BLISTERS

By Bob Athanasiou

After two days of hiking Yellowstone's Bechler Canyon just about everyone in our party had blisters. Our guide asked me during one of our frequent first-aid stops what the best treatment was. There was an embarrassed silence as I searched my mind. It seems the subject had been left out of my medical education. I assured the guide that his experience was a better source of knowledge and made a private promise to research the subject when I got home.

I was chagrined but not surprised when a computer search of the last 20 years produced about a half-dozen articles on blisters. Textbooks and discussions with dermatologists yielded a bit more information. What follows is a summary of the latest medical research on the treatment and prevention of blisters.

Causes

The blisters most hikers suffer from are referred to as friction blisters by doctors to distinguish them from other types such as those caused by sunburn. Friction blisters are caused by the skin rubbing against a tough surface, such as a boot. The friction produces an intradermal lesion—a separation of the epidermis, the tough outer layers of skin, and the dermis, the sensitive inner layers of the skin. Only thick, immobile skin such as that on the palms, soles and heels is subject to friction blisters. Thin or loose skin like that on the back of the hand or arm will abrade rather than blister.

Blisters have three main components—a roof, fluid and a base. The roof is composed of dead epidermal tissue. The base consists of dermal tissues which can regenerate quickly. Fluid fills the space between the roof and the base. The fluid is there because the separation of skin layers upsets the natural balance of fluids in the cells of the skin. Gravity further aggravates this imbalance. If a blister on the palm was held above the head, it would not fill with fluid. Foot blisters will fill rapidly with fluid because of their dependent position.

Moisture and temperature are two important factors in blister formation. Moist skin will blister much more rapidly than dry skin. Cool skin takes longer to form blisters than hot skin. It follows that hot, moist skin—the way your feet are during most summer hikes—is most susceptible to forming blisters.

Prevention

Experiments have shown that both shoes and socks contribute to the formation of blisters. A shoe that fits well, is thoroughly broken in, and is as smooth as possible on the inside is essential to avoid blisters. Some researchers have suggested that Teflon heel and toe counters might help in preventing blisters.

Keeping your feet cool and dry will go a long way toward reducing blisters. There are several ways to accomplish this. The old army tradition of walking fifty minutes and resting ten minutes with your boots off helps prevent both blisters and fatigue. Another very effective method used by the army is nylon or cellulose shoe liners. Similar liners are available from Early Winters in Seattle, Washington and Walking News in New York, New York. These liners allow air to circulate under your feet. They have a cool, comfortable ventilating effect. The feeling takes a few days to get used to, but once you've tried these liners you won't walk anywhere without them. Liners made of foam rubber should be avoided because they will increase both heat and humidity inside your shoes.

A non-absorbent nylon, silk or polyester sock next to your foot will allow moisture to move away from your foot and may also reduce friction. Such non-absorbent liner socks are sold by virtually all outfitters.

Still another way to reduce dampness is to coat your foot with an antiperspirant. This method hasn't met with a lot of success because anti-perspirants tend to make the foot sticky, thereby increasing friction. Foot powder can help to keep the skin dry and reduce friction, too. But its disadvantages are that it cakes up, clogs your socks and must be reapplied many times on a long hike.

Reducing friction can be accomplished by using two or, preferably, three layers of socks. The layer closest to the skin should be non-absorbent. The middle layer should be a soft absorbent sock. Good results have been obtained with wool socks that have reverse pile—the kind with soft, slippery loops of yarn on the inside. The outside layer can be a hard-wearing ragg-wool sock. Friction is thus dissipated between the layers of socks rather than against the skin.

Tape and moleskin are two traditional ways of reducing skin friction.

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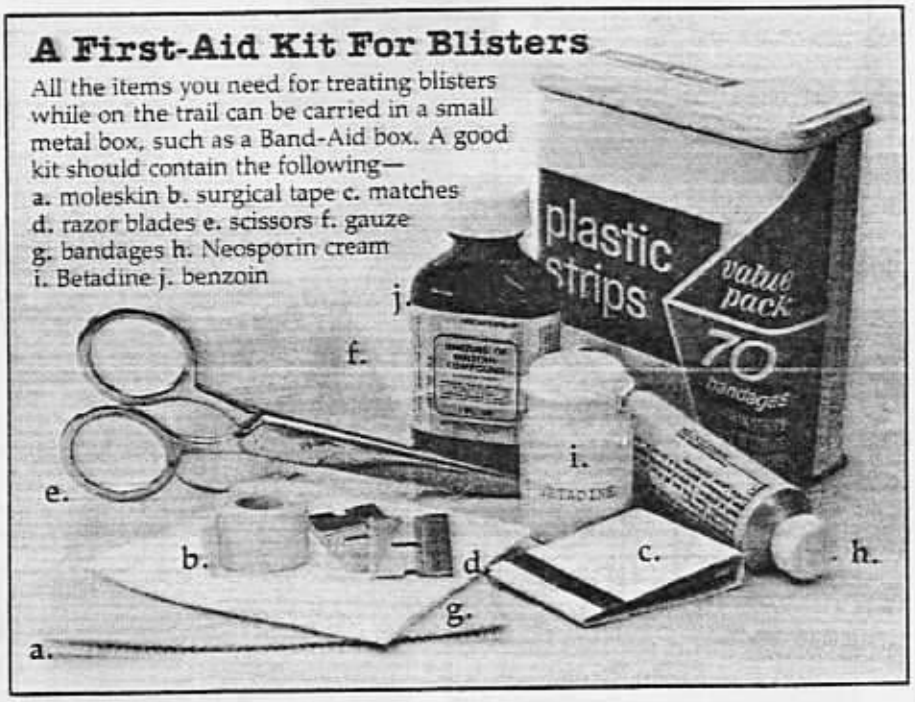
A First-Aid Kit For Blisters

All the items you need for treating blisters while on the trail can be carried in a small metal box, such as a Band-Aid box. A good kit should contain the following—
a. moleskin b. surgical tape c. matches
d. razor blades e. scissors f. gauze
g. bandages h. Neosporin cream
i. Betadine j. benzoin



Water Gap National Recreation Area, C & O Canal National Historic Park, Indiana Dunes National Lakeshore, Point Reyes National Seashore, and Golden Gate National Recreation Area.

There is currently a bill in the House of Representatives, H.R. 5841 National Hostel System Act of 1980, which calls for the development of a national system of hostels. If passed the AYH would enter a cooperative agreement with the Department of Interior and begin work on a National Plan for Hostel Development.

Shenandoah Park

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Books and Trail Guides. Books listed below can be purchased by mail from the Shenandoah Natural History Association. A list of additional publications is also available free from the Association.

- *Guide to Trails in Shenandoah National Park* by Potomac Appalachian Club ($8.95)
- *Appalachian Hiker II* by E. Garvey ($8.95)
- *Circuit Hikes in Shenandoah National Park* by Potomac Appalachian Trail Club ($2)
- *Park Guide, Shenandoah National Park*, issued annually by E.W. Lauck & Company (75 cents)
- *Ancient Leaves in Shenandoah National Park* by Jack Reed ($1.40)
- *Ferns of Shenandoah National Park* by Peter M. Mazzeo (75 cents)
- *Mammals of Shenandoah National Park* by Richard Manville (75 cents)
- *Trees of Shenandoah National Park* by Peter M. Mazzeo (75 cents)

For more information, and to obtain the free park pamphlets *Bear: Friend or Foe* and *Exploring the Backcountry*, write the Shenandoah National Park superintendent.

—Stephen Whitney

Blisters

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Moleskin's slippery surface acts much like reverse pile socks. Moleskin works best when cut into strips and applied so it conforms to the contours of the foot without wrinkles or bumps. Tape is probably not as effective as moleskin but it's easier to apply and costs less.

Getting moleskin and tape to stay put can be a problem. As your foot sweats the glue loosens and frequent applications are required. The secret to getting the stuff to stay on is to use one or two coats of tincture of benzoin on the spots that will be covered with moleskin or tape. The benzoin hardens the outer layers of skin. This allows the tape or moleskin to cling better to the skin, and keeps the skin under the tape from becoming macerated and soft.

Benzoin is safe, cheap and effective. It's available in most drug stores. A four-ounce bottle will last for many trips. Some canoeists coat their palms with the stuff to toughen the skin, prevent sweating and keep their hands from blistering. It's also useful for applying any other bandage and should be an addition to your first-aid kit.

Maximum protection is best achieved by coating the high-risk spots with benzoin, covering the spots with moleskin, wearing three layers of socks, using a ventilated inner sole, and air drying your feet at frequent intervals.

Treatment

If, despite all these precautions, you still develop a blister, there are three basic treatments. These are—draining, bridging and deroofing.

Draining is probably the best method. It will help the roof adhere to the base, making it unnecessary for the skin to completely regenerate. Draining should be done three times at two,

six and twelve hours after the blister rises. Take care when doing this because it's possible, though unlikely, that infection may take place. First wash your foot with soap and water. Then coat the entire blister area with an antiseptic povidone-iodine solution such as Betadine or Pharmadine. Do *not* use tincture of iodine, merthiolate, or merchurochrome. These heavy metal tinctures can cause severe chemical burns and are not effective antiseptics. Plain isopropyl rubbing alcohol is better than nothing if you can't obtain Betadine or Pharmadine from your pharmacist.

Next, sterilize a pin or knife edge by passing it through the blue part of a match or lighter flame. Don't coat the edge with carbon. It's harmless, but it could leave you with a tattoo. Make a few pin holes or a slice through the raised skin at the bottom-most part of the blister. It won't hurt because the upper layers of skin have been lifted away from the nerve endings. Let the fluid drain. Cover the blister tightly with adhesive tape or bandage. Repeat the process at six and twelve hours. Experimental data show that the roof will adhere to the base in 75 percent of all cases.

Bridging can be used alone or in combination with draining or deroofing. Bridging requires the use of moleskin or the buildup of tape *around, but not over* the blister. This works well for some people. Simply cut a piece of moleskin into wide strips and form a circle around the blister to keep it from coming into contact with the sock or shoe. Remember, benzoin will help the moleskin stay in place. Some people feel that the moleskin will increase the probability of blistering in new spots, but this hasn't been demonstrated in any controlled experiment.

To deroof a blister you must first drain it. And it's better to wait about 48 hours before deroofing because the base is still quite tender. The skin must be cleaned and disinfected before the roof is trimmed off. Once the roof is off, the blister must be covered to allow the skin to regenerate which takes four to five days.

One study of army volunteers showed that there were two effective methods for treating deroofed blisters. In one part of the study, the blister bases were treated with Neosporin cream and an adhesive bandage or gauze patch. In the other part, the bases were covered with a cyanoacrylate glue. (Eastman 910 and Krazy Glue are cyanoacrylate glues.) Such glues have been used in surgery for many years. They are used to glue transplanted bones of the inner ear and to cement artificial hips to pelvic bones. At the present time none of these glues are available, or FDA approved, for use

by the public in treating blisters. The use of Krazy Glue or Eastman 910 is not recommended because they are manufactured in non-sterile conditions and may contain other substances that could irritate the skin. This is unfortunate because the army studies showed that coating the blister base with a single drop of glue proved to be a very effective treatment. It relieved pain, prevented infection and permitted the continuation of training. Tissue regeneration was 90 percent complete in just three days.

The best that can be done for a deroofed blister is to apply some Neosporin cream, or first-aid cream, to a gauze patch or adhesive bandage and place that over the blister base. Always apply the cream to the bandage—this keeps the tip of the dispenser sterile and avoids any possible contamination among members of the party.

Weminuche

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stew of freeze-dried beef, potatoes, wild onions, bouillon cubes, and a packet of fresh herbs.

Our last day in the mountains, like the preceding four, shone bright and clear. After breakfast and a dip in Vallecito Creek, we headed out—packs lighter, feet beginning to callous, backs no longer sore. A short walk downstream we passed the confluence where Vallecito Creek meets Johnson Creek, the eastern gateway to 12,800-foot Columbine Pass and Chicago Basin.

We saw nothing of the destructive porcupine that liked to lunch on hikers' packs. But while resting on the wooden bridge crossing Vallecito Creek, we heard the heavy chopping sound of a helicopter. Larry pointed to a silver dot above, heading for Columbine Pass.

"Miners," Larry said.

The obtrusive noise faded, and the remainder of the 12-mile downhill walk to Vallecito trailhead was pleasant. We emerged into a dusty parking lot and caught a ride back to Durango. We came to the D&R station just as the locomotive pulled in.

"Someday," Larry said, "I should ride that train to the end of its line. But I guess as long as the Weminuche is between here and there, I probably won't."

Gates of Lodore

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other end of the rope comes ashore where first four of us, and then all eight, heave the frame off the rock. No easy task. Six people could not have done it; eight accomplish it barely in inch-by-inch increments.

Losses are minor. O'Brien's tool box is the major casualty along with his wallet. Gheen's down sleeping bag weighs 20 wet pounds. Rawling's new