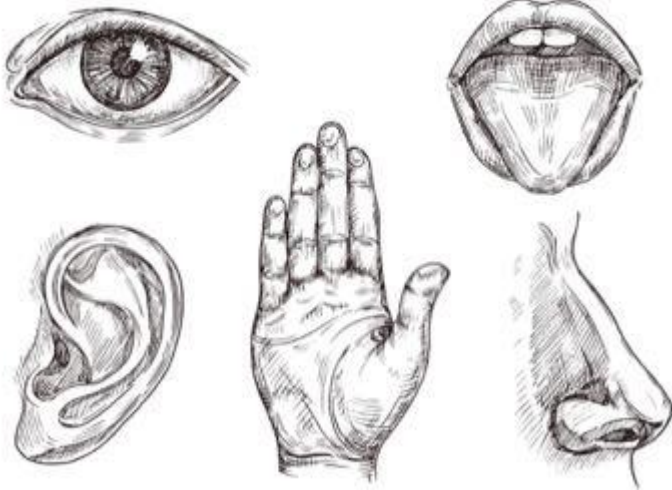


Medical Missionary Health Lesson

Organs of the External Senses



By John N. Loughborough

1868

ORGANS OF THE EXTERNAL SENSES

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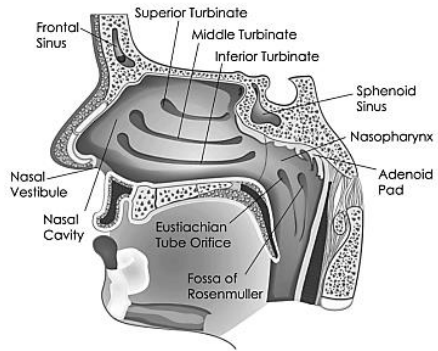
WHAT ARE THE ORGANS OF EXTERNAL SENSE?

Those organs of the animal machine which bring it into relation with external objects are five: smell, sight, hearing, taste, and feeling, or sense of touch. The first four are situated in the head, while the organ of touch is distributed over the entire skin of the body.

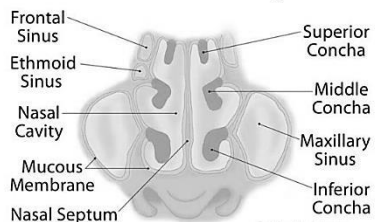
ORGAN OF SMELL

WHAT IS THE ORGAN OF SMELL?

The nose is an organ admirably adapted to the office of smelling. The air, laden with odorous particles, can be drawn through it, and over the delicate membrane with which it is lined, near the surface of which commence numerous nerves, which unite with, and form the olfactory nerve, which carries its impression to the center of animal perception, the top of the medulla oblongata.



There are four cavities to the nose, two through the upper jaw into the throat, by which the nose communicates with the lungs, and thus it is admirably adapted as a breathing organ, as well as smelling. The little hairs crossing the outer cavities of the nose are for the purpose of preventing the ingress of injurious particles of dust to the lungs. The nose is the natural passage for the external air to the lungs. It is by this sense that we are warned of the presence of decaying and unwholesome articles, and through it we experience a thousand delights from the fragrant odors of nature's flowers, etc. The odor of healthful food also quickens digestion.



WHAT IS ESSENTIAL TO A HEALTHY CONDITION OF THIS ORGAN?

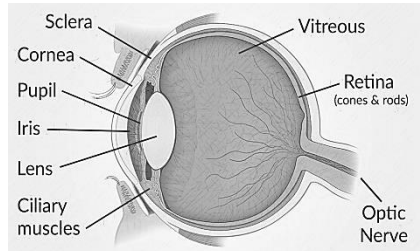
The integrity of this organ requires that the mucous membrane lining the nose should be continually moistened and lubricated by its own exhalation and

secretion. It is liable to become dry, so nature has provided it with facilities for abundant moisture. Colds, inflammation of the mucous surface, such narcotics as tobacco, snuff, smelling bottles of hartshorn, camphor, and all strong and pungent perfumery, weaken, paralyze, and sometimes utterly destroy, all perception of odors, and injuriously affect the whole brain through this sense. Sneezing has been said by some to be the voice of God in our nature commanding us to avoid what causes us to sneeze. Constant irritation of the mucous lining of the nose may in time hush this voice so that the peculiar sensibilities of the nose no longer warn us of intruders from that source.

THE ORGAN OF SIGHT: THE EYE

WHAT IS THE ORGAN OF SIGHT?

The eye; that wonderful organ whose healthful function enables us to see surrounding objects, and thus avoid many injuries, as well as experience many joys. The eye is of a globular form, composed of a number of humors, which are covered by



membranes, and enclosed in several coats. On the front surface there is a slight depression, and in this is situated the crystalline lens. This is a body of considerable thickness and strength, and has the form of a double-convex lens. It is placed in a perpendicular direction immediately behind the pupil, and is kept in its situation by a membrane which is called its capsule.

In front of the crystalline lens, and occupying the whole of the front part of the eye, is the aqueous humor. It is composed principally of water, with a few saline particles, and a very small portion of albumen. A curtain with an opening in its center floats in the aqueous humor, but is attached to one of the coats of the eye at its circumference. This curtain is called the iris, and the opening in it is the pupil. It derives its name from the various colors it has in different individuals, and it is the color of the iris that determines the color of the eye. All the light admitted into the eye passes through the pupil, which is dilated or contracted according to the intensity of the light and power of the eye. The eye has three coats. The outer or sclerotic coat - the white of the eye - is that to which the muscles that move the eye in various ways are attached. Within the

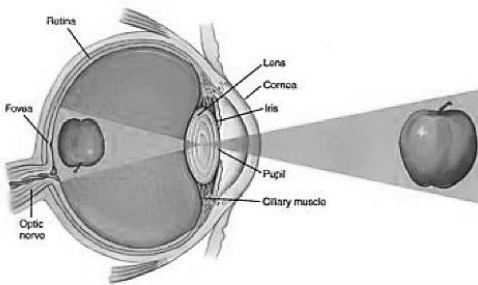
sclerotic coat is the choroid coat, composed mostly of blood-vessels and nerves. The inner coat is called the retina. It is either an expansion of the optic nerve, or composed of nervous filaments attached to it.

HOW IS THE EYE AND ITS VARIOUS PARTS MOISTENED?

There are what are called lachrymal glands, which constantly supply the eyes with moisture, not only when they are open and in action, but also when closed and quiet in sleep. There are two small openings from the eyes into the nose, through which the fluid secreted by the lachrymal glands is conveyed. When these glands are much excited by irritations of the eyes or nose, or by strong emotion of the mind, they pour their fluid into the eyes faster than the small nasal ducts can convey it into the nose, and it flows down the cheeks in tears.

WHAT IS THE MEDIUM OF SIGHT TO THE EYE, AND HOW IS SIGHT AFFECTED?

Light is the medium of vision, and the light conveys the impression of the object to the retina. A good illustration of the action of the eye may be made by cutting a hole in a window shutter large enough to receive a spectacle glass, excluding all light from the room except what comes through the hole. If the sun is shining brightly upon the shutter the rays of light will be seen in the room drawing together till they come to a focal point, and then the rays pass on diverging from one another, but the angle will be alike both sides of the



focal point. At this focal point all the rays coming through the glass cross each other, so that the top rays at the glass are the bottom ones beyond the point. If a sheet of white paper be placed a little beyond the focal point, a beautiful miniature

image will appear upon it of whatever the rays of light may come from, but this image will be upside down, and turned side for side, caused by the crossing of the rays of light. If instead of a spectacle glass, a small glass globe filled with water be placed in the hole in the window shutter, the rays will cross and diverge before they get through it, and the image will be thrown upon the back part of the globe. The interior of the eye is represented by the darkened room; the cornea by the transparent window glass; the iris by the shutter; the pupil

by the hole through which the rays of light enter; the aqueous, crystalline, and vitreous humors, constitute a lens of so great a convexity, that the rays cross and diverge before they get through the globe, and throw their inverted image upon the retina. Here the mind perceives it, and by usage, views the object as though it were right side up.

WHAT CARE IS NECESSARY IN RELATION TO THE EYE?

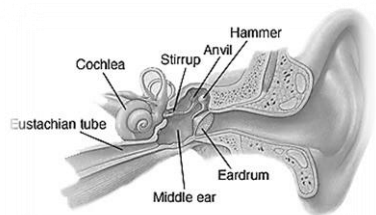
Reading early in the morning, before the just-wakened eyes are accustomed to the light, reading by twilight or lamp-light, are all injurious to the eyes. Never read facing the light of the lamp or window, but let the light shine over your shoulder upon your book. Those who read much should spend considerable time out-of-doors, looking at distant objects. Close application to reading tends to shorten the sight and weaken the eye. It is supposed one reason city people lose their eye-sight sooner than those in the country, is because their sight is confined to objects near at hand. Another reason, however, is the impurity of the air, it being infected with smoke, coal-dust, etc. Smoke of any kind, especially tobacco smoke, is very injurious to the eyes. But it must ever be remembered that all organs of the body sympathize with each other and are affected by diseases of each other; so to cure diseases of the eyes there must be care given to the vital interests of the whole domain of organic life.

THE ORGAN OF HEARING: THE EAR

WHAT CAN YOU SAY OF THE CONSTRUCTION OF THE EAR?

This organ, which, with that of sight, ministers to the intellectual and moral wants of man, as well as the physical, and relates us in duties, interests and pleasures to our fellows, exhibits in its structure a greater complexity than any other part of the human organization.

The ear may be divided into the outer, the inner, and middle parts, and the auditory nerve. The outer part consists of the external ear, and the tube which leads to the membrane of the tympanum. The external ear is composed of cartilage, covered with a delicate skin, supplied with nerves and blood vessels. It inclines forward and is adapted to collect



sounds, which it conveys through the tube. This tube is nearly an inch in length, made partly of cartilage and partly of bone. It has a number of small glands which secrete the wax. Its entrance is guarded by stiff hairs to prevent the ingress of foreign substances to the ear. The middle part of the organ embraces the tympanum and its membrane, the small bones of the ear, and the eustachian tube. This tube passes to the throat a little back of the palate. It is about two inches long, the largest at the throat. The membrane of the tympanum is placed at the bottom of the external tube. This membrane is placed obliquely, inclining downward and inward; it is tense, thin, and transparent. The tympanum, between the external and internal ear, is of irregular cylindrical form, with several openings. It contains the four little bones of the ear called the hammer, the anvil, the round bone, and the stirrup. Muscles of very small size move these bones in various directions. The internal ear is composed of three parts, and is situated in a part of the temporal bone near the base of the skull. Its parts are called the cochlea, the vestibule, and the semicircular canals. The first resembles the shell of a snail. The vestibule is a sort of porch or entry, which communicates with all the other parts. The three semicircular canals are all back of the cochlea and vestibule. The auditory nerve is distributed to the semicircular canals, the cochlea, and the vestibule, terminating in the form of a pulp.

WHAT CAN YOU SAY OF THE ACTION OF THIS ORGAN?

As the pupil of the eye contracts or dilates according to the amount of light transmitted to it, so the nerves of the ear act upon the muscles of the internal ear in proportion to the softness or harshness of the sound transmitted. The muscles move the chain of small bones so as to conduct the vibrations of sound across the tympanum to the internal ear. The contained air of the tympanum reverberates the sound, which is strengthened and modified by reflection from the walls, cells, and spaces of the ear. The impression of this sound is taken cognizance of by the auditory nerve. Of the peculiar action of this nerve, we shall have to content ourselves with admiring its wonderful operation without being able to solve the mystery as to how it acts. Of the philosophy of sound we can only say here that it is a vibration of the air caused in various ways, as by the striking of a bell, by singing of birds, or by the human speech.

WHAT CAN YOU SAY IN GENERAL TERMS OF THE EAR?

It is one of the most useful of the organs of sense. It is attuned to the varied and sweet sounds of nature. Through it the persuasive tones of eloquence exert more power to stir or to stay the passions of man than all the arguments the ablest reasoner can present to the judgment. How important that we carefully guard and preserve this organ. It will be perceived that persons on becoming blind have a more acute sense of hearing than they had before. This hearing in some respects compensates for loss of sight.

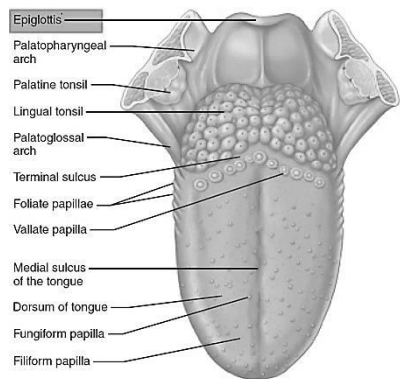
IS THE EAR VERY LIABLE TO DISEASE?

There are very few causes of derangement of the ear. Ear wax sometimes hardens in the ear. This can frequently be entirely relieved by several times dropping into the ear a few drops of pure sweet oil, and swabbing out the ear thoroughly with a little warm soft water and castile soap. Colds in the head, if they affect the hearing, must be very carefully avoided. In dullness of hearing, while you can hear distinctly the ticking of a watch placed against the side of the head, there is hope. Throat diseases, and scarlet fever, are very liable to leave children hard of hearing. This difficulty, as well as a permanent discharge from the ear, usually results from taking cold while recovering from the above diseases. The greatest care should be used that such results should not follow scarlet fever, etc. The difficulty may be outgrown, if not it is likely to grow worse as life advances.

THE ORGAN OF TASTE

WHAT IS THE ORGAN OF TASTE?

The tongue. It is composed of muscular fibers, arranged in almost every direction. Between these muscles is a quantity of adipose substances. At the back part it is connected with the os hyoides by a muscular attachment. It is also attached to the epiglottis and lower jaw by the mucous membrane; this membrane forms a fold in front of the jaw and beneath the under surface of the tongue. The surface of the tongue is covered with four kinds of papillae,



The dorsal surface of the tongue.

supported by a dense layer of membrane. At the root of the tongue are a number of mucous glands. The tongue is abundantly supplied with blood by the lingual arteries. It has three nerves of large size: the gustatory branch of the fifth pair, the nerve of sensation and taste, distributed to the papillae; the glosso-pharyngeal, to the mucous membrane, follicles, and glands. It is a nerve of sensation and motion; the hypo-glossal is the principal nerve of motion to the tongue, distributed to the muscles. The nerves of the sense of taste in the tongue terminate in the papillae of the tongue, and are most numerous in the mucous membrane which covers the end of the tongue.

HOW IS THE SENSE OF TASTE AFFECTED?

The papillae on the surface of the tongue, when brought in contact with savory substances, are excited to that degree that they become erect and turgid, and convey to the appropriate nerves this sense. Here again is one of the wonders of the nervous system: how one nerve so nearly like another in its substance, can have the sense of taste, while the other may have the sense of smelling or hearing. It seems to be necessary in order for the sense of taste to be exercised, that the substance tasted should be soluble. There is also such a sympathetic relation existing between all the organs of the body, that their derangement affects measurably the organ of taste. When the nose is obstructed and injured, the sense of taste is affected.

WHAT CONSTITUTES A HEALTHY TASTE?

The integrity of the sense of taste enables us to select, with accuracy, those alimentary substances just adapted to the wants of the nutritive apparatus. The sense of taste, like all the special senses, is highly educable, but is very generally depraved and perverted. Those persons who cannot realize any agreeable savor in any article of nutriment until the papillae of the tongue are stung into action by salt, pepper, mustard, vinegar, or other pungents, have greatly blunted the sense of taste, and know but little of the real pleasures of eating. Such eat more to silence the goadings of a morbid appetite than to enjoy life. We should carefully avoid the use of every substance which blunts the use of taste: such as intoxicating liquors, tobacco, spices, salt, etc.

THE ORGAN OF TOUCH

WHERE IS THE SENSE OF TOUCH IN THE HUMAN BODY?

The nerves of feeling are the posterior roots of the spinal nerves, and some fibers of the fifth and eighth pairs of cerebral nerves. These nerves are distributed to the papillae of the skin. These papillae are small elevations on the surface of the body enclosing loops of blood-vessels and branches of sensory nerves. It is not possible to puncture the body in any place with the finest needle without wounding both a blood-vessel and a nerve.

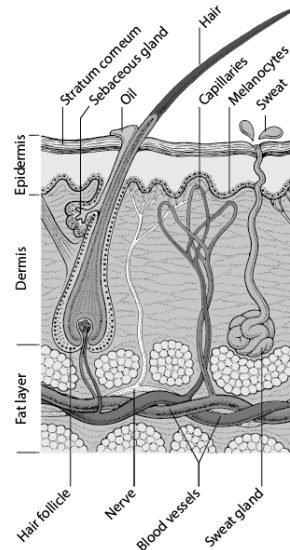
WHAT IS THE STRUCTURE OF THE SKIN?

The skin is composed of two layers, called the derma and epiderma. The derma, or true skin, is composed of elastic cellulo-fibrous tissue, abundantly supplied with blood-vessels, lymphatics and nerves. It is the color of this skin that gives the color of different races of men. The superficial strata of the derma is the papillae spoken of above.

The epiderma, or cuticle, is the sear skin which envelopes and protects the derma. Its internal surface is soft, its external surface is hard and horny. The pores of the epiderma are the openings of the perspiratory ducts, hair follicles, and glands. Of these there are supposed to be about seven millions on the surface of the body. The cuticle becomes very thick and hard on parts of the skin subject to much friction, as the bottoms of the feet, and insides of the hands.

IS THE DERMA CONFINED TO THE EXTERNAL SURFACE OF THE BODY?

It is not. The same membrane lines the cavities of the mouth, nostrils, windpipe, air-passages, the cells of the lungs, the meat-pipe, stomach, intestinal tube, etc. The internal lining of the body is called the mucous membrane. The skin of the surface of the body, and that of the lungs and alimentary canal, in many respects resemble each other, especially in regard to



the substances which they throw off from the system; and they are to a considerable extent reciprocal in their offices, the excess of one corresponding with the suppression of the other. Thus if the insensible perspiration of the external surface becomes checked by sudden exposure - by taking cold - the internal skin collects and disposes of this matter that would have passed from the surface of the body. The nerves of the internal skin connect with the nervous center of organic life, while the nerves of the external skin connect with the center of the nerves of animal life, the top of the medulla oblongata. Thus the external skin and internal mucous membrane sympathize in a powerful manner with each other. Irritations of the mucous membrane affect the external skin, and irritations and affections of the external skin also affect the mucous membrane.

IN WHAT PARTS OF THE BODY IS THE SENSE OF TOUCH THE MOST ACUTE?

The lips, tip of the tongue, and the inside of the last joints of the fingers. At these points the nerves are more numerous, and nearer the surface, and the outer skin is thinner, than at other points. The sense of touch may be educated and increased to a surprising degree. The blind are taught to read, and even to distinguish colors, by this touch. As to how the nerves take cognizance of hardness or softness of bodies, whether they are rough or smooth, hot or cold, is another wonder in the structure of the nervous system. It is by the degree of resistance required in the papillae of the body when brought in contact with any substance, that it is supposed the mind forms its correct idea of their quality in these respects.

WHAT ARE CALLED THE APPENDAGES OF THE SKIN?

The hair and nails. It is a fact, however, that each of these is dependent on an organism of nerves, vessels, etc., for its sustenance and production. The root of the hair, which is situated just beneath the skin, consists of a small oval pulp, invested by a sheath or capsule. That part of the hair in a state of growth is hollow, and filled with this pulp. The vigor of the hair depends on the vigor of its roots. The vigor and integrity of these roots depends on the general welfare of the body. Injury to the digestive organs, gluttony, intemperance, sensual excess of any kind, anger, grief, fear, etc., powerfully affect the roots of the hair, and thus the hair itself. Violent grief, or excessive fear, have whitened the hair, sometimes in a very few hours. The coloring matter is furnished by the

bulb at the root of the hair, and the color of the hair is according to the color of the bulb. It is the unhealthy action of the root of the hair that causes its dry appearance, or its turning gray. All applications to the head, except those which give vigor to the roots of the hair, and healthiness to the skin of the head, are decidedly injurious. Dietetic errors, or abuse of the stomach, are of the greatest injury to the hair; so a proper regard to all the laws of our being is the only reasonable ground on which we can expect a healthy head of hair.

WHAT CAN YOU SAY OF THE NAILS?

The nails have their roots and organs by which they are produced, yet they are themselves destitute of nerves and vessels. They do not sympathize so powerfully with the affections of the body and mind as the hair, but they are more or less moist and pliable, or dry and brittle, according to the general health of the body.

WHAT OFFICES ARE PERFORMED BY THE SKIN, ASIDE FROM ITS SENSE OF TOUCH?

The skin, through its sweat ducts, acts as an eliminating organ, removing from the blood a large amount of impure matter. Copious sweating, as a general law, is debilitating to the body, as it exhausts the serum from the blood; this creates a thirst for water. This water is taken up by the absorbents, only to be immediately expelled again from the blood. So excessive drinking of even pure water, and sweating, causes both the absorbing and eliminating organs to do a great amount of unnecessary duty. The skin is also a breathing organ. In a vigorous state of the body, not too much confined by clothing, the action of the skin on the atmosphere is very much like that of the lungs. It absorbs oxygen, and throws off carbonic-acid gas. The amount of solid matter eliminated from the body through the skin daily is about 100 grains. Frequently exposing the entire surface of the naked body to the air of a well-lighted room, at the same time applying a slight friction to its surface by rubbing, is highly beneficial. The skin is also a universal regulator of the heat of the body. When the skin is in a vigorous and healthy condition it throws off the surplus heat, or retains the deficiency, according to the necessities of the body.

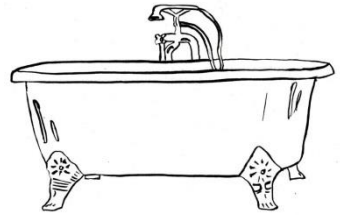
WHAT IS NECESSARY TO PROPERLY CARE FOR THE SKIN AND ASSIST IT IN ITS FUNCTIONS?

Bathing is a great assistant to nature, in that it removes from the surface of the body effete matters that have been conveyed there through the pores of the skin. If these pores become closed, and the skin fails to throw off the matters of insensible perspiration, the lungs are oppressed, the head is giddy and painful, the mouth becomes parched and feverish, the heart troubled with palpitations, the kidneys irritated by excess of duty, the bowels become liable to gripings, spasms, exhausting diarrheas, or inflammatory attacks. It is then of the highest importance to keep the skin in a healthy condition.

BATHING

WHAT GENERAL RULES SHOULD BE FOLLOWED IN BATHING?

With healthy persons a bath every other day, at a temperature congenial to their feelings, may be good. Soft water should invariably be used in bathing. A good tub to stand in and a good sponge are the only essential articles necessary to give a common bath. A soft towel or a cotton sheet should be used to wipe the body thoroughly dry on leaving the bath, after which the whole surface of the body should be rubbed with the bare hand till the skin feels soft and velvety, and a healthful glow is upon the surface of the body. In case of feeble persons, the labor of the bath should be performed by an attendant, they themselves remaining passive to prevent exhaustion of the body. Feeble persons should take a rest, or a nap, after a bath, before they exercise. After there is a thorough reaction from the bath, light gymnastics, walking, riding, or light labor in the open air, according to the strength of the individual, are beneficial. Persons in good health will not experience any difficulty in taking a general bath on first rising in the morning. For all, and especially the feeble, eleven o'clock in the forenoon is the best time for taking a bath. Never take a bath until at least two hours after a meal. Never take a bath when the body is in an exhausted condition. Swimming or bathing after performing a hard day's labor, is a very pernicious practice. Those who practice swimming are very liable to remain in the water too long.



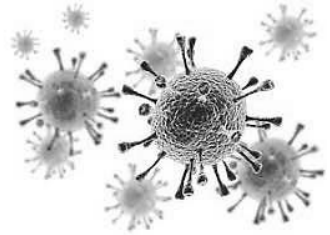
As a general rule, water cool, but not cold enough to produce a chill, is best for persons in comparative health. Persons of low vitality should use tepid water, extremely feeble individuals should use warm water, cooling the bath before

leaving it as their judgment shall dictate. Cold water we call 60 degrees; cool, 60 degrees to 72 degrees; tepid, 72 degrees to 85 degrees; warm, 85 degrees to 100 degrees. Always, before taking a bath of any kind, the head should be wet in cool water, or a linen head-cap, of two thicknesses, wet in cool water, should be placed upon the head.

REASONS FOR COLDS

WHAT IS THE CAUSE OF COLDS?

A large portion of the blood naturally flows through the superficial veins supplying the capillaries of the skin, which pour their exhalations of effete matter through the pores of the skin. When these pores become closed by exposure to sudden changes of



temperature, the blood is thrown from the surface to the deep veins. In this case this effete matter accumulates on the mucous membrane of the internal organs, and causes a cold, irritation, inflammation, etc., varying in intensity according to the violence of the check in the circulation. People usually suppose a cold is always taken by passing from a warm to a colder atmosphere, but frequently passing from cold out-door air into a highly-heated room, will occasion a suppression of the external circulation, and produce a cold. The body when excessively cold should be warmed gradually. Colds are more frequently taken by unevenness of temperature, as for instance, having the room very warm, then letting the fire go down, then raising the temperature again, etc. Eating a full meal at night, after fasting all day, or eating to fullness or oppression, when the body is in a relaxed condition, produces the same change in the circulation.

WHAT IS THE MOST EFFECTIVE WAY OF CURING A COLD, FEVER, OR ANY IRRITATION CAUSED BY SUPPRESSION OF THE EXTERNAL CIRCULATION?

The old plan would be to take a potion of physic. This is about on the plan of cutting off your finger to cure the head-ache. It may relieve it, but it does it by increasing, for a time, the inward irritation, and of course decreasing still more the strength of the system. In case the bowels need relief from mucous already collected, a tepid water injection is one of the mildest remedies. But, the real

end to be gained, aside from this, is to open the pores and establish the natural circulation of the blood. A warm-water sweat, wet-sheet pack, a dripping sheet, etc., act directly on these pores. But avoid all harsh treatment to open the pores, such as the flesh brush, and crash-towel rubbing. These open the pores, it is true, but they leave them gaping wounds. They are thus not only in a condition to dispose of effete matter, but they permit the nutritive particles to pass off from the body through the capillaries, which have been exposed by this harsh treatment. Another, by no means slight, evil inflicted on the surface of the body, is in shaving the beard. Nature requires its growth. If you think you must shave, do it in cold soft water. Better still to keep the razor off your face.

CLOTHING

WHAT FURTHER CARE OF THE SURFACE OF THE BODY IS NECESSARY?

It is highly important to give special attention to the clothing. It should always be warm in all seasons, as light and loose as possible without bodily discomfort. Cotton and linen are the best clothing for summer. Linen for under-clothes is best in hot weather. Flannel, next to the skin, is hurtful in all seasons. In wearing flannel, as a general rule, cotton or linen should be worn next to the skin. Fur neck-clothing and caps are bad; heating too much those parts of the body. Light-colored clothing is best for summer, because it repels heat. Females are apt to wear too great an amount of clothing about the back and hips. Garters, and tight waist-bands, are both injurious, hindering the circulation of the blood, and producing varicose veins and many other diseases. Every article worn during the day should be taken off the body and permitted to air during the night; and the night-clothes, and bed-clothing, should be well aired during the day. These should all be kept clean by frequent washing. The clothing should be so adjusted as in the greatest possible measure consistent with the proper temperature of the body, to admit of a free access of air to the whole surface, and of the most perfect freedom of circulation, respiration, and voluntary action. Regularity should always be observed also in clothing the body. Boots, shoes, hats, caps, thin and thick stockings, gloves, etc., when worn, should



always be worn under similar circumstances, not indiscriminately changed or altered. If a part of the body usually protected by clothing be exposed to a current of cold air, the person will take cold sooner than to expose the whole body. Great care should be taken in clothing the limbs and arms, hands and feet properly. The clothing of females should be of such a length as to escape being wet and brought in contact with the tender ankles, and the feet and ankles should be protected from cold and wet. Rubbers are injurious, and should only be worn to protect the feet from wet.