Health at home / by A.H. Guernsey ; and Irenæus P. Davis.

Contributors

Guernsey, Alfred H. 1824-1902.
Davis, Irenaeus P.
Augustus Long Health Sciences Library

Publication/Creation

New York : D. Appleton, 1884.

Persistent URL

https://wellcomecollection.org/works/udx47phe

License and attribution

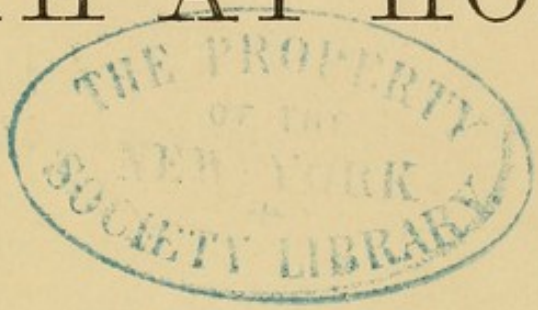
Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

APPLETONS' HOME BOOKS

HEALTH AT HOME

Appletons' Home Books.

HEALTH AT HOME.



BY

A. H. GUERNSEY,

AND

IRENÆUS P. DAVIS, M. D.,

AUTHOR OF "HYGIENE FOR GIRLS."

NEW YORK:
D. APPLETON AND COMPANY,
1, 3, AND 5 BOND STREET.
1884.

CONTENTS.

HEALTH AT HOME.

I.

HOME SURROUNDINGS.

THE habitual condition of a home should be one of health, and to secure this it is quite as necessary that a due care be had for its surroundings as that the building be properly heated and ventilated, and its inmates supplied with suitable food and clothing, accustomed to correct personal habits, and skillfully treated in case of sickness or accident.

By the surroundings of a home are meant all that pertains to it lying without the building itself. The homes of which we speak may be divided into three general classes, which of necessity vary materially in the character of their surroundings.

I. COUNTRY HOMES.—In this class the builder is presumed to have a considerable quantity of land, so that he has a wide choice in the selection of a site, as well as in the arrangement of all his immediate surroundings. He must do almost everything for himself, and may do it as he pleases, without much regard for his neighbors. But, if they can not essentially discommode him, they can do very little to aid him. He must, for example, find his own

spring, or dig his own well, build his own cistern, and make his own system of drains. If the water for domestic purposes must be obtained from a natural spring, the selection of a site for the house, and all the arrangements of the homestead, will be in no small measure shaped by this. The spring should be on a higher level than the outlet of any drain leading from the house or barn. If possible, it should be on a higher level than the foundation of either house or barn, to avoid the chance of organic matter from these places percolating through the soil into it, though, to place a house on low or marshy ground in order to effect this, is to incur one evil in avoiding another.

The natural drainage of the ground, always an important feature in the surroundings of a home, is more important in connection with a country home than with any other, because, while much can be done by artificial drainage, any system adequate to supply a natural lack in this particular must be more extensive than usually comes within the means of the individual householder. Natural drainage depends chiefly on the slope of the surface and the character of the subsoil. The most desirable subsoil on this account is a porous one, as sand or gravel—such a subsoil as farmers call "leachy." The worst is clay.

For farming purposes the relative desirability of these different soils is nearly reversed, so that it often happens that the spot chosen above all for its fertility is the very worst in point of health. It seems as if the primal curse had not only sowed the fertile fields with thorns and thistles, but had also shadowed with sickness the homes of the tillers of those fields in proportion to their fertility. The sterile hills of New England are in general more healthful than the fertile valleys of the Middle States, the savannas of the South, or the prairies of the West.

Commencing in middle New Jersey, and extending southward near the Atlantic coast, is an extensive tract

commonly known as "The Pines," on account of the timber by which it is mainly covered. The inhabitants of this region, who try to live by farming, are wretchedly poor, and their domestic animals are small, thin, and hungry-looking, but the region is notably healthful. This fact is often attributed to the exhalations from the pine-trees, and possibly with some reason, though it is noteworthy that the land, while most of it is low and level, and much of it swampy, is nearly all sand or gravel. Here and there are small spots having a clay subsoil, and on these malarial disorders abound, from which the surrounding districts are comparatively free.

The best site is a hill-side, with a southern or a western exposure, rather than a northern or an eastern one. The hill-side, besides other advantages, furnishes facilities for carrying off the drainage of the house and its appurtenances. It would seem hardly necessary to say that barns and other out-buildings, cattle-yards, etc., should always be a little down the hill from the house, were it not for the fact that these are sometimes seen on the higher part of the premises.

Supposing, however, that the location is already chosen, and the house and principal out-buildings are erected, there are many circumstances relating to the surroundings that require attention.

An excellent suggestion relative to a house built on a hill-side is made in "Building a Home," one of Appletons' "Home Books." It is that a trench should be dug, about ten or fifteen feet above the house, four feet wide, and deep enough to be lower than the cellar-bottom. It should be about twice the length of the house, so that its ends may project some distance beyond the line of the wall of the house on each side, and it should run obliquely down the hill, so that its lower end will reach a point as low as the upper wall of the house. This trench is to be filled with

round or broken stones, the larger ones at the bottom. It may then be covered over. Its use is to prevent any drainage from the upper part of the hill from reaching the foundation of the house. If the soil in which the trench is dug is sandy or gravelly, and free from springs or streams of water, it will answer its purpose tolerably without any outlet, as the water that collects in it will percolate through the porous soil beneath the cellar-bottom. If, however, the soil is clayey or wet, it will be necessary to make a sufficient drain from the lower end of the trench to conduct off the water, and discharge it at some point below the house.

The latter precaution is a very important one, whatever the nature of the soil, if there is above the house another house, a barn, or any other source of drainage more objectionable than rain-water.

The growth of vegetation outside of a house is generally favorable to health, as in the process various noxious materials are taken from the air and the soil to form new and healthful combinations in the plant. The decay of vegetation, however, is exceedingly detrimental to health. For this reason it is very important in the neighborhood of dwellings to remove accumulations of fallen leaves, rank growths of grass, etc., before they have time to decay.

It has been very generally supposed that the cause of malaria exists principally in the rapid decay of the rank and succulent vegetation common to swamps. Certain it is that malarial diseases abound on newly-worked soils containing much vegetable matter to decay, and especially in situations where heat and moisture, the conditions most favorable to such decay, exist. Equally certain is it that with the progress of agricultural industry these diseases commonly diminish; that, when repeated turnings of the soil and successive removals of crops have lessened and changed the accumulated vegetable mold of centuries, when the swamps themselves are drained and mowed, and

even the leaves fallen by the road-side are raked up and carted away, in many localities they almost or quite disappear.

The vicinity of streams or other small bodies of water is sometimes unhealthful, but not always. The water in itself is advantageous on many accounts, provided it is not stagnant or loaded with impurities. A stagnant pool in the neighborhood of a house should be drained, or the house should be deserted. The danger to health from streams and ponds not stagnant arises principally from two causes. One is the decaying organic matter coming from the various drains, swamps, and other undesirable sources that swell the volume of the water, or from impurities incidentally introduced into the main stream or pond. The other cause is the occasional ebb and flow of the water upon its banks. There is much organic matter in the mud at the bottom of nearly every pond or considerable stream. This matter can do little or no harm while it is covered by running water, but, on the contrary, is useful in supplying food to certain fishes and plants, by which means it is gradually removed. If the water recedes, however, and leaves this mud exposed to the warm rays of the sun, decomposition of its organic matter is hastened, while the noxious particles, instead of furnishing needful food to plants or fishes, float out into the air to poison human beings.

Again, if the water overflows its usual boundaries, it stops the outflow of many natural and artificial drains, forms pools of stagnant water along its borders, and occasions the death and decay of much vegetation.

For these reasons a pond or stream that varies much in height at different seasons, especially if it has a muddy bottom, is far more unsafe than one that remains always at about the same level. Indeed, it will sometimes be a decidedly healthful proceeding to convert a swampy place into a pond by means of a dam, and thus drown

"All the infections that the sun sucks up
From bogs, fens, flats."

It is necessary, however, to be sure that the water-supply is sufficient to keep the pond always full and to prevent stagnation. The end sought will be more readily attained if the pond is stocked with fish or water-fowl, or both, as these will do much in removing the organic matter that might otherwise be harmful. Swans are said to be peculiarly useful in this way.

A few trees are desirable about a house, but too many are an injury. Many country houses are rendered very unhealthful by being too much shaded. The trees should be so arranged that there may be a free circulation of air about the house, and that the sun may shine directly on every possible part of its exterior for at least an hour at some time during the day.

II. Village and Suburban Homes.—In this class the occupant has less space at his control, and must be ruled very much by what his neighbors have done or have the right of doing. But, on the other hand, neighbors may unite to do many things of use to all, but which no one of them could do singly. Thus, for example, a group of neighbors, acting either for themselves or through municipal organizations, may erect water-works, which, at a cost small for each member, shall furnish an abundant and unfailing supply of this prime necessity of life.

The considerations relative to the surroundings of a country home are in many respects applicable to a village home. The points of similarity are sufficiently obvious, but there are some varying conditions worth noting.

There is comparatively little choice in the location of the house relative to the character of the soil, the slope of the surface, or the points of the compass. In regard to the last particular, indeed, a choice may be insisted on if desired, for there is no absolute necessity that a house shall

face the street, or even that its walls shall stand parallel and at right angles with the street, and frequently comfort and health will be subserved by a different arrangement. Yet it is generally found most convenient to build a village house with reference to the direction of the street rather than of the prevailing winds and the sun, in consequence of which the arrangement of tree-screens sometimes becomes more important than it would otherwise be. For this purpose various evergreens are eminently desirable, because their foliage remains through the winter, when it is most serviceable in protecting from wind. As shade-trees, of deciduous varieties, those only should be chosen whose natural home is on dry uplands. Willow, soft maple, and some other species and varieties that naturally seek wet places, are often preferred on account of their rapid growth, but, if these stand within fifty feet of any water-reservoir, such as a well or cistern, their roots are almost certain to break their way into it sooner or later, in spite of all precautions. Consequently, one can rarely plant these about a village home without damage to himself or his neighbor.

Although by associated enterprise a village may be much better drained than a farm of equal extent is likely to be, yet it often happens that for want of public spirit, or by reason of natural difficulties such as flatness of surface and insufficiency of water-fall, the problem of drainage is gravely complicated. In such cases the danger from insufficient drainage is greater than on a farm, in proportion as the sources of sewage are multiplied.

When for any reason there is no adequate system of drainage common to the village, the householder is often unable to drain his lot at all, because he can not go beyond it. Occasionally a stream at the foot of the garden may furnish him the needed outlet. If the stream is not of considerable size and rapid current, however, he should not, in respect to his neighbors, discharge into it anything more

than the surplus water from the clouds falling upon or flowing through his soil.

In such circumstances a cesspool is needed. A cesspool is—if such a thing may be—a necessary evil. It is better than the slimy pool in the grass at the end of an open drain and within sight and scent of the kitchen-windows, that forms the only vent for the waste water of too many houses. At least a cesspool may be better than this, but it may also be worse.

The commonest form of cesspool is a bottomless barrel, buried, with waste-pipe entering it. This is a very imperfect arrangement, and in many cases it becomes a noisome and poisonous affair, pestilential gases forming in it and escaping through the waste-pipe into the house, or transuding through the covering soil. Such gases are formed more or less in every cesspool by the decomposition of its contents. To prevent harm from this, it is needful that the cesspool be lined on the sides and top with cement, or in some other way made quite impervious to water and gas, that every drain or waste pipe entering it be provided with an efficient trap, and that it be ventilated from the top. If the last precaution is neglected, the gas not only becomes more dangerous by concentration, but it is liable to be formed in such quantities that its pressure will displace the water in the trap and it will flow through the waste-pipe into the house. If the cesspool is made of proper materials and the traps are good, sufficient ventilation may be had by means of a wooden or metal pipe running to the top of a house or barn, a flag-staff, tree, or any other object that will support it to a height above the level of the air ordinarily breathed by human beings. The gas, then, as fast as it is formed, rises through the pipe to the upper stratum of air, where it is immediately diluted and floats harmlessly away.

If for want of ownership or any other reason it is im-

possible to have such a cesspool, and the ordinary kind must be used, a few precautions will greatly lessen its danger: 1. No waste-pipe connected with it should on any account enter the house. If desired, the waste-pipe from the kitchen sink may open above an open hopper or trough placed outside of the house and connected by pipe or drain with the cesspool, but no close connection should be made. 2. The cesspool should be somewhat deeply buried in dry, porous soil, and the surface covered with sod. Two or three feet of dry earth above a cesspool will absorb and disinfect a great part of its gas, and the growing grass will aid in this process. 3. The hopper or trough leading to the cesspool should receive daily a liberal allowance of some good disinfectant, such as chloride of lime or copperas. These precautions will not entirely avert the danger caused by an imperfect cesspool, but they will go far toward doing so.

It should be a settled principle from the beginning that no cesspool is to be made or tolerated, except in soil that is naturally dry and porous to the requisite depth. If the soil is wet or not freely pervious, a cistern or reservoir may be made in place of a cesspool, cemented on the bottom as well as the sides and top, and provided with ventilating-pipe and thoroughly-trapped waste-pipe as recommended for the cesspool, and also with an exhaust-pipe running from the bottom to some point above the surface of the ground, where it must be closed by an air-tight screw-cap. The contents may then be removed at regular frequent intervals, in air-tight tanks constructed for the purpose, by connecting with the exhaust-pipe. But, unless ample facilities exist for such removal, the reservoir should not be built. In such case it is better to throw the waste water upon the surface of the ground and let it take its chances of removal by evaporation, absorption, and other processes of nature, than to collect it in cistern or cesspool.

In a few villages, notably in some sea-side resorts, where

the ground is low and nearly level, and the only outlet for drainage is the ocean or some other large body of water, extensive systems of sewerage are undertaken, while the facilities for the discharge of sewage are insufficient. The absence of current allows the accumulation of sewage in the water near the sewer's mouth, to the detriment of the surrounding air, and twice daily the tide flows in through the sewer, stopping its outlet and forcing its gas into every house that has connection with it. If a sufficient head of running water can be obtained to thoroughly flush the sewers at certain hours each day, chosen with reference to the tides, the evil can be largely abated, though even then great circumspection will be necessary; and, if this water can not be had, the sewers will be worse than useless, and should be voted a public nuisance.

The more thickly populated such a place is, the greater is the danger from this source. The means provided by nature for the disposal of waste matters thrown upon or mingled with the soil are insufficient for populous districts; therefore, where these means are chiefly to be relied on for want of running water or of sufficient fall for drainage, a closely-built village can not be a healthful one, however well kept it may be. In such circumstances the house to be chosen should be as far from others as practicable, and it certainly ought not to stand within a hundred feet of any.

In a village built on a hill-side and not fully sewered or drained, the houses near the foot of the hill are not suitable for human habitation. If through ignorance or necessity some live there, let those who live above give them sympathy and access to their wells at all times, and quinine and beef-tea when needed.

III. City Homes.—In this class many of the essential conditions are quite different from those that have been considered. The closeness of the houses to one another affords much protection from wind, and renders the warm-

ing of the houses much easier and more regular. More attention is commonly paid to draining, sewering, and the removal of garbage than in rural places, and thus the danger of unwholesome emanations from the soil is reduced to a minimum. On the other hand, the air of cities is notoriously impure from the constant addition to it of the products of teeming animal life, and of many industries. In all these respects certainly, different cities vary greatly. In some there is such neglect of general sanitary engineering that the mortality rate is high, and certain diseases which are almost or quite unknown in less populous places have their permanent or periodical home there. But in other cities, naturally no better in position, where the public sanitary arrangements are better, these diseases find no abiding-place, and the general health is as good as, or even better than, among the same classes of people in the surrounding country.

The mortality tables of a great city like New York or Philadelphia are not a good test of its healthfulness as a place of residence, especially if, as in the case of the former city, it is a principal port of entry for the country at large, or, like either, a railroad center and waiting-place for travelers. These lists are much swelled by deaths of immigrants and other travelers, who do not properly belong to the city's population, and who, moreover, necessarily do not average as high in strength and vitality as people who live comfortably at home, free from the vicissitudes, irregularities, and dangers of travel. The varied industries and mechanical appliances of the city offer many casualties to swell the death-rate, which yet do not affect the healthfulness of a city home. Every added revolution of the wheels of trade crushes out some human life. Every new application of steam to mechanism dooms some artisans to violent death. Every opening facility for rapid travel opens to some souls the gate of eternity. The casualties of a city

bear some relation to the height of its buildings, for every foot of increase in their average height means a geometrically increasing number of the builders hurled into the grave. When to this is added that the city is the natural and final resort of a multitude of persons whose habits are vicious and degraded, and most of whom die early in consequence of these habits, it is readily seen that the city's total death-rate is not a correct basis for an estimate of its healthfulness as a dwelling-place.

Moreover, cities at all approximating in size to the two mentioned are large enough to include districts widely different in their influence upon health, so that it frequently happens that while one part is very unhealthful another part of the same city is quite the reverse. This is notably true of the city of New York. While a residence in some portions of it is very prejudicial to health, other parts are probably as free from unwholesome influences as any of the health resorts within fifty miles of it, and certainly much freer than many of them. The reasons for this difference are to be found partly in the degree of attention paid to the surroundings in different parts of the city, partly to the presence or absence in certain neighborhoods of deleterious industries, such as extensive butchering, rag-sorting, certain manufactures and the like, and partly to differences in the character and contour of the ground, for, notwithstanding any improvements that can be made, the original character of a soil still has some influence, and, while art can do much for a naturally bad soil or location, it can do more for a naturally good one.

All houses built upon newly "made" ground should be carefully shunned, no matter how desirable in other respects. This ground is "made" by filling in some sunken lots, frequently, if not usually, with the sweepings of the streets and the multifarious contents of ash-barrels, not only including ashes and cinders, floor-sweepings and various off-

scourings, but also often containing a dangerous amount of decomposed and decomposing vegetable and animal organic matter. The foul gases generated from these will make their way upward into the air. Nothing which man can do will prevent them from penetrating into a house built upon such ground, poisoning the air of kitchen and parlor, of dining-room and bedchamber. Not a few of the most palatial mansions among us are from this cause as unhealthy as are the fever-wards of a hospital. Even if the filling in were of clean ashes and wholesome earth, time must elapse before the site is fit for a dwelling-house. No structure designed for human habitation should be begun upon even the best "made ground" within less than two years after the filling-in has been completed.

Wide streets and large yards are conducive to health because they afford more circulation of air and more sunlight than narrow streets and small yards. Conversely, houses built back to back, or with any similar extreme economy of ground-space, are highly objectionable. Statistics show that, in tenement-houses many stories in height, diphtheria and many other diseases are more common and more fatal in the lower stories than in the upper ones, and these proportions are in regular ratio and constant, so that the nearer to the sky one lives the better is his health. The causes of this curious fact are the greater purity of the upper air among these swarming human hives, and the greater quantity of sunlight that reaches the upper parts of the tall and closely-built houses. In a large degree the same conditions affect the fashionable "flat" or apartment-houses. As a matter of health the top flats are to be preferred, and the larger the building and the smaller the adjoining yard or court the stronger will be this preference.

II.

PRIVIES AND WATER-CLOSETS.

WATER is undoubtedly the most convenient vehicle for the removal of excreta from a dwelling, provided that the conditions admit of its use for that purpose. The chief of these are that there shall be an unfailing supply, delivered from a sufficient head, and that there is a river or lake or the ocean to serve as a receptacle. These conditions are rarely to be found except in large cities; and in some of these there is the grave objection that the receiving streams become polluted, because they are not sufficient to carry off the immense quantities of foul matter poured into them. The defilement of the Thames, near London, is a case in point.

Add to this that the plumbing apparatus necessarily involved in the water-closet is so complicated in design, and not unfrequently so faulty in construction, as to often defeat its purpose; unless, indeed, the purpose of the plumber was to secure for himself a constant supply of fat jobs in the way of repairs. What with traps and valves, siphons and plungers, cranks and levers, elevators and depressors, and, not seldom, careless users, the whole apparatus is continually getting out of order, to the infinite disgust and no small pecuniary loss of the householder.

The manner in which the water-closet is connected with the sewer is of vital importance, as the entrance of sewer-gas by this means into the house is an exceedingly fruitful

source of disease. The usual connection is through a waste-pipe, provided with a simple "trap" a foot or so below the receiving-pan. This trap is no more nor less than a bend in the pipe, something like the letter S laid horizontally. The theory of its working is that it will remain always full of water, and, the entire diameter of the pipe being thus filled for several inches, no gas can pass up from the sewer, while whatever flows into the pipe from above forces the contents of the trap onward only to occupy the same position until it yields in its turn to another inflow. The practical working, however, is apt to differ from the theoretical in two important particulars: 1. If there is not abundance of water—and sometimes if there is—the trap retains enough matter other than water to be offensive and injurious. 2. Various causes sometimes produce unusual pressure of gas within the sewer, especially if the latter is of considerable extent, and, in such circumstances, the gas is liable to force its way through the water in the trap.

Another danger in connection with water-closets is that of untrapped waste-pipes from wash-basins, bath-tubs, and wash-tubs, entering water-closet waste-pipes or sewers with which the latter are connected. All such pipes should be thoroughly trapped, and even then they may become avenues of danger from unusual pressure of gas, as already indicated, if not from the contents of the traps themselves.

It is a measure of safety to have a small pipe connected with the main waste-pipe of the house and running up to the roof, the upper end being open. This serves as a vent to the gas forced in from the sewer, and prevents it bubbling through the traps.

Wherever a water-closet is in use, the utmost care should be observed that the plumber's work is thoroughly well done, and always kept in perfect order, and that nothing except liquids should ever be thrown into it. Any solid

matter, rags, garbage, and the like, may very likely accumulate at some point and choke up the waste-pipe.

It hardly need be said that in this apartment the utmost cleanliness is indispensable. Whatever other apartment of the house is overlooked upon "cleaning-day," this one should never be neglected.

It should always be built against at least one outer wall, and have a window opening to the air outside, and this should never be closed except in case of a storm. The door should always be kept shut, and there should be no other opening into a hall or any other room in the house. The best covering for the floor is a stout oil-cloth, fitting tightly to the walls all around, and firmly laid down. There should be no carpet of any kind.

The "dry earth," or, better still, the "charcoal closet," is capable of application everywhere; and, though at its best inferior to the "water-closet" at its possible best, is superior to the latter as very commonly found. Its efficacy rests upon the fact that earth thoroughly dried, when thrown upon human excreta, does not merely cover, but forms a compost free from all odor, and having no deleterious properties. Care must be observed as to the kind of earth which is used. Chalky or sandy soil will not answer the purpose. Clays, especially those adapted for brick-making, and loams, are to be chosen. The advantages of charcoal over dry earth are that by it the excreta are more readily deodorized, and putrefactive changes are held in check for a time practically unlimited; and also that a much less quantity of charcoal than of earth is required.

The dry-earth closet, or the charcoal-closet, in its simplest form, consists merely of a pail or glazed earthen vessel placed under the privy-seat, a box to hold the earth or charcoal, and a hand-scoop to throw it into the pail. An improvement upon this is to have the earth or charcoal placed in a hopper, so that by a simple mechanism it will be

automatically sifted over the contents of the pail. A pound and a half of earth, or a quarter as much charcoal, is sufficient for each time of using.

In any case a dry-earth or charcoal commode should be considered an indispensable requisite for a sick-chamber when the invalid is unable to leave the room.

If there is a privy outside of the house, it should be so placed that comfortable and convenient access may be had to it at all seasons and in every kind of weather. The pathway should be very carefully made and kept, and well screened from the prevailing winds of winter. The structure itself should be substantial, perfectly weather-tight, well ventilated and lighted, and shaded by trees or in some other way from the summer sun. It may seem that these provisions for mere personal comfort bear small relation to health, but the want of them does much to foster a habit of neglect that is the despair of physicians.

Privies are sometimes placed over small streams of water, which are thus converted into open sewers. This is obviously uncleanly and unhealthful, and should never be tolerated. Another and even worse plan is to make what is called a well-privy—that is, one of which the vault is dug down until water is reached. This water, of course, as in other wells, comes from some subterranean stream, and as it finds its way into the vault it finds its way out, carrying with it much foul and poisonous material to other wells or springs, no one knows where. Besides this, well-privies are not as easily disinfected, nor are they generally as often cleaned, as others, consequently they are more dangerous to health.

Perhaps the best arrangement for a privy is a shallow vault with a door behind or at one side, and fitted with a box or drawer of wood or metal that can be drawn out through the door and carried away to be emptied and cleaned every week or two, or as often as may be necessary.

If dry earth or charcoal is constantly used in connection with this arrangement, as already described, the plan is as nearly perfect as anything of the kind can well be. The next best plan is to use the dry earth or charcoal without the drawer. The vault must then be somewhat deeper, for without the drawer it can not be emptied in warm weather without offense unless the earth is used more freely and more carefully than will generally be the case. Of course every vault should be emptied every spring and fall, and in the mean time should be kept thoroughly disinfected with dry earth or by other means.

A spot that is naturally wet, or that receives the surplus of rainfalls, is not a suitable place for a privy. It will be difficult to empty, and practically impossible to keep disinfected. If on a hill-side, the defect may sometimes be remedied by a drain above, similar to the one recommended for the protection of the cellar of a house built on a hill-side. If this can not be done, the only safe plan is to line the vault with some water-proof material, or to have no vault, but simply a movable box or drawer above the surface of the ground.

III.

THE HOUSE ITSELF.

STONE, brick, and wood are the materials chiefly used in this country for the construction of houses. Of either of these a perfectly healthful house may be built. On the other hand, it is possible to construct of either a house that will almost inevitably induce illness among its inmates.

One of the first conditions of healthfulness in a house in most climates is imperviousness of the walls to moisture. Some varieties of stone are porous and some others are stratified in such a manner that water readily finds its way through them. Fortunately, such stone is not durable when exposed to the weather, and therefore is not much used for building; but it is used sometimes, with the certain consequence of damp walls.

Bricks are freely permeable to water, and a house built of them is sure to be damp unless it is painted on the outside. It is no uncommon thing after a rain-storm of two or three days' continuance, to find the inner surface of a brick wall covered with drops of water as with sweat, or to find on it large patches that are appreciably wet to the eye and hand, although there is no crack in the wall or roof through which the rain might enter. This effect is often more noticeable in country than in city houses, because the latter are very commonly built in continuous rows, so that, except at the ends of the rows, only the front and rear walls of the houses are exposed to the weather, and as such

houses are, for economy of space and material, nearly always made very long from front to rear, and very narrow, the surface so exposed is very small in proportion to the volume of dry, heated air within the house. This proportion is still further increased in the majority of cases by the fact that the sources of heat and dryness of the air are more numerous and more extensive in the ordinary city house than in the ordinary country house.

In both city and country, however, the moisture absorbed by brick walls is a common cause of illness. It is a cause that may readily be prevented by painting the outer surface of the bricks. It may be held as a universal rule in relation to health that, in any region where the air is sufficiently moist to produce occasional rains, no brick house is fit for human habitation unless its outside is thoroughly painted.

From an architectural point of view the painting of a brick house is commonly regarded as a barbarism, and so it is if the object be to make the bricks represent stone or anything else than what they are, since true art is always opposed to shams. But, since true art has always for its basis the most perfect adaptation of means to end, and since the purpose of a brick house, as of any other, undoubtedly is to afford comfortable and healthful protection from the weather, a brick house painted in a manner not to belie the bricks and mortar is really more artistic than one built of the finest Philadelphia pressed brick and unpainted.

The healthfulness of a wooden house, as compared with one of brick or stone, is very commonly considered as dependent chiefly on the relative heat-conducting properties of the different materials. It is sometimes said by architects and builders that wood is a quicker conductor of heat than brick or stone, and that therefore wooden houses are warmer in summer and colder in winter than those built of

the other materials. The fact is, that stone and brick are more rapid conductors of heat than wood, although between hard wood, brick, and some varieties of stone, there is not a great deal of difference. The principal reason of the difference in temperature between houses built of these different materials, but otherwise subject to similar conditions, is to be found in the relative thickness of the walls. In the case of wood the outer wall has usually a thickness of from half an inch to two inches, to which sometimes is added a lining of brick four inches in thickness, and sometimes not. If brick is the principal material, the thickness must be from eight to twelve inches; and if stone, from eighteen to twenty-four. By reason of these differences a stone house is longer in getting heated, and also longer in cooling, than a brick one, and the latter longer than a wooden one. Hence, sudden changes in the temperature of the outside air are more sensibly felt in a wooden house than in either of the others. But the same cause sometimes renders a stone or brick house uncomfortably, and therefore unhealthfully, warm during half a summer night, where a wooden house would have been comfortably cool within an hour after sunset.

Another and more important consideration regarding the healthfulness of wooden houses is the liability of the wood to rot. There is this liability to some extent in all houses, for all have some wood-work, but there is comparatively little rotting of the inside wood-work, provided the inside of the house is dry and well aired.

The so-called "balloon-frame" houses that have latterly become so numerous at sea-side resorts and in all other places where money is to be made by building on contract at the lowest possible cost, or by building with the prospect of immediate sale, are necessarily unhealthful. The slight frame is covered with boards generally unsound and unseasoned, just sufficient to afford support to the sheathing-

paper which is then nailed on, and on which dependence is placed to stay the wind that would otherwise pass through the joints and cracks of the wall almost as through a sieve. This, again, is covered by very thin clapboards, overlapping each other by a fraction of an inch.

Many of these houses are handsome, and apparently comfortable. In a driving storm, however, the rain finds its way under the edges of the clapboards, or even soaks through them, and wets the paper. Once wet, the paper will often remain so for weeks, or even months, at a time, causing damp walls, mold, a musty smell, and rotten boards and timbers. Of course, this evil is greater at the sea-side, where the storms are more severe and the rain and mist more penetrating than in inland districts, and where very many of the houses are occupied only for a few weeks in summer, and during the rest of the year are unwarmed and unventilated. Many cases of so-called malarial fever are due to a residence of a few weeks, for the purpose of health, in one of these badly-constructed houses.

The roof is one of the most important parts of a house, and the one most likely to call for repairs. Its purpose is not merely to shut out the upper story from the exterior air, for which a perfectly flat roof would do as well as any other. Its main purpose is to shed off rain and snow; and its pitch must be sufficient for this. In those parts of our country where heavy snows are unknown, the pitch may be very moderate. In those parts where the snow-fall is heavy, the pitch should not be less than 45° from the horizontal. The angle at the ridge will thus be 90°, or a right angle. The snow will slide down this decline about as fast as it falls, so that there will be no leaky roofs from this cause. The framework should be as light as is consistent with the requisite strength. For the roofing, the old-fashioned curving tile is probably the best material; metals—tin,

zinc, lead, or galvanized iron—the worst. Between these lie slate and shingles.

A shingle roof is not advisable in a city house, because it is liable to be set on fire by the sparks and cinders from a neighboring conflagration. The same objection applies, in a less degree, to its use in a village or suburban home, where, however, it is not inadmissible. If the shingles be soaked in oil for two or three days before they are laid, and receive a coating of oil directly after, to be repeated every few years, such a roof will remain sound for generations. The slate or shingles should be most carefully laid, with a good overlap, and securely fastened. In no other part of the house is poor material and poor workmanship so bad economy. If the roof is faulty, the whole house is bad, and nothing can make it good.

Windows are the eyes of the house; through them comes all the light which it receives. Light—sunlight, that is—is in itself an effective hygienic and curative agent. Florence Nightingale says: "Second only to fresh air in importance for the sick is *light*. Not merely daylight, but direct sunlight, is necessary to speedy recovery, except in a small number of cases. There are endless instances where in dark wards, or wards with only a northern exposure, or wards with borrowed light, even when properly ventilated, the sick could not, by any means, be made speedily to recover."

Dr. Richardson, a high authority, says: "The mind saddens in a home that is not flushed with light, and when the mind is saddened the whole physical powers soon suffer. The heart beats languidly, the blood flows slowly, the breathing is imperfect, the oxidization of the blood is reduced, and the conditions are laid for the development of many wearisome and unnecessary constitutional failures and sufferings. Sunlight is also of itself useful to health in a direct manner. It favors nutrition; favors the nerv-

ous functions; sustains, chemically or physically, the healthy state of the blood. In every point of view sunlight stands prominent as an agent of health. In sickness and in health, in infancy, youth, middle age, old age, in all seasons, for the benefit of the mind and the welfare of the body, sunlight is the bearer and the sustainer of health."

Every house should have windows large enough, numerous enough, and so placed as to afford the possibility of abundant light to every room, and every corner of it. There is little danger of going too far in this direction. If on a bright summer day the light should be too intense, it is easy to moderate it; but it is not easy to increase it or introduce it when you have done your worst in trying to shut it out.

In England there is, or was, a special tax upon windows, and so builders began to put in as few of them as possible. Artists also find, or think they find, a special beauty in small windows, overhanging window-brows, quaint-looking little dormer-windows, and all that sort of thing, which characterize the so-called "Queen Anne style." We will not quarrel with them so long as they confine themselves to sketching these buildings and extolling their picturesqueness, although to our minds every arrangement of an object which prevents it from fulfilling its proper uses is a deformity. But we do protest against architects putting up buildings for us to live in from which sunlight is excluded. The sunlight may indeed fade our carpets, but surely this is a lesser evil than that the want of it should blanch the cheeks of our children.

Having, then, abundant windows, let them be freely opened to the sunlight during a portion of each day in the year. An hour or two in every twenty-four is none too long for the sun to look directly into every room which we would have in a healthful condition, and more than this is desirable except in the very hottest summer weather,

especially in bedrooms, kitchens, sitting-rooms, and all other apartments where people remain for several hours at a time.

If the house has been built without consideration of this need, so that it contains rooms into the windows of which the direct rays of the sun never or rarely enter, these rooms should be as freely lighted by reflected or diffused rays as possible. The walls and wood-work of such a room should be white or of some very light color. The carpet and furniture should also be light. By this means the light which does enter is so reflected from every side as to produce something, though little, of the effect of direct sunlight. Sometimes, indeed, it is possible to so adjust a screen of white muslin or other suitable material outside of the window, or a system of mirrors inside of it, as to immediately reflect the sun's rays throughout the room. If this can be done, it is not a matter to be lightly neglected.

A striking illustration of the healthful effects of sunlight is furnished by the record of a winter spent by a ship's company in the Arctic regions. Scurvy appeared among the men, and was aggravated by want of sunlight. Several of the crew died, and at length most of the survivors lay down in the forecastle, absolutely dying of darkness. The day when the sun should, for a few moments, rise above the horizon, was at hand, but the poor fellows in the forecastle were too weak to come on deck to look upon it, nor did they believe its light would ever bless their eyes again. The weary horror of dark weeks and months through which they had waited was for them the very shadow of the grave, and silent, sullen, despairing, they waited the end. The commander of the expedition, however, appreciating the curative influence of sunlight, arranged a series of mirrors with mathematical precision so that the very first ray of the rising sun should be reflected down into the forecastle, and notified the dying men exactly at what moment they were

to look for it. When that moment came, and suddenly through the gloom of the death-chamber flashed the sunlight, and lay in a bright band upon the wall, some of the rough, hard men laughed like children, some wept, some shouted—all were delirious with joy. For a few moments only the golden glory rested on the wall, and then passed away. But the next day it returned for a longer stay. And there was life in the light. From the day when it first shone there were no more deaths, and no new cases of sickness, and as day by day its stay grew longer, the sick gained strength and health, until soon no name was left upon the sick-list.

The stairs of a house require attention in a sanitary point of view, for the climbing a badly planned stairway is irksome to all, and decidedly injurious to many, especially to most women. The pitch should not be too steep or the rise too high. A rise of six inches and a breadth of step of eleven inches are about the best measurement. Curved lines are objectionable in any except very large stairways. The squarer the stairway is, the better it is. Winding stairways, in which the steps radiate, and are broader at one end than at the other, are bad in every way. They occasion quite unnecessary tumbles, with the concomitant bruised shins, sprained ankles, and broken bones.

It sometimes happens that, in spite of perfect outer walls and roof, the plastering of a house will always be slightly damp in rainy weather. The dampness may be sufficient to be plainly seen or felt, or it may be just sufficient to cause wall-paper to blister and peel off, and to make the plaster itself gradually scale and crumble. Of course, such houses are unhealthful. They are quite common near the sea-shore, and we are frequently told that the effect is due to the sea-salt in the air. This may be in part true, but probably in most cases the cause lies more largely in the sea-salt in the sand with which the plaster

was made. For this reason sand from the sea-shore or from the surface of the ground within a few miles of the sea—that is to say within the area visited by "sea-air," should never be used for making plaster or mortar for a dwelling-house. Masons will tell us that such sand is "not sharp enough" to make good mortar. In other localities, where sand that is not very "sharp" is sometimes for economical reasons used in building, it would be well to see whether its want of "sharpness" does not mean that it holds some impurity that will cause the mortar made from it to absorb moisture.

The painting and papering of a house often have a relation to the health of its inmates. For the outside, it matters little, in a sanitary point of view, what is the color or the material of the paint. If the object of the painting be to protect from the weather, it is important to use materials that will give a good body, and that will not readily scale off. Also it is well to remember that a white or light colored house will be cooler in summer than a dark one, because the former will reflect and the latter absorb much of the sun's heat. If the house is of wood, oiling will answer the purpose of protection as well as painting or even better. Aside from these considerations, questions of taste and of economy should govern the matter.

For the inside of the house, however, there is more to be said on this point. Most of the materials used in painting are more or less injurious to health, and many of them are highly poisonous. The lead and zinc paints in common use are decidedly so. When applied mixed with oil, these paints form a surface that soon acquires an almost metallic hardness and coherence, and has little or no effect upon the air of a room. Before this point is reached, however, they affect the air very sensibly. The smell of fresh paint indicates the presence in the air, not only of the volatile parts of the oils that have been used in painting, but also

of particles of the coloring-matter itself, albeit these particles are in general nearly or quite inodorous. It is therefore very detrimental to health to occupy a painted room so long as the odor of the paint or of the oil can be perceived.

The case is quite different as regards wall-paper and kalsomine. The coloring materials of these never become so coherent as do oil-paints, consequently if they are poisonous the air of a room decorated with them must always be unhealthful. For some years the injurious effects of arsenical colors thus used have been clearly recognized, and certain shades of green have been therefore condemned. It should be generally known, however, that arsenic is a common factor in the production of some other colors, notably of some shades of gray which are now quite fashionable in wall-papers and kalsomine. Indeed, most wall-papers and kalsomines contain substances that are more or less injurious, even if they are free from arsenic. This matter has not yet been fully investigated, but it is doubtless true that many headaches, disorders of digestion, and various vague ailments are caused by occupying papered and kalsomined rooms, where there is no arsenical poisoning, and where the true cause is not even suspected.

Another objection to wall-paper is that the paste with which it is put on is liable sometimes to ferment and give opportunity to unhealthy fungous growths. Besides, the paper being porous and remaining in place for years, frequently absorbs the germs of certain diseases, and so becomes a spreader of infection.

It is better that the walls throughout the interior of the house should be painted in oil, or else that they should be simply whitewashed. If neither of these plans is considered practicable, it becomes more important than ever that the circulation of air should be abundant and constant.

IV.

THE AIR WE BREATHE.

THE air is composed of two gases, nitrogen and oxygen, in the proportion of 77 parts by weight of the former to 23 of the latter, with a small quantity of carbonic acid, a mere trace of ammonia, and an extremely variable proportion of water in the form of invisible vapor. In some places and at some times air is liable to contain various other gases, as impurities derived from various sources, but those which have been named are constant elements of it. The carbonic acid and the ammonia may, indeed, be considered as impurities, though their sources are so widespread that they are never absent, and it is only with respect to the use of the air for breathing that they can be regarded as impurities, for in some other uses they are a necessary part of it. The watery vapor, on the other hand, is in no sense an impurity, as some portion of it is necessary to make air fit for respiration as well as for other uses.

For our present purposes the main use of the nitrogen of the air is to dilute the oxygen so as to render the whole fit for breathing by the human lungs. Decrease the proportion of nitrogen in a certain ratio, and we have the elements of nitrous oxide ("laughing-gas"), which may be breathed for a short time, but would soon wear out the system by the increased action which it occasions. Decrease the nitrogen still further, and the result is the proportions of the two gases that form nitric acid, which will

eat into the flesh like fire, and will devour almost every metal except gold. Decrease the ratio of oxygen, and we diminish its adaptability to breathing. When the diminution of oxygen reaches a certain point, the air becomes wholly unfit for fulfilling its functions in the human economy, and death ensues, more or less speedily according to the ratio of this diminution.

One great—we may say *the* great—problem of securing a healthy home is to make such provision that the atmosphere within the house shall always be very nearly in its normal condition. That is, practically, that the air vitiated by having parted with a portion of its oxygen by passing into and out of the human system, or otherwise, shall be driven off, and its place taken by pure air from without.

When the air from the house (more or less vitiated) has been expelled, it ceases to be injurious except in extraordinary cases; for all gases have a strong tendency to commingle, and the quantity thrown out is usually so small, when compared with that into which it is thrown, that its noxious power is imperceptible. There are indeed some kinds of manufactures, the waste products of which vitiate the air through a wide circuit—it may be for miles; but such a site will be sedulously avoided by any one who has a healthy home in view, just as he would avoid the vicinity of a malarial swamp.

The special function of the act of breathing is to keep the blood constantly supplied with its due amount of oxygen. Day and night, sleeping or waking, the chest alternately contracts and expands some twenty times a minute, drawing in at each inhalation about half a pint of air, which at each exhalation is expelled in an altered condition.

Physiologists call this atmospheric ebb and flow the "tidal air." But the air is not wholly expelled from the system. About 100 cubic inches remain in the bronchial tubes and in the millions of air-cells within the lungs.

This "residuary air" has been deprived of a portion of its oxygen, giving it up to the blood and receiving therefrom in return carbonic acid. The blood in its passage through the system gives to the various tissues of the body most of the oxygen which it had received in the lungs, and takes from them carbonic acid; and when at last it is collected in the pulmonary artery, has a dark-purplish hue instead of the bright scarlet with which it began its rounds. It is poured into the right side of the heart—or rather the right heart—whose strong contractions force it through innumerable capillary tubes distributed throughout the lungs, where it receives a fresh supply of oxygen, parts with its carbonic acid, is poured into the left heart, whence it is sent again through the aorta and its myriad branching arteries to every part of the system in one unceasing round. This round begins at the moment of birth, and continues until the last instant of life. The first and the last earthly act of a human being is to breathe.

The act of breathing is the one which must be kept up constantly and continuously as the prime condition of life. We may live without eating for days, perhaps sometimes for weeks. We may live for hours, perhaps sometimes for days, without drinking. But we can live for only a very few minutes without breathing. So essential is this function that its exercise is placed mainly beyond the control of the will; at most we can suspend or somewhat modify it for a short time. We eat or drink by an act of the volition; we breathe without at all willing it. When the man has absolutely ceased to breathe, he is dead.

Now, it is essential to the proper function of breathing that the inhaled air shall be measurably pure. To whatever extent it is vitiated—that is, lacks its due proportion of oxygen or contains any noxious material—just in that proportion must the function of breathing be imperfectly performed.

The evil effects of breathing a vitiated atmosphere are manifold, even though in the outset we scarcely notice them, or by long habit become only partially sensible of them. In general terms, it lowers the whole tone of the system, although within certain limits this lowering is not perceptible from day to day, or week to week; but, from season to season, the person is sensibly in worse health than in the same season the year before.

There are other means of vitiating the air of an unventilated room than the mere breathing it over and over again. Among these are the heating of it by the ordinary furnaces or by close stoves; and more especially the lighting by gas. An ordinary gas-burner will consume four times as much oxygen, and consequently generate four times as much carbonic acid, as will a single person by breathing. There can not well be a more unhealthy and debilitating place than a close hall packed with auditors, and lighted by numerous jets of gas. No wonder that many a preacher or lecturer finds himself addressing an audience growing more and more unsympathetic or sleepy.

The object of ventilation is to keep the air of a building or apartment in its normal condition. This normal condition is affected in two ways: 1. By the abstraction of a portion of its elements; 2. By the introduction of ingredients positively injurious. Both these modes of vitiation occur in the case of inhabited rooms. From the pure outside morning air, enter an ill-ventilated bedroom which has been occupied through the night, and you will at once become aware of a disagreeable sensation. The air appears to be "close," and there is also an odor more or less offensive. The "closeness" arises from the partial absence of oxygen and the presence of a considerable quantity of carbonic acid. The foul smell has a quite different cause (for carbonic acid is absolutely inodorous); it arises from exhalations from the body and other sources, and varies in in-

tensity according to the nature and amount of these exhalations.

An adult, in health, breathes about twenty times a minute, inhaling and exhaling at each respiration about half a pint of air—say eleven gallons an hour. Each of these half-pints of air is successively so far deoxygenized and loaded with carbonic acid as to be in itself unfit for further breathing. But these eleven gallons of air are by no means sufficient to maintain life for an hour. From an air-tight vessel of this capacity filled with pure air, let a tube pass to the mouth of a person; close the nostrils, and let him breathe only by the mouth, through this tube, back and forth into the vessel. At each respiration, after a few minutes, the breathing will become more and more impaired, and, probably long before the hour has expired, the experimenter will be dead, unless the experiment has been abandoned. He would die from suffocation, just as he might be suffocated by strangling or drowning.

Practically, the amount of air, originally pure, required to maintain life, is five or six times as great as this—say a hogshead, or about sixty gallons, an hour. In the experiment above suggested, substitute a hogshead for a cask, and the person might breathe for a full hour, although more and more imperfectly from minute to minute toward the last of the hour; that is, while the air in the hogshead became more and more vitiated from minute to minute, it would not at the end of sixty minutes have reached that extreme of vitiation which would render it absolutely incapable of sustaining life.

The processes of ventilation depend mainly upon the *convective* principle by which heat is conveyed and disseminated through a volume of water, air, or gases. And this requires that there should be a difference between the temperature of the outer atmosphere and that within the room to be ventilated. Theoretically it is of no consequence

which is the colder, and therefore the heavier. The colder air will always drive out the warmer, provided there is any means by which the warmer air can escape; not otherwise. Thus, in a room provided with an adequate outlet, if the air within be colder than that without, the current consisting of cold air will be *outward* until an equality of temperature is reached, when the current will cease.

But practically the air within a room is almost invariably warmer than that without, and so the current of fresh air will be *inward*, provided, as before, that there be a sufficient outlet by which the warmer air can escape.

There is no difficulty in providing means for the inlet of the colder air from without. There is indeed some question whether it is best to admit it at the top or the bottom of the room, or at some point intermediate between them. If it is admitted at the bottom (which in itself appears to present the most advantages), an opening of proper size is made in the outer wall; from this outer opening a pipe runs under the floor, through which it opens at some desirable point—underneath the stove if there be one in the room. If the cold air is to be admitted near the top of the room, a partial opening of the window by letting the upper sash down an inch or two is as good as any other possible method.

But some reasons have been adduced for admitting the air at a point between the top and the bottom of the room. A very good authority says: "A substitute for the sash-ventilating plan is to introduce into the room one or more of the so-called 'Tobin's tubes.' These tubes pierce the outer wall horizontally about waist-high, and upon reaching the interior turn upward at a right angle, discharging fresh air into the room some two or three feet from the ceiling. The air ascends, and is distributed gently and without draught throughout the room. There are many

devices for concealing the tubes, or giving them an ornamental aspect."

But most of the advantages of the Tobin's tubes may be secured by a slight modification of the ordinary mode of window-ventilation. Lower the upper sash about ten inches, and fill the opening at the top with a tightly fitting board. A space of about an inch thick, and as long as the width of the window, is thus left between the panes of the upper and the lower sash. Through this will flow an inward ascending current of cold air, which will diffuse itself throughout the room, while it is at the same time gradually sinking by its own comparative weight to the floor. This modification is especially adapted for use during the night in sleeping-rooms, since, should a storm arise, no rain can enter the apartment by it, as might be the case were the opening above the sash left unclosed. In the morning the board should usually be removed, the lower sash raised and the upper one lowered, for a more thorough "airing" of the room.

If an apartment be without a chimney-flue (which should never be the case when it can possibly be prevented), something may still be done by means of a ventilator opening, directly or indirectly, near the ceiling, into the outer air. Better than nothing at all is a mere transom-window over the door, opening into a cool hall. When the sash of the transom (which swings upon pivots) is inclined outward and upward, a current of air will be created on each side—the warm air of the room passing out on the upper side, the cooler air from the hall flowing in upon the lower side. If, however, the air of the hall is warmer than that of the room, and is vitiated by exhalations from the kitchen or otherwise, this transom is worse than useless; for the air which comes in is more impure than that which goes out and is replaced by it.

In very many cases it is impossible to make use of any

means for ventilation other than the doors and windows and the chimneys. Usually these can be made to serve a very good purpose, although their positions and other conditions vary so greatly in different cases that it is impossible to lay down any strict rules for their use. Common sense in the application of the principles already brought to view is required. It should always be remembered that a single opening is not enough in ordinary circumstances. It is better that there should be several, and that they should be at different heights. Thus, a window opened a little way at top and bottom is commonly more effective than a window opened to twice the extent at either top or bottom. If, however, the temperature within the room is the same as that outside, there will be neither incoming nor outgoing current unless advantage can be taken of a breeze or of some artificial movement of the air, and in the absence of these it becomes necessary to throw the window wide open at either top or bottom and trust to the law of diffusion of gases for preserving the purity of the air.

If there is a fire in an open fireplace or grate, or in a stove that has a direct and powerful draught, air will be drawn from the room so rapidly to feed the fire that the outer air will rush in abundantly through any opening that may exist, and frequently when the fire is brisk enough air will thus find its way through the joints of the doors and windows even while these are closed. For this reason it is often possible by building a light fire to ventilate in a few minutes a room that has been shut up a long time and smells close and musty, and, if the fire burns with a free draught and is not continued too long, the air of the room is sometimes decidedly cooler after than before the operation.

V.

THE WATER WE DRINK.

NEXT in immediate importance to pure air is water. Water dissolves or takes up, to a greater or less degree, almost every substance with which it comes in contact. Rain-water is perhaps its purest natural form. But in its passage through the atmosphere it carries with it some ammonia and more or less of the minute animal and vegetable organisms floating in the air. These are often present in such quantities that their decomposition renders rain-water more or less putrid after it has stood some time. Moreover, in thickly populated districts, and in the neighborhood of many manufactories, the rain in its descent absorbs various impurities from the air. It is also liable to acquire organic matter from leaves and other substances on the roofs from which it is commonly collected, and in some cases from the materials of the roofs themselves. From these causes the water of cisterns frequently becomes offensive and unfit for drinking. Even though these impurities are not obvious to any sense, they are always to be guarded against, for water may be perfectly clear, colorless, and sparkling, with no unpleasant taste or odor, and yet contain a dangerous amount of organic matter. There is a very simple test for this: Put into a clear, colorless, glass-stoppered bottle, a pint of the suspected water, with a few grains of white lump-sugar; expose the bottle to the daylight in the window of a warm room. If within a week or

ten days the water becomes turbid, there is organic pollution of some sort, and it is almost certainly unfit for drinking, as it is.

If water has any taste or smell, it should always be boiled before drinking. It is well to filter it also. In fact, it is a wise precaution to filter all drinking-water, even though it be not thought necessary to boil it. There is no end to the number and size of the filters offered for sale. In lack of any of these, one which will answer every practical purpose may be readily extemporized anywhere. Take a common unglazed earthen flower-pot of large size; cover the hole in the bottom with a bit of clean flannel; put in three inches of gravel, and as much of white sand, and over this four inches of charcoal; pour in the water at the top, and let it filter through the hole in the bottom into a glass or earthen vessel below, and what with the antiseptic quality of the charcoal, and the mechanical filtering power of the sand and gravel, the water will come out pure and innocuous. The charcoal in time will become clogged with the impurities, and should be cleansed by heating it upon a shovel over a hot fire. The sand and gravel must also be cleaned or renewed from time to time. This simple and inexpensive filtering, and the boiling of all suspected water, will be a great safeguard against such diseases as typhoid fever, cholera, and dysentery, which are to a considerable extent propagated by drinking-water.

The water of lakes and large ponds is generally nearly as pure as rain-water; often purer than that of springs and wells, for the reason that, while these natural reservoirs derive most of their water from underground streams which are more or less affected by the soil or the rocky strata through which they pass, lakes receive also no small amount of rain-water directly from the clouds, which is nearly pure. The same is true of the water of large rivers, except that it contains in suspension considerable quantities of mud,

which is deposited as earthy sediment when the water is allowed to stand for a while in a suitable vessel. The water thus clarified is usually excellent; that of some large rivers, as the Mississippi and the Nile, pre-eminently so, as is vouched for by all voyagers upon those streams.

The water supplied from lakes, ponds, and rivers is that which is generally supplied to large cities by means of public water-works. Under proper conditions it is unexceptionable except that in summer it is usually too warm to be agreeable for drinking; but this defect is remedied by the addition of ice. With us this icing is usually carried too far. The temperature of our ice-water is usually several degrees lower than it should be, in a sanitary point of view. The best temperature is that of the water from a cool spring or deep well, and this will range through several degrees as indicated by the thermometer. Moreover, the ice itself not unfrequently contains more or less of impurities from various sources; hence it is advisable that the vessel for holding ice-water should consist of two cylinders, one within the other, and not communicating with each other, so that the ice and water do not come in contact. The ice is placed in the inner cylinder, the water in the outer one. If the relative size of these is judiciously proportioned, the water will be kept at a proper temperature, and a considerable saving will be made in the quantity of ice required.

But, if the water of rivers flows through a densely peopled region, especially a manufacturing one, or through or near large cities, it is invariably more or less polluted by the refuse of the manufactories, and the various impurities from dwellings, barn-yards, stables, etc., for which the river furnishes the readiest means of drainage. The water should always be taken from a point above any of these polluting sources; and stringent legal provision should be made that no such injurious establishments shall be so placed that

their drainage may enter the river above the point of supply.

Moreover, it happens sometimes that the water in ponds and reservoirs is affected by what appears to us to be a spontaneous growth of microscopic vegetation, in such quantities as to seriously impair its purity. This evil, usually temporary in its duration, may be obviated by boiling the water before it is used. This will effectually destroy the dangerous vitality of the vegetable growth; and a subsequent filtering will render the water perfectly salubrious.

The water of springs and wells is always somewhat modified by the character of the soil or rocky strata through which it percolates. If the neighboring rock is of granitic formation, the water takes up very little from it, and is consequently very nearly in its natural state. If the rock be limestone or magnesian, the water will be largely, and often injuriously, impregnated with these minerals. If the soil be alkaline, the water will often be utterly unfit for drinking by man or beast. The water of wells is essentially the same as that of the springs of the region, only it is more likely to be polluted by admixtures from without—the drainings of dwellings, barns, manufactories, and the like.

Water containing carbonate or sulphate of lime in solution is called "hard." That which is free from these salts is said to be "soft." In many parts of this and other countries these substances are so abundant in the earth that all the water of the region is hard except rain-water. People who are accustomed to drinking hard water do not generally find it unhealthy, but it is apt, when drunk freely by those who are unaccustomed to it, to cause diarrhœa. Its moderate use for a few days will generally overcome this tendency. If the hardness of water is due principally to the presence of carbonate of lime, it may be made soft by boiling, the carbonate of lime being thus made to adhere to the bottom and sides of the vessel.

The use of lead pipes to convey water is a very common source of unwholesomeness in the latter. The presence of lead in the water is scarcely perceptible to the taste, and its effects are not usually manifested at once, but the poison introduced from day to day accumulates in the system, and after a time the sudden occurrence of "painter's colic" or of the peculiar form of paralysis due to lead-poisoning shows the mischief that has been done. Lead pipes, when used to convey drinking-water, should always be lined with block-tin. If this is not possible, the water, whenever drawn, should be allowed to run until all that has been for any time at rest within the lead pipe is discharged, before any is saved for drinking.

Supposing we have secured reasonably pure and wholesome water, the quantity that we ought to drink demands some consideration. In ordinary circumstances, however, this is perhaps a matter of less importance than some have supposed, provided always that we drink enough to supply the daily waste through the various excretions. In general, thirst is a good guide, though when very thirsty it is well to drink slowly and with intervals, for thirst depends not on the absence of water from the stomach, but on the want of it in the blood and bodily tissues, so that we must not only swallow it but wait for it to be absorbed before thirst will be fully allayed, and if we do not so wait we are liable to swallow more than is needed. There is no great harm in this if we are well and strong, and the water is not too cold, for the superfluous water will very soon be discharged by the skin and kidneys, but until it is so discharged it will cause us discomfort.

The entire quantity of water ordinarily discharged from the body of a healthy man in twenty-four hours is not far from four and a half pounds. This is considerably more than is usually drunk, because a great deal is taken in various kinds of food. Much, however, depends on habit.

Many persons in good health habitually drink and discharge far less than the average quantity of water and watery fluids, while others, seemingly equally healthy, greatly exceed that quantity. Occupation also has a large influence in the matter. Some kinds of labor, carried on in great heat, cause as much perspiration in an hour as commonly occurs in a day, and this must be balanced by drinking an equivalent quantity of water, so that it is not unusual for glass-blowers, foundrymen, etc., to drink water at the rate of half a gallon or a gallon per hour.

The quantity necessary, therefore, becomes largely a matter of circumstances and individual habit, and each one must in this respect be in great measure a rule unto himself.

VI.

THE FOOD WE EAT.

It follows, from the nature of the case, that the food, taken as a whole, must contain, and in due proportions, all the elements which go to make up the body whose waste it has to repair. And it must also be presented in such a form as to render it digestible. A piece of the dry bark of a tree contains in it nearly all of the elements of the human body, but not in a digestible form. It is sometimes eaten under extreme stress of famine; but it must first be broken into small pieces, and boiled in water to soften the tough fiber and cause the starch-vessels to burst. A fleshless bone contains a large proportion of highly nutritive matter, but in such a form that the digestive fluids can not get at it. A man might take into his stomach bone-dust containing enough nutritive matter to make a full meal, and yet starve to death. Yet, if the bones had been subjected to proper boiling, the nutritive matter would have been extracted, and have become excellent food.

The various processes of cooking, besides gratifying the palate, soften the food, and thus render it more easy of digestion. Some of the best articles for food can be used as such only after they have been cooked.

The kind of food suitable for one age of life may be wholly unsuitable for another. In an infant the digestive functions are performed so rapidly that he must feed every two hours. The adult need not eat oftener than two

or three times a day. The infant's food must be of a kind that can be rapidly digested ; at first, milk only. Not one infant in ten would survive many days if he were given only bread, even though soaked in water, to say nothing of vegetables and meat.

It is an often-mooted question whether man should live on vegetable or animal food, or both, but, as a matter of fact, everybody who can get it eats both animal and vegetable food. The structure of his teeth and digestive organs indicate that man was intended to be an eater of both animals and vegetables. So was he in the first beginnings of his recorded history, so is he now, and so we doubt not he will be while the world stands. The proportions in which he will use these two kinds of food depends much upon circumstances, notably on climate. When both kinds are readily procurable, vegetable food will usually predominate in the diet of the inhabitants of the tropics, animal food in that of the peoples of frigid zones.

Vegetables, taken collectively, contain in varying proportions all the elements contained in the human frame. Wheat probably contains them in the best proportions—unless, indeed, maize may be placed close by its side ; in some respects a little above, in others a little below.

When wheat is made into flour, a certain portion of its nutritive value is lost. That is to say, a part of its gluten, which is its principal flesh-forming element, and which lies near the surface of the grain, adheres to the hull or skin when it is ground, and so is lost in the bran. By the old method of grinding and bolting, the finer and whiter the flour is made the more gluten is lost.

These facts of themselves would be sufficient to warrant the theory that bread made of superfine flour would not of itself suffice to maintain human life, since it lacks several of the components of the body. Partial experiments upon man, and complete ones upon animals, fully established

the theory. It has been found that a dog, fed exclusively upon bread made from superfine flour, will not live more than a month. Though furnished with an abundance of this, it is literally starved to death. The other food which we take, however, contains the elements wanting in white bread, thus supplying the deficiency ; so that for us the whitest of bread is not positively unwholesome.

Still, taking all things into account, bread made from flour that contains the full proportion of gluten is, on sanitary grounds, to be preferred. For this reason many have advocated the use of unbolted flour, making the so-called "Graham-bread," while others recommend the use of "middlings" instead of fine flour. Both of these preparations, however, are less agreeable to most people than fine flour, and they contain more or less indigestible material that irritates some stomachs. Flour made by what is called the "new process," however, obviates all these objections, for, while it contains all, or nearly all, the gluten of the wheat, it is perfectly fine, white, and free from bran. It is therefore on all accounts to be preferred, and is well worth the extra price which it costs. Only certain varieties of wheat are capable of being made into flour by this process, and these varieties are rich in gluten. Such is the hard, spring wheat of Minnesota, from which it is said that not only the finest but the most nutritious flour in the world is now made.

Flour, as it comes from the miller, is sometimes adulterated with bean-meal, for rendering the dough more tenacious when kneaded. Damaged flour is "corrected" by the use of alum and of carbonate of soda—the latter to remove the sourness occasioned by decomposition of the gluten. Bakers not unfrequently add alum to "white bread," in order to make it still whiter ; and alum in any considerable quantities acts injuriously upon the digestive organs.

In the making of bread or biscuit two things are of

paramount importance, namely, that it shall be light and sweet. If it is heavy the digestive fluids can not act readily on it, and, while some strong stomachs will digest it without much inconvenience, many will only do it painfully and at the expense of wearying effort, that if frequently repeated must induce disease. If it is sour, it is not only difficult of digestion, but its nutritive value is lessened. The sourness of bread is a certain sign that putrefactive change has commenced in the gluten. This is sometimes due to the fact that the dough or the sponge has stood too long, for this change will always occur when flour is kept moist and warm for a considerable time. Sometimes it is due to the use of "yeast-cakes" or "leaven" made of flour or meal in which the change is already begun. Soda or saleratus is often used to correct such sourness by combination with the acid that has been developed in the dough. It can do this, but it can not restore the decomposed gluten, and if, as frequently happens, it is added in excess of the acid in the bread, it will neutralize some of the acid of the gastric juice in those who eat of it, thereby impairing digestion and frequently causing pain and illness.

Frequently the lightness of bread is secured by mixing with the flour baking-soda and cream of tartar. The chemical action which takes place between these substances when wet, causes the discharge of carbonic-acid gas, which, being confined by the dough, puffs the latter up, or "raises" it. A similar result follows if sour milk or some other acid substance is used instead of the cream of tartar. Bread made in this way may be perfectly healthful if the acid and alkali are used in moderate quantity and in due proportions. In domestic practice, however, the proportions are rarely accurately observed, the alkali being usually somewhat in excess. If it is considerably so, the digestive function must suffer.

All baking-powders are combinations of acid and alkali

similar to the one mentioned. They have the advantage of being generally accurately proportioned, and the disadvantage of being very frequently adulterated with substances more or less deleterious.

"Prepared" or "self-raising" flour is simply flour in which the acid and alkali are already mixed, needing only to be wet in order to develop their action. Such flour, when prepared and sold by responsible parties, is usually perfectly wholesome.

The starch contained in wheat and in many other vegetables is in the process of digestion converted into sugar, and as such serves an important purpose in nutrition. When bread is toasted this change in its starch is greatly forwarded, and therefore toast is much more readily digested than plain bread.

Warm bread is somewhat difficult of digestion, partly because it forms a close, adhesive mass, partly because the butter, which is commonly eaten with it in larger quantities than with bread that is not warm, melts and soaks into it, both of these causes interfering with the action of the digestive fluids upon it.

Of the meats commonly used by us, none are of themselves other than wholesome. Each has some good qualities to a greater extent than others. Good beef combines probably more of these than any other. Good mutton is not far behind. Every now and then a senseless outcry is raised against pork. So far as this is directed against the flesh of swine fed upon garbage, distillery-slops, and the like, kept in close pens, and forced to wallow in filth, the denunciation is well deserved. But the swine in his natural state is very cleanly in his habits. His wont of "wallowing in the mire" is not at all uncleanly. He does so in order to rid himself of certain insect annoyances. The mud only touches his bristles, and comes off when it gets dry. The flesh of corn-fed pork is perfectly wholesome,

and for several reasons is better adapted than any other for the main meat of those who are engaged in laborious out-door occupations. The lumberman, for example, prefers pork to beef as a regular diet.

There are those who find a special delicacy in venison and the flesh of other game. But probably this arises from the comparative rarity of the meat, and from its being usually eaten under circumstances when the appetite is keen, rather than from any real superiority. Poultry and wild birds are unexceptionable at any time; but rather by way of change than as a constant diet. They cloy upon the appetite. "Turkey every day" is what no man can endure. So also with quails and similar small birds.

Boiling renders meat more digestible than any other mode of cooking, and is more economical, since a less proportion of the nutritive matter is lost. It has been estimated that, in boiling, beef and mutton lose about 23 per cent of their weight; in baking, about 31 per cent; in roasting, about 34 per cent. Some kinds of meat—especially the flesh of young animals—are unsuited for boiling, since they contain a large percentage of gelatine and albumen, which are readily dissolved in hot water, and are consequently "boiled away" and wasted.

In baking, roasting, and broiling, the heat should be strongest at first, and then diminished; because the quick heat at the beginning closes the pores of the meat, preventing the juices from escaping, and enabling them to permeate the entire piece.

In stewing and hashing, the meat is put into a more convenient form for digestion than by any other mode. The minute subdivision requisite for digestion, and which otherwise must be done by the teeth, is to a good degree performed by the cooking. Stews and hashes are therefore especially adapted for those whose teeth, whether from age

or other cause, are too imperfect to perform properly their work of mastication.

Fish, as an article of food, holds a somewhat peculiar position. Those who can get only fish for animal food are certainly liable to many diseases. Yet, when alternated with flesh-meat, both are better than either.

The custom, that when a dinner consists of several courses one of them should be fish, appears to be based upon good sanitary grounds. The rule of the greater part of the Christian Church, which, by proscribing the eating of meat on Fridays, virtually prescribes that of fish, is probably a wiser one than the framers of it knew. It would be well, upon the whole, that fish should be eaten to a much greater extent than it now is in our country, and to quite as great an extent as it is likely to be eaten, even should our schemes of fish-culture accomplish all that is hoped for them.

Eggs are purely an animal product, as are meat and milk, between which in composition they hold a kind of middle place. The contents of a raw egg consist of about 74 parts, by weight, of water, 14 of nitrogenous elements, 10 of fatty matter, and 2 of various saline substances. In a sanitary point of view, boiling is the best mode of cooking them. Hard-boiled eggs are not so easy of digestion as soft-boiled ones, and are apt to produce constipation in some persons.

As to the quantity of food required for perfect sustenance, the best authorities give estimates that differ more in seeming than in fact, when the conditions under which they were made are considered. Dalton says :

"The total quantity of food required by man has been variously estimated. It will necessarily vary, indeed, not only with the constitution and habits of the individual, but also with the quality of the food employed ; since some articles, such as corn and meat, contain very much more

alimentary material in the same bulk than fresh fruits or vegetables. Any estimate, therefore, of the total quantity should state also the kind of food used; otherwise it will be altogether without value. From experiments performed while living on an exclusive diet of bread, fresh meat, and butter, with coffee and water for drink, we have found that the entire quantity of food required during twenty-four hours by a man in full health, and taking free exercise in the open air, is as follows:

Meat	16 ounces,	or	1·00	pound	avoirdupois.
Bread	19 "	"	1·19	"	"
Butter or fat	3½ "	"	·22	"	"
Water	52 fluid ounces,		3·38	"	"

That is to say, rather less than two and a half pounds of solid food, and rather over three pints of liquid food."

Dr. Letheby estimates that an adult male, engaged in ordinary active labor, requires each day about 5 ounces of nitrogenous food (meat, fish, eggs, etc.), and 29 ounces of carbonaceous food (bread, butter, sugar, potatoes, etc.), in the forms in which they are ordinarily used. Those engaged in very laborious work may need half as much more of nitrogenous food, and something more of carbonaceous food; those engaged in comparatively inactive occupations require considerably less.

The dietetic scale can in some respects be better arranged by army surgeons than by any others, since soldiers are usually men in the prime of life, and in sound physical condition; and the estimates are made from such large numbers that individual idiosyncrasies will about balance each other. Dr. Playfair has collated the dietaries furnished for soldiers in the Crimean War, the Austro-Italian War, and the civil war in the United States, the general result being that for each day about 8 ounces of nitrogenous and 18 ounces of carbonaceous food were allotted to each

soldier. The comparatively small amount of carbonaceous food required is explained by the fact that the vegetables provided were to a great extent "desiccated," that is, deprived of much of their water.

These proportions are considerably less than those given by Professor Horsford in his table of the rations of the more important armies of the world when in active service, which is as follows :

FOOD.	American.	Austrian.	Bavarian.	British in Crimea.	British in India.	French.	Prussian.	Russian in Crimea.
Flour.....	22 oz. or	..	1·65 oz.	....	....	. ....	....	....
Cornmeal.	20 oz. or	..	....	....	....	.....	....	....
White bread...	22 oz. or	..	2·30 oz.	24 oz. or	16 oz. or	.....	....	....
Hardbread	16 oz. or	..	....	16 oz.	16 oz.	22·83 oz. or	16 oz. or	....
Black rye bread...	....	32 oz.	17·16 oz.	....	....	and 26·43 3·52 oz. oz.	32 oz.	16 oz.
Fresh beef.	20 oz. or	4 oz.	3·10 oz.	16 oz. or	16 oz. or	10·78 oz. or	8 oz. or	16 oz. or
Salt beef..	20 oz. or	..	....	16 oz. or	16 oz. or	.....	....	16 oz. or
Salt pork..	12 oz.	..	....	16 oz.	16 oz.	8·47 oz.	4 oz.	16 oz.
Potatoes	16 oz. 3 times weekly.	..	....	....	....	.....	20 oz. or	...
Rice....	1·6 oz.	..	....	2 oz. or	4 oz.	2·11 oz. or	2·66 oz. or	....
Barley..	....	..	....	2 oz.	other	.....	4 oz. or	....
Peas....	....	..	....	....	vegeta-	.....	8 oz. or	....
Beans ..	0·64 gill.	..	....	....	bles.	2·11 oz. or	8 oz. or	....
Oatmeal ..	....	..	....	....	16 oz.	.....	5·3 oz.	. ..
Desiccated vegetables	or 1 oz. 2 times weekly.	..	....	2 oz.	....	.....	....	....
Cabbage or sauerkraut	....	..	....	1 oz.	....	.....	....	3·5 gills.
Coffee, green...	1·6 oz. or	..	....	1 oz.	....	0·9 oz.	....	....
Coffee, roasted & ground..	1·28 oz. or	..	....	0·25 oz.	1·43 oz.	.....	....	....
Tea.....	2·4 oz.	..	....	0·5 gill.	0·43 oz.	.....	....	....
Brandy...	....	..	....	....	....	0·43 gill, or	2 gills	1·5 gill.
Wine.. ..	....	..	....	....	....	1·75 gill	....	....
Beer.....	....	..	....	....	....	.....	....	1·1 quart
Tobacco..	....	..	....	....	....	⅓ oz.	....	...
Sugar.....	2·4 oz.	..	....	2 oz.	....	.....	....	....
Vinegar...	0·32 gill.	..	....	....	....	.....	....	1·75 gill.
Lime-juice	....	..	....	1 oz.	....	.....	....	quantity
Mustard ..	....	..	....	....	....	.....	....	unk'wn.
Horse-radish...	....	..	....	....	....	.....	....	3·86 gr.
Pepper....	0·4 oz.	..	0·05 oz.	0·31 oz.	...	.....	....	3·86 gr.
Salt	0·6 oz.	..	0·10 oz.	0·62 oz.	1 oz.	0·9 oz.	supply	0·75 oz.

The health of a home depends in no small degree upon

the kinds of food chosen, the quality of each kind, the proper cooking of it, and the manner in which it is eaten. With us there is practically no limit to the choice of kinds, and it is very rare that articles of perfectly unexceptionable quality are not to be had.

It is for many reasons desirable to have variety in our food; why else is such a variety of edibles provided for us, on the dry land and in air and water? And there are many ways in which, by cooking, each material may be made into many quite different dishes. The person who said, "I eat only to live," said a very foolish thing. We are so constituted that the proper exercise of every bodily function gives us pleasure; and the rightful gratification of every sense is an innocent gratification. It may sometimes be a duty to "mortify one's body" for the sake of some higher end; but to mortify it just for the sake of its being mortified is sheer folly. It is worse than folly; it is an implied slur upon the Maker and Former of our bodies. There was little saintliness in the action of that old saint who spread an abundant and varied table for his guests, but made his own dinner of a crust of bread and a radish.

The good housewife need by no means devote her days and nights to the study of the profound gastronomical works of famous cooks; nor need she keep a scrap-book in which to paste the recipes floating about in the newspapers. Her theoretical knowledge of that art which man alone is said to practice can be much more easily acquired. She should, of course, be able to do her own marketing, even though she need not always do it in person. She should know from what part of the animal any particular cut is taken, and for what purpose any particular cut is best adapted. She should be quite able to distinguish the body of a young turkey or chicken from that of a venerable gobbler or ancient chanticleer; a freshly-caught fish from

one that has rested many days in the ice-box, and all that. But, when it comes to the matter of actual cooking, a little volume which she can slip into her pocket is sufficient for all the recipes she needs. It will furnish variety ample enough for all the tastes of a healthy home, and for such delicacies as the wants of a possible invalid may require.

Nor need she lay out all her knowledge in the preparation of a single meal. The variety should be that from day to day, not from course to course in one meal. It will be all the better that the bill of fare should not be the same on any two successive days; nor the same from day to day week after week. If, in compliance with quite general usage, Friday is "fish-day," there is no good reason why Sunday should always be "roast-beef-day," Monday "hash-day," and so on. The husband, when he comes home to dinner, will relish the meal all the more from not knowing of what it is to consist; still better, if it is quite different from what he expected. A surprise, when not a disagreeable one, is always a pleasant thing. To do this in the best way, she should plan in a general fashion the bill of fare for a month ahead, noting beforehand what articles will be in season from week to week, what supplies she will have in store, and what she must lay in from time to time.

Very many articles have their special seasons when they are most plentiful, and consequently cheapest; and they are always in their best condition during this season. The person who chooses to have the first strawberry, the first peach, or the first shad of the season, must make up his mind to pay a very high price for a very poor thing. In a sanitary as well as an economical point of view, he may take to himself the epithet descriptive of the one whose money soon ceases to bear him company.

Potatoes are always in season, though some varieties are better at one period of the year and some at another, and a

potato that has not ripened sufficiently to cook mealy, or that by keeping has passed the mealy stage and is watery when cooked, is hardly fit for human food. The best potato may be spoiled in cooking, but much depends on using each variety when it is in its prime. With some varieties this stage is reached as soon as the potato is fit to be taken from the ground, with others it does not arrive until after the potato has been stored for some months; with some it lasts only for a few days, with others for months. The potato known as the Early Rose has for several years held precedence on account of remaining in its prime longer than most other varieties. Nearly every variety degenerates, however, after a few years, and new ones are constantly being introduced, so that the choice must vary somewhat from year to year. With us, potatoes are almost as staple an article of food as bread, and take the place of that and of other starchy foods to a very great extent, hence the great importance of having them always good. They are more digestible boiled or roasted than fried, because when fried they become more or less soaked with grease, rendering them somewhat cohesive and not easily acted on by the digestive fluids in the stomach. The same condition affects fried foods in general. Fat is a very necessary article of food, notwithstanding much foolish prejudice against it, but the manner of its digestion differs somewhat from that of most other substances, and it is accomplished chiefly through the agency of other fluids than those which are most active in the case of starch, gluten, lean meat, etc.; therefore it is better that the fat should be taken in the form of butter, cream, fat meat, etc., in connection with other food, but not incorporated with the other by frying.

Sweet-potatoes are much more nutritious than Irish potatoes. Pound for pound, the former contain nearly twice as much available nutriment as the latter.

Turnips, beets, parsnips, and some other roots contain

less nutriment than potatoes, and in a somewhat different form. They are in general very wholesome, however, and afford a pleasant and useful variety in food.

Peas and beans are said to contain more nutriment in proportion to their weight than any other vegetables in common use. They are particularly rich in nitrogenous elements, thereby more nearly approaching in character to the flesh of animals than most vegetables do.

Green vegetables are generally quite wholesome, notwithstanding much that is thoughtlessly said to the contrary. It is, indeed, sometimes gravely asserted that Nature never intended any vegetable to be used for food before it is ripe, and that no unripe or immature food can be wholesome. But Nature certainly intended a large class of animals to live entirely or chiefly on green vegetables, and many of those vegetables which are eaten green by man are utterly unfit for food when they are ripe. For example, no one would think of eating ripe cabbage, spinach, or lettuce, unless driven by extreme hunger, but all of these in their green state are grateful to both palate and stomach, albeit they are not so quickly digested as some other foods, and are therefore unsuitable in some forms of illness or of feebleness. Perhaps the cucumber is the only vegetable commonly eaten green, of which it may reasonably be said that it would be better not so to eat it; and, although the cucumber is certainly the product of a vegetable, it is doubtful on which side it should be placed of the line dividing what are known in common parlance as "vegetables" from what are known in common parlance as "fruits." Moreover, the much-abused cucumber itself, though not a very useful food, is quite a harmless one to a large proportion of people if used with ordinary judgment. One cardinal rule to be observed in the selection of green vegetables is that they shall not be stale. They are all liable to ferment, and when they are stale this process may have

already begun, or, if not, it is quite likely to begin in the stomach, to the hindrance of digestion.

Melons contain a great deal of water, some sugar, and a very small proportion of other nutriment. They are, however, exceedingly grateful to most persons, particularly in warm weather, and if ripe and fresh may generally be eaten even in enormous quantities with impunity. This is particularly true of the watermelon. The muskmelon, if eaten largely, is more apt than the watermelon to cause diarrhœa, and during some summers has a decided tendency that way.

Fruits in general are nutritious and healthful, and their free use should be encouraged. With us they are generally eaten at the latter end of a meal and at the close of the day. Probably the reverse of both of these practices would be better. In warm countries it is common to preface the regular breakfast with oranges or other fruits, and the Spaniards have a proverb, doubtless founded on experience, that "fruit is gold in the morning, silver at noon, and lead at night."

Sugar is a vegetable product and a very necessary article of food. It is especially needed by children, and the craving that nearly every child has for sugar and sweet things is not a mere fancy, but the expression of a great physiological need that ought to be satisfied. It is a popular notion that sugar injures the teeth. As sugar it can not do so, for so long as it remains unchanged by fermentation its tendency is to prevent decay. If it ferments in the stomach it may give rise to an acid that will injure the teeth and impair digestion, but in a healthy stomach it is not likely to ferment unless taken in excessive quantity or in connection with something else that is in a state of fermentation.

Very much of the sugar now sold is adulterated with glucose. This is a substance, not at all unwholesome nor in itself objectionable, in chemical composition very closely

resembling sugar. The principal objection to it is that it is not so sweet as sugar.

Candies, when made of pure sugar, glucose, and molasses, are perfectly wholesome. Most of the candies sold, however, are adulterated with various substances, some of them innocent enough, as for instance starch and gum, but many of them more or less injurious.

Of liquid foods milk is the recognized type, since it contains in itself all the carbonaceous and nitrogenous elements, in a form capable of easy and rapid digestion. Hence it must constitute the almost sole food of infants; and to a great extent—perhaps the greater the better—that of children. It should also enter largely, in one shape or another, into that of adults.

The proportions in which the various food-elements are contained in the milk of animals of different species, and in that of individuals of the same species, vary considerably. As the average result of many analyses it may be said that, in one hundred parts of unadulterated milk, there will be by weight from eighty-four to ninety of water, and from ten to sixteen of solid matter of various kinds. Of this solid matter, in the entire quantity, there will be from three to seven parts of nitrogenous compounds, three to five of sugar, two to six of fat, with very minute quantities of the salts of soda, lime, potash, magnesia, iron, etc. These salts, though very small in quantity, are of great importance in nutrition. The milk of the mother is the natural food of the babe. When from any cause this can not be had, or only had in insufficient quantities, either from the mother herself or from a suitable wet-nurse, a fair substitute may be prepared from pure cow's milk. Woman's milk contains considerably more water and somewhat more sugar and butter than that of the cow; hence, in preparing cow's milk for the food of the infant, about one third of the quantity of water and a very little sugar are commonly

added. A better plan is to skim the cream from milk that has stood for a few hours and is perfectly sweet, and add to one part of this cream two or three parts of water and a little sugar. Of course, the cream so taken will be more than half milk, and the mixture recommended will very closely resemble the natural food of infants. It is very desirable, and should be insisted on whenever possible, that the sugar to be used shall be sugar of milk and not cane-sugar. The former can be procured at most drug-stores. It is much less liable to ferment in the stomach than the latter.

Milk is frequently adulterated with water, and sometimes, it is said, with chalk and other substances. The lactometer, which is an instrument commonly used to detect adulteration of milk by ascertaining its specific gravity, is by no means a certain test, for in the first place the specific gravity of milk from different cows varies considerably, and in the second place, if the cream or a part of it be removed from any sample of milk, its specific gravity will be increased, and, if water be added to it, its specific gravity will be lessened, so that a sample of milk may be both skimmed and watered, and yet the lactometer will record the weight of purity.

Very little impure milk is now sold in New York city, on account of the stringency of the law. The sale of skimmed milk there is entirely interdicted, under a heavy penalty, and consequently many people have gotten the idea that skimmed milk is unwholesome. It is certainly not desirable for babies, but for older persons, who take other kinds of food, it is a very healthful drink.

Tea and coffee are not strictly food, for they supply nothing to the tissues of the body, except in the small quantity of milk and sugar sometimes taken with them, but by diminishing the waste of the system they lessen the quantity of food required. At the same time they cause a slight

nervous excitement, to be followed by reaction, and this in many persons, when long continued, causes a considerable nervous depression.

Ground coffee is very generally adulterated, but very rarely with substances that are actually deleterious. The most common adulterant is chiccory, which is perfectly wholesome.

Teas are almost sure to be adulterated. In this art the Chinese have attained a marvelous degree of skill. Even the varieties of "black tea" are mixed with other kinds of leaves. They have also what they call "lie-tea," composed of a little tea-dust and foreign leaves, with more or less of sand, quartz, and magnetic oxide of iron, all made up by means of a solution of starch into little masses in imitation of different kinds of tea. If this lie-tea is used for the adulteration of black tea, it may not be positively injurious; if used in green tea the masses are usually "faced" with Prussian-blue, indigo, and other poisonous matters, to give them the desired color. Teas not unfrequently undergo a further process of "doctoring" after they leave the hands of the importer, and before they come to the consumer.

Of condiments, the only one that is a necessary article of food is salt. That it is necessary has been shown by repeated experiments, as well as by its presence as a component part of every tissue and fluid of the body except the enamel of the teeth. Besides its direct nutritive value, it promotes appetite and digestion, and is reputed to have very decided anti-malarial properties.

The various spices are used simply to please the palate. By their irritating properties they stimulate the flow of saliva, and it is possible that in the same way they may promote the flow of other digestive fluids and thus aid in digestion when used in moderate quantities, but when used largely they are apt to irritate the stomach too much, and thus disorder digestion.

VII.

LIGHTING AND WARMING.

The advantages of gas for public illumination are great and undeniable. For the lighting of private dwellings it is in many respects, and to a considerable extent, more convenient than any other material. But, in a sanitary point of view, it may well be doubted whether its use has not produced more harm than good.

Not to dwell upon minor evils—such as the prolonging of working hours far into the night, thus giving to work many hours which properly belong to sleep, and to sleep many hours which belong to work, the actual escape of gas into rooms by the leakage of the pipes, or by carelessness in shutting off the jets when the light is to be extinguished, and such like "accidents"—the great sanitary evil connected with the use of gas for household lighting arises from the fact of its enormous consumption of oxygen. A single gas-burner vitiates, while in operation, as much air as is vitiated by the breathing of several persons. That is, it takes from the air so much of the oxygen, converting it into forms in which it is irrespirable, and thus compels a greatly increased care in ventilation in order to maintain the atmosphere of a room or a house in a state of purity. But it is vain to expect that the use of gas for household illumination will decrease—will not, in fact, increase—unless it should be to a greater or less extent superseded by some of the modes of electric lighting which

are now undergoing the processes of experiment and trial.

The most which we can now do is to obviate, as far as we may, the undeniable evils attendant upon lighting by gas. One sweeping measure, which would, if practicable, go far to this end, has been proposed. We are gravely assured that "no gas-burner should exist in any room unless a tube of zinc or iron is placed over it to carry off the deleterious products of combustion, and convey them at once into the open air." There are few cases in which this would be practicable even in large buildings; in ordinary household lighting it is wholly out of the question; as much so as if in our houses we were directed to breathe only through a tube one end of which should be in the mouth and the other in the open air outside of the walls. In either case the products of combustion would be effectually carried from the room. Chemists, in their laboratories, do this in effect, to get rid of the noxious emanations often evolved in their experiments and operations. But, practically, the air vitiated by gas-combustion, as well as by breathing, must go into the room, and be thence discharged by the ordinary modes of ventilation.

No gas-burner, therefore, should be allowed in a room that is not well ventilated, and the number of burners to be allowed in any room should be limited by the size of the room and its facilities for ventilation. That is to say, for each ordinary gas-jet as much fresh air must be supplied as would be needed by three or four persons.

The flickering of gaslight is a very objectionable feature, especially if it is used for reading or writing. On this account refined kerosene-oil is preferable to gas for these purposes. The higher grades of this oil, commonly known as "astral" or "head-light" oil, give a clear, steady light, they are more manageable than gas, and with ordinary care are almost, if not quite, devoid of danger. The lower

grades should never be allowed in the house, since they are almost as explosive as gunpowder and more inflammable, they give very poor light with an offensive smell, and their sole recommendation of cheapness is largely deceptive, for they burn much more rapidly than the highly refined oil.

Candles are now so little used for general illuminating purposes that their importance is quite secondary. The same general principles are applicable to their use as to that of gas or oil. Some lights consume more oxygen in proportion to their intensity than others, but practically the amount of fresh air required may be approximately estimated by the degree of light. That is to say, the number of candles or lamps necessary to furnish a light as powerful as that of a gas-jet will need about the same amount of ventilation as the latter.

In reading, one should sit, if possible, with the face turned from the light, allowing it to fall over the shoulder upon the paper. In writing, if the light stands upon the table, this is rarely practicable, and, if it were, would cast the shadow of the hand on the paper. Therefore, in such circumstances it is always best to protect the eyes of the writer by a shade either worn like a visor over the eyes, or else partially covering the lamp in such a way as to interpose between the flame and the eyes and yet let the light fall freely upon the paper. It is always better, provided the light is strong enough, that it should come from above, as the eyes are then protected by their natural curtains.

In tropical regions there is no need to make artificial arrangements for warming a dwelling : Nature has done that in superfluity ; but, as we recede from the equator in either direction, this necessity begins to manifest itself more and more, so that there are within the temperate zones few places in which a fire in the house is not at times desirable. The farther we go from the equator, the more press-

ing does this demand become, until it is absolutely imperative for greater or less portions of the year.

The original mode of house-warming was doubtless to build a fire in the center of the hut or tent, leaving the smoke to find its way out as best it could after pervading the whole interior; and this is the method still practiced among savage tribes. Some inventive genius added a chimney for carrying off the smoke. It was found that the chimney not only carried off the smoke, but added greatly to the activity of the fire itself. The primitive mode of warming in time became developed into the great fireplace with its massive andirons, which we know so well by observation or description.

To be sure, the great fireplace demanded an enormous supply of fuel to produce a tolerable amount of warming. But, so long as fuel was abundant, this was of comparatively little importance, although the mere work of felling the trees, hauling the logs to the wood-pile, cutting and splitting them into manageable size and shape, formed no inconsiderable part of the year's work. But fortunately this part of the work could be best done—at least on our side of the Atlantic—at a season when the farmer had, or thought he had, little else that he could do.

The worst of these great chimney-fires was that, be they as large as they might, they only warmed a small part of a large room, while the keen air from without found abundant means to enter and hold sway over the rest of the apartment. Sitting before the fire, one's face and ribs might be half-roasted, while his neck and back were half-frozen. To go from the fireplace to the door was like passing in an instant from India's coral strand to Greenland's icy mountains. Moreover, the chimney itself seemed at times to set itself at work to give an exemplification of "the total depravity of inanimate things." Sometimes, without any apparent reason, it would not "draw" at all, and no per-

suading of the bellows would keep the fire burning. Sometimes it would draw the wrong way, sending the smoke down and out into the room in dense clouds, to the no small discomfort of eyes and lungs. It is probable that around these fire-sides more tears have been shed by reason of smoky chimneys than for the loss of friends and kindred. Still, in spite of all drawbacks, the old-fashioned fireplace answered its main purpose—that of warming the room—pretty fairly, except on the very coldest days; and as for ventilation, nobody thought of that, or, indeed, had any occasion to think of it. So for generation after generation the sons built their fireplaces and chimneys just as their fathers had done, quite content to let well enough alone.

The grate had its origin when coal began to take the place of wood as fuel, and of course in England. The coal would not lie upon the andirons, and so there must be an iron cage to hold it. The open grate shares with the open fireplace the objection that in very cold weather no single grate is sufficient to heat a very large room. In the best-constructed grates more than three quarters of the heat produced goes up the chimney, and is lost for all warming purposes. For those to whom the saving of expense is no object, this defect may be remedied by having two grates, at opposite ends of the room, which will thus be sufficiently and quite uniformly warmed throughout. Nothing can be more pleasant than a large apartment thus warmed; and with the provision of means for the admission of fresh air, the chimneys furnish ventilation as perfect as could be asked for.

The so-called "Franklin stove" was a great improvement upon the common grate. In Franklin's time coal had not begun to be used in this country as fuel. The original Franklin stove was designed solely for burning wood. He rightly inferred that the heating power of a fire of a given size and intensity was just in the ratio of the

heating surface exposed. His stove was simply an open grate with iron sides, set partly out into the room instead of being built wholly into the chimney. The heating surface was thus increased by perhaps a third or a half, augmenting by so much the useful heating power of a given quantity of fuel burned in it.

But what we now know as the Franklin stove is a very different thing from that devised by Franklin. A modification of this, shown at the Philadelphia Centennial Exhibition of 1876, and styled "The Fire on the Hearth," is one of the best of the improved Franklin stoves. It is an open stove with double sides and back, at some little distance apart. The space between the two casings is open at the bottom, having a perforated iron cover at the top. Fresh air is introduced from without by means of a wooden box-tube opening under the stove. The air rises into the interspace between the casings, where it is warmed by the heat of the stove, and passes up into the room, in gentle currents, through the perforated cover.

Close stoves are usually found only in rooms as tightly shut up as possible. They indeed effect a considerable saving in fuel, since they expose their entire surface to the air of the room, and so a much less amount of the generated heat goes up the chimney. The heated air rises to the top of the room, where it remains if there is no provision made for its egress. The cold air in the room, and that introduced through cracks and crevices or by the occasional opening of the door, sinks to the bottom, and remains there scarcely warmed at all. In the extremely cold climate of Canada, we are told that it is not uncommon to find such a room in which water will freeze on the floor, while at the ceiling the thermometer indicates a temperature of 100°.

The ceiling of such a room is usually low, so that, when a person stands erect, his head is in an atmosphere uncomfortably warm, while his feet are in one uncomfortably

cold. A considerable improvement in the ordinary close stove would be to make the sides double, as in the "Fire on the Hearth" just described. The cold air at the floor would then rise into the heated interspace, and being heated there would ascend, thus establishing somewhat of an equilibrium between the temperature at the floor and at the ceiling.

Two prominent evils are frequently connected with the use of close stoves. One is the excessive drying of the air in the rooms where they are used. This is a common cause of dryness of the lips and throat, thirst, headache, languor, and general *malaise*, in persons who sit in rooms thus warmed. It can very easily be prevented by keeping a little water in an urn or other vessel on the stove. Many stoves are provided with urns for this purpose. It is only necessary that the water should be kept slightly warm to facilitate evaporation. It should not be hot enough to produce visible steam.

The other evil is the escape of noxious gases from the stove into the room. This may occur from imperfection of the chimney-draught, from too great length of stove-pipe, from the closing of dampers to check the activity of the fire, from imperfect joints or cracks in the pipe or in the stove itself, or sometimes, if the stove is of cast-iron, by permeation of the gases through the hot iron. A little observation will commonly determine the cause, and the remedy is then obvious.

There is always need of greater care in ventilating a room heated by a close stove than in one heated by an open fire. A well-ventilated room, with a faulty stove, *may* be a tolerably healthful one; an ill-ventilated room, with the best conceivable stove, *must* be an unhealthful one.

The common hot-air furnace is essentially a large inclosed stove placed in the basement, and having flues leading to the different rooms to be wholly or in part warmed by it. These flues are provided with registers and valves

by which the entire amount of heated air may, if wished, be thrown into either of these rooms. A furnace is a very convenient adjunct to the ordinary heating apparatus of a home in our northern latitudes, where, during very cold days, there is not sufficient fire to fully heat the various rooms and passages to a proper temperature.

A hot-air furnace is, however, by no means an unmixed blessing. The hot air delivered by it is nearly always more or less contaminated with deleterious gases, and in many cases it is much too dry to be suitable for breathing. Besides, the mode of diffusing the heat is entirely by convection, the amount radiated from the metal of the register and conducted through the walls from the flues being so small that it may practically be disregarded. The hot air rises at once to the top of the room, and, unless there is some unusual mechanism for distributing it, remains there until it is cooled. In the absence of any considerable radiating surface the floor and the lower stratum of air in the room remain cold. In short, the evils of the close stove are intensified by the hot-air furnace. Add to this that the furnace is liable, like any stove, to get out of order and be temporarily unfit for use, in which case a longer time must commonly elapse before repairs can be made than in the case of an ordinary stove, and in the mean time the whole house is cold. If a stove gives out unexpectedly, the want of it usually affects only one or two rooms, and can readily be supplied.

These considerations have, of late years, produced a wholesome revulsion of feeling against the use of hot-air furnaces, at least as the main dependence for house-warming. In the mean time the improvements in self-feeding stoves render it possible to obtain most of the advantages of furnace-heat with comparatively few of its disadvantages. If a furnace is to be used at all, it is of the utmost importance to provide for a sufficient supply of moisture in the

air. This can be done by placing sufficient water where the air can get at it. Put water in the room to be heated, and even in the interior of the furnace itself, bearing in mind that the quantity of water taken up by evaporation is in proportion to the amount of surface exposed to the air, not to the quantity of water contained in the vessel. Put the water, therefore, into large shallow pans, renewing the supply as often as necessary. Do this judiciously, and one will have no further occasion to complain of the dryness of the furnace-air.

There are various methods of heating by steam, in themselves preferable to any which have been described; but the size and cost of the necessary apparatus prevent, and probably will prevent, its introduction into ordinary dwellings, and will confine its use to large mansions, public buildings, manufactories, and the like.

The proper temperature to be maintained, in all rooms where people sit, is from 65° to 70° Fahrenheit, or about 18° to 21° centigrade. Every such room should be furnished with a thermometer, and this should hang or stand at a considerable distance from the source of heat, and about midway between floor and ceiling. It should not be in contact with the wall, or with any object that is liable to be of a different temperature from the air of the room. The heat should then be regulated strictly by the thermometer. There are occasions, as in certain forms of sickness, when a different temperature is desirable, but these come under the cognizance of the physician, and should always be determined by him.

It is often said that the temperature of sleeping-rooms should be considerably lower than that of sitting-rooms. It may be so with safety, and perhaps with profit, in many cases. For those who are strong, however, it is not a matter of much consequence, and for those who are weak the danger from dressing and undressing in a cold room is con-

siderable. For the latter class of persons, if the bedroom is at all cool, there should be always a warm dressing-room adjoining.

Probably the chief advantage of a cold bedroom is the absence of the unhealthful gases and dry air that are frequently found in heated rooms. The partial cooling, at night, of a room that has been heated during the day, also tends to purify the air by changing the direction of its currents and by the introduction of a larger quantity. In rooms that are imperfectly ventilated, therefore, it is better that the temperature should be lowered at night, and this rule applies in some degree to other rooms as well as bedrooms. On this account it is better that such rooms should not be warmed by self-feeding stoves. A preferable arrangement is one by which a little fire can be made just before the room is to be used, and then allowed to die out. Such rooms, however, are never fit for sleeping-rooms, and should never be used as such except in the direst necessity. Provided the air in a sleeping-room can be kept reasonably pure, the temperature may be determined entirely by the sense of personal comfort.

VIII.

DISINFECTANTS.

DISINFECTANTS are certain substances or forces which have the property of neutralizing or destroying contagions and miasms. A contagion is a product of disease, capable of communicating the disease to a healthy body by actual contact. Such are the virus of small-pox and that of hydrophobia, etc. A miasm is an emanation capable of inducing disease in those to whom it is carried in the air or by some other vehicle. The miasms against which disinfectants are commonly directed are, like contagions, the products of certain diseases, and capable of communicating the same diseases. Both contagions and miasms may be absorbed, and held for a considerable time without losing their virulence, by garments or other porous substances.

The chemical constitution of contagions and miasms is not known. It is thought to be of organic character, however, and in every known instance seems to be capable of decomposition in much the same manner as organic compounds in general. Such decomposition takes place usually by means of oxidation. All agents, therefore, which favor the combination of oxygen with other substances are disinfectants, more or less efficient in proportion to the activity with which they promote oxidation.

Another mode of disinfection is by dilution of the poisonous principle. The matter containing this principle may become so attenuated, by admixture with air, water,

or almost any other substance through which it can be disseminated, as to be practically innocuous, while, conversely, the danger of infection is always greater in proportion to the concentration of infectious material, as exemplified in many crowded hospitals, ships, prisons, tenement-houses, etc. The practical application of this for home use is that frequent washing of the bodies and clothing of those who are sick of infectious diseases and of those also who are exposed to the infection, and the freest possible ventilation, are valuable disinfectant measures. At the same time it must be borne in mind that these measures are but palliative, that there are some infections which an ordinary washing will not remove, and that the very steam from a washing or the current of air that has passed over an infected object often carries the infection in a sufficiently concentrated form to reproduce the disease.

Among Nature's disinfectants are cold and heat, and she often employs these upon a grand scale. Thus malaria, the local cause of yellow fever and of ague, is deprived of its noxious power by a single hard frost. Cholera, however it may have been introduced into temperate regions, usually disappears on the approach of winter. Practically we can make but little use of cold as a disinfectant, while we can make large use of heat.

The ancients were well aware that heat was antagonistic to infection; so they built large fires in the streets to ward off or drive away the plague. Pliny says, "In heat itself there is a certain medicatory virtue." The experiments of modern science have more than confirmed the ancient speculations. In 1824 Dr. Henry found that the virus of small-pox in clothing was destroyed by exposing the garments to a temperature of from 140° to 200° Fahr. In 1851 Dr. von Busch, of Berlin, made trials of heat in a large hospital of which he had the charge, where an infectious fever was alarmingly prevalent in some of the wards. After trying

in vain all the usual methods of fumigation, he caused the patients to be removed, and the wards heated to a temperature of 150°. The patients were then brought back, and not a single new case of the fever occurred.

Similar successful experiments have been made for extirpating the virus of yellow fever in large vessels. The hatches were closed, and superheated steam was introduced into the hold. Good use was also made of superheated steam in New York hospitals during the cholera season of 1866.

Heat is beyond doubt the very best means of disinfection, where it can be thoroughly applied. But in ordinary dwellings the adequate employment of this great disinfectant must be very limited, and recourse must be had to more convenient methods, which, while they rarely wholly destroy the noxious element that produces disease, will, to some extent, do away with the conditions favoring its further increase and dissemination, and thus will effect some good—although probably much less than is generally supposed. But it must be borne in mind that mere perfumes, as such, are in no sense disinfectants. They merely hide the presence of noxious effluvia, but do nothing to destroy them. They only replace an unpleasant odor by a pleasant one.

There are almost innumerable artificial disinfectants, bearing high-sounding names. Some of these have a certain value; others are worse than useless, because they induce a false feeling of security, and thus prevent the use of more appropriate means of disinfection.

Dr. Richardson, of London, who is high authority upon sanitary questions, after describing some of what he considers the best methods of disinfection, adds emphatically: "While these different means of purifying the air are put forward as of immediate service, it should always be remembered that they are temporary measures—nothing more.

They are not intended to take the place of thorough and efficient ventilation. In fact, in the presence of perfect ventilation of good natural air, they are not required at all; and, when they are called for, the necessity of better ventilation, as the permanent remedy, is at once explained."

Chloride of lime is one of the commonest and most efficient disinfectants. It acts as such by giving up its chlorine to unite with the hydrogen of organic substances, thus destroying the latter and setting free a portion of their oxygen. This effect will be produced whenever chloride of lime is exposed to the air, and will continue until its chlorine is all discharged. In the mean time, the lime combines with a portion of the carbonic acid in the atmosphere to form carbonate of lime. When this point has been reached, it is entirely useless for further disinfecting purposes; therefore it is best to procure it only in small quantities as desired for immediate use, and, when to be kept for any time, it is necessary to put it up in very closely-stoppered bottles. One advantage of chloride of lime for use in ill-ventilated places is that it not only destroys infection but also purifies the air to some extent by setting free oxygen and absorbing carbonic-acid gas. If it is desired to hasten the action of this disinfectant, vinegar or dilute sulphuric acid may be added to it.

Sulphate of iron, commonly known as copperas, is another common disinfectant, and an excellent one. Its special advantages are that it is very cheap, is safe and easily managed, and is inodorous. It causes the oxidation of all dead organic matter with which it comes in contact. Its own decomposition in ordinary circumstances is not rapid enough to directly affect the atmosphere very greatly, and therefore it is best adapted to the disinfection of liquids and solids with which it can be brought into direct contact, either in its crystalline form or in solution in water. Either

this or the chloride of lime should be used in larger quantities than is generally done to get the best effects.

For the disinfection of sewers and privies, a pound of the sulphate of iron or chloride of lime, diffused in a gallon of water, will answer for a large amount of foul matter. Rooms which are occupied may be disinfected by placing a little fresh chloride of lime in saucers in convenient places in the room. Articles of clothing which are not very much contaminated may be disinfected by exposing them to a high temperature, or by boiling them in a solution of permanganate of potassa, one ounce to three gallons of water. Garments and bedding which have been greatly contaminated, especially by small-pox, should, however, invariably be burned.

Sulphurous acid, in the form of vapor, is an extremely efficient and prompt disinfectant. It acts, like chlorine, by combination with the hydrogen of organic substances. It is an irrespirable vapor, however, in small quantities causing choking and coughing, and in quantities sufficient for disinfecting purposes being destructive of all animal life. It is, therefore, incapable of service in a room that is occupied, but is invaluable for the final disinfection of rooms that have been vacated. It is produced by burning sulphur in the air. The room to be disinfected should have all the windows closed and all doors but one. Then, an iron or earthen pan containing coals of fire being placed in the room, a few small pieces of brimstone or roll-sulphur are scattered upon the coals, and the person who does this immediately leaves the room and closes the last door. In the course of two or three hours, the fire having in the mean time exhausted itself, doors and windows are to be thrown open to admit fresh air, and remove the remaining vapor and the smell of sulphur.

Furniture, clothing, etc., may be disinfected by being left in the room during this fumigation. It should be re-

membered, however, that sulphurous acid is a powerful bleacher, and that many fabrics will therefore be ruined by its action.

Of late years carbolic acid (which is obtained by the distillation of coal-tar) has become the most common disinfectant, and is believed to possess more than any other the property of destroying minute animal and vegetable organisms in the air and elsewhere. But Dr. Richardson is earnest in his recommendation of iodine, which he considers better than any other means for disinfecting the air of water-closets and other small rooms. He also gives a very cheap and simple method of using this disinfectant:

Get from the apothecary a common chip ointment-box, of about an inch and a half in diameter; take off the lid of the box, and remove the top of it, so that the ring part only remains; put into the body of the box two drachms' weight of pure iodine (that is, the metalloid itself, not its tincture or spirituous solution); stretch a bit of muslin gauze over the top of the box, and over the muslin press down the ring of the lid, so as to make the muslin taut over the top of the box. Then cut away the loose muslin around the ring, "and then, complete and ready for use, you have an iodine deodorizing-box which will last in action for six or eight weeks, even in hot weather. To bring this box into practical application it is only necessary to place it in the closet or on a shelf or any other resting-place. The iodine will volatilize slowly into the air through the muslin gauze, will diffuse itself through the air, which it will deodorize, and after a time communicate freely an odor like that of fresh sea-air. In cases where an instant effect is required, the iodine may be volatilized in a more rapid manner. A little of it may be placed on a plate, and the plate held over a spirit-lamp within the closet for a minute or two. The iodine, diffused by heat, will pass off as a violet-colored vapor, and as it passes through the air

will exercise a rapid purifying action. The vapor as it cools will condense upon the walls, and there will continue its work of purification."

Dr. Richardson also devised a very simple means of purifying larger rooms by means of diffusing deodorizing and disinfecting substances through the air in the form of fine spray. The fluid used was made by adding iodine to a solution of the peroxide of hydrogen. The water was also charged with two and a half per cent of sea-salt, and was set aside until it was saturated with the iodine. The fluid was then filtered and placed in a spray-apparatus, by which, when required, it was diffused in the finest state of distribution at the rate of two fluid ounces an hour. In a bedroom or sitting-room of ordinary size, one ounce of the fluid was sufficient to render the air—as tried by the best chemical tests—perfectly pure, and that in the course of ten or twelve minutes. "The apparatus," says its enthusiastic inventor, "was so simple in action that any nurse could put it into operation at once, and could deodorize a room hour by hour on the direction of the medical attendant. In fact, there was produced a sea-atmosphere in the room."

Every one perceives at once the difference between a pure inland-breeze and a pure sea-breeze. This arises mainly from the fact that the latter contains some admixture of salt and a little iodine. Now, if one could at will introduce into his city or country bedroom, parlor, or office the atmosphere of the sea-shore, it could not fail to be of high advantage. Instead of going to the sea-shore, he would practically, for the time being, bring the sea-shore to him.

A word of caution is necessary in regard to this use of iodine, and it will apply in some degree to the use of chlorine and of many other disinfectants. The oxygen which is set free by these means is eager for a new combination. This is precisely what makes it valuable as an oxidizer of

deleterious organic matter, but it is equally ready to attack some other substances, including metals. Therefore metallic fixtures, ornaments, instruments, etc., will be rapidly rusted in a room where disinfectants of this class are used, and especially where the iodine volatilizer described by Richardson is in use for weeks together. They should therefore be first removed, or else protected by some coating that will prevent rust.

IX.

THE BEDROOMS.

THERE are those who profess to consider every hour spent in sleep as so much lost time. For aught we know, the Creator might have so constituted man that he should not require any regularly returning intervals of repose. But he has not done so. The physical laws which govern our earthly life prescribe sleep; and it is only by obedience to these physical laws that bodily health can be maintained.

The time required for sleep varies much in different individuals; more in the same individual at different ages, in different states of health, and at different seasons of the year. Dr. Richardson says: "We require in the cold season of winter, when the nights are long, much more of sleep than we do in the summer. On the longest day in the year, seven hours of sleep is sufficient for most men and women who are in the prime of life. On the shortest day, nine hours of sleep is not overmuch; and, for those who are weakly, ten or twelve hours may be taken with real advantage. In winter, children should always have ten or twelve hours of sleep. It is not idleness to indulge to that extent; but an actual saving, a storing up of invigorated existence for the future."

Perhaps this may hold good for Great Britain, where the longest days and the longest nights are longer than with us; and where the people are of a somewhat more

phlegmatic temperament. But for us, and in our climate, the estimate is probably somewhat too high, taken as a whole. Infants, indeed, pass almost their whole time for several months in sleep ; old age sometimes demands more sleep than do youth and maturity ; sickness asks for more sleep than health does. Too much sleep is injurious as well as too much eating. Leaving infancy, old age, and sickness out of view, probably eight hours out of the twenty-four for sleep is a fair average for men and women in our country, who are in ordinary health and engaged in the ordinary occupations of life. That is, about one third of the time during the most busy period of our life must be given up to sleep.

Our sleeping hours are exposed to many perils from which our waking hours are exempt. When awake we can close the windows if the draught is excessive ; put on more clothing if we are cold ; lay aside some if we are too warm ; replenish the fire if it burns too low, and do innumerable other things which it is desirable should be done. In sleep our actions are withdrawn almost wholly from our own control. Whatever preparations are to be made for health and comfort during sleep must be made while we are awake. Were it not that the vital functions of the lungs and heart go on independent of our volitions, every sleep would be one from which there is no waking—sleep and death would be words of the same import.

Then, also, the condition of the body and of all its surroundings is most unfavorable during the hours specially devoted to sleep—say from midnight to daylight. During these hours the life-giving influence of the sun has been longest withdrawn from us, and the vital processes are at their lowest point. Deaths—especially of those who are suffering from protracted illness—occur far more frequently during these hours than during a like period of any other part of the day. These hours are regarded by all physi-

cians, and others who have constant care of the sick, as critical hours. One of our old writers styles them the "hours of Fate." For all of us, and especially for those who are treading the downward slope of life, sleep is deepest and death nearest in these hours of Fate.

Imagine a case, which shall not be exceptional, but a fair type of many which are of constant occurrence: A man somewhat declined into the vale of years, but in good ordinary health for his age, has passed a winter evening in his parlor, heated to a pleasant summer temperature. At eleven o'clock he goes to his bedroom, in which a fire has been kept up. This is still burning, although it is beginning to wax low. But the room is yet warm; so he does not replenish the fuel, but lies down to rest, and soon falls into sound sleep. Four or five hours elapse, during which a great change has been gradually going on in the room. The fire in the grate has burned out and the temperature within has sunk almost as low as that without—say thirty or forty degrees lower than it had been. The sleeper lies unconscious of all this. Perhaps the bedclothing may be sufficient to prevent him from feeling cold. But he has been receiving cold air into his lungs, long accustomed only to the inhalation of warm air. The minute blood-vessels of the lungs are more or less paralyzed by the unwonted cold air. They become congested, and this congestion may result in a bronchial irritation and obstruction, which constitutes one of the most fatal diseases incident to aged people, and which manifests itself most especially when winter comes on.

Now, had the sleeper been awake during these few hours, nothing of the kind would have happened. He would have replenished the fire in due time, and would thus have kept up a uniform temperature through the night. Uniformity of temperature during all the hours of sleep is, for a person not in robust health, of much more consequence than mere warmth.

Any sudden change of temperature involves the chief hazard. The best temperature for a sleeping-room is that of from 60° to 65°, perhaps a little higher for enfeebled persons. But, even for these, a uniform cold atmosphere is better than one in which there is frequent and marked fluctuation. The temperature of a warmed room varies considerably in different parts; the thermometer should be placed at the head of the bed, about two feet above the pillow.

Since so many of the most important hours of the day are passed in the bedroom, and since those hours are beset with so many dangers peculiar to themselves—dangers from which the occupant, while asleep, has no means of protecting himself—it behooves that the utmost precaution and care should be taken to reduce these possible dangers to the lowest actual point, and to ward off, as far as may be, the evils of those which will still remain. Assuming that due ventilation has been provided, and that the heating apparatus, if any, is properly constructed, we pass to the consideration of sundry points, each in itself of perhaps minor consequence, but amounting in the aggregate to very much.

The relative importance of the bedroom is greatly enhanced when, as is generally the case, it is used for many other purposes besides sleeping. In most houses the bedroom serves also as a dressing-room and a private sitting-room. Every person, however social, wishes for more or less hours of solitude; and every one has at times something to do which can best be done in private; and the bedroom is the natural place for these purposes. The boys will study their school-lessons there; the girls will do their stitching and mending and write their letters there. So that, what with all these uses, not much less than half of the twenty-four hours of the day will be spent, at least by the female members of the family, in the bedroom. Its

location and arrangement are therefore of the first importance. The pleasantest and sunniest rooms in the upper part of the house should be devoted to this purpose. A basement bedroom is never to be tolerated on any account, nor should one exist on the first floor unless there is under it a high and dry basement.

The floor of a bedroom can not be too good, and the best floor is one of wood, well seasoned, smooth, carefully fitted and properly laid; not painted, but stained, if desired, to a light oak color. If, however, as is most likely, the floor is not good enough for this use, it may be covered with oil-cloth or straw-matting. Each of these materials presents some special advantages, and they about balance each other.

Oil-cloth is impermeable by water or dust, is easily swept and cleaned, and very durable, so that it hardly needs to be taken up until quite worn out. It should therefore be accurately fitted to every line, angle, and turning of the walls of the room, well laid, and securely nailed down. It should be of some one color, agreeable to the eye in itself or in connection with that of the walls and ceiling. If these, as is to be suggested hereafter, are bluish, the oil-cloth should be of a reddish-brown tint, thus following Nature, our best guide, who spreads an overarching canopy of blue above the blooming of the land whose prevailing tints are brownish.

If matting be chosen for the floor-covering, the same general rules are to be observed as for oil-cloth. It should be of the natural delicate yellowish hue of the rushes of which it is made. Straw-matting is pleasanter to the tread and less resonant to the foot-fall than oil-cloth. It is easily swept, and may be washed off when in any way soiled.

Whether oil-cloth or matting be used as a floor-covering, strips of carpeting—rugs, in fact—should be laid over it in the places most frequently trodden upon: as in front of

the fire—if there be one ; by the sides of the bed, and in front of the wardrobe, dressing-table, and wash-stand. These strips are not to be tacked down at all. They should be taken up whenever the room is swept, carried out-doors, shaken and beaten, brought back and laid down again. In these carpet-strips or rugs, some license—but not overmuch—may be taken as to color. Darker colors and more brilliant tints than are admissible elsewhere in the room may be used here.

The practices which should prevail in the use of carpets in bedrooms may be summed up in two rules : 1. Have carpet-strips in every part of the room where the feet are regularly and frequently placed. This will include all the places specified above. 2. Have no carpets in any part of the room where the feet are not regularly and frequently placed. This will exclude a space of two or three feet around the room next to the walls, and most especially the space under the bed. The reason for the latter rule is that every unnecessary inch of carpet adds to the impurities floating in the air of the room by accumulating dust. Much of the dust thus collected in bedrooms in spite of the most careful sweeping, is of organic origin, and, if not originally noxious, soon becomes so by means of fermentation and decomposition.

If wall-paper is to be used, the following directions of Dr. Richardson are eminently worthy of observance : "1. The paper selected should not be a 'flock-paper.' 2. It ought not to have a raised or rough surface. 3. The pattern should be of the plainest kind—so to speak, patternless. 4. The color should be gray, sea-green, or sky-blue. 5. It should be renewed every three years at least. 6. The old paper should be entirely stripped off, and the wall be well cleansed of dry paste. 7. The new paper should be put on with paste fresh and pure, into which a little alum has been introduced."

But better than to use paper at all, and cheaper in the long run, is to have the walls hard finished and painted in a delicate tint—say sky-blue or sea-green. Some of the "silicate" paints are in some respects the best; but their use is rather costly, owing to the fact that they do not "cover" well; four coats may be required where two of the ordinary lead or zinc paints would be sufficient. After all, perhaps the old mode of painting walls in "distemper" is about as good as any, taking the comparative cheapness into account. At least, there are no sanitary objections to it, as in the case of wall-paper.

The general rules applicable to the walls apply equally to the ceiling. It should in no case be pure white, but of a tint approximating to the wall, preferably a little lighter in shade.

The fittings of a bedroom should be simple rather than ornate. *Bric-à-brac,* to any great extent, is quite out of place. The room is mainly designed for a place of rest; and a "cluttered-up" aspect is suggestive of anything rather than repose. A few good pictures (if they can be afforded) or engravings should hang upon, not cover, the walls. But the pictures should not be of a very bright tone, and the subjects should always be pleasant ones.

It matters little whether the bedstead be of metal or of wood. It should stand upon casters, and be light enough to be easily moved for sweeping under it, and for other purposes.

The great feather-bed, the pride and glory of housekeepers of former generations, is now, fortunately, pretty nearly a thing of the past. It was not favorable to health. Spring-mattresses, of various devices, are excellent. Mattresses of curled hair and the like are unexceptionable. The great evil of a very hard bed is that it supports the body of a sleeper at only a few points, namely, the shoulders and hips. Any bed which is sufficiently yielding to

"give" to the body at every point—to adapt itself to the hollows and protuberances of the frame—is in so far a good one. A soft quilt may properly be placed over the mattress. A very thin feather-bed is not inadmissible in cold weather, although the quilt answers every purpose.

Feathers, though to a good extent banished from use as beds, are still most commonly retained for pillows. Now, feathers require to be cleaned from time to time, and much more frequently than is generally practiced. It is too often assumed that, as long as the pillow has no decided musty smell, all is right. The feathers, after cleansing, should be thoroughly dried, or mischief will happen.

For sheets and pillow-cases cotton is in many cases preferable to linen. The outer bedclothing should be as light as is consistent with a sufficient amount of protecting power. No clothing, whether for the bed or the person, *produces* any heat. It merely acts as a non-conductor, hindering the heat generated by the vital forces within the body from escaping. Woolen blankets, of a fleecy texture, are undoubtedly the best bedclothing. If a "comforter" be desired, one of cotton is quite as good as one of the costliest eider-down. It should consist of not more than three or four pounds of smooth cotton "bats" quilted between a cloth covering on each side. It is advisable that no single article of bedclothing be very thick, but that there be at least two of each kind, so that the thickness of the whole may be graduated according to the weather; and so that they can be changed frequently. Moreover, a thin covering affords less lodgment for the exhalations of the body than does a thick one.

It is sometimes thought to be a token of neatness that the occupant of a bedroom tidy it up by "making-up" the bed before breakfast. But this is not advisable. It is better that the bed be smoothed up until the morning ablutions and dressing have been performed, so that the exhala-

tions of the night shall not escape into the room. Then, the last thing before leaving the room, take off all articles of the bedclothing, hang them as separately as may be over the foot of the bed and upon chairs, and open the windows, so that everything may be thoroughly aired before the bed is made up.

The windows should be left open in pleasant weather until the sun begins to decline, when they should be closed, since late in the day the air, except on very bright days, begins to be charged with sensible moisture—that is, it is more or loss "damp"; and to sleep in damp air is nearly as bad as to sleep in damp sheets.

The common exception to sleeping in "night air," though not very well expressed, is perfectly sound in fact. To be sure, air in the night can, in a strict sense, be nothing else than "night air"; but what is meant in the objection is air unduly charged with sensible moisture. To breathe such air during the day would be just as deleterious as to breathe it during the night, only that during sleep the physical system is in a condition less fitted to resist its evil influence. This does not apply to malarious districts, where noxious exhalations are thrown from the soil into the air much more abundantly during the night than during the day. Thus one may pass the day in the Pontine Marshes near Rome, or in the rice-swamps of South Carolina, with tolerable safety, while it is almost fatal to sleep there for a single night.

It is very desirable that only one person should occupy a bed. In no case, if it can possibly be avoided, should two persons very different in age, temperament, and habits, sleep together. The evils resulting to a young person from sleeping with an aged one are universally recognized. The child is almost sure to become enfeebled; whether the aged person is benefited thereby, as is commonly supposed, is not so certain. The common opinion is, that the old person in

some mysterious way draws out vitality from the young one, and absorbs it into his own system.

But, leaving this out of view, there are evils more or less inseparable from double-bed sleeping. Very rarely will two persons sleep together whose systems require just the same amount of bedclothing; and, if a compromise is effected, one must have too little, the other too much. If one of them be restless, the other must be annoyed; if one be wakeful, he will disturb the sleep of the other. And in any case each must in some degree inhale the vitiated air which has just been breathed out by the other. Two single beds of course occupy somewhat more space than a double one. And in case the size and shape of the bedroom, or the uses other than sleeping for which it may be required, preclude two ordinary beds, a "trundle-bed," to be run beneath the other during the day, is preferable to a double bed, especially where one of the occupants is a child.

A bedroom should, as far as possible, not be used as a store-room; and, in case it is necessary to have a trunk or two in it, these may be utilized as couches or seats, by covering them with cushions made for the purpose. Most especially the space under the bed should not be used as a repository for things to be kept out of sight. Wherever else shoes, bundles, and odds and ends may be placed, they should never be found under the bed.

In a healthful home, no bedroom to be occupied by a single person will contain less than eight hundred cubic feet; say ten feet long, eight feet wide, and ten feet high. For two persons its cubical contents should be greater by at least one half; say twelve feet long and ten feet broad; and a still more liberal amount of space is desirable if the size of the house will permit.

X.

THE CLOTHING WE WEAR.

"GREAT is the significance of clothes," says Teufelsdröck-Carlyle. By "clothes" he indeed means those institutions, forms, habits, and customs which man, the spirituality, has hung upon or wrapped around himself as an invisible environment for his visible existence. But, in a hygienic point of view, we may take the word in its literal signification.

The chief materials used by man for clothing are skins, furs, the bark and leaves of trees, or fabrics made from them, silk, wool, cotton, and linen. Leaving the other materials out of view, it may be said that, especially for under-garments, silk is the best; but its comparative cost precludes its very extensive use for that purpose. Then come wool, cotton, and linen; wool being the best and linen the worst of the three for this use.

As far as health and comfort are concerned, the inhabitants of warm regions, taught by instinct or experience, prefer either as little clothing as is consistent with decency, or loose and flowing garments; while the inhabitants of cold regions prefer garments which fit somewhat closely to each part of the person, and, when loose and flowing ones are added, it is mainly and especially for the sake of adornment, not for health or comfort. Outer garments, or wraps, such as shawls and cloaks, are an exception to this. No attire is beautiful, or will ever be considered so, except

during the brief period when it is "the fashion," which does not either fit to the person, or fall in loose folds about it. Oriental peoples have, from time immemorial, to a great extent adhered to their national ancestral garb ; and as a rule their costumes, while graceful, present little to which objection can be taken upon sanitary grounds. But with us of the Occident the fashions are ever varying from one extreme to the other of positive ugliness.

The sanitarian will not trouble himself to quarrel with Fashion so long as she contents herself with prescribing ugly attire. But when she goes on to prescribe a costume which, instead of fitting to the person, fits the vital organs to itself, displaces them at will, and thereby prevents the due performance of their proper functions, he must lift up his voice in loud though perhaps unavailing protest. Haply a few, at least, may heed his warning, if often enough reiterated.

Fortunately, the male attire of the present day is tolerably suited to its purpose, and is not, except in a few points, specially objectionable upon sanitary grounds ; its defects being mainly those of omission rather than positive violation of sanitary laws. Far different is it in respect to the prevalent female costume.

The evil effects of "tight lacing," as the term is commonly used, are too well known to need to be here detailed. It may be believed that this particular form of compression of the waist has to a good degree gone out of use. We rarely now see the spider-like waists, which one could clasp between the extended fingers of his two hands. So we let this pass.

But evils quite as great as and far more prevalent than those ever occasioned by mere tight lacing are entailed by wearing heavy under-skirts, etc., suspended from the abdomen above the hips. Without going into anatomical explanations, it is sufficient to say that this extra weight,

pulling down upon muscles which have enough to do to perform their own work, impairs the whole process of breathing—that vital function upon whose proper performance every other function depends. All the organs below the tight band which upholds the skirts are dragged still farther downward by a steady, constant pull; and each of them, one ofter the other, begins to complain.

First, perhaps, the stomach gives out its monitory voice. There are fluctuating pains here, there, and everywhere, but seeming to find a common center at the middle of the chest, accompanied by an uneasy pulling downward at the pit of the stomach. The sufferer tries to describe this sensation by designating it as a feeling of "goneness." It closely simulates the sensation of faintness occasioned by want of food. Sometimes, indeed, the irritation of the stomach thus caused produces a factitious hunger, so that the sufferer is "always eating," and perhaps congratulates herself upon her excellent appetite. But by-and-by, although the appetite appears to be so good, the food, be it what it may, does not "agree" with her. The stomach either rejects its burden or passes it on undigested, or the horrors of dyspepsia are added to the misery already endured. In other cases the same irritation causes loss of appetite.

The mere displacement of any one organ involves a displacement of adjacent ones, each of which must in turn take possession of some of the space belonging to its neighbor. The liver can not do its work properly, and so bilious affections are promoted. Meanwhile the passage of the food, after it has left the stomach, is interrupted in the bowels, producing constipation and occasionally violent inflammation and ulcers. The heart also—that toughest of all the organs, which has been compared to an animated India-rubber bag—flags in its unceasing work, and sends out its plaint in the form of palpitations, flutterings, and "sinking feelings."

Worse even than any or all is the effect produced upon the organs belonging specially to the female sex, who not unfrequently undergo from this cause tortures equal to those of the rack or the stake. And the intimate relations between these organs and the brain and entire nervous system induce untold agony, both of body and mind.

Many years ago Miss Beecher, in her "Letters to American Women," put forth statistics, drawn from wide observation and inquiry, to the startling effect that among American women, in good circumstances of life, hardly one in ten was fitted to perform the functions of motherhood. It may be hoped that this estimate was exaggerated; but there can be no doubt that it embodies a fearful amount of truth. And there can be as little doubt that much of this is owing to faulty modes of dress, and notably in the respect of which we are speaking.

One of the worst things in this case is that this abuse in dress begins at a quite early age. Very tight lacing was not usually systematically begun until the girl had entered early womanhood and was of an age to "go out," by which time the bones had become sufficiently "set" to offer a stout and partially successful opposition to the pressure. But the heavy unsupported skirts are hung upon the schoolgirl before she has fairly entered her teens.

This long train of evils may be avoided by a modification in the manner of supporting the skirts. Have a jacket made, fitting well to the figure, like the waist of a dress; it may be best fitted over a corset. It is to be laced behind, but not so tightly that a full breath can not be easily drawn while in a sitting position. It is immaterial whether there are sleeves or not; in either case, the armholes should not be so small as to impede the free movements of the shoulder-joint. The jacket may be stiffened by thin slips of whalebone, which yield readily to every motion of the body, and the corset should be dispensed

with, all its valuable uses being perfectly supplied by the jacket. No stiff "corset-board" is in front, no unyielding "steels" at the back, to interfere with the graceful, swan-like curve which the many-jointed spine assumes when stooping, if its action is not interfered with. At the bottom of the jacket are buttons to which are fastened all the skirts, etc., be they more or less in number. Their weight, within any reasonable limits, is of little consequence; it is all suspended from the shoulders, which are abundantly able to sustain it.

The best mode of under-dressing for all females, and especially for the young, is to wear next to the person a closely-fitting waist of flannel or soft cotton, to which the drawers are buttoned; over this the chemise, and over that the jacket. Then comes the dress itself, of any material, shape, or fashion which may be chosen by the wearer.

The usual "full dress" of ladies, as far as the clothing of the chest is concerned, is most defective. Dr. Richardson, whom we have already frequently cited, says emphatically that men would be suffering every day from colds and bronchitis if they went as women go with the upper part of the body practically unclothed; and it was his experience that, in the large majority of cases of people of consumptive tendencies, the direct cause of the evil was the exposure of the chest. Clothing, he says, should be as porous as possible, and there is no substance for dress as good as light, loose woolen cloth. In a sanitary point of view, color is of considerable importance. For cleanliness, effect of light upon the body, and warmth, gray is the best color, black the worst, for the outside dress.

Drawers should be depended on for securing warmth to the lower limbs, and they should be of material sufficient to accomplish this without aid, skirts being added as desired for the sake of appearance, since the latter do not fit closely enough to give adequate protection against the cur-

rents of air constantly encountered in walking. Many inflammatory disorders of the bowels and of other organs, occurring among women and young children, are due to neglect of this precaution. The practice of dressing little boys in knickerbockers, with the legs partly bare or very slightly clothed, is exceedingly pernicious. The knickerbockers are well enough, provided sufficient protection in the way of drawers and stockings be added, but the drawers and stockings should always meet; the latter should be warm and thick except in very hot weather, and, in cold weather, should either be double, or supplemented by leggings.

Stockings require more care in selection than most articles of dress. Ill-fitting stockings and those having seams are nearly as productive of corns and similar painful affections as ill-fitting shoes. Next to silk, wool is generally preferable for winter wear, but there are many persons whose feet perspire so freely in woolen stockings that they are more comfortable in moderately thick cotton ones, even in the coldest weather. Such persons should be careful when going for a long walk or a drive in cold weather to protect the feet by gaiters of felt or other warm material worn outside of the boot and covering the entire upper part of the foot, and their boots should always have thick soles, and should contain felt or cork in-soles. The in-soles should be removed each night, that they may be perfectly aired and dried.

Colored stockings should, as a rule, be avoided, as many of the dyes used in coloring them irritate the skin very seriously, and sometimes a fatal effect has been produced by wearing them. Always, if the skin appears roughened or inflamed under colored stockings, the latter should be at once discarded.

Stockings should never be supported by garters, as these can not be tight enough to serve their purpose without

impeding the circulation of the blood, inducing coldness of the feet, and causing the veins of the legs to swell and in many cases to become varicose. It is better that the support should be by means of an elastic band attached to the drawers.

Just now the shoes, whether for males or females, are literally the great stumbling-blocks in the way of healthful dressing. A long and narrow foot has come to be considered a great point of beauty. So we have the sharp-pointed, narrow-soled shoe of the time. If one could only look upon a foot which has been distorted by the long wearing of such shoes, he would have a spectacle of extreme deformity. To say nothing of painful corns, unsightly callosities, and bunions, the great-toe is deflected from its place, and lies partly across the other toes, which, as feebler members, have to adjust themselves as best they may to the confined quarters into which they are forced. It will be fortunate if an ingrowing nail or two is not added to the inevitable corns and bunions.

The great-toe is a member of much more importance than is generally supposed. It is the great pivot upon which the body moves at one period in the act of walking. It is to the human foot very much what the thumb is to the hand. In olden times, when a somewhat merciful captor wished to render his prisoners incapable of further offense, with the least personal injury to them, he cut off their great-toes and thumbs. A person thus mutilated is practically a cripple. Cut off the thumbs and great-toes of every person, and in a generation or two the human race would be extinct, simply because without the constant use of these members the various works necessary to human life can not be adequately performed. In respect to the hand the experiment may be easily tried without amputating the thumb. Tie it firmly down, so that it can not be used, and see how many implements you can manage

with only the other fingers. If one could treat the great-toe in the same manner, the result would be quite correspondent.

Sir Charles Bell, in his admirable "Bridgewater Treatise," has set forth the construction of the human hand as a striking instance of the divine adaptation of means to ends. A like treatise might be written concerning the foot. In its natural state the different bones and cartilages of the foot are so arranged as to form an elastic arch, of which the heel and ball of the foot are the base of the support, so that, when we tread, the weight of the body does not come down plump at once as it does upon the stump of a wooden leg. The impact is broken by the momentary yielding of the arch. When the natural structure of this arch, or the play of its parts, is interfered with in any way, its uses are in so far frustrated. The male shoe is bad enough in this respect; but in the female shoe, as now fashionably made, everything is as wrong as it well can be. The heel is so high that it takes nearly the whole impact, of which it should bear only half; it is brought down to a point too small to furnish a good part of a firm basis; and the muscles of the ankle are strained in the vain attempt to maintain the equipoise; they give way upon one side or the other, usually upon the outer side; the heel of the shoe is worn away more upon that side, and the muscles of the ankle are more and more wrenched by the "lopsidedness" of the tread. And, worse than all, the heel of the shoe, instead of being directly under the heel of the foot, is brought forward until it is almost under the insertion of the ankle-bone, with which it forms nearly a straight line. The consequence is that, when the wearer walks, it is almost as though she were mounted upon a pair of wooden stumps. She "minces" in her gait, and this is commonly set down to affectation. It is no such thing in most cases. The poor creature is doing the best she can under difficul-

ties for which she and the shoemaker are jointly, though perhaps ignorantly, responsible.

There is as much reason for the shoe being fitted to the the foot as for the jacket being fitted to the bust. And this can be done only by measurement; as thus: Let one foot be placed firmly upon the floor, while standing erect and bearing one's whole weight upon it. If the toes have been distorted from their proper positions, it is better to put between them soft pledgets of cotton or the like, to bring them as near as may be to their right position. These will be covered by the stocking, and so the measurer need know nothing of them. A sheet of paper will have been laid upon the floor, under the foot; upon this let the orthopedic artist trace the outline of the foot, all around from heel to toe. This outline gives the form of the sole, and it will be quite different from that of the "ready-made" shoes displayed in the show-windows. If one wish to have one's shodden foot appear a little longer, and consequently narrower, than it really is, there is no objection to the sole being somewhat prolonged, and brought nearer to a point beyond the toes.

But feet differ considerably in other respects than length and breadth of sole. One foot will differ from another, of the same length and breadth, in thickness at various points, and especially in height of instep. To insure a "good fit," measurements must be taken, by a tape-measure, at several places, and carefully noted down. If one could be quite certain that the shoemaker would be strictly guided by his measurements, no further directions need be given; but it may be well to tell him that you wish a "loose" fit, rather than a "tight" one.

Ready-made shoes being made to scale, or perhaps to two or three scales, will not fit all feet, and most likely will not be a perfect fit to any one foot. If, however, one chances to find a ready-made shoe that is a tolerable fit in

all respects, it may be wiser to take that than to run the quite probable risk of having a worse one "made to order."

The foot has a happy faculty of getting over any injuries which it may have suffered from maltreatment, only give it a chance. Discard tight, ill-fitting shoes, and you may reasonably hope that corns, bunions, and the like will vanish in a short time; that the distorted and displaced toes will resume their natural shape and position, and you will have a foot as shapely as Nature meant you to have, although it may not quite come up to the ideal standard of the Venus of Milo.

"Congress" boots are convenient in many ways. They save a deal of trouble in buttoning and unbuttoning, lacing and unlacing; and, moreover, buttons have a persistent habit of getting off, and lacings of getting broken at the most inconvenient moment. Care should be taken that the elastic gores are not too stiff, and that they are not tight enough to impede the circulation of the blood in the ankles.

Rubber overshoes are a very necessary protection against wet and damp, but they should never be worn for warmth, because they confine the perspiration and make the feet unhealthy. If one has to be out much in stormy weather, so that rubbers are constantly worn, the feet should be bathed and the stockings and even the shoes changed twice a day.

Slippers to be worn in the house are very well in warm weather, but in cold or even cool weather they are very unsafe, for the floor is commonly the coldest part of the room and is traversed by currents of cold air, and the change from the shoe or boot to the slipper is a very common cause of illness, the more so as this change is usually made at the close of the day, or at other times when one is fatigued and peculiarly susceptible to the influence of cold. It should go without saying, that slippers are not fit for out-of-door wear.

Gloves, to be warm, should be loose and come well up on the wrist, overlapping the sleeve of the undershirt. Silk, wool, cotton, any woven stuff, is preferable to skin, because it does not confine the perspiration, can be more thoroughly aired and cleansed, and in case of wetting is less uncomfortable. Driving-gloves must, on account of the wear to which they are exposed, be wholly or partly of skin. A common fault with gentlemen's driving-gloves is that they are either too short or too flaring at the wrist. In either case they afford insufficient protection from wind, and should be supplemented by wristlets.

Hats should be worn for the reason given in reply to the old conundrum, "Why does a miller wear a white hat?"—the correct answer being, "To cover his head." They are worn by men, commonly, for this reason—by women, not always. It is a common remark among physicians that neuralgia of the face and head is much more common among women than among men, and the cause of the difference is thought to lie largely in the fact that the head-coverings of women are frequently insufficient. The entire top of the head should be covered, and in cold weather the covering should be warm and should include the temples and the back of the head.

For males the narrow-brimmed, high-crowned, unyielding "beaver" is adapted to no good use. If not quite tight it is sure to be blown off at the slightest provocation; and if tight it touches the head only at a few points, where it produces irritation if not discoloration; and the brim is too narrow to afford any shelter to the eyes. A soft felt hat, with a brim of moderate width, the crown rising three or four inches above the top of the head, is graceful and convenient, and leaves little to be desired in a sanitary point of view. If light in color, and light in texture, it is better for summer wear than any fabrication of straw.

The overcoat is the part of our present male attire

which most needs improvement. Of the mere dress overcoat nothing need be said. For the purpose of protection from cold and storms, all overcoats except the "ulster," or something like it, are very deficient. While they protect the chest and arms, the skirts afford little protection to the legs either while walking or sitting; and, moreover, what with linings and paddings, it is not easy to dry one thoroughly should it chance to get wet through.

The Peruvian "poncho," with certain modifications, is perhaps the best form for an outer wrap to be put on or laid aside as the occasion requires. In its simplest form it consists merely of a square piece of cloth with a hole in the center large enough for the head to pass through, the size of the cloth being such that, when thus placed upon the shoulders, it will reach nearly to the feet. Now slit this cloth down through the middle on one side, and upon the opposite edges of this slit sew a few hooks-and-eyes (which are preferable to buttons and button-holes, as more readily fastened and unfastened), and you have a garment which covers every part of the person, and may be put on or thrown off in a moment if the edges of the slit are left unhooked. Make arm-slits of sufficient length (which should have narrow flaps, capable of being buttoned over when desired), and the arms will be perfectly free when thrust through, and they will be warmly wrapped up when their use is not required. Hook the edges of the side-slit together, button down the arm-hole flaps, and you have, in effect, one piece of cloth. Fold this in the middle, and you have a Scottish shawl; fold it again, and you have a heavy carriage-rug, which may be thrown over the knees when driving. When riding, roll it into a bundle, and strap it to the saddle, and it can be unstrapped and put on in an instant, should a sudden storm arise, and its long folds will cover the whole person, limbs and all, like a military cloak.

It should be made of a single thickness of cloth, without linings or pockets to form water-bags during a storm. Should it get wet, all you have to do is to hang it over a line, and it will dry in a quarter of the time which would be needed to dry an overcoat. In traveling by railway or steamer, it may be strapped to the valise, and so be at hand for instant use; or, if packed into a trunk, it will not occupy half the space of an overcoat of half its protecting power. Such a garment is always graceful and becoming to all persons.

In fine, as far as regards clothing in a sanitary point of view, every article of dress should be of proper materials for its purpose; should be so fitted and fashioned as to present the least possible obstruction to the free action of every member and organ of the body; and the whole should be capable of easy and ready adaptation to the ever-varying changes of season, climate, and the physical condition of the wearer. And in all these respects it is just as easy to be dressed properly as improperly. All the rest may be left to the choice of the individual.

Every garment should be removed from the person and thoroughly aired at least once in twenty-four hours. Many people retain at night a part of the clothing that has been worn during the day, changing only the outer garments, especially in cold weather. If the bedroom is cold, there may be wisdom in this, at least for elderly people, young children, and those who are not robust, but in all such cases there should be an entire change of clothing at some time during the day, in a warm room.

From one day to seven is as long as any under-garment should be worn without being washed, the difference having relation less to the amount of visible impurity which the garment has gathered from dust, etc., than to the closeness of contact between the garment and the wearer's skin, and the freedom with which the wearer perspires. Thus,

if we regard merely sanitary reasons, an under-shirt should be changed more frequently than an over-shirt, although the latter will appear more soiled than the former. It is better when the outer clothing is of such material that it also can be occasionally washed, especially in warm weather. When this is impossible, particular attention should be given to having it well aired, and it should now and then be well cleaned and laid aside for a few days or weeks.

No garment, inner or outer, should, on being removed from the person, immediately be folded or rolled up, or put into a close place, as a drawer, trunk, bag, or small closet. Clothing intended for the wash should first hang for several hours in a room or large closet that is well ventilated. It may then be put into a bag and kept in any airy place until wash-day. Outer garments, after being aired, may be folded and laid away, but no garment that has been worn for many days should be closely packed with others until it has been cleaned as thoroughly as possible. Similarly, cast-off garments should not be consigned to the rag-bag without being first washed or otherwise cleaned. It seems almost unnecessary to mention so obvious a requirement, yet from the time of the prophet Jeremiah, when "old cast clouts and old rotten rags" were found in "the house of the king, under the treasury," similar foul deposits have not been wanting in close connection with evidences of wealth and refinement, albeit in these days the occasion for using them to as good purpose as was then done does not often arise.

XI.

PERSONAL HABITS.

By personal habits we mean everything which pertains to the regular routine of our usual daily life. These will of necessity vary much in accordance with the differences of sex, age, and physical condition; much also with the employments which fall to our lot. But, within certain and not very wide limits, the same general principles will apply to all.

First and foremost comes *Personal Cleanliness.* Every act, no matter what, involves the contraction or production of more or less of personal uncleanliness; and this, so far as the surface of the body is concerned, can be got rid of only by washing. A daily bath is, in general, a promoter of health. The high importance of frequently and thoroughly washing the entire body is apparent when we consider some of the functions pertaining to the skin. It is not a mere covering stretched over the body to shield inner and more important parts; it is one of the most delicately organized parts of the whole system; and among its functions is that of acting as a great excretory. It is estimated that an adult in full health takes daily into his stomach some eight or nine pounds of food and drink. Now, everything that comes into the system must go out of it in some way, and almost invariably in a condition so changed that its further presence within the body would be deleterious. Of this amount of food and drink some three or four pounds a day

are thrown off by the skin, about a pound by the lungs, and the remainder by the intestines and kidneys.

To enable the skin to perform this work it is provided with a system of minute perspiration tubes, or ducts, opening from within the body, and terminating at the surface. The total length of these ducts is set down at nearly thirty miles. If these ducts by any means become obstructed or closed up, the matter which should have been thrown off through them must either remain festering within the system, or be thrown off by the bowels, kidneys, or lungs, which thus have extra work imposed upon them. If these organs are in a strong and healthy condition, they may be able to perform this superadded work. But, if they are weak, they begin to flag, and in many cases they break down with disease caused by the extra duty imposed on them.

Now, the orifices of these ducts are continually "silting up," so to speak, with portions of this effete matter in a solid or semi-fluid state; and it is this which is washed away by ablution.

It is only the effete matter lying upon or very near the surface that is thus removed. This, indeed, usually constitutes the greater part of it. But there is almost always more or less of such deposit throughout the entire length of the ducts. This may be removed by what may be called "flushing" the ducts; that is, by temporarily increasing the flow of perspiration by means of a warm bath, and still more thoroughly by an occasional hot-air bath, vapor-bath, or any form of the Russian or Turkish bath.

These baths, however, should be used with much caution, and rarely without the advice of a physician. The intense heat causes an increase of the heart's action, which in some conditions of the circulatory system is dangerous. The general and special exhaustion consequent on excessive action of the skin, also constitute sources of danger, par-

ticularly if very frequently repeated. There is no harm in the occasional use of such a bath as a luxury by persons in perfect health, provided that suitable reaction and rest immediately follow, and in some cases it is very useful as a remedy for disease, but it is rarely necessary for the purpose of cleanliness, which is sufficiently accomplished by the ordinary methods of bathing.

For infants a daily bath is very necessary, as the action of the skin is with them even more important than with adults. For those who are not infants and who are in good health it is very desirable, and in warm climates, as well as during the heat of summer in temperate climates, is almost a necessity.

This does not of necessity involve that one should take a plunge-bath every day, though that is desirable. But, outside of the few large cities abundantly supplied with water by aqueducts, there are few ordinary dwellings where this can be attained. But in almost all places the general end can be reached by means of a bathing-tub. The English portable bathing-tub "consists of a shallow metal basin in which the bather can stand. The center, or 'well,' of the bath is about twelve inches in diameter, and about nine inches deep. This well is surrounded by a broad rim, from eight to ten inches wide, which slopes toward the center all around. In this bath the ablutionist can stand, and can wash himself from head to foot without wetting the floor, since the broad, sloping rim catches the water. To stand in such a bath as this, and from the water of the wash-hand basin to sponge the body rapidly over, and afterward to dry quickly and thoroughly, is everything that is wanted, if the process be carried out daily; and after a little while it becomes no more trouble than the mere washing of the face, neck, and hands which so many are content to accept as a perfected daily ablution."

An improvement on this bathing-tub is common

throughout New England, though for some reason not often met with elsewhere. The improvement consists in having about nine inches of the sloping rim raised to a horizontal position to form a seat on one side of the well, and supported by two legs under the outer edge. There is also a pipe running from the side of the well, near the bottom, under the seat to the top of the rim, through which, by tipping the bath upon the two legs, the water within it may be discharged into a pail without danger of overrunning the sides, as when poured over a broad, sloping rim.

A square yard of India-rubber cloth laid upon the floor answers quite well most of the purposes of this bathing-tub; and even this is not indispensable, since, if the sponge or wash-cloth be not unnecessarily filled with water, so little will reach the floor that it may easily be wiped up.

Some persons bathe too much. They have an idea that bathing is conducive to health, and think the more they have of it the better. Bathing promotes health in two ways: first, mechanically, by removing noxious and obstructive material from the skin; second, physiologically, as exercise does, by promoting the circulation of blood in the part bathed, and especially in the skin.

Like exercise, however, bathing benefits, not by its action but by the reaction. Its first effect upon the skin, and through that upon the system, is depressing. It is the physiological resistance to this depression that constitutes what we call reaction, and is attended with increased activity of the circulation.

If a person is not very vigorous, too frequent or too long-continued bathing induces a degree of depression which the system has not power successfully to resist, and reaction is imperfect or does not occur. If a bath is followed immediately, or shortly, by a feeling of weariness or of chilliness, it has done harm instead of good.

Many persons, therefore, in tolerable health, but not

very robust, will not be benefited by a daily bath, at least in cold weather. Thrice, twice, or even once weekly is as often as some can take a full bath with advantage. In most cases this is often enough to secure sufficient cleanliness of person provided the clothing is aired and changed frequently, and the extremities are often washed.

When the daily bath is an injury, it may be advantageously replaced by a brisk rubbing of the body with a dry towel, with a brush, or with the hand. It is better that this should be done by another person, if possible. Indeed, there are very few cases in which a daily bath would do harm, if the recipient would submit to be bathed and dressed by another, as is done in the case of an infant or a sick person, and if ordinary judgment were used in regulating the temperature of the water and of the room.

The proper temperature for the water of a bath is that which is most agreeable. For a vigorous person, in whom reaction is prompt and energetic, a cold bath is refreshing and useful. A cold bath is one in which the temperature is between 32° and 60° Fahr. At less than 50° the bath is very cold. Most persons will find pleasure and profit in the use of a cool bath, that is, one of 60° to 75°, during warm weather, though for some a temperate bath of 75° to 85° is preferable. In cold weather a tepid bath, 85° to 92°, is generally agreeable and safe for those who can not well bear the lower temperatures.

From 92° to 98° a bath is said to be warm. The reaction following a warm bath is somewhat different from that which follows one at the ordinary temperatures of water. It is not exhilarating, but, on the contrary, induces languor, promotes perspiration, and disposes to sleep. It is therefore better than a cold bath just before going to bed, but should seldom be taken immediately on rising in the morning, and never just before severe exercise or exposure to cold. The hot bath, from 98° upward, is similar in effect

to the warm bath, but more intense, and should be used with some caution.

The temperature of the room in which the bath is taken is important. To secure best reaction it should be about 70° for a tepid or warm bath, and never much below 60° for a cold one.

The best time for bathing is when the stomach is empty or nearly so, the worst is just after a full meal. Just after rising, then, just before one of the principal meals, and just before bedtime, are the most favorable times. A cold bath, in particular, should never be taken very soon after eating.

Exercise should have a prominent place in the list of one's personal habits. Many of our daily occupations and employments enforce an abundance or superabundance of physical exercise. The farmer who works all day in his fields, or the mechanic who toils all day at his bench, has exercise enough, so far as mere amount is concerned; but most of these acts must be performed in a stooping position of the body, whether the person be sitting or standing. The farmer stoops while hoeing and digging, while planting or earing; the mechanic stoops over his work-bench, and so on. Now, this stooping position impedes more or less the vital function of breathing. Let the person whose labor involves much stooping straighten himself up every now and then, throw back his arms, and draw a few full breaths, and then go back to his work.

But many employments involve very little physical exercise. The accountant or student does not exercise at his desk or table; the woman does not exercise in her sewing. For such persons exercise, in itself and for itself, is indispensable; and the modes of taking it are innumerable.

Walking, especially in the open air, first suggests itself. When one walks for exercise he should not plod along, with head bent down; but, with form erect and shoulders well

thrown back, he should step out with free and easy stride, the gait being very nearly the natural one, better somewhat quicker. If the walk have, moreover, some special purpose besides that of mere exercise, so much the better. If it is through a region not familiar to one, he is constantly on the lookout "to see what he can see"; if it be through a familiar region it is pleasant, and therefore healthful, to see how old things look in their new and ever-changing aspects. If the walk is along a city street, do not scruple to stop and look at the shop-windows.

Horseback-riding brings into play a set of muscles quite too little used. The mere act of keeping one's balance in the saddle brings into active though not violent use most of the muscles of legs, arms, back, and chest; while the gentle jolting of the most easy-going steed puts the abdominal muscles into more active play. For mere exercise a somewhat hard-trotting horse is to be preferred to a more easy-going one. It is none the worse if the horse is not one which the proprietor of a livery-stable would recommend as "perfectly trained," one that may with perfect safety be left to follow his own ways; one that would not start or shy if a shell should explode between his legs. The mere act of controlling and guiding a "lively" horse brings into constant and ever-varying exercise many a muscle, while there is exhilaration in the consciousness that one has the power of controlling an animal whose strength far exceeds his own.

While, however, this form of exercise is admirable in very many cases, it requires much judgment in its use. Very rapid riding and leaping are attended with too much danger to be commended on the score of health. One* who was certainly well qualified to speak on the subject of riding says, indeed, that "every horseman must expect, sooner or later, to be thrown." The probability of this accident

* Herbert, "Hints to Horse-Keepers."

is not sufficient to deter any one in ordinary health and strength from riding, but it should be taken into the account in deciding as to the advisability of this form of exercise for those who are not strong. There are many forms of weakness in which the shock from a fall, or even the excitement of looking out for one, would be a serious injury.

Girls and women, in particular, are peculiarly liable to injury from incautious horseback exercise ; partly because the action of the abdominal muscles induced by riding causes pressure on organs that are very easily injured ; partly because their mode of dress aggravates that pressure, restrains the healthful play of muscles, and is in itself burdensome ; and partly because, as some one has said, "women ride the saddle, while men ride the horse." That is to say, a woman's seat on horseback is less firm and more constrained than that of a man, and she can not have the same ease and elasticity of motion in connection with the motion of the horse as he. One of the greatest authorities* on diseases of women says that a considerable proportion of such diseases are directly due to injury received in horseback-riding.

Various exercises which may be grouped together under the designations of "gymnastics" and "calisthenics" are of high utility. They are useful as supplements to, not as substitutes for, walking and the like. The chief danger in their use is their liability to be made too violent or carried too far. It is well to climb a rope hand-over-hand ; to swing, supported only by the hands ; to put up the dumb-bells, to brandish the clubs, to skip the rope, and all that. But there is no sanitary reason why one should put himself to the test in order to ascertain how high he can climb, how long he can swing, how heavy a weight he can put up, or how many times she can skip the rope without stopping.

* J. Marion Sims, M. D.

Especially should due caution be used when the element of competition enters into the exercise. In order to outdo a competitor, or to avoid being outdone by him, one is frequently led to go beyond his strength. In such case the exercise not only defeats its own purpose, but is positively injurious. It breaks down the physical system instead of building it up.

The importance of *system* and *regularity* in all things belonging to the daily round of life is very great. All the operations of mind and body are subject to the laws of habit, and one can only maintain the highest condition of health by so systematizing the acts which necessarily occur every day that the influence of habit will be secured to effect the natural recurrence of each of these in its proper time and place.

For instance, eating should be done at regular intervals. It does not, perhaps, matter very much whether two, three, or four meals are taken in the twenty-four hours, provided that sufficient regularity has been observed in the matter to fix a habit, so that at the time of each of these meals the system demands a certain quantity of food and the digestive organs are ready to take care of it.

Sleep is so necessary that it comes to us whether we will or not, yet it is only by observing great regularity in regard to it that we can enjoy health. Habit may even have something to do with the number of hours spent in sleep, and it certainly is all-powerful in determining what those hours shall be. The best way to regulate this is to begin in the morning; that is, to rise at a regular hour. Physicians, nurses, and some others whose work is very irregular as to time, can not always do this, but the great majority of people can and should. Early rising should be a habit wherever it is practicable, for many reasons, any one of which would be sufficient. It prolongs the day, so that artificial light will be needed for comparatively few hours

—very few indeed except in winter. Daylight, even on a cloudy day, is far better for the eyes than the best artificial light. If one rises with the sun, or at most not more than half an hour later, he will soon learn at what hour to retire for sleep. He should retire early enough to afford himself all the sleep he needs, be it six hours or twelve.

Work and recreation should be well systematized, not only in order to avoid overdoing at certain times, but in order to obtain the best results at all times, and in order also to favor regularity in other things. President Day, of Yale College, lived to be ninety years old, although he had heart-disease during the greater part of his life, and it is said of him that when he was lecturing and the bell struck denoting the expiration of his hour, if he was in the middle of a sentence he would always stop as soon as that sentence was finished, and if it was not a very short one he would stop without finishing it. Another instance of his extreme regularity, which extended to all things, was related by a student who used to make the fire in the college chapel on winter mornings, and who was accustomed, after doing so, to pace up and down the room until the president arrived, in response to the tolling of the bell, to conduct the morning devotions. He was accustomed to say that after the first stroke of the bell he could invariably walk across the room a certain number of times *and a half*, before the president entered the door.

Regularity in the movement of the bowels is perhaps more important to health than in any other one thing, not excepting eating. Many painful and dangerous diseases, and a vast amount of physical weakness and misery not specified as disease, are the direct result of irregularity in this respect. Once daily the bowels should move, and, ordinarily, at no other time. This can readily be accomplished by any one in ordinary health who will set apart some one hour in the day, or rather some one period in the

order of the daily routine, such as the time of rising, immediately after some one meal, or immediately after some act which takes place at about the same time every day, go promptly to stool at that time each day, whether the desire is felt or not, and, if it can be avoided, not go during the intervening time. In the course of a few days, or at most a few weeks, a habit will thus be formed that is invaluable.

Cheerfulness, as the pervading state of the mind, should be assiduously cultivated and maintained as one essential condition to bodily health. A mind continually depressed, sooner or later induces bodily ailments. Troubles will, indeed, arise; let them be borne as best they may. They should not be aggravated by brooding over those which are in the past, or looking gloomily for those which may be in the future. Cheerfulness is to be cultivated as a constant habit, and by all innocent means: by amusements, by social intercourse, by reading pleasant books, and, in due moderation, those which are simply funny, and not in any way "instructive," in the ordinary use of the word. Or, to sum up all, one should look most upon the bright, not upon the dark side of things.

Whatever the exigencies of one's business, certain times and places should be free from it. Especially should it not be taken to the table, nor to bed. Neither should any unpleasant matter be suffered to intrude here. Meal-time should always be a time of cheerful leisure, if possible of pleasant social intercourse. To make it a scene of preoccupation and anxiety, of grudging haste, or of unpleasant inquiry and admonition, is to place a premium upon dyspepsia, while to line one's bed with balance-sheets or to make it a place for contriving ways and means, is to rob it of its office, to make it a rack of torture, from which one rises exhausted in mind and body.

XII.

HOUSEHOLD PRACTICE.

EVERY head of a family, more especially the mother of it, should be qualified to act to a certain extent as the family physician, in so far as slight cases of ordinary occurrence are concerned; and should also know what ought to be done pending the arrival of a physician should one be needed, or in circumstances where a physician can not be obtained. No one should attempt to treat serious cases independent of a physician unless it is unavoidable, as grave consequences might ensue; and every head of a family should make his choice of a physician, and not put off doing so until the moment when his services are urgently required, as it is not possible in all cases under such circumstances to make a wise selection.

There is a little work entitled "Hints and Remedies for the Treatment of Common Diseases," compiled by Dawson W. Turner, D. C. L., "Sometime Student of Westminster Hospital and of Charing Cross Hospital," and "revised, corrected, and enlarged by Twelve Eminent Medical Men, belonging to Different Hospitals in London." One of the very highest of English medical authorities pronounces it to be "the best thing of the kind ever done for the non-professional world." Considerable use will be made of this work in the chapters which are to follow. A list of the "remedies" prescribed in this book would include pretty nearly everything which a physician would be likely to pre-

scribe for a large circle of patients, and many things which would be vainly looked for in a well-equipped druggist's shop.

Our family medicine-chest shall be upon a much more moderate scale, and shall contain nothing which any well-trained person need be at a loss how to apply. It shall contain a vial of each of the following : sweet-oil, hartshorn, spirits of camphor, tincture of arnica, soap-liniment, camphor-liniment, sirup of ipecac, tincture of ginger, sweet spirits of niter, essence of peppermint, a mixture in equal parts of laudanum, spirits of camphor, tincture of capsicum and tincture of rhubarb, labeled "Cholera Mixture," and a flask of good liquor (to be used only for strictly medicinal purposes). There shall be a package of ground mustard (be sure that it is unadulterated), of chlorate of potash, of carbonate of magnesia or of soda, two of flaxseed (ground and whole), and a few seidlitz powders. Each of these articles should be kept in a close vessel of glass or tin, and these should be distinctly labeled so that there may be no mistaking one for another. There should also be a piece of sticking-plaster, a roll of soft rags for bandages and plasters, a little cotton-wool, a spool of stout thread, a soft sponge, a pair of sharp scissors, a graduated medicine-glass and a dropping tube. Every article belonging to the medicine-chest should be kept in it, and nothing else should be put there.

A list is here presented, arranged in alphabetical order, of the most common ailments in which the constant or even occasional services of the physician may not be required. It should, however, be borne in mind that almost every disease, however slight in its beginnings, may assume an aspect so serious as to require the doctor. But in such cases the treatment suggested is advisable until his attendance can be secured.

Ague.—During the cold fit keep the patient in bed,

warmly covered; try to restore warmth by rubbing the hands and feet, and by giving hot drinks, such as tea, coffee, barley-water, etc. During the hot fit, after the patient has been relieved by perspiration, check the perspiration gradually by sponging the body with lukewarm water, wiping the sweat off with hot flannels; then, in order to relieve the thirst, give cold drinks. Be careful that the patient is not exposed to a draught of cold air. The use of quinine and other medicines should be under the direction of the doctor.

Boils.—In their very beginning these can often be dissipated by gently rubbing them for five minutes, two or three times a day, with the end of the finger dipped in camphor-liniment. There is a common notion that "boils are healthy," and that they should be encouraged as purifiers of the blood rather than repressed. This is a mistake. They impoverish instead of purifying the blood, and the more they can be prevented, or the more quickly they can be cured, the better. If a boil does not yield to the treatment already mentioned, it should be encouraged to "come to a head," or point, and suppurate as quickly as possible. With this view a hot bath may be taken—a vapor-bath if possible. The boil should be dressed with a poultice made of ground flaxseed, of Indian-meal, or of anything else that is not irritating and will retain heat and moisture. The poultice should be changed often enough to avoid its becoming dry, as this renders the boil more painful and retards its progress.

An old remedy, and one that is very efficacious in hastening the development of the boil, although from the irritation it causes it is much more painful than an emollient poultice, is a paste made of soap and sugar and spread upon a piece of lint or soft rag to cover the boil, a hole being cut in the center of the covering to allow the escape of the matter.

A boil should never be squeezed or pressed. This is often done after it has broken or been opened, with the object of discharging the matter which it contains, and particularly the "core." It always increases the inflammation, however, and causes the formation of more matter. The better plan is simply to retain a poultice upon it for a day or so after the opening appears, to promote and receive the discharge.

If a boil assumes the malignant form of a carbuncle, do not trifle with it, but send for the doctor. The most obvious characteristics of a carbuncle are a somewhat darker color and greater hardness than belong to a boil, a tendency to increase in size without fairly pointing, a want of free evacuation of its contents after opening, and considerable fever and general exhaustion.

Colds.—One should avoid exposure, as far as possible, by means of proper clothing about the neck and chest. If, however, he has "caught cold," let him cover himself up warmly in bed, putting a bottle of hot water at his feet, to induce perspiration. If he has "cold in the head," so as to impede the breathing, he may cover the whole face with a blanket, breathing through it, which will most likely remove the obstruction. The essential thing is to induce perspiration. An excellent remedy for a cold in the head is to smell of camphor continuously, or nearly so, for several hours. The most convenient way of doing this is to tie up in a rag, like a "sugar-teat," a piece of camphor the size of the end of the little finger, and hold this to the nose. If this is persevered in for the greater part of a day, it will rarely fail to cure a recently contracted cold.

Cramps.—Put the patient at once into a hot bath, or, if that is not to be had on the spot, sponge him all over with water as hot as he can bear. Unclasp the hands if they are much contracted. Put a smelling-bottle to the nose, and give a little weak whisky-and-water. Put the patient into

a bed, previously warmed if possible, and let him rest. If the cramp affects only a limb, use plenty of friction, and extend the muscles during the spasm.

Corns.—Throw away the tight or ill-fitting shoes which may have been worn. Put a small poultice over the corn during the night. During the day cover the afflicted toe with a rag saturated with lard, or, better, with glycerine. Be very careful in paring corns. It is safer just to pick off the head with a knife, or with the nails of the thumb and finger.

Diarrhœa.—In ordinary cases the "cholera mixture" already described will prove very efficacious. Fifteen or twenty drops may be given to adults, in a tablespoonful or two of water, and repeated three or four times if necessary, at intervals of two or three hours. To children a proportionate dose should be given. A good way to determine the dose of this and of most medicines suitable for a child is to make the age of the child, expressed in years, the numerator of a fraction, and the same increased by twelve the denominator. The fraction will then show what part of the adult dose is to be taken. Thus, for a child twelve years old, $\frac{12}{12+12}=\frac{12}{24}$, or one half of the dose for an adult; for a child six years old, $\frac{6}{6+12}=\frac{6}{18}$, or one third of the dose for an adult; and so on in most cases down to one year of age, below which the rule fails. In all cases of diarrhœa in children under five years of age, however, a physician should be called. So should he be, in all cases occurring in old people, as well as in all severe cases, in those that are accompanied with fever or with great exhaustion, and in those where the "cholera mixture," used as above directed, fails. It is proper in every case of diarrhœa to put the patient to bed, and keep him quiet on his back. For food, let him have dry toast, tea without

milk, rice-pudding, or arrowroot; but no meat or vegetables.

Earache.—Turn the head well over on the opposite side, and having warmed a little sweet-oil in a spoon, let a drop of it run into the ear. Or, roast an onion in the oven, and when it is quite soft take out the heart and put that, warm, into the orifice of the ear; then put on a bandage to retain the heat. If earache occurs frequently, consult a physician.

Headache.—This comes from a variety of causes, and different cases require different treatment. The great majority of cases, however, belong to three principal classes, commonly known as nervous headache, sick headache, and neuralgic headache. The first variety is usually caused by fatigue or excitement, and may often be cured by a cup of moderately strong tea and a hot foot-bath. The tea will have little effect, however, on those who use it habitually. If the head is hot and throbbing, cold applications to it will be useful. Rest, in a darkened but well-ventilated room, is very desirable.

Sick headache is caused by indigestion or by some stomach disorder. It originates sometimes in an error of diet, sometimes in cold or fatigue impairing the power of the stomach to perform its work. In perhaps nine cases out of ten it can be cured or greatly relieved, in from five minutes to half an hour, by swallowing about as much red pepper as can be taken up on the point of a penknife, mixed in two tablespoonfuls of water. If the feet are cold they should be put into hot water and afterward quickly dried and warmly wrapped up. It is best to lie down. The body should be kept warm, and it is a good plan to put a mustard-plaster over the pit of the stomach. Applications to the head will generally be of very little use.

Neuralgic headache may be known by its occurring on one side of the head. It frequently affects one eye, some-

times causing it to overflow with tears. Cold applications to the head will do no good, but hot ones—as hot as can be borne—frequently give great relief. The red pepper also, as recommended for sick headache, often acts like a charm in these cases. Mustard, if used at all, should be applied over or near the seat of pain—of course not about the eye, but on the forehead, temple, or back of the neck, according to circumstances. Neuralgic headache occurs generally in debilitated persons, and indicates a low condition of the system, requiring tonic treatment, for which a physician's services should be had.

There is a form of headache caused by a cold in the head. It consists in a dull, wearisome, sickening pain across the brows, lasting usually from one to three days, due to an accumulation of mucus within a cavity in the frontal bone that communicates with the nose. No external application has much effect on it, and the best treatment for it is that recommended for a cold, particularly that of camphor.

Hives.—This disorder is usually caused by irritation of the digestive organs resulting from the presence of undigested food. In many persons it always follows the eating of certain kinds of food, such as shell-fish, honey, etc. There is scarcely an article of food known that does not in some persons invariably produce it. Others are affected with it whenever, from overeating, fatigue, or any cause, they suffer indigestion. The proper treatment is to empty the stomach by an emetic. Sirup of ipecac may be given for this purpose, in doses of one or two teaspoonfuls every fifteen minutes until it acts. After the vomiting is finished, if any irritation remains, a Sedlitz powder will commonly be all that is necessary to remove it.

Sore-Throat.—In slight cases, rubbing the throat externally with a mixture of hartshorn and sweet-oil, in the proportion of one part of the former to three of the latter, will

usually suffice. A very useful gargle for an ordinary sore-throat is made by dissolving about a teaspoonful of chlorate of potash in a glass of water. This should be used as often as once in two hours. In case of inability to gargle, a dessertspoonful of the mixture may be swallowed every two hours. Slight soreness of the throat is sometimes accompanied by a tickling, irritated, or dry feeling, which gives rise to an annoying and almost constant cough. This can frequently be allayed by letting small pieces of gum-arabic or extract of licorice (black licorice) dissolve upon the tongue. In all cases of severe sore-throat, and in those accompanied by any considerable fever or exhaustion, a physician should be called.

Stomach-ache.—In infants this is usually owing to "wind" in the stomach or bowels. Before giving any medicine, try gentle and steady rubbing with the palm of the hand, then throw the infant over your shoulder, so that the stomach will press closely against it. Very rarely will any medicine be required. Stomach-ache in older children is frequently occasioned by the eating of unripe fruit, or something of the kind. When this is known to be the case, a dose or two of sirup of ipecac will be the most prompt and effectual remedy. If the pain is not caused by the presence in the stomach of improper food, it may often be relieved by taking a few drops (five to ten drops for an adult, and a proportionate dose for a child) of essence of peppermint on a lump of sugar. At the same time a mustard-plaster or flannels wrung out of hot water may be applied over the stomach and bowels. In all cases the patient should be kept warm and quiet.

Toothache.—In all cases it is best to consult a thoroughly competent dentist as soon as may be. As a temporary measure until this can be done, if the tooth has a visible cavity, a bit of cotton wet with a drop of oil of cloves or of creosote may be inserted in it. This should be done by another per-

son, in order to avoid touching the tongue or gum, which would be made sore by the contact. If no cavity is apparent, a small mustard-plaster or any hot application may be used on the face over the seat of pain. In no case have anything to do with patent nostrums—"toothache-drops" and the like.

Vomiting.—When this is obstinate, and the stomach will retain nothing, and medical aid can not be had, keep the patient perfectly quiet upon his back in bed. Give him no food for some hours, and then only in very small quantities and at long intervals. A little milk and lime-water mixed in equal quantities will often be retained when nothing else will stay down. A mustard-plaster will generally help to quiet the stomach. It should be large enough to cover the whole of the stomach. The white of an egg beaten up with a teaspoonful of brandy and given a very little at a time, or a little arrowroot, will sometimes be retained when nothing else will.

In cases of severe or protracted illness, good nursing is as essential as good doctoring, and every child, especially every female, should be trained, as she grows up, to understand the proper care of the sick-room.

The nurse should know how to use the common remedies of the domestic medicine-chest, and especially how to follow exactly the directions of the physician should his aid be required. She should know how to prepare the foods and drinks appropriate for the sick, or demanded by a perhaps capricious appetite, or want of appetite. She should bear in mind that a sick person is in a state very different from that of a healthy one, mental as well as physical. The senses, especially those of hearing and smelling, are often abnormally acute. A sound or smell which would scarcely be noticed in health may be terribly annoying in sickness.

The windows of a sick-room should not be darkened by

drawing heavy curtains or closing the shutters, except in the infrequent cases when light is painful to the eyes. The light may be moderated, when too intense, by partially closing the shutters, or by a light screen or curtain. The patient has little to do hour after hour but to look around him, and no disagreeable objects should meet his view; none especially which can serve as constant reminders of his condition. At best he must have quite enough of these. The medicine-vials should not stand in full view upon the mantel-shelf, but upon a stand where they will be out of his sight. It is better that the utensils used for preparing food and the like should be kept in another room or in a closet. Perfect neatness should be maintained in every respect.

The nurse, and any other person who may now and then be in the room, should retain as far as possible their ordinary demeanor. There should be no tiptoeing around the room; no smothered whispering in any case. The sharp hiss of a whisper is more annoying to an ear abnormally sensitive than a quite loud tone of the natural speaking voice. A soft low voice is an excellent thing in all women, especially so in a nurse.

The patient should not be worried by being incessantly asked how he feels. Every such question sets him upon a sort of physical self-inspection; and this constant introspection is not well, even for one in health, much less for one out of health. Absolute silence in a sick-room, except when the patient is asleep or may be inclined to sleep, is not desirable. Rest and repose are the ends in view; and rest and repose are as much interrupted by an unnatural stillness as by noises.

In ordinary cases food should not be urged upon an invalid who has no desire for it. The cessation of appetite is a flag of warning which the stomach hangs out in token that it has as much food as it can digest, and wants no more. The constant urging of food upon one who has no

appetite for it, defeats the end in view. The very idea of food thus urged, although it is not present, not unfrequently becomes loathsome. One should not keep continually asking the patient if he would not like a little of this, that, or the other delicacy, although they may be quite proper in themselves. Better prepare the dish and present it nicely served upon a clean waiter. Perhaps the unexpected sight of it may incite a little appetite. But even in this respect too little is better than too much. Where nourishment is absolutely required by one who has no desire for it, the advice of the physician should be specially asked.

In every case the warming and ventilation of a sick-room should be constantly and carefully seen to. The patient will be covered by bedclothes, and the nurse will be almost constantly moving about, so that the uniform temperature of the sick-room, in cold weather, while a little higher than that desirable in an ordinary bedroom, should be a little lower than that best adapted for a sitting-room. At least twice during the day the apartment, however well ventilated, should be thoroughly aired. The patient should be well covered, and the fresh air freely admitted through the opened window. If the air is too cold, a light shawl may be placed over the head and face, serving as a sort of "respirator." When the airing is complete, the window should be closed and the temperature of the room be brought back, as speedily as may be, to its proper degree.

The face, hands, and feet should be sponged off frequently with water of any temperature which may be most agreeable to the patient. The whole body also, though less frequently, should be sponged off. If the hands, feet, or any other parts are cold, bottles of hot water may be applied as long as necessary.

The bedding and the clothing of the patient should be frequently changed and thoroughly aired, for the exhalations from the body in sickness are usually far more delete-

rious than in health. Moreover, the natural evacuations must be performed in the room—not unfrequently in the bed itself. These, however quickly removed, always leave more or less of foul and unhealthy odors behind them, which should be destroyed by disinfectants, not merely covered up by perfumes. For this purpose disinfection by iodine (as described at page 79) is specially adapted. Most disinfectants have an unpleasant odor, while that of iodine is in itself agreeable, and even positively healthful.

To sum up all: The nurse, or the member of the family who acts as such, should be quiet and gentle in manner and movement; watchful and alert, without being obtrusively so; firm and decided when necessary, without any needless display of firmness or decision; tender and sympathizing always, without parading her sympathy; cheerful and self-contained in any emergency, for which she should if possible be prepared, and, if not fully prepared, never to let the patient suspect it.

All these qualities can be fully secured only by training. Many women are naturally endowed with them in a high degree; there are few who can not acquire them to a good degree. The mother or sister who possesses these qualifications in any good degree is in a very wide sense the family doctor, and is in all respects a welcome aid to the physician.

XIII.

POISONS AND ANTIDOTES.

A POISON is any substance which, when introduced into the system, has the power of producing fatal or noxious effects by other than mechanical means. An antidote is any substance which, when introduced into the system, is capable of preventing or combating the effects of a poison. Some antidotes act chemically, by combining with the poisons, thus producing new and harmless compounds; others act physiologically, by inducing in the system effects which counteract those of the poisons.

The diversity of effects produced by different poisons renders anything like a common antidote—that is to say, an antidote useful in all or most cases of poisoning—an impossibility. To some poisons there are no known antidotes, and in most cases of poisoning, owing to various circumstances, the action of antidotes is more or less uncertain.

In all cases of known or suspected poisoning, the nearest physician should be instantly sent for, and, if possible, several messengers should be dispatched at the same moment for different physicians, as one or two may be away from home, and a delay of five minutes in going from one to another may prove fatal. The messengers should be instructed to tell the physicians on first seeing them that it is a case of poisoning, and, if the kind of poison is known or guessed at, to mention it.

Without waiting for the arrival of any of the physicians,

but at the very instant of sending for them, in every case where poison has been swallowed, with one exception, an emetic should be given. For this purpose anything that is at hand and that will produce vomiting without being in itself poisonous may be used. One who has a knowledge of drugs will prefer certain emetics, if they are at hand, as being more rapid in their action than others, or as being perhaps especially adapted to the particular poison that has been swallowed. If this knowledge does not pre-exist, however, there is no time to acquire it, and in domestic practice a teaspoonful of ground mustard or a tablespoonful of salt stirred into a cupful of lukewarm water will generally prove the readiest emetic, and a very safe and efficient one.

Whatever emetic is used, its action should be assisted and the poison diluted by drinking large quantities of lukewarm water. The drinking of the water and vomiting should be repeated at intervals of five or six minutes for at least half an hour or until a physician arrives.

It is to be borne in mind that some poisons diminish the susceptibility of the stomach to emetics, so that these may fail of effect. Also, some persons are naturally unsusceptible to emetics. In all such cases recourse must be had to other means of inducing vomiting, such as tickling the inside of the throat with a feather or with the finger thrust in through the mouth. Speedy and persistent vomiting is the one thing to be sought by any possible means. In these cases, as well as in others, the warm water should be freely drunk, as a dilutent.

The one exception to the rule of giving emetics and of diluting the poison with water, is when sulphuric acid has been swallowed. This substance has the curious property of producing, when mixed with water, a degree of heat equal to or greater than that of boiling water. For this reason water and all mixtures containing it must in this

case be withheld, and vomiting must be provoked by other means, as recommended in cases where emetics fail to act.

Emetics may be considered as antidotes, in one sense, to poisons in general, since they tend (by discharging) to prevent the action of the latter, but they are not generally so classed, nor are they to be depended on alone. In all cases where special antidotes are known, their use is to be conjoined with that of emetics. In most cases it is best to give the antidote at once, without waiting for the action of the emetic to be finished, in order to neutralize, as far as may be, the effect of the poison while the latter remains in the stomach ; and after the vomiting has ceased the antidote should be used again, in order to prevent, if possible, the action of any poison that may have passed beyond the stomach.

Poisons act in one or more of the following modes : 1. By a direct local corrosion of the stomach and alimentary canal ; this is the case with most mineral poisons. 2. By a general devitalizing action, when they have been introduced into the system through the blood. 3. By a specific derangement of the functions of one or more organs, accompanied by little or no apparent change in the tissues of the organs themselves.

Poisons are derived from the animal, vegetable, and mineral kingdoms. It is a common error to suppose that vegetable poisons are less injurious than mineral ones. The fact is the very reverse. The most deadly poisons (such as prussic acid and strychnine) are vegetable. The announcement in respect to innumerable quack medicines that they are "purely vegetable," or that they "contain no minerals," is utterly misleading, and not unfrequently a gross imposition.

ANIMAL POISONS.

Chief among these is the virus of venomous reptiles and insects, conveyed by their "bite," as it is erroneously called, or by their sting. Serpents and insects do not bite at all; they stab, with poisoned weapons. In temperate regions venomous serpents are not numerous in species, and in settled regions they have been pretty nearly exterminated except within very limited localities. In tropical regions they are far more numerous in species and more prolific in individuals. Serpent-poisons have this peculiarity, that, while exceedingly dangerous when introduced into the circulation through the blood, they may be taken into the mouth, or even swallowed, with perfect safety, provided always that there is no sore, cut, or abrasion of the mucous membrane; so that one may suck out the virus from the wound occasioned by a "snake-bite," either upon his own person or upon that of another, provided always, as just stated, that there be no sore, cut, or abrasion of the lips, tongue, or mouth. Good sense, of course, indicates that the poison should not be swallowed, but spat out at once. The same is supposed—rather from analogy than from well-verified experiments—to be the case in respect to the virus of a rabid dog, which produces hydrophobia.

In case one has been bitten by a venomous serpent (say a rattlesnake), the first thing to be done, in case (as is most usual) the wound be upon a limb, is to apply a ligature very tightly *above* the wound, that is, between it and the body, in order to prevent the further circulation of the poison through the system by the arteries and veins; then the venom is to be sucked out from the wound. After this the wound, which will probably be much inflamed, should be treated like any ordinary wound, only that there should be no effort to close it up speedily; it is better that it should be left running for a while. The further treatment is purely

medicinal, aiming to counteract the effects of the poison already introduced into the system. It seems to be well settled that whisky or other strong alcoholic liquor, taken even in quantities which would be dangerous in any other case, acts as a powerful agent in counteracting the effects of a snake-bite. Probably altogether fictitious are the stories which we read, that there is an herb known to the mongous—the great serpent-destroyer of India—which is a perfect antidote to the venom of even the cobra, the most dreaded of all the serpent family.

In case of being bitten by a dog known or supposed to be rabid, about all that can be done is to suck the wound, and then cut out or cauterize the adjacent parts. One can rarely do this for himself, and it is probably safer to leave it to be done by a surgeon, since the virus, whatever it may be, is one which is very slowly taken into the system. Weeks always, months not unfrequently, and years sometimes, it is said,* elapse after the wounding before the effects manifest themselves in the form of hydrophobia. No time should be lost, however, in getting the surgeon's help. It should be borne in mind that it by no means follows, from the fact that a dog has bitten any one, that the animal is rabid. The wound inflicted by the teeth of any dog, or indeed of most animals, man not excepted, is more severe than a similar wound by a cutting or piercing implement.

The "bites" and stings of insects, such as bugs, fleas, mosquitoes, wasps, hornets, and bees, may properly be classed among animal poisonings; since, although they are not fatal or even dangerous except in very rare instances, they are often annoying to the last degree. When one has been stung by a bee or wasp —the former of which can not

* The best authorities generally place the shortest and longest probable periods at one week and one year respectively, holding that outside of these limits it is scarcely possible the disease can occur.

withdraw his poisoned barbed weapon from the wound it has inflicted—the sting should be carefully extracted, if it remains, by a pair of tweezers or otherwise. The best application to relieve the pain, and one that is always at hand, is ordinary mud, made quite wet and allowed to remain on the wound until dry. The irritation occasioned by the "bite" of a bug or mosquito may be greatly alleviated by the application of hartshorn to the place. This is also useful for the stings of bees, etc.

A perfect preventive of the attacks of these insect pests would be a great boon to humanity. Many have been proposed, and used with more or less success. Mr. Dawson Turner proposes a very simple one, which he declares to be absolutely unfailing, and he certainly speaks from wide experience. "I have traveled," he says, "in many flea-bitten, bug-bitten, and mosquito-bitten countries. In Jerusalem, during the height of summer, I have seen my bed pretty well alive with fleas, and have swept them out with my hands before going to bed; in the excavations in Mount Moriah, I have seen my clothes pretty well covered with them; in Athens I have seen, at early dawn, the bugs leaving my bed, and crawling up the bed-posts by scores; and in neither place was I bitten once.

"I adopted," he continues, "the following preventive, formed on what I had heard of being done in Hungary, a land much vexed in the summer-time by fleas and so on: I oiled myself all over, from head to foot, with sweet-oil (olive-oil). Rub the oil well in with the palm of your hand, over the whole body, head, face, and all, in a warm room, and you may (such is my experience, and without this precaution I am a martyr to fleas) defy either flea, bug, or mosquito. It is quite a mistake to suppose that oiling one's self with sweet-oil is a nasty operation. The oil sinks into the skin at once, and does not stain either cotton or linen. The only effect is that you feel lithe and supple, and

it enables you to defy the sanguinary attacks of your crawling, creeping, flying, and skipping enemies."

VEGETABLE POISONS.

The most deadly of all poisons is *prussic acid.* It is contained, in small quantities, in the bitter leaves of many plants—tea included. A few drops taken into the mouth cause death almost instantaneously. In the concentrated form it is never found except in the laboratories of chemists, though dilutions of it are sometimes used as medicine. It exists in considerable quantities in the pits of peaches and plums, and especially in bitter almonds. Children sometimes seriously poison themselves by eating large quantities of these. The chief symptom of poisoning by prussic acid in small quantities is a partial paralysis. The treatment is, to administer a rapid emetic to empty the stomach, followed by friction of the hand, and the application of ammonia to the nostrils.

Scarcely less dangerous is *strychnine* (produced from the nux vomica, which is sometimes used in medicine). Strychnine is often employed to poison prowling dogs, cats, and other animals of which it is desirable to get rid. Its taste is so intensely bitter that the poison must be hidden in a piece of meat, so that the animal will have swallowed it before he is aware of the bitter taste. The symptoms of poisoning by strychnine are, violent cramps in the stomach and limbs, twitching of the muscles, spasm of the throat rendering breathing difficult, inability to walk or stand, locked-jaw in most cases, and in fatal or very severe cases the most frightful convulsions. The suffering is horrible. No certain antidote is known, but strong green tea has been thought to be useful, and several cases have been reported cured by tea made of tobacco. Lobelia would probably be of service also. The main dependence, however, must be on the prompt action of emetics.

Opium, either in its solid form or in alcoholic tincture (such as laudanum and paregoric), or in one of its extracts (morphine), enters largely into medical practice. In one or more of its liquid forms (laudanum, paregoric, Godfrey's cordial, Bateman's drops, soothing-sirup, etc., etc.), it has, in too many instances, a prominent place in household medicine, where it should always be "conspicuous by its absence." The special characteristic of opium-poisoning is the stupor which it induces. The sleep is very heavy, usually accompanied by snoring and by a puffing out of the cheeks and lips as the breath passes through them. The pupils of the eyes are contracted to mere points. As in other forms of poisoning by the stomach, the first thing to be done is to induce free vomiting, but this is sometimes difficult or impossible, because the opium deadens the sensibility of the stomach and throat as well as of other parts. After the vomiting, or even if that can not be effected, the one thing to be done is to keep the patient awake by any means and by all means. He should be made to drink strong black coffee, the stronger the better. If necessary, he should be beaten, pinched, sprinkled with cold water; should be kept walking about, held up, if need be, by a strong man at each shoulder, for several hours. He must not be allowed to go to sleep until the effects of the opium have passed off. If he falls asleep, the odds are great that he will never awake.

Mushrooms.—When poisonous mushrooms have been eaten, the symptoms sometimes appear very shortly and sometimes not for several hours. The symptoms also differ considerably in different cases. In some there are at first drowsiness, giddiness, and dimness of vision, followed by pain and heat in the stomach, vomiting, and purging. In others the drowsiness does not appear, but the pain, vomiting, and purging are the prominent symptoms. In all cases there is great debility. Fainting frequently occurs, and

sometimes convulsions and delirium. It is not usually difficult, however, to determine the cause of the disorder, for the fact of mushrooms having been eaten will probably be known, and usually several persons, having eaten them at the same time, will be affected simultaneously. The drowsiness produced by poisonous mushrooms differs from that of opium in being accompanied by dilated instead of contracted pupils. No antidote is known, and the treatment should aim at getting rid of the poisonous material as speedily as possible. For this purpose, after the usual emetic, free evacuation of the bowels should be encouraged by frequent doses of Epsom salts or Glauber's salts, and by the use of large, stimulating injections. If fainting or very great exhaustion occurs, small doses of brandy or whisky, diluted with water, may be given.

Poison-ivy, wild-parsnip, and various other plants, are liable, when handled, to produce poisonous effects on the skin of many people. Some persons are so susceptible to their influence, that to pass by where they are growing is sufficient to get the poisonous effect. It is said that those which are perennial, as the poison ivy, are more virulent in spring or very early summer than at other seasons. The susceptibility to these poisons seems to increase by familiarity with them, and it is not uncommon to find persons who at one period of life can handle the plants with perfect impunity, and at a later period are very readily poisoned by them.

For slight cases of this form of poisoning little or no treatment is necessary. Cooling applications, such as lead-water or baking-soda dissolved in water, sometimes afford some relief from the troublesome itching and heat of the skin. These remedies, however, although in common use for this purpose, are not very efficient, and in all cases of any severity it is better to use the following prescription, which any druggist will prepare in a few moments, and which acts like a specific in these cases :

Take of borax, in powder, two drachms; acetate of lead, in powder, one drachm; tincture of lobelia, two fluid ounces; tincture of belladonna, one fluid ounce; water, sufficient to make one pint. Mix. Write, "POISON. For external use only."

Cloths kept wet with this mixture should be laid over every part that is affected with the poison. A cure will generally be obtained in from one to three days, and very great relief commonly follows the first application. As the remedy is a dangerous poison if swallowed, it should not, for fear of accident, be kept in the house except when actually wanted for use, but any portion remaining after the patient recovers should be thrown out. This is a proper rule to observe in regard to prescriptions generally.

In case any of these poisonous plants have been eaten, an emetic should be given at once, as in the case of other poison taken into the stomach. The after-treatment will be in the hands of the physician.

MINERAL POISONS.

It is to the various mineral poisons, almost exclusively, that there are any known "antidotes," in the proper sense of the word. Very many minerals are poisonous, both in their natural state and in their various compounds. The common metals, such as iron, copper, lead, tin, and zinc, are not poisonous in their metallic shape, but several compounds of all of them, which are in common use for various purposes, are highly poisonous.

We shall enumerate the most common of these poisons and their antidotes, and set forth the general treatment to be adopted in their case. The reasons for the use of the several antidotes, and for the modes of treatment, need not be detailed. The course recommended is in every instance such as is prescribed by unquestioned medical authority. It must be premised that the stomach should first of all be

emptied of its contents. The stomach-pump is the speediest and most effective means of doing this, but, as this will not be likely to be immediately at hand, recourse must be had to producing speedy vomiting by the means already described.

For *arsenic* and its various compounds, such as "Paris green," "London purple," "Fowler's solution," "Donovan's solution," etc., the best antidote is oil or melted fat, followed by magnesia-water or lime-water in large quantities, to be kept up until vomiting ensues.

Antimony and its compounds, including tartar emetic, require astringent drinks, such as a decoction of oak-bark, nut-galls, or very strong green tea. *Corrosive sublimate* (often used to poison bed-bugs) and other mercurial poisons are best treated by beating up the whites of a dozen eggs in two quarts of water, and letting the patient swallow as much as he can every three minutes. Milk is the next best antidote; flour-and-water may be useful; and even warm water is better than nothing.

Iodine, or *iodide of potassium*, requires large draughts of flour-and-water or starch-and-water, and afterward vinegar-and-water. *Lime* and *baryta* require a solution of Glauber's salts, or diluted sulphuric acid.

Nitrate of silver ("lunar caustic"), the chief ingredient of "indelible ink," and also of most hair-dyes, demands salt water to be drunk until vomiting ensues.

Oxalic acid (known as "salts of lemon," used for removing ink-stains, iron-rust, etc.) requires pounded chalk in water; strong soap-suds is a tolerable substitute.

Phosphorus is sometimes nibbled by children from the tips of matches; it requires magnesia, with copious drinks of gum-water—gum-arabic, preferably.

Potash, or *lye*, *soda*, *saleratus*, *ammonia*, and most other alkalies, may be neutralized in the stomach by any acid, such as vinegar, lemon-juice, or even tomato-juice; or

any non-poisonous oil, such as castor-oil, sweet-oil, linseed-oil, melted fat of any kind, etc., may be used as an antidote. The strong alkalies commonly cause violent inflammation of the throat and stomach, with partial destruction of their lining membranes, conditions that will require special treatment after the poison has been got rid of.

Copper forms several compounds of a very poisonous nature, such as "verdigris," often used as a green paint, and "blue vitriol," used in dyeing. Copper unites so readily with acids that great precautions should be taken in its use for household purposes. Pickles and other sour articles should never be made or kept in copper vessels. It is safer not to use any cooking utensils of copper. Water, however, may be safely boiled in copper vessels, provided they are clean. The best antidotes for copper are white of eggs and milk. Vinegar and other acids must *not* be given.

Lead is, in its various compounds, one of the most dangerous of metallic poisons. From the facility with which it may be drawn into pipes, and the ease with which these may be bent into any form, it is mainly used in plumbing. Most drinking-waters contain ingredients, harmless in themselves, but forming poisonous compounds with lead. These either impregnate the water passing through the pipes, or adhere loosely in the form of scales to their sides, from which any sudden jar detaches them. Water-pipes should not be made of lead unless lined with tin. Lead is a constituent of many paints, such as white lead, red lead, and chrome-yellow, all very poisonous. Lead is a very insidious poison, since it accumulates in the system for a long time until it has attained a dangerous quantity. Painters are liable to a very painful disease known as "painter's colic," often accompanied by paralysis. Lead also in the form of acetate of lead ("sugar of lead") is a leading ingredient in various "hair-colorers," claiming to be wholly "vegetable," the frequent use of which has been known to

produce paralysis. The glazing of earthen pots contains a large proportion of lead, and, when glazed earthenware is used to hold pickles or other acid articles of food, even including milk that is allowed to stand until it becomes sour, a dangerous quantity of the lead is dissolved by the acid. Many fatal cases of poisoning have occurred in this way. The one specific for lead-poisoning is sulphuric acid, but this should always be administered under the direction of a physician. Other acids will do harm instead of good, and therefore domestic practice should be chiefly confined to getting rid of the contents of the stomach when it is known that any of the poison is there, as in cases where acid food has been eaten from glazed earthen vessels, etc. In case a physician is not immediately at hand, Epsom salts or Glauber's salts may be given as soon as the emetic has acted. In the cases of gradual poisoning from lead pipes, hair-dyes, etc., nothing is likely to be gained by vomiting, and the case will be always in charge of a physician.

The Mineral Acids.—These are strong corrosive poisons. They produce a burning sensation in the throat and excruciating pain in the stomach. When swallowed in their concentrated form they cause immediate and violent vomiting. The lining membrane of the mouth is commonly white, sometimes yellowish or brown. It is softened and more or less corrugated, presenting the appearance of a skin that has been long soaked in water. The abdomen swells, there are hiccough and eructation of gas, and blood is often vomited. Alkalies are the proper antidotes for all these acids. In case of nitric or oxalic acid, the alkalies to be chosen, if possible, are lime and magnesia, the former in the form of lime-water or chalk, or the latter in the form of carbonate of magnesia or calcined magnesia. In case of sulphuric, muriatic, or almost any other strong acid, lime, magnesia, potash, or soda may be used, according to convenience. Baking-soda is very efficient, and usually

close at hand. Weak lye, or sal-soda dissolved in considerable water, is sometimes available when other alkalies are not. In the absence of anything more suitable, strong soap-suds may be used. The caution already given in regard to sulphuric acid should be remembered, not to give water when this has been swallowed in its strong form, until after it has been vomited.

Alcohol.—This substance does not belong, in strictness, to any of the three divisions named. It is capable, either in its pure state, or in the form of any distilled or fermented liquor, such as brandy, wine, or beer, of acting as a poison when taken in large quantity. The symptoms of drunkenness are unfortunately familiar to all persons. When the effects of alcohol pass beyond this stage, there is drowsiness. In severe cases this becomes a very profound stupor, similar to that observed in cases of opium-poisoning, except that generally the pupils of the eyes are dilated. The pulse, at first very frequent, usually becomes slow and feeble. The breathing is slow and difficult. Apoplexy and paralysis sometimes occur. Death may take place from the direct effect upon the brain, from congestion of the lungs, or from a stoppage in the throat. There is no direct antidote, and the chief dependence must be on emetics. Their action should be encouraged as much as possible by warm water. Large injections of salt and water should be thrown into the bowel. If the face is flushed and the head hot, the head and shoulders should be raised very high or the patient should be held erect, and cold wet cloths should be applied to the head and frequently renewed. The extremities should be kept warm by friction and artificial heat if necessary.

XIV.

ACCIDENTS AND EMERGENCIES.

A LARGE proportion of common accidents and emergencies will not require treatment from the physician or surgeon; and, even in the case of such as do require it, much may usually be done while awaiting his arrival. Such of these as are likely to occur are here arranged in alphabetical order, with their modes of treatment.

Bleeding at the Nose.—Place the patient flat upon his back, with the arms stretched back to their full length; unloose the neck covering and apply wet cloths to the back of the neck. If the bleeding still continues, apply ice or the coldest water that can be had to the back of the neck, and put into the nostril a plug of cotton steeped in a strong solution of alum and water or well dusted with powdered alum. The old prescription of a "cold door-key" to the spine is very sound, but any other large piece of cold metal is just as serviceable. If the blood runs down the throat, it will be necessary to turn the patient upon the side or even upon the stomach, or to support him in a sitting posture, with the head inclined slightly forward.

Bleeding from the Lungs.—A celebrated teacher of medicine, addressing a medical class on this subject, said, "For fear that you may be tempted to do something else, hold the basin to receive the blood." This means that, while the hæmorrhage is active, very little can be done directly to check it, and that there is danger of doing harm

in efforts to relieve. The most important indication is perfect quiet. The patient should lie down and avoid speaking and all unnecessary motion. There should be no bustle or excitement of any kind in the room, and only those persons should remain in or be admitted to it who are useful and necessary as attendants. It should be remembered that, although these cases appear very frightful, they seldom involve any immediate danger to life. The clothing should be loosened at the neck and waist. Doors and windows should be opened to admit plenty of fresh air. No medicine can reach directly the seat of the trouble, and therefore many remedies which in other forms of hæmorrhage are serviceable by coagulating the blood around the ruptured blood-vessel are of no use here, and may even add to the distress and danger by forming clots in the throat. Salt has been thought by some to be beneficial in many cases, however, and if the patient can swallow without difficulty there is no objection to its use. Or, he may drink a little cold water and vinegar. If the bleeding is from the throat instead of the lungs, it will be useful to sip slowly a strong solution of alum in cold water. In all cases a doctor should be sent for at once.

Bruises.—Use warm fomentations, flannel dipped in warm water laid over the part, or a bread-and-water poultice. A lotion of tincture of arnica and water—one part of arnica to ten of water—is an excellent application.

Burns and Scalds.—Very slight burns and scalds require only slight treatment, little more than merely wetting with cold water or baking-soda dissolved in water. A very good application when there is considerable redness and pain is composed of equal parts of sweet-oil and lime-water. Baking-soda will answer in place of lime. If a blister forms, prick it just under the skin, and just outside the blister, so as to let off the water. The puffed-up epidermis will then fall down into its place ; do not remove it,

but let it remain until it drops off itself. If the burn or scald is very large or so deep that the skin itself is removed, apply a plaster of common kitchen whiting mixed to the consistency of paste with oil, or even water, about an eighth of an inch thick. Flour will answer instead of whiting, but not as well. Cover the plaster with a piece of cotton cloth or flannel, and keep it soft by the application of oil or water. Bits of rag, or a piece of cotton-wool, dipped in oil, will serve the same purpose—that of excluding the air, but not as well. The dressing should be removed only as often as necessary to clean the wound; when this has been done, wash the surface with a weak solution of carbolic acid, and apply a fresh dressing. Be careful not to break the blister if it can be avoided. If the burn or scald be very severe, involving a great shock to the system, and especially if it be internal, occasioned by swallowing hot water or steam, it is emphatically a case for the doctor.

Clothing taking Fire.—Above all things, keep as cool and collected as possible. Do not run, as the motion only fans the flame; but lie down on the floor, and crawl or creep until you can reach a blanket, woolen shawl, or bit of carpet, in which wrap yourself and thus smother the flames. Those who are much about an open fire should wear woolen clothes while so engaged. This should be especially observed in the case of young children.

Cuts and Wounds.—These frequently contain particles of dirt, shreds of clothing, fragments of wood, glass, iron, etc. The first thing to be done, in case no large blood-vessel has been divided, is to examine for such substances, and, if any are found, to remove them by careful picking and thorough washing with cold or tepid water. Cold water is better if there is much bleeding. All that is necessary beyond this is to bring the edges nicely together and fasten them so. For this purpose, if the cut is a small one

with clean edges that do not gape much, simply binding a rag upon it is sufficient. If it is larger and shows a tendency to gape, a few narrow strips of sticking-plaster, applied crosswise of the cut, will commonly answer the purpose. These should always be drawn very tightly across the wound, to allow for their stretching and for the gradual slipping of the skin under them. If a cut is large and deep, or if from its position it is difficult to retain the edges in perfect contact by plaster, it will be necessary to take one or more stitches with a needle and thread, but no one who is not familiar with this operation should undertake it.

Applications of tobacco, spirit, arnica, liniment, etc., should never be made to a fresh cut. They all irritate, and lessen the chance of healing without a scar. If the edges are rough and jagged, and especially if the part is much bruised, neither plaster nor stitches will be likely to hold the wound together, but there will be more or less suppuration (formation of matter) before healing takes place. In such cases a little carbolic ointment may be applied, or a poultice of bread and milk or linseed-meal may be useful to encourage the suppuration and keep the part from becoming dry and painful. But such cases should be treated by a physician. If pus (matter) forms in any wound that is closed by plaster or stitches, these must be at once removed sufficiently to give free drainage.

When bleeding is troublesome, if no large blood-vessel has been severed or punctured, the bleeding may generally be most effectually stanched by laying a cobweb over the wound. The blood will coagulate in the meshes of the cobweb, and form an air-tight covering, or scab, under which the wound will heal nicely; do not remove this scab, but let it remain until it drops off itself.

But if a large blood-vessel, especially an artery, has been cut or pierced, the case becomes a serious one, and not a moment should be lost. It may be readily ascertained

whether the flow is from a large vein or from a large artery. Venous blood is of a dark, purplish color, and comes out in a continuous spurt or stream. All that in this case will be immediately necessary may be to put a plug of lint—if possible steeped in a solution of tannic acid or other astringent—into the wound, and bandage it tightly and strongly. Arterial blood is of a bright red, and comes out in jerks. If it be an artery that has been wounded, it is well that some one should press his thumb or finger strongly upon the artery just above the wound, so as at least to check the flow of blood. As soon as it can be done, tie a handkerchief, or some other stout bandage, *above* the wound (supposing it to be in an arm or leg), that is, between the wound and the body, insert a stick between the knot and the limb, and twist this around until the bandage is tight enough to compress the limb so as to completely stop the flow of blood. Then, after washing the blood from the wound, apply a thick pad, securing it by a bandage. The pad should be composed of layers of lint, muslin, or linen, the smallest next to the wound, each succeeding layer being somewhat larger than the one below it, until the pad is an inch thick over the wound. When the surgeon comes, he will replace the twisted handkerchief by a regular tourniquet.

Drowning.—The time during which a person can remain under water, without being absolutely drowned, is somewhat uncertain. Within very narrow limits — not more than a few minutes at most—it varies with different individuals. But persons apparently drowned, in whom there was no visible sign of life, have been resuscitated after a much longer period—several hours in some well-authenticated cases. When a person, apparently drowned, is brought to the shore, the first thing to be done is to strip off his wet garments, replace them by dry ones, wrap the body in warm blankets, place bottles of hot water under the arm-pits, at the calves of the legs, and at the soles of

the feet; keep up a constant rubbing, especially of the hands and feet, with the warm hand and hot flannels.*

Meanwhile, and as soon as possible, persistent efforts should be made to bring the lungs to the exercise of their natural function of breathing. This is the essential thing, without which everything else will be of no avail. Lay the body face downward, with one arm under the forehead, to facilitate the discharge of any water that may have been swallowed. The old methods of holding the body up by the feet, and rolling it upon a barrel, are wholly inadmissible; they would be quite sufficient to kill a well person, to say nothing of one who at the best is just hovering between life and death. To start the action of the lungs, Dr. Marshall Hall directs that, as soon as the water has been discharged, pressure should be made along the spine in order to expel the air from the lungs; then turn the body almost over upon its back, keeping the mouth open so that the air will rush in to fill the vacuum produced in the lungs; then turn the body back upon the face, and then again upon the back, pressing upon the spine as before, and repeating the whole operation every three or four minutes. Or, as suggested by Dr. Sylvester, stand behind the head, the body still upon the face; take its two arms, draw them sharply up above the head, so as to put the muscles on the stretch and draw the ribs apart; then press down the elbows against the sides, thus making the air enter and again come out, and so imitating the natural process of breathing. Do this slowly and steadily, about twenty times a minute. Both methods may be used alternately, each for some little time. Bellows have sometimes been used for the inflation of the lungs, but this is open to grave objections. The nostrils may be occasionally tickled with a feather, or hartshorn or snuff may be

* Some authorities say that heat should not be employed at all, but that the body should be kept cold, and in a cool place. But the weight of authority is altogether in favor of the employment of heat, as above.

applied to them. Do not abandon all hope for at least four hours.

Eye, Ear, Nose, and Throat, Foreign Substances in.— Do not attempt to remove any dust, coal-ash, clinker, etc., which may have entered the eye, by rubbing it; you will probably, if it is a hard body, force it still more deeply into the soft external coatings of the eye. Close the lid at once; then take hold of the upper eyelashes, or get some one to do it for you; draw them forward, so as to drag the lid from the eye, and if the substance be not a sharp one, a flow of fluid from under the lid will probably wash it away. A very good way is to souse the face in a basin of lukewarm water, repeatedly opening and shutting the eyes; quite probably, the substance, if it be not a hard one, and imbedded in the eye, will be washed out; but if you have reason to suppose that it is a bit of lime, do not wash the eye at all with water; but use instead a weak mixture of vinegar and water. If neither of these procedures is successful, get some one to take hold of the upper eyelashes, open the lid and search closely for the intruder; if it is not discovered there, let him in like manner try the lower lid. If the substance is found, let him gently brush it away with a camel's-hair pencil or the feather of a quill; or, if that be not stiff enough, use a small, smooth bit of soft wood. If he does not succeed, go to the doctor or an oculist. If there be painful inflammation after the removal of the substance, the best thing is to drop a little castor-oil or olive-oil into the eye.

Insects of various kinds occasionally creep into the ear, causing serious annoyance and pain, and sometimes endangering the sense of hearing. The best way to deal with such an intruder is to turn the head over on the opposite side and fill the ear with oil. Frequently this will dislodge the insect at once, and, if not, will prevent it from doing any harm.

Children sometimes thrust small objects into the ear or nose. If these are pointed, angular, or irregular in shape, like bits of wood, there is generally not much difficulty in extracting them with a pair of small forceps or tweezers. Round bodies, however, such as buttons, cherry-stones, and pebbles, are often very difficult to remove. In such a case great care must be taken not to force the object farther in by the efforts to dislodge it, especially if it is in the ear, as it might readily produce permanent deafness by being pushed through the tympanum. It is better, if the body can not readily be removed, to leave it until a physician can attend to it, or even until it becomes loosened and comes away of itself. Sometimes such a body in the nostril can be dislodged by blowing the nose, the other nostril being closed; or it may sometimes be pushed back so as to come out through the mouth, but only a physician should attempt the latter procedure.

In case of a bone or other hard substance lodging in the throat, it will commonly excite coughing, which should be encouraged with a view of dislodging it. If this fails, sometimes another person may be able to see and remove it through the mouth. If it is a small object, such as a fish-bone, and can not be so removed, it may perhaps be carried down into the stomach by swallowing a mouthful of bread-crumb, or it may be pushed down with the finger. Sometimes such a body is drawn into the windpipe, where its presence may be known by continued obstruction to breathing and frequent frightful attacks of coughing and gasping for breath. In every such case the patient should lie down and keep as quiet as possible until the arrival of a surgeon who should be sent for at once.

If pins or other small, pointed bodies have been swallowed, there is nothing to do but to wait the result. In most cases they do no harm, but, if they do, there is no means of preventing it. Emetics and cathartics *should not* be given.

Fainting.—Lay the person flat on the back, and do not raise the head. Loosen the clothing at the neck and waist. Have as much fresh air as possible, and prevent people from crowding around. Apply ammonia, smelling-salts, or some other pungent substance to the nostrils. Sprinkle the face, and, if needful, the neck and chest, with cold water. For slight faintness, put the person in a chair, bend down his head until it is nearly on a level with the pit of his stomach, and the sensation of faintness will probably pass off in a few seconds.

Fits.—When a paroxysm seems to be coming on, it may often be warded off by placing a smelling-bottle to the nose. If it does occur, unloose the clothing of the neck and chest, and take off the shoes; give as much air as possible, and bathe the forehead with cold water. To prevent the tongue from being bitten, place a large cork or piece of wood wrapped with several folds of cloth between the teeth. Put the feet into hot water, and apply a strong mustard-poultice to the back of the neck. Put the patient to bed as soon as possible. During the convulsions do not hold the limbs tight; restrain, but do not violently oppose his struggles. After the fit has passed away, the diet should be of the very lightest—beef-tea, toast, rice, chicken-broth, milk, tea, and the like.

Falls of Young Children.—Some one has said that it is a providential arrangement that babies' heads are large, heavy, and soft, to serve as cushions for their frequent falls. Infants, in falling, commonly strike the head first, and it is a fact that when they do so strike they are rarely seriously hurt, because the bones of the head are not firmly united, and the brain thus has space in which it can adapt itself to pressure. The bones and joints throughout the bodies of young children, however, from their soft and imperfect condition are peculiarly liable to injury. When a young child falls upon its head, therefore, if it cries lustily

and there is no appearance of great injury, little concern need usually be felt; but, if it falls heavily upon its back, shoulder, or hip, it should be examined carefully to ascertain the exact extent of the injury, and if, after a few hours, any soreness remains in a joint thus injured, the child should be placed in the care of a physician, otherwise a crooked back or a deformed shoulder or hip may be the life-long penalty.

Fractures and Dislocations.—A fracture is a break of any kind in a bone. A dislocation is the slipping of a bone out of joint. A fracture may occur close to a joint, and there is often difficulty in distinguishing between such a fracture and a dislocation. As a rule, in case of a fracture, the part admits of freer motion than is natural, and in case of a dislocation there is commonly much less motion than is natural. Frequently the projection of the ends may be seen or felt through the skin, and these by their form and position may determine the character of the accident. The injured limb should be carefully compared with the corresponding one on the other side, in order that any differences may be observed. In either accident the limb is liable to be shortened, though this does not always occur, and in a few cases of dislocation it may be lengthened. When a fractured bone is moved, the fingers being clasped closely over it, a peculiar grating or rasping may often be felt by the examiner. In a few cases, owing to the swelling of the part or to other circumstances, it is impossible for the most skillful surgeon to determine whether a fracture or a dislocation has or has not occurred.

In every case where either of these injuries is known or suspected, a physician should see it at the earliest possible moment, for, although in many cases a few hours more or less will make no difference in the results, there is always danger that swelling may occur to such an extent as to hide the real nature of the injury, and to make its treatment

difficult and unsatisfactory. No one except a thoroughly qualified physician should attempt to treat any such injury. If a bone of a finger or hand, or one of the bones of the fore-arm, only, has been broken, or if there is a dislocation in the upper extremity not higher than the elbow, the patient may go to the doctor if that is preferred, the arm being supported by a sling. Otherwise the doctor must come to the patient. In fractures other than those mentioned, the patient should be laid on a hard bed, in a position the most easy for him, which will depend upon what bone is fractured. If an *arm* is broken, whether above or below the elbow, it rests most easily half bent upon a pillow; if a *leg*, it rests best upon the outer side, with the knee bent.

Frost-Bites.—First and chiefly, do not approach a fire or enter a warm room. If snow is to be had, keep it constantly applied to the frozen member; if snow can not be had, use cloths wet with cold water, and thus thaw out the frozen part gradually. A member frozen stiff, and quickly thawed out, is almost sure to gangrene and drop off. The ears, tip of the nose, fingers, and toes are the parts most liable to be frost-bitten.

Sprains.—If an arm or hand be badly sprained, do not try to use it; if a knee or foot, do not walk upon it. Lie down and get some one to pour water, as hot as can be borne without discomfort, over the sprain steadily for half an hour or until the pain and soreness have disappeared. The part will still be weak, and should be used with much caution, if at all, for some weeks or even months. A bad sprain is often more tedious than an ordinary fracture.

Sunstroke.—This is caused by exposure to great heat, either from the sun or from some other source. Cases not unfrequently occur in hotel-kitchens, sugar-refineries, foundries, and other places where there is great heat but no exposure to the sun. The greater number of cases,

however, are caused apparently by the direct heat of the sun. Exhaustion, especially when induced by severe muscular exercise and mental anxiety, is a powerful predisposing cause, and it is said that the use of stimulants operates in the same direction.

By way of precaution one should avoid exposure to the direct rays of the sun on a very hot day. A straw or ventilated felt hat, with a wide brim, should be worn, and it is well to put a wet handkerchief or sponge or a cabbage-leaf in the crown. If one's occupation will admit it, when much in the sun an umbrella should be carried, for the ill effects of the heat may be received through the body as well as through the head, though probably not quite so readily. Or, a piece of white cloth or handkerchief may hang down from the hat to cover the nape of the neck and protect the spinal cord. If possible, one should avoid exposure directly after dinner, as this is the most frequent time for an attack.

In some cases the apparent attack will not come on until some time after the injury has really been inflicted. It may come on in the night, but this is exceptional.

The symptoms of sunstroke are sudden and violent pain in the head, giddiness, a sense of fullness and oppression in the pit of the stomach, sometimes with nausea and vomiting, a feeling of weakness, dimness of vision and confusion of colors, quickly followed by more or less complete insensibility. Sometimes there are convulsions. The heat of the body is generally much increased. The breathing sometimes has a snoring sound, at other times it is sighing and accompanied by moaning.

The patient should be at once removed to the coolest place that is near at hand, and in which there is plenty of pure air, but *should not be carried far;* the clothing should be taken off and the body sponged with cold water, if possible with ice-water, unless the surface is already cool, when

warm water may be used. If the heat of the body is very great, the pulse slow and full, the temples throbbing, the breathing snoring, sighing, or moaning, with profound unconsciousness, there is no time to be lost in the use of more active measures. The patient being turned upon the face, the head and shoulders should be somewhat raised, and cold water should be poured upon the head and upper part of the spine from a height of three or four feet, in a continuous stream for several minutes, taking care, of course, that the nose and mouth are so placed that breathing will not be interfered with. If, on the contrary, with the unconsciousness, the pulse is very frequent and feeble, the breathing free from the characters mentioned, and the surface of the body cool, the treatment just described would be very dangerous, and instead of it a stimulating plan must be pursued, small doses of brandy or whisky and water being given by the mouth if they can be swallowed and do not excite vomiting, or, what is much better, if a syringe is at hand, being injected into the bowel. At the same time a blister or mustard-plaster may be applied to the nape of the neck. In all cases the nearest physician should be summoned at once.

Cases that recover generally do so quite rapidly after the improvement begins, but it is best that they should lie perfectly quiet and undisturbed, in a darkened and well-ventilated room for a day or two.

THE END.

PARCHMENT-PAPER SERIES.

Square 16mo volumes, 30 cents each.

I.

English as She is Spoke;

Or, A Jest in Sober Earnest. Compiled from the celebrated "New Guide of Conversation in Portuguese and English."

"'We expect then, who the little book (for the care what we wrote him, and for her typographical correction) that may be worth the acceptation of the studious persons, and especially of the youth, at which we dedicate him particularly.' This is a literal quotation from the preface of one of the most excruciatingly funny little books that has ever been given to the world, 'The New Guide of Conversation in Portuguese and English.' Copies of the original edition are treasure-trove. The author was Senhor Pedro Carolino, who wrote with serious purpose this little book, compiling it with the aid of a Portuguese-French phrase-book and a French-English dictionary. The result is like what we have quoted above. The present book is not a reprint, but is a collection of the most ludicrous passages in the original, comprising vocabularies, conversations, familiar dialogues, idiotisms, and proverbs."—*New York Christian Union.*

II.

Don't:

A Manual of Mistakes and Improprieties more or less prevalent in Conduct and Speech.

"I'll view the manners of the town."—*Comedy of Errors.*

By Censor. Revised, and with a new chapter addressed expressly to women.

"In a condensed form, this little volume gives a great variety of useful hints upon the behavior appropriate at the table, in the drawing-room, in public, in speech, in dress, and in general. This work has been prepared by some one who has a keen eye and ear; he appears anonymously, but his instincts are unerring."—*School Journal.*

"Finally, we would add on our own account, 'Don't fail to read, mark, learn, and inwardly digest this little book, if you would like to remind yourself of some of the things which denote the true spirit of good breeding.'"—*The Literary World.*

"Unlike most books of the kind, it bears internal evidence of having been written by a gentleman, and not by a 'dude' or his valet. The common sense of etiquette was never better exemplified."—*Boston Pilot.*

"If you read this little book—and it is so very interesting, not alone on account of its subject, but because attractively printed, that you will be sure to do so—and if you remember what it says, the recording scribe of the habits of good society will never enter a charge against you of a serious violation of any important rule of good breeding. This excellent little manual will benefit almost every one."—*Boston Globe.*

III.

English as She is Wrote:

Showing curious ways in which the English language may be made to convey ideas or obscure them. A companion to "English as She is Spoke."

"A companion to 'English as She is Spoke,' and hardly less funny than that celebrated Portuguese-English production."—*Philadelphia News.*

New York: D. APPLETON & CO., 1, 3, & 5 Bond Street.

APPLETONS' HOME BOOKS.

A Series of New Hand-Volumes at low price, devoted to all Subjects pertaining to Home and the Household.

Handsomely printed, and bound in cloth, flexible, with illuminated design. 12mo. **60** cents each.

Building a Home.

By A. F. OAKEY. Illustrated.

"Mr. Oakey discusses house-building for the purposes of people of moderate means in the Middle States, and gives plans and elevations of cottages from the very cheapest to a house to be built at a cost of $9,000. The conditions of building, with reference to the climate and material, are fully set forth, and the class of readers whom the book contemplates will find it of advantage."—*New York World.*

How to Furnish a Home.

By ELLA RODMAN CHURCH. Illustrated.

"Mrs. Church's directions for house-furnishing, while very artistic and cheerful, are adapted to the wants of the great army of limited incomes. The chapters wend their way from vestibule, hall, and staircase, the 'living-rooms,' kitchen, parlor, library, and dining-room, and bedrooms, up to the servants' quarters, for which last the suggestions are particularly apt. What may be done in the way of home decoration and upholstery is pointed out, with advice on the finishing touches that so often go to make a house a home."—*Philadelphia Ledger.*

The Home Garden.

By ELLA RODMAN CHURCH. Illustrated.

"We have instructions for gardening and flower-raising, in door and out. Roses and lilies have separate chapters, and there is much valuable information about ferneries, city gardens, miniature greenhouses, and methods of utilizing small spaces for vegetable-raising."—*Albany Argus,*

Home Grounds.

By A. F. OAKEY. Illustrated.

"In 'Home Grounds,' Alexander F. Oakey tells, in a very suggestive way, how the surroundings of a suburban home may be made beautiful at comparatively little expense."—*Christian at Work.*

Amenities of Home.

By M. E. W. S.

"The author has not spared good sense, right feeling, or sound principle. . . . A better book for reading in the family circle it would be hard to name."—*Literary World.*

"Old rules for happy homes are made to appear fresh; indeed, vivacity is the marked trait of the book."—*Boston Advertiser.*

Household Hints;

A Book of Home Receipts and Home Suggestions. By Mrs. EMMA W. BABCOCK.

"The author has evidently been used to the nice economics of life, and her experience is of more than ordinary value. The book is not entirely given up to culinary items; there are talks on various subjects that occupy nearly half its pages, and the introduction is full of sound advice and happy suggestions on making and ordering a pleasant home, that shall have a 'certain physiognomy of its own.'"—*Boston Courier.*

Home Decoration:

Instructions in and Designs for Embroidery, Panel and Decorative Paintings, Wood-carving, etc. By JANET E. RUUTZ-REES, author of "Horace Vernet," etc. With numerous Designs, mainly by GEORGE GIBSON.

CONTENTS: I. Introductory; II. General Remarks; III. Materials and Prices; IV. Stitches and Methods; V. Window-Hangings and Portières; VI. Screens; VII. Lambrequins and Small Panels; VIII. Incidental Decorations; IX. Wood-carving.

Home Amusements.

By M. E. W. S., author of "Amenities of Home," etc.

CONTENTS: I. Prefatory; II. The Garret; III. Private Theatricals, etc.; IV. Tableaux Vivants; V. Brain Games; VI. Fortune-Telling; VII. Amusements for a Rainy Day; VIII. Embroidery and other Decorative Arts; IX. Etching; X. Lawn Tennis; XI. Garden Parties; XII. Dancing; XIII. Gardens and Flower-Stands; XIV. Caged Birds and Aviaries; XV. Picnics; XVI. Playing with Fire. Ceramics; XVII. Archery; XVIII. Amusements for the Middle-Aged and the Aged; XIX. The Parlor; XX. The Kitchen; XXI. The Family Horse and other Pets; XXII. In Conclusion.

The Home Needle.

By ELLA RODMAN CHURCH. Illustrated.

CONTENTS: I. "Go Teach the Orphan-Girl to Sew"; II. Beginning Right—Under-Garments; III. Under-Garments—(Continued); IV. "The Song of the Shirt"; V. Rudiments of Dress-making; VI. Dress-making in Detail; VII. Sewing and Finishing; VIII. The Milliner's Art; IX. Children's Garments; X. House-Linen; XI. The Mending Basket; XII. A Patchwork Chapter.

Home Occupations.

By JANET E. RUUTZ-REES. Illustrated.

CONTENTS: I. Introductory; II. What can be Done with Leather; III. The Possibilities of Tissue-Paper; IV. Modeling in Wax: Flowers; V. Modeling in Wax: Fruits, etc.; VI. The Preservation of Flowers and Grasses; VII. Spatter-Work; VIII. Frame-Making; IX. Collections; X. Making Scrap-Books; XI. The Uses of Card-Board; XII. What can be Done with Beads; XIII. Amateur Photography; XIV. Miscellaneous Occupations.

The Home Library.

By ARTHUR PENN, editor of "The Rhymester." Illustrated.

CONTENTS: I. A Plea for the Best Books: II. On the Buying and Owning of Books; III. On Reading; IV. On Fiction (*with a List of a Hundred Best Novels*); V. On the Library and its Furniture; VI. On Book-binding; VII. On the Making of Scrap-Books; VIII. On Diaries and Family Records; IX. On the Lending and Marking of Books; X. Hints Here and There; XI. Appendix—List of Authors whose Works should be found in the Home Library.

New York: D. APPLETON & CO., 1, 3, & 5 Bond Street.

THE PARCHMENT SERIES,

CHOICELY PRINTED ON LINEN PAPER, AND BOUND IN LIMP PARCHMENT ANTIQUE. 16mo.

"PERHAPS THERE IS NO MORE AGREEABLE SERIES THAN 'THE PARCHMENT LIBRARY.'"—*ATHENÆUM.*

Tennyson's "In Memoriam."

With a Miniature Portrait in *eau forte* by LE RAT, after a Photograph by the late Mrs. CAMERON. $1.25.

"An exquisite little edition, in white binding, and on rough paper. It is perfectly printed. and as fit for the pocket as for the drawing-room."—*Spectator.*

Tennyson's "The Princess": a Medley.

With a Miniature Frontispiece by H. M. PAGET; and a Tail-piece in Outline by GORDON BROWNE. $1.25.

"An admirably got-up edition, printed on the rough paper which is dear to many book-lovers, and bound in white vellum."—*Saturday Review.*

English Odes.

Selected by EDMUND W. GOSSE. With Frontispiece on India paper, from a Design by HAMO THORNYCROFT, A. R. A. $1.25.

"A really delightful little possession, marked by great knowledge and appreciation of English poetry."—*Pall Mall Gazette.*

Shakspere's Sonnets.

Edited by EDWARD DOWDEN. With a Frontispiece etched by LEOPOLD LOWENSTAM, after the Death-Mask. $1.25.

"A more exquisite edition of these poems the book-lover can scarcely desire."—*Notes and Queries.*

Eighteenth Century Essays.

Selected and annotated by AUSTIN DOBSON. With a Miniature Frontispiece by R. CALDECOTT. $1.25.

"The cream of that Arcadian literature, with its kindly humor, pleasant satire, and graphic description."—*Boston Traveller.*

Of the Imitation of Christ.

By THOMAS À KEMPIS. A Revised Translation. With a Frontispiece on India paper, from a Design by W. B. RICHMOND. $1.25.

"The thanks of the readers are due no less to the translator for the substance of the book, than to the publisher for its form."—*Saturday Review.*

The Christian Year.

By JOHN KEBLE. Printed in red and black, with a Portrait of the author, from Mr. G. RICHMOND'S drawing. $1 50.

"The edition remains the best extant of the most popular of English devotional poets."—*Pall Mall Gazette.*

[SEE NEXT PAGE.]

Select Letters of Percy Bysshe Shelley.

Edited, with an Introduction, by RICHARD GARNETT. $1.25.

"The peculiar virtue of his epistles is to express the mind of the poet, as perfectly as Macaulay's express the mind of the man of letters, or Wellington's the mind of the general."—*From the Preface.*

Fables.

By Mr. JOHN GAY. With a Memoir by AUSTIN DOBSON. With Portrait from a hitherto unengraved sketch in oil by Sir GODFREY KNELLER, etched by RICHARD H. A. WILLS.

"They have given pleasure to several generations of readers, old and young, and they have enriched the language with more than one indispensable quotation."—*A. Dobson.*

French Lyrics.

Selected and annotated by GEORGE SAINTSBURY. With a Miniature Frontispiece by H. G. GLINDONI. $1.25.

The selection contains specimens of the writings of French Lyric Poets, from the twelfth to the nineteenth century, with a Prefatory Notice of each author or group of authors.

Poems.

By ALFRED TENNYSON. With Frontispiece. Two volumes. $2.50.

These volumes contain all that was published in the original two volumes by which Mr. Tennyson first became known to the world, together with a few early poems and sonnets not then published, and "Tithonus."

Q. Horati Flacci Opera.

With an Etching from a Design by L. ALMA-TADEMA. $1.25.

The Sonnets of John Milton.

Edited by MARK PATTISON. With Portrait after VERTUE. Antique, gilt top. $1.25.

"A charming edition of one of the most remarkable series of poems in the language by the person most qualified of all men living to be its editor. Mr. Pattison does all that we could wish, and no more. . . . If any one requires either more or less, he must indeed be difficult to satisfy."—*Pall Mall Gazette.*

The Parchment Shakspere.

Complete in twelve volumes. Vellum, gilt top, $1.25 each. *Now ready.*

The text of this edition of Shakspere is mainly that of Delius, following closely the folio edition of 1623, the chief difference consisting in a more sparing use of punctuation than that employed by the well-known German editor. Wherever a variant reading is adopted, some good and recognized Shaksperean critic has been followed.

New York: D. APPLETON & CO., Publishers 1, 3, & 5 Bond Street.

DUE DATE