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HOT WEATHER CLOTHING

By Dr. Edwin E. Slosson.

In these days when we are largely occupied in efforts to keep cool, it is worth while to spend a little thought on the fundamental principles of heat movement and how we can apply them to the problem.

In the first place we must remember that our object is not so much to keep the heat out as it is to get the heat out. Out internal stoves, where food serves as fuel, produce heat enough to raise us to the fever point in a few hours and to cause death by what is commonly called "sunstroke", even though there were no sun, if we could not continually pass off our surplus heat to the surrounding air.

The air will consent to relieve us of our surplus heat on two conditions: first, when the air is cooler than our bodies, and, second, when it has less water than it can hold. If the air is above 99 degrees Fahrenheit and has 100 per cent humidity, there is no help for us.

Fortunately the air roundabout rarely attains these two conditions, but the air that is kept in contact with the skin as by tight or thick clothing does get to the same temperature as the body and does take up all the moisture it can hold. In that case the only thing to do is to get rid of this old air and get in some new that is capable of absorbing heat and perspiration.

From a purely theoretical point of view therefore, the ideal midsummer costume would be to wear a large umbrella and nothing else. But to apply a scientific theory without regard to local circumstances is often unwise and sometimes unsafe. Yet whatever deviation from the ideal local custom may require, we should bear in mind the fundamental principle that cooling is due chiefly to evaporation and that evaporation depends upon ventilation. Close clothing keeps a hot and humid layer of air in contact with the skin so that we who rejoice that we dwell in the temperate zone are really living the year round in a tropic atmosphere except for our hands and face. The circulation of air should theoretically, be sufficient to keep the skin free from uncomfortable accumulation of perspiration, but not so rapid as to chill it by excessive evaporation. It is not the sweat we see that cools us but that which passes off unperceived. To evaporate the water from a man's wet clothing may require as many calories as he gets in a day's food.

Clothing halves the loss of heat in cold weather and cuts it down still more in warm weather. The clothed man ranks between the furry dog and the rabbit in

the matter of heat exchange.

If our skin were a sheet of silver foil of the same thickness, we would lose heat 2280 times as fast as we do, but a layer of immobile air, such as may be caught by fur, feathers, or close-knit cloth, will retard the loss of heat ten times as much as the skin.

To keep the air in free circulation over the skin, the clothing should touch the skin as little and as lightly as possible. Coarse meshed and porous fabrics are better than fine cloth.

The weave makes more difference than the color. It is true that black clothing absorbs about twice as much sunlight as white, but that does not tell the whole story, for it is heat that we want to keep out, and more than half of the sun's heat is not seen by the eye as light. We see about an octave of the solar spectrum, from the red waves of lowest frequency to the violet of highest frequency. But beyond the violet there are two octaves and below the red there are six octaves that we can not perceive with the eye. At high noon in the latitude of Washington, 51 per cent of the energy of solar radiation comes in the form of the dark heat rays of the infra-red, 40 per cent as visible light, and 9 per cent as ultra-violet rays, also invisible but the most powerful of all in their effect on the skin. It is the ultra-violet rays that are responsible for tanning and burning. Now the dark heat rays pass equally well through dark and light cloth, and the ultra-violet chemical rays pass better through light than dark.

Leonard Hill, the great English authority on climatology, commends the Egyptian robes as the most comfortable garments for a hot country for "as the native walks his garments sway and flap in ungainly fashion, but in doing so cause air currents, which have a cooling effect". The missionaries' wives, when called upon to devise a costume for the women of the Pacific Islands, did well from a sanitary point of view when they clothed them in Mother Hubbards, though they could hardly have done worse from an artistic point of view.

But it is not necessary for clothing to be unbecoming in order to be comfortable. Probably American women have never been more seasonably clad than they are this summer, but no one could call their costumes ungainly. The men, too, although they are more conservative and less original than women in matters of dress, have made some progress of late in the adaptation of their clothing to the summer season, but their tight collars and belts are contrary to the first principles of hot weather costume.

HOW ASTRONOMERS WILL OBSERVE MARS AT CLOSEST APPROACH

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Mars will approach closer to earth on August 22 than it has in the past hundred years or will in the next hundred. This ruddy planet, now visible late in the evening as a very bright object low down in the southeastern sky, has been the subject of much speculation in past years, particularly as to whether it supports intelligent life capable of constructing so-called "canals" which have been described by prominent observers of Mars.

At this favorable opposition Mars will be only 34,630,000 miles away from