

MODULE ONE: SURVIVAL AND WILDERNESS TRAVEL
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with assistance from Robert Rosenthal, M.D.

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INTRODUCTION

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Required Readings

1. Surviving the Unexpected Wilderness Emergency, by Gene Fear (Tacoma, Washington: Survival Education Association, 1972). \$5. Read entire book.
2. The Common Sense Medical Guide and Outdoor Reference, by Newell D. Breyfogle (New York: McGraw-Hill, 1981). \$6.95. Read entire book.

Suggested Reading

Mountaineering: The Freedom of the Hills, edited by Ed Peters (Seattle, Washington: The Mountaineers, Fourth Edition, 1982). \$15.

All books are available from Potomac Appalachian Trail Club Headquarters, 1718 N St. NW, Washington, DC 20036 (202 638-5306).

SURVIVAL AND WILDERNESS TRAVEL PRETEST

by Keith Conover, M.D.

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After taking this pretest, check your answers against the correct answers on page 65. The pretest questions are representative of those that might be asked on the final Basic Certification Test, but they cover just a few of the many topics in the standards and in the Module.

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1. For backpackers in the Middle Atlantic region, foraging for food is a _____ part of survival education.
 - a. very important
 - b. very unimportant
 - c. useful
2. Which of the following is a prime rule for wilderness backpackers (not to mention mountain rescue team members)?
 - a. DON'T GET SEPARATED FROM YOUR PACK!
 - b. DON'T GET SEPARATED FROM YOUR PACK!
 - c. DON'T GET SEPARATED FROM YOUR PACK!
 - d. DON'T GET SEPARATED FROM YOUR PACK!
3. Snacks for munching during strenuous exercise (as in backpacking or mountain rescue) should have a high concentration of carbohydrates (that is, sugar and starch) but only a small amount of fat. The reason(s) for this is (are):
 - a. carbohydrates provide quick energy.
 - b. fat is hard to digest, especially during exercise.
 - c. both a and b are true
4. Fatigue, the buildup of waste products in the body, and exhaustion, the depletion of body energy stores, are physical limitations on backpackers' performance. Conditioning will improve fatigue tolerance, and proper diet will help prevent exhaustion.
 - a. true
 - b. false
5. In the field, alcohol (e.g. whiskey) is good to give to someone who is hypothermic, because it is a ready source of calories (food energy).
 - a. true
 - b. false

SURVIVAL AND WILDERNESS TRAVEL PRETEST

12. Anyone who is bitten by a mammal (for example, a raccoon) must be seen by a physician (after returning to civilization) because of the danger(s) of:

- a. rabies.
- b. tetanus.
- c. wound infections.
- d. a and c are true
- e. a, b, and c are true

13. The standard medical treatment of an abscess (a localized infection full of pus) includes:

- a. incision and drainage.
- b. warm soaks.
- c. both a and b

14. Your group is out on a hike on a hot July day. After a strenuous climb up the side of Humpback Mountain, one of the hikers (who has otherwise quite healthy as far as you know) is lagging behind and seems to be staggering. He says he is very nauseated and lightheaded, his pulse is somewhat rapid, and he refuses water when it is offered. He looks pale and sweaty. He is most likely suffering from _____, for which you should _____.

- a. heatstroke; cool him down as rapidly as possible
- b. heat cramps; give him some salt tablets with a little water
- c. heat exhaustion; let him lie down for a while with his feet up and, after a while, persuade him to drink about a liter or so of Gatorade or an equivalent electrolyte drink
- d. dehydration; force him to drink lots of cold water.

15. The proper initial treatment of small burns is immersion in cold water; the initial treatment of frostbite (once out of danger of refreezing) is immersion in warm water at approximately 110 degrees Fahrenheit.

- a. true
- b. false

16. The proper first aid treatment for shock in the city generally includes all of the following except:

- a. reassurance
- b. putting the patient flat but with legs elevated
- c. keeping the victim from chilling
- d. providing Gatorade or similar fluids to drink

17. As a general rule, a victim with a back injury but without a head injury or severe shock should not be transported by an improvised evacuation method, but should be made comfortable until a Stokes litter and backboard can be obtained for a proper evacuation.

- a. true
- b. false

SURVIVAL AND WILDERNESS TRAVEL STANDARDS

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This section lists the survival and wilderness travel standards for Basic Certification established by the Appalachian Search and Rescue Conference in the ASRC Training Guide (Third Edition); these are the basis for all certification tests by the Shenandoah Mountain Rescue Group. In *italics* are additional standards SMRG believes important to the education of a well-rounded Basic Member, but which are not found in the original ASRC standards. These will be covered in SMRG training and the tests for this Module, but will not appear on any SMRG Basic Certification Test.

Standards 5, 8-10, and 15 are skills objectives and will be tested on practical rather than written tests. Information about them may be found in Appendix B and the Suggested Reading, Mountaineering: Freedom of The Hills.

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The candidate must be able to perform the tasks listed in the following items:

1. Convincingly explain the important psychological aspects of survival, including:
 - a. the priorities of short-term survival: the will to live, air, shelter, water, and food;
 - b. reactions to fear, pain, discomfort, and danger, and their effects on the mind and body;
 - c. the usefulness and dangers of panic, and the use of the STOP mnemonic for preventing panic;
 - d. evaluating and acknowledging the limits of oneself and others;
 - e. the way artificial goals may interfere with rational judgment; and
 - f. the concept of one's pack and equipment as a life support system.
2. Briefly describe the following physiological concepts pertinent to survival:
 - a. homeostasis;
 - b. energy level and exhaustion;
 - c. fatigue;
 - d. daily caloric (food) and water needs of the human body;
 - e. the relative energy content and availability of fat, protein, starch, and sugar, including the effects of different levels of exertion and seasonal differences; and
 - f. conditioning for search and rescue: strength, flexibility, and endurance.

SURVIVAL AND WILDERNESS TRAVEL STANDARDS

3. Explain the "energy budget" concept of body temperature homeostasis, including the following key points:

- a. the routes of heat loss, and their relative importance:
 - i. temperature (conduction and radiation),
 - ii. windchill (convection), and
 - iii. wetchill (conduction and evaporation);
- b. the use of energy stores to produce heat, and the metabolic costs of shivering;
- c. vasodilation, sweating, and behavior as means of increasing heat loss, and their long-term consequences;
- d. vasoconstriction and behavior as means of conserving heat;
- e. the effects of tobacco and alcohol on normal heat homeostasis; and
- f. the particular danger of "hypothermia weather," that is, temperatures near freezing with wind and rain.

4. Explain the major points of wilderness clothing selection, including:

- a. listing the "3 W's" of clothing priority for wet cold climates, and explaining their importance. They are:
 - i. wind protection,
 - ii. waterproof clothing, and
 - iii. wool (or other warm-when-wet) clothing;
- b. the advantages, disadvantages, and appropriate uses of waterproof shell garments, and the water penetration resistance of urethane-coated nylon, "60/40 cloth", "65/35 cloth", and Gore-tex;
- c. cold-weather dressing concepts, including the layer principle, ventilation, "dressing cold", and the dangers associated with overheating in the winter; and
- d. description of clothing materials, including cotton, down, wool, and synthetic fibers, in terms of dry warmth, wet warmth, wind protection, absorption and retention of water, and wicking of water.

5. Distinguish equipment suitable for wilderness search and rescue, including boots, packs, sleeping bags and pads, and stoves.

6. List the basic characteristics (voltage, life, weight, cost, temperature characteristics, and dangers) of carbon-zinc, alkaline, lithium, and nickel-cadmium cells.

7. Briefly describe pertinent local weather patterns, including the signs of arriving cyclonic winter storms, cold fronts, warm fronts, and local storms.

** 7.5. Describe the dangers of lightning and proper actions when on an exposed ridge (or elsewhere) during a thunderstorm. **

SURVIVAL AND WILDERNESS TRAVEL STANDARDS

8. Demonstrate the ability to travel cross-country competently in a middle appalachian wilderness area during summer, spring, or fall, including:

- a. large stream crossings;
- b. fourth class rock climbing; and
- c. proper pace and rest stop use, and use of the rest step.

9. Demonstrate the ability to bivouac overnight with normal mission pack gear in summer, spring, or fall, and to carry out mission tasks for a full day following.

10. Build a functional emergency overnight shelter from local materials, and build a fire using mission pack gear.

11. Describe the means of transmission, preventive measures, and appropriate measures in suspected or possible exposure, if any, for the following diseases:

- a. Rocky Mountain Spotted Fever;
- b. Tetanus;
- c. Rabies;
- d. enteritis and diarrhea (viral, bacterial, or protozoal);
and
- e. chiggers, ticks, and mites.

12. Briefly describe the causes, prevention, diagnosis, and wilderness treatment for the following:

- a. muscle cramps;
- b. friction blisters;
- c. tendinitis;
- d. localized infection, including ingrown nails and abscesses;
- e. contact dermatitis (e.g. poison ivy);
- f. poisonous bites and stings: pit viper bites, spider bites, and bee stings;
- g. allergic and anaphylactic reactions;
- h. animal and human bites;
- i. fever;
- j. snowblindness;
- k. hypothermia (acute, subacute, and chronic); and
- l. heat cramps, heat exhaustion, heatstroke, and dehydration.

SURVIVAL AND WILDERNESS TRAVEL STANDARDS

13. Briefly describe how one should treat the following medical problems in a wilderness setting:

- a. subungual hematomas (blood under a fingernail after a crush injury);
- b. nosebleed;
- c. ear infection;
- d. conjunctivitis, a foreign body in the eye, and eye abrasions;
- e. burns and frostbite;
- f. minor and major soft tissue injuries;
- g. sprains, strains, and dislocations;
- h. closed fractures, including improvised splinting;
- i. open fractures;
- j. shock;
- k. gastroenteritis, diarrhea, and vomiting; and
- l. attached ticks and embedded chiggers.

14. Present important factors involved in the decision to:

- a. administer oral fluid and electrolyte replacement; and
- b. to wait for an evacuation team versus beginning an evacuation with improvised methods.

15. Properly demonstrate the following improvised evacuation methods:

- a. 2-person linked-arms "chair" carry;
- b. 2-person packstrap-and-pole carry;
- c. both split coil and sling "piggyback" carries; and
- d. improvised stretchers: rope stretcher, rope and pole stretcher, parkas and pole stretcher, and blanket and poles stretcher.

BASIC SURVIVAL LESSON PLAN
by Keith Conover, M.D.

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This lesson plan is for members' use in teaching short-term survival to the public, and serves as a review of the most basic and vital aspects of short-term survival. A set of slides is being developed to accompany it. When using the slides, please follow the tenets of good instructional technique: do not present a slideshow with commentary, but give a survival lecture illustrated with slides. A good instructor never insults his audience by reading slides and explaining them; the audience can read them as well as (if not better than) the instructor. Instead, use the slides to emphasize important points.

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I. INTRODUCTION

- * How long can you be lost in Virginia/West Virginia? [not long - a few days at most]
- * Therefore only **SHORT-TERM SURVIVAL** is important for this area.

Use chalkboard to list and solicit estimates:

HOW LONG CAN YOU LIVE WITHOUT:

FOOD?	[WEEKS]
WATER?	[DAYS]
SHELTER FROM A STORM?	[HOURS]
THE WILL TO LIVE?	[?]
SURVIVAL KNOWLEDGE?	[?]

- * Short-term survival therefore means **OVERNIGHT SHELTER** in a hostile environment, usually a cold one, knowledge about shelter, and the will to live.

II. THE HEAT BALANCE CONCEPT

- * The body produces heat continuously; this production of heat must be balanced by an equal heat loss to keep the body temperature from going up or down.
- * The body temperature must be kept within a narrow range for vital chemical processes to work.
- * The challenge for outdoor people is to use their equipment and knowledge to help the body stay near 99 degrees Fahrenheit even in a hostile environment.

BASIC SURVIVAL LESSON PLAN

III. HEAT LOSS AND COMPENSATION

- * Heat is lost from the body in 4 physical ways, from 3 main causes:
 - **COLD TEMPERATURE: RADIATION** (like you feel heat radiating from a hot stove) and **CONDUCTION** (like when you sit down on a cold rock).
 - **WINDCHILL: CONVECTION**, as the air your body warms is blown away.
 - **WETCHILL**: you lose heat when you are wet by both **CONDUCTION** into and through the cold water in your clothes, and by **EVAPORATION** (just like when you pour alcohol on your arm and it cools by evaporating).
- * Most clothing, when it's wet, has a thermal conductivity (rate it conducts heat) similar to that of water. How many times faster does water conduct heat than dry air? [240 times!]
- * Death from exposure to cold, also known as hypothermia (hypo= low, thermia=temperature), is probably the most common cause of death in the outdoors. It is a particular problem at temperatures around freezing (32 degrees F) with wind and rain: **COLD TEMPERATURE, WINDCHILL, AND WETCHILL COMBINED**. (When it's colder than 32 degrees, it snows instead of rains, so it's easier to stay dry.) Rain and wind around freezing is **HYPOTHERMIA WEATHER**, called so because so many underestimate it and become hypothermic as a result.
- * Even in the summer, people are often caught unprepared by sudden storms, and the combination of wind and rain may cause hypothermia even at temperatures as warm as 60 F.
- * Proper clothing is important for hypothermia protection:
 - adequate **RAINGEAR** is necessary, but even in truly waterproof (or even Goretex) raingear you will get wet. We all perspire, and clothes get wet from **CONDENSATION** inside the raingear.
 - Therefore your clothes must be **WARM WHEN WET!** And, as nice as **DOWN** parkas may be, they are flat and cold when wet; **AND COTTON** clothes (such as blue jeans and flannel shirts) are even worse; not only are they **USELESS AS INSULATION WHEN WET**, but they **WICK WATER**; if a sleeve or pants leg is exposed to the rain, the whole garment is soon wet (experiment: leave one end of a cotton towel in a full sink and come back to check the towel in half an hour).
 - only **WOOL** and some synthetics (polypropylene, Fiberfill, etc.) retain some warmth when wet.
- * Knowing the triple danger of **COLD, WIND, AND WETNESS**, we can defend against them with the **THREE W's**:
[ON BOARD OR SHOW EXAMPLES:]
WOOL (or other warm-when-wet) **CLOTHING**
WINDPROOF CLOTHING
WATERPROOF CLOTHING

- * We suggest that you always carry with you **TWO LARGE PLASTIC LEAF BAGS** (SHOW). These are light, cheap, and provide quick and simple protection against wind and rain.
- * With what you have learned here, and with some simple and inexpensive clothing, you can be comfortable even in hypothermia weather.

IV. THE PHYSIOLOGY OF HEAT AND COLD

- * How does the body first react to threatened changes in the body core temperature? [by changes in the blood vessels of the skin.]
- * When you get **COLD**, your skin **BLANCHES** as the blood vessels in your skin squeeze down and make the outer parts of your body an insulating shell for the core.
 - But note that blood supply to the vital organs of the head continues unabated, so much heat may be lost from the head and neck (so **WEAR A HAT WHEN YOUR FEET GET COLD!**)
 - If cooling of the outer parts of the body is not enough insulation, you start to **SHIVER**, generating more heat, but at the cost of **FATIGUE** (buildup of waste products) and **EXHAUSTION** (depletion of energy stores) which may even lead to death.

(possible demonstration of fatigue: have class hold out arms for next few minutes.)

- * When you get **HOT**, your skin **FLUSHES**; the blood vessels in the skin expand, bringing blood to the skin so it can radiate away unwanted heat.
- * If you are still too hot, you begin to **SWEAT**. Sweating cools by evaporation, but it uses up limited stores of water and salt.

V. HEAT PROBLEMS

- * Heat may cause excessive loss of salt or water, leading to the following three problems:
- * **HEAT CRAMPS** are cramps from an excessive loss of salt, usually in the legs or abdomen, which don't respond to massage or stretching. Treatment is to **REPLACE THE LOST SALT** by giving Gatorade and something salty to eat (avoid salt tablets; they make many people nauseated).

BASIC SURVIVAL LESSON PLAN

- * **HEAT EXHAUSTION** is a more-or-less normal response to over-exertion in a hot environment, and is like fainting or mild shock. People with heat exhaustion look exhausted: their skin is pale and clammy, their pulse is often rapid, and they are nauseated and lightheaded. Treatment is:
 - (1) Rest in the shade with the feet elevated for 15 minutes or so, and
 - (2) Drink a liter or so of Gatorade or something else with water and salt.The person should be OK in an hour or so.
- * **HEATSTROKE** is when the cooling centers in the brain break down. Heatstroke is a **TRUE MEDICAL EMERGENCY**, and even with the best of care, many people still die from it. People with heatstroke look like they've had a stroke - they may be confused or unconscious, or may have a seizure, or may stop breathing. They look **HOT AND DRY** and often red, because they have stopped sweating. First aid treatment of heatstroke includes **COOLING THE PERSON DOWN** to normal body temperature immediately, and then keeping the body temperature normal, because the person can't do it himself any more.
- * **Review:**
 - **HEAT EXHAUSTION IS LIKE EXHAUSTION.** With some Gatorade and rest, the person will be fine.
 - **HEATSTROKE IS LIKE A STROKE;** people are very sick and may die. Cool down, maintain temperature, get medical attention soon.
- * When in a hot environment,
 - (1) **COVER UP** with loose clothes and a hat to shield from the sun but allow air circulation;
 - (2) **RATION YOUR SWEAT, NOT YOUR WATER.** People have died with water left in their canteens. Your body stores it as well as a canteen, so drink when you're thirsty; but don't drink so much at a time that your body urinates it out.
 - (3) **WATCH FOR DEHYDRATION:** dark urine is the best sign. Dizziness, nausea, and tunnel vision may occur. Thirst is not always present when you're dehydrated.
 - (4) Keep up your salt and water with Gatorade or salted lemonade.

VI. COLD PROBLEMS

- * **HYPOTHERMIA** and **FROSTBITE** are the two major dangers from cold. Which is more serious? [hypothermia, because you don't die from frostbite.]
- * **HYPOTHERMIA** = body core temperature going below normal.
 - Recognize in others: uncontrollable shivering, physical and mental impairment, withdrawal (a drunk appearance).
 - It's **HARD TO DETECT IN YOURSELF** because your mind goes numb, just like when you're drunk.
 - Many people who get to stage of uncontrollable shivering **CAN'T REWARM THEMSELVES** if just put in warm room or sleeping bag!

BASIC SURVIVAL LESSON PLAN

- * If your group is out in weather which is conducive to hypothermia, whether in winter or summer:
 - (1) **RECOGNIZE HYPOTHERMIA:** If someone is shivering badly, or stumbling and fumbling, or seems confused and withdrawn, then
 - (2) **STOP EXPOSURE:** find shelter immediately; set up a tent, dig out your leaf bags, or find a downed log to dig under.
 - (3) **CHANGE INTO DRY CLOTHES**
 - (4) **CANDY AND HOT LIQUIDS** should be offered, even if the person says he's "not hungry or thirsty."
- * If the person still isn't recovered, **REWARM** using body-to-body contact in a sleeping bag. (He may not rewarm by himself if left alone in the sleeping bag.)
- * Rewarming in a hot tub will rewarm quickly, but it may cause shock and heart problems; don't try unless you know how to detect and treat these problems.
- * **FROSTBITE** is the freezing of parts of the body.
 - **FROSTNIP** is freezing of just the superficial skin; it is white but soft to the touch; little or no tissue death has occurred. Rewarm in the armpit, mouth, etc.
 - **DEEP FROSTBITE** is when the affected part is frozen hard like wood; at this stage, much tissue is dead.
 - **FROSTBITE SHOULD NEVER BE RUBBED;** this causes more tissue death. The proper treatment is **RAPID REWARMING IN 105 DEGREE (F) WATER.** However, don't rewarm until you're at a hospital or where there is no danger of re-freezing. Also, frostbitten limbs are numb, so **DON'T COOK THEM** in too-hot water.
 - frostbitten and rewarmed feet are extremely painful, and easily damaged; the victim must be carried out.
 - Frostbite is almost always caused by too-tight boots or other constriction, or by direct contact with super-cooled metal, gasoline, or alcohol.
- * **HYPOTHERMIA AND FROSTBITE ARE DIFFICULT TO TREAT, BUT EASY TO PREVENT.**
- * When out in a cold environment:
 - Carry and wear **THE THREE W'S: WOOL, WINDPROOF, AND WATERPROOF CLOTHING.**
 - Keep dry by **VENTILATING** to avoid condensation.
 - **"DRESS COOL"**, that is, stay cool rather than toasty warm, so you don't sweat.
 - Dress in several thin **LAYERS** rather than a single thick one, to trap insulating air between layers, and so you may adjust your clothing so you don't overheat.
 - Drink plenty of water to **AVOID DEHYDRATION** from the cold air, and munch lots of **QUICK-ENERGY FOOD** to provide a constant supply of energy.
 - **DON'T DRINK.** Alcohol causes **FLUSHING** which makes you feel warm, but causes you to lose heat faster, and may lead to hypothermia.
 - **DON'T SMOKE.** Tobacco causes skin **BLANCHING** and may lead to frostbite.

BASIC SURVIVAL LESSON PLAN

VII. SURVIVAL AND THE MIND

- * The keys to survival in any situation are two: **POSITIVE MENTAL ATTITUDE: THE WILL TO LIVE** and **RATIONAL THINKING** using good survival knowledge. As we often say, **A CLEAR, EDUCATED MIND IS THE BEST SURVIVAL TOOL YOU CAN HAVE.** But the reaction to fear or anxiety may create **PANIC**, which interferes with rational thinking. If you're in a survival situation, you might want to use this mnemonic to help control your fear or anxiety:

[on board:]

S - STOP
T - THINK
O - OBSERVE
P - PLAN

- * Use your mind before you go into the outdoors, so you won't find yourself in a survival situation:
 - **KNOW YOUR ABILITIES AND LIMITATIONS.** Be honest with yourself. Don't push yourself, or let others push you, into a situation you can't back out of.
 - **DON'T LET ARTIFICIAL GOALS INTERFERE** with your survival; exhausted and hypothermic climbers and hikers have been known to fixate on finishing a climb or hike, rather than on survival, and have paid with their lives.
 - **BE PREPARED** for sudden changes in weather and other problems by carrying spare food, water, clothing (all 3 W's), and shelter in your pack. Your pack is your life support system in a hostile environment, as is a diver's SCUBA tanks or an astronaut's spacesuit. So, obey what we all learn as the number one rule of mountain rescue:

DON'T GET SEPARATED FROM YOUR PACK!!!!!!!!!!!!

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SURVIVAL PHYSIOLOGY
by Rich Saunders

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FOOD AND WATER

Under favorable conditions, it is possible to survive for several weeks without any food and for about a day without any water. However, your usefulness as a search and rescue team member deteriorates quickly without an adequate supply of both food and water. How much is enough? That depends on the amount of work you're doing.

If you were operating a radio relay on top of Old Rag Mountain on a balmy spring day, you'd need roughly 2000 Calories¹ of food and about 3 liters of water a day. This is the minimum required (by an average 150 lb. male) under sedentary, non-stressful conditions.

On the other hand, if it were cold outside, and particularly if you were also working hard, as might happen if a freak spring snowstorm caught you loafing around on Old Rag, your daily caloric requirements would increase substantially, to 3000 Calories or so; and, if you have to evacuate your hypothermic partner to climes more safe and warm, you might well require 4000 Calories to meet your body's demands for the day. Your water need for the day would increase to about 6 liters to make up for sweat and other physiologic losses.

In general, the colder the weather and the harder you work, the more food Calories you need; and, the hotter the weather and the harder you work, the more water you need. Realistic values are 3000 Calories of food and 4 to 5 liters of water per day. In many cases you will not have to carry all your water with you, since you will find drinkable water during the day. The Caloric values for some typical mountain rescue team foods are listed on the next page.

-
1. The calorie (with a small c) is the amount of energy needed to raise one gram of water one degree Centigrade. The Calorie (with a large C), also known as the kilocalorie or kilogram-calorie, is the amount of energy needed to raise a kilogram of water (1000 grams) one degree Centigrade. Thus, the typical daily food intake of 2000 Calories is equivalent to 2,000,000 calories. In the context of diet, one always uses the kilogram calorie, though it is often not capitalized.

SURVIVAL PHYSIOLOGY

Food	Calories/ounce
Chocolate	145
Peanuts	166
Raisins	80
Kippered Herring	60

Thus, you can provide all your daily Calories with 3.13 lbs. of kippered herring or 1.13 lbs. of peanuts. This is not to say that you should do so, only that it would provide enough food energy.

Why do some foods have more Calories per ounce than others? In general, the more fat or oil something has, the more Calories it has. Hence peanuts, which are high in vegetable oil, have more Calories than raisins, which have a lot of sugar. Obviously, if you want to save weight, fatty foods are the thing to carry. To some extent, this is a good idea, but there is more to it than that. Fats and oils tend to be harder to digest, and so are more likely to cause indigestion if you eat them before doing something strenuous; they also take considerable time to be digested into energy available to your body for work. Simple sugars such as glucose (dextrose) are the easiest foods to digest and provide the "quickest" energy. More complex carbohydrates like table sugar (sucrose) and starches are slightly more difficult to digest (but still much easier than fats or protein), and provide more sustained energy than glucose.

Protein is intermediate in digestibility, and provides about as many Calories per ounce as do carbohydrates. However, your body needs some protein every day to replace worn-out tissue. When involved in heavy exercise, you need even more protein, due to increased wear and tear on muscles and other tissues. Although you should (ideally) have some protein each day, it takes several days or more for the ill effects of a low-protein diet to show. On the other hand, there is something inexplicably satisfying about an evening meal high in both protein and fat; perhaps our bodies are telling us something we'd best not ignore.

For routine munching purposes, we want an easily digestible, quick energy and sustained-yield mix of protein, carbohydrate, and fat. One easy (and tasty) way to get such a mix is with GORP, a trail mix made of equal parts of raisins, salted peanuts², and M.&M's. This may be administered in small amounts throughout a strenuous day with minimal indigestion.

In winter, many people seem to need more fatty foods to keep them going; this may have to do with increased metabolic needs during very cold weather. In any case, you may want to increase the proportion of fats in your winter diet by adding more nuts to your trail mix and planning a higher fat content for your evening meal.

-
2. Although a diet low in salt is recommended for daily consumption, salt needs increase markedly with exertion. Therefore, every mountain rescue diet should contain plenty of salt.

When planning a menu for wilderness rescue or outdoor recreation, your diet should be as similar as possible to your regular diet at home, with the constraints of weight, bulk, and increased caloric needs. Your body will have difficulty adapting to a drastic change in diet. The bacteria and enzymes in your gut are adjusted to handle your usual diet; sudden changes in the proportion of fat, protein, or other food components will leave you bloated, crampy, and poorly nourished.

CONDITIONING

The better shape you are in, both physically and emotionally, the more help you can provide on a mission. Physically, you can help yourself by improving your strength, stamina and flexibility.

Regular weight training or isometric exercises which challenge (but do not strain) your arms, torso, and legs will increase your muscle mass and make you stronger. This will manifest itself by making rope work and other brute-force type chores easier.

Endurance exercises such as running, aerobics, and swimming laps will, when done regularly, increase the fitness of your heart, lungs, and muscle and make it easier to do a full day of rescue work without becoming fatigued. Fatigue is not only unpleasant, it also makes you much more susceptible to hypothermia and errors in judgement.

Regular stretching, such as with karate or ballet warmup exercises, will make your muscles less likely to cramp and less likely to tear when stretched, and will also help you to stretch far when necessary. Mountain rescue procedures occasionally require great flexibility, as when you have to reach distant holds or steal a fellow Field Team member's food without him noticing.

The key to physical conditioning is to work out regularly. Sporadic exercising might do more harm than good, because you are more likely to strain a muscle if you are unused to such stress. A regular program of strength, endurance, and stretching exercises practiced at least three times per week will not only leave you physically able to face a day or two of rescue work, it will also leave you in better shape emotionally. Needless to say, the benefits of such a program also accrue outside the framework of mountain search and rescue.

CLOTHING AND LIGHT SOURCES

by Rich Saunders

Version 2.0 August 1984

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WILDERNESS CLOTHING

Raingear and Shell Garments

Waterproof Shells, Condensation, and Ventilation One of the most important pieces of personal search and rescue equipment is raingear. Most people who have spent time in the wilderness find that a waterproof shell parka is one of their most versatile and valuable pieces of clothing. Such a shell, when coupled with a pair of waterproof pants or chaps, offers almost complete protection from wind and rain, but takes up very little space in your pack. Although waterproof shells protect from wind and rain, they suffer from a major disadvantage: condensation. Even at rest, the human body lets out a good amount of moisture through the skin, and any exertion will increase this perspiration, perhaps to the point it starts rolling down the skin and we name it sweat. The water vapor given off by the body condenses on the inside of waterproof shells, dampening one's clothes. It seems like an insoluble dilemma: if you don't wear your raingear, you get wet from rain, but if you do, you just get wet from sweat. However, it is possible to circumvent much of this condensation problem by good ventilation, allowing the water vapor to escape. Of course, any vent which can let water vapor escape could potentially let wind and rain in; the best vents seem to be underarm zippers, which allow ventilation of your sweatiest parts without letting in much rain.

Materials Shell garments may be just windproof, with no water resistance; this is a wind shell. The advantage of such a shell is that, although it offers no protection against rain, it allows you considerable exertion in cold, windy weather with no condensation problems. Water vapor slips out through the material quite easily (though rain can, of course slip in just as easily). The other extreme is a heavily coated "slicker" which is completely waterproof even in a downpour, but has major condensation problems. There are all kinds of intermediates, but the trade-off is clear: the more waterproof, the less a material "breathes" to avoid condensation.

Whatever you select as raingear should have a very high resistance to water entry, because a driving rain will quickly soak you through a "water-resistant" garment. Let's look at some examples. An uncoated nylon parka may be treated with a spray-on treatment like ScotchGard^(R); this increases the water resistance, but not by much. On the other hand, if the nylon is

coated (usually at the factory) with urethane plastic (brand names include K-Cote and Super K-Cote), it becomes very highly water resistant and quite suitable as protection from a driving rain. Other shell parka materials, such as ventile cotton, 60/40 cloth (cotton and nylon), or 65-35 cloth (dacron/polyester or similar combinations), have water entry resistance greater than untreated nylon but not as great as coated nylon. They do, however, "breathe" quite well when it's not raining. The theory is that the cotton or other fibers swell in the rain, sealing off the pores; this is true to a degree, but unfortunately, they just won't keep you dry in even a moderate rainstorm, so 60/40 parkas can't really be called raingear, but perhaps "snowgear" or "fog-and-mistgear."

Gore-tex Well, let's get to Gore-tex, since many of you have probably been muttering to yourself about it throughout the last paragraph. Gore-tex is a material both breathable and waterproof; it is so by virtue of tiny (tiny!) holes, which are big enough to let water vapor through, but too small for liquid water to pass. Thus, it minimizes condensation on sunny days, and sheds water when it's raining. Unfortunately, even Gore-tex cannot pass water vapor when it is covered with (liquid) water, so Gore-Tex raingear still needs good ventilation. There are also other materials that claim properties similar to Goretex.

Other forms of Raingear We should briefly mention forms of raingear other than parkas, for instance the poncho. Ponchos have the great advantage of excellent ventilation, but are a bit too well-ventilated when it becomes windy, and novice poncho-wearers are in for a big surprise the first time they try to bushwhack through laurel and rhododendron in the rain. Another raingear variant, much more suitable for mountain rescue, is the cagoule, which is sort of a formal length parka (actually, just below the knees). Worn with a pair of gaiters, it provides excellent rain protection, and can also serve as a bivouac shelter.

Putting it All Together By now you've probably figured out that you need a waterproof parka and pants, and a separate set of non-waterproof parka and pants for weather cold, windy, but dry. The alternative is a well-ventilated Goretex parka and pants (expensive, but not so bad if you figure it replaces both raingear and a fair-weather wind shell).

Insulating Materials

There are many factors to be considered in selecting an insulating fabric for outdoor use. Among these are wind protection, the degree of water wicking, both dry and wet warmth, and the amount of water retention.

CLOTHING & LIGHT SOURCES

Water Wicking and Retention Polypropylene is a material with good water wicking characteristics. This means that, when worn next to the skin, it will draw perspiration away and keep you relatively dry and comfortable. Cotton, too, has good wicking action; it is also quite comfortable against the skin (at least while dry). Although polypro and cotton both wick well, they have one most important difference: polypro retains little water, even after being soaked, whereas cotton holds water like a sponge. A wet cotton shirt is quite useless as insulation, and it will take quite a while to dry, whereas the polypro shirt is still relatively warm and will dry quickly. Cotton's good water wicking turns out to actually be a detriment, due to its high water retention; if just a tiny bit of cotton shirt sleeve is sticking out from one's raingear, soon the the entire shirt is a sodden mess. The moral is: if you can guarantee dry weather for all our missions (and you don't sweat), invest heavily in cotton clothing. Otherwise, stick with polypropylene and wool.

"Wool is Warm When Wet" Wool is the traditional insulating clothing material for in-the-know outdoorspeople. Compared with cotton and many other materials, wool retains less water, keeps more of its warmth when wet, and dries more quickly. If we now compare wool to the new synthetic fibers (like polypropylene), we find that wool is relatively cheap: army surplus wool clothing is still available at a very low cost, and Sears sells (in season) a very reasonably priced and relatively non-itchy 100% wool underwear. (They also recently began carrying very reasonably-priced polypro underwear.) Wool is easily manufactured into a variety of clothing forms including shirts, sweaters, underwear and hats. Wool is versatile: depending on the weave, it is relatively wind-resistant and tough, or wind-porous and soft. Polypropylene and its relatives are moderately expensive, and the selection of polypro clothing is limited (but growing). Polypro clothing is uniformly porous to wind, and is not very rugged compared, for instance, with army wool serge pants. On the other hand, polypro retains much less water than even wool, and dries extremely fast. It also wicks well (which wool doesn't); combined with its lack of skin irritation compared to wool, this makes polypropylene far superior to wool for winter underwear. To put it in one sentence: cotton kills, wool keeps you alive, but polypropylene keeps you comfortable.

CLOTHING & LIGHT SOURCES

	Dry Warmth	Wet Warmth	Wind Protec- tion	Water Reten- tion	Water Wick- ing
Cotton	OK	Low	High	High	High
Down	High	Low	High*	High	Low
Wool	High	OK	OK	OK	Low
Syn- thetic Pile	High	High	Low	Low	High
Syn- thetic Batting	High	High	High*	Low	Low*

*[due to the nylon shell covering layer]

Table 1: Characteristics of Clothing Materials

Table 1 summarizes the qualities of some common outdoor clothing materials which have not been discussed in detail. Pile is made of polypropylene, polyester, or other warm-when-wet synthetic fibers. Batting is loose synthetic fibers, and must be between two layers of nylon or similar material.

LIGHT SOURCES

Mountain rescue operations tend to occur at night, and it is often necessary for team members to be working hard with both hands, while lighting the way ahead with a headlamp. (Head-mounted lights are a necessity; you can only hold a flashlight in your mouth for about an hour without either (a) swallowing it or (b) shorting the battery through your tongue.) It seems that many of our night operations are in the snow or rain, so your headlamp must be reasonably windproof (ruling out carbide lamps) and rainproof (ruling out some cheap electric headlamps) and must function in the cold (ruling out common carbon-zinc dry cells). Now that we have limited the field somewhat, let's consider some specifics.

CLOTHING & LIGHT SOURCES

Batteries¹

The characteristics of common dry cells are set forth in the table and figure below. A few salient points follow.

1. Standard carbon-zinc cells are almost useless when it gets a little chilly, even if kept in an inner pocket. If you have to buy something at a local store in a hurry, get heavy duty or, better, alkaline cells.
2. A set of 4 alkaline D cells and 4 spares weigh a little more than two pounds. Two lithium D cells run your headlamp as long as the 8 alkaline cells, cost about the same, but weigh only 6 ounces, and cost about the same. Lithium cells are a big investment, but worth it. Lithium cells have a very long shelf life, at least 10 years; they haven't been in production long enough to find out how much longer. The one disadvantage of lithium cells is that they may give off inflammable hydrogen gas if you attempt to recharge them or smash the case (so don't).
3. Nickel-Cadmium cells are heavy, but work well in the cold; their main advantage is that they provide cheap power because they are rechargeable. They are suboptimal for mountain rescue use because their short life per charge requires several spares to be carried, but they may be used in spite of the weight because they are so economical.
4. Carbon-zinc and alkaline cells have a limited shelf life, which varies with the temperature and humidity at which they are kept (keeping them in a refrigerator is a good way to extend their shelf life). Nickel-cadmium batteries must be regularly discharged and recharged, as well as maintained in between uses with a trickle (low current) charger, to keep them from dying at an early age.

-
1. Strictly speaking, a "battery" is a stack of individual electric storage cells. The cells may be wet cells, as in lead-acid car batteries, or dry cells, as used in flashlights. Most "batteries" one buys are actually single dry cells, but a few, such as 9 volt radio batteries, are truly a battery of smaller dry cells sandwiched together.

Type Cell	Voltage	Cost/ Cell	Life	Weight/ D Cell	Comments
Carbon-Zinc	1.5 V	X	Y	3 oz.	Short shelf life
Zinc Chloride	1.5 V	1.5 X	1.5 Y	3.5 oz.	"Heavy Duty"
Alkaline	1.5 V	2.5 X	2 Y	4.3 oz.	
Nickel-Cadmium	1.25 V	6 X	2 Y*	3.2 oz.	*Rechargeable
Lithium	2.8 V	8 X	5 Y	2.9 oz.	

Table 2: Dry Cell Characteristics

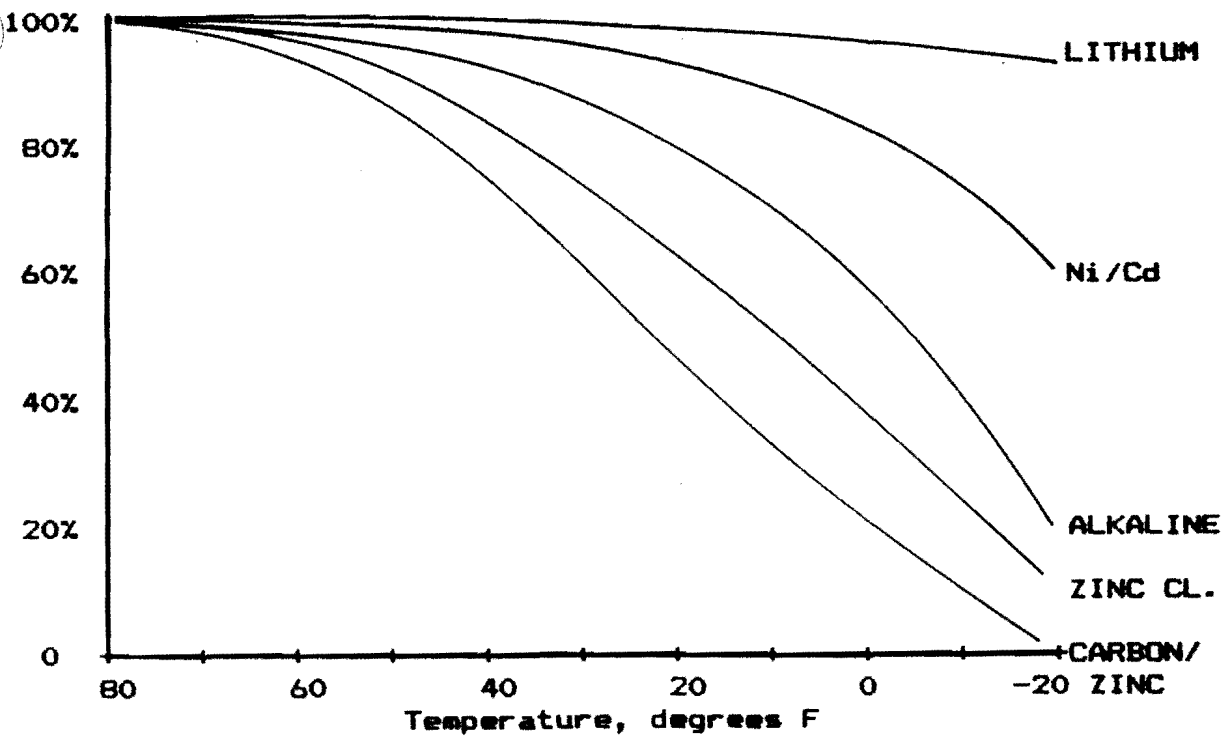


Figure 1: Dry Cell Performance (Power) vs. Temperature

CLOTHING & LIGHT SOURCES

Bulbs

Most outdoorspeople are conscientious about including spare batteries in their packs, but seldom think to include spare bulbs. Bulbs, too, have a limited life. If you use a light with lithium cells, you may find that you burn out 2 or 3 bulbs for each set of batteries.

Bulbs come in many sizes, shapes, and voltages. Your choice of bulb type for your headlamp depends on the intensity of light you want-- a brighter bulb burns out more quickly, but the brighter bulb gives you more light for your battery life (brighter bulbs are more efficient at turning power into light). It is possible to make a very bright, very high efficiency bulb, but in order to keep it from quickly burning out, the bulb must be filled with a special inert gas (krypton bulbs) or with iodine, which requires a quartz rather than glass bulb (quartz-halogen bulbs). These fancy bulbs are expensive, but, as with lithium cells, probably worth the investment in the long run. They tend to produce a much brighter light than the equivalent bulbs, and burn out batteries more quickly, but overall give more light per battery than a conventional bulb (more lumens per watt).

WILDERNESS MEDICAL SELF-CARE

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This Section provides basic reference information for treating medical problems in a wilderness setting, using the SMRG Standard Personal Wilderness Medical Kit (Personal MEDKIT). It assumes knowledge of standard and advanced first aid practices, and the ability to diagnose common medical conditions. One way to acquire this is to take an American National Red Cross Advanced First Aid course or a Department of Transportation First Responder course, and to read Newell Breyfogle's book (which is required reading for this Module).

This Section is divided into two parts. The first addresses medical problems in a systematic way, giving instructions for the treatment of each. The second part lists the contents of the Personal MEDKIT, and comments on the characteristics and proper use of each medication. Only a physician may tell you how to properly use prescription medications, so the uses and doses suggested in this document should be confirmed or modified by your private physician. Medications your physician prescribes for you are for you, not for others; it is neither wise nor legal for you to offer your medications to others. For those using this section as a study guide for the Basic exam, please note that it includes more than the minimum information required by the ASRC Standards: this material will not appear on any Basic exam, but is included simply because it might prove useful.

Special thanks are due to Robert Rosenthal, M.D., attending physician at George Washington University Medical Center and SMRG's Medical Advisor, and Rose Ann Soloway, R.N., M.S.Ed., of the National Capital Poison Control Center, for their assistance with portions of this Section of Module I.

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GENERAL

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Infectious Diseases

Infectious Agents and Medical Countermeasures Many types of infectious agents may cause human disease. Small, unicellular parasites like *Giardia lamblia* or *Entamoeba histolytica* are causes of diarrhea in wilderness hikers. Some bacteria, such as *Staphylococcus* and *Streptococcus*, are normal skin, nose and throat flora, but may cause skin infections (e.g. boils); *Clostridium tetani*, a normally innocuous soil bacterium, will cause tetanus when it grows in wounds. Viruses are the cause of many diseases, including the *Rhinoviridae* that cause the common cold, and the dread Rabies virus. Some diseases are caused by unusual organisms, between viruses and bacteria in size, such as the *Rickettsiae* that cause Rocky Mountain Spotted Fever and that are found in the mouth of certain ticks.

There are two main types of medical countermeasure against infectious disease. Antibiotics are drugs which poison bacteria or other infectious agents, yet are non-poisonous or only slightly poisonous to humans. Unfortunately, for many diseases, including most viral infections, no antibiotic is available.

For certain diseases, including many viral infections, a second type of countermeasure may be employed: immunization, also sometimes known as vaccination. If one is injected with a dose of killed or weakened virus, bacterium, or one of their poisons, one doesn't become ill (other than a slight fever), but the body develops antibodies and other immunity against the virus, bacterium, or poison: one is then immunized against it. Most children are now routinely immunized against Diphtheria, Pertussis (Whooping Cough) and Tetanus (the "DPT" series), Measles, Mumps and Rubella (the "MMR" series) and Polio. Generally, booster doses of tetanus toxoid (see under Tetanus, below) should be given each 10 years, or sooner with a grossly contaminated wound. Immunizations for other diseases are available but not routine.

Two common contagious illnesses in the wilderness are diarrhea and colds. Diarrhea may come from contaminated water, but proper treatment of all drinking water with iodine water-purification tablets or boiling for 10 minutes (longer at high altitude) should eliminate most causes. (*Entamoeba histolytica* cysts are killed by iodine tablets but not by chlorine tablets, but *Giardia lamblia* may be resistant to even iodine; only boiling will guarantee safety.) It is also possible to contract diarrhea from another person, but proper handwashing and care to avoid contaminating food with dirty hands will minimize this. Colds might rarely be transmitted by drinking from a common water bottle, but the most common way to catch a cold is from nose-picking with contaminated hands. (No, this isn't a joke, it's straight from the National Institutes of Health!)

Rocky Mountain Spotted Fever Rocky Mountain Spotted Fever (RMSF), which, contrary to its name, is more common in Virginia and North Carolina than in the Rocky Mountain states, is characterized by a spotty red rash and high fever. (Easily remembered!) Anyone with sudden fever and rash should get medical evaluation without delay, as RMSF and related diseases may be fatal. RMSF may be prevented by avoiding tick bites, since this is the only way to contract it. If it will be a long time until you reach medical care, the antibiotic Tetracycline (not a standard MEDKIT antibiotic) should be given; sulfonamide antibiotics such as Septra or Bactrim should NOT be given, as there are indications that they might make the disease worse. (No, it doesn't make much sense; but, it's true anyway.)

Tetanus Tetanus is caused by soil bacteria that can live only where there is very little air (they are "anaerobic"). They are found living sedately and innocuously in great numbers in soil everywhere; but, if they start growing in a wound, one of their byproducts is a poison which causes "lockjaw" and convulsions. One is immunized against tetanus (which should be every 10 years or after dirty wounds) by injecting small amounts of detoxified poison ("tetanus toxoid"); this causes antibodies to the poison to develop, which will then neutralize the poison if an infection with *Clostridium tetani* occurs. (The infection itself is mild and not a problem; the bacteria innocently produce something that just happens to be poisonous to humans.) The classic place for a tetanus infection to develop is in a contaminated puncture wound. Didn't your mother caution you about "stepping on a rusty nail and getting lockjaw" when you wanted to run around barefoot as a child?

Rabies Rabies, also known as "hydrophobia" because of the inability of those afflicted to swallow water (or anything, for that matter), is almost uniformly fatal after symptoms start. It is caused by a virus which grows in the nerves, brain, and salivary glands of mammals. It is generally transmitted by the saliva of a rabid animal, usually by a bite. The virus extends slowly along the nerves from the original bite or infection until it reaches the brain, causing signs and symptoms; thus, the time from a bite in the foot to the development of symptoms might be months. An almost painless immunization is now available for pre-exposure protection, which may also be used effectively in someone who has been bitten but is not yet showing symptoms. No other treatment is available. Foxes, raccoons, and bats are known to have a high incidence of rabies, but rodents and lagomorphs such as squirrels and rabbits do NOT usually transmit rabies. The risk of contracting rabies after a bite by a rabid animal is significantly decreased by (1) vigorous cleaning of the wound, and (2) prompt administration of the vaccine and another protective substance called immune globulin.

Fever

Fever is an elevation of body temperature above the normal range (normal is about 97 to 99.5 degrees Fahrenheit, or 35.5 to 38 degrees Centigrade), caused by a resetting of the body thermostat. The onset of fever may be associated with chills and shivering as the body tries to raise the body temperature to the new "proper" level. Fever is a normal response to a variety of conditions, including infections either serious or trivial; but, fever may also be a response to noninfectious causes, including simple dehydration. Fever itself is not dangerous, unless the temperature rises above 104 degrees F (40 degrees C). With fever greater than 104-106 F, adults may suffer brain damage. Children tolerate high fever better, but may develop "febrile seizures", which are frightening but rarely cause any brain damage. Mild fever is not harmful, and may be beneficial.

Aspirin and Tylenol (acetaminophen) tend to directly "turn down the thermostat," and may also relieve the discomfort associated with fever. High fever may be treated by cool baths, but the body may just shiver harder trying to keep the temperature up to the new "proper" level. Children with viral illnesses who are treated with aspirin may rarely get Reye's Syndrome, a type of liver failure, so Tylenol is preferred over aspirin for children with an upper respiratory infection ("cold" or "flu") and fever.

Exposure to Cold

Hypothermia Hypothermia may be divided into three major types. Immersion hypothermia, also known as acute hypothermia, results from sudden overwhelming cold stress, such as from falling into a stream in the winter. Subacute hypothermia, also known as mountain or exhaustion hypothermia, is the result of several hours of exposure to cold, usually associated with strenuous hiking and the resultant exhaustion and fatigue. Chronic hypothermia occurs after mild or moderate cold exposure over days, and causes many abnormalities in body metabolism.

Immersion Hypothermia When a person has become rapidly hypothermic (as from falling into cold water), the best treatment is to rapidly rewarm him in a tub of water kept at 110 degrees F. Rewarming shock (see below) is rare when rapidly rewarming someone with this type of hypothermia; still, the arms and legs should be kept elevated and out of the bath until the torso is completely rewarmed and the person appears recovered. The level of consciousness, pulse, and blood pressure should be checked every few minutes. If the level of consciousness decreases, the blood pressure drops markedly, or the pulse becomes rapid, rewarming shock is starting and the rewarming should be slowed, perhaps by adding cool water to the tub. If the rewarming shock is severe, the person should be removed from the tub and placed in the shock position until stable and able to resume rewarming. NEVER REWARM THE LIMBS UNTIL THE TORSO AND HEAD ARE REWARMED, as doing so will cause at least some degree of rewarming shock.

WILDERNESS MEDICINE: GENERAL

Rewarming Hazards A hypothermic person is very vasoconstricted (the skin blood vessels are small in diameter), with little blood circulating to the skin. This provides a cold, insulating layer of skin around the core. It also makes the vascular system smaller than in a person with a normal temperature, and the kidneys react to this by reducing the blood volume (excreting the "excess" water as urine). The importance of this is that the hypothermic person has a smaller-than-normal blood volume, but in a proportionately smaller-than-normal container, so the blood and the vascular system are in balance.

When cold, vasoconstricted skin is placed in 110 degree water, the blood vessels expand (vasodilation), by a local reflex; this increases the size of the vascular system. Thus, when we rewarm a hypothermic person, we are suddenly putting his blood and vascular system out of balance: he has a smaller-than-normal amount of blood, but now in a normal-sized container. This imbalance is a form of shock, similar to that from dehydration or from bleeding. To minimize shock, it is wise to hold off on rewarming the arms and legs until the core is warm.

Another problem of rewarming is also related to sudden reflex vasodilation. The blood in the arms and legs is cold and full of metabolic waste products. At the beginning of rewarming, the skin blood vessels dilate, this cold, stagnant blood is suddenly returned the core, and the core temperature paradoxically drops a few degrees ("afterdrop"). When this toxic blood suddenly goes into a heart that is already chilled, it may cause ventricular fibrillation, a form of cardiac arrest.

These problems are presented not to dissuade you from rewarming when it is appropriate, but to emphasize that it is not a treatment to be taken lightly.

Mild Subacute Hypothermia When a member of a hiking party or Field Team shows signs of confusion, withdrawal, or incoordination, he is probably severely exhausted and fatigued; he is also probably on the verge of hypothermia, even though his core temperature may still be near normal. This is an emergency: the group should stop and shelter the affected member, provide him with dry clothes, give him quick-energy food if he can eat, and rehydrate him if he can drink. (Of course, no patient who is stuporous or semiconscious should be given fluids to drink.) Hot drinks may cause as much reflex skin vasodilation and heat loss as they add heat, but in a well sheltered and insulated person, there may be a net heat gain, and the psychological value of hot cocoa or bouillon is undeniable. If the person does not recover within an hour or so, and certainly if he becomes worse, rewarming is in order. A hot tub may be used, as described for immersion hypothermia, but the danger of rewarming shock and heart problems are greater when the person is exhausted and fatigued. Rewarming by skin-to-skin contact with other warm bodies in a sleeping bag is slower and less effective, but probably will not cause rewarming shock. Hot packs or water bottles may be applied to skin which readily exchanges blood with the core (groin, armpits, and neck), but care must be taken not to cause burns.

Severe Subacute or Chronic Hypothermia A patient who is severely hypothermic (i.e. unconscious or semiconscious), whether from subacute or chronic exposure, is extremely susceptible to shock or heart problems when rewarmed. The best treatment for someone this hypothermic is to transport him to a medical facility for carefully monitored rewarming in an intensive care setting. **THE PATIENT SHOULD BE TRANSPORTED EXACTLY FLAT OR WITH THE HEAD SLIGHTLY DOWN**, as the head-up position may cause seizures and death. While transporting the patient, great care must be taken to **AVOID BUMPING THE LITTER**; a sudden jolt might cause the patient's heart to stop beating normally. The patient should be insulated and a small amount of heat should be added (such as from hot packs) to counteract continuing heat losses. If transportation is not feasible, body-to-body rewarming may be tried (as may warmed oxygen or warmed intravenous fluids). No patient with severe subacute or chronic hypothermia should undergo hot tub rewarming.

(Frostbite: see SKIN)

Dehydration and Exposure to Heat

Dehydration Dehydration is a problem in winter as well as summer. In warm weather, sweating causes loss of both water and salt; in winter, large amounts of water (but not salt) are lost from the upper airways. Warm air can hold considerable water vapor, but cold air cannot and is always dry. Winter air is warmed and humidified by the upper airways to protect the lungs; with each breath, this moisture is lost. It is possible to place a scarf or other "rebreather flap" over the nose and mouth, and thus to trap and return some of this moisture, but still, most of it is lost.

Thirst is not an adequate gauge of water needs, especially in winter. The best signs of dehydration are the presence of concentrated (dark or deep yellow) urine, or a low urine output, as shown by many hours without the need to urinate; blurred or tunnel vision, headache, nausea, or vomiting can also occur. The treatment for dehydration is to replace the water loss while supplying adequate salt as necessary (see also Salt Replacement, below). Prevention is best, by a conscious effort to drink an adequate amount, even when this is much more than thirst demands. How much is an adequate amount? It is enough to prevent the symptoms of dehydration (nausea, blurred vision, lightheadedness) and to assure a fair amount of non-concentrated urine every few hours.

Heat Cramps Heat cramps are caused by imbalance in the content or distribution of body salt, and usually occur in the abdominal muscles or legs. They differ from other cramps in that they are more resistant to massage or stretching. Treatment is salt replacement, as discussed below.

WILDERNESS MEDICINE: GENERAL

Heat Exhaustion Heat exhaustion is a state of mild shock resulting from body water and salt imbalance, often due to replacement of water without adequate salt. Treatment includes fluid and electrolyte replacement as described under Salt Replacement, below. Put the person in the shade in shock position, and keep from chilling. With proper treatment, the person should be better in about an hour.

Salt Replacement Table salt, (sodium chloride), is the major type of salt lost from sweating. However, sweat also contains small amounts of other constituents, an important one being potassium. A normal diet contains sufficient amounts of sodium, potassium, and chloride for a non-strenuous day, but when one sweats excessively, especially if not heat-adapted, large amounts of these *electrolytes* may be lost. The best way to keep up an adequate intake of electrolytes is to salt meals generously. (But, don't do this if you're not sweating heavily; high salt intake may lead to high blood pressure). If an increased salt intake at mealtime is not enough, as it won't be with strenuous activity or if you're not yet acclimatized to the warm weather, then salt supplementation is necessary. Unfortunately, concentrated salt, such as if one were to take a salt tablet or eat a packet of salt, is notoriously difficult to absorb from the stomach, often causing severe stomach cramps, and may cause electrolyte imbalances, especially in children. It turns out that salt with a meal or dilute salt solutions are much easier to absorb. Drinks such as Gatorade and ERG have the appropriate dilute concentration, and include other electrolytes such as potassium; they also may contain some glucose for quick energy. It is possible to make an appropriately dilute solution which will replace sodium chloride (but not potassium) by adding a teaspoon and a half of salt to a liter (quart) of Wyler's or similar lemonade.

SUMMARY: If you need salt supplementation: do salt meals heavily, and drink Gatorade, ERG, or lemonade with 1 - 1/2 teaspoons of salt per quart or liter; don't use salt tablets.

Heatstroke: Heatstroke is the burnout of the brain mechanisms for heat loss control, due to extreme overexertion in a hot environment, or to sudden exposure to high heat and humidity in those unacclimatized, or to heat exposure in those with certain diseases or on certain drugs. Heatstroke is extremely serious, and even with proper treatment, many victims die. Treatment: cool to 99 degrees F, maintain this temperature, follow standard first aid principles such as maintaining the airway, and transport to a medical facility.

Allergy

Severe Systemic Allergic Reaction Some people may have a severe allergic reaction to allergens such as certain stings, plants, foods, or other materials in the environment. This systemic reaction is not limited to the area of contact with the allergen. Its most prominent sign is a wheal-like rash (like mosquito bites without the bite), which may occur over the entire body. These itching hives may be treated with cold applications, and by taking aspirin and an antihistamine (chlorpheniramine). Any nausea and vomiting which might occur may be treated with Compazine (prochlorperazine) tablets.

Anaphylactic Reaction An anaphylactic reaction, also known as anaphylactic shock or anaphylaxis, is an even more severe allergic reaction than that described above. In anaphylaxis, the major problem is swelling of the upper airways which may cause airway obstruction within minutes. Shock is also common. The essential treatment is the Epinephrine (Adrenaline) in the Ana-kit. With an alcohol pad, swab a thickly-muscled section of arm, pinch up a couple of square inches of overlying skin between the thumb and fingers of your left hand, and with the right hand quickly stab the Epinephrine needle into the skin at a 45 degree angle. Switch the thumb and fingers of the left hand to grasp the syringe barrel, pull back on the plunger to make sure you're not in a blood vessel, and inject half of the syringe. If necessary, the plunger may be twisted 90 degrees and a second injection given. Give the chewable antihistamine in the Anakit, or two or three chlorpheniramine tablets; this will serve as an adjunct to the Epinephrine and will provide continuing relief. Epinephrine is not, as Breyfogle states, a specific anti-venom in the same sense as snakebite antivenin; it is a drug which helps relieve anaphylaxis-induced vasodilation and swelling and constriction of airways.

(Asthma: see RESP)

(Skin Allergy: see SKIN)

(Allergic Rhinitis (runny, stuffed-up nose): see HEENT)

(Allergic Conjunctivitis (eye inflammation): see HEENT)

Shock

Blood loss, burns, or severe vomiting and diarrhea may cause hypovolemic (low volume of blood) shock. The treatment is as follows:

- 1) Place the patient in the shock position: on his back, with his torso and head flat, but with his feet and legs propped up about a foot. If there is danger of vomiting, the head should be turned to the side. If the patient is semiconscious or unconscious, he should be placed in the coma position (see CNS) but with the feet still elevated. If there is suspected spinal injury and either unconsciousness or danger of vomiting, the patient should be placed in the modified coma position (see CNS) on an improvised backboard (outhouse doors are traditional); the foot of the backboard should be elevated six inches or so.
- 2) Reassure the patient, to minimize the psychological component of shock. Oral pain relievers should generally not be given because (1) they may cause vasodilation and worsen shock, and (2) absorption from the stomach may be slow with shock.
- 3) The patient should be kept from chilling, as shivering will use up valuable energy stores; however, do not warm enough to cause reflex vasodilation.
- 4) If someone is in mild shock, and it will be a long time until sophisticated medical care is available, consider giving oral fluids. In civilized areas, oral fluids are seldom appropriate; in particular, don't give oral fluids to anyone who is likely to need surgery under general anaesthesia. Anaesthesia depresses the gag reflex and thereby leaves the lungs unprotected from aspiration of stomach contents, which may quietly regurgitate into the throat. Even in a wilderness setting, this same danger is present in someone who is comatose (or heading that way), so don't give oral fluids to a patient with a head injury unless he's clearly stable. In a wilderness setting, it may be appropriate to give oral fluids to someone who may need surgery, but when it will be 12 hours or more until reaching a medical facility. Even in the wilderness, it is not appropriate to give oral fluids to someone with abdominal injuries, because little will be absorbed, and the fluid may spill into the abdominal cavity. Since fluid is not well absorbed from the GI tract in shock, small amounts of Gatorade or a similar salty drink should be given frequently (4 ounces = 120cc = 1/2 cup every 15 minutes). Discontinue if there is nausea or vomiting. A substitute may be made by adding 1 teaspoon of salt (sodium chloride) and 1/2 teaspoon of baking soda (sodium bicarbonate) to each liter or quart of water. The salt replaces lost salt, and the bicarbonate helps correct the acidosis from shock. The salty lemonade suggested under Salt Replacement (one and a half teaspoons of salt in a liter of lemonade) will be effective as well.

Pain

The medical complaint with which you will probably deal most often is pain. Pain is a signal which should direct you to a particular organ or disease, which should then be properly treated. If, however, you have treated the primary problem and the pain remains, or if the primary problem is self-limited, such as a simple headache, then there are two ways you can alleviate the pain:

- 1) Pain, even that from major trauma, has a large psychological component. This is amenable to control in a variety of ways. Apprehension may accentuate pain, and if the person is worried about the extent and implications of his injuries, a clear statement of the patient's injuries may dispel unwarranted fears and thus reduce apprehension and pain. Distraction can greatly diminish the perception of pain: one may give an absorbing task to a patient or engage his interest in a discussion. Imagination may be invoked to distance a patient from his pain: ask the patient to imagine his favorite place or event as vividly as possible and describe it to you in detail. If you have the training and the patient has the ability, an extension of this to a light state of hypnosis may serve as outstanding pain control.
- 2) Medications may be used to control pain. Aspirin (acetylsalicylic acid) and Tylenol* (acetaminophen) are mild analgesics that will relieve minor pains, but not even toxic doses will control severe pain. For strong pain, a narcotic or narcotic derivative such as codeine is needed. Although aspirin and Tylenol are safe in that it takes many times the proper dose to cause overdose, codeine is much less safe, because just a few times the normal dose, or even the normal dose if combined with moderate amounts of alcohol, may cause depression of consciousness or respiratory depression. Narcotic pain relievers may be habituating or even addicting, though during a wilderness emergency the risk is slim.

* Tylenol is acetaminophen, but Tylenol #3 contains both acetaminophen and codeine.

SKIN

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Splinters

Splinters are a common minor medical problem, and a little expertise in the use of a #11 scalpel blade to remove them almost painlessly will probably win you many admirers. The scalpel blade may be used to "stab" the splinter from the side, and then to lift it gently out as shown. This will make a small, clean cut in the skin, but that is better than the ripping and smashing that often results from use of tweezers and needles.



Soft Tissue Injuries

Soft tissue injuries may be divided into minor wounds and major wounds on a practical basis: minor wounds are those which you will treat definitively in the field, and major wounds are those you will package up and send to a doctor or emergency room for care. The distinction between minor and major will depend on your experience in treating wounds, the equipment you have, and the distance to the nearest doctor or ER. In general, major wounds are those more than about 1/3" deep, because these will require deep sutures.

Minor Wounds A very small wound (a scratch or scrape) will do well with a quick rinse from a water bottle, drying with a gauze pad or clean piece of cloth, and application of a bandaid with a little povadone-iodine ointment. The treatment of more serious minor injuries follows certain basic principles:

- 1) Do not introduce any additional bacteria when working on the wound. Turn your head when you talk near the wound, and wash your hands well before working on it. Remember that the fingernails and the mouth are the major contributors to wound infections.
- 2) Do no harm. Don't kill any tissue by putting alcohol, tincture of iodine, merthiolate, or similar harsh cleaners into a wound. Dilute povadone-iodine causes little harm to tissue and may be used to irrigate wounds.

- 3) Clean the wound well. Irrigate to remove bacteria and dirt. You can do an excellent job of irrigation as follows. Fill a Ziploc bag with clean water to which has been added a good squirt of povidone-iodine solution. Close the bag, fold over the top, and make a small hole in one corner. Squeeze the bag and you will get a good stream of water. Use about two bags for a medium-sized wound. If the wound is grossly dirty, you may want to scrub it with some gauze pads and povidone-iodine. Make sure your own hands are well-cleaned before you put them near a wound. You would probably do well to put several drops of Ophthalmic (proparacaine) into the wound and let it sit for 15 minutes or so to anesthetize the wound before you scrub.
- 4) Clean your scissors and tweezers with some povidone-iodine and trim away any tissue which is obviously dead or going to die, as dead tissue serves as a center for bacterial growth. (If you're not sure if it's going to die or not, leave it.)
- 5) A careful choice must be made whether to close the wound to minimize scarring, or to leave the wound open to promote drainage and avoid infection. Wounds which were grossly contaminated will best be left open, while simple, clean cuts may be closed carefully with suture strips. In either case, the wound should be carefully dressed and bandaged, and the wound should be watched for signs of developing infection: pus, a foul odor, or excessive redness, warmth, swelling, or pain. Oral antibiotics should not be used except in cases of grossly contaminated wounds, or known infection, though some povidone-iodine ointment may be put over the wound.

Major Wounds The principles of treatment for major and minor wounds are the same, but with major wounds most of the cleaning and repair is left to the doctor. If you are close to a medical facility (less than 12 hours away) it is probably best to confine wound cleaning to some quick irrigation; the doctor will want to clean the wound under sterile conditions, and there's no sense in duplicating effort and causing additional pain. If it will be a few days until reaching a medical facility, however, you should do the best job you can of cleansing the wound, and keep it scrupulously clean and dry, even though you can't do much repair without proper equipment.

WILDERNESS MEDICINE: SKIN

Subungual Hematoma (Blood under Fingernail)

A subungual hematoma (blood under a fingernail after a crush injury) is exquisitely painful because the blood is under high pressure. It is possible to relieve this pressure by (1) using a #11 scalpel blade to drill through the fingernail, or better, (2) by using a paper clip, as follows. Use the splinter forceps (tweezers) to hold one end of the straightened paper clip, and heat the other end red-hot in a candle or similar flame (a match won't last long enough). The red-hot end is applied to the nail. This is repeated in the same spot until the hole penetrates the nail, allowing the blood to escape. There is no danger of causing a burn if the paper clip is applied only over the hematoma.

Friction Blisters

Friction blisters are best treated by prevention: well-fitting, well-worn-in boots, worn with both rag and liner socks. When blisters threaten, a piece of moleskin should be applied over the red "protop blister." If a blister occurs nonetheless, it should be surrounded with a ring or "doughnut" made of several layers of moleskin. Blisters should be left intact unless in a place where it will obviously rupture (e.g. sole of the foot); the blister top serves as an admirable sterile dressing for the raw skin underneath. If the blister must be drained, do so by making a small scalpel-blade incision at the edge and pressing out the fluid. If the top of the blister is partially ripped off, it should be trimmed away neatly and the area cleaned and covered with some povidone-iodine ointment and a bandaid or other dressing.

Burns

Minor Burns The treatment of choice for small burns is immediate immersion in cold water, to stop burning, cool the tissue, and relieve pain. After the initial shock wears off, the pain is usually intense, so Tylenol #3 may be given. Infection is common in burns, so one must keep the burn dressed and free of mouth and fingernail contamination. Povidone-iodine ointment should be applied to the area once or twice daily. No other ointments, creams or lotions should be used; most commercial first-aid-kit burn ointments are harmless on small areas of sunburn, but worse than useless on serious burns. Burned tissue is sensitive to damage from pressure, as from a heavy blanket across burned toes; burned parts must be supported and protected from such pressure damage. Swelling may cause jewelry (e.g. rings, bracelets) to become tourniquets, so all jewelry must be removed. Oral antibiotics should be given only when infection is apparent.

Sunburn Cold applications, aspirin, and antihistamines (chlorpheniramine) will help relieve the pain of sunburn. In case of severe discomfort, steroid cream should be applied and Tylenol #3 may be given.

Major Burns The treatment for major burns is much the same in the wilderness as it is elsewhere, meaning that there's not much you can do without sophisticated medical facilities. The usual initial problems are shock and respiratory difficulties. After a day or so, infections often occur.

Frostbite

Frostbite is the freezing of skin and possibly deeper tissues. Unless circulation is impaired, for instance by too-tight boots, or from hypothermia or exhaustion, the human body is highly resistant to freezing. However, even a vigorous, healthy person may get frostbite if it is very cold and the wind is very strong across an unprotected nose or ear. It is also possible to get frostbite by touching a bare hand to a piece of supercooled metal, or by spilling sub-freezing stove fuel on a hand.

Frostnip Superficial frostbite, known as frostnip, is freezing of the most superficial layers of the skin, sparing the deeper tissues. It is recognized by a sudden blanching of a nose, ear, or fingertip. Although the part is pale or yellowish, it is still soft to the touch, not hard or "woody" as in deep frostbite. In bitterly cold weather, it is a good idea for team members to check each other's faces for signs of frostnip. Treatment is simple-- rewarming by a warm hand over the nose or ear, or by placing a frostnipped finger in the mouth, in an armpit, or in a warm pocket. On rewarming, the affected part tends to turn red, painful, and possibly slightly swollen, but no permanent damage results.

Deep Frostbite In deep frostbite, the subcutaneous tissues are frozen solid, and the affected part feels hard, like a piece of wood or frozen meat. Freezing causes great tissue damage, but the effects are postponed until the part is rewarmed. If the frozen parts are rewarmed, the damage becomes evident, with excruciating pain and blistering; the rewarmed tissue is extremely susceptible to mechanical damage, i.e. from pressure. Since frozen parts are somewhat protected from further mechanical damage (at least compared with thawed ones), it is potentially possible for someone to walk on frozen feet. This should only be contemplated when hiking out is a life-and-death matter. Whenever possible, those with frostbitten feet should be carried out, and rewarming should be delayed until the victim is at a facility capable of proper follow-up treatment.

WILDERNESS MEDICINE: SKIN

If a party with a frostbitten person is stranded far from a medical facility, it may be necessary to treat frostbite at the scene. Hypothermia and frostbite often occur together, and the need to keep the victim warm will result in slow rewarming of the frostbitten areas. However, studies have shown better results with rapid rewarming of frostbite than with slow, so once hypothermia has been adequately treated, the frostbitten parts should undergo rapid rewarming by immersion in water at 110 degrees F. (Don't damage the frostbitten part by using water which is too hot-- the victim has probably lost temperature sensation in the frostbitten area and may not feel it being cooked.) Once rewarmed, thawed tissue must get the same careful nursing care as a severe burn.

Human and Animal Bites

With any animal bite, the possibility of tetanus or rabies must be kept in mind, and the wound must be considered grossly contaminated. Human bites, including skinned knuckles from hitting someone in the mouth, are so badly contaminated that they are considered infected until proven otherwise. Bite wounds must be cleaned meticulously and left open to drain freely; povadone-iodine ointment should be applied daily; 500 mg. (two tablets) of Erythromycin, an antibiotic, should be given four times a day.

Snakebite

Any snakebite is a potentially contaminated puncture wound and should be given proper wound treatment. IF you are more than a few hours from a facility with antivenin, and IF the bite is envenomated as shown by obvious swelling and pain at or near the fangmarks within 15 minutes or so, THEN AND ONLY THEN should you proceed with the following treatment:

- 1) Have the patient lie down and relax; give no alcohol. Remind the patient (and yourself) that the fatality rate even for untreated pit viper bites is extremely low.
- 2) Place the lymph constrictor from the Cutter Snakebite Kit (note: it's NOT a tourniquet, arterial or venous) between the bite and the heart; it should be loose enough that you can easily slip two fingers under it.
- 3) MAKE NO INCISIONS ON THE HANDS, FEET, ANKLES, WRISTS, FACE, NECK, OR GENITALIA. INCISE ONLY WITHIN THE FIRST HALF HOUR AFTER THE BITE. Clean the bite area by scrubbing gently with povadone-iodine; incise with a #11 scalpel blade (there's one in the snakebite kit) through the area of envenomation, at or close to the fang marks. Make the incisions parallel to the long axis of the limbs, about 1/4-1/2" deep and 1/2-3/4" long, one through each deposit of venom. Use the suction cups from the snakebite kit to remove as much venom as possible for 30 minutes, then quit.

- 4) Do NOT continue suction more than 1 hour past the time of the bite, or cut and suck other than at the site of original envenomation.
- 5) Do NOT apply cold compresses or ice.
- 6) If a carry-out is possible: splint the affected extremity gently at approximately heart level. Carry out; call ahead for antivenom. Antivenom (antivenin) is a blood extract with antibodies to the various components of snakebite venom.

Skin Infections

Cellulitis Cellulitis is a brawny skin infection which shows swelling, redness, warmth, and pain. The skin is tense, and red streaks may be seen radiating up from the initial infection as it spreads along lymphatic vessels. The skin may break down and ulcerate in places. The treatment is as follows:

- 1) Warm soaks to help draw out waste products.
- 2) Oral antibiotics: Erythromycin, 500 mg. (two tablets) four times a day.
- 3) Splint or immobilize the affected area, and elevate.

Abscesses An abscess or boil is a skin infection with a localized collection of pus, much like a large whitehead. Treatment of an abscess is as follows:

- 1) Scrub or paint the area with povidone-iodine and incise straight down into the center of the pus with a sterile #11 scalpel blade. Make an incision large enough to drain out all the pus. If the abscess is large, irrigate as described for wounds. This incision and drainage is necessary as oral antibiotics will not penetrate into the abscess. Oral antibiotics are, in general, neither necessary nor effective, though any cellulitis should be treated with erythromycin.
- 2) Warm soaks, as for cellulitis.

Fungal Skin Infestations (Athlete's Foot, Ringworm, Etc.)

Fungal infestations, including athlete's foot (tinea pedis), jock itch (tinea cruris), and ringworm (tinea corporis) are characterized by redness, scaling, cracking, itching, and possibly tiny blisters. (Yeast vaginitis, caused by a related fungal organism, is characterized by a thick, white, cheesy discharge and itching.) These superficial fungal infestations may all be effectively treated by washing and application of Micatin (miconazole nitrate) cream three or four times a day. Note-- do not put steroid cream on fungal infestations-- the fungus loves it!

WILDERNESS MEDICINE: SKIN

Bugs, Bites, and Bnestings

Chiggers Chiggers are the small (0.5 mm) larvae of Trombiculid mites, found throughout the ASRC region, especially in areas frequented by large mammals such as deer or cattle. They crawl up the legs, burrow their heads into the skin (often around the ankles) and feed on blood and tissue fluid. During feeding, which lasts from an hour up to several days, the mites inject an irritating material that causes an intensely itching bump. The ideal treatment is nail polish; when applied over the bumps, it suffocates the chiggers and helps relieve the itching, perhaps by keeping air from the skin. If nail polish isn't available, you might try a liberal amount of povadone-iodine ointment, held in place with an adhesive bandage for a few hours. A vigorous scrubbing with soap and water may also serve to dislodge the chiggers. After the chiggers have been killed or removed, steroid cream should be applied, and an antihistamine (e.g. chlorpheniramine) should be given to control itching.

Sand fleas (*Tunga penetrans*), also sometimes called chigger fleas, are fleas (1 mm. long) found in warm, sandy areas in Africa and southern parts of North America. The females attack the legs, and may burrow their heads into the skin, particularly around the toes. An adhesive bandage with povadone-iodine ointment will suffocate the flea; care must be taken to remove all parts. If it is crushed, eggs or parts of the flea may stay in the skin and produce an inflammatory response and secondary bacterial infection.

Mites Scabies is an infestation by itch mites (*Sarcoptes scabiei*). These almost microscopic mites burrow in the skin, where they leave their eggs, causing severe itching, particularly at night. Pediculosis is caused by the human head and body louse, *Pediculus humanus*, and the pubic or "crab" louse *Pediculus pubis*. These minute mites suck human blood for sustenance, and live on the skin or in seams of clothing. Transmission is by proximity to an infested person or by contact with infested clothing. Careful laundering is necessary to prevent the spread of mites, and a prescription shampoo or lotion medication, (Kwell: Gamma Benzene hydrochloride) is necessary to rid oneself of them. Because of absorption through the skin and possible ill effects, this agent should not be used routinely.

Ticks Ticks are large bloodsucking mites which have a tenacious grasp once their head is buried in the skin. They carry a variety of diseases, including Rocky Mountain Spotted Fever and several types of encephalitis (brain infection). They may be persuaded to let go by goosing them with a just-blown-out match, or covering them with povadone-iodine ointment so they can't breathe. If it is necessary to remove one by force, use splinter forceps and take care not to leave the tiny head still embedded, as it may become infected.

Spider Bites Many spiders have a venomous bite which causes a local reaction of itching, swelling, and pain; these may be treated as described under Miscellaneous Bites and Stings, below. The two types of spiders whose bites may have serious consequences are the black widow (*Latrodectus mactans*) and the brown recluse (*Loxosceles reclusa*). The black widow bite usually causes a sharp, brief pain. Starting in 15 minutes to an hour, and lasting for a few hours, a reaction occurs, including chills, vomiting, leg and abdominal pain, sweating, and cramps. Death is rare. Good nursing care is the only necessary treatment. The bite of the brown recluse is generally reported as painless, but a local reaction sometimes follows. Usually, the bite becomes painful, blisters and oozes for several hours. Sometimes, the blistering may progress to local tissue destruction, which may require surgery. Rarely, systemic reactions are reported, with chills, vomiting, joint pains, and blood-related abnormalities. Again, supportive care and proper wound care is all that is necessary.

Bee and Wasp Stings Bee and wasp stings may cause three degrees of reaction:

- 1) A "normal" local reaction.
- 2) A strong allergic reaction (see under GENERAL).
- 3) Anaphylaxis (see under GENERAL).

The initial local reaction of severe, sharp pain is followed by a small local swelling with itching, like a mosquito bite, and then some swelling of the surrounding skin. The treatment is as follows:

- 1) If the stinger and venom sacs are still imbedded, remove them without squeezing more venom into the skin: use a knife blade to scrape them out, rather than using tweezers.
- 2) Use the treatment described under Miscellaneous Bites and Stings, below.

Miscellaneous Bites and Stings Many arthropods (bugs, mosquitoes, flies, spiders, insects, caterpillars, centipedes, and so forth) are known to punch holes in the skin and leave irritating substances as their calling card. The general treatment is as follows:

- 1) Wash the skin to remove as much irritant as possible.
- 2) Put Sting-Eeze on it immediately, then steroid cream on the area 3 or 4 times a day for the next day or so.
- 3) Take aspirin and antihistamines (chlorpheniramine) to reduce the skin reaction and itching.

WILDERNESS MEDICINE: SKIN

Dermatitis (Poison Ivy, Skin Allergies)

There are many substances which may cause a skin allergy, manifested by itching, swelling, and redness; more severe cases may develop scaling, blisters, or open, oozing sores. Itching leads to scratching, which may result in a bacterial infection.

Many substances can cause skin allergy, but the most common are poison ivy, poison oak, and poison sumac. These plants secrete an oily substance (urushiol) which usually causes a severe delayed allergic skin reaction. It is difficult to wash off, and may be spread by hands or contaminated clothes.

The typical poison ivy reaction starts in a single place and "spreads" to nearby areas-- this is not truly spreading, but it is simply that the areas with less exposure take longer to react. The fluid from blisters or sores does not have enough urushiol to spread the reaction. Wash the area well; alcohol pads will also help remove the urushiol. Apply steroid cream several times a day - this is the most effective part of the treatment. It is much more effective if it can be applied before blistering occurs, i.e. within the first day after exposure. Take aspirin (2 six times a day) and chlorpheniramine, to relieve itching and swelling.

HEAD, EYES, EARS, NOSE, AND THROAT
=====**Headache**

Headache may be a sign of serious disease, or just a reaction to stress or to exposure to bright light with inadequate eye protection. Of the serious problems heralded by a quickly-developing headache, two are most common: stroke (Cerebro-Vascular Accident or "CVA"), and brain infection (encephalitis or meningitis). (See CNS for more.)

The cause of many minor headaches may never be determined, but they are relieved by aspirin or by rest in a dark area. Most headaches (from whatever cause) have a component of muscle spasm that may be relieved by warm applications to the back of the neck and by gentle massage of the neck and face muscles.

Eye Injury or Inflammation

It is often difficult to ascertain the exact cause of a painful eye, so the first step in treating it (even if you "know" the cause) is a careful examination for foreign bodies.

Approach to the Painful Eye: Foreign Bodies & Abrasions

The first step in examining a painful eye is to relieve the pain so that you can do a good examination. Put one or two drops of ophthalmic anaesthetic (proparacaine) in the eye and wait for a few minutes. This will bring dramatic relief, but a caution is in order-- proparacaine is only for the initial examination. Continued use may interfere with healing and predispose to infection. If severe pain persists, use *Tylenol* #3.

The first thing to check is the integrity of the eyeball proper. If the globe is injured, bandage both eyes properly and transport. If the globe is intact, pull the lower lid down and have the person look up, and examine the lower conjunctival sac. Then evert the upper lid over a small stick and have the victim look down, to examine the upper conjunctival sac (see Breyfogle for an explanation and diagram). Remove any foreign bodies by irrigation with clean water from a Ziploc bag with a small hole in it, or by using the corner of a gauze pad. If a foreign body is removed, expect the continued sensation of a foreign body for a day or so, due to abrasion. If no foreign body is evident, try irrigating anyway-- you may wash out something you couldn't see. If there is still no sign of a foreign object, the pain may be from a simple abrasion. Treatment is the same for foreign bodies in the eye (after removal) and for abrasions: put some ophthalmic antibiotic ointment (*Polysporin*) in the eye and patch firmly with a few gauze pads and tape; keep patched for a day or two.

Conjunctivitis If eye pain has come on gradually, associated with considerable redness of the white of the eye or the inside of the eyelids, perhaps with crusting of the eyes in the morning or a white or yellow discharge, it is conjunctivitis (inflammation of the lining of the eye and eyelids). Conjunctivitis may be due to allergy, or infection, or from non-specific irritants like dust. A careful check for a foreign body should be made, as described above. If itching is prominent, or if other allergic symptoms are present (e.g. itchy, runny nose with sneezing), the conjunctivitis is probably allergic and will respond to aspirin and an antihistamine (chlorpheniramine). If not, the cause may be infectious, and *Polysporin* ointment should be applied four or more times a day. However, many eye infections are viral and will not respond to antibiotics. In any case, an eye infection is cause for a quick exit from the wilderness to see an eye doctor. Creams or ointments containing steroids (e.g. *Cortisporin*, as suggested in Forgey's wilderness medicine book) should not be put in the eye except by a board-certified eye doctor.

Snowblindness Exposure to bright light with inadequate eye protection may cause snowblindness, which is a sunburn of the surface of the eye. The conjunctiva (lining of the eye and eyelid) are usually inflamed as well. Part of the pain is due to irritation of the corneal surface, but a large part is due to spasm of the muscles that focus the eye's internal lens (the ciliary muscles). Treatment is cool compresses to the eyes for a few hours, followed by *Polysporin* ointment and firm patching for a day or two (the burn is similar to an abrasion); *Tylenol* #3 should be used as necessary for pain. Do not use proparacaine for pain control, other than for an initial examination.

Cyclogyl (cyclopentolate), an optional MEDKIT medication, may be used to relieve the ciliary muscle spasm and pain. These eye drops are used primarily to paralyze the eyes' pupillary muscles and thus dilate the pupil for eye examinations. Since it also paralyzes the ciliary muscles that spasm from snowblindness, it may be used to help the pain of snowblindness; since it dilates the pupil, it makes the person sensitive to bright light. *Cyclogyl* may also cause problems in people with a rare disease called narrow-angle glaucoma, in which the iris is bowed outward towards the cornea, instead of lying flat across the anterior chamber of the eye. Most people with narrow-angle glaucoma know they have it. You may use a flashlight to check for a shallow anterior chamber as shown in the accompanying figure; those with a narrow anterior chamber should not use *Cyclogyl* drops.

WILDERNESS MEDICINE: HEENT

Rhinitis (Nose Congestion and Discharge)

Rhinitis (a stuffy, runny nose) may be a result of allergy or of a minor viral infection (a "cold"). Allergic rhinitis responds well to antihistamines (chlorpheniramine), and nasal colds generally respond well to decongestants (*Sudafed* pills and *Afrin* nasal spray). A caution is in order: overuse of nasal spray decongestants may lead to dependence, and long-term use may even cause a type of stuffy nose ("rhinitis medicamentosa"). Aspirin seems to relieve the discomfort of rhinitis, though it probably does little for the congestion. See also Upper Respiratory Infection under RESP.

Sinusitis (Sinus Inflammation)

The sinuses are holes in the head (actually, in the skull) all around the nose which drain into the deeper parts of the nose. They may become inflamed due to allergy or infection; headache and tenderness (pain when you apply pressure on the face around the nose) are characteristic. A green or dark yellow, foul-smelling discharge from the nose is a sign that the sinuses are infected. The treatments are oral decongestants (*Sudafed*), nasal decongestants (*Afrin*), plenty of fluids to drink, and aspirin as necessary for pain. In severe cases, erythromycin may be given.

Sore Throat (Pharyngitis)

A sore throat (pharyngitis) is seldom more than a discomfort; most are minor viral infections that need no antibiotics. Strep throat, caused by beta-hemolytic Group B *Streptococci*, may require antibiotics to avoid rheumatic fever and possible consequent heart damage. There is no way to tell strep throat from a viral sore throat without a throat culture. Aspirin will reduce the pain, and salt water gargles will reduce the swelling and make swallowing easier.

RESPIRATORY SYSTEM

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Asthma

Asthma is an allergy-, emotion-, or exercise-induced state where swelling and spasm of the small airways combines with excessive production of thick mucus to make breathing difficult. The classic signs and symptoms of asthma are wheezing (especially on expiration) and difficulty in breathing. Treatment includes:

- 1) Reassurance to minimize the emotional component.
- 2) Oral decongestants (*Sudafed*).
- 3) Drinking plenty of fluids to avoid dehydration and keep the mucus from drying out and clogging the airways.
- 4) Humidification of the air for the same reason; for instance, using a stove to heat water in a tent with the patient.
- 5) If the attack is severe, epinephrine may be given as described for anaphylaxis (see under GENERAL).
- 6) Antihistamines are generally not helpful. Do not give aspirin, since it can make asthma significantly worse in some people (though it may relieve asthma in others).

Upper Respiratory Infection ("Flu," Common Cold, Etc.)

An "upper respiratory infection syndrome" (URI or common cold syndrome) consists of runny nose, watery eyes, cough, malaise ("feeling bad all over"), and sometimes fever or hoarseness. If severe joint and muscle aches occur, it is the influenza ("flu") syndrome. Both are caused by viruses for which there is little or no specific treatment. Treatment includes rest, aspirin, drinking plenty of fluids, and decongestants (*Sudafed* and *Afrin*) if necessary.

(Allergic Rhinitis (Hay Fever, Allergic Runny Nose): see Allergy under GENERAL, and Rhinitis under HEENT)

Lower Respiratory Infection (Bronchitis, Pneumonia)

The lower respiratory infections (bronchitis and pneumonia), are often associated with fever, chills, and a cough producing yellow, green, or rusty-red sputum (often foul-smelling). Pneumonia in particular often follows a viral upper respiratory infection, but the pneumonia is usually caused by bacteria. Give oral fluids, encourage coughing to clear the lungs, and transport to a medical facility. There are a variety of organisms that cause pneumonia, but the most common ones found in otherwise healthy people respond well to erythromycin. If the patient is still very ill on erythromycin, and it will be days before a medical facility is reached, *Bactrim-DS* might be given as well.

Cough

Cough is a normal mechanism for clearing the airways of secretions, and thus should be encouraged when a person is bed-ridden or has a lower respiratory infection. If the patient has difficulty coughing up secretions, keep up his fluid intake and humidify the air he breathes.

In certain upper respiratory infections, the cough is non-productive (no sputum is coughed up), and it serves only to irritate the airways. For non-productive cough, *Tylenol #3* may be given; the codeine in it is an excellent cough suppressant.

CARDIOVASCULAR SYSTEM

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The first aid treatment for a heart problem in the wilderness is the same as if it happened on a city street. Since fear and anxiety may worsen the heart problem, it is often appropriate to wait for a litter, rather than begin a more frightening improvised evacuation. A person with the severe chest pain of an acute myocardial infarction should be given *Tylenol #3* in large doses (2-3 every 3-4 hours) to help control the pain.

A common cause of chest pain that might cause suspicion of heart attack is stomach hyperacidity and gastroesophageal reflux (heartburn). If the pain is relieved by antacids (e.g. *Camalox*), you have probably both diagnosed and treated the problem (see also under GI).

GASTRO-INTESTINAL SYSTEM

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Gastroenteritis, Diarrhea, and Vomiting

Gastroenteritis is a general term for irritation of the stomach or intestines, which may result in cramps, diarrhea, or vomiting. It is useful to divide gastroenteritis into four categories: food poisoning, traveler's diarrhea, viral enteritis, and infectious dysentery.

Food poisoning is caused by the poisons produced by certain bacteria, mostly *Staphylococci*. When food, particularly that containing mayonnaise or custard, is left unrefrigerated, staphylococcal bacteria may multiply in it and leave behind this exotoxin (also known as enterotoxin). Even though the bacteria may all be dead, the exotoxin still exerts its effects. Within 2 to 24 hours after eating the contaminated food, nausea, vomiting, cramps, and diarrhea begin; they subside within 12 to 24 hours. Fever is seldom seen.

Traveler's diarrhea ("turista," "Montezuma's revenge") is rare except in foreign travel. It is caused by drinking water contaminated with a certain kind of bacteria (enterotoxigenic *E. Coli*). Although this bacteria does not actually invade the wall of the intestine, it grows inside the intestine and secretes a poison similar to the Staphylococcal enterotoxin, so the disease is similar to that of food poisoning, but lasts longer and may include low-grade fever.

Viral enteritis ("stomach flu") occurs in outbreaks, is transmitted from person to person, and is characterized by diarrhea, nausea, vomiting, abdominal cramps, headache, low-grade fever, and fatigue. It usually lasts 24 to 48 hours.

In dysentery, bacteria invade the intestinal wall, causing fever and diarrhea with blood and mucus; the person usually looks (and feels) extremely sick compared with the other diarrheal diseases. The bacteria *Salmonella*, *Shigella*, and *Campylobacter*, may cause dysentery, as may protozoa such as *Entamoeba Histolytica*.

The most serious consequence of diarrhea is dehydration, which may even progress to shock. Therefore, the most important treatment for diarrhea is fluid replacement (see the GENERAL section under Shock).

It is possible to reduce the frequency of bowel movements by giving a narcotic. The codeine in *Tylenol #3* slows diarrhea, but also causes sedation and light-headedness. Lomotil is a narcotic derivative that provides little pain relief or sedation, but is good at slowing the activity of the intestine. However, diarrhea often serves to flush bacteria or toxins out of the intestine; Lomotil slows this also, and may simply postpone the diarrhea, or with dysentery, may make the infection worse. In mountain rescue situations, it may still be appropriate to take a Lomotil to get you back to civilization (where it's easier to deal with diarrhea), even though you may have extended the diarrhea by a day or so.

Nausea and vomiting may result from many conditions, ranging from gastroenteritis to pregnancy. Nausea and vomiting (other than motion sickness) respond well to *Compazine*. Most vomiting is self-limited, but *Compazine* may make things a little more pleasant until it stops on its own.

Motion Sickness

Motion sickness includes seasickness, carsickness, and airsickness. The various stimuli of modern transportation, especially confusion of the balance organs of the inner ear, may result in nausea and vomiting. Motion sickness responds poorly to *Compazine*, but responds well to a new medication, developed for NASA astronauts: transdermal scopolamine. A *Transderm-Scop* patch will relieve motion sickness for about 3 days, and has few side effects except for dry mouth or occasional lightheadedness.

The Acute Abdomen (Appendicitis, Etc.)

A person who has severe abdominal pain, spasm of the abdominal wall muscles (guarding), and exquisite tenderness of the abdomen has an "acute abdomen." There are many possible causes, including appendicitis, diverticulitis, ectopic pregnancy, and pancreatitis. There are several rules to follow in wilderness management of the acute abdomen: (1) give nothing to eat or drink but clear fluids, (2) after checking the temperature and listening for normal bowel sounds (put your ear against the stomach and listen for gurgles), give *Tylenol #3* for the pain, and (3) transport with the hips and knees bent to relieve some of the pain from abdominal wall muscle spasm.

Stomach Hyperacidity and Gastroesophageal Reflux ("Heartburn")

When excess stomach acid irritates the stomach (gastritis) or stomach acid trickles up into the esophagus and irritates it (gastroesophageal reflux and esophagitis), the pain is known as "heartburn." The treatment is as follows:

- 1) Sit up. Stomach acid refluxes worst when one is lying down. In particular, don't lie down soon after a meal. If necessary, prop up the head and shoulders when sleeping.
- 2) Take a few antacid tablets (*Camalox*) an hour after meals and at bedtime. They reduce the strength of stomach acid and also tighten the sphincter valve between the stomach and the esophagus.
- 3) Avoid the agents that stimulate gastric acid secretion: caffeine, alcohol, tobacco, and salicylates, such as aspirin (*Tylenol #3* has no salicylate, however).

Constipation

Constipation, the hardening of stool in the bowel, is a common problem for hikers and climbers, due to diet, irregular schedules, or whatever. Warm drinks are sometimes effective at getting the bowels moving. If not, taking 1 or 2 *Ducolax* tablets at night will usually result in a bowel movement in the morning. If discussing constipation sounds trivial to you, consider how much effort you put into keeping the weight of your pack to a minimum. Now, just think-- if you go for 3 days without a bowel movement, that's about 8 pounds you could have left at Base Camp.

GENITOURINARY SYSTEM

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Vaginitis

Vaginitis is an inflammation of the vagina, usually with pain, itching, and increased, sometimes malodorous, discharge. The most common cause is yeast, which is a form of fungus. Yeast vaginitis usually has a white, cheesy discharge and marked itching. The treatment is miconazole cream, 5 grams (1/3 of a 15 gram tube) intravaginally once a day for 10 days.

Cystitis and Urethritis (Lower Urinary Tract Infections)

Frequency of urination (having to go often, in small amounts), urgency (having to go right now), or burning on urination indicate a lower urinary tract infection (UTI). Any man who has even one UTI must be evaluated by a doctor, because it may indicate underlying structural urinary tract problems. UTI's are more common in women, but any woman with recurrent UTI's also needs careful medical evaluation. Most UTI's in women respond to a single dose of two tablets of Bactrim-DS.

Kidney Infections

A person with fever and chills (indicating an infection) and with symptoms of a lower UTI, or with flank or back pain, or with blood in the urine, probably has a kidney infection. This is cause for immediate evacuation to a medical facility. If it will be a long time to a medical facility, Bactrim-DS should be given.

NERVOUS SYSTEM

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Coma Position

An unconscious person should be placed in the coma position, so that any vomit or secretions will drain out of the mouth rather than going into the lungs. Place the person on the left side with the left leg bent; place the arms under the head with the left arm straight up and the right bent, positioning the head with the face somewhat down.

Modified Coma Position

Any unconscious person who is suspected of having a spine injury should be placed on a backboard in the modified coma position: in the coma position, but with padding and straps or tape to hold the head in a neutral position.

Spine Injury

If you suspect a cervical spine injury, unroll your wire splint, pad it with gauze or a cravat, and wrap with the elastic bandage. Bending the splint as necessary, place it around the neck as a cervical collar, and fasten with adhesive tape. For any suspected spine injuries, improvise a backboard: consider using outhouse doors or packframes. For an isolated lumbar spine injury, try wrapping an ensolite pad around the patient's torso.

Stroke/CVA (Cerebro-Vascular Accident)

Wilderness first aid for CVA victims is the same as in the city: reassurance, good airway protection via sitting forward or the coma position and other supportive care as necessary.

Brain Infections: Meningitis and Encephalitis

Meningitis, infection of the linings of the brain and spinal cord, and encephalitis, infection of the brain substance, are life-threatening diseases. The classic signs of meningitis include high fever, confusion, and a stiff neck. Encephalitis is the same, but without the stiff neck. These diseases may be caused by both bacteria and viruses. There is no adequate wilderness treatment; intravenous medications are required.

MUSCULOSKELETAL SYSTEM

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Tendinitis

Tendinitis, also known as "squeak heel" or "mal de racquette" (from the french for snowshoe), is an inflammation of the tendon connecting a muscle to a bone, most commonly the Achilles tendon (tendo calcaneus) at the back of the ankle. The most common cause is pressure from ill-fitting boots, though crampon or snowshoe use may contribute. The tendon is painful, and may be swollen. A squeak may be heard or felt when the tendon slides through its sheath as the foot is flexed and extended. The only good treatment is rest (and possibly a new pair of boots), though high doses of aspirin may offer some relief.

Muscle Cramps (see also GENERAL, Heat Disorders for Heat Cramps)

Muscle cramps are treated by (1) stretching, (2) massage, and (3) warm compresses.

Muscle Strains

The treatment for muscle strains is as follows:

- 1) Rest the affected muscle for several days.
- 2) Apply cold compresses for about 20 minutes every few hours for the first 12 hours, to reduce swelling. After 24 hours, warm compresses (again, 20 minutes every few hours) may be employed to speed healing.
- 3) Use aspirin for a few days to control pain and inflammation.

Injuries Around a Joint: Sprains and Dislocations

Sprains It is sometimes difficult to tell a bad sprain from a fracture, but a careful examination of the sprained joint can usually rule out gross fractures. For that matter, bad sprains can be as serious as a fracture, and deserve the same treatment (except possibly for splinting), which is as follows:

- 1) Wrap the joint firmly with an elastic bandage to control internal bleeding. Do not wrap it too tight; check regularly to see that swelling has not made it into a tourniquet.
- 2) Apply cold compresses for about 20 minutes every few hours for the first 12 hours, to reduce swelling. After 24 hours, warm compresses (again, 20 minutes every few hours) may be employed to speed healing.
- 3) Use aspirin for a few days to control pain and inflammation.
- 4) Keep the extremity elevated to reduce swelling.

WILDERNESS MEDICINE: BONE

Dislocations The general rule for dislocations is to "splint them as they lie." There are a few dislocations which are potentially reducible in the field. Certainly, when there is no circulation beyond the dislocation and it is hours to a medical facility, an attempt should be made to reduce the dislocation. On the other hand, certain dislocations, such as of the hip or elbow, are such that you would probably do great damage if you tried to reduce them in the field. Some dislocations which might be field-reducible are listed below. A *Tylenol* #3 or two should be given.

- 1) Dislocations of the jaw present with the mouth stuck open. By pressing down on the back lower molars with both thumbs, and then pressing the jaw back, the dislocation is easily reduced. Be careful, and consider wearing your leather gloves, if you want to your thumbs back intact.
- 2) Dislocation of the shoulder may be reduced by the Stimson method: have the person lie face-down on a picnic table, bunk, or rock, and dangle the affected arm off the edge. Fasten a 15-pound weight to the wrist, and wait for about 20 minutes. Gravity should overcome the muscle spasm and allow reduction. Giving 2 or 3 *Tylenol* #3 tablets will aid in relaxation.
- 3) Dislocation of the kneecap (patella) to the side can be manually reduced by simple pressure.
- 4) Dislocation of a finger joint may often be reduced by simple continual outward pulling (don't jerk).

After reduction, splint and treat as a sprain: an elastic bandage, cold compresses, and elevation.

Fractures

Management of closed fractures is no different in the wilderness than elsewhere; *Tylenol* #3 should be given for pain. If you are confronted with an open fracture more than a day from a medical facility, you should clean the wound as meticulously as you can, cover with povidone-iodine ointment and a sterile dressing, and give erythromycin. Bones easily become infected, so be scrupulously clean in your dealings with the wound. If it will less than a day before reaching a medical facility, limit cleansing to just brushing off obvious dirt, and cover with a dry sterile dressing. The orthopedic surgeon will clean it under sterile conditions in the operating room, irrespective of any cleaning you do, and most orthopedists would prefer to see the wound in its original condition.

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SECTION 2: THE PERSONAL MEDKIT

On the next two pages is reproduced the contents of the SMRG Personal Wilderness Medical Kit, Version 2.1, August 1984, also found in Appendix C-4 of the Basic Member Training Course. On the pages immediately following are detailed notes about each of the medications.

Notes:

1. Medications with an "Rx" require a doctor's prescription.
2. The suggested doses should be confirmed or modified by your physician.
3. The Optional Medications are suggested for long trips, but will seldom be necessary for short trips or missions.
4. Names in *italics* are registered tradenames.

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MEDKIT CONTENTS

MEDICATIONS

	<u>Number/amount</u>	<u>Item and size/strength</u>
o	#30:	aspirin tablets, 325 mg (5 gr.)
o	1:	3cc squeeze bottle oxymetazoline nasal spray (e.g. <i>Afrin</i>)
o	#8:	sustained-release pseudoephedrine tablets 120 mg. (e.g. <i>Sudafed</i>)
o	#8:	sustained-release chlorpheniramine tablets 8 mg. (e.g. <i>Chlor-Trimeton</i>)
o	#10:	<i>Camalox</i> or similar antacid tablets
o	#5:	bisacodyl tablets 5 mg. (e.g. <i>Dulcolax</i>)
o Rx	#6:	<i>Trans-Derm/Scop</i> transdermal scopolamine patches
o Rx	#10:	<i>Tylenol</i> #3 tablets
o Rx	#10:	<i>Lomotil</i> tablets
o Rx	#10:	prochlorperazine tablets 10 mg. (e.g. <i>Compazine</i>)
o Rx	1:	2 cc dropper bottle proparacaine HCl ophthalmic solution
o Rx	1:	3.5 g tube polymyxin/bacitracin ophthalmic ointment (e.g. <i>Polysporin</i>)
o Rx	1:	anaphylaxis kit (includes injectable epinephrine) (e.g. <i>Anakit</i>)
o Rx	1:	15g tube fluocinolone acetonide cream 0.2% or similar high-strength steroid cream or lotion (e.g. <i>Valisone</i> , <i>Benisone</i> , <i>Lidex</i> , <i>Kenalog</i> , <i>Aristocort</i> , <i>Uticort</i> , <i>Synalar</i>)
o	3:	1g foil packets povadone-iodine ointment
o	1:	30 cc bottle mild liquid soap, e.g. <i>Hibiclens</i>
o	1:	15 cc bottle <i>Sting-Eeze</i> solution
o	2:	packets <i>Gatorade</i> or <i>ER6</i> powder, each to make 1/2 liter

WILDERNESS MEDICINE: MEDKIT

(The following medications are for longer trips or expeditions)

- (o 1: 15g tube miconazole nitrate cream 2%) (e.g. *Micatin*)
- (oRx #40: erythromycin tablets 250 mg.)
- (oRx #20: *Bactrim DS* tablets)
- (oRx 1: 2 cc dropper bottle Cyclopentolate HCl ophthalmic solution 0.5% or 1%, e.g. *Cyclogyl*)
- (oRx #20: acetazolamide tablets 250 mg., e.g. *Diamox*)

DRESSINGS AND BANDAGES

- o 4: 3" x 4" pieces of moleskin
- o 1: 1" (by at least 3 yards) waterproof adhesive tape
- o 1: 3" by 5 yards (stretched) elastic ("Ace") bandage
- o 1: 3" by 5 yards (stretched) conforming roller gauze (*Kling*)
- o 10: small adhesive bandages (e.g. 1" x 3" *Band-aids*)
- o 8: medium-size (e.g. 3" x 3") gauze pads
- o 5: medium-size butterfly strips or "suture strips"
- o 1: triangular bandage with 2 safety pins
- o 1: wire mesh splint

MISCELLANEOUS

- o 1: 15 cc bottle povidone-iodine solution (e.g. *Betadine*)
- o 6: Alcohol prep pads, in foil
- o 6: sterile cotton applicators ("*Q-tips*")
- o 3: #11 scalpel blades, sterile
- o 1: paper clip, medium size
- o 1: pr. small sharp scissors
- o 1: pr. fine-point splinter forceps
- o 1: *Cutter Snakebite Kit*
- o 1: low-reading clinical thermometer
- o 1: nylon zipper bag for MEDKIT
- o 1: plastic-laminated contents/instructions
- o 5: freezer-style zip lock plastic bags (if not available elsewhere in SAR pack)

MEDICATION DESCRIPTIONS

STANDARD MEDICATIONS

AFRIN (oxymetazoline) NASAL SPRAY: 1 - 3 ml. squeeze bottle

DOSAGES -

- (1) For rhinitis: spray into nose once every 12 hours.
- (2) For middle ear or sinus infections: while laying on back, spray into nose; wait 10 minutes before arising, to allow the spray to penetrate the deep parts of the nose. Repeat once each 12 hours.

EFFECTS - *Afrin* causes vasoconstriction of nasal blood vessels.

CONTRAINDICATIONS - sensitivity to *Afrin*, high blood pressure, heart problems.

SIDE EFFECTS - restlessness, fast pulse, nosebleeds.

ANAKIT (1 cc 1:1000 epinephrine in syringe, lymph constrictor, and chewable antihistamine tablets). Rx: 1 kit

DOSAGES -

- (1) For anaphylaxis: follow directions given with the Anakit.
- (2) For severe asthma: give as for anaphylaxis, but do NOT give the chewable antihistamine.

EFFECTS - The epinephrine in the *Anakit* syringe causes dilation of constricted airways in the lung, and reduces loss of fluid from the blood into the skin.

CONTRAINDICATIONS - heart conditions, pregnancy, high blood pressure.

SIDE EFFECTS - rapid heartbeat, restlessness, irritability, irregular pulse.

ANTACID: see *Canalox*

ASPIRIN: 30 - 325 mg. (5 gr.) tablets

DOSAGES -

- (1) For pain and fever: 1 or 2 every 4 to 6 hours.
- (2) For sprains, tendinitis, or strains: 4 every 4 to 6 hours.

EFFECTS -

- (1) in doses as low as one a day, it inhibits the effectiveness of platelets, which interferes in a small way with the blood clotting mechanism. For most uses, this may be ignored.
- (2) doses of 4 to 12 a day are effective in relieving minor pains and in lowering fever.
- (3) doses of 16 or more a day are effective in reducing inflammation from strains, sprains, or arthritis.

CONTRAINDICATIONS - those with sensitivity to aspirin (e.g. some asthmatics) and those with a history of bleeding ulcer should avoid aspirin.

SIDE EFFECTS - Aspirin may cause stomach upset. This may usually be avoided by taking aspirin with meals or with an antacid tablet (*Canalox*).

BETADINE: see povidone-iodine

WILDERNESS MEDICINE: MEDKIT

CANALOX: - 10 tablets

DOSAGE - For stomach hyperacidity, or gastroesophageal reflux: 1 or 2 tablets as needed.

EFFECTS - *Canalox* is an antacid, which neutralizes stomach acid and causes the upper sphincter valve of the stomach to tighten, reducing reflux of acid into the esophagus.

CHLORPHENIRAMINE MALEATE SUSTAINED RELEASE TABLETS (e.g. Chlor-Trimeton): 8 - 8 mg. tablets

DOSAGE - For allergic rhinitis, allergic conjunctivitis, or contact dermatitis: 1-2 every 8-12 hours

EFFECTS -

- (1) Chlorpheniramine is an antihistamine; antihistamines interfere with the mechanisms of allergic swelling and itching.
- (2) Antihistamines tend to cause sedation; it is even possible to use one or two at bedtime for difficulty in sleeping.

CONTRAINDICATIONS - sensitivity or allergy to chlorpheniramine.

SIDE EFFECTS - drowsiness.

COMPazine (prochlorperazine). Rx: 10 - 5 mg. tablets

DOSAGE - For nausea: 1 or 2 tablets every 6 to 8 hours

EFFECTS - *Compazine*, a phenothiazine, decreases nausea through an unknown mechanisms.

CONTRAINDICATIONS - allergy to *Compazine* or phenothiazines; *Compazine* may interact with narcotics (*Tylenol #3*, *Loxotil*) to cause increased depression of respiration and consciousness.

SIDE EFFECTS - sedation, drowsiness, restlessness, and possibly dystonic reactions: spasmodic face and tongue motions. If dystonic reactions occur, the medication should be stopped.

DUCOLAX (bisacodyl): 5 - 5 mg. tablets

DOSAGE - For constipation: 1 to 3 at bedtime as needed.

EFFECTS - *Ducolax* stimulates movement of the intestine.

SIDE EFFECTS - regular use may cause dependence on laxatives.

FLUOCINOLONE ACETONIDE CREAM 0.2%. Rx: 1 - 15 gm. (1/2 oz.) tube

DOSAGE - Apply to affected areas 3 or 4 times a day.

EFFECTS - Fluocinolone is a steroid, similar to hydrocortisone but stronger. Steroids inhibit certain parts of the immune response, and reduce certain mediators of swelling in allergic reactions. Steroids should not be used in the eye, and steroids stronger than hydrocortisone should not be used on the face or genitalia, except for a day or so for poison ivy or bug bites. Any of the multitude of strong steroid creams or lotions may be used in place of fluocinolone if one is available. Examples:

Valisone, *Benisone*, *Lidex*, *Kenalog*, *Aristocort*, *Uticort*, *Synalar*.

CONTRAINDICATIONS - Steroids should never be put on fungal or viral skin rashes or eye infections.

LOMOTIL (2.5 mg. diphenoxylate + 0.025 mg. atropine sulfate). Rx:
10 tablets

DOSAGE - For diarrhea: start with 2 tablets every 6 hours, and taper down to 1 tablet a day if possible.

EFFECTS -

Lomotil is a close relative of the narcotic derivative Demerol; the pain and cough suppression of *Lomotil* is much less than that of other narcotics, and its action to suppress activity of the intestines is strong.

CONTRAINDICATIONS - sensitivity to diphenoxylate or atropine.

SIDE EFFECTS - as a narcotic, *Lomotil* may rarely cause depression of respiration and consciousness; the atropine, which is included solely to discourage abuse, may cause dry mouth.

POLYSPORIN OPHTHALMIC OINTMENT (polymyxin/bacitracin). Rx:

1 - 3.5 gm. tube

DOSAGE - For potentially abraded eyes: apply into the lower eyelid 2 or 3 times a day.

EFFECTS - *Polysporin* is a combination of two antibiotics which together are effective against most bacteria causing eye infections.

CONTRAINDICATIONS - sensitivity to either antibiotic.

POVADONE-IODINE (Betadine, Acu-dyne)

OINTMENT: 5 - 1 gm. foil packets

SOLUTION: 5 - prep pads

Povadone-iodine ointment and solution are antibacterial, anti-fungal, antiviral iodine preparations which have been made less damaging to tissue by the addition of liquid plastic. Povadone-iodine solution may be diluted with clean water for wound irrigation, or used to paint areas of skin. Povadone-iodine ointment may be used on wounds to provide a bacterial barrier, and for the treatment of skin and external ear infections.

CONTRAINDICATIONS - sensitivity to iodine.

PROPARACAINE .5% OPHTHALMIC SOLUTION. Rx:

1 - 2 cc bottle

DOSAGES -

- (1) For examination of the painful eye: 1 or two drops. Do not use routinely for eye pain.
- (2) For preparing wounds for cleaning: empty 1 cc into the wound and wait 10 or 15 minutes.

EFFECTS - proparacaine is a local anaesthetic.

CONTRAINDICATIONS - sensitivity to proparacaine.

STERIOD CREAM: see Fluocinolone Acetonide cream

WILDERNESS MEDICINE: MEDKIT

STING-EEZE SOLUTION (phenol, camphor, eucalyptol, diphenhydramine HCl, and Benzocaine): 1 - 1/2 oz. bottle

DOSAGE - For miscellaneous stings or bites: apply liberally to the affected area immediately.

EFFECTS - Sting-Eeze is a mixture of local anaesthetics and an antihistamine.

CONTRAINDICATIONS - sensitivity to any component.

SIDE EFFECTS - local irritation.

SUDAFED (pseudoephedrine) sustained-release tablets:

8 - 120 mg. tablets

DOSAGES -

(1) For rhinitis: 1 tablet every 8-12 hours

(2) For sinus or middle ear infection: 1 tablet every 8-12 hours

(3) For asthma: 2 tablets, followed by 1 tablet every 8-12 hours

EFFECTS -

(1) vasoconstriction of blood vessels in the nose and sinuses.

(2) dilation of small airways in the lung.

CONTRAINDICATIONS - Sudafed should not be used by those pregnant or with high blood pressure.

SIDE EFFECTS - Sudafed may cause restlessness, sleeplessness, irritability, and an increase in pulse and blood pressure.

TRANSDERM-SCOP transdermal scopolamine patches. Rx: 6 patches

DOSAGE - one patch behind the ear every three days as needed.

EFFECTS - a continuous low dose of transdermal scopolamine has been shown highly effective in the prevention of motion sickness.

CONTRAINDICATIONS - sensitivity to scopolamine.

SIDE EFFECTS - If some of the scopolamine in the patch adhesive remains on the hands and is transferred to the eyes, it may cause pupil dilation and ciliary muscle paralysis, resulting in blurred vision; these effects will wear off in several hours. Dry mouth or lightheadedness will resolve several hours after the patch is removed.

TYLENOL #3 (300 mg. acetaminophen + 30 mg. codeine). Rx:

10 tablets

DOSAGES -

(1) For moderate pain: 1 or 2 every 3 to 4 hours; for severe pain: 3 every 3 hours.

(2) For cough: 1 every 4 hours.

(3) For diarrhea: 1 every 4 hours, but use Lomotil if available.

EFFECTS -

(1) The acetaminophen (Tylenol) in Tylenol #3 relieves minor pain and suppresses fever.

(2) The codeine in Tylenol #3 is a narcotic derivative which relieves moderately severe pain, suppresses cough, and suppresses intestinal activity.

CONTRAINDICATIONS - sensitivity or allergy to acetaminophen or codeine.

SIDE EFFECTS - codeine may cause drowsiness, lightheadedness, difficulty in judgement, and constipation. Persons taking Tylenol #3 should not drive, pilot, belay, or engage in other activities where coordination and quick judgements are essential.

OPTIONAL MEDICATIONS

ACETAZOLAMIDE (Diamox). Rx: 20 - 250 mg. tablets

DOSAGE - For improving acclimatization to high altitude, take one every 8-12 hours for 24-48 hours before ascent, and throughout the climb.

EFFECTS - The mechanism of action is not known, but acetazolamide has been shown effective in decreasing the time needed for altitude acclimatization.

CONTRAINDICATIONS - severe kidney disease.

SIDE EFFECTS - increased urine production.

BACTRIM-DS (double-strength) (160 mg. trimethoprim/ 800 mg. sulfamethoxazole). Rx: 20 tablets

DOSAGES -

- (1) For uncomplicated lower urinary tract infection: 2 tablets.
- (2) For middle ear infections or kidney infections: 1 tablet each 12 hours for 10 days.

EFFECTS - Bactrim-DS is effective against the organisms which most commonly cause ear and urinary tract infections.

CONTRAINDICATIONS - sensitivity to sulfa drugs or trimethoprim.

SIDE EFFECTS - nausea.

CYCLOGYL (cyclopentolate hydrochloride) solution. Rx: 1 - 2 cc eyedropper bottle

DOSAGES - two or three drops in each eye every four hours as needed for control of the pain of snow blindness.

EFFECTS - Cyclogyl is used to dilate the pupil so one may see the back of the eye. It also paralyzes the ciliary muscles that focus the lens, and therefore will relieve the spasm of these muscles responsible for much of the pain of snowblindness.

CONTRAINDICATIONS - A narrow anterior chamber of the eye (see HEENT), or a history of narrow-angle glaucoma. The more common open-angle glaucoma is not a contraindication to Cyclogyl.

SIDE EFFECTS - blurring of vision, sensitivity to bright light.

ERYTHROMYCIN. Rx: 40 - 250 mg. tablets

DOSAGES - For infections: 1 or 2 tablet every 6 hours.

EFFECTS - Erythromycin is a broad-spectrum antibiotic, effective against many skin infections and pneumonias.

CONTRAINDICATIONS - sensitivity to erythromycin.

SIDE EFFECTS - nausea.

MICONAZOLE NITRATE CREAM 2% (Micatin): 1 - 15 gm. tube

DOSAGES -

- (1) For fungal skin infestations: wash affected area and apply twice daily.
- (2) For yeast vaginitis: apply 1/3 of the tube (5 gm.) intravaginally once a day at bedtime.

EFFECTS - miconazole is a potent topical antifungal agent.

CONTRAINDICATIONS - sensitivity to miconazole.

SIDE EFFECTS - local irritation.

SURVIVAL PRETEST ANSWERS

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1. b. You can live for a long time without food, longer in fact than you can be lost in any eastern US wilderness. If you are stranded in the wilderness because you have been hurt badly enough that you are unable to walk out of the wilderness, it is improbable that you would have the capacity to forage for food. See page 9.
2. a,b,c,d Your pack is your life-support system in a hostile environment.
3. c. Gorp is better than a lamb chop for on-the-trail munching.
4. a. Though gorp is good for on-the-trail munching, a lamb chop makes a better dinner, as it has protein for rebuilding muscle damage, and fat for concentrated and sustained energy. See page 15.
5. b. The first part is false, the second part true. Alcohol is a ready source of calories (ever heard of a "beer belly"?), but it causes vasodilation of skin blood vessels, a fancy way to say flushing. Flushing makes the skin feel warm (and may suppress shivering), but accelerates heat loss from the skin, often causing hypothermia.
6. e. The worst combination is wind and rain at temperatures near freezing ("hypothermia weather"), because wet clothes lose their insulating value, convection (windchill) heat loss is enormous, and evaporation heat loss increases with the increased wind and wetness.
7. a. COTTON KILLS. Blue jeans wick water well (i.e. if a cuff sticks out from under your rain chaps, soon your jeans are soaked all over), and when wet they act as a heat pump, efficiently transporting heat from the skin to the outside of the jeans where it is lost. Wool and synthetic piles and bunting, however, are WARM WHEN WET. See p. 10.
8. b. Even warm-when-wet clothes are warmer dry than wet. If you sweat going uphill, some of that sweat is retained in your clothes to cause evaporative heat loss later, as when you stop for a rest and don't need the extra heat loss. See page 19.
9. c. Lithium cells are expensive and hard to get. However, since you only need two lithium cells to provide as much voltage as four regular cells, and they last several times as long, the overall cost is about the same as for regular alkaline cells. (Plain carbon-zinc cells are useless in the cold and never used.) See page 22.
10. e. A cold front means heavy storms then clearing and colder air; a warm front means extended precipitation. See Breyfogle p. 301.
11. a. Isolated trees are like lightning rods. Ground currents may jump the entrance of a cave entrance, or shock someone not well-insulated from the ground. See Breyfogle page 347.
12. e. Minor wounds don't generally need more than careful personal care, but bites are contaminated puncture wounds and always require a physician's attention. See page 40.
13. c. Antibiotics do little for abscesses; they must be drained.
14. c. This hiker has heat exhaustion and is depleted in both water and salt; he must be treated as for mild shock, and both water and salt must be replaced. Salt tablets are likely to cause stomach upset, and may cause electrolyte imbalances. See page 12 for more.
15. a. See page 13 and page 39.
16. d. See page 34. Oral fluids are used for shock only in the backcountry or in a disaster, i.e. when no intravenous fluids are available.
17. a. See Breyfogle, pages 106-114.

SURVIVAL AND WILDERNESS TRAVEL POSTTEST
by Keith Conover

Version 2.0 August 1984

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=====

Pick the best answer for each question. For matching questions, use each possible answer once only or not at all, unless otherwise directed.

=====

1. It is possible to survive for at least a week without food; therefore, foraging for food is a low survival priority for SAR team members in the ASRC region.

- a. true
- b. false

2. The physiological reaction to danger (rapid pulse, sweaty palms, etc.) and the associated psychological urge to action (the "fight or flight" response) may be appropriate in certain danger situations, but may also obscure or sidetrack rational thinking.

- a. true
- b. false

3. The purpose of panic-stopping mnemonics (such as STOP: Stop, Think, Observe, Plan) is to reassert the control of rational thinking over one's involuntary reactions.

- a. true
- b. false

4. Which of the following examples shows why it is important to know one's capabilities and limitations?

- a. An unrealistically optimistic view of one's capabilities may lead to situations where one is overextended. For example: you are going hand-over-hand up a 100 foot rope. Fifty feet up, you realize that you don't have enough strength left to reach the top or to downclimb.
- b. An unrealistically pessimistic view of one's capabilities may hamper participation in search and rescue tasks. For example: during a rescue, you must climb an exposed section of rock (but with an excellent belay). Since you have done a fair bit of backpacking but no climbing, you are scared out of your wits and inform the Field Team Leader that you can't climb it. After 45 minutes of "consultation" with the FTL, you get up the climb, call "OFF BELAY!" and only then collapse on your face. Looking back at the climb, you realize that it really is pretty trivial, and that you now have a better idea of your capabilities. Unfortunately, while you were on the climb, the victim managed to crawl to the hospital under his own power.
- c. Both are good reasons to push your limits in a safe environment, so you know the extent of your capabilities; you are then better able to function in a dangerous environment.

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

5. In the US and Canada each year, one or more parties of young, inexperienced mountaineers get into trouble and have members of their party die. Which of the following is probably the least important factor in these disasters?

- a. the egoistic need to complete an ascent rather than admit defeat in the face of deteriorating weather
- b. cotton blue jeans, cotton flannel shirts, but little or no wool or synthetic clothes
- c. inadequate wind and rain protection
- d. inadequate survival rations (food)

6. Which of the following is a prime rule for Field Team members on all ASRC missions?

- a. DON'T GET SEPARATED FROM YOUR PACK!!!!
- b. DON'T GET SEPARATED FROM YOUR PACK!!!!
- c. DON'T GET SEPARATED FROM YOUR PACK!!!!
- d. DON'T GET SEPARATED FROM YOUR PACK!!!!
- e. all the above answers are correct

(7-12) MATCHING: SURVIVAL PHYSIOLOGY CONCEPTS

- | | |
|---|---|
| 7. Homeostatic mechanisms | a. 1000-4000 |
| 8. Energy level | b. buildup of waste products |
| 9. Exhaustion | c. tend to keep something at a preset level, much like a thermostat |
| 10. Daily food energy requirement, in Kcal. | d. 2-10 |
| 11. Daily water requirement, in liters (quarts) | e. lack of available energy |
| 12. Fatigue | f. amount of energy available to do work |

(13-17) MATCHING: TYPES OF FOOD

ANSWERS MAY BE USED MORE THAN ONCE

- | | |
|--|---------------------|
| 13. Highest energy per weight | a. fat |
| 14. Small amounts needed to repair damage to body tissues | b. sugar and starch |
| 15. Most difficult to digest | c. protein |
| 16. Quickest available energy | |
| 17. Sometimes craved in winter diets; some say it helps protect against cold | |
18. Physical and mental conditioning are important for ASRC Field Team members. Goals for conditioning should include:
- a. strength
 - b. flexibility
 - c. endurance
 - d. all the above answers are correct

(19-22) MATCHING: MODES OF HEAT LOSS

- | | |
|-----------------|--|
| 19. conduction | a. sleeping "under the stars" rather than in the forest or in a tent |
| 20. radiation | b. skin and lungs |
| 21. convection | c. windchill |
| 22. evaporation | d. sitting on a cold rock |

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

23. Which of the following is not a source of body heat loss?
- a. radiation
 - b. convection
 - c. evaporation
 - d. wind chill
 - e. basal metabolism
 - f. expired breaths

24. Water has a higher heat capacity than air (an ounce of water holds more heat than a similar amount of air). Therefore, wet clothes lose their insulating value only because of an increase in evaporation heat loss.

- a. true
- b. false

(25-32) MATCHING: PHYSIOLOGIC RESPONSES TO HEAT AND COLD ANSWERS MAY BE USED MORE THAN ONCE

- | | |
|--|---|
| 25. First physiologic response to cold stress | a. dehydration and salt loss |
| 26. Second physiologic response to cold stress | b. shivering |
| 27. Long-term consequences of the answer to (26) | c. sweating |
| 28. First physiologic response to heat stress | d. exhaustion |
| 29. Second physiologic response to heat stress | e. vasodilation: increased blood flow to the skin |
| 30. Long-term consequences of the answer to (29) | f. vasoconstriction: decreased blood flow to the skin |
| 31. Ingested (ethyl) alcohol, as in whiskey | |
| 32. Smoked tobacco | |

33. "Hypothermia weather" is a term outdoorspeople use to describe weather which poses a great threat of hypothermia, particularly because its danger is often underestimated. It is:

- a. temperatures below 0 degrees F.
- b. temperatures below 0 degrees F with strong winds.
- c. temperatures near 32 degrees F with wind and rain.
- d. temperatures near 32 degrees C on a beach in the Bahamas.

34. "Wetchill" is the chilling effect of rain or perspiration on an outdoorsperson and his clothing. Which of the following does not contribute to wetchill?

- a. Water conducts heat faster than air, and wet clothing also conducts heat faster than dry clothing
- b. Wet clothing causes vasodilation (increased blood flow) in the skin
- c. It takes a lot more heat to warm up a piece of wet clothing than the same garment dry, because water has such a high heat capacity (meaning it takes a great amount of heat to warm up water just a little, compared with air or dry clothing)
- d. Wetness causes increased evaporation heat losses

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

35. The ASRC has been using the idea of THE THREE W's as an aid for teaching outdoorspeople the three important aspects of protection against hypothermia. The ASRC "three W's" are:

- a. wool, wool, and wool.
- b. windproof, waterproof, and wool (or other warm-when-wet) clothes.
- c. warm, well-ventilated, and well-fitting clothing.
- d. Wein, Weib, Gesang (wine, women, and song).

36. If you are on a winter hike with wind but no rain or snow, your best choice of an outer garment would be:

- a. a waterproof (urethane-coated) parka or cagoule.
- b. a breathable (water-vapor permeable, such as ventile cotton, non-coated nylon, or 60/40 cloth) parka or windshirt.
- c. a knit wool sweater.
- d. a kilt and sporran.

37. If you are on a winter hike with wind and rain, your best choice for outerwear (among the given choices) would be:

- a. a waterproof (urethane coated) parka or cagoule.
- b. a breathable (water-vapor permeable, such as ventile cotton, non-coated nylon, or 60/40 cloth) parka or windshirt.
- c. a knit wool sweater.
- d. a full wetsuit and SCUBA tanks.

38. Which of the following is a good reason for using the layer principle for cold weather?

- a. layers may be added or taken off for a comfortable temperature level
- b. multiple thin layers are easier to manage than a single thick layer
- c. multiple thin layers trap more air and are therefore a better insulator than an equivalent weight of material in a single thick garment
- d. (a) and (c) are both correct

39. Ventilation, "dressing cool" (so that one is slightly chilly, rather than warm), and stopping often to take off or put on a layer of clothes, are all essential parts of good winter hiking technique. Which of the following is the most important reason to avoid overheating in the winter?

- a. to avoid heat exhaustion and heat cramps
- b. to avoid eclampsia
- c. to avoid wet clothes
- d. to avoid heatstroke

40. For cold-weather mountain rescue purposes, the wicking of water by cotton clothes is:

- a. good because it helps keep the skin dry.
- b. bad because if one part of a cotton garment is exposed to rain, the entire garment becomes wet.
- c. irrelevant. This is a stupid question.

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

41. Wool and certain synthetics (e.g. polypropylene) retain a fair amount of their insulating value when wet. On the other hand, cotton and down are almost useless as insulation when wet.
- true
 - false

42. The relative cold-weather performance of alkaline, carbon-zinc, and lithium cells is, from best to worst:
- lithium > carbon-zinc > alkaline
 - alkaline > carbon-zinc > lithium
 - alkaline > lithium > carbon-zinc
 - lithium > alkaline > carbon-zinc
 - all are similar in cold-weather performance

(43-47) MATCHING: DRY CELLS

ANSWERS MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL

- | | |
|--|-------------------|
| 43. best performance in cold | a. alkaline |
| 44. lightest weight per cell | b. lithium |
| 45. rechargeable and good in cold | c. carbon-zinc |
| 46. standard cheap battery, poor in cold | d. nickel-cadmium |
| 47. heavy, available in many stores, performance in the cold is fair | |

(48-50) MATCHING: WEATHER SIGNS

48. Mare's tail clouds (fleecy cirrus clouds), progressively becoming lower and thicker, forming a leaden sky (thick layers of stratus clouds), moving in from the southwest.

49. Mackerel sky (rippled altocumulus clouds) in the evening, followed by a red sunset, followed by a halo around the moon; the next morning, thunderheads appear off in the west.

50. A warm summer day with many cumulus clouds in the sky; in the afternoon, it becomes dark, quiet, and then the wind shifts markedly.

- an approaching cold front, with possibly some violent but short-lived storms
- an approaching warm front, probably bringing an extended period of rain
- a local thunderstorm developing

(51-55) MATCHING: INFECTIOUS DISEASES

- | | |
|----------------------------------|--|
| 51. rocky mountain spotted fever | a. puncture wounds |
| 52. tetanus | b. fecal contamination of drinking water |
| 53. enteritis and diarrhea | c. animal bites |
| 54. rabies | d. itchy bumps around the ankles |
| 55. chiggers | e. ticks |

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

56. Proper treatment for muscle cramps includes all the following except:
- warmth (warm compresses)
 - antihistamines (e.g. chlorpheniramine)
 - stretching
 - massage
57. As a general rule, the top layer of a friction blister should be removed.
- true
 - false
58. The correct treatments for tendinitis ("squeak heel," "mal de racquette") include:
- remove the cause (e.g. use some moleskin to pad the boot so it doesn't rub on your heel any more)
 - rest the affected tendon
 - aspirin
 - all the above answers are correct
 - a and b only are correct
59. The essential treatment for an abscess is:
- oral antibiotics (e.g. erythromycin).
 - incision and drainage.
 - warm soaks.
 - aspirin.
60. Treatment for a bad case of contact dermatitis, such as from poison ivy, might reasonably include:
- aspirin.
 - steroid cream.
 - an antihistamine (e.g. chlorpheniramine)
 - all the above answers are correct
61. The proper treatment for any allergic reaction includes immediate subcutaneous injection of epinephrine (adrenaline).
- true
 - false
62. In anaphylaxis, a major problem is swelling of the lining of the airways.
- true
 - false
63. The proper initial step in management of a suspected pit-viper bite in the backcountry is:
- immediate incision and suction of the backcountry.
 - packing in ice.
 - cross-shaped (cruciate) incisions and suction, especially if the bite is on the hands or feet.
 - application of a tourniquet.
 - a careful check for signs of envenomation (marked redness, swelling, warmth, or pain).

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

64. Any raccoon, skunk, or fox bite must be treated as an important medical problem, because of the possibility of rabies.
- true
 - false
65. Fever doesn't need to be treated, except to relieve the discomfort with aspirin, unless it exceeds 104 degrees F (40 degrees C), but it may indicate an underlying problem that should be treated.
- true
 - false
66. The most important treatment for diarrhea is fluid and electrolyte (salt) replacement.
- true
 - false
67. An important part of the treatment for snowblindness is patching of the eyes and rest.
- true
 - false
68. When a hypothermia victim is rapidly rewarmed:
- one may see "afterdrop," a paradoxical drop in the core temperature as rewarming is started.
 - stagnant blood from the extremities may rush back to the heart, causing it to stop beating normally.
 - excessive reflex vasodilation (expansion) of the skin blood vessels may cause shock.
 - all the above may occur
69. A person who has subacute (mountain/exhaustion) hypothermia with uncontrollable shivering should be put in dry clothes and put into a thick sleeping bag to rewarm himself.
- true
 - false
70. Which of the following is not a good place to put hot packs on a hypothermic patient?
- the neck
 - the groin
 - the armpits
 - the calves of the legs
 - all are good places
71. When transporting a person with severe or chronic hypothermia, which of the following cautions should be observed?
- keep the litter level or with the head down slightly, to avoid causing seizures
 - do not to bump or jostle the litter, as this may cause problems with the heart rhythm
 - keep the patient's legs bent to avoid stress on the spinal cord
 - a and b
 - a and c
 - b and c

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

72. Heat cramps are due to a salt imbalance. The treatment is therefore to give something to drink which has salt in it (but only slightly rather than very salty, to avoid stomach upset).

- a. true
- b. false

73. Of the following, which is the most sensitive and reliable sign of dehydration?

- a. thirst
- b. dark (concentrated) urine
- c. delirium
- d. flushed skin

74. Of the following, the best rule for a hot environment is:

- a. Ration your water to one pint a day.
- b. Drink enough fluids to ensure a good urine output, even if you're not thirsty.
- c. Take at least 10 salt tablets every day; take them between meals.

75. In winter, dehydration is seldom a problem because the body uses less water than in a hot environment.

- a. true
- b. false

76. The combination of weakness, tunnel vision, and concentrated urine (but without nausea, vomiting, or pale skin) probably indicates:

- a. heatstroke
- b. heat exhaustion
- c. dehydration
- d. heat cramps
- e. a team member who is a wimp

77. In many ways, heat exhaustion is similar to mild shock.

- a. true
- b. false

78. Heatstroke is characterized by:

- a. hot, dry skin.
- b. cool, clammy skin, and a rapid pulse.
- c. neither of the above

79. _____ is a true medical emergency requiring immediate treatment to bring the victim's temperature down.

- a. heatstroke
- b. heat exhaustion
- c. severe dehydration
- d. heat cramps

80. The extreme pain of blood under a fingernail after a crush injury (a subungual hematoma) may be greatly relieved by drilling or burning a hole through the fingernail to let the blood out.

- a. true
- b. false

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

81. The proper treatment for an external ear infection will probably include the local application of antimicrobial ointment (e.g. *Polysporin* ophthalmic ointment).

- a. true
- b. false

82. The proper treatment for a middle ear infection (behind the eardrum) will probably include the use of a decongestant and an antibiotic (e.g. *Bactrim-DS*).

- a. true
- b. false

83. Conjunctivitis (inflammation of the lining of the eye and eyelids) may be caused by:

- a. allergy; the treatment includes the use of antihistamine (e.g. chlorpheniramine)
- b. a foreign body in the eye (actually, in the conjunctival sac); treatment includes removal of the offending object with aid of a local anaesthetic (e.g. proparacaine)
- c. a mild abrasion of the eye; treatment includes careful examination (under local anaesthetic) for a foreign object, application of an ophthalmic antibiotic ointment (e.g. *Poly sporin*), and application of a patch.
- d. "snowblindness," which is a sunburn of the cornea; treatment includes cool compresses and application of a patch.
- e. all the above answers are correct

84. Proper immediate treatment of small second degree burns is:

- a. antimicrobial ointment (e.g. povadone-iodine ointment), butter, or lard.
- b. immersion in cold water.
- c. oral antibiotics (e.g. erythromycin).
- d. antihistamines (e.g. chlorpheniramine)

85. Proper follow-up care for small second-degree burns includes:

- a. protection from pressure or mechanical damage
- b. application of a clean, dry dressing
- c. application of povadone-iodine ointment once or twice a day
- d. all the above answers are appropriate.

86. A good treatment for deep frostbite is to rub the affected part with snow to increase circulation.

- a. true
- b. false

87. Since re-freezing of a frostbitten part is extremely damaging, frostbitten parts should not be rewarmed if there is a good chance of refreezing.

- a. true
- b. false

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

88. A person may walk on frozen feet (feet with deep frostbite) with little additional damage, but cannot walk if they are thawed.

- a. true
- b. false

89. The recommended treatment for deep frostbite is immediate rewarming in water heated to 100 degrees C (212 degrees F).

- a. true
- b. false

90. The proper definitive wilderness care of minor wounds (ones which will be definitively treated in the field, and are not cause for a trip to the Emergency Room or doctor's office) includes all the following except:

- a. clean the wound with copious amounts of clean water, to which a little povidone-iodine solution may be added.
- b. remove any small bits of tissue which will obviously die.
- c. apply tincture of iodine, merthiolate, or alcohol into the wound.
- d. apply a sterile dressing.

91. If you are less than 12 hours from a hospital, and you are presented with a major wound (one which will need to be cared for by a surgeon or other physician), you should not clean the wound thoroughly, as the physician will want to clean it himself under sterile conditions. If, however, it will be days until a hospital is reached, you should clean the wound as meticulously as possible, to minimize the chances of infection.

- a. true
- b. false

92. The ideal treatment for an ankle sprain includes all the following except:

- a. aspirin
- b. cold applications for approximately the first 12 hours, followed after approximately 24 hours with warm applications
- c. steroid cream to the ankle
- d. slight elevation of the foot for at least 24 hours
- e. an elastic bandage, firmly applied but not restricting circulation

93. In the field, dislocations should generally be treated as one would a fracture: splint it as it lies and transport to a hospital. However, it may be appropriate to attempt reduction of certain dislocations when far from the road. In which one of the following cases is it probably not reasonable to attempt reduction in the wilderness?

- a. dislocation of the jaw
- b. simple dislocation of the finger
- c. anterior dislocation of the shoulder with no pulse, movement, or feeling in the arm
- d. posterior dislocation of the hip

SURVIVAL AND WILDERNESS TRAVEL POSTTEST

94. The treatment of muscle strains or contusions includes: elevation, cold applications for approximately 12 hours, and then after approximately 24 hours, warm applications for a few days.

- a. true
- b. false

95. The general rules for splinting include:

- a. "Splint it as it lies."
- b. "For a fracture of a long bone: immobilize the joints above and below."
- c. "For a dislocation or a fracture around a joint: immobilize the long bone above and the one below."
- d. all the above answers are correct

96. The treatment of an open fracture far in the backcountry (more than a day from the nearest hospital) includes meticulous cleaning, a dry dressing, and antibiotics (e.g. erythromycin).

- a. true
- b. false

97. Which of the following is not part of the proper treatment for shock?

- a. position the patient lying but with the feet elevated
- b. keep the patient from chilling
- c. IF you are far from the road AND IF the patient is completely conscious AND IF the patient has no internal injuries, you may give small sips of Gatorade
- d. give small sips of whiskey

98. The proper treatment for an attached tick is to persuade it to let go by covering it with povadine-iodine ointment, or prodding its rear end with a hot object. If it must be removed with the splinter forceps, one must be certain to get out any embedded head parts.

- a. true
- b. false

99. A possible treatment for chiggers is to cover the skin over them with nail polish and thus to suffocate them.

- a. true
- b. false

100. Assume you're out hiking with a party of 10 in an area with a good wilderness rescue capability (e.g. in the backcountry of Shenandoah National Park). With which of the following situations should you start an improvised evacuation, rather than simply sending for help and waiting for a rescue team with a Stokes litter?

- a. signs of deepening stupor and coma following a blow to the head
- b. a femur (thigh) fracture without severe shock
- c. a spine injury
- d. a heart attack

SURVIVAL AND WILDERNESS TRAVEL: INDEX

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This Index provides references to all portions of this Module, including the pre-test, the standards, and all supplementary readings. It does not cover the required readings (Fear and Breyfogle) or the suggested reading (Freedom of the Hills).

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KEY: F = Fear, B = Breyfogle. Other page numbers refer to the Supplemental Readings of Module I.

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Shenandoah Mountain Rescue Group
SURVIVAL POSTTEST ANSWERS
Version 2.1 November 1985

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BASIC MEMBER TRAINING COURSE
Editor: Keith Conover, M.D.
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