WHY COTTON KILLS

by David Oliver #2360 W1040
Board Member & SAR Committee Chair

It was late afternoon in the Catskills. The light had gone flat, and the cold was settling fast. Near the trailhead, a group of hikers clustered around a woman sitting on a log. She looked pale, her movements sluggish, her hands trembling uncontrollably. Someone nearby mentioned that her clothes were cotton. I was not one of the people helping her. I was just there, close enough to see how quickly comfort had turned into danger. She survived, but the image of her sitting there on level ground stayed with me ever since.

Throughout the day, the temperature had dropped. It started in the low 40s and slid toward freezing, with sleet coming in that fine, invisible way that finds every opening in your clothing. That is what the Catskills do. They change fast. And if your layers cannot keep up, the mountains will steal your warmth before you even realize what is happening.

I have trained myself to learn from moments like that. In wrestling, I was taught the opposite of what most people believe. My coaches, who were legends in their own right, built their incredible careers on a simple rule: *study everything, especially what went wrong.*

They believed that improvement came from looking directly at mistakes, both yours and everyone else's. That mindset stuck with me.

When I hike, I bring the same discipline. I pay attention to what happens around me, both good and bad, because that is how you stay ready. The problem today is that too many people only focus on the positive, and that obsession with comfort is exactly what leads to the negative outcome, especially when it comes to clothing.

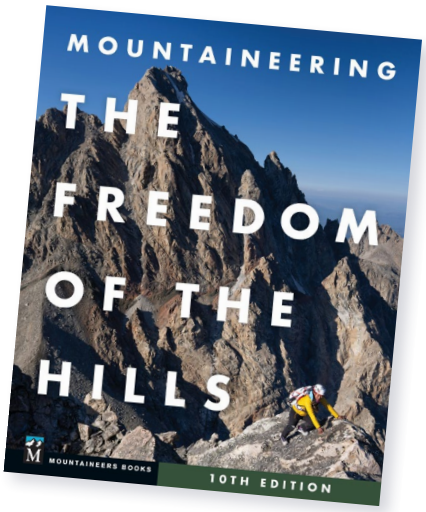
Years before that day, I had made a similar mistake myself. It was a fall climb on Big Indian and Fir. I wore a heavy flannel, thinking it would hold up better against the brush. Underneath was a thin cotton base layer.

At first, it felt fine. I warmed up on the climb and started to sweat. Then the snow came. The flannel got soaked through from both sides, sweat on the inside, wet flakes on the outside. When I stopped to rest, the heat left my body. Within minutes, my hands were clumsy, and my back felt like ice. I was not in real danger because I was with a group, but I remember how fast it happened. The shock stayed with me and came rushing back when I saw the woman near the trailhead. It made me want to understand why a simple choice of fabric could turn warmth into cold.

A Short History of the Phrase

The phrase *"cotton kills"* emerged from mountaineering and search-and-rescue circles in the 1970s. Instructors needed

something short and sharp that students would remember after one cold, wet field day. Manuals such as *Mountaineering: The Freedom of the Hills* began using it in print, and by the 1980s, it appeared in scouting handbooks and National Park Service safety bulletins. [1] [2] [3]



The phrase spread because it was true and easy to teach. Even now, most outdoor-skills courses still begin their clothing unit with those two words.

The Science of Why Cotton Kills

The saying *"cotton kills"* has been part of outdoor education for decades. You will find it in mountaineering manuals, scouting guides, and National Park Service safety pages because it is simple and accurate. [1] [2] [3]

Cotton is dangerous because of how it behaves when wet. Its fibers act like little sponges that soak up and retain water. As they swell, they displace the tiny pockets of air that normally trap warmth. In fact, cotton can absorb up to 27 times its own weight in water. [4]

Water conducts heat roughly 20-30 times faster than air under standard conditions, [5] [6] which means that when wet fabric lies against your skin, your body heat flows into that water and escapes into the air. Evaporation only worsens the problem. Turning liquid into vapor requires energy, and that energy comes from you. As the cotton dries, it cools you even more.

So far, that is the fabric side of the equation. The rest is biology. Your body loses heat through four main mechanisms: **radiation, convection, conduction, and evaporation.**

- **Radiation** is the slow loss of heat from your skin to the colder air around you. Clothing works by trapping air to slow that process.
- **Convection** happens when wind sweeps away the warm air your body has heated. That is why a shell layer, even a light one, makes such a difference.
- **Conduction** is the direct transfer of heat through contact with cold surfaces or water. This is where wet cotton becomes truly dangerous.
- **Evaporation** cools you as sweat or moisture turns to vapor, drawing warmth directly from your skin.

When you wear cotton, you lose protection against all four. Once the fabric soaks through, its fibers squeeze out the air that slows radiation, let wind slip through the gaps to fuel convection, conduct heat straight from your skin, and accelerate evaporation by holding moisture against you. That chain reaction is what leads to hypothermia. Even in mild temperatures, once enough heat leaves your core, the decline speeds up. First comes shivering. Next, your dexterity fades. Speech begins to slur. Coordination falters. And finally, judgment fails before awareness does, which is why people developing hypothermia often insist they are fine. [7] [8]

At that point, even simple tasks become a struggle. Fingers stop responding. Zippers that worked an hour ago suddenly feel impossible.
In the moderate stage of hypothermia, the body protects the core by reducing blood flow to the skin and limbs. That makes the hands and feet feel numb, clumsy, and slow. Once shivering stops, the severe stage begins, or in other words, coordination collapses, speech fragments, and thought turns foggy. Without outside help or immediate rewarming, that decline can end badly. The woman at the trailhead had likely only reached the first stage, but it already showed in every movement she made.

Better Clothing and Layering

Start with a **base layer** that pulls moisture away from your skin. Wool or synthetics such as polyester or polypropylene do this best. Merino wool works across seasons because it insulates even when damp and resists odor. Add a **middle layer**, fleece or synthetic insulation like Polartec or Primaloft, for warmth. Finish with a **shell layer** that blocks wind and precipitation while allowing vapor escape. Softshell jackets are ideal for high-output movement, while hardshells perform better in heavy rain or sleet. Bring a **dry base layer** sealed in a plastic bag. That single habit can save a hike.

Merino wool base layer.

Your extremities fail first. Wear wool or technical socks and always carry an extra pair. Choose gloves that still insulate when wet and a hat that covers your ears. These simple layers can add several degrees of effective warmth since so much blood passes through your head and neck.

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Buying Clothing That Works

When you buy clothing, read the fiber content carefully. If you cannot tell what the material is, do not trust it.

I never buy a new piece of clothing online unless I have tried it in person. I test the fit, the stretch, and how it feels against my skin. A good local shop, or a store such as REI, can show you the difference between fabrics. I am not paid to say that; I say it because experience matters, and the people who work there usually have it.

Be cautious with private-label or unbranded items online. Some are mislabeled or poorly made. A tag might promise *"synthetic blend"* but turn out to be mostly cotton. That is a risk you do not need to take. Buy from companies known for consistent quality. If money is tight, buy used from a trusted source. Two used pieces of proven quality are safer than one new bargain that fails when wet.

There is an old saying from survival training: *"Two is one, and one is none."* If you only have one piece of essential equipment, you effectively have none if it fails. The same logic applies to clothing. If you find a base layer, jacket, or pair of gloves that truly works, get a second one while you can. Outdoor companies love to discontinue great designs for no clear reason. When you find something that fits and performs, keep it. If your budget allows, buy two used pieces instead of one new one. You will save money and have a reliable backup when the weather turns bad.

Fleece mid layer.

Hardshell layer.

The Larger Lesson

What I learned that day near the trailhead, and from my own mistakes, is that weather does not care about your plans. It reacts to physics, not ego.

Cotton kills because it erases your margin for error. It lets water in, pushes air out, and pulls heat from your body until you cannot think clearly enough to make good decisions. The solution is simple: dress for moisture, not fashion. Learn from other people's experiences and from your own. That is how you stay safe and keep enjoying the mountains.

If you remember nothing else, remember this: wet cotton steals your heat quietly. Good clothing gives you TIME: time to think, to react, and to make it home.

References

1. American Alpine Club, How to Layer for Winter, 2023 (https://www.outdoors.org/resources/amc-outdoors/outdoor-resources/how-to-layer-for-winter).

2. REI Co-op, Layering Basics, 2023 (https://www.rei.com/learn/expert-advice/layering-basics.html).

3. National Park Service, Hiking Safety Tips, Great Smoky Mountains National Park, 2024 (https://www.nps.gov/grsm/planyourvisit/hikingsafety.htm).

4. Cotton Council International, Cotton and the Consumer, 2022 (https://www.cotton.org/pubs/cottoncounts/upload/Cotton-and-the-Consumer.pdf).

5. Engineering Toolbox, Air Properties: Viscosity, Conductivity, Heat Capacity, 2024 (https://www.engineeringtoolbox.com/air-properties-viscosity-conductivity-heat-capacity-d_1509.html).

6. Engineering Toolbox, Water: Thermal Conductivity of Liquid and Gas Water vs Temperature, 2024 (https://www.engineeringtoolbox.com/water-liquid-gas-thermal-conductivity-temperature-pressure-d_2012.html).

7. MIT Environmental Health and Safety Office, Cold Weather Safety: Hypothermia Prevention Guide, 2023 (https://ehs.mit.edu/wp-content/uploads/EHS_0190.pdf).

8. Wilderness Medical Society, Prevention and Management of Accidental Hypothermia: 2019 Update, 2019 (https://www.wildmedcenter.com/uploads/5/9/8/2/5982510/wms_hypothermia_2019.pdf).