

Surviving the Cold

by
Jim Phillips

About Jim Phillips

Jim and his late father, James G. Phillips, are engineers who love winter camping but hate getting cold. Over 45 years ago they set out to find an insulating material that would keep them warm in the winter while hiking, lounging about camp, and sleeping. Nothing worked, so they threw out all conventional ways of thinking and started from a clean slate. What they discovered was a material which was never designed for clothing, but which outperforms all other clothing insulation.

Jim and his dad used this material to create an entire cold weather clothing system. They have tested it for weeks at a time, on numerous occasions, in the arctic during the winter, living day and night in -10° to -40° temperatures without heat.

In the mid 1980's, under contract with Burlington Industries, over \$2,000,000 was spent further testing, evaluating and designing the clothing system. The US military also funded several tests and developing projects. This allowed Jim to gain an invaluable understanding into how and why the clothing works so well.

Today, Jim's mission is helping people prepare for whatever may come. Although his specialty is cold weather survival, he provides in-depth training on dozens of topics, available at preparemyfamily.com

A Foundation

There are four things that will make the difference between life and death, between being a survivor or a victim, and between experiencing a very difficult/traumatic event as “an adventure” or as a catastrophe. The first three of these four can never be lost, stolen, or taken away from you. They are:

- 1) **A strong sense of who you are.** (A deep and abiding God-given sense of self-worth, purpose and spiritual foundation.)
- 2) **A “never ever give up” attitude.** (Not an attitude of arrogance, but rather a determination to keep going, especially for the sake of others whose survival depends on you, and most especially if they are family.)
- 3) **Knowledge.** (not just information, but information combined with personal experience and wisdom.)
- 4) **Having the right stuff.** (The right tools, equipment, and other necessities.)

I give entire lectures on the importance of #1, #2, and #3, because even if you have all the right stuff, the right stuff alone is not enough. With #1, #2, and #3 as a foundation, I generally conclude with #4, but today, I will talk about the right stuff as it pertains to you and how you might live/work/play/survive in the cold.

To put the value of this topic into perspective, consider a scenario where a natural disaster or terrorist event occurs in the dead of winter. You are unable to heat your home (no power, no fuel, too many windows blown out, etc.) for weeks, or you must leave and go somewhere that will not be heated, or you are far away from home when the event occurs.

Stop and consider the significance of being able to stay comfortably warm rather than barely surviving on the verge of hypothermia. Also consider this: It takes up to 3 weeks to starve to death. It takes up to 3 days to die of dehydration. But, **you can die of hypothermia in as little as 3 hours**. Furthermore, hypothermia is an extremely slow and painful way to die. Not at all like dying in your sleep! (I speak from personal experience on the topic of serious hypothermia.)

There is no way to cover this vital topic in such a short article. So I will give you some fundamentals with the hope that it will make the difference between thriving or just barely surviving. I also strongly encourage you to get more in-depth understand. Knowing only a little can get you into trouble in a real emergency. I teach cold weather survival in a 14 hour course. I do so to ensure that students have a deep and thorough understanding. (New students often wonder why it takes 14 hours and then at the end of the class they are asking for more.)

The four factors of a cold weather clothing system:

- 1) Understanding body thermodynamics.
- 2) Effective insulation.
- 3) Moisture management.
- 4) Wind shielding.

Body Thermodynamics

No matter the clothing system, you must know something about how the body heating system functions.

- 1) It is vitally important to maintain your core body temperature. Your “core” includes your head, torso, and half way down your thighs. Keeping your core warm increases survival and even helps the extremities stay warmer. That is why, “if you want your feet warmer, put a hat on.” If you lose your hat, find something or even cut off a sleeve and make a hat. Stuff crumpled newspaper into your shirt as a short-term measure. **Do whatever it takes to keep your core warm.**
- 2) Drink ample water. Your body is like a boiler and your circulation like steam pipes. Water is vital to circulation and keeping the “boiler” running at its peak. It may not seem like it, but you lose more water in the cold than on a warm summer day. Your water intake at -10°F needs will meet or exceed those of +110°F. Drink about ½ to 1 gallon of water per day, about ½ fl oz per pound of body weight, and more when exercising heavily in the cold.
- 3) Recognize the signs of hypothermia and avoid falling prey to it. The first sign is shivering, then uncontrollable shivering, then the point of no return when you no longer shiver, and not because you are warm; when you reach this point you are literally dieing. Other signs include; clumsiness, the false sensation of feeling warm, slowed or slurred speech, confusion, a change in behavior or the way a person looks. The cold has caused the mind to be unable to recognize the cold and unable to realize the danger. Most people, by this point, are so exhausted they just lie down and die. At this stage you cannot save yourself. That is why it is so vitally important to stay warm.

Insulation

Materials do not insulate! Insulation is created within the material where tiny pockets of still (unmoving) air are trapped. It is these tiny pockets of trapped air that insulates you – not the material directly.

There must also be enough insulation to do the job. Thin insulation is a misnomer (I'm being kind by saying it that way). **There is no such thing as thin insulation!** Generally, you need the equivalent of ½ to 1 inch of dry air space all around you, 1 to 2 inches around your feet. I'll describe the ideal material below, but in an expedient situation, there are dozens of materials right around you that can trap tiny pockets of still air. Many of them will do okay as temporary insulation.

Wind Shielding

As you might imagine, if air blows through an insulating material there will no longer be still air. This will, of course, defeat even the best insulation. An outer windproof shell is critical. But, it **must not be waterproof**. Moisture from perspiration must be able to pass through the outer shell and to the outside air. If the material is waterproofed, moisture will build up inside the insulation and make it ineffective.

I recommend a very tightly woven uncoated (no water proofing) synthetic fabric as the best. In rain or sleet you will have to put a poncho or rain gear over the windproof outer shell to keep water from coming in, and then remove it when not needed.

Moisture Handling

I cannot emphasize this enough – **moisture handling is the key to cold weather survival**. How well a material handles moisture will make or break the clothing system. There are many materials that will keep you warm while they are dry but will become deadly when damp, and I do mean deadly! If you are able to stay dry using them you would probably be okay – but the real problem is you cannot stay dry! So long as you are breathing you are also perspiring – and you will eventually get your clothing damp from the inside, unless it can handle the moisture as explained below.

Poor moisture management is why most clothing systems will ultimately fail. They may be okay for awhile (giving you a false sense of security), but as they begin to retain moisture (from perspiration or elsewhere) they will fail miserably. Moisture conducts heat away from the body 25 times faster than dry air. So, no matter how good the insulation is, no matter how much it costs, if it cannot expel moisture it will ultimately fail, usually when you need it the most.

Many products claim to wick moisture away. However, **wicking is not the answer**. To wick means draw off as in capillary action. Wicking will indeed draw moisture away from you, and your skin may feel dry. However, the insulating material is the “wick” which now contains the moisture, and thus a far less effective insulating material.

Let me repeat again, moisture conducts heat away from the body 25 times faster than dry air. This means that just a small amount of moisture in your clothing has a huge impact on its ability to retain heat (your body heat) from escaping out into the cold.

Cotton is the worst of all. Other natural fibers are nearly as bad because they absorb moisture right into the fibers. Down is deadly when wet, and wool is the best of the natural materials because it is much slower on the uptake of water, but eventually it becomes sodden also. Although synthetic fibers (including Hollofil® and Fleece) do not absorb moisture into the fiber, they will retain enough moisture in their structure which in the end will seriously reduce their insulating properties. These thread-like fibers touch each other at millions of points. Moisture will attach itself at every point where fibers cross and touch. This is a bonding force similar to the capillary force, and it will hold water in the material, even though the water is not inside the fiber.

I have tested dozens of fiber insulations. I have weighed the clothing dry before beginning a test and weighed it after, and there will be up to several pounds of added weight from water retention. To keep the fiber-based synthetic products effective you must be proactive in helping them get rid of enough moisture to keep them working reasonably well.

Moisture Vapor Transfer

Moisture vapor transfer is much more than wicking. With the right material, moisture moves through without leaving any water in the material. Warm moisture has a powerful motive force to move quickly towards a cooler and dryer environment. Because there is insulation between you and the cold outside, your insulation must be a good conduit for moisture vapor to travel through, away from you, and entirely out of the clothing system. There is one material that I know of that both insulates adequately and handles moisture superbly well at the same time. Surprisingly, it comes from a very unlikely source; the furniture industry.

Open cell polyurethane foam plastic which is used in couch cushions and automobile seats has the perfect structure for moisture vapor transfer and does an excellent job of trapping tiny pockets of still air. (This is sometimes called foam rubber, but it is not rubber. It is also NOT neoprene, which is used in wetsuits.)

Open cell polyurethane foam is synthetic and therefore will not absorb moisture. However, this is not the secret of its effectiveness. It is the **structure** of the foam that creates the ideal moisture vapor transfer conduit. Unlike synthetic fibers, foam has an uninterrupted structure with no contact points where moisture can attach to.

Moisture from perspiration and wetting from the environment can easily move through the foam structure into the outside air. It is the difference in temperature between the inside next to you (warm) and outside (cold) that drives the moisture to rapidly move outward. The natural tendency is to think this will also cause a lot of heat loss, too, but that is not the case. The outward moving moisture gives up much of its heat on the way out and the system works like an enthalpy heat exchanger, thus retaining much of the heat originally contained in the water vapor.

Open cell polyurethane foam will release moisture so long as there is a warm body in it. You may be surprised to learn that if you accidentally get it wet (by falling through the ice), or if you wash the clothing, the way to dry it is to wear it. I had to prove this to a group of reporters. They challenged me to simulate a winter survival scenario.

They challenged me one January to chop a hole in a frozen lake and spend 15 minutes in 32°F water. (Being in the icy water for that amount of time was very painful as I simulated someone who had fallen in and was going into hypothermia.) I then got out and squeezed out the bulk of the water. I became active by walking to begin re-warming my core temperature, and stayed active setting up camp. That night I slept out in a bag (made of the same material) with my wet clothing still on. In the morning I was dry and my clothing was also dry.

A Safety Note

One last important safety point. All synthetic materials (foam and fabric) can melt and/or burn. I have seen people standing near a fire or other heat source wearing their PALS clothing on and melt holes in it (very hazardous). They don't realize how hot the clothing surface is getting because the insulation works so well they couldn't feel the heat. For this reason, youth especially ought to wear denim jeans or wool on the outside for safety. The best option is to make the clothing with a synthetic outer shell and put a pair of denim jeans on over when needed.

Where to Go From Here

You may be wondering where to get this clothing. For years I have taught people how to make their own, which I still encourage them to do, so they will have the skills to make it if needed in an emergency.

I instruct people on how to specify and source possible foams from the furniture industry, get a sample and test it for suitability. However, things have been changing in the industry and it is more difficult to find the premium foams today than in the 70's, 80's and mid 90's. Due to regulations, the foam industry has changed its formulas, both with additives and commonly producing it with more closed cells and fewer open cells. (Cells must be open to allow moisture to pass through. Closed cell foams will not work.) All of these changes make many of the commonly available foams less desirable. (But, if nothing else is available, it is still better than fiber insulation.)

In an emergency, the cushions in your couch or automobile seat can save your life. If you will slice them up into ½ to 1 inch thick sheets they can be sewn into or even stuffed into clothing as crude cold weather underclothing. The foam must be near the skin. Foam over other clothing does not work as well as next to the skin or over a thin, preferably synthetic undergarment. (Remember that cotton is a wick and will hold moisture next to you and cause you to both overheat and sweat more and then chill you.)

Because of so many requests and because the right foam is now much harder to find, I have contracted with a clothing manufacturer and with a foam manufacturer to provide completed units, do-it-yourself kits, and the raw materials designed to my specification. Check my website for details, www.preparemyfamily.com. You will also find a library of information on <http://www.jimsway.com>.

Well, I've given you a very brief overview and there is much more I'd like to share. You might consider getting the DVD, "The Self-Reliant Family #2: Clothing. It contains over 2 hours of detailed information on what is now known as PALS (Phillips Arctic Living System). There is also a CD called "Living in Winter Without Heat."

Since winter happens, you must learn to deal with it properly, if you are going to be truly prepared.

I trust that even this limited space to share with you here will make a difference. Please learn more and experiment, first in controlled situations close to home, and then as you and your equipment evolves you can range further a field. Over time you, just like I've done, can develop the knowledge, skill and equipment to visit true Arctic environments safely and comfortably in the heart of winter.

Have a Great Day
Jim Phillips

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