go to a sand-filled tracking box to study the cross sections of most "live" tracks. You can do this using very similar methods. Just scrape away enough sand behind the track so you will have room to work. If the sand is wet enough, it should hold firm and provide some fascinating views.

Layer-cake Tracking

The impact, weight, and movement of an animal's foot affects the surrounding soil in ways that are not even visible in cross section. To see just how a track compresses and deforms the ground below and beyond the obvious pressure releases, make a "layer cake" with sand and flour. Follow the same basic procedure explained for making a cross section, but when filling the container, alternate half-inch layers of sand with sixteenth-inch layers of flour. When you cut away the cross section, undulating patterns of flour and sand will show up in beautifully stratified layers. By studying these, you can easily determine the greatest areas of downward pressure, which are often imprinted in the sand far below the bottom of the track itself.

9

"AGING" TRACKS AND SIGNS

Most tracks dwell on the interface between the earth and the sky. They don't usually last very long because they are constantly being erased by the elements. No sooner is a track created than the forces of wind, water, temperature, and gravity begin breaking it down. The ground is an ever-changing, ever-fading manuscript. It is also a collection of stories overlapping through time, where the tracks of one animal are altered by those of another. As a tracker, you'll be concerned not only with identifying and reading tracks, but with finding out just when they were made.

The art of "aging tracks" (determining the age of tracks) is very much like the geologist's art. Part of it is done by accurately reading the layers in the ground, and part by estimating the amount of erosion that has taken place.

Overlapping Tracks

The first rule for aging tracks is very simple: The track on top is the newest and the track on the bottom is the oldest. Whenever you find two or more intersecting tracks, see which one has been least damaged and that will be the most recent. Then try to reconstruct the track or tracks below by imagining how they were distorted by the one on top.

One of the most common cases of overlapping tracks occurs with the diagonal walkers, whose front prints are often distorted or even destroyed by the hind prints coming down on top of them. This is especially true of direct-registering animals such as the cats, whose hind prints almost (but not quite) obliterate the front ones. Another common instance is when the tracks of one animal are later partially destroyed by the tracks of another. If you found a bird track inside the track of mountain lion, you would rightly conclude that the bird walked over the lion track. If the bird track was partially destroyed by a mouse track, you would conclude that the mouse was the more recent visitor.

Tracking the Weather

Before you do any serious "time tracking," it is important to keep a detailed account of the weather. Tracks are altered at different rates by different weather conditions. If you have a record of weather changes for a given period, you'll be better able to narrow down the age of the track.

Let's say an animal leaves a track on Monday morning at six o'clock. Monday is a clear fall day. At noon on Tuesday it rains for about an hour. At ten o'clock on Wednesday morning, a windstorm comes up, and on Thursday you come by and find the track.

Weathering:

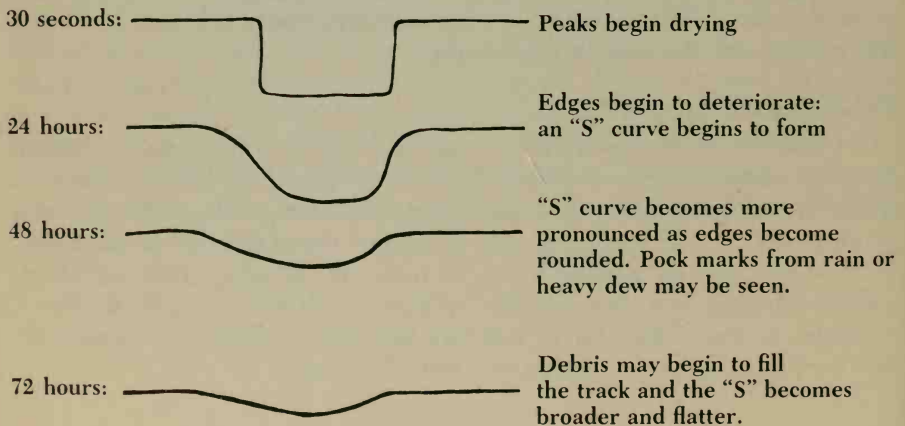
You examine the track and find that it contains a few leaves and twigs that have been blown into it by the storm. Looking in your notebook, where you have kept a simple weather log, you logically conclude that the track must have been made before the storm—that is, before ten o'clock Wednesday morning. With your tweezers you then carefully lift out the debris and discover that the track is covered with tiny pockmarks, indicating raindrops. Consulting your weather record again, you now conclude that the track was made sometime before noon on Tuesday. But how long before?

Track Erosion

The answer to this question lies in erosion—or what I call "peak deterioration." Under the effects of time, weather, and gravity, the sharp edges of a fresh track begin to round; the soil on the periphery slumps and flows into the middle; and eventually the ground flattens out and the track disappears altogether. This process suggests the second important rule for aging tracks. You can tell how old a track is by how worn it is.

Obviously, this is a very general principle. Being able to pin down the hour of a track's creation is an art that requires not only an accurate

"PEAK" DETERIORATION:

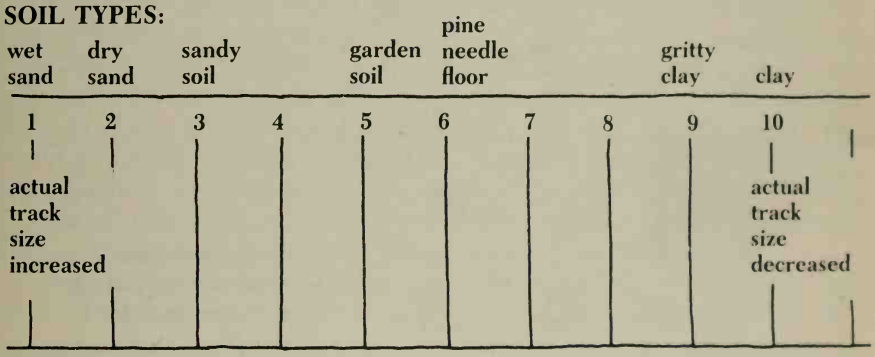


record of the weather but a great deal of skill. Through practice, you have to develop an automatic sense of how time and weather affect tracks on different kinds of terrain.

Rick and I learned this the hard way—by making all kinds of tracks on all kinds of terrain and watching them deteriorate hour after hour, day after day, in all kinds of weather. Sometimes we would take our lunches and spend an entire day watching a single track. Other times we would watch a track while waiting beside a trail for an animal to come by, so it didn't seem so long. No matter how we did it, it required a tremendous amount of dedication and patience, but our perseverance paid off.

Soil Hardness

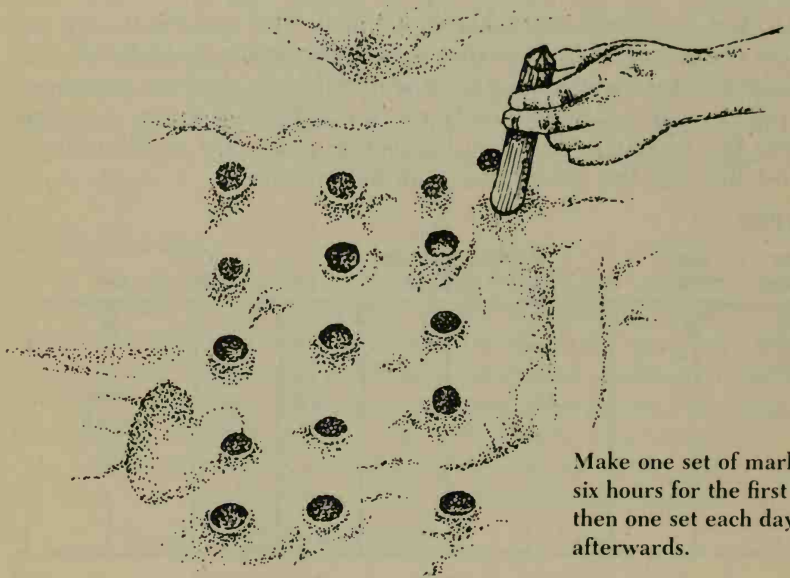
One fact that became quickly apparent to Rick and me during our many hours of track watching was that some tracks erode much faster than others. Sometimes we watched tracks in mud for hours without seeing any change, yet in sand we could clearly see the individual grains tumbling away every few seconds. Thus we discovered aging rule number three: The harder the soil, the slower the peak deterioration.



If soil hardness could be rated on a scale of one to ten, sand would be at the low end of the scale and clay would be at the high end. In the middle, about five, would be garden soil. To consider the effects of soil hardness on track deterioration, let's say a dog comes by and makes a track in garden soil on day one. The track is easily visible, with clearly defined toes and claws and all the edges outlined in sharp peaks. Given an "average" amount of weather (a little sun, a little rain, a little wind, etc.), on day two the edges of the track begin to round noticeably, but the toes and clawmarks are still distinctly visible. By day three, continued rounding, slumping, and filling leave a shallow depression without clawmarks or defined edges. This process, which took three days in garden soil, might take only three hours under the same conditions in sand—and in clay it might take as long as three weeks! Obviously, you will have to take soil hardness into account when you are aging tracks. But how do you do it?

Exercise 9-1: The Wisdom of the Marks

In the old days, Rick and I spent countless hours watching tracks and trying to remember how they disappeared. When Stalking Wolf finally showed us an easier way to learn how tracks deteriorated, we were overjoyed. It is so simple we were ashamed we hadn't thought of it before. It is an old Apache method called the Wisdom of the Marks.



Make one set of marks every six hours for the first day; then one set each day afterwards.

0 hrs. 6 hrs. 12 hrs.

First, find three different areas of soil hardness—ideally, sand, clay, and garden soil. Clear and smooth the areas, and in each one make five marks right beside each other with your thumb or a blunt instrument. Vary the depth of the marks from one inch to one-sixteenth of an inch to simulate animals of different weights. Study the marks carefully from sev-

eral different angles, noting peaks, depressions, and other fresh signs. Finally, leave a tag near each set of tracks showing the time you made them.

From time to time during the next six hours, keep an eye on the weather. At the end of six hours, return to each area and make another identical set of tracks just below the previous ones. Mark these with tags showing the elapsed time and compare them with the ones you made before. Continue this process, returning every six hours to make a fresh set of tracks. After twenty-four hours, you will have five sets of tracks on soils of three different hardnesses—an entire day's worth of erosion and aging before your very eyes.

After the first day, return once a day to tag and study the tracks. Do this until they disappear completely. You will then have a record of the entire life of a track in a particular area for a particular season, in soft (1), medium (5), and hard (10) soils and for animals of different weights. This comparison can then be used to estimate the effects of time and weather on many other kinds of terrain.

Variations. There are many variations to this exercise. One of the most useful is to collect the three different soil types and put them in separate boxes, side by side. This way you can compare all the tracks in a single glance and more easily file them in your memory. Another is to experiment with other types of terrain such as humus, hard-packed trail, and leaf-covered grounds of varied hardnesses. A third is to use the Wisdom of the Marks in conjunction with a baited tracking box (see "Attracting Animals for Study," page 133). Your own tracks can be left to age in a roped-off corner of such a box, while animals are invited to walk over the rest of it. Each time you return to check the marks, you can also check for fresh animal tracks and study their aging in the same way.

If you're pressed for time, just make marks in your garden or any patch of soil. Observe them at any convenient time during the day—for example, when you're leaving and returning from work. Any practice is better than none; but remember to tag the tracks with the date and time and to follow the changes in the weather. If you photograph the tracks (see "Using a Camera," page 225), put the photos and the weather record together in your tracking notebook for future reference.

You'll discover with the Wisdom of the Marks that the older the track and the more it's been buffeted by the elements, the more difficult it is to pin down when it was made. With a track that's two weeks old, you'll be doing well to estimate its age to within a day or two. However, you can often estimate the age of very recent tracks to within hours or minutes, depending on the soil and the weather. As you practice, you'll notice finer and finer distinctions in such things as soil color and moisture content that will allow you to estimate more accurately.

Specific Weathering Effects

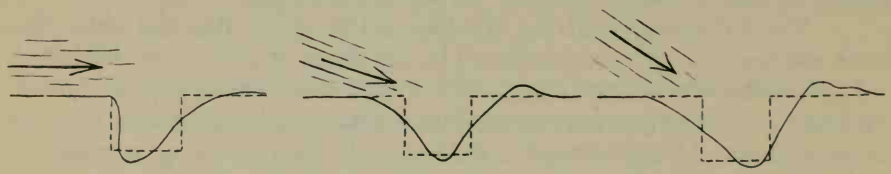
From one perspective, learning to age tracks is simply learning to read the "tracks" of the weather. In this sense, an old animal track is nothing more than a track that has been altered by the tracks of air and water. Like different animal species, these two elements leave signs that show their volume and intensity, where they came from, where they were going, and how their movements changed along the way. To determine the age of tracks, it's important to understand how these forces work. The best way to find out is to watch them in action—and the best place to watch them is in dry sand.

Exercise 9-2: Tracking Air Currents

Observe and record the effects of various wind angles and velocities on a track in dry sand. There are many ways to do this. The most natural way is to make a track while the wind is blowing and watch it degrade over time. Given enough time, you could probably record the effects of everything from a light breeze to winds of gale force. But you needn't wait for the weather. Even in your own home, you can use a sandbox in conjunction with a hair dryer, fan, or lungs.

Be systematic about your study. Start with a "slow, steady breeze" that moves straight along the ground toward the track and observe how the track deteriorates. Also observe what happens around the track. (You may discover a considerable amount of rippling on the opposite side of the track, much as in the dunes of a desert.) Record the results in your notebook. Increase the angle of the breeze by twenty degrees and see what happens. In regular increments, work all the way up to ninety degrees, where you have a breeze blowing straight down on the track. (This often occurs when a track is situated at the base of an obstacle such as a tree trunk that funnels the wind straight down.)

Record the results of your study with cross-section drawings after each trial. Below are examples of what some of these might look like. Notice the dramatic differences left by winds of the same velocity at dif-



Effects of different wind angles on track erosion.

ferent angles. The first drawing shows a typical track being eroded by a low velocity ground wind. The second shows the usual erosion pattern for low velocity winds up to about a thirty-five-degree angle to the track. The third one shows the "funneling" effect caused by low velocity winds coming in at about a forty-five-degree angle.

Variations. When you have completed the above exercise, increase the wind velocity and do it again. How do these results compare with those of the first set? When you're done with this, try other things, for example, placing various objects between the track and the wind source. Try it with tracks of different depths, shapes, sizes, etc. Experiment! There's no better way to learn.

(I should emphasize that the effects of wind on a track depend not only on velocity and angle, but also on the shape of the original track. For example, most round tracks such as those of the cats tend to wear very evenly in steady wind, whereas more blocky tracks wear quite unevenly. Tracks in very soft ground such as sand and snow can also become tremendously distorted if the wind is just right. Once I saw a dog make a print in shallow powder snow and watched as a strong breeze played with it. The wind blew crystals in and out of the track in such a dynamic equilibrium that after an hour the track had moved more than a foot from its original position and yet still retained its characteristic shape!)

Exercise 9-3: Tracking Raindrops

On sandy terrain, experiment with a misting bottle, watering can, sprinkler, or other source of "raindrops" to discover the aging effects of water. One of the best ways is to use a garden hose with a nozzle. This way, you can create drops of varying sizes, and you can also aim them to simulate rainstorms hitting the track at various angles and velocities. Follow the same procedures outlined in the previous exercise and record the results in your notebook. When you are done, try the same experiments on soils of harder consistency and note the differences.

One of the most characteristic effects of rain is that it seeps in around the walls of the track, causing them to crumble and fall to the inside. The more rain that falls, the more the track crumbles and the more material collects in the middle. From the size of this central "island," you can often gauge the intensity and duration of the rain.

Exercise 9-4: Temperature Variations

With a little ingenuity, you can create temperature effects that mimic conditions as different as those in Death Valley and the Antarctic. Using a space heater and a thermometer, for example, you can test the effects of heat on various kinds of tracks and soils. Just put the thermome-

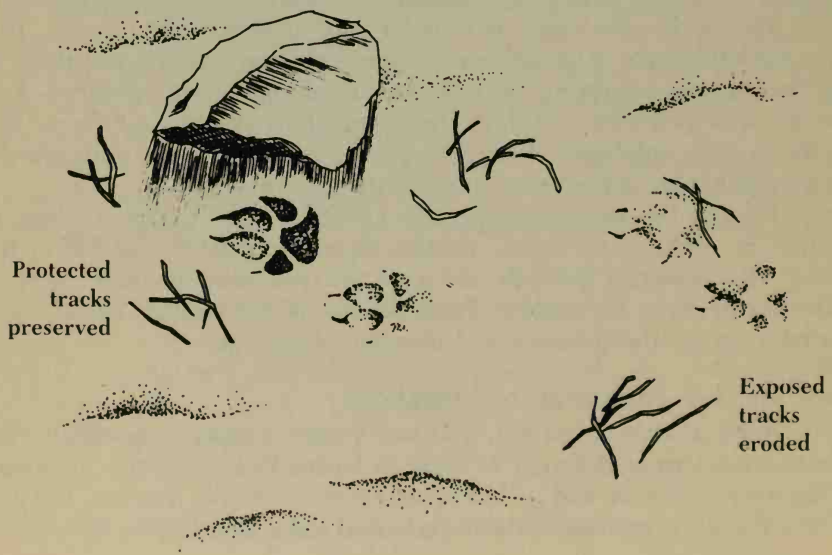
ter next to the track, move the space heater far enough away to create the desired temperature, and let the tracks "bake" for a specified period of time. With a hair dryer, you can combine heat with moving air to simulate a warm wind. If you want to know the effects of freezing weather, make a track in wet sand or damp garden soil and put it in a freezer.

Among the discoveries you'll make with these exercises is that the ground is almost alive with movement. Like a glacier, it is constantly expanding and contracting. A rapid temperature increase causes drying and cracking. Increased humidity causes faster degradation. Freezing causes the ground to harden and expand. And thawing often drops the bottom out of tracks, leaving a cone-shaped depression. Experiment and see what other discoveries you can make.

Weather and Topography

One of the most obvious principles you will learn from the preceding exercises is aging rule number four: Tracks exposed to the weather erode much faster than those in protected places. Often I've watched my students follow tracks through brushy areas with no trouble at all, only to become stymied when the track suddenly disappeared in an open spot. Another thing that often seems mystifying to beginners is that tracks that appear to have been made by different animals at different times have actually been made by a single animal in the space of a few seconds.

The answer to these riddles is found in a combination of weather and topography. A track behind a protective rock lasts longer than one on



a flat, open plain. The trail of a fox may be clear and easy to follow on one side of a hill and yet seem old and eroded on the other side. Depending on the soil consistency and the lay of the land, a track may last for weeks or disappear within minutes. You have to be able to determine the prevailing weather systems and predict how they will affect tracks on a variety of landscapes. You can usually determine the movements of wind and rain from ground signs and vegetation, but understanding all the possible effects of those movements takes a lot of dedication and "dirt time."

"Aging" Disturbed Vegetation

Gnawings, bitings, broken sticks, and other disturbed vegetation can tell you almost exactly when an animal came by, if you're skilled enough to read the signs. The best way to learn to age vegetation is to break or bruise various leaves, stems, twigs, and sticks and return at regular intervals to see how the vegetation has changed (see Exercise 9-5, page 236).

As time goes by, you'll see the differences clearly. Freshly matted grass gradually rises back to its original position. Freshly torn leaves look hardy and green but eventually wither and turn brown on the edges. The broken stem of a live plant looks moist and whitish at first, but gradually dries, hardens, and yellows with age. The newly exposed areas on dead, broken twigs have sharp edges and often look conspicuously white against the ground, but they slowly become blunt and darken as time goes by.

As with tracks, the speed of the aging process varies with temperature, wind, humidity, and precipitation—but not in the same way. Increased temperature and wind speed up the aging of damaged plants, whereas increased humidity and precipitation slow it down. Generally, this means that you can expect damaged vegetation to show signs of aging faster in good weather and warm, dry environments than in bad weather and cold, wet environments. On the desert I've seen vegetation turn to parchment in a few hours when it might have taken weeks to reach that stage in a rain forest.

Be sure to check for brittleness, especially with damaged parts of live vegetation. Much of the aging process depends on how fast a plant loses its water content after being damaged. This in turn depends partly on how much of the inner surface area is exposed to the air. A tiny break exposes less surface area, so it loses water more slowly than a large break. Vegetation that has been diagonally cut by the teeth of rodents or rabbits loses water very quickly, just as flowers whose stems are cut on a diagonal absorb water more quickly when placed in a vase.

Exercise 9-5: "Aging" Vegetation

Break or bruise several different kinds of vegetation (grass, twigs, leaves, ferns, moss, etc.) and mark them with tags indicating weather conditions and the date and time of the disturbance. Return at regular intervals to observe the effects of time and weather with a magnifying glass, and record these in your notebook. On damaged parts of live plants (for example, broken twigs with buds that are still attached to a tree), be sure to check along the entire length of the broken part, as the signs of aging will vary in proportion to the distance from the break.

With live vegetation, many of the most dramatic effects will occur very quickly, so I recommend returning every two hours during the first day. Each time you return, compare the original disturbance with a fresh one and tag the fresh disturbance with the date and time. (Do not destroy any more vegetation than absolutely necessary—and don't forget to use your sense of smell!) After many such visits, you will have a series of equally spaced disturbances for easy comparison. Eventually, this record of change will engrave itself in your memory.

"Aging" Scat

The secret to aging scat is twofold: Scat dries gradually from the inside out, and the outer shell is very subject to changes in the weather. You may find a scat that appears wet, fresh, and greenish on the outside but discover that it is quite dry and dark on the inside. This would be a relatively old scat. Older still would be scat that has become powdery on the inside. On the other hand, you may find droppings in a warm climate that are very dry on the outside but still wet and soft at the core. This would indicate relatively fresh scat.

Another general guideline is that very fresh scat tends to be quite soft and mucous-lined on the outside—especially that of the hoofed animals. This mucous layer is usually lost within a day or two, although wet weather can preserve it for up to a week or more. Also, the pellet-type droppings of the deer and rabbit families are usually very compact and may last a year or more, while those of the predators may begin to break up within days. Predator scat is often more difficult to age than the fibrous scat of the herbivores, especially if it contains great amounts of hair and bones.

Exercise 9-6: "Aging" Scat

Practice aging various types of animal scat. The best way is to collect the droppings in plastic bags and leave them exposed in your yard to weather. You can do this in much the same way you did with vegetation—

planting tags or Popsicle sticks beside each dropping, indicating date and time, and then noting the differences at regular intervals. As with tracks and vegetation, the rate of decay will depend on the climate and weather variations in your part of the country. (For more information on animal droppings, see "Scat Analysis," page 204, and "Animal Tracks and Habits," page 136.)

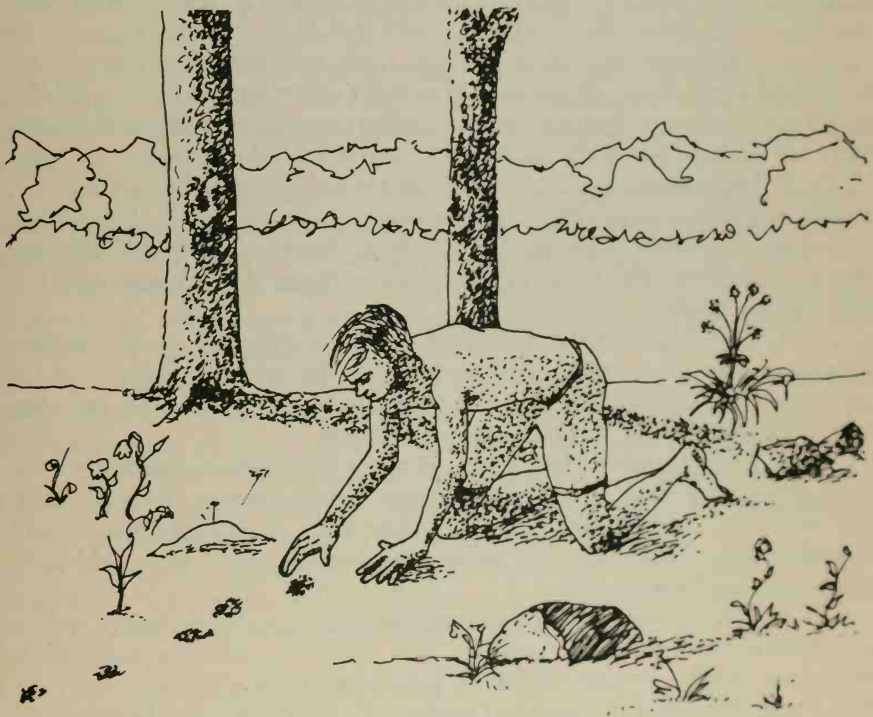
10
READING AND FOLLOWING TRACKS

Now that you've learned the tracking "alphabet" and familiarized yourself with the most common animal tracks and signs, you're ready to start putting your knowledge to work. In this chapter I will discuss general procedures and helpful aids for reading and following tracks in the field.

Important Things to Remember

In the following list of important tips, some points were discussed in earlier chapters on nature observation, but they are well worth repeating.

1. Lighting. The best time for tracking is early morning and late afternoon when the sun casts the longest shadows. The hours around midday are the worst because the sun is more directly overhead and leaves very little or no shadow.



Low-angle light is best. Keep the tracks between you and the source of light.

2. Angle of Vision. The best way to look at a single track is to get low to the ground, keeping the track between you and the source of light. As you are learning to track, you should spend most of your time on your hands and knees—including many hours with your eyes only inches off the ground.

3. Sideheading. The best way to read faint or confusing tracks is to get down on hands and knees, lower the side of your head to the ground, and close your top eye while looking at the track with your bottom eye. This foreshortens the track and emphasizes compressions, irregularities, and shadows.

4. Varied Vision. Vary your vision frequently while tracking. If you have trouble spotting a track or trail, back up and look for patterns and shadows. If you lose sight of a faint track, let your eyes go into splatter vision for a moment and then refocus them. When studying a single track, look up often to see how the track fits into the landscape.

5. Thumb Aging. To quickly calculate the age of a track, push your thumb into the ground next to it and compare the fresh thumbprint with the track in question (see "'Aging' Tracks and Signs," page 227).

6. All Senses. Use all your senses while tracking. As you search for tracks and signs, listen for the sounds of birds and snapping twigs, sniff the air for telltale scents, and absorb information through your skin and fingertips. Let your whole body become a receptor for information.

7. Movement. Stalk quietly if the track is fresh and you think the animal might be nearby. If not, either weasel walk or fox walk. Remember that slow, soundless movement is the least threatening to wildlife, and that many animals will come by to teach you things if you blend with the flow of the woods.

8. Left-Right. When following a trail, never step on the tracks. Except to vary your vision, stay on the side that is most convenient for you. If you're left-handed, this will probably be the right side; and vice versa. Experiment to find out what works best.

9. Concentration. Don't talk or make noise while tracking. Aside from scaring the wildlife, it will break your concentration. To track well, you must be in total concentration, free from distracting words and thoughts. As soon as you start talking or thinking about your cold feet, you're not tracking anymore.

10. Attunement. Relax and shut down the internal dialogue. Before and during every tracking excursion, take some time to open yourself up to deeper levels of awareness (see "Toward a Deeper Awareness," page 63). Trust your intuition and don't analyze. Your hunches and first impressions are usually the best.

11. Role Playing. Pretend you are the animal you're tracking. If you lose the trail, ask yourself where you would go if you were a badger, an otter, or a mink. Examine the landscape with that frame of mind. The tighter the kinship you feel with an animal, the better you'll be able to track it.

Reading the "First Track"

Let's say you've found some clear tracks in soft soil. Before you rush off on the animal's trail, remember: Your ultimate goal is not to identify and follow the tracks, but to read the story they tell you. Your aim is to interpret the animal's movements in relation to the entire landscape. With this in mind, your first job is to survey the landscape and ask some questions. Here is a list of logical ones to start with. If you can't answer them right away, keep them in mind throughout the tracking process.

1. Geographical Area. In what part of the country do you find the tracks?

2. Description. What does the area look like? Is it mountainous, flat, forested, scrub country, desert, or what?

3. History. What changes has this area gone through in recent years? Has there been a forest fire? A flood? A volcanic eruption? Is there evidence of pollution or other human effects on the land? How might this affect the animal?

4. Plants. What kinds of vegetation does the area support? Which ones would interest the animal? Which ones might interest other animals, and what effect might this have on the one you're following?

5. Water. What water sources are in the area? If you can't see any immediately, where would the closest one logically be? Where would this animal likely go to drink?

6. Animals. What other kinds of animals besides yours might the area support? Would your animal compete with them for food? Would it be afraid of any of them? How would these things affect its actions?

7. Weather. What is the general climate of the area? The prevailing wind direction? The temperature? The air pressure? The humidity? How might these factors affect the animal's movements?

8. Season. What time of the year is it? Based on its annual cycle, what kinds of things would you expect your animal to be especially concerned about? How would this affect its movements?

This list is rudimentary. There are many more questions you could ask within each category, and, as you'll see, the questioning goes on and on. If you spend some time pondering these things at the very beginning,

you will arm yourself with lots of information about a specific area and begin to understand how it dictates the life and movement of the animals within it. In this way, you won't be blindly stumbling from one track to the next but following a logical pattern.

Measure and Observe. With these questions in mind—some answered and some not—your next step is to measure and observe the track (or tracks). What kind of soil was it made in? How old is it? (See "'Aging' Tracks and Signs," page 227.) What are its most obvious characteristics? Is it deep, faint, distorted, twisted? What does its appearance tell you? (See "Reading Pressure Releases," page 209.) Carefully remove debris from the track with your fingers or a pair of tweezers. Take accurate measurements and record them in your notebook. If the ground shows several clear prints, include the length and width of front and hind feet, slow stride or running stride, trail width, straddle, and pitch. (See "Measurements," page 129.)

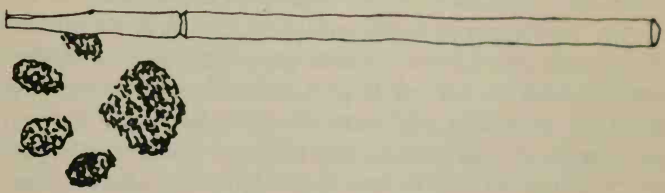
With this done, think about the information. What do your measurements and observations tell you? What kind of animal is it? Is it male or female? Large or small? Young or old? How fast is it moving and why? What is it doing in the area and where is it going? When might it be back? Where is its den or bedding area? Write your conclusions and speculations in your notebook. (Now you can begin to see how valuable it is to have a knowledge of animal habits!)

Finding the Next Track

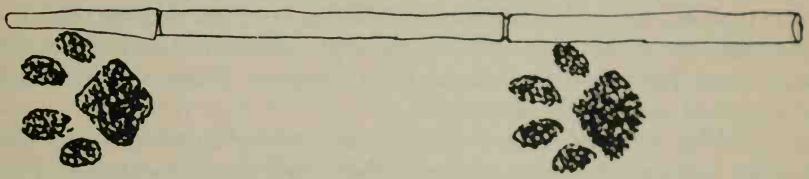
It's easy to follow tracks on a sandy beach or in soft soil. But what happens when an animal steps on a bed of leaves, a patch of grass, or a hard-packed trail? Often the tracks seem to magically disappear! At this point, many people look no farther, when in fact there are a variety of positive signs. It's just that sand grains, smudges, and faint compressions are not easy to see—especially in the beginning. For this reason, you may need some help finding the next track.

The Tracking Stick. One of the most useful aids is the tracking stick. This is nothing more than a straight, pointed, three- to four-foot stick fitted with four moveable markers. (A half-inch dowel or an old ski pole with small rubber washers, or "O-rings," is excellent. Or you can even use a stick with carved notches.) It works like this: After you've taken accurate measurements, indicate them with the markers on the tracking stick. The distance from the point of the stick to the first marker shows the length of the foot. The distance between the first and second markers is the width of the foot. From the point of the stick to the third marker is the stride. And from the third to the fourth marker is the inner trail width, or straddle.

Measuring length of foot



Measuring length of stride (from toe to toe)



If you are tracking a very small animal, you might want to make *#1* the length of the overall pattern, *#2* the trail width, and *#3* the length of the average leap. On the other hand, tracking sticks can be made almost any size. For little creatures, you might want to make a "mini-stick" that's more accurate and convenient to use. This also gets you into the habit of noticing finer and finer details, which makes tracking larger animals that much easier.

The main purpose of the tracking stick is to help you find the next track. Its key measurement is the stride. Anytime you get stuck and can't find the next track, or if you find yourself in a confusing maze of tracks, set the stride marker at the toe of the last confirmed track and look at the point of the tracking stick. If there is no sudden change in the animal's gait, you're almost sure to find evidence of the next track somewhere near the end of the stick. If you don't see it directly ahead of the last track, move the point of the tracking stick in a slow arc, scanning the area around the point.

The stride recorded on the tracking stick should be that of the animal at its normal slow gait. Though the animal may speed up or slow down for a short stretch, it will eventually return to its normal stride. If it maintains a different gait for a long time, simply change the stride measurement on your tracking stick by moving the third marker.

A metal tape measure also makes an effective tracking stick. Since it is marked in inches and feet and can be placed flat on the ground, the tape allows for accurate measurements any time you want them. You can also carry a tape more easily than a tracking stick. The only disadvantage is that you may have to keep the important measurements in your head. But even this is not necessary if you mark the tape with erasable ink.

Landscape Clues. Another great help in finding the next track is to remember that each track is part of the landscape and part of the larger community of plants and animals. As you track, vary your vision frequently from the minute to the majestic and take in the larger picture. Look for things on the horizon that might offer clues to the animal's movements. Look for landscape variations that might force the animal to change its gait or direction. For example, an animal walking uphill takes shorter strides than on flat terrain. An animal walking on rocks shortens its stride and widens its straddle for greater stability. Obstacles such as bushes, stumps, and logs often force animals to jump or detour. Ask what the animal would most likely do next.

Finally, remember that all tracks are part of a string of clues and that each one contains secrets about where to find the next one. If you find a set of deer tracks showing dewclaws and thick dirt plumes, you wouldn't expect to find the next track twenty inches ahead. You might have to look ahead six feet or more. If you find a track that shows deep caving and mounding on the right side (see "Reading Pressure Releases," page 209), you'd logically suspect a quick stop and a left turn. There are endless clues such as this that will tell you where to find the next track.

Find Every Track

In the excitement of finding a new track, there is always a tendency to hurry on to the end of the trail. When a trail gets difficult to read, there is also a tendency to skip and see if you can find clearer prints ahead. Resist these temptations until you have learned everything you can about the track in front of you. If you have trouble finding the next track, it's probably because you didn't read the last one carefully enough. Even an animal's thoughts are written in its tracks, awaiting the tracker who is skilled enough to read them.

The main reason for not skipping tracks (unless absolutely necessary—see "Cross Tracking," page 245) is that the track you can't find is the one that has the most to teach. Maybe you'll only find a creased leaf, a dirt smudge, or a stone roll. Maybe it will be a faint compression or a grain of sand. Whatever it is, you'll gain by sticking with it. When you find the track, you will recognize that sign more easily next time you see it. You'll also condition yourself to notice increasingly subtle things. With

enough practice, even the tiniest and most ethereal signs will seem obvious, and other people will be asking how you could possibly see them.

Exercise 10-1: Tracking Yourself

On terrain of average tracking difficulty ("average" is for you to decide), walk normally for fifteen or twenty steps and return to your starting point. Set length, width, stride, and straddle on your tracking stick and follow the tracks one by one to the end. No matter what happens, do not skip tracks. If you can easily follow the tracks to their end, choose more difficult terrain and do the exercise again. Constantly challenge your ability.

Skipping and Cross Tracking

The only situation in which I recommend skipping tracks is when all traces of the next track have been destroyed by wind, rain, or other disturbances. In some situations, you may only have to skip one or two tracks in order to pick up the trail. In others you may have to walk across a rushing creek or an asphalt road. Whatever the situation, mark the last confirmed track and note the animal's last known direction. Then, without moving, look in that direction for signs. If you see none directly ahead, slowly scan the terrain for 360 degrees, looking for logical routes. If you notice some signs, check them while taking care not to destroy others. If you see no signs, try "cross tracking."

Cross tracking (also called "sign cutting" by search and rescue agencies) is a simple method of searching an area until you intersect the animal's trail. Some examples: If the last confirmed track is on one side of a highway and the animal seems to be headed for the other side, walk to the far side of the highway and search along the edge in both directions. If the last confirmed track is in the mud at the edge of a stream, pick the easiest route across the stream and search up and down the bank on the other side. If there are no such obstacles, move back a few feet behind the last confirmed track and begin walking (or crawling) in a circle to see if you can intersect the track farther out. The diameter of the circle depends on the situation. Do whatever seems most logical for the animal and the terrain. If you complete the circle without finding the track, increase the radius and try again. (For more information on cross tracking, see "Search Tracking," page 251.)

String and Popsicle Sticks

A procedure that is especially useful when trying to determine an animal's gait and track pattern is to mark each track at the toe with a popsickle stick and connect all the sticks with kite string. This way, you can quite literally tie together a whole series of tracks and see how they are interconnected. Looking back at the string of sticks, you can see at a glance just where the animal went, how it turned to avoid a rock, how it shortened its stride to go up a hill, and where it stopped to sniff for danger. Also, if one or more of the sticks seem out of place, you can go back, check your tracking, and correct for errors.

I have found that Popsicle sticks work best because they are light-colored and show up well in most kinds of terrain. If you use sticks without string, they often show up better if you lay them flat on top of the track instead of pushing them vertically into the ground. This way, you can also indicate pitch, which is especially useful when tracking humans (see "Search Tracking," page 251). At any rate, I recommend taking a good supply of string and Popsicle sticks whenever you go tracking. If you don't have Popsicle sticks, use twigs, rocks, and other natural materials to mark the trail.

"Feel Tracking"

Sometimes, because of poor lighting or difficult ground conditions, you can't see a track clearly enough to read or follow it. This is when you should use your hands. The native Americans used to track by feel not only at night but during the brightest times of the day when the ground seemed flat and featureless. I recommend using your hands in conjunction with your eyes almost all the time, as your hands are the most sensitive tracking devices you have. They can feel nuances the eyes cannot see and they will always give you accurate information, whereas your eyes will often fool you.

Different parts of the hands and fingers are more sensitive than others, but the size and consistency of the track will often dictate what part of the hand to use. Generally, search for tracks with your whole hand, patting it lightly over the ground until you feel a telltale depression. If the track is very large (human or bear, for example), feel the heel with your palm and the toes with your fingers. If it's a medium-sized track (say, a deer), use two or three fingers. With dogs and cats I often use three fingers and a thumb, and sometimes I use the most sensitive fingers on both hands in a single track. For small tracks you may have to use just part of a finger. Find out what works for you.

The procedure is basically the same regardless of the track size. First, determine the general track outline, being very careful not to de-

Use a very delicate touch for feeling tracks.

stroy it. Feel for telltale mounding, cracks, or other disturbances around the track that might indicate speed, direction, or unusual movement. Then let your fingers relax and slowly work them backwards inside the track (ever so lightly, tapping rather than dragging) to determine its main features. Allow the width, depth, cliffs, mounds, caves, and other prominent pressure releases to register on your fingers. Let their meanings seep into your mind, just as they would with a blind person reading braille. (Whether it's braille or animal tracks, you first have to know the "alphabet." See "Identifying the Track," page 117, and "Reading Pressure Releases," page 209.)

Finally, return to the front of the track and systematically explore its finer features. For these parts of the track, use an extremely soft touch. Let your fingers dab lightly into every depression as though you were trying to stroke a butterfly wing without removing any scales. Shut off all thoughts and absorb the information that comes through. Then ask yourself what it all means. (If you don't know, spend more time studying pressure releases.)

For best results while feel tracking, keep your eyes closed or look away from the track. This will allow you to concentrate on touch, and it will also keep your mind from playing tricks on you. You've probably seen old etchings or lithographs of Indian scouts kneeling and gazing off toward the horizon while examining a track with one hand. Not many people appreciate the meaning of this classic pose or the skill it suggests. These Indians were doing just what you should do—reading the track with their fingers while connecting it to the landscape with their eyes.

Exercise 10-2: Hand Tracking

Close your eyes and explore the inside of one hand with the fingers of the other. Follow the same procedure outlined above, first getting an overall feel for the shape and size of the hand, then going over it again with a lighter touch for finer details. Feel the ridges, finger joints, calluses, and palm lines, down to the smallest lines you can see. Try this same exercise on other surfaces and notice how quickly your touch improves. (For other touch exercises, see "Fine-tuning the Senses," page 37.)

Feel tracking is especially useful at night. If you can't clearly see the landscape but don't want to risk disturbing the animals with a flashlight, you can use your hands to find trails, runs, and other large-scale signs. First locate a good area by getting low to the ground and picking out the silhouettes of features that suggest promising transition areas. Once in the area, look for dark and light areas that mark variations in the landscape. Where you detect these, run your hands lightly along the brush or grass until you feel a break that indicates a trail or run. Then feel for individual tracks.

To follow a track by feel, first identify the animal and determine its direction of travel and its stride. If it's a deer, you can fairly safely say that it's walking and that its stride will be around twenty inches. (If it's not walking, find out what it is doing by reading the pressure releases in its tracks.) Then, using your hand and forearm as a ruler, measure the approximate distance to the next track and "sweep" in that vicinity with your other hand until you find it. The next track will probably be a few inches to one side or the other, so remember whether you're looking for a left or a right foot. Also remember to compensate for obstacles. If you come to a rock or log, ask whether the animal would understep or overstep to clear it. If you run into a bush, try to predict which way the animal would detour.

Exercise 10-3: Blindfold Tracking

Make a set of tracks in beach sand or garden soil and see how well you can follow them while blindfolded. Use the principles explained above. Do this on more and more difficult ground until you can track by feel on almost any terrain.

Tracking With Flashlight

Flashlights are excellent tracking aids, not only for night tracking, but also for highlighting tracks in poor light during the day. They can even be used at high noon, when the sun doesn't create enough contrast. You can use these artificial suns in many ways, from illuminating hidden details to making deep shadows.

Most often you'll want to create shadows. To do this, follow the same principles as for tracking in natural daylight. Keep the track between your eye and the source of light by holding the flashlight on the far side of the track. If it's a direct beam light, hold it at a low angle. If it's a soft beam light such as a Tecna-Lite (better for tracking and easier on the eyes), hold it straight up and down and vary the height instead of the angle. Experiment with the light until it casts long shadows that clearly define the track. Then move it slowly back and forth as you explore the details.

Tracking Kit

When you go out in search of animal tracks and signs, keep all important items in a convenient pack or pouch. One of the best containers is a little belt pack that can also serve to carry essential survival items. For tracking, such a pack should include the following:

1. Field guides
2. Tape measure (10 feet)
3. Flexible ruler (6 inches)
4. Magnifying glass
5. Kite string
6. Popsicle sticks
7. Labels (for twigs, etc.)
8. Cutting pliers (for twigs)
9. 3 × 5 file cards (for drawings)
10. Tweezers (for debris, scat)
11. Scotch tape (for hairs)
12. Vials or film canisters (for hairs, etc.)
13. Plastic bags (for scat, twigs, etc.)
14. Thermometer
15. Small flashlight
16. Compass
17. Map of the area

11
SEARCH TRACKING

As I mentioned previously, one of the most useful ways you can improve your tracking ability is to track people. An even more compelling reason to practice tracking your fellow humans is to save their lives. Every year hundreds of people of all ages become lost or stranded in the wilderness. Some of them wander off trails or become separated from their friends or families. Others become injured when they are out alone and are unable to send for help. Whatever the reasons, many of these people die because they are not found in time.

It has been proven beyond a doubt that tracking can help to prevent some of these tragic deaths. Through the dedicated work of such men as Jack Kearney, Albert Taylor, Joel Hardin, and other members of the U.S. Border Patrol, tracking has gained increased respectability as a search technique in some parts of the country. California in particular reports a high incidence of successful searches as the result of tracking. Even when trackers do not actually find a lost person, they can dramatically narrow the search area and cut crucial hours or days off the search effort by identifying the person's tracks and determining a direction of travel.

In spite of these facts, the awareness of tracking as a useful tool is by no means as widespread as it should be. In most searches, for example, I am called several days to a week or more after the person was first reported missing—only after most other efforts have failed. Thus the tracks have aged and are more difficult to follow, and in many places they have been obliterated by the footprints of other searchers. More important, the lost person has been exposed to the elements for a longer time and is less likely to be found alive. For these reasons, I frequently urge the people who take my classes to consider forming tracker associations, groups that are skilled enough in tracking and survival techniques to coordinate with existing search and rescue organizations and respond quickly to calls for help in their area.

There are many advantages to forming such a group. There is the sense of fellowship that comes from a common effort toward a worthwhile goal. There is also the advantage of meeting regularly with others who enjoy tracking, to compare notes and techniques and to practice your skills. Such groups, while having the primary purpose of helping to find lost people, can also serve as the focal point for a more general study of nature. And not least of all advantages is the satisfaction of service—of having done something worthwhile for others. Though it takes dedication, there is great personal reward in search and rescue work, and no application of tracking is more important.

If you are interested in forming a tracker association, I would make the following suggestions. First, find other interested people and practice your skills to the point where you feel you would be a real help in a search effort. Second, don't wait to offer your services until you find out that a search is in progress. As soon as you feel you are qualified, contact the government official in your area (usually the county sheriff) who is responsible for search and rescue operations, explain your purpose, and ask how you can become one of the agency's regular search groups.

Most likely the official will show some interest, but you will probably have to prove yourself before your offer is accepted. This is as it should be. A wilderness search is no time to discover that you don't know how to use a map and compass, or that you aren't familiar with basic first-aid techniques, or that you can't build a fire, or that you don't have the proper equipment to weather a storm. It will be to your own advantage to meet the agency's standards. The extra time required will not only test your resolve but give you a chance to work out the best ways of cooperating with other groups. It will also give you a chance to pass on some "track awareness" so that other searchers will be more conscious of your methods and needs during a real search.

Obviously I cannot tell you everything there is to know about search and rescue tracking in one chapter. My purpose here is mainly to whet your appetite in the hope that you will go on to learn more about it yourself. (If you are interested in further study, a good introductory book is *Mantracking*, by Roland Robbins, distributed by *Search and Rescue* magazine in Montrose, California.) With this disclaimer, following are some of the more important aspects of search tracking.

The Psychology of Lost People

Tracking a human being is not radically different from tracking any other kind of animal. The same principles apply—it's just that it's much easier. Even under normal circumstances, humans tend to clomp and crash their way through the great outdoors (see "The City Shuffle," page 91). Especially on uneven walking surfaces, most people have great difficulty controlling their feet. They tend to force themselves through and over vegetation rather than moving with their surroundings as most other animals do. Most people, for example, pull loose from a bramble bush instead of backing up and pushing the bramble out of the way. If they encounter a brush-covered trail, they tend to plow right through rather than choosing the path of least resistance.

The Panic Syndrome. Normally, a person walking through a wilderness area causes slightly less disturbance than a bear. A person who is lost and panicky in a wilderness area causes about as much disturbance as an elephant.

Once a person knows he is lost and becomes frightened, tracking suddenly becomes very easy. The person begins to blunder and stumble. He crashes his way through the woods without clearly seeing or interpreting his surroundings. In cases of profound shock, he may become so irrational and despairing that he does not even recognize the way out when he sees it. I once tracked a lost hunter across a four-lane highway only to find him dead fifty feet from the other side of the road. He had a full canteen, a loaded gun, and a pack with all the necessary supplies. He had died of profound shock.

Uphill or Downhill? Whether in a panic or not, most people take the route that is easiest for their muscular and skeletal structure. For children aged one to six, that route is usually uphill; children from seven to twelve tend to traverse a hillside; and those over twelve generally travel downhill unless some other route is obviously easier.

The Attraction of Water. Most people are instinctively attracted to water—partly because of thirst, but also because there is something calming and reassuring about it. Many have also heard that if you walk downstream far enough, you will eventually come out of the woods. When planning the search, check a topographic map for lakes, streams, and other water sources. (Often the landscape naturally "leads" a person to such places.) Another good reason for checking these areas is that they are excellent places to find clear tracks.

A Child's Viewpoint. Children have less tendency to avoid discomfort, so they often hole up in places that an adult might dismiss as too uncomfortable. When tracking a child, don't overlook logs, caves, depressions, overhangs, and thick brush. Also try to look at the landscape from the child's point of view. A six-foot adult may see a blackberry patch as an impenetrable thicket, but to a six-year-old child such a place may be a maze of inviting and protective hollows.

The "Boogeyman Complex." For those who are not overcome by panic, irrational fear can show up in another form. I call it the "boogeyman complex." After the first day, most frightened children do not answer to their names. After the second day, most frightened adults do not respond, either. In some cases, people actually hide from their rescuers, thinking they intend to hurt or capture them. I recall one case in which a hunter who had been lost for four days was convinced the government was trying to kill him. He hid behind a stump, threatening his rescuers with a loaded gun, and it took a lot of talking to get him to come out.

Children are even better at hiding than adults, and they may stay hidden until they are suddenly discovered by their rescuers. If you find such a frightened child, the search may end up in a footrace and a struggle. One of the worst fights I ever had was with a nine-year-old boy who had been lost for two days. He not only outran me for some distance, but

when I finally caught up with him, he unleashed such a flurry of kicks and punches that it was all I could do to restrain him.

As you can see, it's not only important to be able to track, but to be able to care for the immediate physical and psychological needs of the lost person once he or she is found. Sometimes when reassuring words aren't enough, I stuff a candy bar or a Twinkie into a person's mouth. Since lost people are usually ravenous by the time they're found, this is often enough to bring them to their senses. However, in cases of injury or exposure, it may also be critical to have warm liquids and first-aid equipment on hand. These are things you should discuss with your local search and rescue agency.

Interviewing Witnesses

Before you start the search, first gather all the information you can about the lost person and the circumstances surrounding his or her disappearance. To do this, it may be necessary to interview many people and possibly even make some long distance phone calls. But do not neglect this all-important aspect of the search. The time you spend on it may make all the difference in the final outcome.

The way in which you conduct the interview is also important. If there is more than one witness, interview each one separately, as different people sometimes have different stories. Also remember that the witness (possibly a parent, spouse, or close friend) may be very upset. Show concern and compassion. Most important, ask your questions without assuming anything and without leading the witness in any way. If you suggest answers to your own questions, you'll often get the witness to confirm your own false assumptions! Remember that every person has a different point of view, and that every search is rampant with speculation and misinformation. Even so-called "facts" sometimes turn out to be falsehoods. This is all the more reason for you to remain calm, quiet, and objective when gathering information.

Following is a list of important questions:

1. Name
2. Age
3. Sex
4. Height
5. Weight
6. Physical build
7. Hair color, type, and length
8. Clothing
9. Equipment
10. Where and when last seen
11. Activity when last seen
12. State of mind when last seen
13. Outdoor experience
14. State of health (physical and mental)
15. Past injuries

16. Personality traits
17. Hobbies and interests
18. Right- or left-handed
19. Weather conditions since disappearance
20. Footwear

There are specific reasons for each of these questions. Items 1 through 9 will provide a physical description of the lost person and suggest his or her level of preparedness. When dealing with item 8, include colors and kinds of clothing all the way down to the underwear. The same goes for item 9; include all equipment, making special note of food items, wrappers, and scraps that might be dropped or discarded along the trail. (Remember that panicked people often forget or discard important clothing items, too.)

Items 10 through 12 will suggest a logical place to begin the search and possibly indicate a direction of travel. Again, don't lead the witness. Just ask frankly where the person was last seen, what he or she was doing, and how he or she was feeling. If the witness doesn't know, don't try to fill in the information.

Items 13 through 18 will give you clues to the lost person's mental and physical preparedness, as well as some personal tendencies that may suggest what the person would do and where he or she would go. These answers will also provide clues to the person's walking patterns, as any physical or mental disorder will show up in the tracks. As you track, try to imagine you are the lost person. Ask yourself what you would do, given the situation and the surroundings. Pay particular attention to item 18, remembering that left-handed people tend to circle to the left and right-handed people tend to circle to the right. (The reason for this is that most left-handed people take a slightly longer stride with the right foot, while right-handers take a longer stride with the left foot.)

Item 19 will indicate the rate of weathering since the person's disappearance and suggest what kind of track you're looking for. (When you find a good possibility, "age" it by comparing it with a fresh track of your own.) This information will also provide clues to the lost person's activities and state of mind.

Item 20 is one of the most critical of all, since it will give you an accurate picture of the first tangible piece of evidence you're likely to find, namely, the lost person's tracks. Don't ask what kind of boots or shoes the person was wearing; ask for a description of the "footwear." This leaves the possibilities open and does not lead the witness. The person could have been wearing anything from moccasins to moon boots—or might even be barefoot!

When you've established the type, size, and age of the footwear,

Shoe measurements in order of importance

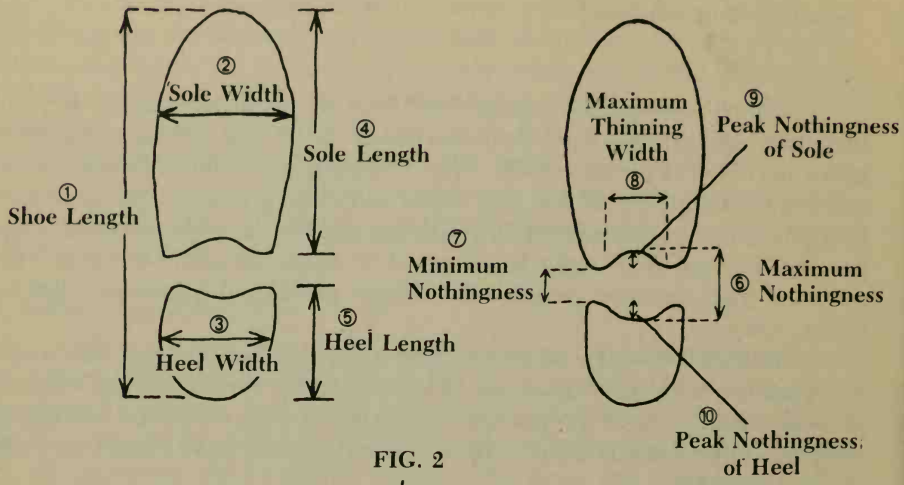


FIG. 1

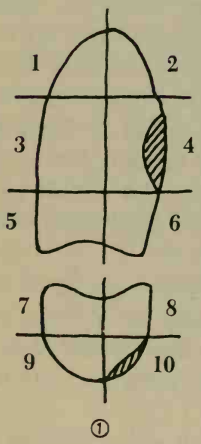


FIG. 2

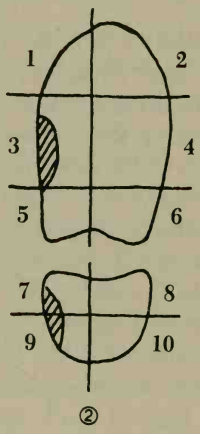
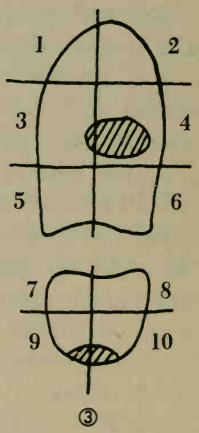
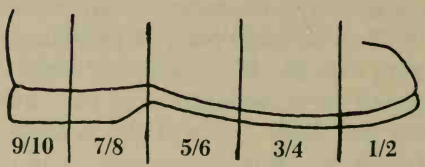


FIG. 3



Wear Patterns



(Using the same quadrant references, also note wear patterns for the edges of shoes and heels.)

try to get a description of the sole pattern. This may be impossible without an actual copy of the shoes. If you cannot get this information locally, have someone call a shoe store (ideally the one where the footwear was bought) and ask for this information over the phone. It can be relayed to tracking teams in the field.

If you're lucky enough to get ahold of an old pair of the lost person's shoes, take accurate measurements and make drawings of the sole and wear patterns, as shown in the illustrations. (If the person was wearing hiking boots and you can only get a pair of tennis shoes, keep in mind that the wear pattern may be quite different.) Measure the shoes by actual size in inches, not by commercial size units, and be sure to describe the wear patterns for both left and right shoes, as they may differ markedly.

Exercise 11-1: Wear Patterns

The wear pattern in Figure 1 can be described most easily by dividing the shoe into quadrants, as shown. The wear pattern in Figure 1 can be described as "section 4—thumbnail pattern on right side, center to lower right corner; section 10—sliver in lower right corner." Describe the patterns in Figures 2 and 3. Then make up other patterns and describe them. Finally, reverse the process, making up descriptions and drawing the patterns. This is good practice for radio communication, when accurate description of tracks and patterns is especially important.

Organizing the Search

The success of a search often hinges on its organization. Though the major aspects of any search are usually decided by the county sheriff, it is up to the tracker association to organize itself well enough to be able to work effectively within the overall plan. To be most effective, each team of trackers should have all the above information (in written form), appropriate topographic maps of the area, and a dependable radio for clear communications with the base leader. (The base leader in turn should maintain ongoing communication with witnesses and pass on further information when appropriate.) Each tracker should have enough equipment to stay out for twenty-four to forty-eight hours in any kind of weather, and each team should carry enough extra equipment (food, warm liquids, clothing, bandages, etc.) to administer first aid to the lost person if he or she is found injured or ill.

Trackers work most effectively in groups of three or four. Groups of two can also be effective, but one tracker alone is seriously handicapped even if accompanied by a navigator and a radio communicator. One person alone is less likely to find a trail, more likely to have difficulty staying with it, and more prone to fatigue from the prolonged concentration and effort required. Moreover, a single person must try to "dead-track" (that is,

move faster than the lost person has traveled) in order to catch up, whereas teams of trackers are able to cross track in front of each other until the person is found.

Initial Strategies

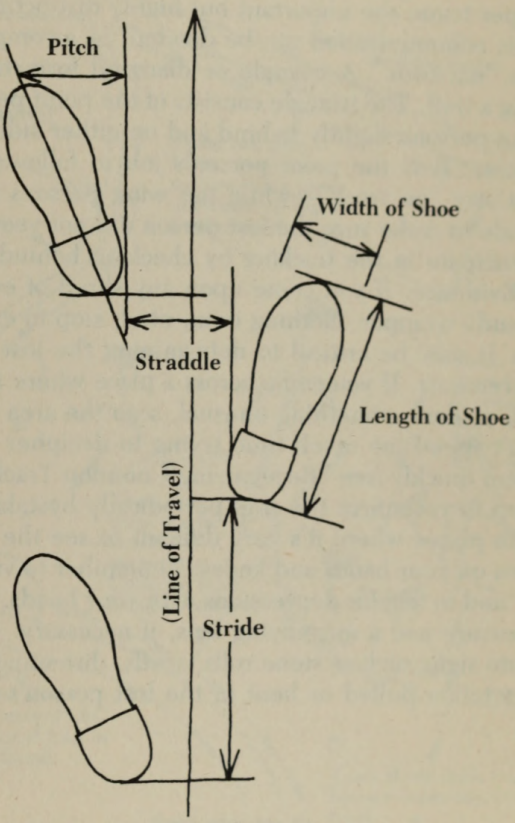
On page 261 is a diagram showing how this cross tracking technique works. The small circle in the center (PLS) indicates the place where the lost person was last seen. Teams begin their search here, checking along roadsides, trails, and other logical places for evidence of the person's tracks. This "perimeter searching" (also called "sign cutting") should be done in such a way that each team either finds a track or eliminates an entire area from further consideration. If a team does a perimeter search all the way around the place last seen, it should theoretically encounter the lost person's tracks before it closes the circle—unless the terrain is too difficult or the tracks have been destroyed by other searchers. In this case, another group can be sent out to track in a wider radius.

Another search method is binary tracking, in which an area is bisected by cross tracking in a relatively straight line of travel. This serves the same function as perimeter searching. If a team can say with certainty that the lost person did not go through that area, the area can be eliminated from the search. If the person's tracks are found, the area can theoretically be bisected again and again until the person is found. Binary tracking is usually done with team members walking side-by-side at right angles to the person's suspected line of travel.

All initial searching should be done with members traveling close enough together for easy voice contact. It should also be done very slowly and systematically, as there is rarely a second chance to find a set of tracks. If the area around the place last seen has already been combed by other searchers, it will be such a maze of confusing tracks that there will be no point in trying to find evidence there. If you encounter such "dead areas," go beyond them to begin the search.

Confirmation. When a possible track is found, it is aged, measured, "weighed," studied, and compared with that of the lost person. Trackers should take some time with this. They should also communicate shoe measurements, sole pattern, and wear pattern clearly to base, as other groups will be relying on the initial description. Once a team has confirmed a track, it reports stride, straddle, pitch, direction of travel, and other evidence. (A human stride is measured from heel to heel rather than from toe to toe.) Then team members mark the track with a bright-colored flag or engineering tape, adjust the markers on their tracking sticks, and begin following the trail. At this point, the base leader sends another team

IMPORTANT MEASUREMENTS FOR TRACK CONFIRMATION



Measure human stride from heel to heel.

out ahead (anywhere from a quarter mile to several miles, depending on the terrain) to intercept the trail by cross tracking (see page 261).

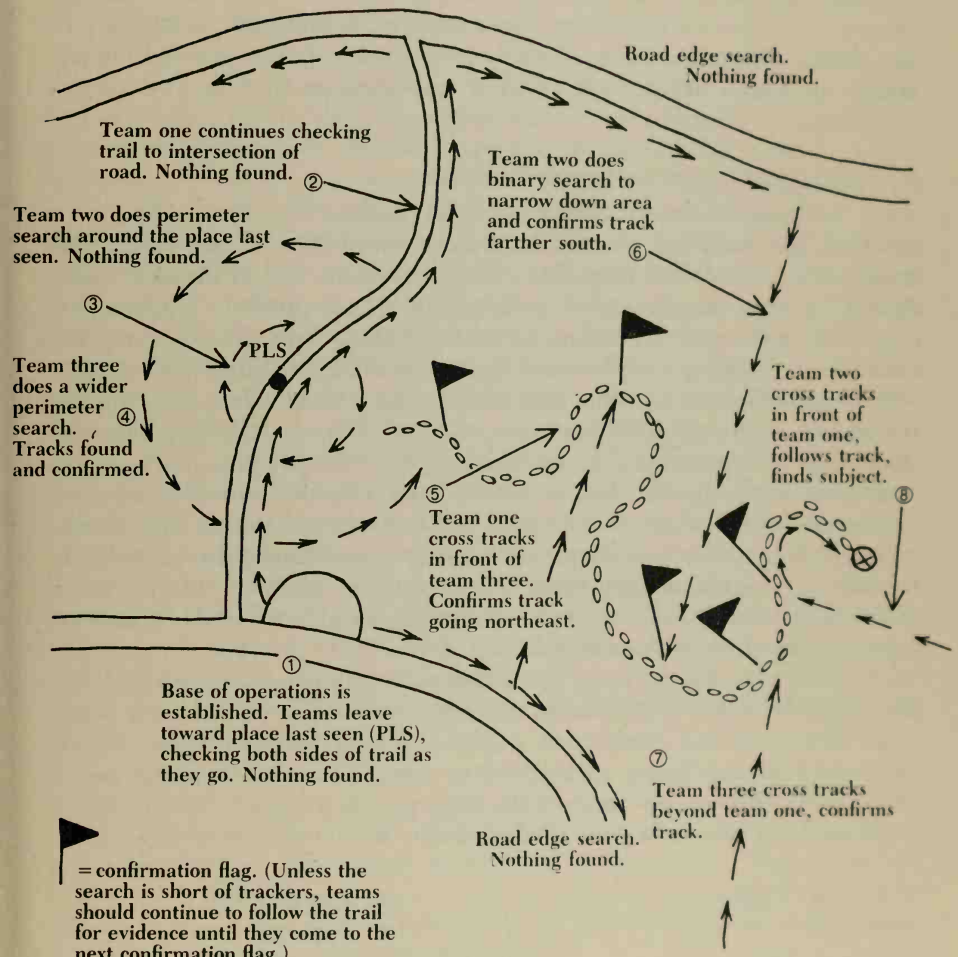
Following the Trail

Ideally, each tracking team should include a "point person," two "wing persons," and a navigator/communicator. If there are only three people per team, the important but highly distracting duties of navigation and radio communication can be divided, or a competent non-tracker can serve as "nav/com." A triangle or diamond formation is usually best for following a trail. The triangle consists of the point person in front, with the two wing persons slightly behind and on either side. The nav/com travels in the rear. It is the point person's job to follow the footprints one by one—to stay "on track"—while the wing persons scan the landscape to either side to make sure the lost person did not veer off. The nav/com can also participate in the tracking by checking behind and to the sides.

Evidence. If you come upon any shred of evidence (hair, shotgun shell, candy wrapper, clothing item, etc.), stop to examine it and report it to base. It may be critical to determining the lost person's whereabouts and movements. If you come across a place where the subject has rested, camped, or done something unusual, scan the area carefully for evidence, but don't spend too much time trying to decipher the tracks if you can't read them quickly (see "Recognizing Common Track Patterns," page 262). Also stop to reconfirm the trail periodically by taking measurements.

In places where it's very difficult to see the trail, don't hesitate to get down on your hands and knees. Remember to vary your vision, to look closely, and to feel for depressions with your hands. Use a tracking stick or tape measure and a magnifying lens, if necessary. Be especially sensitive to minute signs such as stone rolls, scuffs, dirt smudges, twig depressions, and vegetation pulled or bent in the lost person's direction of travel.

HYPOTHETICAL SEARCH



The search varies with the terrain. In general, teams use natural and man-made barriers to box the lost person into a progressively smaller area.

Lost Trail. With three or four sets of eyes on the landscape, a team is much less likely to lose the trail; yet it happens frequently. As soon as the point person loses the trail, he or she should order the others to stop. Rule number one of search tracking is: Don't go beyond the last confirmed track. If you lose the trail, scan the area in front of the last track with a tracking stick or tape measure calibrated to the last known stride. If you cannot find the track even then, cross track by fanning out in a wide circle. (Don't forget to backtrack a few steps before you begin the circle!) When you find a likely track, verify it and continue tracking as before.

Recognizing Common Track Patterns

Although the main object in search tracking is to reach the end of the trail, you're going to miss important information if you follow the tracks without understanding them. For this reason, one of the most valuable skills of the search tracker is the ability to read pressure releases (see page 209) and recognize common track patterns. You should know, for example, that heavy people leave deeper heel depressions, that people with large bellies toe out, that people with heavy backpacks have a shorter stride with relatively light heel pressure and a deep pushoff at the toe, that a heavy object carried in one hand causes a deeper depression in the corresponding footprint, that an outside sprain causes more pressure on the inside of the foot, and vice versa, and that as a person becomes tired, he begins to drag his toes, then heels and toes, and finally the entire foot. In addition, you should be able to recognize tracks made by different parts of the body—hands, elbows, knees, buttocks, head, etc.—and be able to interpret the disturbances they leave.

The only way to learn these things is by experimenting, and the best place to experiment is in an extended tracking box filled with damp sand. There you can study track patterns to your heart's content, filling reams of notebook paper with drawings (see "Extended Tracking Box," page 223). Following are some of the most common human track patterns found in the woods. Use your tracking box to find out what they look like.

1. Walk
2. Fast walk
3. Run
4. Turn around
5. Kneel
6. Limp
7. Stagger
8. Slip and recover
9. Slip and fall
10. Trip and recover
11. Trip and fall
12. Sit down
13. Tired walk
14. Very tired walk
15. Exhausted walk
16. Turn left

17. Turn right
18. Fearful walk
19. Panicked gait
20. Leg injury
21. Rolling

If you have formed a tracker association, I recommend using the extended tracking box for group study at your monthly meetings. After the business part of the meeting, members can retire to the basement or garage to practice reading pressure releases and track patterns. This study is especially useful if one member makes a track pattern while all others are out of the room. Then the others can return and try to decipher the pattern, track by track. Finally, someone can repeat the pattern so that everyone can see how it was made.

Though this kind of study is important for search tracking, even more important is field practice. There is no way a tracker can maintain the necessary level of competence without regular "dirt time." This means doing some tracking every day, holding frequent practices with other group members, and staging periodic "callouts" that simulate a real search. These practices and callouts, if followed by constructive criticism, will not only hone your tracking skills, but iron out organizational problems and make for a much smoother procedure during a real search.

Other important suggestions: Don't just track people in the woods, track them *everywhere*. Notice their shoes, their clothes, their faces. See how they're holding themselves and what they're interested in, and watch how their attitudes and interests are expressed in their feet. Notice the difference between an excited gait, a frustrated gait, an angry gait, a happy gait. Let this kind of observation become a habit. Remember that nothing will improve your search tracking faster than tracking tiny animals—frogs, mice, chipmunks, and even insects. The more time you spend reading these intricate tapestries, the more human tracks will look like those of dinosaurs.

Finally, don't limit your observation to people and animals. Remember that a tracker is first and foremost a good observer of nature. Like Sherlock Holmes, develop an unending curiosity about the world and an insatiable drive to learn more about what makes it tick. The world includes everything from people to plants and cars to alarm clocks. Any place and any moment can be a training and proving ground for the search tracker who is open to the opportunities.

CONCLUSION

It is very difficult to stop writing a book like this. So many things remain unsaid and so much more information begs to be included that it is all I can do to say, "Enough." Suffice it to say, this book represents only a small fraction of the information I would like to pass on about nature observation and tracking. There is not a chapter that could not be doubled in length, and not an animal's history that could not fill many more pages.

On the other hand, I am satisfied with this book in at least one respect. I believe that it presents the most important nature observation and tracking skills: the foundation that is necessary for you to go on and learn as much about nature as you have an inclination to do. With dedication and practice, there is no limit to the excitement, discovery, and mystery you can uncover on your own. This is as it should be, for each person's interaction with the natural world is a unique and creative experience.

I hope by now that you can see why I consider nature observation a fine art, and why I consider tracking an integral part of it. I hope further that you have begun to feel what it's like to combine these skills into a smoothly functioning unit, and that your knowledge and intuition are working together to open up deeper levels of awareness. If so, you have begun to see that nature observation is not only an art, but also a way of being.

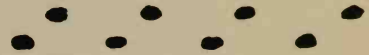
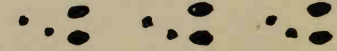
It is my belief that we cannot develop a true connection with nature without being drawn closer to the forces on which our lives depend. Nature's vitality and renewing power are everywhere if we will but slow down and simplify ourselves enough to let it in. Wherever we are, however we live, it is impossible to escape our ties to the earth, for our bodies themselves are part of it.

Wendell Berry, the essayist, once wrote of his native Kentucky, "I had come to be aware of the land as one is aware of one's body. It was present to me whether I thought of it or not." That is the kind of awareness that I hope your nature observation and tracking will lead to—an awareness that is as natural and spontaneous as breathing. I have no doubt that it can, if you let it happen.

In conclusion, I wish you well in your study of nature. As long as you maintain your interest in it, it will bring you much joy and satisfaction. For nature returns every devotion. Through your joy, may you come to feel a deeper connection with the earth, and may your life express more of the wisdom and grace that are necessary to preserve it.

APPENDIX

TRACK CLASSIFICATIONS

Group or Family	Toes Front	Toes Rear	Claws Showing?	Track Shape	Normal Gait	Gait Pattern, etc.
CAT	4	4	No		Diagonal walkers	Direct Register 
DOG	4	4	Yes		Diagonal walkers	Indirect Register 
RABBIT	4	4	Some		Gallopers	
RODENT	4	5	Some		Gallopers/ Pacers	Gallop 
WEASEL	5	5	Some		Bounders/ Pacers	Bound 
RACCOON, OPOSSUM, BEAR	5	5	Yes		Pacers	
DEER	Hoof	Hoof	---		Diagonal walkers	

TRACK COMPARISONS AT A GLANCE*

Animal	Page	Front Length	Front Width	Rear Length	Rear Width	Trail Width	Slow Stride	Running Stride
CAT FAMILY								
House Cat (feral)	137	1½	1½	1⅜	1⅜	3	7	12–40
Bobcat	138	2	1⅞	1⅞	1⅝	5	10–13	15–45
Lynx	139	3¾	3¾	3¾	3½	7	12–14	30–50
Mt. Lion	141	3¼	3½	3	3¼	8	14–17	36–72
DOG FAMILY								
Red Fox	144	2⅜	2	2⅛	2	4½	10–14	18–36
Gray Fox	146	1⅝	1⅜	1½	1¼	3¾	8–12	18–36
Coyote	146	2⅝	2⅛	2⅜	2	5	13–16	16–50
Gray Wolf	149	4¾	4¼	4½	4⅛	7	16–18	25–54
RABBIT FAMILY								
Blacktail Jackrabbit	151	1½	1⅛	2⅝	2	7½	9–12	48–144
Whitetail Jackrabbit	152	1½	1	3½	3	8	10–15	36–108
Snowshoe Hare	152	1½	1⅛	3	2	8	10–12	36–84
Cottontail	153	⅞	⅝	2¾	1⅛	6	7–2	15–36

*All measurements in inches.

TRACK COMPARISONS (Cont.)*

Animal	Page	Front Length	Front Width	Rear Length	Rear Width	Trail Width	Slow Stride	Running Stride
RODENTS								
Meadow Vole	156	3/16	3/16	1/4	1/4	1 1/4	1/2–1 1/2	1 1/2–4
House Mouse	156	1/4	1/4	5/8	3/8	1	2 1/2	4–6
White-footed Mouse	156	1/4	1/4	5/8	3/8	1 1/2	2 1/2	4–6
Norway Rat	157	5/8	3/4	7/8	7/8	3 1/8	2 1/2-5	5–8
Bushytail Woodrat	158	3/4	1/2	1	5/8	2 1/2	4 1/2–7 1/2	7 1/2–10
Chipmunk	159	1/2	1/2	1 1/8	3/4	2	4–7	7–9
Ground Squirrel	160	5/8	3/8	7/8	5/8	2–3 1/4	2–7	7–15
Red Squirrel	161	1/2	3/8	7/8	5/8	4	5–9	9–30
Gray Squirrel	162	2	1 3/8	2 5/8	1 1/4	5	10–15	16–38
Woodchuck, Marmot	163	2 1/8	1 7/8	1 5/8	1 3/8	5	6–8	12–20
Porcupine	164	1 3/4	1 1/4	2 1/4	1 1/2	8	6–10	10–24
Muskrat	165	1	1	2	2	3 1/2	3–6	7–15
Beaver	166	2	2	5	5 1/4	8–11	4–6	7–24

*All measurements in inches.

TRACK COMPARISONS (Cont.)*

Animal	Page	Front Length	Front Width	Rear Length	Rear Width	Trail Width	Slow Stride	Running Stride
WEASEL FAMILY								
Shorttail Weasel	168	¾	⅜	1	½	2¾	7–12	12–16
Longtail Weasel	169	1⅛	½	1½	¾	2¾–3¼	10–13	14–18
Least Weasel	169	⅜	¼	⅝	⅜	1	6–8	8–12
Mink	170	1	1⅜	1⅛	1½	3	9–20	20–30
Marten	171	1¾	1¾	1⅜	1⅝	5–6	6–9	10–23
Fisher	172	3	3	2⅞	2⅝	4–8	12–18	19–30
River Otter	172	2⅝	3	2⅞	3⅛	6	15–18	18–30
Wolverine	173	4½	4½	3½	3⅜	10	16–18	19–36
Spotted Skunk	174	⅞	1	1⅛	1¼	6	4–6	8–12
Striped Skunk	175	⅞	1⅛	1½	1½	7–9	5–8	10–18
Badger	176	2⅛	2	2	2	9–11	9–12	12–24

*All measurements in inches.

TRACK COMPARISONS (Cont.)*

Animal	Page	Front Length	Front Width	Rear Length	Rear Width	Trail Width	Slow Stride	Running Stride
RACCOONS, OPOSSUMS, BEARS								
Raccoon	177	3	3	3¾	3⅜	8–10	12–16	16–28
Opossum	178	1⅞	2	2½	2¼	6	7–10	10–15
Black Bear	179	4½	4	6⅞	3½	14	18	24–60
Grizzly Bear	180	5½	5⅛	9⅞	5⅝	18	18–20	36–72
DEER FAMILY								
Whitetail Deer	181	3	1⅞	2⅝	1½	6	18–21	72–108
Mule Deer	182	3¼	2⅝	3⅛	2½	6	21–24	72–180
Elk	183	4¾	3	4¼	2⅞	8	26–28	72–108
Moose	184	6	3½	5⅝	3½	9–10	30–33	96–120
Mountain Goat	185	3	1⅞	2⅝	1½	6½	15	48–72
Bighorn Sheep	186	3½	2½	3	2	7–8	18–23	72–108

*All measurements in inches.

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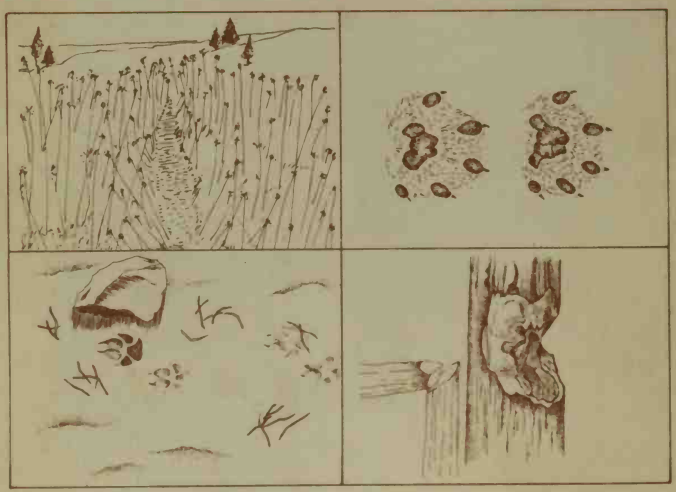

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