

GLENN RANDALL



**OUTWARD
BOUND**

OUTWARD BOUND BACKPACKER'S HANDBOOK



“Without question the best backpacking manual I have ever seen.”

—Jon Krakauer, author of *Into Thin Air*

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OUTWARD BOUND BACKPACKER'S HANDBOOK

Third Edition

GLENN RANDALL

FALCONGUIDES

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ABOUT OUTWARD BOUND

Outward Bound, America's preeminent experiential education organization, has been a pioneer in the field of wilderness experiential learning since it was established in the United States in 1961 and has continued to deliver unparalleled outdoor educational programs ever since. Today Outward Bound provides adventure and learning for teens, adults, veterans, at-risk youth, and professionals, helping them achieve their full potential and inspiring them to serve others.

A Brief History

Outward Bound is based on the educational ideas of Kurt Hahn, an influential German-born educator. Hahn established the school at Schloss Salem in an attempt to combat what he perceived as the deterioration of values in post-World War I Germany. Salem's progressive curriculum focused on character development through physical fitness, skill attainment, self-discipline, and compassionate service. In 1933, thirteen years after establishing Salem, Hahn fled Nazi-ruled Germany to Britain. Soon after his arrival, he set about establishing the Gordonstoun School in Scotland to continue his work under the motto *Plus est en vous* ("There is more in you than you know").

In 1941, in a joint effort with British shipping magnate Sir Lawrence Holt, Hahn founded the first Outward Bound Sea School in Aberdovey, Wales. The name of the school was adopted from the nautical term used when ships leave the safety of the harbor for the open seas: They were said to be "outward bound" for unknown challenges and adventures. The school not only taught sailing skills but also integrated Hahn's core belief that character development was just as important as academic achievement. Hahn's goal was to teach self-reliance, fitness, craftsmanship, and compassion as a way to provide the youth of Great Britain with the benefits of life experience and prepare them to serve their nation in the struggle against Nazi Germany. The program revolved around a series of increasingly rugged challenges designed to develop the self-confidence, fortitude, and leadership skills required to survive harsh physical and mental challenges.

Josh Miner, an American who taught under Hahn at Gordonstoun, was inspired to bring Outward Bound to the United States. Working with a small group of committed supporters, Miner founded the Colorado Outward Bound School in 1961, bringing the principles of hands-on learning and compassionate service through outdoor adventure to America.

Outward Bound Today

Today Outward Bound has expanded to thirty-six countries throughout the world. In the United States the organization has close to one million alumni who stay connected and engaged through Outward Bound's alumni association (outwardboundalumni.org). Central to its mission are the values of inclusion and diversity, evidenced by its scholarship program designed to attract and benefit populations that are typically underserved. Approximately 25 percent of participants receive financial support, and they span ethnic, socioeconomic, and geographic diversity.

In the United States, to advance goals of transforming lives and developing compassionate, purposeful people, Outward Bound now offers its unique blend of adventure-based programs fitted to the needs of:

- Teens and young adults
- At-risk youth
- Adults
- Veterans
- Professionals

Although programs vary broadly in target population, location, and objective, they all contain the elements that Kurt Hahn espoused as central to the development of effective and compassionate citizens: adventure and challenge; learning through experience; integrity and excellence; inclusion and diversity; social and environmental responsibility; leadership and character development; and compassion and service. For participants in any of the varied programs, in any part of the world, these core values provide the foundation for their Outward Bound experience.

The Instructors

Outward Bound instructors are highly trained, qualified educators and outdoor skills specialists. Participant safety is a high priority—foundational to every program. Every course is accompanied by instructors who hold wilderness first-responder-level certifications at the minimum and who have received hundreds of hours of educational, safety, and student- and activity-management training. Staff members are proficient in—and passionate about—the specific wilderness skills of the activity they teach, whether rock climbing, sailing, mountaineering, sea kayaking, canoeing, or whitewater rafting. To help participants along their personal growth paths, instructors are trained in managing groups and individuals.

A vital component of every course is the instructors' ability to not only shepherd participants through individual course challenges but also to help them work as effective leaders and contributing members of the team.

Outward Bound's Lasting Impact

The impact of each expedition extends well beyond the course itself. This impact is different for each individual but can be seen in a variety of ways, including improved school performance, closer relationships with family and friends, and a new commitment to service. When Outward Bound participants return home, they bring with them a new sense of responsibility, an enhanced appreciation of the environment, and a strong service ethic that they share with friends and family. Most important, they bring a newfound belief that "There is more in you than you know" and an inspiration to act on that knowledge. In one participant's words, "What I was lacking I have found; now I have the tools to keep growing and to work hard to accomplish my dreams and to do anything I can to help others accomplish their dreams as well."

INTRODUCTION

Another measureless mountain day in which we are dissolved and absorbed and sent pulsing onward we know not where. Life seems neither long nor short, and we take no more heed to save time or make haste than do the trees and stars. This is true freedom, a good practical sort of immortality.

—John Muir, 1838–1914

Thirteen precious, fleeting backpacking seasons have flown by since I wrote the second edition of *Outward Bound Backpacker's Handbook*. How has backpacking changed? Backpacking clothing and gear have continued to shed weight, which is a good thing. Although I haven't added weight to my waistline, I have put another thirteen years of wear and tear on my knees. Backpacking food is now more nutritious and digestible, if not necessarily more palatable. Energy bars, pastes, chews, and drinks now come in a bewildering variety of consistencies and flavors. Though it's debatable if they actually taste better, I do find I can hike longer and stronger if I'm muscling down some of the new "products." (I hesitate to call some of these new items "food," since it now feels like I'm eating sour gummy bears for lunch.) Although marmots have inhabited the mountains far longer than backpackers, in the past decade they seem to have become the scourge of backpacking equipment, with an infuriating propensity to chew on anything that smells new or emits a chemical odor, such as the rubber-clad antenna on my brand-new, state-of-the-art GPS receiver. Convertible pants with zip-off pant legs, scorned in the 1990s as a fashion-challenged invention of the 1960s, are back—and for good reason. The electronic gadgets some backpackers love to carry have proliferated. You can now carry a smart phone with apps that log your trip, geotag your photos, help you locate constellations, and communicate with an emergency locator beacon that can send an SOS call via satellite virtually anywhere in the world. Tents, boots, packs, stoves, and sleeping bags have continued to evolve. All told, there are ample reasons for a third edition of this book.

The heart of backpacking, however, goes far beyond the acquisition and mastery of gadgets. As I enter late middle age, time seems to flow by at an ever-accelerating pace. Now more than ever, backpacking provides rich opportunities to slow down, to live in the present, and even to experience moments so beautiful that time seems to stop. For a timeless interval that cannot be measured in seconds or minutes, I'm no longer conscious of my aching feet or hungry belly or the mosquito buzzing around my ears. Instead, I am wholly absorbed in the sheer magnificence of our planet.

Even today backpacking remains an antidote to industrialized society, where the list of tasks that must be accomplished seems to multiply exponentially, yet the days never grow longer. Every day, newspapers recite an endless dirge of war, poverty, oppression, and environmental disaster. Backpacking provides an escape, temporarily, from life's complex and seemingly insolvable problems. In their stead, backpackers need only deal with a far more manageable set of concerns, each elemental in its simplicity: finding the easiest route, summoning the energy to walk that last mile, selecting a good campsite. Backpacking offers an abundance of life's most repeatable pleasures, the ones that never grow stale: resting when you're tired, eating when you're hungry, drinking when you're thirsty, and smashing a mosquito just before it bites.

To those basic pleasures I would add two more, less connected with survival of the body than with survival of the spirit. The first is the quest for adventure. From one perspective, struggling mightily to reach a pass or the summit of a lofty mountain is absurd, possibly even mildly deranged, and yet, as the bumper sticker says, "If I wasn't nuts, I'd go insane." Sol Roy Rosenthal, MD, has spent many years studying what he calls the "risk-exercise response," a powerful feeling of euphoria that follows participation in an adventurous sport. Rosenthal is quick to point out that he's not talking about life-threatening endeavors, but rather sports like skiing that contain an element of challenge, that cause participants to push themselves in some way, that provide some sense of venturing into the unknown. According to Rosenthal, the risk-exercise response goes beyond simply feeling good. Risk takers talk of living up to their potential, of feeling fulfilled and yet expecting more from their lives. For me, many of the hours I have spent hiking, climbing, and skiing in the wilderness stand out like lighthouse beacons in the night as I look back over the vast sea of undistinguished days that make up the bulk of my suburban existence.

When I was thirteen, my father and I hiked up Strawberry Peak, one of the smaller peaks in the ring of mountains that almost encircles Los Angeles. As we were coming down, we crossed a creek. We knew that the trail led away from the creek for a ways, avoiding the deep canyon into which the creek disappeared, then crossed the creek again a mile or so farther down as the canyon walls diminished in height. To my boyish mind the obvious proposition was irresistible: Why not follow the creek through its dark and mysterious gorge? My father agreed, and we plunged in. All too soon we discovered why the trail led around the canyon. The creek plunged over a 10-foot cliff, creating a lovely waterfall and a formidable obstacle to further progress. For a time we contemplated retracing our steps, but the day was old and our legs had lost their spring. I spied a line of footholds and handholds tracing a possible route around the falls and began inching down, no

doubt worrying my father tremendously. When I succeeded, he had to follow—which probably worried him even more. Overjoyed at our success, but wondering if a larger, impassable waterfall lay just around the corner, we hurried around the next bend and discovered a marvelous limpid pool carved into the stone and filled to the brim by a bubbling cascade. I said to my father, “That’s so perfect it looks man-made.” He replied, in words that have stuck with me for more than forty years, “That’s the kind of perfection man strives to imitate.”

Though more than four decades have elapsed since that simple hike, the excitement of our little adventure and the small but stunning vision of beauty it offered are still the twin keys to my lifelong fascination with wilderness. There are no blank spots on the map anymore, no places marked “terra incognita,” but there are still thousands of blank spots in my experience, thousands of peaks to climb and canyons to explore, thousands of wilderness vistas to feast upon with awestruck eyes. For me no painting, sculpture, or photograph; no city, monument, or building—nothing man-made—has ever compared to the beauty of nature at its grandest. Wilderness is so inspirational for me that in 1993 I began spending more and more time making wilderness landscape photographs, primarily in Colorado. Eventually I became a full-time wilderness landscape photographer. Ever since then I have been privileged to spend about fifty days a year, in all seasons, hiking and backpacking in the most remote and spectacular regions of one of the most beautiful states in the nation. Much of the advice in this book on recent advances in backpacking gear and technique has been gleaned from that ongoing experience.

Backpackers don’t set the twenty-first century aside when they hoist their loads and head into the wilderness. Backpackers don’t live off the land in any significant sense. If every backpacker cut his own bough bed, felled saplings to build a lean-to, and speared a porcupine for supper, the woods would become a wasteland in short order. In fact, far from spurning technology, backpackers frequently embrace it. The backpacking boom that began in the early 1970s was spurred on significantly by the application of sophisticated technology to the task of creating clothing, tents, stoves, and packs that could reasonably be carried on a bowed but unbroken human back. Necessarily, however, the use of technology is limited by backpacking’s iron law: If you want it with you, you have to carry it (unless, of course, you can bribe your companion). Some backpackers—perhaps all of them at one time or another—become fascinated by the equipment game, minutely comparing the merits of one stove against another, one rain jacket against a second and third. Choosing gear that allows you to balance convenience, comfort, and utility with weight and bulk is an amusing sport but one that ultimately misses the point. The

never truly exists to make it possible to explore the wilderness. It is this experience that ultimately gives backpacking its value.

Although much of this book will be devoted to discussing advances in equipment, the soul of this book remains unchanged: the effort to instill a reverence for the wilderness that will cause low-impact hiking and camping practices to become second nature. These techniques have changed little since the first edition, but the need to apply them thoughtfully and consistently grows more urgent every year. Living simply in the woods is good practice for living in civilization. If we can learn to see the wilderness for what it is—a precious, irreplaceable, fragile treasure—then perhaps we can learn to see the whole world in the same light, and so save ourselves from the threat of ecological catastrophe.



That man is richest whose pleasures are the cheapest.

Henry David Thoreau, 1817-1852

If you walk into a specialty outdoor shop and start picking top-of-the-line gear as your first step toward going backpacking, you'll probably learn, dead away and never set foot off pavement. Fortunately, there's no need to empty your bank account. Before you can start to enjoy the wilderness, for short day trips in the summer, you've probably got almost all the gear you need lying around the house. Sneakers are fine for your first outing and for many more besides. Throw a wool sweater, a rain jacket, a water bottle, and some snacks into any old kind of back pack or day pack, and head out.

As you extend your range, you'll probably want some other items. More supportive, protective, and water-proof footwear will probably be one of your first purchases, and perhaps a more comfortable and comfortable pack. You'll surely want a map of the area and a compass, if only so you can orient the map so it's facing north and so directions on the map correspond to directions on the ground.

When you really get rolling, you'll probably get the itch to start investing in some of that lightweight, high-tech gear whose prices initially made you gag. As you'll soon discover, it costs about \$100 a pound to lighten your pack. Don't jump in headfirst, however, and end up buying gear that either doesn't work well or isn't exactly what you need. That's doubly expensive, because you'll probably keep hankering for the right gear until you finally cave in and buy it. You can learn about gear you're interested in by reading customer reviews on the websites of major outdoor-equipment retailers and by talking to more experienced backpackers.

Once you've got some trail miles behind you, it's time to start thinking about your first overnight trip. Some outdoor shops have rental programs that offer overnight-size packs, tents, sleeping bags, and stoves. More experienced hikers may be willing to lend you some gear for your first outing or two. You shouldn't have to make a big investment to try the sport for the first time.

Going Light

The quickest way to ruin your first trip is to overload your pack with too much stuff. Then pick some ambitious itinerary resulting you to hike 30 miles and gain 5,000 feet of elevation every day. Backpacking may sound similar to bank-breaking, but

it shouldn't be synonymous with it. It's one of Murphy's Laws that packs invariably grow heavier as the day progresses. Backpackers loudly lament this fact, of course, and issue increasingly inflated estimates of the weight of their load. The longer the day, the bigger the pack of lies.

The key to enjoying backpacking, therefore, is to pare the load as much as possible. In the beginning, aim for no more than 25 percent of your body weight including food and water; less is always better. Even highly fit, experienced backpackers on long trips should keep their starting load at less than 50 percent of their body weight. Ultralight backpackers can go out for two or three days carrying only 15 or 20 percent of their body weight. Get in the habit of weighing gear on a postage or bathroom scale and knowing approximately how much all your gadgets and gizmos weigh. Learn what different pack weights feel like and what you can reasonably carry in different types of terrain. A weight that can be carried easily on well-groomed trails can be as cantankerous as a cross-eyed mule if you're climbing, scrambling, bushwhacking, or on skis. "Take half of it and go for it" is the half-joking philosophy of mountaineering that is equally applicable to backpacking. With experience you'll probably find that you can do without many of the items you considered essential at first. Once you've learned to leave behind all unnecessary gizmos, you'll have graduated from pack rat to pack mule.

Eventually, if the sport really grabs you, you'll want to invest in your own gear instead of renting and borrowing. My philosophy on buying equipment was defined as a boy, when my dad told me to always buy good tools. "If you buy a lousy one," he said, "you'll curse it forever, but you'll never want to spend the money to buy a good one because you'll already have one that's barely adequate." I try to define my needs carefully, buy the best I can afford, then take care of it meticulously and make it last. The cost of good gear, per year of use, is probably no higher than the cost of buying cheap gear and throwing it away when it breaks or falls apart after a year or two of service. When you factor in the satisfaction of using top-quality equipment, the investment begins to seem like a bargain.

The best place to find high-quality backpacking gear is undoubtedly at a specialty shop. Not only will the shop carry a good selection of the best gear, but the salespeople are likely to be knowledgeable about its strengths and weaknesses. Most specialty shops hire people who actively participate in a wide range of outdoor sports. They can often provide valuable suggestions on what will work best for your intended purpose as well as good places to go to use it. If there is no specialty shop in your area, consider shopping online at one of the big outfits like REI, Eastern Mountain Sports, or Campmor, which stock all the major

brands. If you can, avoid the camping-supply sections of the discount chains like Walmart and Target. The gear there may be cheap, but it will also be heavy, bulky, and probably ineffective.

Good gear, meaning lightweight, durable, effective gear, is undeniably expensive. Console yourself with the thought that once you've made the purchase, you can vacation at will while hardly spending more than you would if you stayed home and commuted to work every day.



If any normal person under fifty cannot enjoy being in a storm in the wild, he ought to reform at once.

—Evas Mink, 1870-1922

In July many years ago, my wife, Cora, and I were hiking in the popular Indian Peaks Wilderness near Denver when a powerful thunderstorm rolled in over Arapaho Pass. A hard rain began, which quickly congealed into stinging hail. Cora and I dove into our packs and pulled out the “train suits” — pants and jacket — that we carry on all but the shortest hikes, even at the height of summer. Now comfortably shielded from the storm’s fury, we continued our hike, enjoying the wild peals of thunder and the staccato lightning bolts glimpsed through the trees.

Suddenly a couple of their early thirties appeared around a bend, heading for the parking lot a mile away as fast as they could run in their get-ups. Their cotton shorts and T-shirts were already soaked through by the 30°F rain and the tiny hail. The man carried a baby in a frontpack, shielding it as best he could with the only piece of protective clothing they’d brought, a nylon windbreaker that was certainly not waterproof. We knew they would probably come out all right no longer a matter of them spraining an ankle on the slippery muddy trail, but we both shook our heads at the unnecessary misery as we stood aside to let them pass.

While that incident was an extreme case, it was not the first time, nor the last, that I’ve seen poorly prepared summer hikers blown like chaff before the wrath of a Rocky Mountain thunderstorm. When you leave the city on an 80°F summer morning, it’s easy to forget that in the mountains it may be raining and near freezing by 3 p.m.

Summer Clothing

Here’s a quick list of the clothing I normally carry for summer day hikes and backpacking in the Rockies:

- woven nylon short-sleeve shirt
- nylon pants with zip-off legs that can convert to shorts
- woven polyester nylon long-sleeve shirt
- sun hat
- hooded polyester fleece jacket

- ultralight down sweater
- fleece hat
- light gloves
- rain jacket and pants

If I'll be shooting sunrise from the summit of a Fourteener (a passion of mine), I throw in a pair of long johns to wear under my convertible pants. In the warm, humid climate of the central and southern Appalachians in summer and in the desert Southwest from May through September, you certainly won't need this much clothing. In the northern Appalachians, the Rockies, the Pacific Northwest, and the Sierras, however, the amount I carry is probably about right for most people.

That lengthy clothing list leads immediately to another of Murphy's Laws of backpacking: In good weather the packs carried by well-prepared hikers will always seem ridiculously large and heavy because they are crammed with all the foul-weather gear that may be needed in a few short hours.

Let's take the first few items on that list and fill in some details.

Although I wear a lot of cotton in the city, the **short-sleeve shirt** I wear when backpacking is 100 percent nylon. Cotton provides the illusion of comfort on a hot day by soaking up sweat when you're working hard. As I explain in more detail below, however, that wet cotton will chill you thoroughly when you climb up above timberline into a stiff breeze. The only solution is to remove the wet cotton T-shirt, stuff it in your pack, and put on something dry. Pull that wet T-shirt back out of your pack hours or days later, and it'll still be soaking wet and uncomfortable, not to mention fragrant. A synthetic short-sleeve shirt, by contrast, dries fast, so I can wear it constantly; I don't need to remove it and store it wet in my pack when the weather gets chilly. I prefer tightly woven shirts over knitted ones because a good woven fabric is impenetrable by all but the most voracious mosquitoes. Woven shirts are usually offered in a buttoned style with a collar and pockets. Woven shirts are less breathable than knitted shirts, however, so you may prefer a knitted shirt on a bug-free desert trip.

Despite all my warnings about being prepared for the worst, **shorts** certainly have their place in the mountains. I'm sure I've worn shorts for at least 75 percent of the summer miles I've ever hiked. A dilemma arises, however, when the temperature drops and the wind begins to blow. You could carry a separate pair of long pants and change into those, but that requires you to take off your boots and find shelter from ogling eyes. You could pull off the shorts, pull on long johns, and put the shorts back on top, but this has the same disadvantages as carrying a separate pair of long pants, along with the further disadvantage that mosquitoes

can easily bite through most long johns. You could wear skin-tight stretch shorts like those bike racers wear (minus the chamois in the crotch) and pull your long johns right over the top, but you still have to take off your boots. Stretch shorts have another drawback: Mosquitoes easily penetrate the tightly stretched fabric and, as I can testify from personal experience, putting repellent directly on the fabric can dissolve the elastic, ruining the shorts.

Convertible pants, on the other hand, solve the dilemma beautifully. The zip-off pant legs weigh only a few ounces and take up negligible room in your pack, yet they provide near-instant protection from bugs and chilly breezes. The best models have long separating side zippers in the pant legs in addition to the zippers that allow the legs to detach, so you can remove or attach your pant legs without dirtying the inside of the legs with your muddy boots. Although once deemed to be a fashion faux pas, convertible pants are now ubiquitous on the trail and are even finding their way into casual wear in the city. My current pair is made of a tough, lightweight, fast-drying woven nylon that is completely mosquito-proof and holds up well when I'm bushwhacking and scrambling.

Take care if you wear shorts with belt loops while carrying a heavy pack. The belt loops' bulky seams can chafe your hips and the small of your back. A leather belt can be an even worse offender. Wear a soft nylon webbing belt, or choose convertible pants that don't need a belt to prevent them from becoming ankle hobbles. I like to tuck my shirt inside my waistband to provide a little padding and protection against abrasion.

My **long-sleeve shirt** utilizes a button-down style with a couple of handy chest pockets, one secured with a hook-and-loop closure, the other with a zipper. It came from the factory impregnated with permethrin, a synthetic version of a natural insect repellent, to further discourage mosquitoes. Several companies now offer sun hats and pants that have received similar treatments.

Why carry both a short-sleeve and a long-sleeve shirt? Why not just wear the long-sleeve shirt and roll up the sleeves when it gets warm? The answer, for me, is that a short-sleeve shirt is significantly cooler than a long-sleeve shirt with the sleeves rolled up—enough cooler that I carry both.

The **sun hat** I like is a baseball cap with a skirt that hangs down to my collar. The skirt keeps both sun and mosquitoes off my neck. If you don't want to buy one, you can fashion one yourself with a baseball cap, an old handkerchief or bandanna, and some safety pins. When I'm feeling handsome and debonair, I think that wearing such a hat makes me look like a dashing member of the French Foreign Legion; when I'm in a mood to laugh at myself, I think it makes me look like the flying nun.

Fabrics for Backpacking Clothing

So far I've talked about garments designed as protection from stares, sun, and blood-sucking insects. Before I discuss the next items in my backcountry wardrobe, which are primarily designed to provide warmth, I need to digress for a moment and talk about insulation and backcountry fabrics.

Insulation in clothing is actually provided mostly by the air trapped in between the fibers of the garment, not by the fibers themselves. Air conducts heat far more slowly than clothing fibers, which differ little among themselves in terms of their heat conductivity. Air's low heat conductivity makes the preservation of tiny air pockets critically important in an insulating garment.

No matter how well your garment traps air, its ability to insulate will still deteriorate if it gets wet, whether from rain or from perspiration. To quote equipment innovator and in-the-buff nature enthusiast Jack Stephenson, "Nothing is warm when wet but a hot tub." Evaporation of water from your skin extracts an enormous amount of heat. In addition, wet skin is just plain uncomfortable. Manufacturers of insulating garments have responded to this problem by devoting a great deal of energy to creating (and hyping) fabrics that are supposed to wick moisture away from your skin, leaving it drier and more comfortable. At least in theory, wicking should also reduce the rate at which you become chilled from evaporative cooling because the water will evaporate from the surface of the garment, well away from your skin, instead of directly from your skin itself.

Cotton is the worst cold-weather material. By its nature, cotton is a highly absorbent fiber that loses all its resiliency and springiness when it gets wet. That lack of wet-weather backbone causes all the tiny air pockets that really provide your insulation to collapse and disappear. To make matters worse, water conducts heat about twenty times faster than dry air, ten times faster than dry cotton. If your cotton T-shirt or sweatshirt gets wet, you've got the worst of both worlds: no air pockets to provide insulation and a dense mat of saturated, highly conductive fibers clinging to your skin and conducting heat like crazy. Water evaporates directly off your skin, increasing your frigid misery. To add a final insult, cotton clings tenaciously to the water it absorbs, so it dries on a geologic time scale. Cotton does still have one last place in my summer clothing ensemble. I wear cotton briefs because I get much less itchy after three or four days in the backcountry wearing them than I do wearing synthetic briefs. Since I always carry rain pants, my briefs almost never get wet, and since briefs are very compact, I can carry a spare pair. And although it's not strictly clothing, I do carry a cotton bandana to dry my glasses after a rain.

Wool shares cotton's bad habit of sucking up water like a sponge, but it has one redeeming feature that made it the fiber of choice before synthetics: It retains

its resiliency when wet. That means it retains its ability to trap tiny air pockets and won't collapse against your skin like cotton. The problem with wool is that it dries just as slowly as cotton. If the sheep from which it came happened to have a particularly dyspeptic disposition, it also makes my skin itch and even break out in a rash. On the plus side, if economy is your main criterion, you can probably pick up military surplus woollies for a song. Just be aware that you may be singing the blues if they get wet the first day, because they'll probably stay wet for the rest of the trip.

Synthetics offer three significant advantages compared to cotton: They retain their resiliency and insulating capacity when wet; they absorb very little water, so they dry fast; and they're more abrasion-resistant than cotton, so they last longer. Polypropylene was the first synthetic to be widely used in outdoor clothing, but it quickly came under fire for its rather harsh, plastic feel, its penchant for shrinking into doll clothes if thrown into the clothes dryer, and its tendency to lovingly embrace body odors and refuse to let them go, even under threat of repeated washings in paint thinner. Polyester seems to be the material of choice now for long underwear and for the large and varied assortment of thick, heavily napped fabrics loosely called pile or fleece. Polyester can be knitted into lightweight, wonderfully soft, and comfortable styles for long underwear and bulkier forms for sweaters and jackets. It doesn't cling to odors as much as polypropylene and bears up well under normal washing and drying procedures. Nylon, while ubiquitous as the shell fabric in rain gear and insulated parkas because of its great strength and abrasion resistance, is rarely used to provide the insulation itself.

Layering

Let's return now to my clothing list for backcountry adventures in summer and continue with the insulating garments. As you begin selecting these garments, think in terms of layers, a concept for which we are indebted to the late Benjamin Thompson, a.k.a. Count Rumford. Rumford, to quote one biographer, was an "unprincipled opportunist, a ruthless self-promoter, and overbearingly arrogant." He was also, history tells us, the discoverer in the 1780s that the insulating property of clothing comes primarily from trapped air. From this he concluded that several thin layers of clothing were warmer than one thick one because they trapped air in between the layers as well as within the layers themselves. Carrying several thin layers, rather than one thick layer, has an additional advantage: It gives you the flexibility to fine-tune the amount of clothing you're wearing to exactly match your heat output and the current temperature. If you bring just a heavy parka and a short-sleeve shirt, for example, you might have the same total amount of insulation

available to you as if you brought a short-sleeve shirt, a midweight underwear top, a fleece sweater, and a wind shell, but in a very inconvenient form. With no ability to have just a medium amount of insulation, you'll probably be too hot wearing the parka or too cold wearing just the short-sleeve shirt.

The first fleece garment I put on top of my long-sleeve shirt always has a hood. The hood insulates my neck, which is well supplied with blood vessels that run near the surface. These vessels, with their cargo of warm blood, provide a large escape hatch for heat. In cold weather it pays to insulate them well. Hooded fleece garments weren't always available. For my second Alaskan expedition, in 1980, my climbing partners and I sewed thin fleece balaclavas onto long john tops, then added a neck zipper. I was so sold on the concept after that expedition that I tried to persuade Yvon Chouinard, founder of Patagonia, one of the most innovative outdoor clothing companies, to offer hooded fleece sweaters through his company. He responded, "Go buy a cotton sweatshirt at Kmart. Hooded fleece pieces won't sell."

Yvon eventually changed his mind. Patagonia, along with many other specialty outdoor companies, now produces excellent hooded garments. Year-round I never go into the backcountry without one. I also bring a warm fleece hat. That gives me three options for insulating my head and neck: the hood by itself, the hat by itself, or the hood and hat together. Simply by varying the amount of insulation on my head and neck, I can hike comfortably in a wide variety of temperatures and wind speeds without ever stopping to remove or replace an entire layer.

Fleece today comes in many varieties, including fabrics made largely from recycled soda bottles. Fortunately, the performance in terms of drying speed and resiliency when wet doesn't vary much. Warmth does vary with thickness. After deciding on what thickness you need, choose your fleece jacket based on fit and overall attractiveness. Look for a full-length front zipper that lets you ventilate easily. Hand-warmer pockets are welcome on cool mornings, and a zippered chest pocket or two are handy for keeping small valuables accessible while wearing a pack. If you're really cold-blooded, like Cora, you should consider adding fleece pants to your summer layering system. Look for a pair that has full-length zippers along the outside of the pant legs. Better yet, look for a pair with side zippers that separate at the top next to the waistband, so in the wintertime you can put them on without taking off your skis or snowshoes.

Insulated Sweaters and Jackets

The final insulating layer in my summer clothing ensemble used to be a second fleece jacket. Recently, however, a number of companies have begun producing ultralight

down sweaters that provide as much insulation as a fleece jacket, yet weigh as much as a pound less and pack into a tiny stuff sack that would barely accommodate a fleece jacket's sleeves. Down sweaters are great for lounging around camp on cool mornings and evenings on a summer backpacking trip. Summer temperatures are warm enough that I never need to wear a down sweater while hiking. In winter I still carry a second fleece sweater because it's cold enough that I sometimes need to wear both sweaters while snowshoeing. The fleece sweater retains its insulating value under the compression of the pack straps and back panel, while the down sweater would collapse into two sheets of nylon.

Down is not the only filling available in ultralight insulated garments; some of these insulated sweaters use a synthetic filling. Since you'll face the same choice in an even more important context when you buy a sleeping bag, I'll hit the subject lightly here and go into more depth in the sleeping bag discussion in chapter 6.

For years chemists have sought a synthetic equivalent to down, the innermost plumage of ducks and geese. So far nothing they have produced can equal high-quality down on the basis of insulating capacity for a given weight. Good down is also more compressible than the best synthetics, which saves room in your pack. While down costs more than synthetics initially, it retains its loft longer, so the cost per year is usually less if you take good care of the shell fabric. On the negative side, down, like cotton, loses all its resiliency when it gets wet. A wet down jacket is as worthless as a pack of used bubble gum, and it's likely to remain worthless until you get a day of brilliant sunshine or drop a lot of quarters in the nearest Doozy Duds clothes dryer. Synthetic insulators retain their loft when wet and dry much faster.

My preference in parka insulation, summer or winter, has been honed by my experiences in the wintertime Rockies and in the high, glaciated mountains of the Alaska Range. For those climates, which are very cold and relatively dry, I prefer down, particularly if protected by a water-resistant shell. In the wetter climate of the Northwest and Northeast and in coastal Alaska and Canada, a synthetic-filled parka is probably a better bet.

Rain Gear

The outermost layer in your summer clothing arsenal should always be some solidly built rain gear. I am still dumbfounded at the number of times I've seen people with a cotton sweatshirt tied around their waist blithely heading upward above timberline as a vicious squall gathers strength and begins bearing down on its clueless victims.

The least expensive rain gear is a plastic poncho, a large square of vinyl with a hole in the middle capped with a hood. Unfortunately, ponchos are only useful

in brief, gentle rains not accompanied by wind—a description that doesn't fit the typical high-mountain thunderstorm. In a real thunderstorm a poncho's loose, floppy fabric is guaranteed to billow up around your face with the first gust, leaving you blinded and stumbling while the wind-driven horizontal rain soaks everything below your shoulders. Don't waste your money on a glorified tablecloth, no matter how cheap it seems; you'll want something better almost immediately.

The next step above a poncho is a rain jacket made of nonbreathable, urethane-coated nylon. Such garments are waterproof if the seams are sealed and the coating hasn't worn away under the abrasion of your pack straps, but they allow sweat to escape only at the cuffs, neck, and waist, not through the fabric itself. If you wear such nonbreathable rain gear while you're inactive (fishing, swearing at fishing, swearing off fishing forever, etc.), then it performs adequately. If you're active, however (storming back to camp after snagging five flies on the same underwater log), it's difficult to prevent sweat from building up inside your rain gear and soaking your insulating layers. When hiking hard in nonbreathable rain gear, you face two ugly options: Get soaked by sweat, or remove your rain gear and get soaked by rain.

This eternal dilemma has spurred the development of dozens of fabrics that claim to be both waterproof and breathable. The first was Gore-Tex. By all reasonable standards, Gore-Tex is indeed impenetrable by liquid water; by most reasonable standards, in most situations Gore-Tex does indeed breathe, allowing moisture in the form of water vapor to escape from your sweaty body. This miracle is achieved by the construction of a two-layer composite. One layer is made of expanded polytetrafluoroethylene, PTFE for short, better known as Teflon. This material is laced with nine billion pores per square inch. These pores are larger than the water molecules found in water vapor, but smaller than a droplet of liquid water. First-generation Gore-Tex contained only this layer, but hikers soon found that if the fabric became contaminated by skin oils or mosquito repellent, water could begin wicking through the pores and the fabric could start to leak. Second-generation Gore-Tex solved the problem by coating the microporous layer with an oleophobic (oil-hating), nonporous polyurethane layer that absorbs water molecules on the warm, humid side of the material next to your body, and discharges those molecules on the drier, cooler side away from your body. The Gore-Tex membrane "breathes" when the temperature and humidity on the inside of the fabric next to your body are greater than the temperature and humidity on the outside of the fabric. In most situations where you want to be wearing rain gear and other shell clothing, such conditions prevail.

The current version of Gore-Tex certainly works well, but it's very expensive. Other manufacturers have tried to capitalize on the consumer demand for

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