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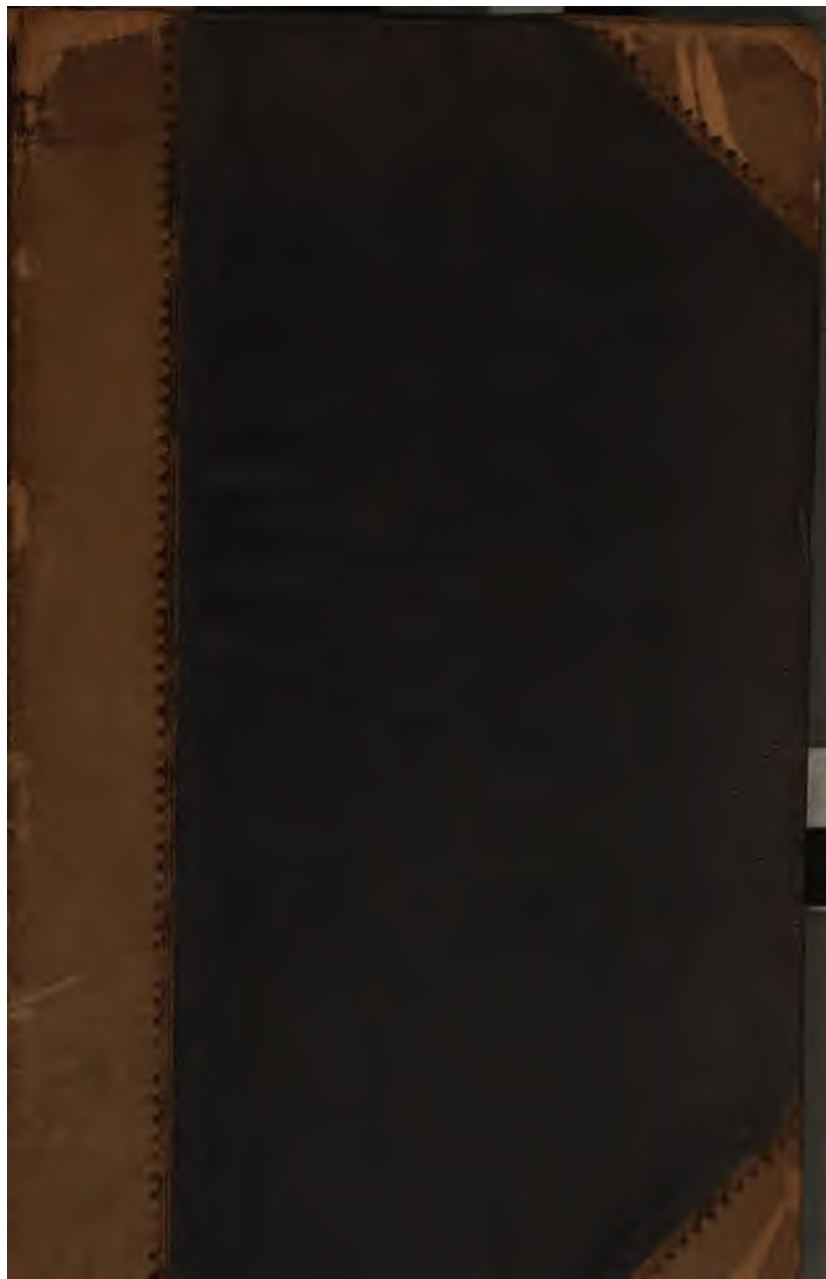
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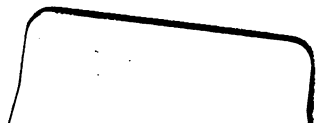
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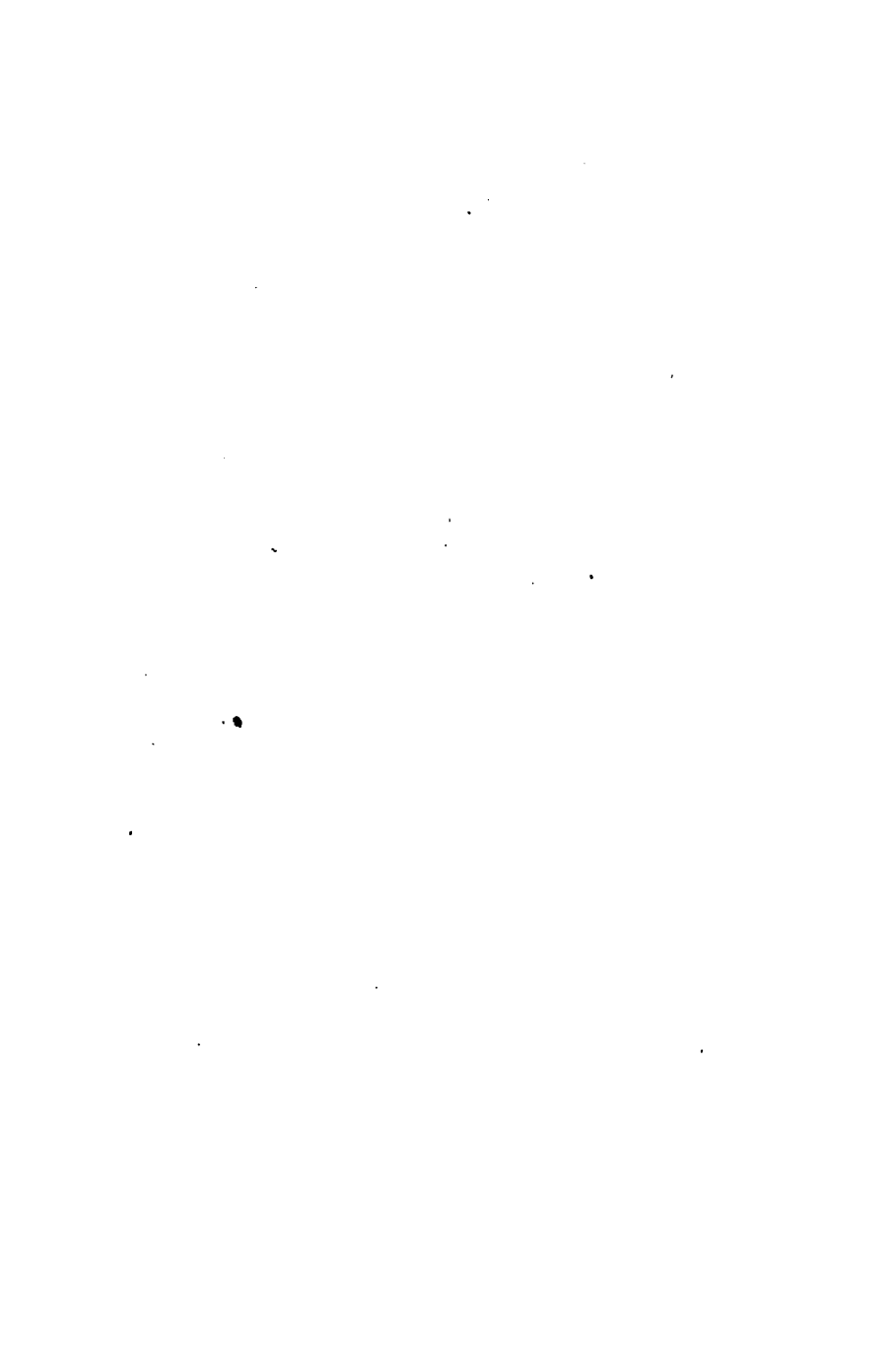
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HEALTHY SKIN:
A
POPULAR TREATISE
ON THE SKIN AND HAIR,
THEIR
PRESERVATION AND MANAGEMENT.

BY
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OF ENGLAND.

EIGHTH EDITION.



LONDON:
J. & A. CHURCHILL, NEW BURLINGTON STREET.
MDCCLXXVI.

151. o. 393.

THE LONDON PRINTING AND PUBLISHING COMPANY, LIMITED,
BOVAY PLACE, HOLLOWAY, N.

TO
EDWIN CHADWICK, C.B.,

THIS LITTLE WORK

Is Inscribed,

IN COMMEMORATION OF HIS STRENUOUS AND INDEFATIGABLE
LABOURS IN THE CAUSE OF SANITARY PROGRESS,

BY THE AUTHOR.



CONTENTS.

CHAPTER I.—The scarf-skin : its nature and uses ; cause of colour of the skin ; and discolorations. The nails : their nature and management	<i>Page</i>	1—21
CHAPTER II.—The sensitive skin : its structure and properties ; varieties of sensation ; insensibility produced by ether and chloroform		22—39
CHAPTER III.—The perspiratory system : its arrangement, extent, and uses ; phenomena of animal temperature		40—53
CHAPTER IV.—The oil-glands of the skin : their nature and purposes ; parasitic animals inhabiting the oily substance ; nature of the so-called “grubs” of the skin		54—63
CHAPTER V.—THE HAIR : its structure, mode of growth, and phenomena ; changes of colour of the hair ; fabulous stories		64—114
CHAPTER VI.—Diet : its influence on the health of the skin		115—130
CHAPTER VII.—Clothing : its influence on the health of the skin		131—151
CHAPTER VIII.—Exercise : its influence on the health of the skin ; mischievous effects of stays		152—168

CHAPTER IX.—Ablution and bathing: their influence on the health of the skin	Page 169—197
CHAPTER X.—The rashes of the skin; management of the sick chamber; contagion	198—215
CHAPTER XI.—The eruptions of the skin: their nature and varieties	216—244
CHAPTER XII.—Warts and corns: their nature and management	245—252
CHAPTER XIII.—Disorders affecting the blood-vessels and nerves of the skin; mothers' marks	253—260
CHAPTER XIV.—Disorders affecting the colour of the skin	261—265
CHAPTER XV.—Disorders affecting the respiratory function of the skin	266—269
CHAPTER XVI.—Disorders affecting the oil-glands and oil-tubes of the skin; human horns	270—284
CHAPTER XVII.—Disorders affecting the hair and hair-tubes; loss of hair; baldness; ringworm	285—306

PREFACE

THIRTY-ONE years ago this little Book was first presented to the public.* Seven large editions have already found their way into the world ; and the exhaustion of the seventh leads the Author to hope that there still remain Readers for an eighth.

In the space of time that is past, the Author feels that he might and ought to have made the Book more acceptable and more useful ; and, in seeking for an excuse for not having done so, the only one he can find is, that he has not been idle in the meanwhile ; that he has continued, as ever, an earnest and steadfast labourer ; and has not been unmindful of the great responsibilities which belong to the profession of Medicine, and especially to those of its members who take upon themselves the duties of instructors and guides.

LONDON, *October*, 1876.

* In 1845.

PREFACE TO THE SEVENTH EDITION.

WE should feel ourselves wanting in courtesy and somewhat in gratitude to a generous public, were we to launch our new edition of "Healthy Skin" on the stream of society without a few words of kindly greeting, without a word of thanks for the obligation we owe to our Readers, for requiring us so soon to appear before them again with another—with our SEVENTH EDITION.

We are flattered by the hope that we have, in some degree, contributed to the popularity of WATER and SOAP among our countrymen, and to the universality of an institution which we are inclined to regard as especially and characteristically British. If there be any one thing which, at the present day, distinguishes an Englishman or an Englishwoman, more than another, it is the use of THE BATH: "the tub," as they call it, with an expression of affectionate regard. In fact, our countryman of to-day is no longer so remarkable for his devotion to his port-wine or to his porter, as he is to his "tub," and the limpid element that contributes to his freshness and his salubrity.

One of our dearest friends, the world-renowned DOUGLAS JERROLD, has left behind him the following passage with regard to the present book: the quotation so well expresses the intention of the volume that we presume to quote it entire, not as an illustration

merely of the far-seeing judgment of the writer, but also as a grateful reminiscence of a great-hearted and much-beloved man :—

“ No education can now be considered complete which does not include a certain acquaintance with medical science. The work before us is a valuable contribution to the medical department of general literature. Not only will Erasmus Wilson have sufficiently established the necessity of baths and wash-houses for the labouring classes, but of THAT BATH AND THAT WASH-HOUSE WHICH THE BASIN AND THE BED-CHAMBER PLACE DAILY AT THE COMMAND OF HIS READERS. Nor will the incumbency be less obvious of those attentions to diet, to clothing, and to exercise, which he so convincingly urges as essential to the due performance of the cutaneous function. His work abounds in ingenious suggestions for the relief of the minor but troublesome ‘ills that flesh,’ or at least skin, ‘is heir to;’ and also in refutations of various anile fallacies and mal-practices which infect the family treatment of such disorders. Its style is divested of useless technicalities, is so light and agreeable, and so pregnant with apt remark and illustration, that, in spite of its theme, it may be read not only with instruction but with entertainment.”

PREFACE TO THE FIFTH EDITION.

THE purpose of this work is twofold—in the first place, it is intended to supply a knowledge of that part of the economy of man which forms the exterior of his body, and is more immediately under his own personal control—namely, the SKIN, the NAILS, and the HAIR ;—in the second, to suggest reasons for the devotion of a certain amount of care and attention to its management. The subject is replete with interest ; the study of the structure and phenomena of the skin, the nails, and the hair, discloses manifold illustrations of the surpassing beauty and wonderful contrivance of Nature's works, and the knowledge which their contemplation affords explains many circumstances which we are enabled to turn to practical account in the preservation of their beauty and health.

If any further inducement were needed to urge us to the consideration of this important subject, it might be found in the threatened invasion of that terrible and devastating disease, the ASIATIC CHOLERA. Nothing that we can do is so likely to preserve us from the attack of this disease, and, indeed, of every disease of an epidemic or contagious kind, as a proper and judicious attention to the skin. The instructions put forth by the Board of Health for securing our defences against cholera, and the evidence collected with regard to this frightful disorder, abound in recommendations having reference to the maintenance of the skin in a state of cleanliness, of proper activity, of warmth ; and it is only by a knowledge of the nature and functions of

the skin that we can hope to succeed completely in effecting this object.

The necessity of cleanliness has of late become a household truth, and the spread of those admirable institutions, the Public Baths and Wash-houses, and especially, the eagerness with which they are sought after, prove that the value of cleanliness is as much appreciated by the poor as by the rich. It is too little to say that these institutions are calculated to carry cleanliness into the humble abodes of the labouring classes: they do infinitely more than this: they pour forth a stream of health, of happiness, of loyalty, of thoughtfulness; they elevate the moral position of those whom they succour, and the numberless benefits which they confer are not only enjoyed by those who receive, but are reflected upwards and around upon society at large. The Public Baths and Wash-houses are among the noblest of the institutions of this favoured country, as they are one of the greatest discoveries of the present age. May they meet with the support which they deserve!

To those whose attention has not been already drawn to the subject of Baths and Wash-houses, it may not be out of place to mention that the first institution of this kind was established in Liverpool, in 1843, and met with so much encouragement as to attract the attention of philanthropic men in several of the manufacturing towns. The Liverpool institution possessed at that time only eight separate baths and one vapour bath; but such was the eagerness with which they were sought by the working classes, that "as many as 220 labourers have bathed there on one Saturday." The Bishop of London—from whose speech, at the public meeting held at the Mansion House, in London, in 1844, for the purpose of promoting the establishment of public baths and wash-houses, I quote the above statement—further illustrated the advantages of the bath, by the remark of a labourer, "that he felt he could do another week's work after

he had come from the bath." "Now," continued the Right Reverend Prelate, "supposing this to take place on a Saturday, you will remember that those labouring men are not only, as to their natural sensations, and, to a certain extent, their physical energies, capable of doing another week's work, but they are more fit for, and probably will be more disposed to, the due observance of that holy day immediately following the Saturday, which is given to man for the rest and refreshment of his soul as well as of his body. There is probably hardly any one cause which operates more to the keeping of the poor from the Lord's house on the Lord's day than the habits of uncleanness in which they are, against their own inclination, compelled to live."

In the same speech, the Bishop of London took occasion to refer to a passage in Dr. Southwood Smith's evidence on the sanitary state of our large towns. Dr. Smith observes:—

"A clean, fresh, and well-ordered house exercises over its inmates a moral, no less than a physical influence, and has a direct tendency to make the members of the family sober, peaceable, and considerate of the feelings and happiness of each other; nor is it difficult to trace a connexion between habitual feelings of this sort and the formation of habits of respect for property, for the laws in general, and even for those higher duties and obligations, the observance of which no laws can enforce; whereas a filthy, squalid, unwholesome dwelling, in which none of the decencies common to society, even in the lowest stage of civilization, are *or can be* observed, tends directly to make every dweller in such a hovel regardless of the feelings and happiness of each other, selfish and sensual: and the connexion is obvious between the constant indulgence of appetites and passions of this class, and the formation of habits of idleness, dishonesty, debauchery, and violence."

It will not be matter of surprise that, with the proofs of success of the Liverpool institution, and the important

bearings of cleanliness on the health and well-being of society, so clearly brought before the eyes of a public meeting of philanthropic men, convened in the Egyptian Hall of the Mansion House, under the immediate sanction of the Lord Mayor, they should not have separated without having determined on the immediate erection of a public bath and wash-house in London, and organized committees for the purpose of carrying out the necessary details. Accordingly, in 1848, the committee report that they have built and are now completing, in Goulston-square, Whitechapel, an establishment "calculated for 94 baths, and 96 washing-places, each with its separate drying closet, and to meet a *weekly* demand for about 30,000 baths, and the washing and drying of the clothes of about 20,000 persons." Similar institutions are now in progress, or already in action, in Glasshouse-yard, East Smithfield; in the parishes of St. Pancras, St. Martin's, St. Marylebone, and in other districts of London.

The first of the London establishments thrown open to the public was that of George-street, Euston-square, in the parish of St. Pancras. The success of this institution has been most complete and most gratifying to its supporters. Inexpensive and unpretending in its architecture, bearing the palm above all others in the useful to the exclusion of the vanity and extravagance of display, it is week after week thronged with the votaries of Cleanliness and Health. It is situated on the edge of a piece of ground belonging to the New River Company, and most liberally granted to the institution by the Directors. In honour of this body I have further to state, that "a full supply of excellent water from the adjacent reservoir was afforded gratuitously for the first fourteen months." A visit to these baths will be found to be not amongst the least interesting and gratifying of the enjoyments of the great Metropolis.

By a report of the working of this establishment, from the day of its opening (August 3, 1846), to November 12,

1848, I find that the number of persons who have enjoyed its benefits, that is to say, have obtained the incalculable blessing of clean skins or clean linen, to which may be added, also, as another feature of the institution, clean and wholesome dwellings, amounts to no less than 674,866. Of this surprising number, 284,994 were bathers; and 97,468 washers; while a separate report from the department for "Cleansing, Purifying, and Disinfecting the Dwellings of the Poor," shows that during the last ten months upwards of one thousand purifications have been effected.* The following brief quotation from the report of this institution will serve better than many words to throw a light on its method of operation:—

"To a poor man or woman, the charge for a cold bath, containing sixty gallons of fresh water, is one penny, and for a similar bath, warm, two-pence; in either case, the use of a clean towel being included. For the use of a washing-tub, boiler, and wringing machine, with a plentiful supply of hot and cold water, for one hour, the charge is one penny; for two hours, two-pence; and for using the same, together with a drying closet, iron, and mangle, for four hours, the charge is three-pence."

In the report for 1852 occurs the following passage, an illustration of the moral influence of these institutions, and of the universal comportment of the poor when we treat them, according to Christ's commandment, as that neighbour whom we should love as ourselves:—"The conduct of so great a number of persons [upwards of a million] using the establishment has been, with few

* Up to the 31st December, 1852, the total number of persons who had received the benefits of this Institution was as follows: Bathers, 648,967; washers, 409,507, representing the supply of clean linen for 1,638,000 persons; and of apartments cleansed, lime-washed, and otherwise purified and ventilated, 13,024. At this moment there are seven establishments of the kind in London.

exceptions, free from irregularities or misbehaviour." Is it then too much to say that, besides affording the blessings of cleanliness and health, the baths and wash-houses are schools for the moral training of the people. They are among the institutions which place the poor in their most agreeable and prepossessing light ; they are the means of drawing the rich nearer to their poorer brethren ; and they enable us to fulfil, with more ease to ourselves, the Divine injunction, to "love one another."

Recurring to the relations of the skin to health—an excellent and able author* remarks, that it "must not be considered merely as a common covering to defend us from the sun and the rain, but as one of the most important organs of our body, without the incessant activity and agency of which there can be neither health nor long life ; and in the neglect of which, in modern times, lies the secret source of numberless diseases and evils that tend to shorten our existence.

"The skin is the greatest medium for purifying our bodies ; and, every moment, a multitude of useless, corrupted, and worn-out particles evaporate through its numberless small vessels, in an insensible manner. This secretion is inseparably connected with life, and the circulation of our blood ; and by it the greater part of all the impurity of our bodies is removed. If the skin, therefore, be flabby or inactive, and if its pores be stopped up, an acidity and corruption of our juices will be the unavoidable consequence, and the most dangerous diseases may ensue.

"Besides, the skin is the seat of feeling, the most general of all our senses, or that which in an essential manner connects us with surrounding nature, and in particular with the atmosphere ; and by the state of

* Christopher William Hufeland, M.D., Public Lecturer on Medicine at Jena ; in a work entitled, "The Art of Prolonging Life," 1797.

which, in a great measure, the sensation of our own existence, and the relation which we bear to everything around us, is determined. Hence a greater or less sensibility, in regard to disease, depends very much on the skin; and those whose skin is weak or relaxed have generally a sensation too delicate and unnatural, by which means it happens that they are internally affected in a manner highly disagreeable by every small variation in the weather, every change of atmosphere, and at length become real barometers.

“The most ignorant person is convinced that proper care of the skin is indispensably necessary for the existence and well-being of horses and various animals. The groom often denies himself sleep and other gratifications, that he may curry and dress his horses sufficiently. If they become meagre and weak, the first reflection is, whether there may not have been some neglect or want of care in regard to combing them. Such a simple idea, however, never occurs to him in respect to his child. Since we show so much prudence and intelligence in regard to animals, why not in regard to men?”

Further, a recent writer, Alexander Bain, A.M., in a lecture delivered before the Edinburgh Philosophical Institution, on the application of science to human health and well-being, suggests the establishment of public baths as a national institution: speaking of the advantages of the bath, he says,—

“Next to eating and sleeping, the bath may be ranked among the very foremost of the necessaries and supports of life. It is of far higher consequence, and of more general utility than any kind of manual exercise, gymnastic, or sport. It affects the system more powerfully than these, even in the very points wherein their excellence consists; and it is applicable in a thousand circumstances where they are not. It does not supersede, but it ought to come before, these other practices. A place should be therefore found for the bath among the regular occupations of life; it ought to be a permanent

institution, ranking immediately after the prime necessities of our being. Either daily, or several times a week, should every one repair to it, in some shape or other, either at morn, mid-day, or evening, according to strength and leisure. There certainly does not exist a greater device in the art of living, or a greater instrument for securing a vigorous and buoyant existence. It is one of the most powerful diversions to the current of business occupation; it can suspend for a time the pressure of our pursuits and anxieties, and return us fresh for the enjoyment of our other delights. To the three varieties of state which our bodies pass daily through, eating, working, sleeping, it would add a fourth, luxurious in itself, and increasing the relish for all the rest. It would contribute to realize the perfect definition of a good animal existence, which is, *to have the appetite always fresh for whatever is before us*. The health of the mind must be based in the first place on the health of the body; mental occupation and refined enjoyments turn into gall and bitterness if they are not supported by the freshness and vigour of the physical frame."

CHAPTER I.

THE SCARF-SKIN.

THE skin is the soft and pliant membrane which invests the whole of the external surface of the body, following its prominences, its depressions, and its curves. The interior of the body, like the exterior, is covered by a skin, which, from the constantly moistened state of its surface, is denominated *mucous membrane*. At the various orifices of the body, the exterior skin is continuous with the internal skin or mucous membrane, and in those situations, from the similarity of their structure, it is difficult to distinguish between them. The difficulty is increased by the circumstance, that when a portion of skin is made to occupy an internal position, it assumes the humid character of mucous membrane; and when a portion of the latter becomes external, it loses its moisture by evaporation, and then takes on the ordinary appearance of skin. This reciprocal metamorphosis of the two great investing membranes, or, rather, the two divisions of the one great investing membrane of the body, is occasionally seen in domestic life, and is therefore alluded to in this place. It is dependent, obviously, on the analogy of structure subsisting between the two parts of the same membrane. To illustrate the transition of these membranes into one another, I may refer to the eyelids, on the thin margin of which the skin becomes mucous membrane; the former covering the outside of the lid, the latter the inside of the lid and front of the eyeball. The red surface of the lips is an illustration of a mucous

membrane which has become dry by exposure to the atmosphere, its junction with the skin taking place at the abrupt line where the red joins the lighter tinted covering of the face. The entrance-tube of the ear is a cul-de-sac of about an inch in length, and lined by mucous membrane. This circumstance explains the discharges of matter from the ear which not unfrequently take place in children ; for it is the ordinary character of mucous membrane, when in a state of inflammation, to send forth a discharge, but not so commonly the external skin.

An important medical law is founded on the continuity and similarity of structure of the investing and lining membrane of the body. This law resolves itself into three expressions ; namely, *that disease affecting a part of a membrane is liable to spread to the whole ; secondly, that disease of the mucous membrane may spread to the skin, and vice versâ ; and thirdly, that disease of a part of the mucous membrane may become translated to a distant part of the skin, and vice versâ.* As illustrations of a popular kind of these three propositions, I may adduce, in evidence of the first, the spreading nature of St. Anthony's fire, or erysipelas ; of the second, the itching of the nose and lips in children from irritation of the alimentary canal, caused by the presence of worms ; or the eruption around the lips which follows slight attacks of cold or feverishness. The third proposition explains the coincidence of dyspepsia and other internal disorders with cutaneous rashes and eruptions, and their mutual relations.

It must have been observed by every one, that the skin is composed of two layers ; for these layers we see separated from each other by the action of a common blister. One of these layers, namely, that which is raised by the fluid of a blister, is the *scarf-skin*, also called the cuticle, or epidermis, while that which retains its connection with the substance of the body is the *sensitive skin*, the cutis or derma. These layers

perform very different offices in the animal economy, and are widely different from each other in structure. The scarf-skin is horny and insensible, and is a sheath of protection to the highly sensitive skin situated beneath it. The latter feels: but the former dulls the impression which occasions feeling, and in some situations is so dense and thick* as to exclude

Fig. 1.†

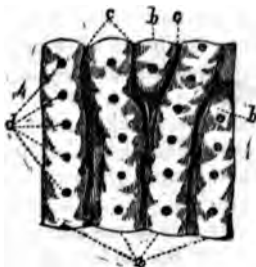
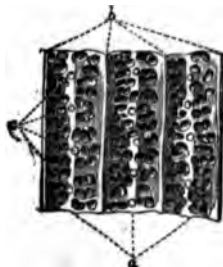


Fig. 2.‡



ordinary impressions entirely. Of this we see an example at the ends of the fingers, where the hard and

* In the palm of the hand of a person unaccustomed to manual labour, I found the thickness of the scarf-skin to amount to one-fourth of a line; in other words, $\frac{1}{16}$ of an inch.

† Fig. 1.—A small portion of scarf-skin from the palm of the hand magnified nineteen times. The parallel arrangement of its ridges, and the manner in which they terminate abruptly every here and there, are shown in this figure; as well as the circular pores of the perspiratory tubes.

a. Four of the little ridges, which may be seen on the front of the fingers and palm of the hand by means of a lens of low power. b b. The abrupt termination of two of the ridges. c c. The grooves between the ridges. d. The pores of the perspiratory tubes placed at regular distances along one of the ridges: similar pores are seen on the other ridges.

‡ Fig. 2.—The under surface of a portion of scarf-skin from the palm of the hand, magnified nineteen times. The ridges and grooves are the reverse of fig. 1. In each of the three grooves represented in this figure are seen numerous oval-shaped depressions for the tufts of papillæ of the sensitive skin, and running along the middle of each groove a slightly elevated line, a, upon

dense nail is the scarf-skin modified for the purpose referred to. It is the scarf-skin which the needlewoman pierces in the operation of sewing on the finger; it is the scarf-skin which the cutler shaves in order to test the sharpness of his blade. In the words of an old author on the skin, Daniel Turner, "Its chiefest uses are to be the medium of the touch, to defend the parts of the true skin from being injured by occurring bodies, to close the mouths of the little vessels and glandules dispersed through it, and yet at the same time to let forth superfluous humours through its pores as aforesaid; and, lastly, by covering its inequalities underlying, to give ornament and comeliness to the whole."

If, now, we imagine a portion of scarf-skin freshly separated from the derma, we shall find it soft at its under part, for it is here that the operations of its development and growth are in progress, and becoming firmer and firmer as we trace it upwards to the surface. The under part is exactly modelled on the surface of the derma; and as the latter is projected into numerous small prominences termed papillæ, so the under face of the scarf-skin is depressed into hollows which serve as sheaths to those papillæ. Hence is derived the appearance of a network, the meshes of which are the hollows for receiving the papillæ (fig. 2), and the term mucous net, or rete mucosum. We therefore speak of the scarf-skin as being composed of two layers, the horny layer and the rete mucosum; but, in reality, there is no definite separation between them; the rete mucosum is simply the lowest stratum, and as it grows in thickness it becomes gradually converted at its upper part into the horny stratum.

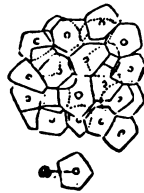
which, at short distances, are the conical sheaths of the perspiratory tubes.

a. The three grooves, with the elevated line running along the centre of each. *b.* The ridges which divide the grooves and correspond with the grooves of fig. 1. *c.* The conical prominences of the sheaths of the perspiratory tubes. These correspond with the pores of fig. 1.

By means of the microscope, however, we detect a very interesting series of changes taking place in the scarf-skin. Its lowest part, which I shall now call the rete mucosum, may be said to be composed of from four to six layers of minute bodies termed cells. The cell consists of an oval-shaped granule or nucleus, surrounded by a transparent envelope of a material termed protoplasm. The lowest tier of cells are oblong in figure, and ranged compactly side by side, but without any visible separation between them. The next rows are larger and polygonal in figure; many of the nuclei are now double, which is the ordinary mode of multiplication of the cells; and the circumference of the cell has become enveloped by a fine boundary wall or cell-membrane, and, curiously enough, the cell-membranes are ridged on the exterior so as to adhere more firmly to each other. Above these four, five or six rows, constituting the rete mucosum proper, the cells gradually become flattened, they grow by the circumference, they are firmer in consistence, they lose their nucleus, and are eventually converted into thin transparent laminæ, or scales. We see them, as it were, passing in quick succession from a state of soft generative material, through a stage of multiplication and growth, and reaching, as their final destination, the perfected condition of horny scales.

The chief part of the thickness of the scarf-skin is composed of these flattened scales, which are closely matted together, and form a dense and laminated texture, adapted, on the one hand, to yield freely to the movements of the body, and, on the other, to resist the influence of

Fig. 3.*



* *Fig. 3.*—A thin fragment of scarf-skin, magnified 155 times, showing its construction of flat, polyhedral, overlapping scales, in some of which a nucleus is seen.

a. A separate scale, with its nucleus.

chemical and mechanical agents in causing injury to the sensitive skin beneath.

The scarf-skin is therefore undergoing a constant process of formation and growth at its under part, to compensate for the wear which is taking place as continually on its surface. An uniform thickness of the scarf-skin is in this manner preserved, the faculties of sensation and touch are properly regulated, the place of the little scales, which are continually falling off under the conjoined influence of friction and ablation, is supplied, and an action necessary, not merely to the health of the skin, but to that of the entire body, is maintained.

The minute scales above referred to must be distinguished from those larger scales which are cast off under the influence of irritation of the skin. The latter exfoliate in little flakes like scales of bran, and after some fevers, as, for example, scarlet fever, laminæ of scarf-skin of considerable extent peel off. There is one situation in which the scales always assume the appearance of little flakes, namely, the scalp, where they become entangled with the hair, and give rise to the appearance called "scurf." This observation will show how futile any attempt must be, which shall have for its object to prevent the formation of the scurf. It may be removed, and should be removed, every day, with the hair-brush : but prevention is impossible, inasmuch as it is opposed to a law of nature. Occasionally, as a morbid action, an unusual quantity of scurf is produced, in which case medical means may be adopted to bring the scalp into a more healthful state.

The union of a dense and horny layer, like that of the scarf-skin, with one so soft and pliant as the sensitive skin, is naturally attended with a certain amount of influence on both membranes. The yielding layer has its suppleness in some measure diminished, and the horny stratum is made to bend to an extent proportionate to its degree of thinness. The effect of this antagonism of *properties* is made apparent on the surface of the skin

by the folds and linear markings which result from alternation of dimensions, and from the movements of the body. In the neighbourhood of joints, where motion is greatest, the foldings are necessarily most considerable, while on other parts, although scarcely perceptible to the naked eye, they exist in vast number, and form an intricate maze. In the flexures of the joints, the foldings or wrinkles of the skin lie transversely to the axis of motion, while on the convexities the wrinkles have a transversely elliptical arrangement, the centre of the ellipsis being the most prominent part of the joint. In the hand, where, besides the flexion, which gives rise to simple closure, a bending of the sides towards the middle of the palm takes place, the arrangement of the lines of motion is more complex, and those singular combinations are formed which, in the minds of the superstitious and of the ignorant, have conjured up the wild fancies and dreams of chiromancy and palmistry, fancies with which the wandering gipsy still beguiles the trustful heart of the rustic maiden.

We need go no further than the hand to discover another reason, besides extent of motion, and its frequent repetition, for the depth and permanence of these linear markings of the skin. It is evident that thickness of the scarf-skin has a considerable share in this effect, for whereas, in the palm, where the scarf-skin is often half a line in thickness, the lines are found strongly and deeply marked; at the flexure of the elbow, where it is very thin, the lines are more or less completely effaced as soon as the extended position of the arm is restored.

The quality of the skin on which the existence and persistence of its linear markings depends, is elasticity, a property which it possesses in a high degree.* But

* An early dermatologist, Daniel Turner, who flourished more than a century back, adduces the following extraordinary example of the ductility and elasticity of the skin:—"Of the wonderful dilatability of this part, I have heard nothing that comes up to that in the young Spaniard, Meckrin takes notice of, who, in the hospital at Amsterdam, showed himself to Van Horn, Sylvius,

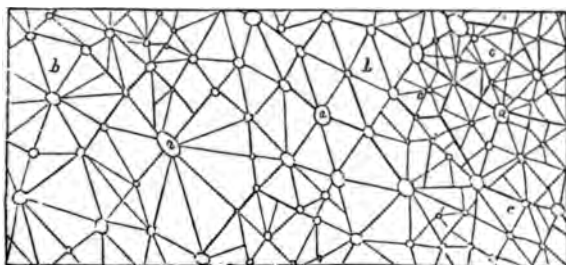
the elasticity of a vital texture, composed of heterogeneous materials, is necessarily different from that of elastic bodies composed of similar atoms of matter, like caoutchouc or steel, and the degree of elasticity of the skin is modified by all those conditions which affect the powers of life, and consequently, of health. With youth and health in its favour, the skin enjoys its maximum of elasticity, and lines and wrinkles are least likely to be formed or to remain. With age, however, and sickness, and their attendant feebleness of the powers of life, the elasticity of the skin is weakened, and lines and wrinkles assume a permanent character. Over certain of these wrinkles we have no control, namely, those produced by the motions of joints, and those which result from the expansion and falling away of the bulk of the body. But there are others which are kindly placed by Nature under our own subjection; for example, those of the face, which preside over the expression of the countenance. I have already remarked that, by repetition, lines, at first slight and temporary, become deep and permanent, and the face is thus converted into a tell-tale of the workings of the mind. If those workings be such as emanate from the higher faculties of man, the lines become the index of benevolence of heart and majesty of thought. If the grosser and the selfish faculties are those which are permitted unrestricted play, the mark of Cain is set upon the brow, begetting dread and repugnance. We have it, happily, in our power to decide which of these qualities shall gain the ascendant. It is not in the early days of youth, be it recollected, that the

Piso, and other learned physicians; taking up with his left hand the skin of his right shoulder and bringing the same up to his mouth; again, he would draw the skin of his chin down to his breast like a beard, and presently put it upwards to the top of his head, hiding both his eyes therewith, after which the same would return orderly and equally to its proper place, lying smooth as in any other person; after the same manner, the skin of the right knee and leg he would pull either upwards or downwards for half a yard's length, whilst, which was yet more remarkable, the *skin of his left side* would not admit of any such expansion."

stamp of evil becomes fixed, but it is in youth that the softened wax receives the impression which must endure in later days.

The plan of arrangement of the minuter lines of the skin is very curious, and is illustrated in the accompanying diagram, drawn, to secure accuracy, with the camera lucida. The portion of skin selected is the shoulder of a

Fig. 4.



child five years of age, and the magnifying power used, about fifteen diameters. In a square inch of surface of the skin in question, I counted sixty prominent hair-pores (*a a*), from each of which a number of straight lines, varying from five to ten, passed off at nearly equal distances, like rays from a centre. The lines terminated by abutting against smaller pores, or against the lines from neighbouring centres, and so traced out the surface into a number of triangular *areæ*. Interspersed among the larger pores, at nearly equal distances, and within the same extent of skin, were six hundred smaller pores, belonging, probably, to perspiratory and oil tubes. From each of these latter, a series of radiating lines, equal in number to those of the larger pores, passed off, subdividing the triangular *areæ* into secondary spaces of a similar shape but still smaller size, and forming a complex, but not inelegant mosaic pattern. In the diagram, the coarser lines and larger *areæ* are shown on the left

(*a a*), and the slighter lines and smaller aræ, which occupy the interspaces of the former, on the right (*c c*). Again, taking the boundaries of the radiating lines, instead of the pores, as the leading feature, the general character of the pattern is that of a number of polygonal figures (*b b*), of irregular dimensions, nicely fitted to each other, and subdivided into triangular spaces.

When examined chemically, the scarf-skin is found to be composed of a substance analogous to dried white of egg; in a word, albumen.* Now, albumen is soluble in the alkalies, and these are the agents which are commonly employed for purifying the skin. Soap, whatever its specific name, is a compound of the alkali soda or potash, with oil, the former being in excess. When used for washing, the excess of alkali combines with the oily fluid with which the skin is naturally bedewed, removes it in the form of an emulsion, and with it a portion of the dirt. Another portion of the alkali softens and dissolves the superficial stratum of the scarf-skin, and, when this is rubbed off, the rest of the dirt disappears. So that every washing of the skin with soap removes the old face of the scarf-skin, and leaves a new one: and, were the process repeated to excess, the latter would become so much attenuated as to render the body sensible to a touch too slight to be felt through its ordinary thickness. On the other hand, where the scarf-skin and the dirt are rarely disturbed by soap, the sensibilities of the skin are necessarily benumbed.

The proper inference to be drawn from the preceding remarks is in favour of soap as a detergent for the skin. On the faces of some women, soap acts as an irritant, and patches of red are left after its use. These are exceptional instances, and are generally attributed to an

* The scarf-skin also contains five per cent. of gelatinous matter; one per cent. of salts, consisting of lactates, phosphates, and sulphates of potash, lime, and ammonia; oxide of iron and manganese, and a minute quantity of fat; the remainder being *albumen*.

unusually delicate and susceptible skin ; but the truth is that the skin is less in fault than the habits or health of the individual. The former are faulty where soap is not regularly employed, or where the water used in washing is too warm, and exposes the skin, as in the winter season, to a violent alternation of temperature ; the latter supports a charge of too little exercise in the air, late nights, and over-indulgence. Other means than soap for the cleansing of the skin are highly objectionable, such as the various wash-powders and grease ; they are sluttish expedients, half doing their work, and leaving the corners unswept. Another and a weightier objection obtains against them : from having no power of removing the superficial laminæ of the scarf-skin, these become unnaturally thick and stained, and then the skin has the appearance of being mottled with irregular brown or olive-coloured spots. The remedy for these spots is lemon-juice, an agent of great utility in removing stains from the skin, after the dirt has been first completely washed away with soap.

The scarf-skin is interesting to us in another point of view, as being the seat of colour of the skin. The difference of hue between the blonde and the brunette, the European and the African, lies in the scarf-skin, in the deeper, and softer, and newly-formed layers of that structure, namely, the rete mucosum. In the whitest skin, the cells of the scarf-skin and their contents are not perfectly colourless ; they always contain more or less of a peculiar pigment, incorporated with the elementary granules which enter into their composition. In the white races the pigmentary tint is extremely slight, and less in the winter than in the summer season : in the darker

Fig. 5.*



* *Fig. 5.*—Cells of the scarf-skin containing pigment granules. This figure was drawn from a case of black secretion from the skin ; and the pigment is consequently in larger quantity than is usually met with in the negro skin.

racés, on the contrary, it is deep and strongly marked. The various tints of colour exhibited by mankind are therefore referrible to the amount of colouring principle contained within the elementary granules of the mucous layer of the scarf-skin, and their consequent depth of hue. In the negro, the granules are more or less black ; in the European of the south, they are amber-coloured ; and in the inhabitants of the north they are pale and almost colourless.

Colour of the skin has reference to energy in its action ; thus, in the tropics, where light and heat are in excess, and the skin is stimulated by these agents to vigorous action, colour is abundant and intense ; while in the frigid north, where both are wanting, the lungs, the liver, and the kidneys relieve the skin of part of its duties. The same observation relates to summer and winter : under the enlivening warmth of the summer sun, with its flood of light, exposed parts of the fairest skin become brown ; that is, their pigment-forming energy is increased. But the winter's scarf-skin is white and pigmentless, and restores the fair complexion when the summer's scarf is worn away. The law of colour, as relates to man, is, therefore, the same as that which sheds its influence over the vegetable world : the winter's flower and the first blossoms of spring are cold and pigmentless, while the warm hues of the dahlia are borrowed from the bright sun of summer and early autumn. If these changes follow naturally alternations of climate and alternations of temperature, we may easily conceive the influence of the scorching rays of the fire, the parching of the east, and the piercing of the north wind, in injuring the complexion. To be preserved in the beauty and freshness of youth, the skin must be protected against these noxious irritants ; it must be veiled against causes of irritation acting from without, and guarded against stimulants, not less dangerous, working from within.

That state which we call "disease," and which may

be defined, a disturbance of healthy function, has its summer effects and its winter effects on the pigment of the skin; and impresses upon it periods of exalted, and periods of diminished action. These effects are necessarily most conspicuous where extremes of colour are concerned; for example, the African is occasionally visited by a total cessation in the production of the cutaneous pigment on parts, and, more rarely, over the whole of his body. In the former case, he becomes a "pied negro;" in the latter, if I may use so paradoxical a term, a black Albino. In India and South America, the occurrence of the spotted skin is by no means uncommon, and it is met with more frequently than could be imagined in our own climate, and especially in the murky gloom of London. But with us the reverse of the picture is more usually seen; freckles, coppery patches, liver-coloured patches, sulphur-coloured patches, and patches of the most grotesque form and colour, are far from being rare. Previously to confinement, ladies are sometimes visited with these unsightly spots, which disappear when their strength returns, and their health resumes its natural standard. When we pass from the spring to the summer of life, there is a summer change in the colour of the skin. A brown patch will sometimes follow the healing of a blister; and I have observed, not unfrequently, dark spots produced under the irritation of gout and rheumatism. I ought not, in this place, to pass over the total abrogation of pigment which exists in the Albino, and leaves not only the skin, but other structures of his body, thoroughly blanched.

Having reviewed the scarf-skin in its various relations to formation, growth, renovation, and colour, and glanced at its most obvious function, namely, that of protecting the delicately organised structure of the sensitive skin, I may now refer to the manner in which this latter purpose is effected. The scarf-skin being, in its first stages, soft, is adapted to the utmost unevenness of surface which the sensitive skin presents; every

prominence of the latter has its particular sheath of soft scarf-skin, and the scarf-skin, as a whole, is a perfect mould of the structure beneath it. We can, therefore, by looking at the scarf-skin, judge of the nature of the surface on which it rests, and can perceive, at once, how the little ridges on the palm of the hand must be a model of the structure of the sensitive skin in that situation. It is this beautiful adaptation of the scarf to the sensitive skin that protects the latter from bruises and pressure, injuries which otherwise would be destructive of its integrity, and, probably, of its life.

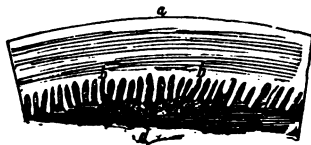
THE NAILS.

The nails, as I have before remarked, are a part of the scarf-skin, and present the same phenomena of adaptation to the surface of the sensitive skin, but in a more striking manner. The portion of sensitive skin which gives support to the nail is formed into very delicate

longitudinal folds, which stand up perpendicularly to the surface. The nail, upon its under surface, is fashioned into thin vertical plates,† which are received between the folds of sensitive skin; and

in this manner, the two kinds of laminæ reciprocally

Fig. 6.*



* *Fig. 6.*—Transverse section of a finger-nail, showing the manner in which it is connected with the sensitive skin by its under surface. *a*. The nail laminated in texture. *b b*. The vertical plates of its under surface. *c c*. The sensitive skin, which sends up folds between the plaits of the nail. *d*. A small blood-vessel supplying the sensitive skin and its folds.

† These vertical plates are seen in a magnified form on the inner side of the hoof of the horse, where the number has been estimated by Bracy Clark at 500.

embracing each other, the firmness of connexion of the nail with the soft parts is maintained. If we look on the surface of the nail, we see an indication of this structure in the alternate red and white lines which are there observed; the former of these correspond with the sensitive laminæ, the latter with the horny plates. These sensitive laminæ are provided with an unusual number of blood-vessels for the formation of the nail, and hence they give a red tint to that portion under which they lie. But, nearer the root of the nail, there is a part which is not laminated, but merely ridged longitudinally, and is less abundantly supplied with capillary vessels. This latter part consequently looks pale, as compared with the preceding, and from its half-moon shape is technically termed the *lunula*. Beyond the lunula, the root of the nail is embedded in a fold of the sensitive skin, and has the same relation to that structure that any single one of the thin horny plates of its under surface has to its corresponding pair of sensitive laminæ. The depth of implantation of the root of the nail within the skin is about a line, that is, the twelfth part of an inch, for the fingers and toes; a line and a half for the thumb; and two lines, that is, the sixth of an inch, for the great toe. In other words, the root of the nail is concealed by the skin for the distances here stated.

The mode of growth of the nail is peculiarly interesting. It must be apparent to every one that the nail is thicker at its free end than in the situation of the lunula, and consequently, that it must grow in thickness as well as in length. The growth in thickness takes place by the addition to its under surface of cells in the manner already described in the formation of the scarf-skin. By this process, the horny plates are gradually raised out of their sheaths, and their original depth is maintained by fresh additions to their free edge. And, moreover, their entire surface, being in a state of progressive formation, is soft and impressible. Let us now turn to growth in length. This takes place by means of a similar process,

occurring at the free edge of the root. Additions are made to this edge, and as the cells enlarge they press the nail forward, and the latter, being connected with the longitudinal laminæ by a soft medium, offers no resistance to the onward growth. Thus we have growth in thickness and growth in length proceeding harmoniously.

The amount of growth in length has been estimated by a French writer, Dr. Beau, at one millimetre, that is, two-fifths of a line, a week, for the nails of the hands; and the same length in four weeks for those of the feet. According to this observer, the length of the thumb-nail, including the root which is hidden from sight, is eight lines, that is, twenty millimetres: consequently, the period occupied in the growth of that nail would be twenty weeks, or five months. In like manner, the nail of the great toe, measuring in length nine lines and a half, or twenty-four millimetres, and requiring four times the period for growth of the thumb-nail, would consume ninety-six weeks, that is, nearly two years in its growth. Upon these data, we may calculate the time required for the removal of a spot or stain from the nail by growth, or the production of a new nail after an injury which shall have destroyed its predecessor.

But, what if we interrupt wilfully the regularity of growth, which is here described, and oppose Nature in her harmonious course, by wearing a shoe that is obviously too short for the foot, and which brings the edge of the nail against the leather? Why, in this case, Nature gives us warning, by means of her agent, *pain*, that such a proceeding is contrary to her laws. We stop our ears, and get accustomed to the pain, which, perhaps, is not severe, and soon goes off; the shoes get a scolding for their malice, and we forget all about it for a time. But does Nature check her course to suit the convenience of thoughtless man? No, no. In a short time we find that the nail, intercepted in its forward course, has become unusually thick and hard, and has

spread out so much upon the sides, that it is now growing into the flesh, and so makes a case for the doctor. Or, perhaps, the continuance of pressure may have inflamed the sensitive skin at the root, and caused a sore and painful place there. And instances are by no means infrequent in which the power of production of the nail at the root becomes entirely abrogated, and then it grows in thickness only. When this is the case, it is quite remarkable what a mass the nail will become. I know an instance in which the nail is regularly shed; whenever the old one falls off, a new one being found beneath it. Sometimes, growth in length is not entirely checked, although growth in thickness is induced, and then we get some marvellous specimens of toe-nails. I have several such in my possession; one being fully two inches long.

When we reflect upon the delicate mode of formation of the nail, we shall not be surprised to learn that the process is occasionally disturbed, but rather wonder that disturbance does not more frequently occur. The nails, from their position, are continually getting knocks and thumps, particularly in children; and when this takes place, a momentary disturbance of cell-formation is the consequence, which is indicated by an opacity of the cells produced under the influence of the impression left by the blow, and is marked by a white spot. In school-boys, it is no uncommon thing to find the nail spotted over with these white marks, which are moved onwards with its growth, and are eventually carried to its free border. To obviate the appearance of such spots, the hands must be taken care of, and the nails as little disturbed as possible. The care of the nails should be strictly limited to the use of the knife or scissors to their free border; and the ivory presser to their base, to prevent the adhesion of the free margin of the scarf-skin to the surface of the lunula, and its growth forward with that part. This edge of scarf-skin, *should never be pared*, the surface of the nail *never scraped*, or the nails

cleaned with *any instrument whatever* saving the nail-brush. Soap and the nail-brush, with the occasional use of the knife or scissors to the free end, and the ivory presser to the scarf-skin at the root, are *golden rules for the care of the nails*, and will prevent all their irregularities and disorders.

There is no rule for the management of the nails of greater importance than that which prescribes the pressing back of the free edge of scarf-skin which forms the boundary of the base of the nail. This margin is naturally adherent to the surface of the nail, and has a tendency to grow forward with it, and become ragged and attenuated. When allowed to do so, the ragged edge is apt to split up into shreds, and these, projecting from the surface, are pulled and torn, and often occasion a laceration of the skin, and a painful wound. From the liability to annoyance which these little shreds occasion, they have been denominated *agnails*, an old English term originally applied to every variety of disease occurring in the neighbourhood of, and affecting, the nails. Now, the occurrence of agnails may be effectually prevented by the regular use of the presser. The instrument should be applied once or twice a week, and with gentleness, so as to keep the free margin of scarf-skin loose, without interfering with the root of the nail. If used too frequently or violently, the root would be injured, and white spots and marks be produced. When the nails are stained and discoloured, a little lemon-juice is the best corrective.

Allied with the alteration in the nail caused by external injury, is a defective state of its growth resulting from constitutional disease. The nails are often produced very irregularly; they are thick, discoloured, and bent, and separate from their holding to the skin. Sometimes the beautifully smooth and polished surface which they present in a state of health is replaced by one rough and fibrous, like the inside of the husk of the cocoa-nut; and at other times they are brittle and soft. It is well

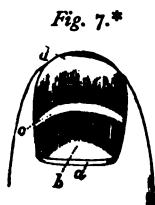
known that in certain fevers, portions of the scarf-skin of considerable extent, and sometimes the covering of the entire hand or foot, are cast off. In our anatomical museums, occasional specimens of these gloves and slippers of skin are preserved, and their examination shows that the nails, which form part of the scarf-skin, have participated in the separation. A similar action occurs periodically, as a natural phenomenon, among some of the inferior animals, as in the serpent, where, not only the scarf-skin of the general surface, but also that which covers the eye, is thrown off in one unbroken sheath. During the process of separation, the animal is unwell and abstains from food, but recovers all its energies as soon as the slough is left behind. In man, the natural moult of the scarf-skin takes place only through the medium of its elementary particles, the *scales*, and the displacement of such portions as those I have referred to is the effect of disease.

Dr. Beau, to whose observations on the growth of the nails I have already adverted, has further remarked that during the continuance of every constitutional disorder, the nails suffer to a greater or less extent. According to him, the law of growth of the nails is precisely the same both in health and disease (an assumption which, although not strictly true, approaches sufficiently near the truth to be admitted as a general proposition), but, in the latter state, the materials of growth are supplied by the blood in diminished quantity. Hence, the portion of nail formed during the progress of disease will be perceptibly thinner than that produced during health, and may be distinguished on the surface as a transverse groove. If the disease have been sudden, the outer boundary of the groove will be abrupt, and *vice versa*. And if the disease be one in which the nutritive functions are seriously affected, the depth of the groove will maintain an exact correspondence.

Dr. Beau's theory certainly accords with the known operations of the laws of physiology, and obtains an

important corroboration from another appendage of the surface-membrane of the body, namely, the teeth. The deep and uneven transverse furrows which are frequently observed on the teeth are referrible to infantile disease, and each notch is a sad and too faithful record of a period of suffering and pain.

Recurring to the time occupied in the growth of the nail, Dr. Beau suggests the possibility of determining the period of occurrence and also the period of duration of a disease, provided the time do not exceed that required for the entire growth of the nail. For example: a groove, or rather ledge, situated at the distance of eight millimetres from the edge of the root of the thumb-nail, or five from the free margin of the skin, is indicative of an attack of disease which commenced eight weeks previously; while the breadth of the groove being two millimetres would prove the disease to have continued for the space of two weeks. After five months,



on account of its entire growth in length being accomplished, and the vestige of disease consequently obliterated. The great-toe nail is now to be appealed to. At five months, the groove indicative of the above disease has advanced only five millimetres from the root, and is only just becoming apparent beyond the free margin of the skin, the breadth of the groove being only half a millimetre. In making these observations, M. Beau selects the thumb-nail and corresponding nail in the foot, because in them only he finds the appearances regularly present.

* *Fig. 7.*—A thumb-nail bearing the mark of a foregone illness. *a.* Is the edge of scarf-skin which overlaps the nail at its root. *b.* The lunula. *c.* The groove occasioned by deficient formation during the period of the illness. *d.* The free extremity of the nail.

To put Dr. Beau's observations to the test of experiment, I noted an illness which took place in myself, commencing on the 14th of December, and lasting for a fortnight. On the 1st of May following, I found across each thumb-nail, a groove measuring one line in breadth. Now a line is equal to two-and-a-half millimetres, and as the rate of growth of the nail, according to Dr. Beau, is one millimetre a week, my illness should have lasted two weeks and a half instead of two weeks. I therefore came to the conclusion, that either my own feelings of convalescence preceded the perfect restoration of the function of cell-formation, or that the rate of growth of the nail was more rapid in me than in other persons.

I next measured the distance between the beginning of the groove (namely, the margin nearest the extremity of the nail) and the edge of the skin nearest the root, and adding to that quantity three millimetres for the depth of the root, I obtained as a result seventeen millimetres; in other words, a space representing seventeen weeks, whereas the real time since my recovery from the illness was nineteen weeks and a half. This was exactly the reverse of my first observation, and went to prove that, in me at least, the growth of the nail was less rapid than is represented by Dr. Beau. Nevertheless, the experiment came sufficiently near the truth to render Dr. Beau's observations interesting and deserving of attention; they may be taken as certain as a proof of the fact of an illness and the probable period of its existence; and might be of use, as corroborative evidence, in a judicial investigation.

CHAPTER II.

THE SENSITIVE SKIN.

THE sensitive skin or derma, or corium, the true skin, as it is termed by anatomical writers, performs the dissimilar and, as it might at first sight appear, incompatible offices of an organ of exquisite sensation, and one of defence to the deeper parts of the body. The former of these functions is fulfilled by the superficial stratum of the derma, which is constructed for that purpose in a particular way; the latter is effected by the entire thickness of the true skin, but chiefly by its middle and deeper strata. In harmony with this distinction of the derma into a sensitive and defensive portion, is the division of it, made by anatomists, into a papillary and fibrous layer. It is the derma or corium of animals, the scarf-skin and hair having been removed, that by a chemical process is converted into leather. The smoothness of surface of leather, and the peculiar markings which it presents, are due to the papillary layer, whilst its thickness and strength are the qualities of the fibrous layer. Nature has contrived no other substance so beautifully, so perfectly fitted for the countless purposes of utility and elegance which leather fulfils. But how infinitely more admirable is the living and breathing skin!

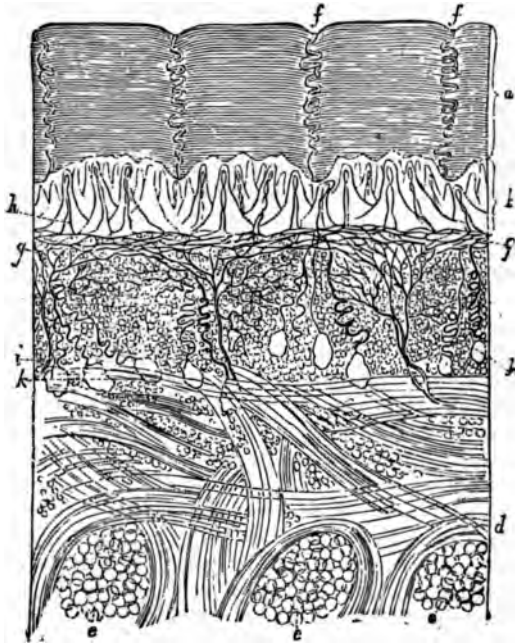
The defensive portion of the skin, or fibrous layer of the corium, is constructed of excessively minute fibres, which are collected into small bundles, or strands; and these latter are interwoven with each other, so as to constitute a firm, strong, and flexible web. In the super-

ficial part of the corium, the web is so close as to have the character of a porous felt; but more deeply, the pores become progressively larger, and, upon the deep surface, have a diameter somewhat less than a line, or twelfth part of an inch. The pores are round or oval in shape, and are separated from each other by strands of fibres of double their own diameter, which give to the under surface of the skin the appearance of a coarse net. The strands are connected with the fibrous web in which the subcutaneous fat of the body is deposited, and the open meshes are filled with little bags of fat. The mechanical arrangement which is here described is one which is calculated to excite our admiration. A membrane of inconsiderable thickness is so constructed as to offer different qualities, at different points of its depth; upon one surface, being a porous felt fitted to give an even support to the delicately organised sensitive layer; and upon another, a coarse network, capable of adapting itself to distension in every direction, and of returning completely to its original form. That the distension and contraction of the membrane should meet with no check, the open meshes are filled, as we have seen, each with a soft and compressible little cushion of fat, and the entire skin is preserved from the violence of contusion by being pillowed on a soft and elastic medium, the subcutaneous fat of the body, which breaks the force of a blow, by yielding before it. The cricketer, unknowingly, relies on this contrivance, when he receives the flying ball on his outstretched hand: and we all test its importance in the power which we possess of supporting, for hours together, the whole weight of the body upon so delicate a structure as that of the sensitive layer of the skin of the foot.

Much more wonderful, however, is the vital constitution of this membrane. The fibres of which the strands are composed are of three kinds: the greater part are white and comparatively inelastic, the elasticity of the membrane which they contribute to form being derived

from their manner of distribution ; some are yellow, highly elastic, but brittle ; a third set are reddish, without strength or elasticity, but possess a faculty of

*Fig. 8.**



independent motion. It is the latter that produce the motions occasionally manifested by the skin, namely,

* *Fig. 8.*—A section of the skin of the palm of the hand, the section being made along the middle of one of the ridges, and not across the ridges, as in *fig. 1*. The figure is magnified thirty-eight times.

a. The scarf-skin, showing its laminated texture, and four spirally twisted perspiratory tubes which traverse it. *b.* The papillary layer of the sensitive or true skin : three clusters of

that state which is denominated *goose-skin*, and the erection of the hairs under the influence of mental emotion or physical sensation.

The skin of man is very thick when taken in comparison with that of many animals, and particularly with those which have a protective covering of feathers, hairs, or scales. Of all animals, the skin is thinnest in birds, while it is remarkable for its thickness in the bald-skinned animals, such as the hog tribe, the rhinoceros, the elephant, and the whale. The defensive layer of the derma naturally varies in thickness on different parts of the body; for example, on the back of the trunk and on the outside of the limbs, where injuries are most likely to be received, the corium is thick; while on the front of the trunk, and particularly on the inner side of the limbs and in the flexures of joints, it is thin. This peculiarity is associated with the occurrence of certain eruptions in particular situations; some are met with only on the inner side of the limbs, while others are rarely seen but in the opposite locality. Watery pimples and moist excoriations are found in the former; while dry pimples and the scaly forms of cutaneous disease prefer the latter.

The sensitive layer of the skin (fig. 8, *b*) is thin, soft,

papillæ are seen. *c, d*. The fibrous portion of the corium or true skin: in its upper part—namely, at *c*, being close and dense in texture; and in its deeper part, as at *d*, composed of strands of fibres of considerable bulk. *e, e*. Little cushions of fat, which occupy the interstices of the strands of fibres in the deep part of the corium. The fat, or rather oil, of the body is contained in little globular bags or vesicles, packed together in considerable numbers, as is shown in the figure. *f, f*. Two of the pores of the skin, or apertures of the perspiratory tubes. *g, g*. The network of capillary vessels lying at the base of the papillæ, and supplying the latter with blood by means of capillary loops. *h*. The capillary loop of one of the papillæ; similar loops are seen in other papillæ. *i, i*. Two of the supply-pipes or vessels, termed arteries, which convey the blood to the capillary network: a third supply-pipe is seen between these two. *k, k*. Perspiratory glands, with their twisted tubes: several other glands and tubes are seen in the figure.

and uneven, pinkish in hue, and composed of vessels which confer its various tints of red; and nerves, which give it the faculty of sensation. Its unevenness has reference to an important law in animal organisation, namely, that of multiplying surface for increase of function; and the manner of effecting this object is by the extension of its substance into little, elongated, conical prominences, technically termed *papillæ*. These papillæ are microscopic in size, as may be inferred from their being imperceptible to the naked

Fig. 9.*



eye; and as they exist in various degrees of magnitude, on every part of the skin, their number is infinite. In structure, some contain a minute vessel (termed *capillary*, from its hair-like size) and some a minute nerve. In the vascular papillæ, the vessel forms a simple loop, and the two little cylinders, with their enclosing membrane, are a measure of the diameter of a separate papilla. In the nervous papillæ, endowed with a power of sensation, the little nerve expands into a small cone-shaped body, and ends by several filaments. The little vascular loops (fig. 8, *h*) spring from a network (*g*) of minute vessels (capillaries), and the nerves from a nervous plexus, embedded in the porous stratum of the corium at the base of the papillæ: and they receive their supply of blood and nervous influence through small vessels and nerves, which take their meandering course through the fat-distended openings of the deeper strata of the

* *Fig. 9.*—A portion of the internal skin of the lip; showing the capillary vessels and their arrangement. In the upper part of the figure they form loops, and these loops, clothed with a thin membrane, are papillæ. Lower down, the capillaries form a network; the large vacuities in this network, in the lowest part of the figure, are for the reception of glands, corresponding with the *oil-glands* of the skin.

corium. We have seen already, that the openings in the corium are a provision for its elasticity: we have here a second purpose which they fulfil; for in this, as in most of the operations of the animal organism, we are continually reminded of the expressive lines of Pope:—

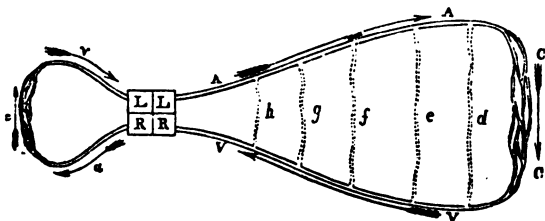
“ In human works, though labour'd on with pain,
A thousand movements scarce one purpose gain ;
In God's, one single can its end produce,
Yet serves to second, too, some other use.”

It is always interesting to observe the modification of a known principle of structure to suit a special purpose. An instance of this modification is seen in the palm of the hand and sole of the foot, and on the corresponding aspect of the fingers and toes. On the parts indicated, the sensitive layer of the derma is raised in the form of small ridges, which are curiously arranged, as may be seen by inspecting them on the hand in their epidermal dress; some are traced in concentric ovals; others, running more or less parallel, pursue a serpentine course; some separate abruptly and suddenly diverge; and others are seen to part for a short distance, and again to reunite. These little ridges, when examined with the microscope, are found to be marked, at distances corresponding with the breadth of the ridge, into small square allotments; and each allotment is made up of a tuft of papillæ, from ten to twenty in number.

In the sensitive layer of the derma it is that the blood of the skin is chiefly distributed, being conducted to that layer by small vessels (tubes), termed *arteries*, which find their way to the surface through the irregular interstices of the strands of fibres of which the corium is composed. Having reached the porous, felt-like layer of the corium, the small arteries empty their blood into a very beautiful and rich network of minute vessels, remarkable for their frequent communications with each

other, and for their uniformity of size; these are the *capillaries*, called also, because they occupy an intermediate position between the arteries and veins, and are the only channel of communication between the two, *intermediate* vessels. From the capillaries, the blood, having performed its circuit in the skin, runs onwards into vessels which take a retrograde course through the interstices of the corium, by the side of the arteries, and return the blood to the heart; these are the *veins*. The circulation of the blood through the skin, and its course from and to the heart, may, perhaps, be better explained by the annexed diagram.

Fig. 10.



In this diagram, the letters L L R R represent the heart, composed of four cavities, L L being the left, and R R the right chambers; A A, a channel representing the system of *arteries*, which conduct the bright-red blood from the left chambers of the heart to every part of the body; V V, a channel representing the system of *veins* which return the blood of a dark-red colour, and in an impure state, to R R, the right chambers of the heart; C C, capillary vessels of the surface of the body, conducting the blood from the arteries to the veins, consequently, *intermediate vessels*; d, e, f, g, h, intermediate vessels in the interior of the body, supplying with blood the various organs—the brain, liver, stomach, kidneys, &c. The relation of these vessels to the *cutaneous intermediate vessels* shows, that if the blood

were checked in its passage through C C, it would be driven, or repelled, or determined upon *d, e, f, g, h*. If the check were slight, *d* (which may represent the kidneys) only would suffer; if the check were more severe, *e*, the stomach, *f*, the liver, *g*, the spinal marrow, *h*, the brain, or L R, the heart, would become overloaded with blood. In like manner, an overloaded state of C C, whether the consequence of disease, or artificially produced, will lighten, or, in some instances, exhaust *d, e, f, g, h*. So fearfully and wonderfully are we made! This diagram shows also how an eruptive disease may act the part of a safety-valve to the economy. On the opposite side of the heart, *a* represents an artery conveying the impure blood from the right chambers of the heart to the lungs; *v* is the channel by which, when purified, the blood is brought back from the lungs to the left chambers of the heart; *c* represents the intermediate vessels, or capillaries of the lungs, in which the purification of the blood is accomplished. The circle R, *a, c, v, L*, is the lesser circle, the course of the pulmonary circulation, or circulation of the blood through the lungs: L, A, C, V, R, is the great, or systemic, circle, the course of the circulation through the rest of the system. But the truth is, there is but one circle or circulation, the channels of which are brought into proximity at the heart.

The blood which proceeds from the heart, and is conducted along the tubes, termed arteries, is of a bright vermilion colour, and pure: in the capillaries it yields up its nutrient principles to the tissues through which it meanders, and, at the same time, gathers the materials of decay cast off during the process of nutrition. Coincident with this change in the vital composition of the blood, is a change in its colour and temperature; it has lost nearly one degree of Fahrenheit; and it returns to the heart, through the veins, of a dark-red hue, almost approaching to black, and under the appellation of impure, or venous blood.

That which is now stated with regard to the skin, will, in like manner, serve as an explanation of the circulation of the blood throughout the entire body. The heart, as I have represented in the diagram, contains four chambers, two on its left, and two on its right side; and, so far as it is concerned in the process of circulation, is a force-pump for propelling the contents of these cavities, the direction which the fluid is to take being regulated by apertures and valves, permitting its passage in one direction only. Thus, from the left chambers of the heart (L L), the blood is propelled through a system of elastic tubes, called *arteries* (A A), to every part of the body; the arteries terminate everywhere in minute tubes termed *capillaries* (C C); from the capillaries, after a certain course, the blood passes into *veins* (V V); and the latter, being the returning channel of the blood, convey it to the right chambers of the heart (R R). The circulation of the blood, therefore, in its simplest expression, resolves itself into *a transit from the left (L) to the right chambers of the heart (R)*. Let us now inquire what purpose it fulfils during this transit. The arteries and veins are the mere carriers of the blood; but the capillaries are agents of high account in regard to its distribution. They exist so abundantly in all parts of the body, that some of its organs appear to be almost wholly made up of them; * and their abundance in the skin may be inferred from the fact that the smallest needle-point cannot be inserted into that structure without wounding some of these vessels; in the words of my quaint old friend Daniel Turner, "there is no part impermeable to that vital nectar, the blood." For the purpose of facilitating the passage of the blood, and preventing the possible occurrence of obstruction in the circulation, the capillaries communicate with each other

* A celebrated Dutch anatomist, Ruysch, spent his life, which reached to the period of 93 years, in making preparations to exhibit the blood-vessels, and he came to the conclusion that the *body was entirely made up of vessels.*

at minute distances, and thus constitute a network of exquisite delicacy and beauty; and for the purpose of bringing every portion of the blood into the most favourable position for performing its office, their size corresponds with that of the solid particles of the blood (the blood disks), and is pretty uniform throughout the entire body. In structure, the capillaries are porous, and permit the passage outwards of oxygen and of the nutrient elements of the blood, and inwards (that is, into the flowing stream) of the carbonic acid gas generated in the tissues of the body, and the waste of nutrition. Coincident with these changes is the gradual conversion of the blood, from its previously bright scarlet hue, to a dark red. The purpose which the blood fulfils, therefore, is to convey oxygen and the elements of nutrition to the ever-changing tissues of the body; and in return, to become charged with the elements of decay, and thus rendered unfit for the further sustenance of the animal machine, until it is subjected to some process of purification.

Having arrived in the chambers of the right side of the heart (R R), in the state of an impure and dark-coloured stream, the blood is now propelled through an artery (*a*) to the capillaries of the lungs (*c*), and through the latter into four veins (*v*), which convey it to the left chambers of the heart (L L). The blood, therefore, performs a second but smaller circuit—namely, through the lungs, and during this course is affected in precisely the opposite manner to that which occurred during its current through the body. From having been dark-coloured, it is now bright scarlet; its carbonic acid and some of its water have been thrown off into the lungs, and its little disks have become again charged with oxygen. The lungs, it need hardly be said, are the organs of respiration—two cellulated bags* filling the chest, con-

* The lungs receive the atmospheric air through the windpipe. At the root of the neck the windpipe or trachea divides into two branches called bronchi, and each bronchus upon entering its

structed almost wholly of capillary vessels, and distended with atmospheric air at every inspiration. The capillaries hold the same relation now to the atmosphere that they did in the greater circle to the tissues of the body; and, being endowed with the same properties of permeability, they give passage, through their pores, to the carbonic acid of the impure blood, which is discharged from the lungs with the expired air, and they imbibe from the atmosphere a portion of its oxygen. The blood, therefore, on its return to the left chambers of the heart, is fitted again to resume its current through the system, and perform the functions of the greater circulation.

It may possibly be inferred, from this description of the circulation, that the lungs are the sole purifiers of the blood, and that carbonic acid gas and water are the sole impurities which are thrown off by that fluid. This would be incorrect, for about one-fourth of the venous blood is distributed by means of capillaries through the liver, and yields up materials fitted to form the bile before reaching the right side of the heart. Again, many of the impurities introduced into the blood with the elements of decay pass undisturbed through the lungs, and are separated from the system by organs specially destined to that office, namely, the kidneys and skin. These two latter, in truth, may be styled the purifiers of the arterial blood; while the liver and lungs are the purifiers of the venous blood.

All the phenomena of colour of the skin, excepting that which is due to its pigment, are referrible to the quantity, velocity, or composition of the blood flowing through its capillaries. When mental emotion causes a

respective lung divides into an infinity of small tubes. The latter terminate in small pouches, called the air-cells, and a number of these little air-cells communicate together at the extremity of each small tube. The number of air-cells in the two lungs has been estimated at 1,744,000,000, and the extent of the skin which lines the cells and tubes together at 1,500 square feet. This calculation of the number of air-cells and the extent of the lining membrane rests on the authority of Dr. Addison, of Malvern.

sudden turgescence of the capillaries, the natural red hue of the skin is heightened, and the state is termed *blushing*. But an opposite effect may be produced by the same cause, and particularly when the emotion is of a depressing kind, or when an inward struggle ensues for mastery over the feelings, and then we have intense pallor; pallor dependent upon the rush of blood from the skin upon some internal and perhaps vital organ, maybe the heart, maybe the brain.* Inflammation is always accompanied by heightened circulation in the part inflamed; and as most of the diseases of the skin are associated with inflammation, so redness is a general concomitant of cutaneous disease. This is remarkably the case in erysipelas, in scarlet fever, and in measles. In the two latter diseases, another phenomenon may also be observed, which is that the redness occurs in minute points, an appearance which results from over-distension with blood of the vessels of the pores of the skin. Purpleness or blueness of the skin always depends on some cause of retardation of the cutaneous circulation. Thus, on a winter's day, the vigour of the nervous power is reduced by the cold; and in addition to the repulsion inwards of much of the blood contained within the vessels of the skin producing pallor, that which remains behind moves so languidly through the capillaries, that the change from bright-red to deep black-red has time to be established before it completes its circuit and reaches the veins. The mottled appearance of the skin of children in cold weather owes its darker shades to the same cause. As respects the colour resulting from altered composition of the blood, the yellow tints of dyspepsia and jaundice are due to admixture of the colouring matter of bile with the blood, and the varied hues of chlorosis or green sickness to a similar colouring principle, superadded to an absolute deficiency in the quantity of red blood contained within the body.

The nerves of the skin, proceeding as they do from the

* See description of diagram, p. 28.

great centre of the nervous system, the brain and spinal marrow, are the source of the sensibility of the skin. The degree of its sensibility offers great and remarkable variety, not only as respects individual circumstances, age, sex, temperament, and state of health, but also in relation to the part of the skin under examination. The differences of sensibility among individuals are so great, that that which amounts to absolute torture in one, is a matter of almost indifference to others, and this without any known signs by which such variety of sensibility might be predicted. I have frequent occasion to observe this diversity of sensation in the effects of medicinal substances used as applications to diseases of the skin, and am enabled to act accordingly, attributing to its right cause what might, by the unobservant, or the ignorant, be set down to deficiency of moral power.

In reference to age, sex, temperament, and health, as modifiers of pain, there can be no question that the sensibilities are more acute in the young than in the adult, and in the latter than in advanced life; they are greater also in the female than in the male; in the sanguine and nervous than in the phlegmatic and bilious temperament; and in those who are enfeebled by disease than in the sound and robust. I recollect a lady, who had long suffered from an exhausting malady, telling me that her sensations had acquired so painful a degree of acuteness, that she felt the scratching of her pen on the paper, in the act of writing, repeated on her head like the point of a burning knife tracing characters on the bare flesh; and I know another lady who at times is unable to bear the weight of her dress. A gentleman complained to me of an acid feeling in the skin; and another has the sensation of two lateral halves to his body, and during illness the sensibility of one half is so much excited, that he cannot bear to be looked at on that side.

Numerous instances are on record which show that in *a particular state of the brain and nerves* physical sen-

sation is diminished, and in some instances, to all appearance, entirely abrogated. An apt illustration of this fact is exhibited in the perfect insensibility produced by the inhalation of ether. This powerful vapour, received into the stream of blood during respiration, is quickly diffused through the entire system, and rolling, like a somniferous cloud, on the brain and nerves, wraps them in a mantle of total insensibility. The condition of the patient while in this state is one of deep sleep. As the vapour clears away, the faculties awaken; first those of the mind, creating dreams of repose and pleasure: then the senses of sight and hearing; and, lastly, common sensation, or the perception of pain. The enjoyment caused by ether, however, falls very short of that produced by the protoxide of nitrogen, or laughing gas.

We are indebted to America for the idea of seizing upon the moment of insensibility, caused by the inhalation of ether, for the performance of painful operations, and the thought is a blessed one for humanity. Not only may the pangs of painful operations, by this means, be buried in oblivion, but the torturing achings of the nervous system, dependent on other causes, may be assuaged and calmed. Indeed the amount of benefit conferred upon society by this simple expedient, can, in the present infant state of our experience with regard to it, barely be imagined. I have just quitted a friend, a dentist, to whom, a fortnight since, I was recounting my own observations on the ether inhalation. At that time, he received my opinion with manifest doubt. To-day, he tells me, that having to remove two large teeth for a darling child of his own, an operation which had been deferred for months, from the fear of giving her pain, he administered the vapour of ether, and before insensibility was quite complete, he withdrew one of the teeth. After the operation, she awoke, stretched out her hands, and exclaimed:—"Is that you, papa? I have had such a delightful dream." He then repeated the inhalation,

and removed the remaining tooth. I think my readers will agree with me that in the unprepared state of the nervous system, the extraction of a tooth is very far from being a dream of pleasure. The same gentleman allowed a lady to leave his house under the impression that, as she had not inhaled properly, her tooth, a painful stump, could not be removed. She soon, however, returned to express her gratitude, having detected the absence of her woeful tormentor.

Since the proof afforded to the world of the anæsthetic power of ether, another agent for procuring insensibility to pain has been discovered. The new agent is chloroform, a transparent, colourless, and highly vaporizable spirituous fluid. It is administered, like ether, by inhalation into the lungs, and is found to take effect more speedily, and act more powerfully than the former fluid. On a late occasion, I administered this vapour to a wagoner, while under the operation of amputation of the thigh. He was evidently unconscious during the whole of the painful process, and seemed like a person in a deep sleep. When the operation was completed, I dashed water in his face in order to arouse him, and asked him how he felt. He replied that he was well and comfortable, and thought he must have been dreaming, for he fancied that he was leading his horses into a river, and that one of them had splashed the water in his face. To my further question, whether he was ready to have his limb removed, he answered, that we might do anything we liked. Now, it is evident, that in this instance there must have been total insensibility to the pain of the operation; had he experienced suffering, however slight, it would so far have awakened his brain as to have shaped his ideas into the form of a dream, and in the dream would have been shadowed forth the painful condition of his nerves. This, however, was not the case: his first perception of outward events appears to have been the shock of cold water dashed upon his face; *and, then*, as a second mental operation, the little spurt

of thought which gave, for a signification of this impression, the homely scene of his rural occupations. But if chloroform be more rapid and energetic in its effects than ether, it has also disadvantages, which call for greater caution in its use; for if employed in too large a dose, or applied too long, it would be apt to occasion a state of fatal insensibility.

When chloroform, by means of its vapour, or in the fluid state, was applied to the skin, it was found in man to produce a partial state of insensibility; but in animals whose skins were moist and thin, the loss of sensation and motion was very remarkable. Thus, in Dr. Simpson's experiments, frogs, whose hinder limbs were enclosed in a bag filled with the vapour of this agent, lost for some time the power of leaping; and worms and millipedes subjected to its influence were affected in a similar manner, and dragged the paralysed part of their bodies behind them. In all these cases, the power of motion and sensation was restored more or less quickly.

Another means of lowering the sensibility of the skin, so as to permit of the performance of surgical operations without causing pain, is an ingenious application of the well-known benumbing property of cold, suggested by Dr. James Arnott. The apparatus required for effecting this object is, "a small pig's bladder, some pounded ice, and a little salt. The bladder, containing tepid water, is placed so as to cover the portion of skin to be rendered insensible; the ice is then gradually dropped in, and last of all the salt, so as to bring the temperature considerably below the freezing point." Dr. Arnott observes, that by this plan he has succeeded in "dissecting off a square inch of the skin without causing pain," and "made setons without the patient's being conscious that the skin was cut." The time requisite for prolonging the chilling process is from fifteen to twenty minutes.

However various the differences of sensibility may be in different individuals, and under different circum-

stances, it would scarcely be supposed that any great amount of variety could exist in parts of the skin of the same person, and yet such is the case. Dr. Weber, an eminent physiologist of Leipsic, ascertained by experiment, that to be distinguished as separate sensations, the points of a pair of compasses applied to the skin of the middle part of the arm or thigh, must be separated from each other to a distance of thirty lines; while on the tip of the finger, two sensations are obtained by a separation amounting only to one-third of a line. On the front of the finger, the distance necessary to give two sensations was two lines; on the cheek, five lines; forehead, ten lines; and on the middle of the breast, twenty lines. The same gentleman has pointed out other curious phenomena in connexion with the sensation of the skin; thus, he observed that if the two hands were immersed in warm water of the same temperature, that in which the left was plunged would feel the warmest; and that if the finger of one hand and the whole of the opposite hand be held in hot water, the sensation communicated by the single finger would be trifling, while to the entire hand it would be unbearable. These facts serve more strongly to corroborate the diversity of sensibility existing among individuals.

I have hitherto referred only to natural sensations—namely, to sensations determined by the excitation of the nerves of the skin, such excitation being directed either from without or from within; but there are other sensations, and those of a painful character, which are dependent on an unnatural and unknown state of the nerves themselves, sometimes involving a single nerve or a part of a nerve, and sometimes more or less of the whole nervous system, including even the brain. Of this kind is that distressing itching of the skin which, without any external cause, sometimes assails more or less of the surface of the body, destroying comfort and repose, rendering sleep impossible, and eventually injuring the health by continued irritation. In the interval

of the attacks the sufferer is easy and at rest, probably enjoying conversation, and unconscious of his physical tormentor; but the instant the thoughts recur to the seat of suffering, that instant the itching is renewed. A lady, bearing the outward appearance of perfect health, describing to me the torture which she experienced, remarked, "the sensation caused by the sponge dipped in scalding water, and immediately applied to the skin, is perfect bliss when compared with the pungent suffering caused by this itching." Instances are on record of kings being afflicted with this frightful malady. Plato in his old age, suffered under it; as did the Abbé Morellet, in the eightieth year of his age. Other varieties of painful sensation experienced by the skin are, tingling, smarting, pricking, shooting, creeping, tickling, burning, scalding, &c.

An opposite state of sensation is sometimes met with, namely, where the sensibility of the skin is much diminished, and in rare cases, even abrogated (anæsthesia).^{*} As we have seen in the preceding paragraph, anæsthesia may be induced artificially by medicinal agents—as, ether, chloroform, &c. It is, like exalted sensation, a state of the nerves, and sometimes of the brain, although the apparent seat of the disorder is the surface of the body, and a part distant from the real disease.

^{*} This word is derived from the Greek, and signifies *deficient sensation*.

CHAPTER III.

THE PERSPIRATORY SYSTEM.

IN the two preceding chapters, the skin has been described as a membrane of inconsiderable thickness, constituting the surface of the body, and composed of three layers, namely, scarf-skin, sensitive layer, and fibrous layer. I have now to point out the existence of numberless minute tubes, which traverse the three layers of the skin more or less deeply, and open on the surface of the scarf-skin by as many minute

*Fig. 11.** apertures, which are termed *pores*. These tubes, with their corresponding pores, belong to three systems of cutaneous organs, now to be examined; namely, the perspiratory glands, oil-glands, and hairs.



The perspiratory apparatus consists of very minute cylindrical tubes, which pass inwards through the scarf-skin and sensitive skin, and terminate in the deeper meshes of the latter. In their course through the scarf-skin, each little tube forms a beautiful spiral coil; in its deeper course through the corium it is also more or less spiral or flexuous; and on arriving at its destination, coils upon itself in such a way as to constitute a little oval-shaped or

* *Fig. 11.*—A perspiratory gland, with its tubule.

a. The pore. *b.* That portion of the tube which is situated in the scarf-skin; the spiral is close. *c.* The tube within the sensitive skin; the spiral is more open than the preceding. *d.* The gland.

globular ball, the perspiratory gland. The perspiratory gland, therefore, is a very small mass, formed by the twisting of a minute tube; and the latter is constructed, and, indeed is a prolongation, of the three layers of which the skin is composed,—namely, the scarf-skin, which lines the interior of the tube; the sensitive layer, furnished with a rich net of capillary vessels; and the fibrous layer, which forms a protective layer to the exterior for its strength and support. In the language of anatomical science, the tube and gland are an *involution of the skin*. The mouth of the perspiratory tubule on the surface of the scarf-skin, namely, the “pore,” is also deserving of attention. Its extremity is the section of a spirally-twisted tube, and in consequence of this peculiarity, the aperture is oblique in direction, and possesses all the advantages of a valvular opening.

In this structure, and in the fact of the scarf-skin being prolonged as a tubular sheath into the perspiratory duct, the reader will perceive the reason of a phenomenon which puzzled the earlier physiologists, and induced them to declare that there were no such things as “pores” in the skin. I allude to the retentive powers of the scarf-skin in the case of a blister: it was thought, that if there were pores, the fluid of a blister must necessarily permeate those openings; but it is easy to perceive, that if each pore be in the first instance spiral, and then prolonged for some length as a contracted tube (for whenever a blister is formed, the lining of the perspiratory duct is drawn out of the true skin), the entrance of fluid into the tube must be as difficult to effect as its

Fig. 12.*



* Fig. 12.—The lining membrane or sheath of one of the perspiratory tubes. The lighter part of the cylinder represents the area of the tube. The sheath is shown to be composed of cells rendered polygonal in their form by compression. Magnified about 250 times.

passage through the scarf-skin itself. Again, the distension of the scarf-skin acting with direct pressure on the coils of the spire, must press them together and hermetically close the tube; and as the lining of the first portion of the latter, after it has passed the scarf-skin, is thick and rigid, and projects like a cone from the under part of the cuticle, the fluid pressing on all sides will tend to obliterate its passage, while the rest of the tube, in the act of being drawn out and suddenly giving way with an elastic rebound, must be closed equally securely. On the palm of the hand and pulps of the fingers, the openings of the perspiratory pores (fig. 1, *d*) are distinctly perceptible to the naked eye; they are situated at nearly equal distances* on the little ridges, and give to the latter the appearance of being crossed by little transverse lines. On the sensitive layer they make a similar impression, dividing the ridges into little square allotments, each allotment being separated from that which precedes and follows it, by the shaft of a perspiratory tube.†

Taken separately, the little perspiratory tube, with its appended gland, is calculated to awaken in the mind very little idea of the importance of the system to which it belongs; but when the vast number of similar organs composing this system is considered, we are led to

* They are situated at about one-sixth of a line apart along the ridge, and a little less than a quarter of a line from ridge to ridge. On the heel there are four and a half pores in the compass of a line along the ridge, and three and a half across the ridges.

† "If one will," writes an old author, Grew, in the *Philosophical Transactions*, "with an indifferent glass, survey the palm of his hand, *very well washed*, he may perceive innumerable little ridges of equal bigness and distance, and everywhere running parallel one with the other: upon these ridges stand the pores all in even rows, and of that magnitude as to be visible to a very good eye without a glass; but, being viewed with one, each pore looks like a little fountain, and the sweat may be seen to stand therein as clear as rock-water, and as often as it is wiped off to *spring up* within them again."

form some notion, however imperfect, of their probable influence on the health and comfort of the individual. I use the words "imperfect notion" advisedly, for the reality surpasses imagination, and almost belief. To arrive at something like an estimate of the value of the perspiratory system in relation to the rest of the organism, I counted the perspiratory pores on the palm of the hand, and found 3,528 in a square inch. Now, each of these pores being the aperture of a little tube of about a quarter of an inch long, it follows, that in a square inch of skin on the palm of the hand there exists a length of tube equal to 882 inches, or $73\frac{1}{2}$ feet. Surely such an amount of drainage as seventy-three feet in every square inch of skin, assuming this to be the average for the whole body, is something wonderful, and the thought naturally intrudes itself:—What if this drainage were obstructed? Could we need a stronger argument for enforcing the necessity of attention to the skin?

On the pulps of the fingers, where the ridges of the sensitive layer of the true skin are somewhat finer than in the palm of the hand, the number of pores on a square inch a little exceeded that of the palm; and on the heel, where the ridges are coarser, the number of pores on the square inch was 2,268, and the length of tube 567 inches, or 47 feet. To obtain an estimate of the length of tube of the perspiratory system of the whole surface of the body, I think that 2,800 might be taken as a fair average of the number of pores in the square inch, and 700 consequently, of the number of inches in length. NOW, THE NUMBER OF SQUARE INCHES OF SURFACE IN A MAN OF ORDINARY HEIGHT AND BULK, IS 2,500;* THE NUMBER OF PORES, THEREFORE, 7,000,000, AND THE NUMBER OF INCHES OF PERSPIRATORY TUBE 1,750,000, THAT IS, 145,833 FEET, OR 48,600 YARDS, OR NEARLY TWENTY-EIGHT MILES.†

* Haller's estimate of the extent of surface of the body is fifteen feet square, that is, 2,160 inches.

† To the medical reader, it may be necessary to explain that

The perspiratory system of the skin is one of the usual channels by which excess of water is removed from the blood, and in effecting this purpose, the perspiratory function becomes a regulator of the temperature of the body. In health, perspiration is always taking place, even in a passive state of the body, and passes off in the form of an imperceptible vapour, which is therefore termed *insensible perspiration*. But when the muscular system is in exercise, when chemical combination is active, and the nervous system excited, the perspiration is no longer insensible; it becomes perceptible, and more or less abundant, and is then denominated *sensible perspiration*.* The existence of perspiration in its insensible or sensible state bears relation, however, not merely to the quantity of perspired fluid, but also to the state of the atmosphere. Thus, in a close, damp day, when the atmosphere is warm, and already charged with moisture, it is incapable of receiving that of the skin, and the ordinary insensible vapour becomes condensed in a sensible form. On the other hand, when the atmosphere is dry, and the body or the air in motion, the moisture is carried away so rapidly, that the sensible, under ordinary circumstances, becomes an insensible perspiration. The term "insensible perspiration," therefore, properly applies to

the sebiparous system is included with the system of perspiratory glands and tubes in this calculation. I have ascertained, beyond question, that the sebiparous system is the perspiratory apparatus of the greater part of the body, the true perspiratory glands and the tubes being found only in certain parts. Therefore, the calculation which I have made on these premises must be considered as falling within rather than beyond the truth.

* It is not a little remarkable that in many, and indeed in the greater number of mammiferous animals, perspiration never proceeds so far as to moisten the skin. The privilege of free transpiration is enjoyed by horses and cattle in common with man, but is denied to the canine race, dogs, foxes, and wolves. Dr. Mason Good, however, observes: "In violent agony I have known a Newfoundland dog thrown into a sweat that has drenched the whole of his thick and wavy hair."

the imperceptible evaporation from the skin when the body is at rest, or in gentle motion.

To comprehend in what manner the perspiration is a means of limiting the heat of the body, it will be necessary to glance at the principal phenomena concerned in animal temperature. The ordinary temperature of the body, as ascertained by placing the bulb of a thermometer under the tongue, is 100 degrees of Fahrenheit. This may be regarded as the standard temperature of the human body in health, and it offers very little variation, in summer or in winter, at the equator* or the pole.† In disease, even, the variation is less considerable than might be imagined, the lowest temperature on record, namely, that of Asiatic cholera, being 77°, and the highest 110 $\frac{3}{4}$ °.‡ The sources of animal temperature are, the chemical processes constantly taking place in the body during the action of the various phenomena concerned in nutrition, and these, by developing heat, maintain a condition which is necessary to the continuance of life. The minimum of heat to be thus produced is, we have just seen, 100 degrees of Fahrenheit, and so long as this quantity is developed, the functions of the body are properly performed, and a state of comfort is maintained; but the instant the temperature sinks below this point, the chemical processes have then to be aroused and stimulated by such means as are capable of augmenting the rapidity of respiration and circulation. These are the processes which, in the winter season or at the poles,

* In Hindostan, the temperature is occasionally 120 degrees of Fahrenheit. In South Carolina, Dr. Dunglison remarks that the thermometer has been seen as high as 115°; and at Fort Gibson, on the 15th of August, 1834, it stood at 116°.

† At the bivouac at Miedneski, on the 8th and 9th of December, during Napoleon's retreat from Moscow, the temperature was as low as 27 and 32 degrees below zero; and in the Polar Voyages the thermometer has been noted at 70 degrees below zero.

‡ A case of tetanus recorded by Dr. Edwards.

are engaged in keeping the temperature up to the natural standard; and in this case, the insensible perspiration, although it exist, is at its minimum of activity, and every collateral condition of external warmth and clothing is required to aid in the preservation of the proper amount of heat. But when the human body is transferred to the equator, or when, as has frequently happened, a man has subjected himself to a temperature* much greater than that of boiling water, at a moment, too, when his own vital processes were generating more heat than the natural standard required, it is then that the influence of the perspiration, as an agent in limiting the temperature of the body, is strikingly manifested. Sir Charles Blagden supported a temperature of 260° for nearly ten minutes. I myself sat for ten minutes, without inconvenience, in the Laconicum of a Turkish bath heated to a temperature of 240° , namely, 28 degrees above the boiling point of water. The thermometer placed in the mouth of a man who had been exposed to a temperature of 120° for a quarter of an hour, stood at 105° ; and the temperature of animals, when the heat has been raised to a degree sufficient to cause death, has never exceeded in elevation from nine to fourteen degrees above the natural standard.† The reduction of the heat of the body at so

* The furnace in which Sir Francis Chantrey was in the habit of drying his moulds was heated to a temperature of 350° , and into this his men occasionally entered without inconvenience. The oven used by Chabert during his exhibitions in London was heated to between 400° and 600° .

† It is interesting to note, that in animals made the subjects of these experiments, the blood was found in the opposite position to that which it would have occupied after death from cold. Instead of being collected about the heart and internal organs, as in death ensuing from the latter cause, the heart was empty, and the vital fluid dispersed towards the periphery of the body, in some instances being actually forced out of its vessels into the surrounding tissues. The blood seemed to have been killed by the heat, for it had lost its power of coagulating, and its deep black hue was not altered by exposure to the atmosphere, a *change* which takes place in living blood. In a moist atmo-

elevated a temperature takes place at the expense of the water of the blood and of the tissues. To be raised in the form of vapour, water requires a large amount of heat, and in this way the excess of heat is employed. Again, as the water becomes dissipated by perspiration, thirst is occasioned, and the fluids taken to alleviate the desire for drink are immediately engaged in the evaporating process. From what has been said in a previous paragraph (page 44), it is evident that all the above high temperatures have reference to dry air, for when the air is moist, evaporation is checked, and the removal of heat consequently prevented.

As an illustration of the influence of a moist atmosphere, at an elevated temperature, on the human system, I may adduce the effects occasioned to a gentleman who recently visited the baths of Nero, near Pozzuoli, the ancient Posidiana. To reach the bath, he had to pass through a narrow winding passage of about 120 yards in length, and seven feet high, by about three in breadth. A little within the mouth of the passage, the temperature was 104° in the upper strata of the atmosphere, and 91° near the ground; farther on, the air was filled with a dense vapour of a temperature of 118° above, and 111° below; and over the bath it was 122° , the heat of the spring being 185° . After proceeding for about one-third the length of the passage, he began to feel a sense of oppression and discomfort, his pulse rising from 70 to 90 beats in the minute. A short distance further, the oppression increased, his breathing became rapid and panting, and he was under the necessity of stooping his head frequently to the earth, in order to obtain a chestful of air of a less suffocating temperature. His skin at this time was bathed in a profuse perspiration, his head throbbing, and his pulse beating 120 in the minute. Continuing his progress, the sensations of suffocation

sphere, the animals died sooner than in dry air of a higher temperature, and without losing weight; in dry air they lost weight.

became insupportable ; his head felt as though it would burst ; his pulse was so rapid as to defy calculation ; he was exhausted, and nearly unconscious ; and it required all his remaining power to enable him to hurry back to the open air. On reaching the mouth of the passage, he staggered, and nearly fainted, and was very uncomfortable until relieved by a bleeding from the nose. During the rest of the day, his pulse remained at 100 : he had uneasy sensations over the surface of the body, and did not recover until after a night's repose. The same gentleman bore a temperature of 176° in dry air without inconvenience.*

The regulation of the temperature of the body is only one of the purposes fulfilled by the perspiration : another, and an important one, is the removal from the system of a number of compounds noxious to animal life.† It was estimated by Lavoisier and Seguin, that eight grains of perspiration were exhaled by the skin in the course of a minute, a quantity which is equivalent to thirty-three ounces in twenty-four hours.‡ Of this quantity a large proportion is, naturally, water : but nearly one per cent., according to Anselmino, consists of solid substance ; of the latter, one hundred parts contain about twenty-three parts of salts, the remainder being organic matter.§ An analysis of one hundred

* *Gazette Médicale*, April 27, 1844.

† The pores of the skin, says Daniel Turner, not only serve to "discharge the fuliginous recements of the blood, with the steams arising from the subjacent parts," but also "to ventilate the flame of the circulating blood, that it may not be oppressed or suffocated."

‡ Krause states the quantity of perspiration in 24 hours at 25 ounces, of which 120 grains are organic matter and volatile salts, and nearly 40 grains, mineral substance.

§ The perspiration is an acid fluid, and the most recent analysis assigns to it, as its proportion of solid matter, three tenths to one half of an unit per cent., consisting of salts of soda, lime, ammonia, potash, and magnesia ; chlorides, hydrochlorates, phosphates, sulphates, and lactates ; together with iron, fat, and urea.

parts of the solid matter of perspiration, according to Anselmino, gave the following results, namely :—

Osmazome,* combined with common salt	48	parts.
Lactic acid salts, with osmazome	29	„
Animal matter, with vitriolic salts	21	„
Calcareous salts	2	„

Mentioned in detail, the substances contained in the perspiration are, animal matter, gases, acids, alkalies, calcareous earth, metals, salts, and probably a simple body, sulphur. Among the animal matter occurs a small quantity of fat and pigment. The gases are, the carbonic acid, which is most abundant after a meal of vegetable food; and nitrogen, which is most largely given off after animal diet. The acids are, butyric, lactic, acetic, hydrochloric, phosphoric, formic, and sulphuric: the alkalies, soda, potash, and ammonia: the calcareous earth, lime, in combination with phosphoric acid: the metals, peroxide of iron, and, possibly, copper and lead in minute quantities: and the salts, a long list formed by the combination of the acids with the alkalies and lime. The principal salts are, the chloride of sodium, carbonate, phosphate, and sulphate of soda; chloride of potassium, and acetate of potash; lactate and hydrochlorate of ammonia; and phosphate and carbonate of lime. The peculiar odour of perspiration is due to its organic constituents, and to the butyric acid and lactic and acetic acid.

When the perspiration is checked, from disorder of the skin or cold, several of these matters fail of being removed, and are circulated through the system with the blood. Under favourable circumstances they are separated from the latter by the kidneys, the liver, or the lungs, but not without disturbing the equilibrium of action of those organs, and sometimes being the cause

* The peculiar animal principle which gives flavour to meats and some part of the odour to perspiration.

of disease.* The perspiration is a fluid whose regularity and continuance of exhalation are not merely conducive, but absolutely necessary to health; without such regularity, the animal temperature would run riot, and substances of an injurious quality would be allowed to permeate the finest and most delicate of the tissues of the body. Some experimentalists† in France conceived that, by obstructing the perspiration of the skin, and thereby preventing the dispersion of animal temperature by evaporation, they would be enabled to produce internal fever at will. To satisfy themselves on this question, they covered a rabbit with an impermeable coating of varnish; but the result failed to satisfy their expectation. Instead of an increase of temperature, the heat of the body quickly diminished; and in one hour and a half the animal died of asphyxia.

While speaking of exhalation from the skin, it may be proper to consider another phenomenon allied with exhalation, but having no direct relation to the perspiratory system; I mean, the transmission of moisture through the skin from without, "absorption," as it is technically termed. Man, to a certain extent, is an hygrometric machine, and his tissues have a natural tendency to an equalization of moisture with the medium in which he

* Turner says, "From the constriction or constipation of these cutaneous pores by the ambient air, especially when the body, beforehand put into a heat, is suddenly exposed thereunto, the serous particles, which used to fly off continually in vapour, being now pent in, excite an intestine and feverish effervescence; till finding some other passage, either by the kidneys or by the glandules of the nose and windpipe, they are discharged by way of a catarrh; or missing this separation still keep up the ebullition, very often to the hazard of life by suffocating the vital flame. And this is the natural consequence of obstructed insensible perspiration, which, in the vulgar phrase, is the same with what they mean by catching cold, and of which, give me leave to remark, that as fevers make two-thirds of diseases infesting mankind, according to the computation of the judicious Sydenham, so two-thirds of fevers very probably may take their rise from perspiration hindered."

† Becquerel and Breschet.

lives ; but as this disposition, in an active state, would be destructive of existence, it is very properly controlled and regulated by the vital powers. Another obstacle to absorption is the scarf-skin ; and so long as the scarf-skin retains its natural texture, and is bedewed with its ordinary oily secretion, absorption by the skin is impossible. Indeed, were it not so, our lives would scarcely be secure for an instant ; for a moist atmosphere, bearing in suspension infectious matter or miasmata, and traversing without impediment the tissues of the skin, would introduce so much of the poison into the system as would be immediately destructive of life. We are already exposed to great danger by the extent of breathing surface* offered to the contact of the atmosphere by the lungs ; more would indeed be a serious evil. When, however, the condition of the scarf-skin is changed by the long contact of fluid, particularly if the fluid be alkaline, or warm, and is thus converted into a moist membrane, the play of the absorbing powers becomes active, and is then only limited by the physical laws which govern the transmission of fluids. It is in this way that we must explain the relief of thirst, afforded to persons who have been shipwrecked and exposed to the elements for several days without food, by saturating their garments with sea-water. Instances are on record, in which bathing in warm milk has been successfully employed as a means of supporting life, when the communication between the mouth and the stomach was impervious ; and numerous experiments tend to show the possibility of absorption of substances in solution through the skin, where the latter has been for some time in contact with the fluid.

An interesting illustration of the absorbing power of the skin, when the scarf-skin is kept moist by the confinement of the exhalation of the skin, is mentioned by

* The extent of surface presented by the lungs has been estimated at 1,500 square feet. See page 31.

Mr. Ceeley, of Aylesbury, in connection with his important experiments on vaccination. "I have often," he says, "succeeded in procuring vaccine vesicles without puncture, on the skins of children especially, and young persons, by keeping lymph in contact with the skin, and excluding it from the air by a coating of blood." Now, in this case, it is evident that the perspiratory exhalation, while, on the one hand, it kept the scarf-skin soft and saturated with moisture, was an effective agent in procuring the absorption of the lymph, by maintaining it in a state of solution.

Whenever we wish to introduce medicines into the system by way of the skin, we find it necessary to select those spots in which the scarf-skin is thinnest ; and then we are not satisfied with simple contact, but rub the substance into the skin, in order that it may enter the pores, and attain as close a vicinity as possible to the vessels of the sensitive layer of the derma, which are the agents for conveying the substances so introduced, into the blood. By the friction which is used in this process, we also stimulate the cutaneous vessels and nerves, and obtain their co-operation. But even in this way, some few substances only can be transmitted through the skin ; and excepting in the instance of a single medicine, the practice is discarded. Another plan, which is occasionally pursued, will serve as a further illustration of the opposition afforded by the scarf-skin to the transmission of substances from without. It is termed the *endermic* method of administering medicine, and is founded on the well-known active absorbing power of the sensitive layer of the skin. To succeed in this practice, the first step is to remove the scarf-skin, by means of a small blister, and then to sprinkle the medicine on the exposed surface. Opium and other powerful medicines have been administered in this way, and have been found to act as rapidly as when introduced into the stomach. In some instances, the endermic method offers advantages ; as when, for ex-

ample, the medicines which it is desired to administer are known to disagree with the stomach, or where the power of swallowing is lost. The latter was the case in a patient suffering under hydrophobia, in whom opium administered through the skin produced a soothing calm in the height of the most violent struggles.

The endermic absorption of the skin is not always, however, the harbinger of good; deleterious substances are sometimes accidentally introduced into the system in this manner. Violent attacks of strangury occasionally, though rarely, follow the use of a blister, from the absorption of the juices of the Spanish fly into the blood, and its subsequent transmission to the kidneys for removal. I have seen strangury produced by the rubbing of turpentine liniment into the skin. A more distressing illustration of this action is that in which arsenic is absorbed into the system, from the surface of a sore, a sore being at all times an actively absorbing surface. No medical man would think of applying arsenic to an open sore without great caution; not so the quacks; their universal remedy for cancer is arsenic; and happy is the unfortunate sufferer who escapes destruction at their hands. With them, every trifling and temporary enlargement is a cancer, and their CURE is DEATH. Daniel Turner, referring to sufferers from this disease, exclaims, let them not, "as they value the quiet of their lives, listen after a promised cure by cosening quacks or cancer-curing pretenders, who, to my knowledge, have hastened great numbers of people miserably to their graves, who might otherwise, and that very tolerably, have spun out a much longer thread, and have kept under this distemper."

CHAPTER IV.

THE OIL-GLANDS OF THE SKIN.

THE apparatus for keeping the surface of the skin bedewed with an oily fluid, resembles, in general particulars of structure and economy, that of the perspiratory system. It consists of minute tubes, which

*Fig. 13.**



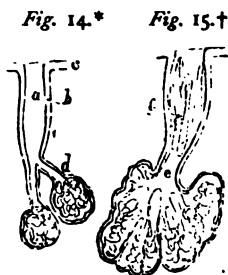
traverse the scarf and sensitive skin, and enter the fibrous web of the corium, where they terminate in small glands. These tubes are similar in structure to the perspiratory ducts, being composed of three layers, derived respectively, from the scarf-skin, which lines their interior: the sensitive layer, which is the medium of distribution of their vessels and nerves: and the fibrous layer, which gives them strength and support. Like

the perspiratory tubes, they are in some situations,

* *Fig. 13.*—Two oil-glands, from the scalp, magnified 38 times.

a. The gland. *b.* Its tube, which was slightly spiral in this specimen. *c.* The pore or outlet of the tube. *d.* The scarf-skin with which the lining of the tube is continuous. The other gland differs from the preceding only in the larger bulk of the glandular structure, and in the size and straightness of the tube.

spiral; but this is not a constant feature; more frequently they pass directly to their destination. They are also larger than the perspiratory tubes. The chief characters in which they differ from the perspiratory apparatus are, the straightness and greater diameter of their tubes, their absence in certain situations, as on the palm and sole, and abundance in others where their office is more needful, as on the face and nose, the head, the ears, &c.; and the greater degree of complication in the structure of their glands. This latter character is sufficiently remarkable, since they offer every shade of complication from the simple straight tube, to a tube divided into numberless ramifications, and constituting a little, rounded, arborescent mass, of about the size of a millet-seed. In a few situations, these little glands are worthy of particular notice, as in the eyelids, where they possess great elegance of distribution and form, and open by minute pores along the edges of the lids (fig. 20): in the ear passages, where they produce that amber-coloured bitter substance known as the wax of the ears: and in the scalp, where they resemble small



* *Fig. 14.*—Oil-gland from the skin of the nose, magnified 38 times. This gland is double, the two tubes joining to form a common tube. *a.* The canal of the tube. *b.* The lining of the tube which is continuous above with *c.* the scarf-skin. *d.* One of the small tubes proceeding from its gland.

† *Fig. 15.*—A compound gland; the main tube divides at *e* into a number of secondary tubes, and each of the latter is connected with a small glandular mass. The tube is filled with a number of the peculiar animalcules *f* of the oily substance. The heads of these creatures are directed downwards, towards the gland.

clusters of grapes, and open in pairs into the sheath of the hair, supplying it with a pomatum of Nature's own preparing (fig. 21).

The mode of formation of the unctuous "distilment" of the skin, the *sebaceous substance*, as it is called by medical writers, is not the least curious of the phenomena of animal life. In a previous chapter I have explained the manner of formation of the scarf-skin, namely, by cells, which are subsequently converted into scales; the same process takes place in the production of the scarf-skin of the oil-tubes and glands, the point of distinction between the processes being the difference in the nature of the fluid imbibed by the cells from the blood, and its subsequent destination. In the case of the scarf-skin, the fluid is mainly water, containing saline matters in solution, and only a small quantity of oil. In the cells of the oil-tubes and glands, besides the water and salts, there is a large proportion of oil, partly in intimate mixture with albumen or white of egg, partly free and diffused. These substances are all derived from the blood flowing through the capillaries of the walls of the tubes and glands; and when the cells are fully formed, that is, fully distended, they yield up their contents, and collapse into scales, as in the case of the scarf-skin; the fluid matters which they contained are consequently set free, and passing along the tubes to the surface, constitute the unctuous element of the economy of the skin.

It will be perceived that, in the preceding description, I have only accounted for the fluid which is given off by the cells during their collapse, and that the destination of the cells themselves still remains to be explained. These latter are cast off in the form of minute scales, like those of the scarf-skin, and are expelled from the tubes in company with their fluid product, to be dispersed upon the surface. Such are the phenomena which attend the formation and destination of the unctuous matter in a state of perfect health, in that state

which most nearly approaches one of simple nature. But in the inhabitants of cities and towns, in the midst of the sedentary and irregular habits of refined society, and of the mental "wear and tear" of practical life, such a state of the unctuous system of the skin as I am now describing rarely or never exists. The actions, instead of being completed according to the standard above established, are irregular and torpid, the contents of the cells are unnaturally solid and dense, they are only partly, or not at all, emptied, and are thrown out in a mass upon the surface of the skin.

Sometimes, however, the contents of the cells are too dense and dry even for this mode of escape, and then they collect in the tube of the gland, distending it beyond its natural limits, and becoming impacted in that situation until removed by art. While in this state, the impacted matter reaches to the surface, and as it then comes in contact with the dust and smoke of the atmosphere, becomes dirty and black, and is recognized as a small, round, dark spot. Such spots are common on the nose, forehead, and other parts of the face of the inhabitants of towns, and especially in persons who have, constitutionally, a torpid state of the skin. They are removed by squeezing the skin between the finger-nails, and then there issues forth an elongated, white cylinder of unctuous matter, modelled by the tube in which it has been so long confined; in truth, a little candle, which, strange to say, from its form and size, and particularly on account of its black extremity, is reputed to be a maggot or grub, and as such is popularly known. When the impacted matter produces inflammation of the tube, no uncommon occurrence, it then has the appearance of a black spot in the centre of a small, red, conical pimple, and is termed "punctated or spotted acne."

Having now glanced at the nature of the unctuous matter of the skin, and pointed out its tendency to remain within the tubes, and referred that tendency to its cause,

namely, torpor of the skin, I have, in the next place, to describe a contrivance, of modern discovery, that may be appropriately introduced with the words of Hamlet:—

“There are more things in heaven and earth, Horatio,
Than are dreamt of in your philosophy.”

Some years ago, there were discovered by a German physician, Dr. Simon, in the unctuous matter which col-

Fig. 16.*



Fig. 17.†



Fig. 18.‡



lects within the oil-tubes, certain minute animals, of which he published an account in the June number of a German periodical, *Muller's Archiv*, for 1842.§ Having

* Fig. 16.—The steatozoon folliculorum, viewed upon the side.

† Fig. 17.—The animal seen upon its under surface. In this view the head and breastplate are shown.

‡ Fig. 18.—The animal viewed upon its back; the head being drawn back into the chest.

§ The creature had been previously (1841) seen by Henle in the wax secretion of the ears; but Simon's discovery was quite independent of that of Henle.

read Dr. Simon's account, I set myself to work to seek for the animals in question, and before the end of June had seen some hundreds of specimens, and become so far interested in the subject, that I pursued it with almost exclusive attention for six months. In the course of this investigation, I examined many thousands of the animals, and arrived at some novel conclusions with regard to them. I found that Dr. Simon's description and figures were imperfect; that he had overlooked several points of entomological importance in the structure of the animal, as, for example, the head; and that he had left one vein of the mine, namely, the progressive development of the young from the growth and hatching of the egg, to maturity, entirely unopened. Under these circumstances, I was enabled, in the month of December, 1842, to communicate to the Royal Society a paper, since published in the *Philosophical Transactions*,* containing many original observations, and upwards of forty figures of the animal. In this paper I found myself under the necessity of changing the name given to the animalcule by Dr. Simon, as being founded on a wrong view of its structure and zoological position. As a temporary appellation, I termed it entozoon folliculorum; but upon more mature consideration, and in reference to its habitat and food, I have thought the name *steatozoon folliculorum*, that is, the "animal of the oily product of the skin," more appropriate and correct.

The animalcule of the skin is found in the oil-tubes whenever there exists any disposition to the unnatural accumulation of their contents; it is found in numbers, varying from one or two to twenty, in the substance of the little grub-like cylinder which is squeezed out by the

* Researches into the structure and development of a newly-discovered parasitic animalcule of the human skin—the Entozoon folliculorum. *Philosophical Transactions*, Part II.; 1844.

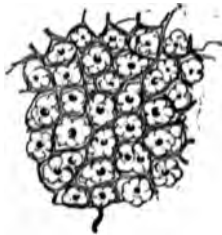
pressure of the fingers (fig. 15), and this in an apparently perfect state of health of the skin, or, more correctly, without any appearance of disorder, for the skin cannot be said to be in perfect health when its functions are performed in a torpid manner. Now, as in the majority of mankind, and certainly in all the inhabitants of cities and large towns, the skin is more or less torpid in its functions, so the presence of this animal in the skin is the rule, its absence the exception, I have found it at all ages, from youth to old age, more numerous, it is true, at the latter than the former period, and in great and remarkable numbers during sickness. Under these circumstances, I see no other conclusion open than to assume that it performs some beneficent purpose in the economy of the skin; that purpose being, according to my belief, the disintegration of the accumulated mass of distended cells, the impression of a new condition on the contents of the cells, and the stimulation of the tubes to perform their office more efficiently. In corroboration of this view is the fact, that these little creatures increase in numbers when the vital powers decline, so that, when the energies of the system are reduced by disease, and when the skin, participating in that reduction, is unable alone to fulfil its functions correctly, these little beings are permitted to aid it in its work.

The steatozoon folliculorum is extremely minute, and quite undistinguishable by the naked eye, the longest I have seen being but little more than a quarter of a line in length; that is, forty-five, placed end to end, would measure in length only one inch. In form and shape, in the perfect state, they are very like caterpillars, and have a distinct head with feelers, a chest with four pairs of legs, and a long tail-like body. The whole body is so transparent that its interior may be easily seen, and the animal always occupies the same position in the oil-tube, the head being directed inwards, and the tail towards the aperture of the tube, as though it had crept into that situation from without. In some

persons these singular creatures are larger than in others, and in some than in other parts of the face. So much is this the case, that an eminent naturalist to whom I showed figures of their varieties considered the difference between the two, not merely in length, but also in shape, to amount to a specific character. If this be the fact, we may look, I imagine, for the shorter variety on the alpine ridges of the nose or eyebrows, and the longer kind in the glades and valleys of the nose and cheek. But the real cause of the difference in length I believe to be a relative diversity in the calibre of the oil-tubes in different situations, associated with a various degree of density and nutritive property of the oily matter. In the same group, also, we find eggs, embryonic forms, and young, all mingled together in confusion. In pursuing this inquiry into the animal world, I have examined them in the dog, and have found them more recently in the horse. In both these animals, the steatozoa are relatively larger than in man, and, at the same time, more tapering and slender.

I now come to the uses of the unctuous product of the oil-glands: these are two-fold, as in most of the operations of nature; the first being mechanical, namely, the protection and defence of the skin; the second, vital, the separation from the blood of matters noxious to life and health. In the exercise of the former office, the unctuous substance is diffused over those parts of the skin which are naturally

*Fig. 19.**



* *Fig. 19.*—A group of oil-glands on the nose, showing their close aggregation, and the network of vessels which supplies them with nutrition. I was enabled to make this sketch in consequence of the skin being affected with a peculiar disease, which renders it thin and transparent, and the glands opaque.

exposed to vicissitudes of temperature, as the nose, face, ears, and head ; to the injurious attrition of contiguous surfaces, as the flexures of the joints ; or to the contact of acrid fluids, as is instanced in the excoriations to which infants are liable. The oil of the unctuous substance is the main agent in effecting these purposes, as it prevents, on the one hand, the evaporation or congelation of the water of the scarf-skin, which would cause it to become parched and peel off, and leave the sensitive skin exposed ; affords, in the second place, a soft medium to the contact of moving surfaces ; and in the third, repels moisture and fluids. The latter purpose is strikingly exhibited in the use made by aquatic birds of the oil-glands situated at the base of their tail ; the oily secretion in this instance being employed to render the feathers more repellent of the element in which they pass so great a share of their existence. In its vital capacity, as an agent for removing noxious substances from the skin, the unctuous matter is allied with the perspiratory system, being a purifier of the blood. The oleaginous part of the product separates hydrogen and carbon ; its animal constituents, a large proportion of nitrogen ; and its salts, lime.

A third use of the oily product of the skin has reference to the social instincts of animals. Their abode and concealment is made known to each other, and often to their enemies and pursuers, by the peculiar odour emitted by this substance. In some cases the odour is so powerful and offensive, for example, in the skink (*viverra putorius*) as to serve them in place of a means of defence ; and in others, without being so excessively disagreeable, it is very unpleasant, as in the peccary (*sus tajucu*), and fox. In some few animals the odour of the oily product in a diluted form is regarded as a perfume, for example, that of the musk deer (*moschus moschiferus*), and musk rat (*castor moschatus* and *zibethicus*). Instances are not wanting in which the peculiar odour of musk has been given off by the human skin ; and I was once struck by

the powerful mouse-like odour emitted by the skin of an insane person. A lady informs me that she made the same observation in the case of a departed friend. It is, no doubt, known that musk is a substance which was once highly prized as a medicine, and is still administered occasionally. Another product of the oil-glands, namely, castor, which is obtained from the beaver (castor fiber), also occupies a place in our pharmacopeia among antispasmodic medicines.

Fig. 20.*



In considering the purpose of the unctuous matter of the skin, there are two situations in which it deserves especial remark, namely, along the edges of the lids, where it is poured out in considerable quantity, and in the canal of the ears. In the former place, it is the means of confining the tears and moisture of the eyes within the lids, of defending the skin from the irritation of that fluid, and of preventing the adhesion of the lids, which is likely to take place upon slight inflammation. The Germans term it the "*butter of the eyes*" (augenbutter). In the ears, the unctuous wax not only preserves the membrane of the drum, and the passage of the ear moist, but also, by its bitterness, prevents the intrusion of small insects.

* Fig. 20.—The oil-glands of the upper eyelid, drawn from nature; the cocked-hat-shaped field on which they are represented is the gristle of the lid. The tubes of the glands are seen descending to the edge of the lid.

CHAPTER V.

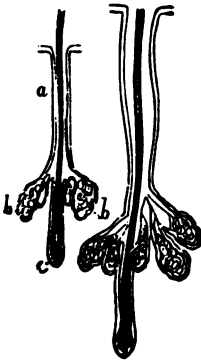
THE HAIRS.

THE hairs are appendages of the skin contributing to its defence, like the scarf-skin, of which latter, indeed, they may be regarded as modifications, suited to a special use. They are analogous to the scarf-skin in

several respects, and are so connected with it, that they come off when the latter is separated from the sensitive skin by the action of a blister, by scalding, or decomposition. They resemble it, also, in the general features of its construction, but are somewhat more highly organized and complex. The hairs traverse the skin like the perspiratory and oil-tubes, and resemble both in the extent to which they are prolonged into it, the downy hairs, like the latter, being limited to the superficial strata; the long hairs, like the former, extending more deeply, and even piercing it altogether, so

as to reach the subcutaneous fat. Within the skin, each

*Fig. 21.**



* *Fig. 21.*—Two hairs, enclosed in their tubes. The smaller of the two is one of the fine hairs of the ear-passage; the larger is taken from the head.

a. The hair-tube. *b, b.* The pair of oil-glands opening into the hair-tube. *c.* The bulb of the hair. In the hair from the head the same parts are seen, but the oil-glands are more complicated.

hair is enclosed in a sheath or tube, closed at its extremity where it blends with the root of the hair, and constructed, like the perspiratory and oil-tubes, of three layers derived from the skin, namely, a lining of scarf-skin, a middle vascular layer, and an external and protective or fibrous layer. These sheaths or hair-tubes, as they resemble the perspiratory and oil-tubes in structure, so also do they imitate them in function. The tubes of many of the downy hairs are, at the same time, oil-tubes and hair-tubes, performing a double function ; and even where this simplicity of structure does not exist, oil-tubes are connected with the hair-tubes, and open into them, sometimes one to each tube, sometimes two, as in the case of the hairs of the head, and sometimes more. Indeed, the principle of formation of these three kinds of tubes, namely, perspiratory tubes, oil-tubes, and hair-tubes, would appear to be the same. They all originate on the surface of the skin in the form of little pouches, and grow inwards to the required depth. In the case of the hair-tubes, with appended oil-tubes and glands, the former are first formed, and the latter are productions from their sides, growing as mere pouches, and increasing in length like the tubes from which they originate.

Every part of the skin, with the exception of the palm of the hands and sole of the feet, is organized for the production of hairs. On the major part of the body they are short and fine, and in many instances so small as scarcely to rise above the level of the skin ; while in others, as the scalp, the eyebrows, and, in man, the whiskers and the beard, they grow to a considerable length. The length and thickness of the hair, as these instances illustrate, are regulated by a law of nature, the hair of the head being always longer and finer than that of the beard, and the latter longer than the whiskers and eyebrows. When hairs are left to their natural growth, they attain a certain length, and are then thrown off by a process analogous to the change of the coat in ani-

mals, or the moult of birds, their place being supplied by young hairs, which grow out of the same tubes ; and this temporary decadence of the hair occurs, also, when it is kept cut of moderate length.

The ordinary length of the hair of the head, as deduced from its measurement in women, ranges between twenty inches and a yard, the latter being considered as unusually long ; and its weight between six and eight ounces. But in some instances the length is much greater, as in the case of a lady, in whom, I am informed, it measures two yards, and trails on the ground when she stands erect.* Of a like, or perhaps greater length must have been the hair of the lady to whom the poet refers in the following lines :—

“ Like her, to whom at dead of night,
The bridegroom with his locks of light,
Came in the flush of love and pride,
And scaled the terrace of his bride :
When, as she saw him rashly spring,
And midway up in danger cling,
She flung him down her long black hair,
Exclaiming, breathless, ‘ There, love, there ! ’ ”

When, however, hair is kept closely shaven, it appears to become persistent, and at the same time increases in strength and bulk. It has been calculated by a curious investigator† that the hair of the beard grows at the rate of one line and a half in the week : this will give a length of six inches and a half in the course of a year, and for a man of eighty years of age, twenty-seven feet which have fallen before the edge of the razor. Such an amount of growth appears in nowise remarkable when we learn from Eble, that in the Prince’s Court at Eidam there is a full-length painting of a carpenter whose beard

* A lady with whom I have lately been in correspondence writes to me as follows :—“ I am five feet five inches tall, and many of my hairs trail on the ground three or four inches. I am twenty-eight years of age, my hair is wavy, and it gives me positive pain to pull a healthy hair out.”

† *Withof*, quoted by the celebrated Haller.

was nine feet long, so that when engaged at work he was obliged to carry it in a bag: moreover, that the Burgomeister Hans Steiningen, having upon one occasion forgotten to fold up his beard, trod upon it as he ascended the staircase leading to the council chamber of Brunn, and was thereby thrown down and killed.* Another observer, Berthold, records that the beard when shaved every twelve hours will grow to the length of from five to twelve inches a year; whereas if shaved every twenty-four hours, its extreme growth will be only seven inches and a half; and every thirty-six hours only six inches. The speed of growth of the hair of the head, I ascertained by experiment to be nearly six lines, or half an inch per month; whereas in young women between the ages of seventeen and twenty-four, Berthold puts it at seven lines. Other observations have shown that the hair grows faster in youth than in old age, by day than by night, in summer than winter, when cut than when left alone, and when frequently cut than when cut seldom. Berthold states that the hair grows one-sixteenth faster by day than during the night,

The shape of individual hairs is cylindrical for the smaller kinds, and more or less oval for those which grow to any length. The hairs of the head are never perfectly cylindrical, and those of the eyebrows and beard are more or less oval in contour. When left to their natural growth, the end or tip is always conical and pointed, and in animals it is common to find that portion of the shaft which is nearest the skin smaller than the more distant portion. These differences in the thick-



* Encyclopædia Metropolitana, article Zoology.

† Fig. 22.—Horizontal section of four hairs from the beard, showing their oval form. They are magnified 155 times.

a. The outer layer or cuticle. *b.* The fibrous part, which constitutes the chief bulk of the hair. *c.* The central portion, or pith.

ness of the same hair, at different points of its length, are easily explained. The producing organ is at first small: as the formation of the hair advances, it becomes larger, and growth having reached a certain point, it shrinks, becomes again small, and eventually ceases to produce more; the fully-formed hair then falls, and, after a period, the producing organ resumes its function, in the same order and to the same end. To illustrate this phenomenon, I have referred to animals, because in them it is common; but the same thing is also met with in man: look at a hair pulled from the eyebrow; and the same may sometimes be seen in the hairs of the head. A French anatomist, M. Mandl, has stated that hairs become pointed at their extremity, after being cut, by a process of deposition on their ends of certain fluids containing horny matter in solution, which make their way from the root of the hairs through the centre of their shaft. These views are now known to be erroneous, and are neither consistent with the acknowledged structure of the hair, nor with observation. When the hair is cut, it is liable to split, and become ragged at the ends.

With the view of determining accurately the thickness of hair, I measured the diameter of two thousand hairs taken from thirty-eight persons, and found them to range between $\frac{1}{1000}$ and $\frac{1}{40}$ of an inch; the finest ranging from the former size to $\frac{1}{800}$, the coarsest from $\frac{1}{40}$ to $\frac{1}{14}$. I made similar observations on a hundred and fifty-five hairs obtained from the heads of three South American Indians, and on fifty from a New Zealand chief. The comparative results were as follows:—

	Number of hairs examined.	Finest.	Coarsest.
British	2000	$\frac{1}{1000}$ - $\frac{1}{800}$	$\frac{1}{40}$ - $\frac{1}{14}$
South American Indians	155	$\frac{1}{1000}$ - $\frac{1}{800}$	$\frac{1}{40}$ - $\frac{1}{14}$
New Zealander	50	$\frac{1}{40}$	$\frac{1}{50}$

Having ascertained the *extremes* of thickness of hairs according to the above table, I next sought to obtain a *knowledge* of the *average* of their admeasurements.

The extremes of this average, in the two thousand hairs of British persons, ranged between $\frac{1}{160}$ and $\frac{1}{120}$; the mean being $\frac{1}{140}$. The mean average of the South American Indians was about the same; and that of the New Zealander somewhat more, that is, somewhat coarser, namely, $\frac{1}{120}$. So the mean average, in other words, the *ordinary thickness* of human hair as it exists upon the head, is $\frac{1}{140}$ of an inch; that is, four hundred hairs laid side by side will cover the space of one inch. The following table shows the exact relation of the measurements in question :—

British	$\frac{1}{160}$ to $\frac{1}{120}$
South American Indians	$\frac{1}{160}$ to $\frac{1}{120}$
New Zealander	$\frac{1}{120}$

With respect to the modifications produced in the hair by sex, my observations are in favour of the hair of woman being coarser than that of man. This is a contradiction to analogy that I was not prepared to expect, for, independently of the greater delicacy of the animal textures, which is a known characteristic of woman, as compared with man, the habit in the latter of keeping the hair short, I believed to be calculated to give it greater strength and coarseness. That this is by no means the invariable rule, was proved in one instance which I had the opportunity of examining, where the hair, although repeatedly shaven to give it strength, did not exceed the medium average of size. The range of thickness of the hair, in thirty-six persons of different sexes, is stated in the accompanying table :—

	Number of heads.	Number of hairs.	Range of thickness.
Man	18	1016	$\frac{1}{160}$ - $\frac{1}{120}$
Woman	18	940	$\frac{1}{160}$ - $\frac{1}{120}$

Age naturally exerts some influence on the dimensions of the hair, and as a general rule, the hair of children will be found to be finer than that of adults. My obser-

variations on children have been more limited than those on the adult, and amount to no more than six instances, of which the measurements were as follows:—

Number of hairs.	Range of thickness.
269	$\frac{1}{320} - \frac{1}{400}$

Even on the same head, great diversity exists with regard to thickness of the hair, as the following instances, taken without selection from a number of observations, prove:—

Number of hairs.	Finest.	Coarsest.	Average.
67 ...	$\frac{1}{1600}$	$\frac{1}{320}$	$\frac{1}{400}$
81 ...	$\frac{1}{1600}$	$\frac{1}{300}$	$\frac{1}{400}$
79 ...	$\frac{1}{1200}$	$\frac{1}{320}$	$\frac{1}{400}$
97 ...	$\frac{1}{720}$	$\frac{1}{320}$	$\frac{1}{400}$
57 ...	$\frac{1}{320}$	$\frac{1}{160}$	$\frac{1}{400}$
64 ...	$\frac{1}{800}$	$\frac{1}{240}$	$\frac{1}{400}$

Indeed, each single hair is far from being perfectly uniform in its dimensions: thus, in a hair six inches long, and apparently of the same diameter throughout, I found the extremes of size to range between $\frac{1}{320}$ and $\frac{1}{320}$ of an inch. In another, they ranged between $\frac{1}{400}$ and $\frac{1}{400}$; while a white hair, which was perceptibly enlarged at short distances, presented a range of $\frac{1}{400}$ to $\frac{1}{320}$; the diameter of its point measuring $\frac{1}{3000}$ of an inch.

With respect to colour, as a condition associated with diversity in thickness, my observations tend to show that flaxen is the finest and black the coarsest hair. Grey hairs commonly represent in thickness the colour which they succeed; but as a general rule, the white hairs which intrude themselves as age advances, are coarser than the hairs among which they are found, suggesting the inference, that deficiency of the pigmentary is compensated by excess of the horny principle. The most extensive range is enjoyed by light brown hair. The

average measurements of hairs of different colours are as follows:—

Flaxen	...	...	...	...	$\frac{1}{32}$ to $\frac{1}{40}$	of an inch.
Chestnut	...	...	...	...	$\frac{1}{32}$ to $\frac{1}{30}$	„
Red	...	...	...	...	$\frac{1}{32}$ to $\frac{1}{30}$	„
Dark Brown	...	...	...	...	$\frac{1}{30}$ to $\frac{1}{30}$	„
Light Brown	...	...	...	...	$\frac{1}{30}$ to $\frac{1}{30}$	„
White	...	...	...	...	$\frac{1}{30}$ to $\frac{1}{30}$	„
Black	...	...	...	...	$\frac{1}{30}$ to $\frac{1}{30}$	„

These observations accord with those of Withof.

The hairs of different regions of the body of the same individual necessarily present some degree of variety of diameter; but the amount of variation is less than might have been anticipated, as may be seen from the following table, in which the average term is employed. The diameter of the hair of the head is given in the first line as a standard of comparison.

	Man, black.										
Head	$\frac{1}{32}$
Beard	$\frac{1}{30}$
Breast	$\frac{1}{30}$
Whisker	$\frac{1}{30}$
Eyebrows	$\frac{1}{30}$
Eyelashes	$\frac{1}{30}$
Armpit	$\frac{1}{30}$
Thigh	$\frac{1}{30}$
Leg	$\frac{1}{30}$

Among other observations into which I have been led by these inquiries, is one which relates to the thickness of the hair in cases of congenital disease. Thus, in a child having marked indications of a scrofulous temperament, the hair was remarkable for its dryness and thinness. The medium average of diameter did not exceed $\frac{1}{30}$ of an inch, and the extreme range, in ninety-seven hairs, extended from $\frac{1}{30}$ to $\frac{1}{30}$.

Withof has instituted inquiries as to the number of hairs grown upon a square inch of the skin of the head.

He found, of black hairs, 598; chestnut, 648; and flaxen, 728. Upon making a similar observation, with the view to the elucidation of this subject, I found in a superficial square inch of the scalp of a gentleman with dark hair, 744 hair-pores. And, supposing each pore to give passage to only a single hair, the number of hairs would be the same. Now, the surface of the scalp presents about 120 superficial inches, and the number of hairs upon the entire head would therefore be 89,280, or, in round numbers, ninety thousand. This calculation, however, has reference only to a thin head of hair, for many of the pores give passage to two hairs. Now, supposing this to be the case with one-half, we should then have as the number of hairs in a superficial square inch, 1,116 hairs; and upon the entire head, 133,920 hairs. Or, supposing, as would probably be the case in a thick head of hair, that every pore gave forth two hairs, the number in an inch would then be increased to 1,488, and the total number for the whole head to 178,560; nearly two hundred thousand. As an average, therefore, of the number of the hairs of the head, I think we may fairly take the number in a superficial square inch at 1,000; and the number on the entire head at 120,000.

The hair contained within its hair-tube was compared by a celebrated physiologist, Malpighi, to a plant growing in a flower-pot; but the comparison is not happy, for the hair-tube is many times longer than its breadth, and more nearly resembles a loosely-fitting sheath, the interspace between the cylinder of the hair and the scarf-skin of the tube being very slight, and becoming even more straitened towards the root. At its lower end, the hair-tube terminates in a *cul-de-sac*, and this portion of its cavity is filled by an accumulation of granules and freshly-formed cells, which constitute the bulb of the hair. Above this point the little mass of cells separates into two parts: a central part, of a cylindrical figure, which is the newly-formed hair; and a peripheral

layer, which encloses the former, and is the sheath of scarf-skin which lines the tube. In the centre of the bulb, and rising from the bottom of the *cul-de-sac*, is a small pear-shaped papilla, which is the agent of development and growth, and also, of the sensibility of the hair; and the cells of the hair are produced from this papilla or pulp, in a manner analogous to the production of the cells of the scarf-skin from the papillæ of the sensitive skin.

Now, in describing the cells of the scarf-skin, I pointed out that more or less of pigmentary matter formed an invariable constituent of the contents of the cells, the skin of the albino alone excepted, and that in the negro the cells were abundantly supplied with a deep black colouring matter.

This same circumstance is conspicuous in the hair-cells; they contain a large supply of pigment when there is very little in the scarf-cells, and upon it depends the colour of the hair. The hair of the negro may be associated with the scarf-skin of the blonde, or the hair may partake so much of the character of the scarf-skin, as to be colourless or flaxen.

The shades of colour of the hair evident among mankind, although various, are referrible, for the most part, to some one prevailing type: for example, if we journey towards the north, we find the hair becoming lighter,

Fig. 23.*



* Fig. 23.—A hair from the scalp, showing its position in the hair-tube and its mode of implantation at the bottom of the latter.

a, a. The substance of the skin. *b, b.* The thick layer of scarf-skin or epithelium which lines the hair-tube. *c.* The shaft of the hair. *d, d.* The narrow space between the hair and the lining of the hair-tube. *e.* The root or bulb of the hair. *f, f.* The point at which the separation between the hair and its sheath takes place.

while, if we proceed to the south, it deepens in its hues ; these differences being generally associated with a greater or less amount of pigment in the scarf-skin. Blumenbach makes the uniformity of colour and texture of the hair one of the characters of his five varieties of man. Thus, the inhabitants of mid-Europe, the Caucasian variety, have hair of a "nut-brown, running on the one hand into yellow, and on the other into black, soft, long, and undulating ;" the Mongolian variety, hair which is "black, stiff, straight, and sparing," with an olive-coloured skin, as we see in the natives of the East Indies, China, and among the Laplanders and Esquimaux ; the Ethiopian variety, hair "black and crisp," and black skin, as in the negro ; the American, copper-coloured skin, and hair "black, stiff, straight, and sparing," like that of the Mongolian race ; and the Malay variety, which comprehends the inhabitants of Malacca, the East Indies, and the Pacific Islands, is characterized by tawny skin, and hair "black, soft, curled, thick, and abundant."

The next consideration which arises relates to the structure of the hair ; and here we find the curious phenomenon of a threefold modification of the cells within so limited a circuit as that of the hair-shaft. At the centre of the bulb, the cells undergo very little alteration from their original spherical form : around them, and comprising the chief thickness of the hair, by a process of lengthening common in the economy of cells, they are converted into fibres ; and quite at the outer circumference, a thin circle of cells are flattened into the form of scales, like those of the scarf-skin, or the contiguous layer of cells which constitute the lining membrane of the hair-tube. So that a hair, in its pigmy section, presents three different textures ; a loose cellular texture in the centre, a strong texture of parallel fibres, becoming more and more dense towards the circumference, externally to this ; and a thin, varnish-like layer of flattened cells, constituting the polished surface of the hair. We

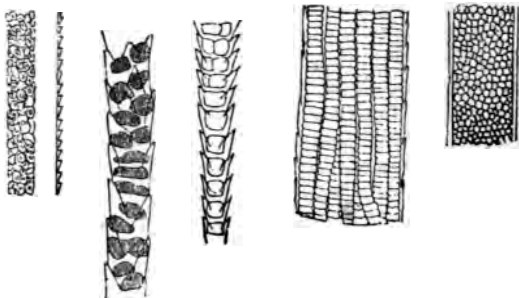
may compare this structure very aptly to the section of a twig, or stem of a plant, with its cellular pith in the centre, its dense wood encircling the pith, and its smooth and polished bark at the surface.

The structure of the hair of man, as compared with that of animals, is so characteristic, that the smallest fragment might be determined by the microscope with the greatest accuracy, even after the lapse of centuries. An illustration of this fact has lately been given by an accomplished microscopist, Mr. John Quekett, in the instance of some small pieces of human skin transmitted to him for examination by the secretary of the Archæological Society. According to tradition, the bodies of persons found guilty of sacrilege were, in the olden time, flayed, and their skins nailed against the doors of the churches in which their crime had been committed, in order to strike terror into depredators of a similar class. Some small portions of a substance resembling parchment having, it appears, been discovered recently by the archæologists, on certain ancient church-doors, where they were protected by ornamental clamps and hinges, they were sent to Mr. Quekett, who was enabled, by detecting on them some lingering hairs, and subjecting those hairs to the inquisition of the microscope, to establish the truth of the tradition. One of the pieces in question was found on a door of Worcester Cathedral; another, on the church door of Copford, in Essex; while a third, supposed to have belonged to a Danish pirate who was executed 900 years ago, was discovered beneath a grating which served to protect it, on the door of the church of Hadstock, in Essex.

Although the central part of the hair of man is a loose pith, in which the original spherical form of the cells is more or less completely lost, yet in many animals this form is retained with the most exact precision, and such hairs appear to contain in their axes a very beautiful string of beads, rendered strikingly obvious, in dried hairs, by the emptiness of the cells. Such is the appear-

ance of the very fine hairs of the hare or mouse. In thicker hairs from the same animals, there are two or three or more rows of cells, and the largest hairs, from

*Fig. 24.** *Fig. 25.†* *Fig. 26.‡* *Fig. 27.§* *Fig. 28.||*



the number of these rows, bear a resemblance in structure to an ear of maize. This is the chief modification which the pith of the hair undergoes in the animal kingdom, being more completely or less cellulated, and holding a greater or less proportion to the entire bulk of the hair; sometimes, indeed, as in some hair in my possession, from one of the deer tribe, the whole texture of the hair is cellular, the other two portions being condensed into a thin envelope. In the feather of a bird,

* *Fig. 24.*—Pith of the human hair, showing its composition of cells: the cells are nucleated.

† *Fig. 25.*—Hair of the mouse, magnified 310 times. The cells containing the pigment which gives colour to the hair are single in the lower part of the figure, but become double higher up. The scales of the surface of the hair are also seen.

‡ *Fig. 26.*—One of the fine hairs of the hare, magnified 310 times. In the lower part of the shaft the cells are single, in the upper part double. On the sides the scales of the surface are seen.

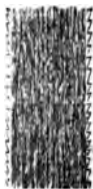
§ *Fig. 27.*—One of the thick hairs of the hare, magnified 155 times. It is composed of a number of rows of cells enclosed in a transparent envelope composed of scales.

|| *Fig. 28.*—Hair of the fallow-deer, magnified 38 times.

which is a modification of hair, the white pith with its dense external covering is very evident in the shaft, while the quill is an illustration of the outer parts alone, the transparent puckered membrane, which is drawn out of the quill when first cut, being a single row of dried-up cells. In the growing feather, the contents of the quill would be found distinctly cellulated.

The fibrous portion of hair is the source of its strength, and the degree of strength possessed by these delicate threads is almost beyond belief. A single hair from a boy eight years of age, says Robinson, in his *Essays on Natural Economy*, supported a weight of 7,812 grains; one from a man aged twenty-two, 14,285 grains; and the hair of a man of fifty-seven, 22,222 grains. Muschenbroeck found that a human hair, fifty-seven times thicker than a silkworm's thread, would support a weight of 2,069 grains, and a horse hair, seven times thicker, 7,970 grains; a part of this extraordinary strength is, undoubtedly, due to the high degree of elasticity which it possesses. Weber found a hair ten inches long stretch to thirteen inches; while a hair stretched one-fifth returns to one-seventeenth of its original length.

Fig. 29.*



The fibrous part of a hair is also the principal seat of its colour. In viewing a hair with the microscope, it is evident that the pigment is not diffused uniformly through the fibrous texture, but that there are some cells which contain more than others, and appear as black spots amongst the rest; while, in all, that portion of the cell which is termed its nucleus, is the most deeply tinted. It is upon this unequal mingling of the coloured with the uncoloured portions that the tint of the hair depends. Thus, the grey of the hair of the mouse is produced by a

* *Fig. 29.*—The fibrous part of a human hair, magnified about 250 times. The dark streaks give colour to the hair, and are more or less dark in hair of different shades of colour.

succession of coloured and uncoloured cells in alternate pairs, the blending of the colourless and the black giving their compound grey, just as alternate lines of blue and yellow produce upon the eye the impression of green; blue and red, purple; and red and yellow, orange.

The exterior layer of the hair, composed, as we have seen, of flattened cells or scales, of an oval form, exhibits a peculiar arrangement of these little pieces. They are so disposed, that each newly-formed circle overlaps the preceding, like tiles upon a house-top; so that if the

*Fig. 30.** *Fig. 31.†* *Fig. 32.‡* *Fig. 33.§* *Fig. 34.¶*



reader will imagine a convex surface coated with oval tiles, disposed, not in measured rows, as upon the roof of a house, but irregularly, he will have a perfect idea of

* *Fig. 30.*—A human hair, magnified about 250 times, showing the scaly structure of its surface.

† *Fig. 31.*—A hair of the Indian bat, magnified 310 times. The scales on the surface of the hair suggest the idea of feathers, and mark a transition from the simple cylinder of a hair to the more complex form of a feather. It is interesting to find this structure in a flying quadruped.

‡ *Fig. 32.*—Separate scales of the hair of the Indian bat, showing their individual form, and the manner in which they embrace the shaft of the hair.

§ *Figs. 33, 34.*—Barbs from the vane of a small pheasant's feather, showing the transition in structure of its component cells from simple cylindrical flattened cells, to cells shooting forth buds at one end; and thirdly (*fig. 34*), to the elongation of those buds into short spurs or branches. Magnified 310 times.

the appearance of the surface of a hair. The scales of a fish, or of a serpent, would give just the resemblance wanted, only, that in these animals the plates are arranged with the most perfect and beautiful regularity. With this structure in our recollection we have a key to the well-known phenomenon of a hair feeling rough when drawn between the fingers in one direction, and smooth when drawn in the opposite, or to the movement of a hair from its root to its point when rubbed longitudinally between the fingers. These are natural consequences of the projection of the edges of the scales. It also explains the circumstance of hairs working their way into wounds when the latter are not properly protected from their contact, or beneath the nails, or between the gums and teeth, as I am told by an intelligent hair-dresser, Mr. Main, not unfrequently takes place, if those engaged in the cutting of hair be not on their guard. He also informs me, that when, by accident, the hairs of an artificial head-dress are so placed that the points of some correspond with the roots of others, the hair can never be made to lie smooth, from the existence of an unconquerable tendency on the part of the misplaced hairs to separate from the rest. To remedy this inconvenience the following simple process, founded on the peculiarity of the structure of the surface of the hair, is had recourse to. The bundle of mixed hairs is laid upon a flat surface, and rolled backwards and forwards with the finger, when the wrongly-placed hairs, as if endowed with life, issue from one end of the bundle, and are easily withdrawn. The irregularities found on the surface of the hair, also afford an explanation of the irritation to the skin, caused by woollen garments; the adhesion of dust and dirt to the hair, and the difficulty of separating from it the particles of scurf which become entangled in its midst.

A more important consequence of the projection of the edges of the scales which form its exterior surface, is the fact that the process of *felting* depends upon this peculiarity. Without it hair would be unfitted, from the

smoothness of its surface and shortness of its staple, for combining with the strength necessary for the production of felt. But in this fitness for felting, there is great variety in hair, and an equal difference in the degree of prominence of its raised edges. In human hair, they are very slightly marked; but nevertheless, felting is not uncommon when the hair is neglected, and there are some diseases of the hair which turn wholly on this property of felting. When particles of dust collect on the edges of the scales and form projections, or the edges themselves become loosened and raised, they give the idea of branches from the shaft of the hair, an appearance which misled Leeuwenhoek into the belief that hairs, like feathers, were naturally furnished with branches.

In the preceding description, I have explained that the bulb is the first produced part of the hair, and that in its earliest state the bulb is composed of cells distended with fluid like those of the scarf-skin. Pursuing this resemblance further, the fluid, in the next place, is given up from the cells by evaporation, and these latter are converted into fibres and scales. Now, it follows from this process that the cellulated portion of the hair, namely, that which is in contact with the bottom of the hair-tube, must be the bulkiest part of the organ, and for this reason it is called its *bulb*; while the evaporation, which occurs subsequently, explains the lesser thickness of the shaft. Without some explanation, it might be difficult to understand how a hair could be thicker at its root than in its shaft, unless the root itself were stationary, and the producing organ of the part beyond it, which is not the fact. When a hair is freshly plucked, its root has a rounded, swollen appearance, well expressed by the term *bulb*, and presents certain varieties of aspect; being sometimes obtuse, sometimes conical, sometimes perfectly straight, and sometimes clubbed or bent. These appearances are the consequence of the violence used in its removal, there being more or less of the membranous lining of the

hair-tube torn away with it, which latter, being drawn across the root, or rolling up on one or the other side, produces the irregularity in question. When, however, this membranous matter is wiped away, the fibrous structure may be seen, with the microscope, to be the chief constituent of the root; and the fibres being different in thickness, colour, and length, the root has precisely the appearance of an old paint-brush, worn away to a rough conical stump.

That portion of the shaft of the hair which is contained within the hair-tube, the root of the hair, is steadied in its position by contact with the lining scarf-skin of the tube, and as the latter is continually undergoing the process of formation and exfoliation, the superficial scales of the sheath are moved towards its aperture with the growing hair, and are then scattered on the surface in the form of "scurf." The scurf, therefore, is a natural and healthy formation; and though it may be kept from accumulating, it cannot be prevented. It is produced on every part of the body where hair is found, although, from the more active growth of hair on the scalp, the facilities for collecting, and the contrast of colour, it strikes the eye most disagreeably in that situation. Sometimes it happens that, instead of obtaining a free escape at the outlet of the tube, it becomes impacted, as I have previously noticed to be the frequent condition of the unctuous substance of the skin. In this case, the hair also is impeded in its onward movement; for, although from the position of its scales, the hair is an agent in the prevention of such an occurrence, and would naturally carry obstacles before it, yet the impaction is sometimes too great for the power which it is capable of exerting. When a condition of this kind occurs, the hair makes pressure on the sensitive papilla at the bottom of the tube, and the impression so produced, transmitted to the brain by the nerves, is felt as a sensation of itching; that is to say, a sensation which, falling far short of pain, is nevertheless disagreeable. A

natural remedy for the unpleasant sensation is at hand ; the nail is conveyed to the seat of inconvenience, it disturbs the impacted matter at the aperture of the tube, probably dislodges it, and the hair resumes its accustomed state. Those who are subject to a dry scalp know the suffering which this trifling impaction occasions, for where the unctuous substance is deficient, such a state is most likely to occur. In a natural condition of the skin, the comb and brush are contrivances to prevent such a circumstance from arising ; hence comfort, as well as nicety, demands their regular use.

Having dwelt, I fear at too great length, on the economy of the long hairs of the skin, I may now advert to those of minor growth. On the general surface of the body, the hairs are less closely set than upon the head, and, in consequence of this arrangement, the tubes enjoy a more independent position in the skin. They are also provided with minute muscles, which cause the erection of the hairs, and, at the same time, depress the intervening portion of the skin, rendering the erection more obvious and complete. This action is seen on the application of the stimulus of cold to the skin, and is also brought into operation by moral influence. The prominence and rigidity of the pores produced by this muscular action is commonly denominated "goose-skin," and, as will be seen by observation, is an appearance which is due to the presence of the hairs and of their muscular apparatus.

The short hairs of the skin are not unfrequently disturbed, in their growth, by a cause previously referred to in connection with the hairs of the head, namely, deficient oleaginous qualities of the product of the oil-tubes. When this happens, the dry scales and cells of the oil and hair-tubes collect at the aperture of the latter, and become a source of impediment of growth to the hair, which, as a consequence, assumes a coiled and twisted condition. But sometimes, this closure of the orifice of the hair-pores takes place after the fall of the

old, and previously to the growth of the young hair, in which case, the latter is imprisoned in the tube, and there grows, although unable to escape. I have occasionally seen nearly the whole of the hairs of a limb thus imprisoned, and forming little spiral circles, which are visible through the thin horny scale of desiccated cells which covers them and keeps them down. The obstruction occasions, as may be anticipated, a good deal of itching and uneasy feeling in the skin, and is more or less alleviated by tearing up the filmy covering.



Abundance of soap, and plenty of friction by means of the flesh-glove, are the best means of obviating this inconvenience; but it is sometimes so inveterate and painful as to require medical treatment. This state of the hairs is referred to by Aristotle, by whom, and by the older authors in general, it was supposed to result from the breeding of hairs under the skin. Turner calls it a rare distemper, "which, in a man's life-time, scarce calls for his assistance." His description of the malady is very accurate. "It is said," he observes, "to arise from an overweak expulsion of the hairs, which, being intended to be thrust forth of the skin, are stopt by cuticle, and hindered from coming forth, whence lying under the skin," they raise "a small tumour, and are to be taken out with a pair of nippers, or forceps, being often found half an inch long, and frequently longer."

* *Fig. 35.*—Two hairs which have become coiled into a spiral form, by the occurrence of impediment at the aperture of the hair-tube; magnified 19 times. The shaft of the hair is straight, up to the aperture of the hair-tube, where the coil commences.

a, a. The torn bulbs of the hairs.

The invisible or downy hairs of the body rarely appear above the level of the skin, for when they do, they necessarily fall into the category of the short hairs. I may best illustrate them by referring to a position in which their presence is invariable, although seen in that situation as an exceptional occurrence; I allude to the

*Fig. 36.**



nose. The nose is ordinarily bald; but if the unctuous product of an oil-gland be squeezed out of its tube, and examined beneath the microscope, one or more of these little hairs will constantly be detected in the centre of the mass. Indeed, when the unctuous matter has been detained in the oil-tube for any length of time, the number of hairs may be considerable, as, for example, twenty, thirty, or even forty. Now, the whole of these hairs have, as far as we at present know, been produced by a single papilla, and having attained maturity, have been shed, to be carried out of the oil-tube with the unctuous substance; but the latter being retained, they have had time to collect, as we have seen, in astonishing numbers. I should be inclined to infer, from this circumstance, that these little hairs grow very quickly, and are shed at short intervals of time. On no other hypothesis can their numbers be satisfactorily explained.

In their normal state and position, these little hairs are colourless and transparent, having rounded blunt points and brush-like roots; but under the influence of augmented nutritive action in the skin, they are susceptible of growth to a considerable extent, both in length and bulk; in fact, of becoming equal in dimensions to the short hairs of the body. Of this we have an example

* *Fig. 36.*—A group of downy hairs from the compacted product of a single follicle; magnified 19 times. The hairs are rounded at the point; and at the other extremity present the worn-out paint-brush-like bulb.

in the occasional growth of visible hairs upon the nose. I may refer also to the disproportionate development of hair in the male and in the female, and may adduce, besides, some curious illustrations of augmentation in the growth of hair, recorded by various writers. Schenkus and Ambrose Paré have left accounts of cases in which the entire body was covered with hair; and Daniel Turner, quoting from Peter Messias on the authority of Damascenus, relates, "that upon the confines of Pisa, at a place called the Holy Rock, a girl was born all over hairy, from the mother's unhappy ruminating and often beholding the picture of St. John the Baptist, hanging by her bedside, drawn in his hairy vesture." Ruggieri published, in 1815, the account of a woman, twenty-seven years of age, who was covered from her shoulders to her knees, with black, soft, and woolly hair, like that of a poodle dog. In the embassy to Burmah of 1829, a man was seen at Ava who was completely hairy from head to foot; on his face, ears, and nose, the hair was eight inches long, and on the breast and shoulders four or five inches.

Of a daughter of this man, a more recent traveller, Captain Henry Yule,* writes:—"To-day we had a singular visitor at the Residency. This was Maphoon, the daughter of Shevémaong, the 'homo hirsutus' described and depicted in Crawford's narrative, where a portrait of her as a young child also appears. Not expecting such a visitor, one started and exclaimed involuntarily as there entered what, at first sight, seemed an absolute realization in the flesh of the dog-headed Anubis.

"The whole of Maphoon's face was more or less covered with hair. On a part of the cheek, and between the nose and mouth, this was confined to a short down, but over all the rest of the face was a thick silky hair of

* A Narrative of the Mission sent by the Governor-General of India to the Court of Ava, in 1855. 1858.

a brown colour, paling about the nose and chin, four or five inches long. At the *alæ* of the nose, under the eye, and on the cheekbone this was very fully developed; but it was in and on the ear that it was most extraordinary. Except the extreme upper tip, no part of the ear was visible. All the rest was filled and veiled by a large mass of silky hair, growing apparently out of every part of the external organ, and hanging in a dependent lock, to a length of eight or ten inches. The hair over her forehead was brushed so as to blend with the hair of the head, the latter being drest (as usual with her country-women) *à la Chinoise*. It was not so thick as to conceal altogether her forehead.

“The nose densely covered with hair, as no animal’s is that I know of, and with long fine locks curving out and pendent like the wisps of a fine Skye terrier’s coat, had a most strange appearance. The beard was pale in colour and about four inches in length, seemingly very soft and silky.

“Poor Maphoon’s manners were good and modest, her voice soft and feminine, and her expression mild and not unpleasing after the first instinctive repulsion was overcome. Her appearance rather suggested the idea of a pleasant-looking woman masquerading than that of anything brutal. This discrimination was, however, very difficult to preserve in sketching her likeness, a task which devolved on me to-day, in Mr. Grant’s absence. On an after visit, however, Mr. Grant made a portrait of her, which was generally acknowledged to be most successful.

“Her neck, bosom, and arms appeared to be covered with a fine pale down, scarcely visible in some lights. She made a move as if to take off her upper clothing, but reluctantly, and we prevented it.

“Her husband and two boys accompanied her. The elder boy, about four or five years old, had nothing abnormal about him. The youngest, who was fourteen months old, and still at the breast, was evidently taking

after his mother. There was little hair on the head; but the child's ear was full of long silky floss, and he could boast a moustache and beard of pale silky down, that would have cheered the heart of many a cornet. In fact, the appearance of the child agrees almost exactly with what Mr. Crawford says of Maphoon herself as an infant.

"This child is thus the third in descent exhibiting this strange peculiarity, and in this third generation, as in the two preceding, this peculiarity has appeared only in one individual.

"Maphoon has the same dental peculiarity, also, that her father had, the absence of the canine teeth and grinders, the back part of the gums presenting merely a hard ridge. Still she chews pawn like her neighbours."

Another remarkable instance of a similar kind is mentioned by Fry, in his Travels, as having been witnessed in a Fakir, the hair on whose breast measured four ells.* A French physician, Ollivier, writing recently, narrates the case of a young lady, remarkable for the fairness of her skin and beauty of her deep black hair, who was the subject of fever, and while recovering perceived the whole surface of her body to be in the state termed "goose-skin." In a few days, the little elevations looked dark at the summit, and were surmounted each by a short black hair, which grew very rapidly, so that at the end of a month, every part of the body, with the exception of her face, the palm of the hands, and sole of the feet, was covered with a short hairy coat, of about an inch in length. Eble narrates that, during the reign of Maria Theresa, a woman who served in the army for many years as a hussar, and rose to the rank of Captain, had a strong mustachio. The bearded virgin of Dresden, who lived in 1732, and whose portrait is preserved in the gallery of the kings of Poland, was still more remarkable. Her beard, according to Michaelis,† grew from

* Encyclopædia Metropolitana, article Zoology.

† Acta Acad. Nat. Cur., vol. iii., Obs. 127.

each side of her chin, was three inches long, and of snowy whiteness. She cut it at first every month, then every fortnight, afterwards twice in the week. On her upper lip was a mustachio of short black hair. She had a powerful voice, ate enormously, and was bold and courageous. In the course of the year 1852, Dr. Chowne recorded the case of a young woman of twenty, a native of Switzerland, who in consequence of possessing whiskers and beard four inches long, and remarkably bushy, applied at the Charing-cross Hospital for a certificate of her sex, with a view of removing the scruples of the clergyman to the celebration of her marriage. Excepting the hair upon her face, and a longer growth on her back and limbs than is usual in woman, she presented no other indication of belonging to the harder sex, and the question was further placed beyond dispute by the circumstance of her being five months advanced in pregnancy. The certificate procured her the means of marriage, and she was afterwards exhibited in London as a hairy prodigy. She stated that she was born with hair upon the face, and that at the age of eight years it was two inches long. She further mentioned the curious circumstance that she had a brother as deficient in beard as she is prolific. She had no mustachio; her upper and lower lip being both as smooth as is customary with her sex. It subsequently appeared that she had a sister two years younger than herself, similarly constituted.

Dr. Gross, of Louisville, mentions a similar instance; an old woman, seventy-eight years of age, enjoying excellent health, and the mother of a numerous family. The sides of her face, chin, and lips, he says, "are all thickly covered with coarse hair, which she is obliged to shave off regularly once a week. Her whole aspect is remarkably masculine, and but for the length of the hair of the head she might be easily mistaken for a male."*

I was consulted in 1875, by a young woman, aged 33,

* Elements of Pathological Anatomy.

for loss of hair and complete baldness of the summit of her head ; she had formerly had a strong crop of hair. Another of her troubles was an excessive growth of hair upon the rest of her body. She was obliged to shave daily to keep down a thick beard, moustache, and whiskers, which would otherwise have been as strongly marked as in a man. Her body and limbs were covered with hair, which was more fully developed on the former than on the latter, and ranged in length from half an inch to two inches and upwards. The hair was thick, harsh, and black, and varied in length in different regions. From the back of the head it formed two thick peaks which descended on the sides of her neck ; a thick shaggy tippet covered her shoulders and upper part of the arms ; a broad hairy belt covered her loins ; a thick fringe hung downwards from her buttocks, and the spine was marked by a kind of mane, which occupied its whole length. Over this large expanse there were several spots where thinness of the hair was remarkable ; for example, at the root of the neck, over the convexity of the blade-bones, upon the lower part of the ribs, an ellipsis in the middle of the loins, and a transverse band across the hips. In these situations the skin was perceptible, but hairy ; while on the rest of the surface the appearance was that of a hairy animal. On the front of the trunk of the body the hair invested the whole surface, being thin at the root of the neck, on the breasts, the flanks and the hips, and especially thick on the front of the shoulders, the chest, and the abdomen. Curiously enough, with all this covering of hair she complained of constant chilliness.

In the arrangement of the hairs on the surface of the body, it might be inferred, that little existed to excite attention ; but this is not the fact, if we are to judge by the careful investigations to which the subject has given rise. The hair-tubes are not placed perpendicularly, but obliquely, in the skin ; hence the direction of the hairs, after their escape from the tubes, is in the same sense

inclined towards the surface ; and the " set " of the hair, from the root to the point, is governed by a law as precise as that which regulates any other of the secondary vital functions. Thus, on the head, the hair radiates from a single point,* the crown, to every part of the circumference, making a gentle sweep, behind, towards the left, and in front, to the right. The direction of this sweep is naturally indicated on the heads of children, and is that in which the hair is turned. On the forehead, the downy hairs proceed from the middle vertical line, with a gentle curve to the right and left, curving downwards to the situation of the whisker, and forming, by their lower border, the upper half of the eyebrow. At the inner angle of each eye is situated another radiating centre, like that of the crown of the head. The upper and inner rays from this centre ascend to the line between the eyebrows, where they meet those which are proceeding from the opposite centre, and those, also, which are diverging from the vertical central line of the forehead ; so that here a lozenge is formed, which is the point of approximation of hairs from four different quarters. It is this circumstance that gives to the hairs of the inner end of the eyebrow a direction towards the middle line ; and occasionally we see instances in which, from the unusual development of these hairs, the eyebrows meet at the base of the forehead, and form a little crest, for a short distance, along the root of the nose. The upper and outer rays curve along the upper lid, forming, by their upper margin, the lower half of the eyebrow. The lower and outer rays, together with those from the side of the nose, mouth, and chin, make a gentle sweep over the cheek, and side of the face. On the upper lip a current is directed from the apertures of the nose, outwards, and forms the sweep of the mustachio ; a similar disposition is observed at the middle line of the lower lip, near its free edge, while the beard is formed

* I have several times seen two centres on the crown of the head.

by the convergence of two side currents, which meet at the middle line.

On the trunk of the body, there is a centre of radiation from each armpit, and two lines of divergence, one of the latter proceeding from this point horizontally to the middle of the front of the chest, the other vertically along the side of the trunk, across the front of the hip, and down the inner side of the thigh to the bend of the knee. From the armpit centre, and from the upper side of the horizontal line, a broad and curved current sweeps upwards over the upper part of the front of the chest, and around the neck, to the back. From the lower side of the horizontal line, and from the vertical line, the set of the current is downwards and inwards, with a gentle undulation to the middle line in front; and backwards, also with an easy undulation to the spine.

From the armpit centre there proceeds another line of divergence, which encircles the arm like a bracelet, immediately below the shoulder. From the upper margin of this line the direction of the current is upwards over the shoulder, and then backwards to the mid-line of the body. Another line commences at this ring on the front part of the arm, and runs in a pretty straight course to the cleft between the index finger and thumb on the back of the hand: this is the line of divergence of the arm; from it and from the ring the stream sets, at first, with a sweep forwards, and then, with a sweep backwards to the point of the elbow. In the fore-arm, the diverging currents sweep downwards in front, and upwards behind, also tending to the point of the elbow, which is thus a centre of convergence; while on the back of the hand and fingers the sweep outwards, with a curve having the concavity upwards, is quite obvious.

On the lower limb there are two vertical lines of divergence: the one being the continuation of that of the side of the trunk, proceeding around the inner side of the thigh to the bend of the knee; the other, an undulating line, beginning at about the middle of the hip, and

running down the outer side of the thigh and leg, and across the instep to the cleft between the great and second toe. A short oblique line connects the two vertical lines at the bend of the knee. On the front of the thigh, the streams from the two lines converge, and descend towards the knee. On the back they converge also at the middle line, but ascend towards the trunk of the body. On the leg, where there is but one line, the diverging currents sweep around the limb, and meet upon the shin, while on the foot they diverge with a sweep, as upon the back of the hand.

Chemical analysis shows the hair to be composed of a basis of animal matter (albumen), of a certain proportion of oily substance, of the salts of lime which enter into the composition of bone, of flint, sulphur, and two metals, namely, manganese and iron. The quantity of sulphur is somewhat considerable, and it is this substance which is the principal cause of the disagreeable odour evolved by hair during combustion. The constituents of hair of various colours also present some differences: for example, red hair contains a reddish-coloured oil, a large proportion of sulphur, and a small quantity of iron; fair hair, a white oil, with phosphate of magnesia; and the white hair of the aged, a considerable quantity of bone-earth or phosphate of lime. According to the latest ultimate analysis, fair hair contains the least carbon and hydrogen, and most oxygen and sulphur; black hair follows next; while brown hair gives the largest proportion of carbon, with somewhat less hydrogen than black hair, and the smallest quantity of oxygen and sulphur. The hair of the beard was found to contain more carbon and hydrogen than the hair of the head, and less oxygen and sulphur. The quantity of nitrogen is the same in all.

The presence of animal matter in the hair is a cause of the hygrometric phenomena which it is known to evince. Animal matter, having saline substance entering into its composition, has a great disposition to attract

fluids from the atmosphere, and when this occurs, the shaft of the hair becomes swollen and straightened. When, on the contrary, the hair contains a larger proportion of oily substance, the influence of the animal matter and salts in the absorption of aqueous fluid is checked, and the hair maintains its natural curliness. This I believe to be the explanation of the curling and non-curling quality as it exists in hair.* The ordinary effect of damp in destroying the curls of the hair is well known, but it is not perhaps so well known that this state of the hair participates in the daily health of the individual. I have collected several instances in which the hair, naturally possessing a strong curl, becomes lank and straight if its possessor be out of health, and wherein the straightness of the hair becomes as certain an index of a disordered state of the economy as a yellow eye-ball or a white tongue.

The influence of climate on the curliness or non-curliness of the hair is illustrated in the difference in this respect between the natives of the north and of the south, the long lanky hair of the former as compared with the frizzly curls of the natives of Africa. I am indebted to Dr. Tilt for a lock of hair, of which I subjoin a likeness, from the head of a Bosjeman girl, fourteen years of age. It is the most remarkable I ever saw, consisting of minute curls like those of a doll, the curls being beautiful in themselves, but very unfit to cover the head of a woman† of fourteen. The individual hairs are not deficient in length, but they are excessively fine. I

* The curling property of the hair has given rise to much theoretical speculation on the part of physiologists. One attributes it to flatness of the shaft; another, to unequal distribution of the fluids in the substance of the hair; a third, to impediment in its escape from the aperture of the hair-tube; a fourth, to impediment in traversing the deep layer of the scarf-skin; and a fifth, to deficiency of gelatine. Of these theories, that which ascribes the curling property to flatness, that is, to the form of the shaft, is most worthy of attention.

† Womanhood is complete at fourteen in Africa.

find a similar formation and disposition on the head of one of my servants, a young negro from Nubia ; the hair is soft, fine, very curly, and gathered all over into little flocks, which very imperfectly cover the head ; and yet his hair has not been cut for two years and

*Fig. 37.**



a half, since, in fact, he allowed it to grow after shaving and the use of the tarboosh. He is now twenty years of age, but has neither whiskers nor beard. Mr. St. John, in his "Travels in the Valley of the Nile," remarks, "that the effect of the climate of Egypt upon the hair is remarkable. My own beard, which in Europe was soft and silky, and almost straight, began, immediately on my

arrival at Alexandria, to curl, to grow crisp, strong, and coarse, and before I reached Es-souan, resembled horse-hair to the touch, and was all disposed in ringlets about the chin. This is, no doubt, to be accounted for by the extreme dryness of the air, which, operating through several thousand years, has in the interior changed the hair of the negro into a kind of coarse wool." He further says, that on his return to Europe, when he reached Malta, he had lost all his curls.

Now, Mr. St. John, in the above paragraph, speaks of the hair of the negro, as other authors are wont to do, as being a "coarse wool ;" but, according to my observation, the individual hairs of the negro are finer than those of Europeans ; and as respects the term wool, why, wool is hair, differing in nothing essential from the hair of the Caucasian head. I refer now to the wool of the sheep ; but the woolly curls of the African are nothing less than the curls about the chin of Mr. St. John's beard, when in its curliest state of Eastern luxuriance. The

* *Fig. 37.*—A lock of ringlets, natural size, from a Bosjeman girl, aged fourteen.

existence of curliness causes the fine hairs to cling together and give rise to the production of flocks.

A well-known and conspicuous property of the hair is its aptitude for assuming an electrical condition. The noisy sparkles produced by friction of the hair of a cat are familiar to every one, and are an illustration of this curious quality. Hair becomes negative, in reference to electricity, by friction; it is also a condenser and bad conductor of the electric fluid. Hence, we occasionally have an opportunity of observing the same luminous sparkles in human hair as in that of animals. I am acquainted with a lady who is a great sufferer from neuralgia of the head, and while under the influence of the distressing pain of this malady, her hair becomes highly electrical, so that when she lets it down at night, each hair repels its neighbour, and every hair hangs separate from the rest, giving to the entire shock a most remarkable appearance. Then we have, most of us, experienced the crackling state of our own hair, in dry states of the atmosphere, and particularly during the prevalence of easterly winds.

We come now to the question, of the purpose of hair in the animal economy? That it effects an important one, we have evidence in its almost universal distribution among the mammiferous class of animals, and, indeed, if we admit the analogy between feathers and hair, among all warm-blooded animals; additional evidence is obtained in the perfection of its structure, and again, in its early appearance during the development of the young. As a bad conductor of heat, it tends to preserve the warmth of the body, and in man it would have that effect upon the head, and serve to equalize the temperature of the brain. It is also an agent of defence against external irritants, as the heat of the sun's rays and the bites of insects; and against injuries inflicted with violence, as we see illustrated in the use of the horse's tail on the helmets of warriors. Of special purposes fulfilled by the hairs, we have instances in the eyebrows

and eyelashes, which are adapted for the defence of the organs of vision ; in the small hairs which grow in the apertures of the nostrils, and serve as a guard to the delicate membrane of the nose ; and in similar hairs in the ear-tubes, which defend those cavities from the intrusion of insects. Among the larger mammiferous animals, the hair of the tail is used as a whisk to remove flies that pierce the skin to suck blood or deposit eggs ; and in those parts of the body which the tail cannot reach, a flowing or bushy mane serves to supply its place. By a power of conduction of outward impressions common to the hair with all rigid bodies, these organs are calculated to perform the office of an apparatus of touch. We feel distinctly the disturbance of the hairs of the head by the movements of a fly, although the little creature is at some distance from the skin ; and, on a similar principle, the long and rigid hairs of the upper lip of feline animals are an agent of touch, transmitting whatever impression they receive to the sensitive papilla upon which they are implanted. Indeed, animals of the cat tribe have the power of erecting these hairs, and rendering them fixed, so that the slightest impression of contact is transferred to the nerves of the sensitive papilla.

The property of the hair of defending the head against heat is curiously illustrated in the habits of hot climates. Mr. St. John remarks, that it is the custom in Egypt to shave the head, but as a substitute for the loss of the natural covering, "to guard the head from the heat of the sun, two red felt caps (called tarboosh), with another of double calico, are worn ; and as the season advances, or as we proceed farther south, a thick handkerchief is stuffed into the crown." Speaking of the Ababdé and Bisharein Arabs, he says, they were clad in "brown sacks, without tarboosh or turban, trusting to their prodigious growth of black curly hair to defend their heads from the sun." In another place, referring to a Nubian travelling with a laden ass, he

observes, "his head was shaven, excepting that important tuft on the crown, by which the Angel of Death, in the last day, will bear all true believers to Paradise: yet he walked uncovered in the sun, whose heat appeared sufficient to scorch his brain to a cinder." Again, "it can hardly be doubted, that the habitual exposure of the bare skull tends, as Herodotus has remarked, to harden it exceedingly; but it may possibly, at the same time, produce an injurious effect upon the brain. Dervishes, Santons, Sanyāsis, Yoghis, and other fanatics or vagabonds found in the East, who expose themselves in penance to the sun, if they were not lunatic at the outset, generally become so. Nature, by furnishing the head with a thick covering, suggests the propriety of protecting the brain from the effects of intense heat, and there are few points on which she can be disobeyed with impunity."

Among the purposes of the hair, that of ornament will occur to the mind of most of my readers, though they will hardly be prepared to find it so disfigured to the uses of man as is shown to be the case among the inhabitants of some of the islands of the Indian Archipelago. "We were visited along the whole length of the coast" (New Ireland), writes Captain Keppel, "by a constant succession of canoes, with natives very similar to those of the Feejee Islands. Although they came alongside, none of them could be induced to come on board. They had a vast quantity of hair, frizzed out, and coloured white, black, or red. A man, having his hair carefully divided down the middle, would present one side covered with a jet-black mixture, while the other half would be of a bright red, or perhaps white. The men, five or six in number, belonging to the same canoe, were generally coloured uniformly. Suppose a canoe with a black crew to have paddled up to one side of the ship, presently, while your attention was occupied elsewhere, they would shift round to the other side; but, lo! now the crew were white. It is not

easy to believe that black is white, yet here it was so : one and the same crew were black on the port and white on the starboard side. Others with their hair cut short, and covered over with some dirty thick gluey substance, would paint a white ring round the head just above the eyes and ears, with a line under the chin. It was difficult to believe that the head was not confined in a close-fitting skull-cap." The reviewer of Captain Keppel's book concluding his notice, aptly remarks : "Truly the 'family of man' numbers some strange members."

In considering the special functions of the hair, I am led to a subject to which, some years back, Mr. Chadwick directed my attention, namely, the uses of the beard. There can be no doubt, says Mr. Chadwick, that the mustachio is a natural respirator, defending the lungs against the inhalation of dust and cold ; it is a defence of the throat and face against the cold ; and it is equally in warm climates a protector of those parts against excessive heat. Mr. Chadwick was first led to make these observations by seeing some blacksmiths who wore beards, whose mustachios were discoloured by the quantity of iron dust which had accumulated amongst the hairs ; and he justly inferred, that had not the dust been so arrested by a natural respirator it must have found its way into the lungs, where it could not have done otherwise than be productive of evil consequences. Mr. Chadwick further reminds me of the necessity for the beard in sandy countries, as Syria and Egypt, and mentions the well-known fact, that travellers through those countries find it expedient, and even necessary, to wait until their mustachios have grown to a sufficient length to defend their mouths against the admission of the burning sands of the desert. Upon the same principle he conceives that the mustachio would be of service to labourers in all dusty trades, such as millers, bakers, masons, &c. ; to workmen employed in grinding iron and steel ; and to travellers on dusty

roads. In favour of the mustachio as a defence against the inhalation of cold air, it has been stated that persons who wear mustachios are less susceptible of toothache than others equally exposed; and that the teeth are less apt to decay. The use of the mustachio and beard as a means of maintaining the temperature of the parts which it covers is indisputable. Mr. Chadwick remarks, that he has known an instance of a cold occasioned by shaving the mustachio; and I have myself seen a severe attack of mumps result from the removal of the whiskers. Mr. Chadwick also states, that the sappers and miners of the French army, who are remarkable for the size and beauty of their beard, enjoy a special immunity against bronchial affections; and in further illustration of the same principle he has known persons susceptible of taking colds and sore throats rescued from that inconvenience by permitting the growth of hair beneath their chin. The celebrated Egyptian traveller, Mr. St. John, informed me, that Walter Savage Landor was a great sufferer from sore throat for many years of his life; and that he lost the morbid disposition by following the advice of the surgeon of the Grand Duke of Tuscany to let his beard grow; a certain corrective, as he was assured by that medical authority. There are strong reasons for the opinion advanced by Mr. Chadwick, and others, that the army and navy should wear mustachios and beard. The arguments against the mustachios and beard, at least in this country, are founded on the possible neglect of cleanliness. This argument could not apply to the army and navy, where attention is paid to such points; but it would and might among our ill-fed and worse-lodged working-classes. In warmer climates another difficulty arises, as happened to a friend of my own, who took pride in a majestic beard, and almost wept over the necessity for its destruction, when, one morning, after enjoying the hospitality of an Arab tent, he beheld his glorious beard teeming with animated forms, a forest of small deer.

Of the delicacy and beauty of structure of the hair, I have endeavoured already to adduce evidence ; and with regard to its early development, I will now make a few observations. At the period of birth, the human infant, without reference to sex, is covered with a thick down,* and it is then that we have the best opportunity of observing the direction of the hairs ; for, during the first year, the greater part of the temporary hairs have fallen, and are succeeded by others which appear upon the surface, only in some situations. The first hairs that are developed are those of the eyebrow, then those of the upper lip and around the mouth, and, at a later period, those of the head. The last which push through are the hairs of the fingers and those of the external ear and nose. At the period of adolescence, the hairs acquire a new impulse of growth in co-relation with the more active development of the frame ; and when the powers of the system are on the wane, the hair is among the first of the organs of the body to evince an associated infirmity. It seems to be an established fact that the hairs, at their first formation, do not issue directly from the hair-tubes, but become bent upon themselves, so that they form a loop, whereby the point of the hair is directed towards the root, and the bend of the loop towards the aperture of the hair-tube, or pore. The cause of this position of the hair would appear to be some obstruction at the pore, from the accretion of the unctuous substance of the oil-glands and the cast cells of the hair-tube, for the little scale formed by this accretion is gradually raised by the elasticity of the hair, and when the latter attains sufficient power, is cast off, and the hair bursts from its temporary imprisonment.

In reflecting on the purposes of the hair in the animal economy, we must not pass over its chemical constitution. A large quantity of carbon and hydrogen are by its

* Lorry compares this down on the faces of young children to the bloom on freshly gathered fruit.

means separated from the system ; and although several other organs are concerned in the more abundant removal of the same elements, yet it would not be judicious to deny, that the comparatively trifling aid of the hair is, under some circumstances, of importance in the exact counterpoise of the manifold operations of the animal organism. A learned French writer, Moreau, narrates the case of a young lady who was cured of mania by the cutting of her hair. Another relates that a Capuchin friar was cured of a serious internal disease by shaving his beard ; and several instances are recorded in which headache has subsided on the removal of the hair. Vauquelin and Fourcroy have given it as their opinion, that the hair, in conjunction with the other products of the skin, is capable of supplying the office of the kidneys.

Again, it has been observed that the growth of the hair is unusually rapid in that disease in which the functions of the lungs are more or less completely abrogated, namely, pulmonary consumption ; and we are but too well acquainted with the long silken eyelashes, and long and streaming hair, of the sufferers from that distressing malady.

It is a question to what extent the hair, after its growth is completed, is susceptible of influence proceeding from its formative element, the skin. In other words, whether it is capable of imbibing fluids derived from the blood-vessels, and if so, whether this power of imbibition extends to the entire length of the shaft, or is limited to that portion of the hair which is contained within the hair-tube. I have already stated my conviction that a transmission of fluids from the blood-vessels of the skin into the substance of the hair really occurs ; the quantity of such fluid and its nature being modified by the peculiarity of constitution or state of health of the individual. Hence, in a state of perfect health, the hair may be full, glossy, and rich in its hues, in consequence of the absorption from the blood of a nutritive juice, containing its proper proportion of oily and albu-

minous elements. In persons out of health it may lose its brilliancy of hue, and become lank and straight from the imbibition of juices imperfect in composition and ill-elaborated; while, in a third group, there may be a total absence of such nutritive juice, and the hair, as a consequence, look dry, faded, and, as indeed is the case, dead. That these phenomena do take place in the hair, I have satisfied myself by frequent observation, and I feel also satisfied that the juices penetrate to the extreme point of the hair. That there may be circumstances which will cause a limitation in the distance to which the fluids proceed, is quite obvious; but these must be regarded in the light of modifying conditions.

Now, if it be established that the hair is susceptible of permeation by fluids derived from the blood, it follows that such fluids, being altered in their chemical qualities, may possess the power of impressing new conditions on the structure into which they enter. Thus, if they contain an excess of salts of lime, they may deposit lime in the tissue of the hair, and so produce a change in its appearance from dark to grey. But the mysteries of vital chemistry are unknown to man, and other and more extraordinary changes may be produced in the juices of the blood by sufficient causes, and then such phenomena may result as the sudden conversion of a part, or indeed, of the whole of the hair of the head, from a dark colour to one of snowy whiteness. I was an unbeliever in the possibility of this change until some years ago, when an instance which I shall presently narrate, and which I cannot doubt, unexpectedly came under my notice.

But, besides the sudden or speedy conversion of the entire head of hair from a dark tint to white, the change may be slow and partial, and having taken place, may either continue; or return, on a change of health, to its natural hue. This latter circumstance points to a curative indication, and, acting upon the suggestion, I have in several instances succeeded in restoring the original

colour to grey hair by medical means. The following quotation from the letter of a medical friend will illustrate the kind of alteration to which I am now referring. He says: "I have observed my own hair to be more grey in the spring than in the beginning of winter, and that, for several years past. I think that the hair which shoots out during the winter is white, and that in the summer dark, and the white hair becomes dark as it grows up in the summer." Another instance, now before me, is that of a lady who had her head shaved in consequence of disease of the scalp. When the hair grew, it was very grey, but by degrees resumed its natural colour. I may refer also to the case of a literary friend, who, having had his head shaved while residing in Egypt, found at the end of four months, when he allowed it to grow, that it was quite white. As growth advanced, some of the natural colour of the hair reappeared, but it has since gone back, and is at present perfectly white.

The history of the case of sudden blanching of the hair, to which I have alluded, is as follows:—A lady, in her sixty-second year, had had an early and long attachment for a gentleman to whom she was affianced, and who, at the period to which I refer, was on his voyage from Hull to London, to complete his marriage engagement. On the morning of November 19, 1823, a few days after the time when he had promised to return, a letter was put into her hands, which conveyed the news of his shipwreck and death. She instantly fell to the ground insensible, and remained in that state for five hours. On the following evening, her hair, which had previously been of a deep brown colour, was observed by her sister to have become as white as "a cambric handkerchief." Her eyebrows and eyelashes retained their natural colour.

The distress into which this poor lady was thrown by the sad news above related was such that she was unable to quit the house for six months. Her whole system

underwent convulsion ; the fountain of life seemed for a time to be dried up, and the very colour of her blood exhausted. Subsequently, the whole of the white hair fell off, and when another crop appeared, it was grey, as it still remains. These details, corroborated by the sister who first perceived the change, were told to me, even at this distance of time, with a quivering lip and moistened eye. Her heart has beaten irregularly ever since.

Lord Byron has recorded in words more durable than brass, an instance of the gradual conversion of the hair to grey :—

“ My hair is grey, though not with years ;
 Nor grew it white
 In a single night,
 As men's have grown from sudden fears.”
Prisoner of Chillon.

A lady of some literary eminence to whom I related the foregoing instance of sudden blanching of the hair, informed me that an aunt of her own had become grey in a few days, in consequence of the shock occasioned to her nervous system, by finding, on waking in the morning, a beloved sister lying dead by her side. Mary Queen of Scots and Marie Antoinette both became grey in a short period, from grief. Sir Thomas More, we are told, turned grey during the night preceding his execution. According to Borellus, two gentlemen, the one a native of Languedoc, the other a Spaniard, were so violently affected, the first, by the announcement of his condemnation to death, the latter by the bare thought of having incurred a serious punishment, that both became blanched in the course of a single night. The gravity with which Daniel Turner relates the following case, which he attributes to Schenkus, is amusing :—
 “ Don Diego Osorius, a Spaniard of a noble family, being in love with a young lady of the court, had prevailed with her for a private conference, under the shady boughs of a tree, within the garden of the King of Spain, but

by the unfortunate barking of a little dog, their privacy was betrayed, the young gentleman seized by some of the king's guard, and imprisoned: it was capital to be found in that place, and therefore he was condemned to die. He was so terrified at the hearing of his sentence, that one and the same night saw the same person young and old, being turned grey as in those stricken in years. The jailor, being moved at the sight, related the accident to King Ferdinand, as a prodigy, who thereupon pardoned him, saying he had been sufficiently punished for his fault." And again, this, from the same author:—

A young nobleman "was cast in prison, and, on the morrow after, ordered to lose his head; he passed the night in such fearful apprehensions of death, that, the next day, Cæsar sitting on the tribunal, he appeared so unlike himself, that he was known to none that were present, no, not to Cæsar himself; the comeliness and beauty of his face being vanished, his countenance like a dead man's, his hair and beard turned grey, and in all respects so changed, that the emperor at first suspected some counterfeit was substituted in his room. He caused him, therefore, to be examined if he were the same, and trial to be made if his hair and beard were not thus changed by art; but finding nothing counterfeit, astonished at the countenance and strange visage of the man, he was moved to pity, and mercifully gave him pardon for the crime he committed." And he follows this case with another, both being intended to illustrate the force of imagination. "Somewhat like this," says he, "is that relation of Esquire Boyle's, who tells us, that when he was in the county of Cork, in Ireland, there was an Irish captain, who coming to deliver himself up to my Lord Broghil, commander of the English forces in those parts, according to a pardon proclaimed to those Irish that were willing to surrender themselves and lay down their arms; he was casually met, with some of his followers, by a party of English, and intercepted, the governor being then absent. Upon which

the poor captain was so apprehensive that he should be put to death before my lord's return, that the very fear and anxiety of his mind quickly changed the colour of his hair, in a peculiar manner, not uniformly but interspersedly, among some of his locks, which were perfectly turned white, the rest of them retaining their wonted reddish colour."

Dr. Cassan records the case of a woman, thirty years of age, who, on being summoned before the chamber of Peers to give evidence upon the trial of Lovel, underwent so powerful a revulsion, that in the course of one night the hair was completely blanched, and a furfureous eruption appeared all over her head, upon her chest, and upon her back. Henry of Navarre, on hearing that the edict of Nemours was conceded, was so mightily grieved, that in the course of a few hours part of one of his mustachios whitened. In one person, some of the eyelashes became blanched from mental agitation. The writer of the article, *Zoology*, in the *Encyclopædia Metropolitana*, "has known one instance of a banker whose hair became grey in the course of three days, when under much anxiety during the great panic of 1825: and also another gentleman, who at his marriage when about forty years old, had a dark head of hair, but on his return from his wedding trip, had become so completely snow-white, even to his eyebrows, that his friends almost doubted his identity." Moreau narrates, that he once knew an aged man, for whom snow-white hair and a countenance deeply marked by the furrows of care inspired the respect which we owe to age and misfortune. "My hair," said he, "was as thou seest it now, long before the latter season of my life. More energetic in their effects than assiduous toil and lingering years, grief and despair, at the loss of a wife most tenderly loved, whitened my locks in a single night. I was not thirty years of age. Judge, then, the force of my sufferings; I still bear them in affrighted remembrance."

I am little disposed to speculate on the "modus operandi" of this change of colour of the hair, but am content, for the present, to give a fitting place to the fact as it stands. The phenomenon may be the result of electrical action; it may be the consequence of a chemical alteration wrought in the very blood itself; or it may be a conversion for which the tissue of the hair is chiefly responsible. In any case, the following explanation, offered by an eminent French chemist, Vauquelin, I should feel inclined to discard, as partaking too largely of the coarser operations of the laboratory. "We must suppose," says the author in question, "to explain the sudden change of the hair, that at the critical moment when Nature is in revolution, and when, consequently, the natural functions are suspended or changed in nature, that an agent is developed in the animal economy, and passing into the hair, decomposes the colouring matter. This agent must be an acid."

The rapid blanching of the hair derives an important illustration from the animal kingdom. Several of the animals which inhabit the polar regions are known to become white during the winter season, and among the most remarkable of these is the lemming. Sir John Ross observes that, finding the lemming, like the polar hares which had been tamed and kept in confinement, preserve its usual colour during the winter, he placed one in the open air, on the first of February, when the thermometer stood at 30° below zero. The next morning, the fur of the cheeks, and a spot upon each shoulder, had become perfectly white. On the following day the hinder part of the body and the flanks were of a dirty white hue, and at the end of a week, the animal was entirely white, with the exception of a saddle-shaped patch on the middle of the back. No other change ensued, although the poor animal was kept exposed to the cold until it perished. When the skin was examined, the white hairs were found to be much longer than those of the unchanged patch, the

blanching being confined to that portion which exceeded in length the natural hairs. So that, when the white ends were cut off, the animal appeared to have regained, with very little alteration, its summer coat, and without any reduction in the length of its fur.

It is by no means uncommon to find instances of a gradual change of colour of the hair referrible to a particular period of suffering, as was the case with the greyness of Mary Queen of Scots and Marie Antoinette. Alibert records, that after severe illness, a head of brown hair was exchanged for one of bright red, and in another person, from having been previously brown, the hair became deeply black. Several instances are narrated in which brown hair became fair, and in an old person the white hair fell off, and was replaced by brown. John Weeks, who lived to the age of 114, recovered the brown hue of his hair some years before his death; and Sir John Sinclair reports that a Scotchman who died in his 110th year, had his hair restored to its original colour in the latter years of his life. Susan Edmonds, in the 95th year of her age, had her hair changed to black; it again became grey previously to her death, at 105.* Dr. Isoard, detailing the constitutional peculiarities of a particular family, observes, with regard to one of its members, a young lady of seventeen, deaf and dumb from birth, that each time she is attacked by a fever peculiar to herself, she undergoes a change in the colour of her hair, from a pleasing blonde to a dusky red; but that so soon as the febrile symptoms diminish, the natural colour returns. A more perplexing case is the following, communicated by Dr. Bruley, a physician of Fontainebleau, to the Academy of Medicine of Paris in 1798:—A woman, sixty-six years of age, afflicted with consumption, had fair hair, transparent as glass; four days before her death, this hair became jet-black. On examining the

* *Encyclopædia Metropolitana.*

roots of the hair, Dr. Bruley found the bulbs distended to an unusual size, and gorged with a black pigment, while the roots of those of the fair hairs which yet remained, were pale and shrivelled. The case, however, is imperfect, from the circumstance of the length of the hair being unmentioned.

We sometimes meet with cases in which the blanching of the hair has resulted from disorganization of the skin produced by inflammation or accident. I have had occasion to remark upon the growth of white hair upon the scars left by certain of the diseases of the scalp. According to Pepys, Prynne, the antiquary, amused the guests assembled around a dinner-table, on one occasion, by citing the example of "one Damford, that, being a black man, did scald his beard with mince-pie, and it came up again all white in that place, and continued to his dying day." Of a similar nature are the white patches upon the back of horses which have been galled by the saddle.

An unexpected gleam of light was thrown upon the explanation of sudden blanching of the hair by a very curious and interesting case which I made the subject of a communication to the Royal Society in 1867. My case was that of a lad between seven and eight years of age, in whom every hair of the head was chequered brown and white in alternate bands, looking as if encircled with rings, and giving to the general mass a curiously speckled appearance. The brown segment of the hair, which was its normal colour, measured $\frac{1}{10}$ of an inch in length, the white or abnormal segment about half that length, and the two together about $\frac{1}{3}$ of an inch, equivalent to one-third of a line. This change in the hair was first noticed when the lad was between two and three years old, and seemed latterly to become more conspicuous; the change was confined to the hairs of the head, and was not traceable in the eyebrows and eyelashes. The cylinder of the hair was uniform; the white portion occupied its whole diameter, being more

or less rounded and compact towards the root, and expanded into fibres at the opposite extremity; moreover, by transmitted light it was opaque, while the brown segment was transparent. Closer examination with the microscope showed that the whiteness and opacity of this segment were due to the existence of minute spaces filled with air; these spaces being sometimes arranged in linear order, and sometimes forming short irregular canals, which here and there stretched into the transparent segment, while in the pith or medulla there were numerous air globules.

It was evident, from the examination of this hair, that the abnormal appearance of whiteness and opacity occurring in regular segments, was due to the presence of a gaseous fluid within the hair; and that the development of a gaseous fluid within its structure is capable of producing whiteness; hence, a sudden formation of gaseous fluid would give rise to a sudden whiteness or blanching of the hair. In the present case the gas may have been generated at the time of formation of the abnormal segment, or the cells composing that segment may have been originally filled with an aqueous fluid which evaporated quickly, and was replaced by air penetrating from without. Whichever explanation be adopted, it may be inferred that the pair of segments are the growth of twenty-four hours; and as the hair grows more slowly during the night than during the day, it may further be supposed that the white and opaque and smaller segment was the produce of the night, and the larger and normal segment that of the day. There is, however, this further difficulty to be got over; namely, that whereas, according to my observation, a rapidly growing hair acquires only $\frac{1}{8}$ of an inch in length a day, and the length of the brown portion alone is $\frac{1}{10}$, it is quite possible that the separate segments may be product of alternate days.

The specimen of hair just described is preserved in the Hunterian Museum of the Royal College of

Surgeons of England. A similar specimen may be seen in the museum of St. Bartholomew's Hospital; but the occurrence is undoubtedly extremely rare. At about the same time that my case was published, the observation was made by a German physiologist, that some of the hairs of a person labouring under delirium tremens became quite white during the few days that he remained in hospital; and these hairs, when examined under the microscope, were found to owe their whiteness to the presence of air infiltrated through their substance. Air is no doubt a normal constituent of healthy hair within the cells of the medulla or pith; and according to these observations it must now be accepted as an occasional abnormal constituent of hair. Its presence within the hair is a satisfactory explanation of the whiteness of hair in certain cases, and its capability of rapid development will explain the suddenness with which the change has been known to occur. Moreover, gaseous infiltration of the hair, in a less marked degree, may be more common than has been hitherto supposed, and will explain some of the changes in the appearance of the hair which occur during illness, and which are susceptible of removal. In cases of whiteness and opacity, the restoration of the colour of the hair would be a simple problem, merely requiring that the air should be displaced from its cavities by saturation with oil. The normal colour of the hair would then be immediately perceptible.

The brief history of the hair which I have now given, would be incomplete, were I not to refer to the numerous fabulous stories to which ignorance of the economy of the hair has given birth, and this is the more necessary, from the circumstance of such fables being sometimes met with in high places, and under the sanction of high names. A more celebrated name than that of Bichât is hardly to be met with among medical authorities; and yet Bichât has propagated a serious error in declaring that he has found hairs growing from the internal mem-

branes. Similar statements have been made by more recent writers, and amongst the places named as the seat of hairs is the tongue. But the fictions of the ancients on this subject far outweigh all that the moderns have ever written or imagined. Thus, in the "Philosophical Collections," it is recorded, that "Pliny and Valerius Maximus concur in their testimonies, that the heart of Aristomanes was hairy." Cœlius Rhodiginus relates the same of Hermogenes, the rhetorician; and Plutarch, of Leonidas the Spartan.* A prevalent belief, strengthened by the opinion of several modern French writers on this subject, is, that the hairs grow after death.

The hairs, "by some authors," writes Daniel Turner, are "denied to be proper parts of the body, as not being nourished by the common life of the whole; it being observable that the hair, and some say, the nails also, grow after death." And Diembroeck likens them to polypody, or "any other small fibrous shoots out of an old tree, which continue to grow after the tree is dead, having a proper vegetation of their own, differing from that of the root or trunk from whence they arise." I fancy that I have seen an apparent growth of the downy hairs on the dead body, where decomposition has made considerable progress, but I am unwilling to believe in such a phenomenon without further and more careful investigation. The lengthening of the hairs of the beard, observed in a dead person, is merely the result of the contraction of the skin towards their bulb, and not a vital process continuing after the death of the individual; indeed, it is identical with a similar pushing of the hair which is known to take place in posthumous plaster casts; a mere result of contraction of the plaster, and occurring where growth from nutrition could never be suspected. It is said, that when the sarcophagus containing the head of Charles the First was opened

* Encyclopædia Britannica, article Hair.

recently, the hair was found to have grown to an extraordinary length. Again, in the "Philosophical Collections" above referred to, an account is given by Wulferus, of a "woman buried at Nuremberg, whose grave being opened, forty-three years after her death, there was hair found issuing forth plentifully through the clefts of the coffin, insomuch that there was some reason to imagine the coffin had sometime been covered all over with hair." And Mr. Arnold gives* "the relation of a man hanged for theft, who in a little time, while he yet hung upon the gallows, had his body strangely covered over with hair."

* Encyclopædia Britannica, article Hair.

The *London Review* for September 23rd, 1865, publishes an interesting article on "Human Hair," with particular reference to false hair; it states that the great market of human hair is Paris, wherein one hundred tons of that article are received annually; the sources from which the market is supplied are very various, some being those departments, such as Brittany, where custom enforces among the young people the use of the cap; others the prison or the convent, the latter being technically termed "church hair." Black hair is brought chiefly from Spain and the north of Italy; golden hair from Germany; and yellow hair from Holland. In England the prevailing colour is brown; with a dash of flaxen, derived from the Saxons, in the south and south-eastern counties; the blue-black of the Celts from Wales; and red from the Danish descendants of the north-eastern counties. The most valuable colours are, golden hair, of which the price is twelve to fifteen shillings the ounce; and white, to make up into gray hair, which sells at one guinea the ounce. The dealers have acquired the curious power of distinguishing the qualities and even the source of the hair by touch and by smell; the former teaches them its thickness, while a difference of odour may depend on the chemical composition of the hair itself or its mode of packing for market. Its manufacture consists in cleansing it from grease by means of dry sand; carding, to straighten it; and matching in length so as to form small parcels which are somewhat characteristically termed "leeches." To give it a permanent curl, for ringlets, it is wound around small cylinders of wood and boiled in water. The quantity of the long black hair from a French head averages about five ounces; that of an Italian, six ounces; and of a German ten ounces. A head of hair, measuring six feet in

length, from an English lady, was shown at the Exhibition of 1862 by Messrs. Hovenden; and the durability of hair is exemplified by the existence in the British Museum of a wig of auburn hair taken from the tomb of a Theban mummy; and supposed to be 2,000 years old. The article also cites the calculation by a German philosopher of the number of the hairs, which corresponds very nearly with my own; in a blonde he found 140,000; in a head of brown hair, 109,440; in a head of black hair, 102,962; and one of red hair, 88,740; my own average of a good head of hair being 120,000 (page 72).

CHAPTER VI.

ON THE INFLUENCE OF DIET ON THE HEALTH OF
THE SKIN.

IN preceding chapters I have endeavoured to show, that whether we regard the skin as an independent organ, or consider its function in connection with the entire system, we cannot fail of coming to the conclusion that it must be an important agent, for good or for evil, in the animal economy. In addition to the power of sensibility which it confers on the system, it is the means of conveying to the mind a knowledge of the state of temperature of the body: it is, as it were, the thermometer of vital heat, the degrees upon its scale being computed by the expressions *agreeable* and *disagreeable*, in place of the terms of the common thermometer. The value of these expressions to health is not, however, sufficiently estimated; but it is nevertheless certain, that a disagreeable impression of temperature in the skin, is a warning note of something mischievous to health, acting either within or out of the economy. If the temperature be elevated above the agreeable point, without an evident cause, there is fever; if it be lowered below the agreeable point, upon only a part of the body, there is need of vigilance. The temperature of health is a genial summer over the whole surface, and when that exists, the system cannot be otherwise than well. This brings me to the rule of health which I wish to establish, namely, *by food, by raiment, by exercise, and by ablution, to maintain and preserve an agreeable warmth of the skin.* Everything above this is suspicious; everything below, noxious and dangerous.

Food is in a twofold manner a source of warmth: firstly, by supplying the material of nutrition requisite to balance the continual waste taking place in the body; and secondly, by conveying into the system those elements which, by their chemical combinations, elicit heat. To ensure these results, food must be wholesome and sufficient, and must combine all that variety of animal and vegetable which a Divine Providence has bestowed upon man. Dr. Prout has grouped all nutritive substances into four classes, which he terms aqueous, saccharine, albuminous, and oleaginous. The first of these needs no elucidation; it is an abundant and necessary constituent of the body, and an universal component of our food. The saccharine class is derived from the vegetable kingdom; the albuminous chiefly from the animal realm; and the oleaginous from both. "A diet," writes Dr. Prout, "to be complete, must contain more or less of all the four staminal principles: such at least must be the diet of the higher class of animals, and especially of man." And the same author beautifully remarks—"This view of the nature of aliments is singularly illustrated and maintained by the familiar instance of the composition of milk. All other matters appropriated by animals as food, exist for themselves, or for the use of the vegetable or animal of which they form a constituent part. But milk is designed and prepared by nature expressly as food, and it is the only material throughout the range of organization that is so prepared. In milk, therefore, we should expect to find a model of what an alimentary substance ought to be, a kind of prototype, as it were, of nutritious matters in general. Now, every sort of milk that is known, is a mixture of the four staminal principles we have described; in other words, milk always contains, besides water, a saccharine principle, a caseous, or strictly speaking, an albuminous principle, and an oily principle. Though, in the milk of different animals, the three latter of these staminal principles

exist in endlessly modified forms, and in very different proportions, yet neither of them is at present known to be entirely wanting in the milk of any animal."

To those who are unacquainted with the principles of chemistry, it will be a startling announcement, that all organic matters, whether animal or vegetable, are composed essentially of the same elementary principles; and, moreover, that these principles are only four in number, namely, oxygen, hydrogen, nitrogen, and carbon. The first two of these gaseous elements are the constituents of water; nitrogen exists in the atmosphere, in conjunction with oxygen; and carbon is the impurity of the air exhaled from the lungs during respiration. Thus, in the air which we breathe, and in the water which we apply to our commonest uses, these four essential elements of everything organic on the face of the globe, these four constituents of ourselves and of our means of life, are present, as almost sole components. The saccharine staminal principles are composed of oxygen, hydrogen, and from forty to fifty per cent. of carbon; the albuminous, of oxygen, hydrogen, nitrogen, and from fifty to seventy-five per cent. of carbon; and the oleaginous, of oxygen and hydrogen, with eighty per cent. of carbon. Now, as these three nutritive principles embrace an extensive variety of substances (for example, the saccharine includes sugar, acid juices, starch, and gum; the albuminous, all the varieties of flesh, jelly, curd, and gluten; and the oleaginous, a great variety of oils, besides fat, suet, butter, and alcohol), it follows, that the whole of these substances, however dissimilar they may appear in character and properties, differ, in reality, only in the possession of a little more or little less of one or other of the primary gaseous principles of which they are all composed.

When alimentary substances are taken into the stomach, they are submitted to the chemical process termed *digestion*, which has for its object the separation

of the four above-mentioned primary principles from their state of union in the food, and their combination anew, in order to constitute an animal nutritive principle, capable of being received into the blood, and of undergoing successive transmutations. For example: this newly-formed nutritive substance, having been mingled with the blood of the right side of the heart, and propelled through the lungs, combines with the oxygen of the atmosphere. It is then conveyed to the left side of the heart, and transmitted by the arteries to the capillary vessels in every part of the system (see diagram, page 28). Here another chemical process, termed *nutrition*, is effected, the newly-formed nutritive principle transudes through the coats of the capillaries, and yielding up its oxygen, becomes deposited as new matter in the living tissues. The oxygen combines with the old material, just supplanted by the new, and forms, among other effete substances, which are separated from the body in various ways, carbonic acid gas. The latter enters the blood particles, communicates to them a different refractive power, gives them the deep colour which is characteristic of impure blood, and, finally, is cast off from the blood, in the lungs, to be removed from the body with the expired air.

Thus it will be seen that a succession of chemical changes is taking place; firstly, in the stomach, then in the blood, then in the tissues, and then in the lungs; and the whole of these changes are attended with the development of heat; the most important, in reference to the present subject, as giving rise to the greatest amount of heat, being the chemical change which accompanies nutrition. Whenever an unusual proportion of carbon exists in the system, a larger supply of oxygen than common is required for its removal, an active chemical combination is consequently taking place in the tissues of the body, and an energetic development of heat is the necessary result. Now we have

seen that the alimentary principles differ from each other in the proportion of carbon which they contain, and if we are desirous of increasing the amount of heat, we should have recourse to that kind of food which promises the maximum of carbon, and *vice versa*. Thus, the diet of invalids suffering from feverishness should be of the saccharine kind, as containing the least carbon; and the same remark applies to the summer season; while in the winter, and cold climates, the oleaginous must necessarily be the prevailing and favourite aliment. Of this principle, we have a remarkable illustration among the natives of countries near the Pole, whose food is almost entirely composed of fat and oil, and they are enabled, by its use, to withstand the excessive cold of their climate. How wonderful, therefore, is the Providence that guides the seal and the whale whose blubber is the chief source of the oil they use as food, to the seas of these desolate regions.

The chemical process which has now been described is identical with that which takes place in a burning candle; the carbon of the fatty matter of which the candle is composed combines with the oxygen of the atmosphere, and carbonic acid gas results; the process in man and animals is therefore very correctly likened to combustion; the same chemical change occurs, and heat is, in like manner, evolved. But the whole of the carbon of the body is not got rid of by this process alone; some is deposited, as fat, in the tissues and bones; a large quantity is separated, as a fatty emulsion, by the liver; some is disposed of in the formation of the hair and unctuous substance of the skin; and some is eliminated by the skin, as carbonic acid gas. The nitrogen of the food forms compounds in the blood and in the tissues, which are of a stimulant nature, and hence are very proper to assist in the development of heat; but when these substances are produced in excess, they act as a cause of irritation, and, indeed, are so violent in their effects as sometimes to cause death. The kidneys

and the skin are the organs which separate these irritating matters from the body, and their detention in the skin is possibly the cause of some of the eruptions and irritations of that membrane.

In the preceding remarks, I have endeavoured to bring before the reader a view, as extensive as my limits will allow, of the nature of food, and of the chemical and vital processes by which it is subjected to the purposes of nutrition. I need say little with regard to the goodness of the food selected; that is a matter to be left to the judgment and taste, as well as to the experience, of the consumer. "Be watchful of the effects of the food which you take; avoid whatever appears to irritate, and eat only that which experience has proved acceptable."* If the question arise, whether a given article of diet be wholesome, it may be well to bear in mind the saying of Mandeville to some ladies of the court who made such an inquiry of him: "Do you like it? does it agree with you?"† "Sanis sunt omnia sana." To the healthful everything is wholesome.

It is hardly necessary to observe that all aliment, to be nutritious and beneficial to the system, must be sound and fresh. When decomposition has taken place, combinations of a dangerous kind are generated, which act as poisons on the system. Of the articles of food which are thus to be eyed with suspicion are fish, potted meats, sausages, game, &c. There are, of course, individual peculiarities of constitution which cannot be taken into consideration here, in which the most wholesome food may prove noxious, as in the example mentioned by Dr. Prout, of a person who was unable to eat *mutto*

* Kitchiner's Peptic Precepts.

† "Instinct than Reason makes more wholesome meals."

YOUNG.

"My appetite is in several things of itself happily enough accommodated to the health of my stomach; whatever I take against my liking does me harm; but nothing hurts me that I eat with appetite and delight."—MONTAIGNE. *Essay on Experience.*

without being seriously ill. In his case the peculiarity was supposed to depend on caprice, and the meat was repeatedly disguised ; but in every instance it produced the same injurious effects.

I have met with several cases of a similar repugnance for certain articles of diet. In one of these, the offending substance was egg, and the susceptibility of the gentleman in whom it occurred was so great, that the mere glazing of pastry was sufficient to induce a serious malady. The other instance happened in a farm-servant, who could not be induced to partake of a Michaelmas dinner because a turkey stuffed with sage and onions was to be one of the dishes. Once he was nearly suffocated from having gone to sleep in a room in which some onion-seed was left to dry ; and in crossing a kitchen in which the smell of onion was mingled with that of other savoury odours, he was under the necessity of holding a handkerchief to his face, as we should do when exposed to mephitic vapours. Dr. Dunglison* remarks, that "a friend of Tissot could not take sugar without its exciting violent vomiting."

A literary man of great eminence, Father Prout, suffers great derangement of stomach whenever he takes an article of diet or medicine containing anything appertaining to the orange, whether the pulp, the rind, or the blossom ; and he informs me of an instance of an entire family, whose susceptibility of constitution gives rise to vomiting whenever they attempt to swallow veal. I know, besides, a whole family, to whom pepper, and particularly cayenne pepper, is so repugnant, that if accidentally swallowed, it immediately gives rise to red blotches on the skin, more especially of the face and neck. In one member of the same family, hot roast beef produces a similar effect.

As relates to the quantity of food taken, it is best, at all times, to err on the side of moderation, and the

* On Human Health.

appetite must be made the test of sufficiency. I have no hesitation in condemning great variety in a single meal, however much variation of diet may be generally useful, for variety of dishes is simply an ingenious device for heaping an unnatural load on the stomach.* Dr. Combe, in his work on digestion and dietetics, has the following excellent remark on the subject: "It may be alleged, that a glass of brandy after a heavy dinner facilitates digestion, and therefore cannot do harm. I admit at once, that when we eat too much, or fill the stomach with indigestible food, a dram of brandy, from its temporary stimulus, enables us to get rid of the load sooner than we could do without it. But it seems to me that a far wiser plan would be to abstain from eating what we know to be oppressive to the stomach, and that by this means we shall attain our end infinitely better than by first eating a hearty meal, and then taking a stimulus, the efficacy of which is diminished by every repetition of its use. If we were compelled to exceed the bounds of moderation in eating, there would be some apology for our conduct."

The periods of taking food usually adopted, in conformity with convenience and the recurrence of hunger,

* Mandeville remarks, "Be content with one dish at a meal; in the choice of that consult your palate."—*Treatise on Hypochondriasis*.

To gain a knowledge of our antagonist is a first success in every strategy. Hear what the "Métaphysique de l'Appétit" prepares for our persecution. "Il y a trois sortes d'appétits: celui que l'on éprouve à jeûne, sensation impérieuse qui ne chicane point sur les mets, et qui vous fait venir l'eau à la bouche, à l'aspect d'un bon ragoût. . . . Le second appétit est celui que l'on ressent lorsque, s'étant mis à table sans faim, on a déjà goûté d'un plat succulent, et qui a consacré le proverbe, *l'appétit vient en mangeant*. . . . Le troisième appétit est celui qu'excite un mets délicieux qui paraît à la fin d'un repas, lorsque l'estomac satisfait, l'homme sobre allait quitter la table sans regret. . . . La connaissance de cette métaphysique de l'appétit doit guider le cuisinier habile dans la composition du premier, du second, et du troisième service."—*Cours Gastronomique*.

are those which are best suited to the purposes of health, namely, the morning meal, the mid-day meal, and the evening meal. The *morning meal*, or break-fast, the "early bit" of the Germans, is taken at eight or nine. The *mid-day meal*, the dinner of our forefathers, the second breakfast of the French, and the luncheon of fashionable life, is taken at one or two; and the *evening meal*, the supper of our forefathers, and the dinner of the present day, at seven or eight.* That these are the proper periods for meals is evident from the fact of

* Among the ancient Greeks, the three meals of the day were called, *ariston*, the first or morning meal, taken at sunrise; *deipnon* or *dipnon*, the meal, or chief meal, or dinner; and *dorpon*, the evening or sunset-meal, the supper. The Athenians took two meals only, as do the French at the present day, and called them *ariston* and *deipnon*, excluding the *dorpon*, and sometimes the *ariston* was regarded as the luncheon, the *prandium* of the Romans, in which case the morning meal was called *acratisma*. The last meal, whether *dipnon* or *dorpon*, corresponded with the *cæna* of the Romans. The modern Greeks call their three meals, *progeuma*, *geuma* (the *gouter* of the French), and *deipnos*, or, as they are pronounced, *proyevna*, *yevna*, and *dipnos*. In Constantinople, where the German habit is followed of a cup of coffee in the morning and a dinner at mid-day, the latter is called *mesemeriaticon*, literally, the mid-day meal.

On the meals of the ancient Hebrews, I am indebted to Dr. Löwy for the following note:—"The Hebrew Scriptures make no allusion to definite meals except in the history of Joseph (Genesis xliii. 16); 'for these men shall dine (*literally*, eat) with me at noon.' In the book of Ruth (ii. 14), Boaz says to Ruth, 'at meal-time come thou hither;' the Hebrew for 'meal-time' is, *eth haschel*, literally, the time of eating. By a careful perusal of this chapter, one is justified in the conjecture that this repast took place in the noon of the day. In post-Biblical Hebrew and Chaldean writings, some information can be found regarding the names of the different meals.

"The Chaldean paraphrase of Genesis xliii. 16 renders the passage already quoted, 'for with me shall the men dine at the mid-day repast;' the Chaldean words being *sherutha dētihdrā*, meal of noon.

"In one of the sections of the Talmud (Treatise 'Shabbath,' folio 118, page a), it is stated that in Palestine the overseers of the poor used once a week to go round and collect food so as to supply every poor man with two meals a day. The times when those meals were consumed is not stated. On Sabbath days

their maintaining their place amid the changes which fashion is constantly introducing. The lunch of fashion is a light and commendable dinner; the dinner of fashion is an early and moderate supper. If we look at those periods in another point of view, we shall find an interval of four hours left between them for the act of digestion and subsequent rest of the stomach. Digestion will claim between two and three hours of the interval; the remaining hour is all that the stomach gets of rest, enough perhaps, but not too much, nor to be justly infringed. We here see a rule of diet vividly suggested, namely, to let that patient drudge the stomach alone during its three hours of labour and one of rest; to put nothing more into it while the mill is at work, nor when it is in repose gathering its strength for another grind. Tease it not, fret it not, if you would keep it in good humour, and without its good humour alas for yours! Another inference: the maxim "little and often" is obviously unsound, *moderate* and *seldom* would be more to the purpose.

And where is my tea? says the reader. The tea is not a meal; when it is properly used, it should not be a meal; but it has a special purpose to fulfil which I will now explain. Tea—and under the generic term tea I include coffee—tea is usually taken three hours after dinner. Now, as I have shown above, this is the moment which corresponds with the completion of digestion, when the food having been conveyed away from the stomach, nothing remains behind but the excess of the acid juices employed in digestion; these acid juices

three meals were taken. The Hebrew-Chaldaic term for a meal was *seudah*, that is, refreshment.

"It deserves to be noticed that the ancient Hebrews, after the close of the scripture canon, had no special distinctive expression for the various meals of the day; for they were obliged to borrow words from the Greek language to describe the different repasts. They called the dinner given by Joseph to his brothers *ariston*; another meal taken in the evening was the *dipnon*."

create an uneasy sensation at the stomach, and a call is made for something to relieve the uneasiness ; tea fulfils that object, for tea is in its nature alkaline, and therefore serves to neutralise the acid juices to which I have referred. Tea, then, must be regarded simply as a chemical agent, having a specific purpose, that of neutralizing the acid of the stomach. In this light, it is a most useful article of diet, as we know it to be most grateful ; and we find the lady of fashion sipping her tea at five o'clock, three hours after her lunch, because the small sharp voice of the stomach calls for it, and because by its means she feels revived and refreshed. On the same principle, after the business of the dining-room, the antacid and refreshing beverage, either in the shape of tea or coffee, is prepared in the drawing-room. In taking either, the nearer they approach to the simple infusion the better, little milk or cream, and less sugar should be the principle. But seeing the purpose of tea, how unreasonable to make it the excuse for a meal, to conjoin with it, toast, muffins, bread and butter, and *id genus omne*. I go back, then, to my previous position, and say, three meals a day may be taken as the standard of habit and custom ; tea and coffee having a specific place and purpose as a beverage, but none as a meal.

There is another branch of dietetics that calls for an observation from me, I mean the diet of children. Children are growing animals ; nutrition in them is active, and calls for good and plentiful material in the shape of nourishment. As far as period is concerned, the same law that applies to adults is equally suited to them, three meals a day, an interval of four hours between each. I speak of children out of arms, not of infants. The substance of their meals cannot be too nutritive or too much varied ; they have men and women to make ; healthy and strong and handsome men and women, and to do this well, the little artisans must have good food and plenty ; then plenty of oxygen in air and exercise ; then plenty of sleep, to rise up again in vigour to their

labour. I have heard children taunted with idleness, when childhood is the most active period of man's life ; the child is father to the man ; physically as well as morally, he builds up and makes the man. Hence, a heavy responsibility attaches to parents and guardians in the matter of supplying them with the requisite means.

That the diet of children cannot be too varied or too extensive is a doctrine I have long held ; and I was recently much charmed in finding the subject treated with such admirable sense and judgment by a high authority in the science of living—Soyer. His letter, entitled "The Nursery Dinner," in the "Modern Housewife," I cannot too strongly commend to the perusal and attention of my readers, and to the study of those on whom the proper rearing of children in any way rests. Speaking of the diet of children for the day, this author writes: "Bread and milk for breakfast at eight ; the dinner at one, which was composed as follows throughout the week : roast mutton and apple pudding, roast beef and currant pudding, baked apples ; boiled mutton with turnips, after which rice or vermicelli pudding ; occasionally a little salt beef, with suet dumplings, plain and with currants in them, or pease pudding ; or if unwell, a little veal or chicken-broth, or beef-tea."

This scheme of diet is intended for the children of persons in very moderate circumstances ; but for those who can afford it, he prescribes as the dinner of one day, roast mutton ; "then the next day I would give them a small piece of mutton plain boiled, with turnips and apple tart, or a few slices of roast beef, or a small piece roasted on purpose, after which a very plain currant pudding ; or, occasionally, a little pickled pork with pease pudding, or roast pork with baked apples, and now and then a little salt beef, but very well boiled, with suet dumplings, and occasionally, for change, *either* bread, vermicelli, or tapioca puddings ; in case

of illness, and with the approbation of the doctor, veal, mutton, or chicken-broth, sago, gruel, panada, &c Many people may perhaps imagine that this is too much variety of food for children, but it is quite the contrary, for change of food is to the stomach what change of air is to the general health; and, of course, with children, these changes must be effected with judgment."

Soyer is perfectly right with regard to the question of variety of food for children; and the intention is so rational, that it is difficult to conceive how a difference of opinion can exist with regard to its truth; and yet I have heard parents make a boast that their children were fed exclusively upon mutton, as though it were their intention to render the stomach incapable of supporting and digesting any other kind of food;—in which they generally succeed. Another monomania is that of minimizing the quantity of food. Being consulted, on one occasion, for eruptions of the scalp in a family of children, and perceiving that the disease resulted, in a word, from starvation, I put the following questions to the father—a man considered safe in every other particular, and a rational man. My questions developed his lunacy:—"What have your children for breakfast?" "Bread and butter, and milk and water." "All the year round?" "Yes, invariably." (Here a smile of satisfied complacency passes over the face of respondent.) "What have they for dinner?" "Puddings—light, you know, not heavy things—no pastry, no fruit." "I fear you did not understand my question: Have they no meat?" "Yes, oh yes; mutton, say, at least three times a week: no beef—at least, very seldom—chiefly mutton." "Well, and what do they have for supper?" "Bread and butter, and milk and water." Well, reader, am I wrong in saying that my friend is a madman, to feed his horse upon hay, and expect him to be always ready for work—no oats, too hard of digestion!—to feed his children with milk and water, and

bread and butter, and expect them to make flesh and blood, thews and sinews, let alone heart, and that bluff frankness which characterizes the Englishman. Society puts no restraint upon such madmen as these ; they are permitted to walk at large, and be the founders of a poor, puny, miserable, consumptive race ; a race, mind ye, that, in a more primitive state of society, would be weeded from the stalwart crop, and hung up to the branch of the nearest tree. Then came out the reeking wonder of this gentleman's mind—that, with so bland, so careful, so digestible a diet, his children could suffer from any ailment, and, more than all, from a skin complaint. With an improved diet the children got well instantly.

Sameness of food, improper food, defective ventilation, and insufficient exercise, are the causes of most of the diseases of children, and especially of cutaneous complaints. This is the secret of the ring-worms and scall'd heads of public seminaries. In some of these institutions, as I have heard, there is a ceremony in which the children take a public meal in the presence of the governors and their friends. On these occasions, the platters eclipse in whiteness the envious snow ; a suppressed burst of delight is heard from the spectators ; the morsel of cheese, cut with mathematical precision, would not vary a grain in the thousand platters ; the bread—what ingenuity ! each with its neighbour a very twin. And how many days in the year do the children enjoy this fattening collation ? 365. For three hundred and sixty-five days, for a thousand children, is this " *toujours perdrix* " feast the very same ; and yet there are people in the world who wonder that diseases should break out, that skin affections should be rife, that consumptions should prevail. Engraft a bud of Soyer on such an institution, and health and happiness, learning, ability, and talent, will take the place of disease, melancholy, stupidity, and commonplace intellect. What now, in this intelligent country, if there were a college

of cookery, with Soyer* for its head. Think, reader, before you smile. It would not be too much to hope, as a result, a great improvement of the intellect of the country, and an equal improvement in its physical strength.

I have little to say regarding the diet especially suitable for diseases of the skin, inasmuch as, upon this head, very little indeed is known. Vegetables generally are supposed to be purifiers of the blood, probably on account of their tendency to produce a laxative effect on the alimentary canal. There is one edible plant in particular which has long enjoyed an anti-scorbutic reputation; whether justly or unjustly, I cannot say. But if we are to credit an old French author,† we must conclude the latter to be the case. "Of the various herbs whose juices have obtained the reputation of being salutary in diseases of the skin," he says, "there is one which I snatch eagerly from its position, as being in a high degree pernicious in these diseases; the plant to which I refer is the *cress*. It is inflammatory in its action on the blood, astringent to the bowels; in other words, it constipates and inflames. How then has it obtained the reputation which it possesses? Ought it not rather to be despised for its mischievous effects?"

I must in this place also attack a prejudice that relates to another article of diet in connection with skin disease, namely, salted meats. Now, salt is as necessary to the health of the economy as the most nutritive substance; indeed, it may be affirmed, that without salt animal existence would be impossible, inasmuch as salt enters as a natural element into the composition both of the fluids and of the solids of the body. On the other hand, it is known that if persons be made to live exclusively on salted provisions for a considerable length of

* The Printer reminds me, by a note of interrogation, that Soyer is, alas! no more; the mausoleum at Kensal Green holds the remains of a good and useful man.

† Retz. Third edition. 1790.

time, as is sometimes the case with sailors during a long voyage, they are apt to suffer from a disease, the scurvy, in which the skin is seriously affected.

Now, it unfortunately happens that, with the majority of the public, *scurvy*, or its Latin adjective, *scorbutic*, is the family name for every disease of the skin. So, as sailors fed for many months on salt junk are liable to scurvy, why, landsmen, having a skin affection, *vulgo* a scurvy or scorbutic, must needs be made to shun all meats which contain the most moderate amount of salt. This is bad reasoning, gentle reader; for setting aside the fact that it is uniformity of food, and not the salt, which is the cause of scurvy, we can form no idea, in these times of peace and plenty, of the nature of the salted meats which are consumed by sailors under the circumstances above referred to. Our closest approximation to salted meats, namely, salt beef, ham, bacon, salt fish, &c., are, in truth, fresh meats in comparison with junk, and wholly incapable of exciting or exasperating cutaneous diseases, were they even taken constantly, instead of rarely, as is the case. I doubt very much, if a person abstaining wholly from salted meats, and partaking only of fresh, would not, from necessity both of taste and digestion, swallow as much salt in the twenty-four hours as he who made no such restriction. Those who never touch salt (if such there be) must not imagine that they take none with their food, for there is scarcely an article of diet, whether animal or vegetable, that does not contain it. And those substances in which no salt can be discovered will be found to possess the elements of salt, ready to combine and produce it the instant they are admitted into the stomach or into the blood.

CHAPTER VII.

ON THE INFLUENCE OF CLOTHING ON THE HEALTH
OF THE SKIN.

NEXT in importance to a judicious and rational diet, as a means of maintaining the temperature of health, is the raiment selected for its preservation. It is a fact which must be apparent to every one, that clothing, in itself, has no property of bestowing heat, but is chiefly useful in preventing the dispersion of the temperature of the body, and, in some instances, in defending it from that of the atmosphere. This power of preserving heat is due to the same principle, whatever form the raiment may assume, whether the natural covering of birds and animals, or whether the most beautiful and elegant tissues of human manufacture. In every case it is the power which the coverings possess of detaining in their meshes atmospheric air that is the cause of their warmth. We have an exemplification of this principle in the lightness of all articles of warm clothing as compared with water; the buoyancy, for example, of a fleece of wool, or the lightness of a feather. In the eider-duck, or the sea-bird, it is the accumulation of warm air within their downy covering that defends them alike from the temperature of the water, and from its contact. The furs from the piercing regions of the north, which we prize so highly as articles of dress, are, to the animals which they invest, so many distinct atmospheres of warm air; and the same principle is carried out in the clothing of man. Our garments retain a stratum of air, kept constantly warm by its contact with the body, and as the external temperature

diminishes, we increase the number of layers by which the person is enveloped. Every one is practically aware that a loose dress is much warmer than one which fits closely; that a loose glove is warmer than a tight one; and that a loose boot or shoe, in the same manner, bestows greater warmth than one of smaller dimensions. The explanation is obvious: the loose dress encloses a thin stratum of air, which the tight dress is incapable of doing; and all that is required is, that the dress should be closed at its upper part to prevent the dispersion of the warm air, and the ventilating current which would otherwise be established from below. The male summer dress in this climate consists of three layers which necessarily include two strata of atmospheric air; that of females contains more; and in the winter season we increase the number to four, five, or six. As the purpose of additional layers of dress is to maintain a series of strata of warm air within our clothes, we should, in going from a warm room into the cold, put on our defensive coverings some little time previously, in order that the strata of air which we carry with us may be sufficiently warmed by the heat of the room, and may not be in need of borrowing from our bodies for their warmth.* Otherwise, we must walk briskly in order to supply heat, not only to keep up the warmth of the strata of atmosphere nearest ourselves, but also to furnish those which we have artificially made by our additional coverings. When we have been for some time in the air, if we could examine the temperature or climate between the several layers of our dress, we should find the thermometer gradually falling, as it was conveyed from the inner to the outer spaces.

* The practice of keeping clothes in a cold room, and of putting on chilled garments, is very injudicious and dangerous. Dr. Kitchiner remarks:—"A great coat must be kept in a room where there is a fire; if it has been hung up in a cold damp hall, as it often is, it will contribute about as much to your calorification as if you wrapped a wet blanket about you."

These observations on dress have reference to the number of layers of which the covering is composed, but they are equally applicable to the texture of the garment itself. The materials employed by man in the manufacture of his attire are all of them *bad conductors of heat*; that is to say, they have little tendency to conduct or remove the heat from the body; but, on the contrary, are disposed to retain what they receive, hence they are speedily warmed; and once warm, preserve their temperature for a lengthened period, and convey the sensation of warmth to the hand. They are also bad conductors of electricity, and on this account become sources of safety in a thunderstorm. They are all derived from the organic world, some from the vegetable, and some from the animal kingdom; for example, hemp and flax are the fibres of plants; while cotton is a covering of the seed of a plant. Silk, wool, hair, feathers, and leather, are animal productions; silk being a kind of tenacious gum drawn through minute tubes, like those of the spinneret of the spider, in the body of the silkworm, and dried in the form of excessively delicate threads. Wool is a soft and elastic hair; while hair, feathers, and leather have been already described in preceding chapters of this work. Of these materials, the first five are chiefly employed as articles of clothing, and, in order to be fitted for that purpose, are spun into threads, and then woven into a tissue of various degrees of fineness and closeness. It is evident that this tissue will have the effect of retaining a quantity of air proportioned to the size of its meshes; hence, besides the strata of atmosphere imprisoned between the different articles of clothing, each article is in itself the depository of an atmosphere of its own. Thick textures are warmer than thin ones made of the same material, because the body of air retained in their meshes is greater, as we see illustrated in blankets and woollen garments. Wool, moreover, being in reality hair, is cellulated in its structure, and each of its little cells is

the separate casket of a collection of air. Hair differs from wool only in the greater solidity of its structure : but from its attendant hardness is little adapted to the purposes of weaving ; it is employed chiefly in the production of manufactures termed *felts*, for which, from the nature of its formation, it is peculiarly fitted. Hats, and sometimes bonnets, are made of felt, and so, likewise, is a particular kind of thick shawl recently introduced. Felts are necessarily porous in their texture, besides being composed of a cellulated fibre, and are proportionally warm. Leather is a kind of natural felt, but of much closer and firmer texture than an artificial manufacture. The thinner and softer kinds of leather are sometimes used as body-clothes, but its special and proper purpose is the manufacture of coverings for the hands and feet to protect them from cold and wet. To the inhabitants of cold climates feathers are a source of peculiar comfort, but, from their bulk, are not easily convertible into body garments. From their lightness and warmth, they are fitted to supply the wants of the most refined and fastidious Sybarite, and they serve to cover and protect us from the ever-recurring winter of the twenty-four hours, when, as I shall have

*Fig. 38.** presently to show, our power of generating heat is temporarily reduced.



LINEN differs from other textures used as clothing in the roundness and pliability of its fibre. These qualities give a smoothness and softness to its tissue which adapt it, peculiarly, as a soft and agreeable covering, to be worn next the skin. Hence we find, that in temperate climates, linen is a universal favourite. But linen has its objectionable features ; it is a good conductor, and bad radiator, of heat, and therefore the very opposite of a warm dress, which should be a *bad conductor* and *good radiator*. On this account it is that despite its ex-

* *Fig. 38.*— A fibre of linen, magnified 155 times.

cellence in other particulars, it feels cold when it touches the skin. But linen is open to a stronger objection than that which I have just mentioned: from the porosity of its fibre, it is very attractive of moisture, and when the body perspires, it absorbs the perspiration actively, and displaces the air, which, in a dry state, is held within its meshes; so that, in place of an atmosphere of dry air, it becomes the means of maintaining a layer of moisture. Now, water is one of the best conductors of heat, and removes it so rapidly from the body as to cause a general chill. But this is not all; the moisture in the tissue of the linen has so great a capacity and attraction for heat, that it continues to rob the body of more and more of that element until the whole of the fluid is evaporated. These circumstances have caused the entire abandonment of linen as a covering next the skin in hot climates, where the apparel must of a necessity be thin. But in temperate and hot climates, we get over the inconvenience by wearing a bad conductor and a good radiator outside the linen, in the form of a woollen or leather covering in the winter, and cotton or thin woollen in the summer season. *Fig. 39.**

COTTON is a warmer covering than linen, from being a better radiator and worse conductor of heat, and, in the present excellence of its manufacture, offers most of the advantages of softness and pliability of that texture. But it must be admitted that it is wanting in the freshness of linen, a quality which, in this climate, we could not easily dispense with. Cotton has the advantage over linen of not absorbing moisture to anything like the same amount, and consequently does not destroy its own radiating powers by substituting a good conductor, water, for a bad conductor, dry air. Hence cotton is, with good reason, the favourite and proper body linen



* *Fig. 39.*—A fibre of cotton, magnified 155 times.

of hot climates. Besides the absence of freshness in cotton, there is another objection to its use ; it is not, like linen, composed of fibres which are perfectly rounded ; but, on the contrary, its fibres are flat, and have sharp edges, which latter are apt, in delicate skins, to excite irritation. It is on this account that we carefully avoid the application of cotton to a graze or wound, and employ for such a purpose its smoother and softer rival, linen.

SILK occupies the third place above linen as a bad conductor and good radiator of heat, and comes next to cotton as a means of bestowing warmth : its fibres, like those of linen, are round, but softer and smaller ; and when woven into a tissue, it has less disposition to absorb moisture than cotton. Therefore, so far as roundness of fibre, softness of texture, absence of attraction for moisture, and power of communicating warmth are concerned, silk is greatly superior to both linen and cotton ; moreover, it gives the sensation of freshness to the touch which is so agreeable in linen. But with all these advantages, silk has its defects : on the slightest friction, it disturbs the electricity of the skin, and thus becomes a source of irritation. Sometimes, it is true, this irritation is advantageous, as causing a determination of blood to the surface : but when this action is not required, it is disagreeable, and quite equal, in a sensitive constitution, to producing an eruption on the skin. I have seen eruptions occasioned in this manner, and when they have not occurred, so much itching and irritation as to call for the abandonment of the garment. A silk shirt offers peculiar advantages of comfort and easement from pain and restlessness, to the consumptive and bedridden.

WOOL is open to several of the objections brought against the three preceding tissues : thus, from the nature of its structure, being similar to hair in the formation of its fibre, it is highly irritative to sensitive skins, and, moreover, disturbs the electricity of the

cutaneous surface, on friction, even more than silk. On these accounts, there are persons who find it quite impossible to wear woollen garments next the skin in any shape, whether as flannel, worsted, or merino. Happily, this is not absolutely necessary, for all the advantages of wool, and they are many, may be obtained by wearing the woollen garment outside one of linen; indeed this is preferable, in warm weather, to wearing the wool next the skin, since the linen absorbs the perspiration, while the woollen garment preserves the warmth of the body, and prevents the inconvenience resulting from its dispersion. Wool, as may be inferred from these observations, is one of the worst conductors and best radiators of heat, and is, on this account, a valuable and indispensable means of preserving the bodily heat in the winter of cold climates like our own; and even in the summer is a serviceable defence against colds and rheumatism.

Fig. 40.*



The influence which colour exerts over the apparel, as modifying its power of preserving warmth, is very remarkable. As a general rule all the dark colours absorb more light and more of the sun's rays than those of a brighter kind, and in proportion to this quality is their power of absorbing heat. A good absorber is also a good radiator; hence dark colours are good radiators of heat, and, according to the nature of their material, bad or good conductors. White, on the contrary, reflects the rays of light, and with them, the heat, and thus is a bad absorber and a bad radiator of heat. It is therefore well adapted both for a summer and a winter dress; in the summer season prohibiting the passage of heat from without inwards, and in the winter in the contrary direction. Franklin, many years since, placed a number of

* Fig. 40.—A fibre of wool, magnified 310 times. It presents on its surface the ordinary scaly character of hair.

small squares of various coloured cloth of the same material on the snow, and found, after a time, that the snow covered by the black piece was the most, and that beneath the white the least melted. Sir Humphry Davy "took six pieces of copper (each an inch square and two lines thick) of equal weight and density, and coloured one of the surfaces white, one yellow, one red, one green, one blue, and one black. On the centre of the under surfaces was placed a portion of a mixture of oil and wax, which became fluid at 76° . The plates were then attached to a board painted white, and the coloured surfaces of all the pieces equally exposed to the direct rays of the sun. The result was, that the cerate on the black plate first began to melt, then that on the blue, next the green and red, and lastly the yellow. The square coated with white was scarcely affected by the heat, though the black had completely melted." More recently, a similar experiment was made by Stark. He enveloped the bulbs of a number of thermometers in pieces of cloth of the same material, but of different colours, and immersed them in boiling water. The thermometer around which the black cloth was wound was the first to indicate a given heat; then that which was covered with green, then red, and last of all, white; the difference between the black and the white being twenty-five per cent. This influence of colour is antagonized by the nature of the material, and as it acts superficially, produces very little change on thick, although considerable on thin, texture, such as gauze.

While on the subject of the colour of clothing, we are led to glance at some inconveniences which are known to have their origin in the chemical pigment with which it is dyed. New red flannel, worn next the skin, has been frequently the cause of considerable irritation and eruption; but more serious inflammation has resulted from the use of certain colouring matters of modern discovery, called aniline pigments; amongst which are

blues, reds, and yellows of great beauty. One of the reds has been called fuchsine, and another coralline, both names significant of exquisite tints. The aniline dyes are obtained from benzine, a product of coal-tar; coralline deriving its source especially from carbolic acid. Fuchsine has been in use as a dye for nearly twenty years, and, until it was employed for dyeing textures to be worn next the skin, remained unsuspected of evil; but when used as a dye for stockings, socks, and gloves, was found, in a number of instances, to cause inflammation of the skin, sometimes of a very severe and intense character. It often happened that the pattern of the sock was transferred to the skin, and was represented there by lines and figures of inflammation. Another property of this inflammation was the very inconvenient one of being propagated to distant parts of the individual, such as to the hands and arms, although those parts had not come in contact with the dye; and a still greater annoyance resulted from the recurrence of the inflammation after the skin had apparently recovered, several weeks later than the original attack; indeed, in some instances, these repetitions extended over a period of one and two years.

We have now discussed the principles which render clothing a means—firstly, of *preventing loss of warmth by the body*; secondly, of *increasing its degree*; thirdly, of *guarding it against alternations*; and fourthly, of *protecting it from intensity of heat*, both of the atmosphere and sun; but there is one other point in connexion with clothing that still remains to be observed, which is, that it permit the free transpiration of the skin so necessary to comfort and even to life. This property is due to the porosity of the textures employed in the fabrication of dress, and that it is an indispensable quality will be admitted at once, when we recollect that the skin is an important agent in respiration, receiving oxygen through its tissues, and giving back carbonic acid in return, and an equally important agent in

separating from the blood those impurities that otherwise would oppress the system and occasion death. In a previous chapter I have referred more particularly to these circumstances, and especially in the instance of those remarkable cases where death was occasioned by the application of an impermeable covering to the skin. This is a reason why any close dress, such as one impregnated with caoutchouc (Macintosh) would be objectionable next the skin ; and it explains how a lady, too anxious for the protection of her person against cold, may be suffocated in her own dress. The apparel must be such as shall permit free transpiration from the skin, and, moreover, convey the transpired fluids from the surface ; otherwise, colds, irritation to the skin, and other bad consequences, must follow. Those who have worn india-rubber socks or shoes will have experienced the first of these discomforts from the puddle of transpired fluid in which their feet are bathed in a few hours after putting the coverings on ; and as an instance of the second, I shall adduce a quotation from my work on the Diseases of the Skin* on the subject of a disorder termed *sudamina*, or *miliary eruption*. " Since the days of Sydenham, who advocated so powerfully the adoption of a cool temperature and cooling regimen in fevers, *sudamina* have become rare ; but previously to his time, they were exceedingly frequent, and, from their connexion with fever, were regarded as a specific disorder, preceded and accompanied by a severe and dangerous fever. This fever was termed *miliaria*, and for many years was regarded as a dangerous and fatal disease, spreading like an epidemic, and destroying multitudes of lives ; but, as I before remarked, since a more rational method of treatment has been employed in medicine, *miliary fever* has ceased to exist." On the same subject, Bateman remarks : " Among the various circumstances under which the *miliaria* was formerly

* Sixth Edition.

excited, the puerperal state appears to have been most frequently the source of it, insomuch, that it was described as an epidemic among puerperal women. This is sufficiently accounted for by the treatment which was unhappily pursued in those days during the confinement after childbirth, of which an impressive description is given by Mr. White; for not only was the mother immediately loaded with bedclothes, from which she was not allowed to put out even her nose, and supplied with heating liquors from the spout of a tea-pot; but to her room, heated by a crowd of visitors and a fire, all access of air was denied, even through a key-hole. From these causes, fever was almost necessarily induced, with the most profuse sweats, oppression, anxiety, and fainting, and these again were aggravated by spicy caudles, spirits, opiates, and ammoniacal medicines. That a number should perish under such management with every symptom of malignity, and that many who survived it should escape with broken constitutions, will surprise no person who is acquainted with the baneful influence of over-excitement in febrile complaints."

In the preceding remarks I have endeavoured to establish as a law of health *the necessity of preserving an agreeable temperature of the body*,* and I have pointed out the means, so far as food and raiment are concerned, of effecting this object. I should wish it to be understood, also, that the feelings, if the nervous system be sound, are the proper channel for arriving at a knowledge of the state of warmth of the system. I will now proceed to describe certain phenomena, in connexion with the temperature of the body, necessary to

* "Only fools and beggars suffer from cold," says Boerhaave, "the latter not being able to procure sufficient clothes, the former not having the sense to wear them." Another aphorism of the same author was, that our winter clothing should be put off on Midsummer's day, and put on again the day after. This rule was intended to apply to the climate of Holland, but may be remembered, if not wholly acted on, also, in Britain.

be known, in order to derive the proper benefit from these observations. We have seen that the temperature of man varies very little in the whole extent of range between the tropic and the pole; that he can support the intense heat* of the former without much elevation of his inward heat; that he can live where mercury is a solid mass, like lead, with the most trifling depression of his vital warmth. But it must not be supposed that the constitution of the man is the same in these two opposite conditions; it is, indeed, widely different; in the one he enjoys what may be termed a *summer constitution*; in the other, a *winter constitution*; and we all, without being aware of it, have a summer constitution, to harmonize with the warmth of summer, and a winter constitution, to enable us to resist effectually the inclemency of that season. In other words, we become inured or accustomed to the existing atmospherical state, so that familiarized with the warm breath of June, the moderate temperature of a summer's night strikes cold and chill, while a few months later, in the winter season, the same temperature would feel oppressive from its heat. Upon the same principle, the temperature of the atmosphere at zero feels warm and agreeable to the mariner in the polar regions after he has been for some time previously subjected to a temperature of fifteen or twenty degrees below that point. I may better illustrate this topic by relating an experiment performed by a distinguished physiologist, Dr. Edwards, of Paris. In the month of February, this gentleman removed five sparrows from a warm room, and placed them in a cage surrounded with snow and ice. At the end of three hours they had lost less than two degrees of temperature. In the month of July, four

* At page 45, I have stated the temperature of Hindostan to rise occasionally to 120°. It has been noted in Africa at 125°, and in the Oasis of Mourzouk, in British India, according to Ritchie and Lyon, at 130°. At Kew, in August, 1876, the temperature rose to 84.6 in the shade, and 135.6 in the sun.

sparrows, under the same circumstances, and in the same lapse of time, lost upwards of twenty-one degrees of temperature. They were, in point of fact, nearly frozen by a degree of cold which in the winter they could bear without discomfort. Man is in precisely the same position during the two seasons; in the winter, he possesses a power of generating within himself sufficient heat to resist the cold; in the summer, he loses this power, and is proportionately dependent for his heat on the temperature of the surrounding atmosphere.

It is this power of endurance of cold at one period, and the absence of its necessity at another, that enables animals, in their wild and unprotected state, to bear the vicissitudes of winter with so little preparation in clothing, and so little real inconvenience. And, in like manner, man, in our climate, and in a state of health, does not require an amount of covering at all proportioned to the difference of temperature between summer and winter.* Indeed, we not uncommonly, from

* The poor among the ancient Britons went naked, not, it is true, from choice, but from necessity. "Perhaps it was in consequence of this want of covering," says Smollett, "that they had recourse to the practice of painting their bodies with a substance that shut up the pores and defended the nerves of the skin from the inclemencies of the weather: thus fortified, Dio Nicæus tells us, they could endure the severest cold, and even remain whole days immersed in mud." The shutting up of the pores, as the readers of this book must be aware, is bad physiology, but does not alter the fact which the quotation is intended to illustrate.

In *Chambers' Journal* for July 5, 1845, it is stated that the inhabitants of Terra del Fuego, belonging to the Petcheree or Yacanacu tribe of Indians, are naked, with the exception of a small piece of seal-skin, which they hang upon the shoulder next the wind. Their climate is much colder than that of North Britain, no season being quite free from frost. In the month of March, when the thermometer stood at 46°, an infant about a week old lay in the bottom of one of their canoes quite naked; and the "little children were seen capering, quite naked, on the beach, although the thermometer was at 40°." The colour of the people is a light copper hue, the hair being "long, lank, and black."

inattention or want of due consideration, make no difference between our summer and our winter dress; and the poor, from necessity, are compelled to know no distinction. But sickness has the same effect on our system as the summer constitution, and by reducing our power of generating heat, renders us more than ordinarily susceptible of cold, even when the temperature is comparatively mild. Thus, when we suffer from what is popularly termed "a cold," or a slight attack of indigestion, we are acutely sensible of a low temperature; and it is then, as under other circumstances producing a like sensation, that we should protect ourselves by warmth and warmer clothing. Indeed, while we neglect this rule, we are augmenting the state of congestion of the internal skin or mucous membrane, which is the essential cause of the ailment under which we suffer, while, by encouraging and promoting the warmth of the skin, we tend to dissipate it.

The same remarks apply with equal force to sedentary occupations in a warm room, whether in the summer or the winter season, or to employment conducted in a warm atmosphere in the winter time. Such conditions are equivalent to the effect of a warm climate, and bring with them the summer constitution, which is unsuited to stand the severity of cold. To persons in this state, a greater amount of warm clothing is needful than to those whose constitution is hardened by out-door occupations and exercise in the air. Thus, from the influence of circumstances, the upper classes, and particularly the female sex, who are too frequently indisposed to take the exercise necessary for health, are more in need of warm clothing than the out-door labourer and the very poor, but not more so than a class equally necessitous with the latter, namely, the needle-woman and in-door labourer. This observation, it must be recollected, applies to the article of clothing only: for although in this, the poor are no worse off, as regards the mere necessity, than the rich, yet, in another and a more important con-

dition, their position is very different, namely, in the possession of means for obtaining good and sufficient food. It may not be irrelevant to the present subject to inquire whether the difference in the condition of the poor and the rich exerts any influence on their longevity: that it does upon their health there can be no question. The answer to this inquiry is contained in the following table. The first column contains the ages examined, and the three succeeding ones the mortality in one hundred persons: the first being the common rate of mortality in London; the second the mortality among the rich; and the third, the mortality among the poor of France.*

Ages.	Common rate of mortality in London.†	Rich.	Poor.
30 to 40	1'40	1'08	1'57
40 — 50	2'04	1'17	2'13
50 — 60	3'28	1'99	3'59
60 — 70	5'89	3'60	7'50
70 — 80	11'67	8'04	14'36
80 — 90	22'52	13'22	100'00

The inspection of this table speaks volumes for the results to health of the ease and comfort of the rich, as contrasted with the consequences of the deprivations and contingencies of the poor.

In addition to the difference of power of preserving warmth dependent on the differences of health, climate, and season, there are other modifications, which have reference to the activity of the vital energies at different periods of life. The infant, for example, and the aged person, are more susceptible of cold; that is, they have less power of generating heat than the adult, and consequently are more open to the injurious influences originating in a low state of the external temperature. The temperature of a seven months' child, well clad, and placed before the fire, was ninety degrees of Fahren-

* Duvillard.

† The Registrar-General's Fourth Annual Report, page 20.

heit.* In an infant of the full period, at birth, the temperature vacillates between 95° and 99°.† During the first week, the average temperature of infants is 98°; during the period ranging between four months and fourteen years, nearly 99°; in the adult, 100°; and in eight old persons, between 87 and 95, the average was a little above 98°.‡ In further illustration of the decreased power of generating heat, Dr. Edwards ascertained the temperature of young puppies and kittens lying near their mother to be one or two degrees lower than that of their parent, but when he removed them they rapidly cooled down, until within a degree of the level of the atmosphere. Seeing this to be the case, we are not surprised to learn that many infants die from cold, and that the mortality of infants of the first month is nearly doubled during the winter season.§ According to M. Lombard, of Geneva, *one-sixth of these deaths result from inflammation of the lungs!* The mortality of infants during the first year of their life amounts, in Paris, to nearly nineteen per cent.; in the whole of France, to twenty-one and a half per cent.; in Philadelphia to twenty-two per cent.; in Berlin to twenty-five per cent.; and in St. Petersburg, to thirty-one per cent.||

What is now said of children must be repeated with regard to those who have outlived the energies of adult life. I have shown above that the natural temperature of old persons is inferior to that of the adult; and if they feel the cold less, it is that their sensibilities are blunted by age, that the same cause which occasions their diminished power of generating heat, makes them unconscious of the want, but not the less liable to its effects. Indeed, the position of the aged, under these

* Edwards.

† Roger, who makes his observations in the arm-pit.

‡ Dr. Davy.

§ Observations made in Belgium, Geneva, Russia, and Paris.

// Duvillard and Rau.

circumstances, is not a little hazardous : it is like that of a man handling heated iron with gloved hands, who is unconscious of the warmth until he is burned to the quick ; or like the fish, protected by a hard and massive shell, that is unaware of danger until the knife is struck into its heart. Dr. Davy found that old persons, having a natural temperature of 98° when their feelings of warmth were agreeable, had their temperature reduced to 96° and 95° when subjected to cold. The winter season is always a period of fatality among the aged ; and in our establishments for the poor, the number of deaths immediately following the temporary excitation of the cheer of Christmas is quite remarkable. Kitchiner observes, "cold often kills the infirm and the aged." "When the thermometer is below 30° , the proper place for people beyond 60 is their own fireside."

The remedy for the modifications of vital temperature resulting from age is so obvious as to need but a passing remark. Infants must be warmly fostered ; young children must be warmly and judiciously clad ; and old persons must learn to apportion their clothing to their age, and not to their desire of maintaining a perpetual and artificial youth. After the age of thirty-five, the meridian period of life, according to Kitchiner, "it may be better to exceed rather than be deficient in clothing."* These propositions are so reasonable and so obvious, that I may perhaps fall under the accusation of "adding perfume to the violet : " but are they followed in practical life ? Are the little highlanders and Greeks whom we meet during three out of the four quarters of the year, under the guardianship of their nursery-maids, dawdling about the streets, in our public walks, or squares, properly protected from the cold ? Are the fantastically attired children whom we see "taking an airing" in carriages in our parks, sufficiently and properly clad ? If this question can be truly answered in the affirmative,

* Adair on Diet.

then, and then only, my remarks are needless. There can enter into the parent mind no more baneful idea than that of rendering children "hardy" by exposing them unnecessarily to cold, and by clothing them insufficiently. I have known instances wherein parents acting on this principle have failed entirely in rearing their offspring. Does Nature treat her progeny thus? Does she not, first of all, ensure the birth of her young only at a kindly season, and then provide them with downy coverings, warm nests, and assiduous protectors? And WE must imitate Nature, if we would give to Britain a race capable and worthy of maintaining her independence and honour. The little denizens of a warm nursery must not be subjected, without a carefully assorted covering, to the piercing and relentless east or north-east wind; they must not be permitted to imbibe the seeds of that dreadful scourge of this climate, consumption, in their walks for exercise and health; they must be tended, as the future lords of the earth, with jealous care and judicious zeal. *One-sixth of the deaths of young children, it must be remembered, result from cold.*

I come now to a subject teeming with interest, as of more general and universal application, than, perhaps, any that I have hitherto touched, I mean the subject comprehended under the popular expression, "draughts," and their consequences. The principle on which the operation of this source of serious disease depends is the partial cooling of the body through the medium of the skin, and is illustrated in the following experiment by Edwards and Gentil. They immersed the hand, having a natural temperature of 98° , in cold water at 41° , and kept it there for twenty minutes. Five minutes after its removal its temperature was ascertained to be no higher than 55° , and at the end of one hour and a half, 69° . So that, as an effect of the application of cold, for a short period, to a part of the body, a depression of temperature occurs to the amount of 43°

of Fahrenheit, and the part recovers only 14° of its heat in one hour and a half; and if we suppose the heat to increase in this ratio, the system would require nearly five hours to regain the temperature which in twenty minutes had been removed. Now, this is precisely the condition of a person who exposes a part of the body, usually covered, to a cold but still atmosphere, or of a person properly clothed, but seated in a draught or current of cold air. The warmth of the part so exposed, or of the side of the person directed towards the draught, the uncovered parts first, and then the covered, is reduced; and as an effect of the chill, the transpiration is checked. But soon another principle comes into action, and one of greater importance than even the preceding; it is thus experimentally illustrated. When the hand is immersed for some time in cold water, and its heat consequently lessened, the temperature of the opposite hand is also reduced, and to a very remarkable extent, so that the mischief of partial cooling is not limited to the first effect produced upon the exposed or chilled part of the body, but is gradually spread over the frame, until the person feels completely chilled through. Have we not all, at some time or other, felt this? Have we not felt, when a part of the body is cold, as, for example, the feet, the chill strike through the entire frame? Yes, it is too frequent an occurrence not to have been experienced, on more than one occasion, by every one, and to his sorrow. It is in this way that thin shoes, wet shoes, wet dress, or damp sheets, do their work of mischief and disease, and cannot, therefore, be too carefully avoided. Youth will resist much, strength much, health much; but it must be recollected that **WE DIE BUT ONCE**, and although we escape ninety and nine times, yet the hundredth may be near, and the last.

Now, the dangerous results which sometimes flow from causes of the above description are popularly ascribed to "checked perspiration;" but the truth is, that the suppression of perspiration is merely one of the

effects of the shock received by the constitution, and by no means the cause. The first effect of the cold upon the part is a lower tone of the cutaneous nerves, and a consentaneous contraction in diameter of the capillary blood-vessels. As a consequence of these preliminary changes, the skin becomes contracted and shrunken; less blood than natural is sent to the surface; nutrition and its chemical actions are suspended; perspiration is suppressed; and the surface becomes pallid and bloodless (see diagram, page 28). The blood, in fact, no longer able to enter the contracted capillaries, its cutaneous circulation being at an end, retreats upon the internal membranes and vital organs, affecting one part or other of the mucous membrane, or one or other of the vital organs, according to the constitutional peculiarity of the individual. In one, the blood will be determined on the lungs, causing cough and inflammation; in another, upon the throat, producing quinsey; in a third, upon the membranes lining the nose, eyes, and ears, producing sneezing and catarrh, or cold in the head; in a fourth, upon the stomach,* causing a bilious attack; in a fifth, upon the bowels, causing pain and inordinate action; in a sixth, on the kidneys, producing severe pain in the loins; in a seventh, on the joints, producing rheumatism; in an eighth, on the nerves, producing neuralgia or tic-doloureux; in a ninth, on the brain, producing faintness, insensibility, convulsions, and even apoplexy; and so on. "There is scarcely an organ in the body," remarks Dr. Dunglison, "that may not be affected by undue or irregular action excited in some portion of the capillary system of the skin. In a minor degree, it may be observed, that whenever we are slightly

* In a memoir of Mr. Coleman, the eminent professor of veterinary medicine, written by Sir Astley Cooper, it is mentioned that Mr. Coleman had, at one period of his life, "a curious sympathy between the stomach and skin, which manifested itself by throwing up the contents of his stomach whenever he exposed himself to cold air after dinner."

chilled, as by too light dress, by cold shoes, &c., any sensitive organ of the body immediately evinces discomfort or distress ; thus, if we have suffered at any period from tic-doloureux or rheumatism, we immediately feel a warning twinge, or if our lungs be delicate we begin to cough ; while, on the other hand, the very instant we get warm, the twinge ceases and the cough subsides.

In contradiction to what I have just advanced, it may be thought that when a person is warm, or in a state of perspiration, and is then exposed suddenly to the cold, the checked perspiration is certainly the cause of the subsequent disorder. But that is not the case ; the perspiration is suppressed only as an effect, and that with which the skin is moistened at the moment of exposure merely increases the effect of the cold by its rapid conduction of heat and evaporation.

CHAPTER VIII.

THE INFLUENCE OF EXERCISE ON THE HEALTH
OF THE SKIN.

IT is quite true that the whole body of known hygienic principles and laws are applicable to the health of the skin, as conducive to that of the system in general. But there are parts of those laws which have reference to the skin alone, and it is my present purpose to separate these as much as possible from the rest, that their importance may be more prominently seen. It is thus with the subject of exercise. Well-directed exercise favours the preservation of the general health by calling into direct action the majority of the organs of the body: and it also acts powerfully on the skin, by stimulating its functions, increasing its temperature, awakening its tone, and subjecting it to a current of atmosphere favourable for its respiratory offices. The conditions subservient to health, which have been previously discussed, namely, food and raiment, are, in one respect, different in their nature from those which are to follow, namely, exercise and ablution: the former are simple and easy in their application, appealing, on the one hand, to a sense of appetite; on the other, to a sense of comfort for their regulation; and making a demand on the judgment only so far as selection and experience are concerned. The latter are more complicated in their bearings, calling in the aid of judgment at the very outset of their application, and frequently requiring to be employed in opposition to the feelings and present enjoyment. In other words, they require the mind to direct and go with them; and although the mind regu-

lates by reference to the inferior faculty of sensation, yet to ensure their benefits, the soul must be present.

What is it that makes the difference between the exercise of youth and that of the felon on the treadmill ; between the pedestrian in the Isle of Wight or Switzerland and the pedestrian from Chelsea to the Bank ; between the light and quick footstep wending to Greenwich Park and the dull tread of the nursery-maid at home ? Is it not mind ? Is it not the young and buoyant joy of the schoolboy that inspirits his laugh and his leap ? while, silent and morose, humiliated, not convinced, the felon suffers his monotonous existence, moving, it is true, but not in exercise. Is it not the novelty or the beauty of the scene, the pleasant weather, or the immunity from customary labour, that gives spirit to the pedestrian's tour, as compared with the dull, desultory repetition of the same sights, same persons, same things, and same path from and to business ? Is it not the prospect of enjoyment,* of gaiety, or pleasure, that

* " Joy," says Hufeland, " is one of the greatest panaceas of life. No joy is more healthful or better calculated to prolong life than that which is to be found in domestic happiness, in the company of cheerful and good men, and in contemplating with delight the beauties of Nature. A day spent in the country, under a serene sky, amidst a circle of agreeable friends, is certainly a more positive means of prolonging life, than all the vital elixirs in the world. Laughter, that external expression of joy, must not here be omitted. It is the most salutary of all the bodily movements ; for it agitates both the body and the soul at the same time, promotes digestion, circulation, and perspiration, and enlivens the vital power in every organ."

Few of my readers, I trust, will require to be taught the nature of joy ; lest any one should, I will quote the words of my old friend Daniel Turner. " Joy," says he, " may be defined a certain delight or pleasure of the mind. 'Tis here we find our spirits, as it were, tickled, and moving pleasantly both in the brain and thence into the nerves of the heart, from whence a regular and pleasant circulation of the blood, through all parts of the body, enjoying a kindly warmth or heat, and partaking, if we may so say, of the exultation." And as a kind of encouragement to foster fleeting joy, he further says : " So ready are these outlets of the nerves to the passages of the said spirits, that having often before

makes the difference between the elastic step of the maiden enfranchised from present duties, and the same person in the pursuit of her necessity-impelled and ordinary offices? We need not ask which is most calculated to be beneficial to health; which to arouse the dormant functions of the skin; to promote the removal of irritating elements from the blood; to increase the vigour of the frame, purify the complexion, and enrich the beaming tints of beauty. In mind lies the great secret of *beneficial exercise*, and without it exercise is a misnomer, and a fraud upon the constitution. "A sportsman," says Kitchiner, "habituated to ease and luxury, will rise with the sun, undergo the most laborious exercise in hunting a stag, hare, or fox, for the space of half a day, not only without fatigue, but with benefit to health, owing to the amusement and hilarity which the mind enjoys; but were the same gentleman compelled to go through half as much exercise which afforded no amusement, his fatigue and disgust would be insupportable. This is every day the miserable experience of men who were once engaged in the habits of industrious trade and bustle, and whose success and wealth have encouraged and enabled them to retire from business: they find life a burden; and not having a pleasing object to encourage exercise, they acquire a painful *ennui*; they find they have exchanged the *otia* for the *tedia vite*. It is here that various exercises have been suggested as succedanea; but, alas, they all fail, because they want the pleasurable zest! The dumb-bell is tugged, the feet and legs are dragged along the walks and avenues of a garden, but alike uselessly."

Exercise, in so far as practicable, should be *regular*; a daily purpose is to be answered by its use; and therefore it is unreasonable to expect that benefit should arise when it is neglected for days consecutively, and

travelled the same tracts or *vestigia*, they of themselves after, even without our knowledge or observation, readily run thereinto."

made to be secondary to occupations and pursuits of a trivial nature. We are impelled by hunger to the daily use of food, and by our sensations to the employment of dress. To those who know themselves, who have a proper acquaintance with the animal organisation, there are also sensations which indicate the want of exercise; they have the power of supplying that want, or of rejecting its calls; but Nature, in the end, must triumph; punishment will assuredly follow the breach of her appointed laws. We have seen that exercise promotes the removal of the impurities of the system. Suppose them to remain, the human frame immediately becomes a source of destruction to itself, and of evil to others; matters which should be cast off, as useless and noxious, are mingled with the blood, and, fermented by its heat, are developed on the skin in the form of flushes and eruptions; or they are exhaled as fetid emanations from the lungs, or disposed of in some other way equally disagreeable. The brain also suffers in its turn; the mental faculties are disturbed, the intellect enfeebled, and the sentiments lowered. The injurious effects of neglected exercise cannot be better illustrated than in the medical history of those who are compelled to lead a sedentary life. In such persons we find a pallid and discoloured skin, depressed spirits, incapacity for exertion, headache, frequently palpitations of the heart, fulness of the head, dyspepsia, tendency to biliousness, and general imperfection and irregularity of the alimentary functions.

Another condition of "beneficial exercise" is, that it should be *moderate*. A short walk in agreeable society, either of thoughts or friends, is infinitely preferable to one of greater distance, and taken as a task. But there is a feeling, too prevalent among the unthinking, that if a little be good, a great deal must necessarily be better. It is this principle, carried out to the utmost limits of extravagance and absurdity, that called forth the reaction in Medicine known under the name of Homœo-

pathy.* People, left to themselves, would have converted their insides into medicine chests; the endless inquiry after *something* to do this, and *something* to do that, was fast amounting to a suicidal mania for drugs, when the opposite extreme rushed in, and became the occasion of a rational equilibrium. So, in exercise, we must neither have excessive nor infinitesimal doses; we must endeavour to maintain a proper medium between mischievous extremes, and be guided by our sensations, not only present but consecutive. Our first walk should be short, the next a little farther, and of somewhat longer duration; subsequent walks a little increasing on their predecessors, varied as much as convenient, and the most agreeable in associations that can be selected. We thus put ourselves under a kind of training, we discover our powers of supporting muscular exertion, and we eventually arrive at a point when we feel that our exercise is *enough* and profitable. This is the point towards which all our endeavours should tend; our main object should be, to use as much exercise as shall keep our bodies in health, and our minds cheerful and in vigour. We should not be desirous of exerting ourselves as much as possible, any more than we should conform to the same practice at the table; at a given point, our appetite, in health, whispers, "enough;" the same expression will be elicited by our feelings in relation to exercise, when we have made ourselves as well acquainted with the practice and influence of it, as of the more urgent necessity of taking food.

In the recommendation of exercise to ladies, I am continually met by replies such as this: "My household duties give me sufficient exercise: I am sure that I am tired enough by bed-time:" or, "I do take exer-

* I am no advocate of the various conundrums which chance draws every now and then from the wheel of fashion, but I quite agree with a recent author, that "a wise discrimination can select from every passing system and observance something capable of being retained, and of being philosophically and usefully employed for the relief of suffering humanity."

cise ; there are my occupations at home, and then my calls." Now, it will be seen at once, that household occupations are not exercise ; for, in the first place, they are duties, generally desultory, often irksome, and often anxious ; calculated to engender fatigue both of body and mind, but wholly wanting in the attributes appertaining to true exercise, namely, change of thought, change of scene, and muscular action, accomplished in the open air.* Again : it is well known, that after being thoroughly fatigued by employments of this nature, a walk is often refreshing and agreeable. Fashionable calls are open to the obvious objection of merely changing the air of one house for that of another, and often without any mental satisfaction arising out of the accomplishment of the duty. Shopping is more animating ; but here also, more perhaps than in the call, the objection of an impure and confined atmosphere steps in, while the open, fresh, unbreathed air should be the main object of search. Hufeland remarks, that "the enjoyment of free air may be considered as nourishment equally necessary for our existence as eating and drinking. Pure air is certainly the greatest means of strengthening and supporting life ; while confined and corrupted air is its most subtle and deadly poison." The same author further observes, that "by such daily enjoyment of air," we gain the advantage of making ourselves "acquainted and familiar with a free atmosphere ; and people are thus secured against one of the greatest evils that at present afflict mankind ; I mean, too much sensibility in regard to all impressions and variations of the weather." He moreover goes the length of attributing to this custom "infinite advantage in regard to the eyes," considering "that a great cause of weak eyes and short-sightedness are the four walls within which we

* "I consider it an indispensable law of longevity, that one should exercise, at least, an hour every day, in the open air. The most healthful time is before meals, or from three to four hours after."—HUFELAND.

are accustomed to live from our infancy, and by which the eyes at length lose their whole power of seeing remote objects distinctly."

The part of the day selected for exercise should be that when the temperature is most agreeable: for example, mid-day in the winter: or the morning and evening in the summer season. In the morning of winter, the atmosphere is too cold for any but the soundest lungs; and if the weather be not frosty, there is more or less moisture in the air, which is insalubrious. The evening is much more objectionable, for the same reasons, and not merely on account of the cold which it produces, but also from the circumstance that infectious matters are more easily imbibed and suspended by a damp than by a dry air. In large cities, another objection attaches to the morning and evening; namely, the quantity of smoke retained near the earth by the cold air, which becomes dissipated in the middle of the day. In the summer season, the middle of the day is objectionable from its great heat, and the night air from the fogs and mists which collect near the earth's surface.

Consideration must also be given to the period of taking food; exercise should not be taken either immediately before or soon after meals; and here I must remind my reader, that the word exercise is not applied to a gentle walk or lounge, but to motion, performed to the point of sufficiency, with all the energies engaged. Such exercise requires the whole power of the nervous system for the time, and a certain quantity of nervous power is necessarily expended. This loss must be regained before the nervous system is directed upon another effort, such as digestion; which, to be performed well, requires the whole effort of a sound and fresh nervous apparatus. It is a law of the animal economy, that no two actions requiring a large expenditure of nervous force can be carried on at the same time. Now exercise, properly effected, is such an action as I *am now* considering, and consequently, if it be accom-

plished immediately before a meal, the latter must suffer. On the other hand, digestion absorbs the powers of the system so completely that it is a common thing to find it succeeded by lassitude and drowsiness. It is evident, therefore, that if exercise be taken the instant the meal is swallowed, the latter must remain an undigested load in the stomach until the moment arrives for rest, and then the function will be exceedingly imperfect, if performed at all.*

Another consideration in the observance of healthy exercise is the clothing employed during its use. It is evident that some arrangement should be made in this respect. It would be unwise to commence a long walk with clothing adapted to a state of rest, and equally so, to relax from exertion without having an additional covering to throw on. Indeed, without precautions on this head, exercise would become a cause of disease. Again: as all the energies of the muscular system, and the chief of those of the nervous system, are to be thrown into exercise, the body should be relieved of all incumbrances to its free motion. All ties about the person should be easy, ladies should leave their stays at home, and shoes and boots should be ample and strong.

Of the kinds of exercise, it may be premised that all motion for this purpose should, if possible, be performed in the open air, and in every departure from that principle the nearest approximation should be adopted. There is no condition more necessary to the enjoyment of health than pure air: and as we consume more air when the muscular system is in activity than at any other time, we must endeavour to obtain it as pure as possible at that period. In cities, the air is necessarily

* "After dinner, rest for three hours," says Mr. Abernethy.

Dr. Harwood, Professor of Anatomy in the University of Cambridge, having fed two pointers at the same time, had one taken out and kept in exercise for two hours. On its return both animals were killed; in that which had remained at home and at rest, the meal was entirely digested; in the other, the process of digestion had not so much as commenced.

impure from the exhalations which arise on all sides, and the large quantity of smoke diffused through the atmosphere. On this account, schools, where the physical as well as moral education of children is regarded, should be as far removed from the smoky atmosphere as possible; and where this is not practicable, the purer air should be sought for, for the purposes of exercise, in the nearest outlet from town. "We can at most," says Hufeland, "breathe the same air only four times; for it is then, from the finest support of life, converted by ourselves into the most deadly poison." Rooms in which a number of persons are breathing soon become contaminated,* and we are frequently made aware of this condition of an apartment by the detection, on entering it, of a peculiar faint odour, which is soon lost when we mingle with the crowd. I have previously remarked on the necessity of attending to the admonition of our senses, and in no case is this more necessary than in that of the organ of smell. As disagreeable impressions of temperature or appetite are bad, so also are those of smell. By a wise Providence, odours dangerous to life are generally disagreeable, and cannot be too carefully avoided. What is more disagreeable, for example, than the smell of the smouldering wick of a tallow-candle? and a case is recorded of destruction to life from holding such a wick under the nose of a sleeping boy; or what more delicious than a chestful of pure air on some bluff hill in the country? It is true that our senses become dulled by use, or the pursuit of other objects; the man

* The injurious effects of crowding a number of persons into a small space, was fatally illustrated in the instance of the Black Hole of Calcutta, a room eighteen feet square, aired by a single grated window of small dimensions. One hundred and forty-six persons were confined in this small chamber by Surajah Dowlah, at the taking of Fort William, the estimated space for each person being twenty-six and a half inches by twelve. At the end of eleven hours, one hundred and twenty-three of the inmates were *found dead*.

or woman of the world would despise the thought of being indebted for any portion of their enjoyments to "common air," "air that everybody breathes." But after a season of London smoke, pure air has a chance of being estimated. What a delicious beverage water would be regarded if it were rare; can we conceive anything more grateful? It is perhaps true, that to be an epicure in water requires a residence in London or a large city, of some years' duration, and the same may be said of air.

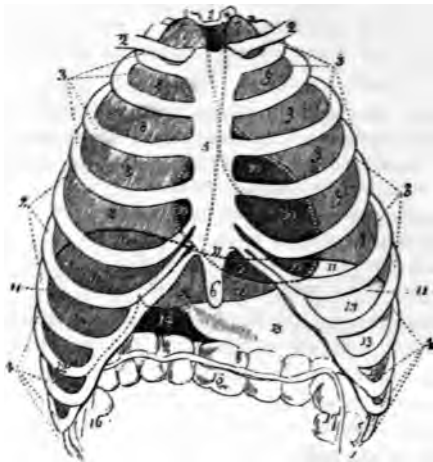
"Great cities are great plagues! There, native joy
 Flies from man's breast, and makes him pleasure seek
 In art alone. There everything by paint
 Is seen disguised, the countenance and walls,
 Each action, words, and even the very heart.
 All there consists of costly wood or stone;
 And even the owners seem as hard as these.
 O rural life! 'midst poverty, how rich!"

In determining the kind of exercise suitable for the sexes and different periods of life, we must observe nature, and bear in mind the conditions of exercise previously considered. Childhood is a period of excessive mobility, and demands excessive action. Games, wild, rude, and rapid, are the fitting exercise and enjoyment of boys. Nature commands it, and it would be a refinement of cruelty to restrain them. They are precisely in the condition of one who is inspiring laughing-gas, a necessity for muscular action exists, which cannot be suppressed without injury to the individual. Indulge the necessity, and in a certain time the tumult ceases, and a tranquil thrill of enjoyment, not fatigue, remains. Such are the feelings of children uncontrolled in their exercise. Such has Nature ordained. The games of boys are so numerous, and in general so well adapted for the purposes of health, that I shall not stop to enumerate them. Gymnastics also have advantages when they are practised from inclination, or with a professional object,

but are open to objection when they incite to exertions beyond the powers of the body.

For girls, the catalogue is hardly less than for boys; hoop, played with each hand alternately, the skipping-rope, dancing and singing,* being among the best.

Fig. 41.†



The whole of these games must be practised with sufficiency, and unrestrainedly, to be of any use. Stays,

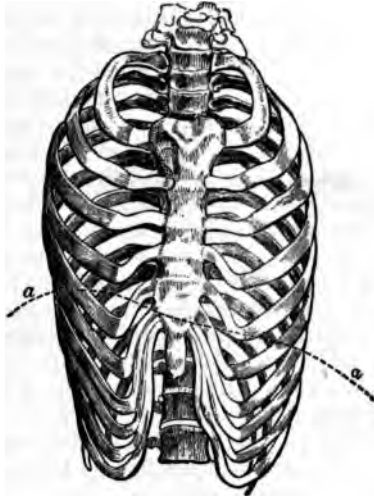
* It is said that Cuvier, when first appointed to his professorship, was threatened with consumption, but that he overcame this disposition by constant speaking.

† Fig. 41.—A diagram showing the natural form of the healthy chest, and the proper position of the organs which it contains.

1, The spine. 2, 2, The collar-bones. 3, 3, The seven upper, or true ribs. 4, 4, The five lower, or false ribs. 5, The breast-bone, with which the true ribs are joined. 6, The sword-shaped extremity of the breast-bone. 7, 7, The upper part of the two lungs rising into the base of the neck. 8, 8, The right lung, seen between the ribs. 9, 9, The left lung, seen in like manner, between the ribs. 10, 10, The heart. 11, 11, A thin layer of muscle, the midriff, which divides the upper from

before womanhood, are instruments of barbarity and torture, and then they are needed only to give beauty to

*Fig. 42.**



the chest. It is the duty of every mother and every guardian of children to inquire the purpose for which

the lower part of the chest. Medically, that part only is the *chest* which lies above the midriff. The midriff is arched, and forms a kind of dome, upon which the heart and lungs rest. This circumstance, and the occupation of the cavity of the dome by the liver and stomach, cause the lower and front part of the lungs to lie in front of the upper portion of the liver; and the stomach, in like manner, to lie, in part, behind the heart. 12, 12, The liver. 13, 13, The stomach. 14, The continuation of the stomach, termed duodenum. This is the first part of the bowel, and is the frequent seat of pain. 15, The transverse portion of the large bowel or colon. 16, The upper part of the colon of the right side, bending inwards to become the transverse colon. 17, The commencement of the colon of the left side; being the continuation of the transverse colon.

* *Fig. 42.*—The chest distorted from the abuse of stays. If

stays were introduced into female attire. Was it for warmth? If so, they certainly fulfil the intention very badly, and are much inferior to an elastic woollen habit, or one of silk quilted with wool. Was it to force the ribs, while yet soft and pliable, into the place of the liver and stomach, and the two latter into the space allotted for other parts; to engender disease and deformity to the wearer and her children for generations? Truly, if this were the object, the device is most successful and the intention most ingeniously fulfilled. But few, I think, will believe that this really is the purpose which mothers and guardians have in view in confining their little victims in stays; whatever the result may be. Yet these are not the days when ignorance can be pleaded as an excuse for such wrong-headed folly and wickedness; it is obvious that the stay is an appurtenance of woman only when she has arrived at a state of full development; but then it should be divested of all the apparatus of busks and bones that frequently encumber it, and its main bearing should be limited to the upper half of the chest. The stay is, in reality, a support for the bust; such is its purpose, such alone its intention. How very ludicrous it would appear to put it on boys; and yet boys have as much need of it as girls up to the period of womanhood, and I may say further, up to the period of marriage. But as stays form a staple article of female dress in this country, it may be well to point out their physiological operation on the frame.

It is well known that the upper half of the trunk of the body, the *chest*, as it is properly termed, is constructed of a framework of twelve pairs of narrow bones, the *ribs*, which bend round from the spine behind, to

this figure be compared with the preceding, the effects of pressure will be seen at once. The figure is drawn from a chest in my possession. The letters *a a* refer to a dotted line, which indicates the position of the midriff. How miserably the space allotted to the liver and stomach is curtailed.

the breast-bone in front. These bones constitute the defence of the chief organs of the body; namely, the heart, the lungs, the liver, and the stomach, the two former being above, the two latter below. Upon these bones are spread out certain muscles of respiration and the muscles which support the spine, and the muscles are covered in by a layer of fat and by the skin. Muscles, it will be recollected, are the parts of the body termed flesh; they are red in colour, moderately firm, receive a large quantity of blood and many nerves, and are the agents by which motion is effected. Moreover, they possess the property of becoming large and firm with exercise, and small and soft or flabby from disuse. Hence the expression *muscular* is synonymous with "powerful." Now, the first effect of stays is to limit the bending and other movements of the trunk of the body; the body moves, as it were, "all of a piece;" and the obvious consequence is, the degradation of the muscles from their firm condition to a soft and flabby state. Next, the stays press upon the muscles, how much, young ladies could tell if they would! but the muscles become injuriously squeezed between the unyielding stay and the hard bones of the chest. As a consequence of this treatment, the circulation of blood through the muscles and the freedom of the nervous fluid is interrupted. If it could be seen when thus compressed, the muscle would be found pale and exsanguine, and being deprived of the quantity of blood necessary for its nutrition, much less its action, it becomes *wasted*, or, in technical language, *atrophied*. The muscles, then, by the use of stays are weakened and rendered powerless, and the chest, at the growing period of life, is limited in its expansion, and the spine in its proper amount of muscular support. The consequence is inevitable; the spine sinks under the pressure of the superincumbent weight, or the child throws the pressure against one or the other side of the stay, and curved spine or spinal disease is established. How can it be

otherwise? If we wished to produce curved spine, could we adopt a more scientific or certain plan? But stays are not the sole cause of curved spine, spinal disease, and deformity, in girls and young women. Another cause is, insufficient food; the stomach, forsooth, must be schooled to a lady-like appetite; Nature is turned off as a dunce. Another cause is insufficient clothing, and another, insufficient exercise. That horrid word "lady-like," haunts the poor girls of the middle and higher classes through years which should be devoted to physical education, and leaves them at last the prey of deformity and disease. It may be wholesome to reflect that spinal deformity is scarcely known in schoolboys, and is almost universal in school-girls.

Since the publication of the first edition of this work, I have asked many ladies the *use* of stays. I obtained but one answer: "the stay gives us a *roundness of waist* which we could not otherwise obtain." This is quite true; the natural waist is broader from side to side, than from before backwards; in other words, it is slightly flattened. God has made us so; must we not say wisely; dare we say unbecomingly? What right, then, have we to dispute Nature's laws, and set up an idol for ourselves? What right to establish a standard for the human form, as we would a fashionable shape for a bonnet or a coat? Or if, as adults, we persist in a right to mortify ourselves, let not our children be made sufferers for our sins. The truth is, that the round waist being a distortion of the natural shape, is painful rather than agreeable to the eye of man.

One of the most inveterate pinchers among my lady acquaintance, who is, in reality, miserably distorted from the true standard of feminine perfection of form, and who has entailed upon herself, in consequence, a wretched state of health, adduces an argument in defence of stays, that I find too prevalent among women, and too mischievous in its tendency, to let pass without a reply.

Her delusion is, that because the stays are not tightly laced, they cannot be hurtful; but, to understand the true relation of stays to the health of the body, we must go back to the period when they were first used, namely, to the period of childhood. I have already shown, that stays restrict the motions of the trunk of the body, and consequently set an immediate limit to the growth of the muscles, which become, in consequence, weak and powerless. Besides this, they prevent the growth and expansion of the chest, and by a gentle but continuous and daily repeated resistance, they maintain the waist of the dimensions of childhood, while the rest of the body grows and enlarges into womanhood. A girdle of infancy is made to encircle the heart, the lungs, the stomach, and the liver of womanhood. And these important organs are constrained to seek accommodation in their narrow cell by mutual displacement.* I could forgive the adoption of stays at adult age, and would then sanction any amount of constriction the votaries of tight-lacing might think an improvement on nature; the process would be found too torturing to endure. That which I desire to see checked, is the detestable refinement of cruelty that begins the proceeding in infancy, before the intelligence of the child is sufficiently developed to resist this cruel infringement on woman's happiness and woman's health.

Fashion is the war-cry of tyranny, and some years ago, it was the fashion for women to appear with deformed bodies. Happily, fashion has become more rational at the present day, and it is most sincerely to be hoped that British children will be educated, physi-

* "A strong constitution," writes Dr. Dunglison, "is considered to be dependent upon the due development of the principal organs of the body, on a happy proportion between those organs, and on a fit state of energy of the nervous system, whilst the feeble or weak constitution results from a want of these postulates." Dr. Dunglison might have added:—and the undue and inharmonious development resulting from the use of stays produces puny mothers and a puny offspring.

cally as well as morally, to perform the duties of British mothers. I have described the manner in which small waists and deformed spines may be made; I will now cite a parallel from the work of my friend Mr. Tradescant Lay, entitled, "On the Chinese as they are." "At five," writes Mr. Lay, "the rich man's daughter has her foot so firmly bound, that in the native phrase, the whole is killed. The foot, below the instep, is pressed into a line with the leg, to add to the height of the little sufferer, while two of the toes are bent under the sole, that its breadth may be only of the least dimensions. The agony of such a process it would be hard to estimate; but it is said to last about six weeks, when, I suppose, the wasting of all the parts, and the cessation of many of their functions, have rendered the whole insensible to pain. This insensibility to pain is perhaps confined to the outer parts, for the chief person belonging to the temple on the island of Honam, stated, that his sister suffered much anguish in the sole of the foot, or rather, in its lower, and more central parts."

The exercise best adapted for the adult is walking and riding on horseback; and, for the elderly, walking, and the more gentle exercise of riding in a carriage. Walking, when practised with a proper regard to the conditions mentioned in preceding paragraphs, bestows all the advantages which are to be derived from exercise. It favours digestion and nutrition, facilitates respiration, stimulates the skin, and promotes its action; increases the temperature of the body, and invigorates the physical and mental powers. Equestrian exercise offers similar advantages to those whose strength is unequal to walking a sufficient distance, or a sufficiently long time, to derive benefit, and is therefore peculiarly adapted for invalids or persons of a weakly constitution. The action of the skin is speedily excited by riding on horseback; an agreeable warmth is diffused over the entire body, and all the advantages of walking exercise are obtained *with greater variety of scene and less fatigue.*

CHAPTER IX

THE INFLUENCE OF ABLUTION AND BATHING ON THE HEALTH OF THE SKIN.

THE preceding chapters on the structure and purposes of the skin, and particularly those parts which treat of the constant exfoliation and reproduction of the scarf-skin and the functions of the oil-glands and perspiratory system, afford the ground-work upon which much of our reasoning on the necessity of ablution must rest. The scarf-skin is being constantly cast off in the form of minute powdery scales; but these, instead of falling away from the skin, are retained against the surface by the contact of clothing. Moreover, they become mingled with the unctuous and saline products of the skin, and the whole together concrete into a thin crust, which, by its adhesiveness, attracts particles of dust of all kinds, soot and dust from the atmosphere, and particles of foreign matter from our dress. So that, in the course of a day, the whole body, the covered parts least, and the uncovered most, becomes coated by a pellicle of impurities of every description. If this pellicle be allowed to remain, to become thick, and establish itself upon the skin, effects which I shall now proceed to detail will follow. In the first place, the pores will be obstructed, and in consequence, transpiration impeded, and the influence of the skin, as a respiratory organ, entirely prevented. In the second place, the skin will be irritated both mechanically and chemically; it will be kept damp and cold from the attraction and detention of moisture by the saline particles, and, possibly, the matters once removed from the system may be again

conveyed back again by absorption. And, thirdly, foreign matters in solution, such as poisonous gases, miasmata, and infectious vapours, will find upon the skin a medium favourable for their suspension and subsequent transmission into the body.* These are the primary consequences of neglected ablution of the skin ; let us now inquire what are the secondary or constitutional effects.

If the pores be obstructed and the transpiration checked, the constituents of the transpired fluids will necessarily be thrown upon the system, and as they are injurious, even poisonous, if retained, they must be removed by other organs than the skin. Those organs are, the lungs, the kidneys, the liver, and the bowels.† But it will be apparent to every one, that if these organs, equally, or one more than another, which is generally the case, be called upon to perform their own office, *plus* that of another, the equilibrium of health must be disturbed, the oppressed organ must suffer from exhaustion and fatigue, and must become the prey of disease. Thus, obviously and plainly, habits of uncleanness become the cause of consumption, and other serious diseases of the vital organs. Again : if the pores be obstructed, respiration through the skin will be at an

* Hufeland, in laying down rules for security against infection, observes : " Pay the utmost attention to cleanliness ; for the greater part of poisons of this kind (contagious) are conveyed to us through the external surface of our bodies : and it is fully proved that poison, already communicated, has been by cleanliness removed before it could actually produce any bad effect. I here allude, in particular, to frequent washing, bathing, rinsing the mouth, combing the hair, and often changing the linen, clothes, and bed."

† This statement, grounded on analogical reasoning, is proved by the recent chemical researches of Scherer, who finds that the extractive or colouring matter of the product of the kidneys contains an augmented quantity of carbon and hydrogen, when the lungs, the liver, or the skin are deranged. And other observations show that the accumulation of carbon and hydrogen, in the state of fat, in the organs in question, gives rise to one of *the most fatal diseases of our times.*

end, and, as a consequence, the blood, deprived of one source of its oxygen, one outlet for its carbon, the chemical changes of nutrition will be insufficient, and the animal temperature lowered. As a consequence of the second position, cutaneous eruptions and diseases will be engendered, the effects of cold manifested on the system, and the reabsorption of matters once separated from the body will be the exciting cause of other injurious disorders. The third position offers results even more serious than those which precede. If a pellicle of foreign substance be permitted to form on the skin, this will inevitably become the seat of detention of miasmata and infectious vapours. They will rest there previously to being absorbed, and their absorption will engender the diseases of which they are the peculiar ferment.

With such considerations as these before us, ablution becomes a necessity, and needs no further argument to enforce strict attention to its observance. But I fear that water, the medium of ablution, hardly receives a just appreciation at our hands. Water is the most grateful, the most necessary, and the most universal, of the gifts of a wise Creator; and in an age when man drew his luxuries more from nature, and less from works of his own production, when water was his friend more than his servant, water was regarded as a representative of the Deity, and was raised to the dignity of a mythological god. Thus the rivers of Greece and Rome were represented allegorically by a tutelar god, with his attendant nymphs, and to this day the Ganges is adored by the votaries of Brahma. The practice of the worship of rivers has undoubtedly, in some instances, obscured its principle, a remark applicable in the most modern times, and in the most civilized countries, to the most serious objects; but the principle evidently is, *the utility of water to man*. From the first hour of existence to his latest breath, in health and in sickness, on the throne or in the cellar, water is an universal good. Baths were dedicated by the ancients to the

divinities of Medicine, Strength, and Wisdom, namely, Esculapius, Hercules, and Minerva, to whom might properly be added, the goddess of health, Hygeia. The use of water has been enforced as a religious observance, and water has been adopted as one of the symbols of Christianity.

Let us turn our attention to water in its several relations to cleanliness, health, and the relief of disease. In its former capacity, it enables us to remove the pellicle of impurities previously spoken of, from our bodies, and also from the clothes which we wear nearest our skin; and it effects this purpose by its quality of dissolving saline matters, and holding in temporary suspension those which are insoluble. There are, however, certain substances for which water has a natural repulsion, and over which it consequently exerts no influence until assisted by a chemical power. Those substances are oily matters of all kinds, and the skin, as we have seen, is abundantly provided with an unctuous secretion. The chemical power which is called into use for the subjection of the oil is soap; soap renders the unctuous product of the skin freely miscible with water, and hence is an invaluable agent for purifying the skin.* I may affirm that it is an indispensable aid, for in no other way can the unctuous substance of the surface of the skin and the dirt which adheres to it be thoroughly removed. I am aware that certain substances termed "wash-powders," are occasionally used as substitutes for soap; they are rubbed on the skin with the

* Water, when used for the purposes of ablution, is commonly spoken of as being *soft* and *hard*. The softest water is distilled water, then rain water, next river water, and lastly spring water. The quality termed hardness depends on the presence of saline matters in a state of solution, and particularly sulphate of lime. Hard water may be known by its property of curdling soap; it may be rendered soft by the addition of a little potash or soda, in the proportion of five-and-twenty grains to the quart. In calcareous and aluminous districts, water is harder than in others. When hard water is used for washing, more soap is required than for *soft* water.

hands, and act in the same manner that crumbs of bread do upon a chalk drawing. But draughtsmen well know that they cannot remove the chalk which has entered the crevices of the paper, nor can they, indeed, restore the surface to its original whiteness and purity. Neither can wash-powders follow the innumerable apertures of the skin, nor enter the mouths of the pores otherwise than to obstruct them. A skin cleaned in this manner may always be detected by a certain kind of shining, not to say greasy, polish, and the whole complexion looks mellowed into a kind of *tone*, as we say of pictures, in which dirt and time have softened and matured the tints. But surely no one would care to put up for the reputation of resembling *an old picture*, however rich its tints, or admirable the art developed in its painting. Soap is accused of being irritative to the skin, but this is an obvious injustice done to soap, *for soap never irritates the delicate skin of infants*. Depend upon it, that when soap does cause irritation, the error is in the condition of the complainant, and betokens either an improper neglect of its use, or a state of susceptibility of the skin verging on disease of that membrane. If we would have health we must use soap. If soap act as an irritant, we must train to its use by beginning with a small quantity, and increasing it gradually. I may be asked, What is the best soap? I reply, white soap, made of the best materials; good yellow soap, thoroughly dried; or any of the toilet soaps. The use of soap is certainly calculated to preserve the skin in health, to maintain its complexion and tone, and prevent it from falling into wrinkles; and if any unpleasant sensations are felt after its use, they may be immediately removed by rinsing the surface with water slightly acidulated with lemon-juice.

The unpleasant qualities usually attributed to soap, are frequently referrible to the temperature of the water used in ablution. In this, as in most other of the rules of health, extremes should be avoided. To a man

whose duties call him to brave the cold of winter in all its intensity, water at its lowest temperature is appropriate and refreshing. But to woman or an invalid, such a degree of cold is not merely painful, but really injurious to the skin. The temperature of the water should be raised to a point at which it feels lukewarm, but no higher. For if cold water be hurtful to the skin, that which is hot is infinitely more mischievous, particularly in the winter season. The heat excites the circulation of the part, and stimulates its nerves; it is then, perhaps, immediately exposed to a cold atmosphere, sometimes a piercing wind. Can we be surprised that, with such an extreme, the skin should be irritated, roughened, and chapped, or that the complexion should suffer? In alternations of temperature, as of food, clothing, and exercise, moderation and judgment must be used; and if we are in doubt, we had better trust the casting vote to our sensations, which will rarely deceive us. As regards the frequency of abluion, the face and neck, from their necessary exposure to the atmosphere, and the impurities which the latter contains, cannot escape with less than two saponaceous ablutions in the twenty-four hours: the feet, from the confined nature of the coverings which are worn over them, require at least one: the armpits, from their peculiar formation in reference to the detention of secretions, and also from the peculiar properties of the latter, at least one; and the hands and arms, so many as nicety and a refined taste may dictate. No harm can arise from too frequent ablutions, much evil may result from their neglect.

And now, dear reader, having determined to wash your face, how will you set about it? There are many wrong ways of effecting this simple purpose; there is but one right way; I will tell it you. Fill your basin about two-thirds full with fresh water; dip your face in the water, and then your hands. Soap the hands well, and pass the soaped hands with gentle friction over the *whole* face. Having performed this part of the opera-

tion thoroughly, dip the face in the water a second time, and rinse it completely ; you may add very much to the luxury of the latter part of the process by having a second basin ready with fresh water to perform a final rinsing. And now you will say, What are the wrong ways of washing the face ? Why the wrong ways are, using the towel, the sponge, or flannel, as the means of conveying and applying the soap to the face, and omitting the rinsing at the conclusion. If you reflect, you will see at once, that the hands are the softest, the smoothest, and the most perfect means of carrying the soap, and employing that amount of friction to the surface with the soap which is necessary to remove the old and dirty scarf, and bring out the new and clean one from below. Moreover, the hand is a sentient rubber, a rubber endowed with mind ; it knows when and where to rub hard, where softly, where to bend here or there, into the little hollows and crevices where dust is apt to congregate ; or where to find little ugly clusters of blackened grubs, the which are rubbed out and off, and dissolved by soap and friction. In a word, the hand enables you to combine efficient friction of the skin with complete ablution, whereas in every other way ablution must be imperfect. Then, as regards drying the face : a moderately soft and thick towel should be used ; a very rough towel is not desirable, nor one of thin texture. This is a point which may be safely left to your own taste and feelings. The question of friction during the drying is of more consequence, and this is a reason why the towel should be moderately soft, that you may employ friction and regulate the amount. With a very rough towel it is impossible to use friction, for its tenderest pressure may be enough to excoriate the skin ; and a very soft towel is equally open to objection from its inadequacy to fulfil the obligation of friction during the process of drying. In washing the face you have three objects to fulfil ; to remove the dirt, to give freshness, and to give tone and vigour to the skin.

Such is ablution when intended for the purpose of cleanliness, but it must be in the experience of every one, that other effects spring from its use ; that nothing is more refreshing than a thorough ablution ; that, in point of fact, to those who conduct the operation properly, and with a due attention to temperature, nothing can be more luxurious, nothing restore the energies more surely and agreeably, after hours of toil or exertion ; and not those of the body alone, but also those of the mind. Thomson, in his poem on the Seasons, exclaims :—

“ Even from the body’s purity, the mind
Receives a secret sympathetic aid.”

And Homer, speaking of a person just returning from the bath, and anointed with fragrant oils, says, that he appeared taller and larger than before, and was grown something like the immortals. In relation to health, the common term which we hear applied to the effects of a thorough ablution is “ bracing ;” in professional language we speak of them as being “ tonic ;” and, in truth, there exists no better means of restoring the “ tone ” of the system than the judicious employment of water ; and this leads me to the modes in which water may be used with the best prospect of benefit to the health.

It must not be supposed, that, because water is a good and excellent tonic, our health would be better for being thrown into a fever by it, or even drowned in it, any more than that a parallel argument would be tenable with regard to food, clothing, or exercise. I know very well that equilibrium is not suited to the times ; that there exists among mankind, in medicine as in politics and religion, a certain thirsty “ go-a-head ” principle which is absolutely insatiable. I do not say that this character is the peculiar attribute of the present age, for the history of nations proves it to have existed at all periods of the world. There is no philosopher’s stone of health any more than for commuting the grosser into

the precious metals. But every one who desires it, has the elements of an equally valuable "arcanum" in conforming to a correct practice of diet, clothing, exercise, and ablution.

The simplest mode of applying water to the skin, and that by which the smallest extent of surface is exposed, conditions of much importance to the weakly and delicate, is by means of the *wetted sponge*. In this mode, the water may have any temperature that is agreeable to the sensations, a part only of the body is exposed at a time, and as soon as that part has been *briskly* sponged, and as *briskly* wiped dry, it may be again covered by the dress. The whole body may in this way be speedily subjected to the influence of water, and to the no less useful friction which succeeds it in the operation of drying. An invalid rising from a bed of sickness would adopt this remedy by degrees, beginning first with the arms, then proceeding to the chest, and then, gradually, to the whole body. He would use warm water in the first instance, but if the season were summer, would be speedily able to proceed to cold. A person of weakly habit beginning a system of daily ablution for the first time, should commence in the spring or summer, and by the winter his powers of endurance will have become so well trained that he will bear cold water without inconvenience. It must be admitted that the plan here laid down is very simple; it requires no apparatus, a sponge and a basin being the sole furniture for its use; but it is no less a valuable appliance for health. The cold chill of the sponge, which was at first disagreeable, becomes pleasant, the quick friction which ensues is agreeable, and while it stimulates the skin, gives action to the whole muscular system; and the warm glow, the thrill of health which follows, is positively delicious. I must, however, call attention more strongly to the "glow of warmth" over the surface, as it is the test by which the benefit of the remedy is to be estimated, in this and in all other forms of ablution and bathing. I can hardly

conceive a case in which the application of water, according to this method, could leave a chill behind it;* but if such an occurrence take place, the individual has need of medical aid, and that should be promptly supplied. I may mention that it was the present form of ablution which was used by Sir Astley Cooper, and to which he attributed much of his unusually robust and excellent health.

The second form of ablution by the sponge requires the aid of a large, shallow, empty tub, or sponging-bath, in which the bather stands or sits, while he receives the water from a sponge squeezed over the shoulders and against his body. The same precautions, with regard to temperature, may be taken in this as in the preceding case, but the bather is necessarily more exposed, and the form of bathing is suitable only to persons in moderate health, excepting in the summer season, when it may be borne by invalids. In the early use of the sponging-bath, the bather should content himself with a single affusion from the sponge, and should then dry the body quickly. As there is more freedom for the limbs, there is more muscular action in this than in the former method, and the glow is proportionally increased. Indeed, in the sponging-bath, exercise and ablution are combined, and its employment by persons of sedentary habits is highly advantageous. I know but one circumstance that could render the sponging-bath objectionable, and that is, the occurrence of palpitations. This, however, may be obviated, by relinquishing the drying of the body to an attendant, or adopting the "wet-sponge," and, after a short time, if there be no tendency in the system to disease of the heart, the palpitations will cease.

Of all the forms of cold bathing, the preceding is the most convenient, the most universally applicable, and

* Paulus Ægineta very judiciously recommends, that if a chill follow the use of the bath, some warm restorative cordial should be taken.

not the least conducive to health. It should be taken the instant we step out of bed, and may be shortened or prolonged to an extent commensurate with the temperature of the atmosphere or the feelings of the bather. I am in the habit of recommending, that a spongeful of water should be given to each of the arms before the trunk is moistened; that the minimum for the trunk should be two spongefuls in front, and one over each shoulder for the back; that there should be one also for each leg. The whole process will not occupy more than one minute; at the end of the second minute the body may be dried, and the woollen garments put on. By that time is the winter of the bath made glorious summer. The reward follows quick upon the penance. In many persons, reaction is so rapid, that the whole body is enveloped in a cloud of vapour before the affusion is fully accomplished, and the comparison of Boerhaave, in reference to another condition of the skin, is aptly realized. If, says Boerhaave, the piercing chill of winter could be introduced into a summer assembly, the insensible perspiration, being suddenly condensed, would give to each person the appearance of a heathen deity, wrapt in his own separate cloud. The instant the clothes are put on, the whole body feels a warm and refreshing glow. This is the kind of bath that truly deserves the meed of commendation awarded to cold bathing by Agathinus. "They who desire to pass the short time of life in good health, ought often to use cold bathing, for I can scarce express in words how much benefit may be had by cold baths; for they who use them, although almost spent with old age, have a strong and compact pulse, and a florid colour in their face; they are very active and strong, their appetite and digestion are vigorous, their senses are perfect and exact; and, in one word, they have all their natural actions well performed." To which Sir John Floyer adds: the effects of cold bathing "reach the very soul of the animal, rendering it more lively and brisk in all its operations."

There is another mode of ablution, which is the height of luxury, and it is a luxury which I am glad to enjoy every morning of my life. Let the reader, after his shave, divest himself of his dressing-gown, and in the uniform of Adam, bend over his hip-bath and give his face and neck a good wash ; by the side of the washing basin, the hip-bath is a small ocean, in which he can souse and snort like a sea-god ; unfettered in position, uncramped by the narrow dimensions of the washing-stand, and safe against the risk of bespattering the paper of his apartment, or flooding all the joints and drawers of the table with the scattered water. After such a wash, he must feel as I myself did, when I first tried it,—that I had never had a wash before. Then, the head and face washed and dried, let him rub his soap-cake into the arm-pits, and all the creases of the body ; and with the hand raise a good lather ; then, let him sit in the hip-bath, and with a large sponge spread a stream over the shoulders and trunk, and thoroughly rinse away the soap : next let him stand up in the bath, and flood the legs with his sponge ; then soap the feet and toes with as much care as he would his hands ; first one foot, then the other foot, still standing in the bath ; then let him rinse the soap from the feet, and step out upon the woollen rug on which the bath stands. Then let him take his seven-feet-long bath-cloth* and throw it mantle-wise over his shoulders, and dry himself leisurely ; first, the arms, then the trunk ; next the feet, and then the legs. Then he will be ready to admit that he has enjoyed the perfection of a bath, and regard the hip-bath with the veneration which it deserves : a gallon or two of water, has given him a sense of comfort, that will hardly wear off with the day. After the bath, the clothing should not too hastily be put on ; to give time to the air to make acquaintance with the skin.

* The best kind of bath-cloth is one made of coarse linen, three feet in breadth, the usual breadth of the stuff, and seven or eight feet long.

A third kind of ablution is that with the shower-bath, which provides a greater amount of affusion than the former, combined with a greater shock to the nervous system. But that which more particularly distinguishes this from the previous modes, is the concussion of the skin by the fall of the water, the degree of concussion having reference to the height of the reservoir and the size of the openings through which the little columns issue. The usefulness and convenience of the shower-bath and its facilities of application, render it a necessary article of furniture in every house, the only question of importance with regard to it being the kind of apartment assigned to its use. I have known instances of the shower-bath being transferred to an area, an out-house, or a cellar, so that the bather had to make his way from a warm bed, if the bath were taken at rising, only partly dressed, through cold passages, to his bathing-place, and was generally chilled on his way. The bath, in such a case, becomes an instrument of punishment and disease rather than one of health. The shower-bath must be located in a dry room, a room in which a fire can be lighted in the winter season—in an airy dressing-room, for instance—and every regard paid to comfort and convenience. It is in this that the public bath is generally so much superior to that of home; in it, every suggestion that comfort and even luxury can invent, is realized, and over such a bath only does Hygeia preside. The shower-bath admits of modification, to render it suitable to the most delicate as well as to the most robust. The extent of fall may be increased or diminished, the apertures may be regulated, so as to produce the lightest spray or the heaviest rain: the temperature of the water may be adjusted to any degree of warmth; and, moreover, the quantity delivered also determined. I cannot too often repeat that the sensations of the bather must be tenderly regarded, if good is to follow the practice of ablution; and this is in no case more necessary than in delicate or con-

valescent health. By judicious training, the nervous system, which would shudder under the application of a tepid sponge to the skin, could be made to bear, without uneasiness, a smart charge of cold water from the shower-bath. It is evident that in this case a victory of the utmost importance is gained over the sensations, and one which cannot be too highly valued; for, by a parallel reasoning, the skin, which in this way is made to bear the shock of a shower-bath, could better, and for a longer period, resist the influence of atmospheric cold and its consequent morbid effects on the economy. In making use of the word "shock," as expressive of the effect of a discharge of water by the shower-bath on the surface of the body, it must not be supposed that I refer to any unpleasant or painful effect: this is far from being the fact; the shock with warm water, with which the bather should always begin, is really agreeable, and the feeling will be one of regret when the shower is at an end. A person unaccustomed to the shower-bath entering one with a strong charge of water at a low temperature, and pulling the valve-string, would certainly be shocked by the sudden and unusual sensation caused by the rush which immediately follows; but this is abusing, not using, the shower-bath. In the like manner, a feeble stream of electricity may be passed through the body without producing a disagreeable sensation, and with benefit to the part, while half the quantity from a Leyden jar would occasion a severe and painful shock. In using the cold shower-bath, it will be found that the first impression made upon the skin is much colder than that which follows; and after being prolonged for a few minutes, the sensation is really one of warmth. This is an effect of the concussion of the skin by the water, which I shall hereafter have more particularly to allude to. The old "tumbling-bath" is the parent of the present shower-bath, and much inferior in its value, for in it the whole body of water contained *in the reservoir* is thrown at once upon the bather.

Before quitting the subject of the shower-bath, I must refer to an objection that has been made to its use, namely, that it is liable to cause a determination to the head, and is therefore improper for persons of full habit. This is an error originating in abuse of the bath, and is only so far related to truth as the assertion, that an excessive meal will produce apoplexy. If a person whose vessels are oppressed with excess of blood subject himself without training to the sudden shock of a shower-bath, a shock whose first effect is to impel the blood inwards upon the vital organs, it is impossible to answer for the result; the result, in fact, must be ruled by the physical strength of the tissues of those organs to resist the impulse. But the whole tenour of the observations on food, raiment, exercise, and ablution contained in this book, is to guard against violent extremes, which are, in reality, a wilful risk of life. If, in the case above supposed, the individual be young, and the tissues elastic and strong, the vital organs will not only resist the strain, but will not in any wise be injured. If, however, the person have reached that time of life when the tissues are brittle rather than yielding, something must give way. But I repeat that I cannot look upon this otherwise than in the light of an exceptional case, and such an one as could not occur if the rules of bathing here laid down were strictly followed. Indeed, the *training* necessary to arrive at the comfortable use of such a bath as has been supposed, would itself prevent the fulness, which in this case was the cause of mischief. To prevent the dangerous consequences attributed to the shower-bath, it has been suggested that the feet should be immersed in hot water during the operation. I can only say, that if this harmless expedient will in any way conduce to the confidence of the bather, let it be practised by all means; but philosophically, it is useless; *the secret of safety lies in the training*; not only in this, but also in all other matters in which the vital organs are concerned. I

should not deserve the pardon of my lady readers if I were to neglect another matter connected with this subject, namely, the suggestion of some covering for the protection of the hair. The best contrivance for this purpose that I have seen, is a high, conical, extinguisher-shaped cap, made of some light material, and covered with oiled silk. A cap of this shape has the advantage of not interfering with the descending shower, while, by the breadth of its base, it effectually protects the head and offers the means of tying a border of the same silk beneath the hair. The waterproof cap, however, is a well-known appliance.

The douse, or douche-bath, is a contrivance for applying water locally, and combining, with affusion, more or less concussion of the skin. As a remedy for local disease, this form of bath has been in use from time immemorial: a jug of water poured from a height on a part of the body is a douche-bath; and a more complete one is the stream from a pump, the popular treatment of a chronic sprain. The douche-bath to the head is also applicable in some kinds of insanity. From these remarks it will be apparent that the douche-bath is less manageable than the forms previously described, and that recourse must be had to some bathing-establishment when its use is required. In establishments of this nature, the douche may be obtained of any size or temperature, and may be received in any direction, some being horizontal, and some also ascending. The concussion of the skin caused by the blow of the water against the surface, is a feature of importance in this form of bath; and when a sufficient height of column cannot be obtained, the blow may be supplied artificially by a little wooden hammer, with which the skin is beaten as the water falls.

The cold bath is of three kinds, fresh, saline, and mineral; and the properties of each may be modified by being at rest or in motion. The still, fresh-water, or *plunging* bath offers few advantages over the shower-

bath, and combines the same principles.* The affusion is, perhaps, somewhat more complete; the shock is dependent on the temperature of the water; and the concussion on the activity and energy of the bather, who by his active movements in the bath, supplies the want of motion in the fluid. The cold-water bath on the banks of a stream is infinitely preferable to that taken in an apartment; the temperature of the atmosphere is probably agreeable, the sun may be warm, the fresh air breathes upon the limbs, and the immersion is active, and accompanied by diving or the exercise of swimming. The saline bath, at rest, differs from the fresh-water bath in the more stimulating properties of the saline matters which it contains, and in the greater weight of the water; while the same bath in motion, that is, the open sea, produces a greater degree of concussion than the river stream, particularly when accompanied with active motion or swimming. The mineral baths, in like manner, owe their special properties to the mineral salts which they hold in solution.

What I have before said, with regard to the necessity of combining cheerfulness and hilarity of disposition with exercise, applies with equal force to bathing. The bath should be regarded as an enjoyment: if it be not, its use is questionable, and, in many instances, will prove unfriendly. Hufeland speaks in the following terms of sea-bathing, which, he says, "on account of its stimulative and penetrating power, may be placed at the head of those means that regard the care of the skin, and which certainly supplies one of the first wants of the present generation, by opening the pores, and thereby

* According to Sir John Floyer, children were immersed at their christening until the Reformation. The discontinuance of this practice he considers, somewhat questionably, to be the cause of the great prevalence of rickets, a disease which, he says, was scarcely heard of before the reign of Henry the Seventh. Dr. Baynard's theory is the more credible, that this state of disease depended on the mischievous habit of putting children out to nurse.

reinvigorating the whole nervous system. This bathing is attended with two important advantages : the first is, that, besides its great healing power in cases of disease, it may be employed by those who are perfectly well, as the means most agreeable to nature for strengthening and preserving health. In this respect it may be compared to bodily exercise, which can remove diseases otherwise incurable, and which may be used also by those who are sound, in order to preserve themselves in that state. The other advantage is, the noble, grand, and indescribable prospect of the sea connected with it, and which, on those not acquainted with it, has an effect capable of bracing up the nervous system and producing a beneficial exaltation of the whole frame. I am fully convinced that the physical effects of sea-bathing must be greatly increased by this impression on the mind, and that an hypochondriac or nervous person may be half cured by residing on the sea-coast, and enjoying a view of the grand scenes of nature which will there present themselves ; such as the rising and setting of the sun over the blue expanse of the waters, the awful majesty of the waves during a storm, &c."

When the cold bath is disagreeable to the sensations or to the constitution of the bather, it may be raised in temperature to suit his purposes. It then changes its designation, and, according to its heat, is termed temperate, tepid, warm, or hot. A temperate bath ranges from 75° to 85° ; a tepid bath, from 85° to 95° ; a warm bath, from 95° to 98° ; and a hot bath, from 98° to 105°. In other words, the warm bath comes up to the elevation of the warmest parts of the exterior of the body, the hot bath to that of the interior, and a little beyond ; the temperature of the blood on the left side of the heart being 101°. "To those who are past the meridian of life, have dry skins, and begin to be emaciated," writes Darwin, "the warm bath, for half an hour, twice a week, I believe to be eminently serviceable in retarding the advances of age."

The vapour bath offers some points of difference from the preceding, in the circumstance of extending its influence to the interior as well as to the exterior of the body. The bather is seated upon a chair, in a position agreeable to himself, and the vapour is gradually turned on around him, until the requisite temperature (from 90° to 110°) is attained.* The vapour is consequently breathed; and thus brought into contact with every part of the interior of the lungs. At first the sensation caused by the vapour bath is one of oppression at the chest, and some slight difficulty of breathing; but very soon the perspiration bursts through the pores, and then the breathing is easy and agreeable. After a time, the perspiratory fluid rushes down the skin in rills, and so continues as long as the bather remains in the bath, and, indeed, for some time afterwards. From the steam-chamber the bather steps into a tepid bath, and there remains for ten minutes, while he receives a shower of fragrant water on the head. He then quits the bath, and dries up the living springs with warm towels. After such a process the bather is in a position to agree with Sanctorius, that melancholy is overcome by a free perspiration, and that cheerfulness without any evident cause proceeds from perspiration succeeding well. The vapour bath has undergone much improvement within the last few years, and its powers as an agent for the cure of disease have been increased by the discovery of various vegetable substances, whose volatile elements are susceptible of being diffused through the vapour, and thus introduced into the blood, are made to act upon the system.

An agreeable adjunct to the vapour bath is *cold affusion*. Among the Romans, cold affusion after the warm bath was the common practice, and still continues to be so in those countries in which the vapour bath is used. The Thermæ or public baths of Rome were very

* According to Dr. Traill, of Liverpool, the temperature of the Russian vapour baths is from 133° to 144° ; and those of Finland, according to Acerbi, from 158° to 167° .

numerous, and comprehended many of the most magnificent buildings in that city. The bath consisted of four apartments, a Tepidaria, heated with warm air, in which the bather undressed and afterwards dressed himself, when the final friction and inunction with oil and pomatum were accomplished; a Laconicum, raised to a higher temperature by heated air; a Calidaria, containing a warm bath; and a Frigidaria, a cold bath, into which the bather plunged after quitting the Calidaria; from the cold bath he returned to the Tepidaria to be dried, anointed, and powdered. These latter processes are probably intended to prevent a second breaking out of perspiration, as well as to supply the place of the natural oily secretion of the skin which has been removed.

The Hummums of the American Indians are a humble imitation of the Roman Thermæ: "The doctor takes three or four large stones, which, after having heated red hot, he places in the middle of the stove, laying on them some of the inner bark of oak, beaten in a mortar to keep them from burning; this being done, they (the Indians) creep in, six or eight at a time, or as many as the place will hold, and then close up the mouth of the stove, which is usually made like an oven in some bank near the water-side; in the meanwhile, the doctor, to raise a steam, after they have been stewing a little time, pours cold water on the stones, and now and then sprinkles the men to keep them from fainting; after they have sweat as long as they can well endure it, they sally out, and (though it be in the depth of winter) forthwith plunge themselves over head and ears in cold water, which instantly closes up the pores and preserves them from taking cold."* After the bath they are anointed like the Romans, the pomatum of the Indians being for the most part bear's grease, containing a powder obtained by grinding the root of the yellow alkanet.

In reference to the Muscovitish and Finnish baths,

* History of Virginia, by R. B. Gent.

Olearius observes : " It is almost a miracle to see how their bodies, accustomed to and hardened by cold, can endure so intense a heat, and how that, when they are not able to endure it longer, they come out of their stoves as naked as they were born, and plunge into cold water, or cause it to be poured on them."*

Sir George Lefevre, † in his description of the Russian baths, after alluding to the manner of raising the vapour by pouring water over a stove, and in case of any obstacle to free perspiration, flagellating the skin " with bunches of brushwood with the dried leaves on, till you become as red as a lobster," observes, " let the man pour a bucket of warm water over your head, how grateful is the sensation ; then a second bucket less warm, and a third quite cold ; then towel the body well, and the business is over." The same author discredits the statement relative to Russian bathing made by Lord Carlisle, when ambassador at the Court of Moscow, that " it is not uncommon for the natives to leave the bath and roll themselves in the snow ;" and that " two-year old children are seen to do this with impunity."

It is incorrect to suppose that any danger is likely to result from cold affusion when the skin is in a state of excitation, and the nervous powers at their natural standard, or elevated above their normal range. It is only when the body is chilled, and the powers of the nervous system are depressed, whether from moral or from physical causes, such as fatigue or disease, that any ill consequences can accrue. Dr. Currie, many years since, pointed out the importance of cold affusion in the hot stage of fever, and pursued the practice with success. Cold never injures the body when acting as a stimulant, it is only when it acts long upon the surface, and robs the latter of its heat, that cold is injurious. The youth of Rome, to avoid the dangers arising from cold, were wont, after their contests on the plain of Mars, to leap

* Travels in Muscovy, vol. iii.

† The Life of a Travelling Physician, &c. 1843.

into the Tiber. By this practice, they checked and removed the perspiration from the skin, prevented its slow evaporation and the cold engendered by that process, and caused a healthful reaction. If we hear of disease following this practice, it is in cases where the object is unknown or overlooked. The individual is labouring under nervous exhaustion from fatigue, or his nervous powers are lowered by the long continuance of the ablution; or he is passive in the bath; there is always some such depressing cause. As a stimulant, I repeat, cold immersion cannot be injurious.

In reference to cold bathing, Sir George Lefevre makes the following judicious observations, as a caution to bathers. Let them not "wait till the body becomes cold before they plunge into the water. It is in this (the cold) stage that there may be danger; for excitement has already passed away, and the body cannot resist the depressing influence of cold. If the surface be dry and the heat above the natural standard, little is to be feared from immersion into a lower temperature. If the body be cooled down, and the surface be covered with moisture, such experiments should not be hazarded."

Bathing and exercise are very closely allied to each other; they both stimulate the actions of the skin, and both, if carried too far, are productive of fatigue. Bathing, again, is indebted to exercise for some of its useful properties. In like manner, the rules of bathing and those of exercise are very similar. Bathing, to be efficient in preserving health, should be regular, should be commenced by degrees, and increased by a process of training, and should not be permitted to intrude upon hours devoted to some important function, such as digestion. It must not approach too near a meal, that is to say, if it be attended by the least fatigue; nor must it follow a meal too closely, three or four hours being permitted to elapse. The time occupied in bathing in cold water by invalids should not exceed a few minutes, ranging, perhaps, from two to ten; but persons in health may carry

it to the point of satiety, provided always that they combine with it active exercise. The period for the tepid, warm, or vapour bath is from a quarter to half an hour, unless special indications require to be fulfilled.

I come now to the immediate physiological effects of bathing on the system. When the body is moistened with a sponge wetted in cold water, or when affusion by the sponge or shower-bath is effected, the skin immediately shrinks, and the whole of its tissues contract. As a result of this contraction, the capacity of the cutaneous system of vessels for blood is diminished, and a portion of the blood circulating through them is suddenly thrown upon the deeper parts and internal organs (see diagram, page 28). The nervous system, among others, participates in, and is stimulated by, the afflux, and communicating its impression of stimulus to the whole economy, causes a more energetic action of the heart and blood-vessels, and consequent rush back to the surface. This is the state termed "re-action," the first object and purpose of every form of bathing whatsoever, the test of its utility and security. Reaction is known by the redness of surface, the glow, the thrill of comfort and warmth, which follow the bath; and the bather should direct all his care to insuring this effect. By it, the internal organs are relieved, respiration is lightened, the heart is made to beat calm and free, the mind feels clear and strong, the tone of the muscular system is increased, the appetite is sharpened, and the whole organism feels invigorated. This is the end and aim of the bather, and to this all his training tends. The error is, to expect the result without the preparation. After a proper training, the most plethoric and apoplectic individual may derive health and safety from systematic bathing; but it will be seen at a glance, by the above explanation, that without the training, the attempt would be madness. But the reader must not imagine, that, because there is danger in bathing in a particular case, the practice is dangerous; that

would be an erroneous inference. I have endeavoured to show that food, raiment, and exercise, when judiciously used, are the source of many enjoyments, and the means of our existence; and I think it will be granted without difficulty, that excess in either is replete with danger. Are we to give up the use of food because an incautious person eats himself into an apoplexy? Bathing is as little dangerous as food, the difference between the two being, that we prefer the one, and therefore take it under the mantle of our protection, while we repudiate the other, because it is less agreeable to our appetites, or perhaps a little troublesome.

In order to increase and promote the reaction of the skin, various measures and manipulations are resorted to, some of them being practised in the bath, others after quitting it. Of the former kind is the Hindoo operation of shampooing, which consists in pressing and kneading the flesh, stretching and relaxing the joints, brushing and scrubbing the skin. The process is thus described by Anquetil: "One of the attendants on the bath extends you upon a bench, sprinkles you with warm water, and presses the whole body in an admirable manner. He cracks the joints of the fingers and of all the extremities. He then places you upon the stomach, pinches you over the kidneys, seizes you by the shoulders, and cracks the spine by agitating all the vertebræ, strikes some powerful blows over the fleshy and muscular parts, then rubs the body with a hair-glove until he perspires, grinds down the thick and hard skin of the feet with pumice-stone, anoints you with soap, and lastly, shaves you and plucks out the superfluous hairs. This process continues for three quarters of an hour, after which a man scarcely knows himself; he feels like a new being."* Sir Alexander Burnes, in his "Travels in Bokhara," observes, with regard to this process, that it "is most singular. You are laid out at full length,

* Deslandes, Manuel d'Hygiène, quoted by Dunglison.

rubbed with a hair-brush, scrubbed, buffed, and kicked; but it is all very refreshing." The ancients were in the habit of scraping the skin with an ivory knife. But practices so agreeable to the bather have been little followed in temperate and cold climates, partly from the prevailing neglect of the bath, and partly from the necessity of having the operation performed by a person skilled in the manœuvre.

Our common means of stimulating the skin are confined to the rough towel, the horse-hair glove or rubber, and the flesh-brush, which are used after quitting the bath.* Indeed, this short catalogue embraces all the appliances requisite for the purpose. For tender and delicate skins, the rough towel answers every purpose, and should be used by the bather himself, unless the exertion be found too great, or cause palpitation of the heart. In the latter case, it must be resigned to an attendant, and the process completed by the bather, in order that the reaction may be increased by some degree of muscular exercise. Some skins bear the horse-hair and bristle brushes equally well with the rough towel, in which case they may be used after the drying is effected.

* Since the above was written, I have had the opportunity of examining a flesh-glove that comes recommended to us by the experience of ages, and certainly offers advantages superior to any other kind of rubber for the skin in existence. This is the Indian flesh-glove or kheesah, a glove, or rather mitten, which has been used, from time immemorial, in Hindoostan, Persia, and throughout the East, and by a race of people, both from necessity and luxury, more attentive to the skin than any other upon the face of the globe. The glove was introduced into England by Sir Ranald Martin, the eminent surgeon, and much labour and expense have been bestowed by Messrs. Savory and Moore in having a similar glove manufactured in London. Their imitation, however, is perfect, both in appearance and properties; and it is a satisfaction to me to recommend so admirable a contrivance for promoting the health of the body, through the agency of the skin. The glove is made of goat-hair, the material used in the manufacture of the Burruck or Persian glove-cloth, of which the original kheesah is composed.

When there is any delicacy of the respiratory organs, the horse-hair and bristle brushes, by producing an increased degree of stimulation over the chest and trunk of the body, are important additions to our means of cure. It is not intended, however, that the remedy should be more unbearable than the disease, which is likely to be the case if the common horse-hair gloves* are employed: a better kind are those which have a brush surface; they are much softer, and more efficacious. The electrical qualities which are spoken of in connection with horse-hair gloves are an innocent fraud on the imagination of the purchaser. The best form of flesh-brush is one in which the bristles are set on a leather back. "The benefit of friction," says Daniel Turner, "which consists of motion and heat, whether or no the same be raised by rubbing the body with a coarse cloth or the flesh-brush, has advantages inconceivable and scarce credible, by which the obstructions of the pores and cutaneous glandules are opened, their stagnating juices broken into small particles, dissolved, and rendered fit to be carried off in perspiration, in the room of which, as my Lord Verulam well observes, new juice will succeed with new vigour to the body; and longevity, saith that great naturalist, is this way most certainly promoted."

The influence which the bath exerts over the nervous and circulating system of the bather is not the least remarkable of its effects. The temperate and the tepid bath, for example, produce a gradual diminution in the number of the heart's pulsations, a calm in the nervous system, and a tendency to sleep; in other words, they are *sedative* in their action on the system. The hot bath, on the contrary, causes an excitation of the nervous and vascular system, increased heat of the interior of the body, a quickened pulse, and profuse perspiration.

* In Hindoostan, the horse-hair glove is employed for rubbing down horses, a purpose for which it is certainly better fitted than for using to the human skin.

It is a *stimulant* to the system. The warm bath, occupying a mid-position between the tepid and the hot bath, is also intermediate in its effects; but, as the power of maintaining and bearing heat is very different in different persons, it is impossible to fix upon the exact point of neutrality for all. It appears to extend over a range of about ten degrees from 90° to 100° , so that if we wish designedly to produce a sedative or a stimulant effect on the economy, we should, having always regard to the feelings of the bather, select a temperature above or below the neutral range.

Another curious and important law is associated with the influence exerted by the bath over the state of the pulse, which is a power of absorption by the skin below the neutral range, and an augmented transpiration above it. The absorbing power is modified by various circumstances, such as the quantity of fluids already contained within the tissues of the body, the state of the system in relation to food, activity of nutrition, &c. In this sense, medicated baths have the power of acting upon the system. The process is, however, slow, and requires long immersion when the water bath is used, but is more active with the vapour bath.

The opposite effect is produced when the temperature of the bath rises above the neutral range; in other words, above the temperature of the blood. In this case, transpiration is so active, that the bather loses weight. If the bath be prolonged, there is danger of its proving fatal, by over-excitation of the system; the pulse, as before mentioned, becomes rapid, the beating of the heart tumultuous, the respiration quickened; the bather experiences a sensation of oppression amounting almost to suffocation; he is faint and giddy, and falls into the insensibility of apoplexy.

A City merchant, Mr. Vieweg, of Wood Street, Cheapside, impressed with the goodness and godliness of the body's purity, some years ago (August, 1865), expended nearly £40,000 on the erection of baths and washhouses, in a quarter of London where

such an institution must be most acceptable; namely, Golden Lane, St. Luke's. His philanthropy drew around him many friends and confidants; and at his invitation, it was a pleasure to me to have the opportunity of contributing a code of short rules for the bath, which I here subjoin, as likely to be interesting and useful to all lovers of the bath:—

ESSENTIALS OF BATHING.

1. Undress quickly.
2. Immerse the whole body and head at once.
3. Rub the skin and limbs gently with the hands while in the bath; and, in the swimming bath, swim; that you may combine moderate muscular exercise with the action of the water on the skin.
4. Try to feel when you have had enough:—some can bear immersion in water longer than others.
5. Never abuse the bath by bathing too long; your own sensations are a better test than time; you have your sensations always about you, not so your watch.
6. When you have had enough, quit the bath; and throw a large and long towel, mantle-wise, over your shoulders.
7. Dry the body leisurely, with moderate friction, beginning with the head; then take the arms and body; then the legs and feet.
8. Rough friction to the skin is never necessary; neither in the bath, nor out of it.
9. Friction has three purposes; namely, to move the circulation in the skin; to exercise the muscles; and to rub off dirt and loose skin.
10. The cleansing of the skin is very much assisted by soap; soap is tonic to the skin and very wholesome; it removes the old face of the skin and the varnish of dirt that is apt to form upon it; and it brings the atmosphere nearer to the blood and nerves.
11. Never dress until the body is perfectly dry; then the clothing should be resumed leisurely, to give the skin time to feel and breathe the air. A great authority on the bath, Mr. George Witt, F.R.S., finishes a code of rules for the bath with these memorable words:—
“Finally, the bather should dress deliberately, walk away slowly, and reflect on the blessing that he has enjoyed.”

TIME OF BATHING.

There are several kinds of baths; and several purposes to be performed by the bath, thus:—The bath may be cold, or tepid, or warm; and it may be taken in the morning or in the evening. *Let us consider these points separately.*

12. The *Cold Bath* is the tonic or bracing bath, and should be taken in the early morning, as soon after rising as possible, or, in the forenoon; it sharpens the body for its work.

The test of the cold bath agreeing with the bather is the warm glow which follows its use, and is termed *reaction*. If the reaction be weak, it may be stimulated by friction, or, better still, by exercise, such as a brisk walk.

13. The *Tepid Bath*, ranging in temperature between 80 and 90 degrees, is the soothing and restorative bath; it may be taken at any time of the day, and especially in the afternoon or evening: it tranquillizes the nervous system, restores muscular power, and removes restlessness and fatigue.—For common use the tepid bath is preferable to the cold bath.
14. The *Warm Bath* ranges between 90 and 98 degrees; like the tepid bath it is soothing and tranquillizing, but has a tendency to relax the skin, and is suited for invalids rather than for those in health.
15. The *Hot Bath* has a temperature of 98 to 100 degrees, or blood heat; it induces perspiration, and should only be used under medical advice.
16. The *Morning Bath* is the bath of labour; the evening bath is the bath of rest and repose; the morning bath should therefore be cold; the evening bath, tepid.
17. The bath should never be taken directly after meals, lest it put a stop to digestion and produce faintness and sickness.
18. The proper time for the bath is before a meal, or three hours after a meal;—somewhat sooner after a light meal than after a heavy meal.
19. If the bather turn faint or sick, it is the consequence of some indiscretion; he should lie flat upon the ground, upon his side; and dry and dress himself slowly as soon as he has recovered.
20. If the bather be in a state of perspiration, he should take a tepid bath before he resorts to the cold bath. And if he be exhausted or fatigued, he may still take a tepid bath,—*but on no account take a cold bath.*
21. The time spent in the bath must be regulated by the sensations of the bather; it may be longer for a tepid bath than for a cold bath. From *five to fifteen* minutes may be enough for the cold bath; from *ten to twenty* minutes for the tepid bath. But this time may be prolonged if the bather be engaged in the exercise of swimming.

CHAPTER X.

THE "RASHES" OF THE SKIN; NAMELY, ST. ANTHONY'S FIRE, RED RASH, ROSE RASH, AND NETTLE RASH.

THE intention of this work being to convey such an amount of knowledge of the nature of the skin as may serve to raise it to its proper place in the estimation of mankind, and obtain for it that degree of attention which is necessary for its preservation in a state of health, my plan would be incomplete if I omitted to point out the leading modifications which the skin undergoes when under the influence of disease, and especially so, as the consideration of its diseased state serves to illustrate in many important particulars its healthy condition and structure.

One of the most striking characters of aberration of health manifested by the skin is the heightened colour of its surface occasioned by distension of the blood-vessels. When redness exists, accompanied with heat, pain, and swelling, we call the state "inflammation." Inflammation, therefore, may be trifling or severe; it may be limited in extent or diffused over a large surface, or the signs by which it is known may be present in unequal proportion; in other words, it may be of little consequence or serious; and this, nothing but a knowledge of the state of the system, the cause, the nature of the part attacked, and the kind of knowledge which the special study of medicine confers, can decide. When the redness is vivid, the heat great, and the tumefaction considerable, we call the state *St. Anthony's fire*, or *erysipelas*. *St. Anthony's fire*, moreover, is accompanied with more or less consti-

tutional fever; namely, thirst, white tongue, quick pulse, pains in the head, &c.

When the redness is less vivid, the heat less, and the tumefaction but little perceptible, particularly if it be of long duration, vary in its tints, and appear settled on the spot, the case is one of *fiery spot, blotch, or red rash*. The red rash is generally slow in its progress, variable in point of extent, and not necessarily accompanied by constitutional fever, as is the case with St. Anthony's fire.

Sometimes, in place of one or several moderate-sized or large spots, the latter are numerous and distributed over the greater part of the body: they are small and irregular in form, and have a crimson tint. This is the eruption known as the *rose rash*, so common in summer after over-exertion.

In another case, the redness may not at first be perceptible, but there is itching and uneasiness in the skin; and if it be scratched, the redness becomes vivid, and is marked by white wheals and small white, rounded, button-like eminences; in fact, the affected part has the appearance of the skin when stung with nettles; it is thence called *nettle rash*, technically, *urticaria*, from the Latin word "urtica," signifying a nettle. These four inflammations of the skin are the so-called "rashes."

To fully understand the nature of the family of the "rashes," it is further necessary to have some acquaintance with their cause. The cause of St. Anthony's fire lies in the constitution, and many persons have an hereditary or acquired disposition to the production of a rash of this sort, upon the existence of any disturbance of the digestive or nervous system, or upon some wound of the skin, even of a trifling nature: or they take it by infection from another labouring under that disease. In disordered and weakened constitutions, it is liable to attack the eyelids, and thence extend to the head. It sometimes follows leech-bites or the scratch of a pin, and is always an indication of some action or change in the system that requires watching. A peculiarity of St.

Anthony's fire is its disposition to run from one part to another; from the hand, for example, running up the arm to the body in the course of a few hours; at another time, it suddenly quits the part first affected without leaving a vestige of its existence behind, and flies to a distant one. These eccentricities, and the serious constitutional disturbance always conjoined with it, render it an obnoxious companion. Very frequently, when the redness and swelling are at their height, the scarf-skin is lifted up all over the surface in blisters; and occasionally the swelling is dropsical and alarming.

The unprofessional person who has ever reflected on the cause of a given disease, will have felt the perplexity of the subject, and the obscurity that environs the term "cause." And yet no progress towards cure can be made until the cause is guessed or known, and the treatment directed in accordance with some proper principle. I have alluded above to the cause of erysipelas as being present in the constitution, and I may now observe, that the causes of disease in general may be arranged into three classes—namely, moral, constitutional, and local. The *moral causes* are not the least powerful and energetic in the production of disease, and as they are more under the control of the patient or his friends than of the medical man, they should be most closely watched and carefully obviated. The *constitutional causes*, depending upon some error in the phenomena of life, can be comprehended only by the medical man, and to him they should be left. There are, however, constitutional remedies of great power, but not sufficiently valued, in the hands of every one, namely, diet, clothing, exercise, and ablution. The reduction of inflammation may be effected entirely, or much facilitated, by a diluent diet, that is, such an one as shall dilute and cool the blood; by a moist covering to the part; by modified exercise, or by rest; and by local or general bathing; according to the nature of the case. But such appliances require judgment; the cause may be one which demands other

means, or the treatment may be carried too far. The *local causes* are either internal or external: when the former, they are out of the reach of domestic aid; but they may be known causes, such as improper articles, or excess, or even want, of food: in which case, they contribute to the knowledge of oneself, and may be avoided at another time. When external, they are within the reach of every one; and if they cannot be removed at once, may perhaps be mitigated, and the remedy applied with greater certainty. The treatment of disease is therefore naturally entwined with its causes, and the consideration of one is scarcely complete without that of the other. Treatment is suggested by the cause, it is dependent on the cause, and it admits of the same threefold division into moral, constitutional, and local. Shakspeare has shown himself fully aware of the necessity of a moral treatment of disease, and expresses his conviction in the well-known appeal of Macbeth to his physician:

“Canst thou not minister to a mind diseased;
Pluck from the memory a rooted sorrow;
Raze out the written troubles of the brain;
And with some sweet oblivious antidote,
Cleanse the full bosom of that perilous stuff
Which weighs upon the heart?”

In the domestic management of St. Anthony's fire, every disturbing cause, such as noise, conversation, bad news, heated temperature, cramming with nice broths and jellies, should be avoided, and the injunctions of the medical man carefully followed. The disease is always serious, and its consequences doubtful: it is often dangerous, often attended with delirium, and by no means a case to try Mrs. A.'s or good Mrs. B.'s advice upon; in other words, it must not be tampered with. Officious kindness in the sick room is highly dangerous; deeds are wanted there, not words; the real wants of the patient should be anticipated; but no imaginary

wants created. The inflamed part should always be raised into an easy position, and one which will facilitate the current of the blood to the heart, and the prescription of the medical man carefully followed. Sometimes he may prescribe a cold lotion, in which case a layer of thinnest linen wetted in the lotion but not so much as to drip and make the bed wet and uncomfortable, should be laid gently upon the part, and replaced by a second, as soon as the first loses its moisture. Three of these pieces of linen should be in use at the same time, one on, one in the basin containing the lotion, and the third hanging on a string to cool, previously to taking the place of the second. No other covering should be placed upon this, as the object is to encourage evaporation as much as possible.

More frequently, perhaps, the medical man will prescribe a warm fomentation; and this is a remedy which the friends and attendants of a patient may have recourse to, in such a case, without danger, whenever the advice of a medical man is out of reach, or cannot immediately be procured. In the warm fomentation, a layer of flannel may be used, or, if linen, the latter should be folded once or twice, dipped in warm water, or a decoction of chamomile flowers and poppy-heads, and applied in the same manner upon the inflamed part. The thickness and folding of the linen must be regulated by the sensations of the patient, for a light covering will often give the sensation of a ponderous weight to a part in a state of inflammation. The same precautions must be taken with regard to the dribbling of water, and the wet compress must be covered by a dry fold of cotton or flannel to prevent evaporation. Sometimes everything in the shape of moisture is disagreeable to the patient, and flour or cotton wool or lard may be used instead. These are considerations for the medical man to determine; but in his absence either might be advantageously employed, *the sensations of the patient being made the test of the applicability of the remedy.* When there are blisters,

they should be gently snipped with a pair of scissors (the scarf-skin being insensible), and the fluid which they contain carefully absorbed by a clean sponge, squeezed dry out of warm water, or by a piece of soft and dry linen. When flour is employed as a covering for the surface, it generally soaks up this fluid. In snipping the blisters, the only care required is to avoid tearing off the scarf-skin. When the scarf-skin is preserved, it falls down upon the excoriated surface after the escape of the fluid, and forms its most natural and appropriate dressing.

As regards internal remedies of a domestic kind, the appetite of the patient should again be consulted; he will reject everything in the shape of solid food, but will take with pleasure cooling and unstimulating drinks, such as lemonade, orangeade, sherbet, acidulated barley-water, &c. These, therefore, are the most appropriate to his case. At a later period, arrow-root, sago, and tea, come in for their share of approval; and still later, light broths and soups, the yolk of an egg beaten up with sugar in white wine, omelette, &c., form a transition to a stronger diet. There is no greater mistake, no greater unkindness, than pressing niceties, in the shape of food, upon sick persons, when their inclination is opposed to them. Nature prohibits food in illness; and to make her prohibition indisputable, she removes the appetite and all disposition for eating.

These maxims are universal in medicine, and I cannot too strongly impress them upon the reader; in so serious a disorder as St. Anthony's fire, they require additional attention. In this disease, the medical practitioner may think it right to depart from the usual practice of keeping the patient low, and administer stimulants and wine. When he does this, the attendant should obey his instructions to the letter as to the limitation of the quantity. Wine and stimulants should on no account whatever be given to sick persons, except under the direction of a medical man.

In convalescence, precaution must be taken as to the

quantity and regularity of the food administered, for in returning health after disease, a person is in a state similar to one who has been starved. He requires to have small quantities given at a time, and repeated at intervals of three or four hours. A moderate meal in health would be an excessive one to a convalescent, and would probably be followed by injury to the stomach, and relapse into the disease from which he was just escaping. If a walk across the room to the invalid is a mile to the same person in health, his diet must be regulated on the same principle as his exercise.

The RED RASH, or *blotch*, presents great variety in form, situation, and severity, and not less in duration. Very frequently it is referrible to a constitutional cause, and is associated with disordered action of some of the vital organs. Of this kind are the *fiery spots*, or blotches, that fix on the faces of women, the consequence of disordered health, or dyspepsia. Another kind of red rash is that which affects one or both of the legs, and is accompanied with so much swelling as to resemble St. Anthony's fire. This is a rash of elderly people, or younger persons of weakly health who have over-walked or over-exerted themselves. Sometimes the red patches are circular or oval in form, and come out suddenly, to disappear again in the course of a few hours; or, like St. Anthony's fire, they vanish in one place and appear in another. At other times, they commence in a small blotch, and spread by the circumference, while they fade at the centre, forming very distinct rings, the *ringworm blotch*. When they are thus acute and numerous in their eruption, the rash soon fades away; but when they appear singly, and are slow, they are tedious in their cure. It would, however, occupy too much space, and be ill suited to a popular work, to follow out all the varieties of the red rash; I shall therefore conclude with two of a more familiar kind, namely, *gall* and *chap*. Whenever two surfaces, moistened by perspiration or other fluid, are in such

contact that they rub together during the motions of the body, the part becomes red and inflamed, and is said to be galled or chafed. These conditions are most frequent in young children, and are almost restricted to persons having a tender and delicate skin. They occur between the large rolls of fat in children and fat persons, in the groins, behind the ear, &c., are exceedingly painful, and if not remedied, give rise to troublesome excoriations. The *chop*, as it attacks the wrists and back of the hands in cold weather, and during the prevalence of piercing winds, is still more familiarly known. It is obviously an effect of cold. But there are chops which depend on the contact of moisture associated with chafing, and which attack the covered as well as the uncovered parts of the body, and these are sometimes very troublesome. A painful illustration of the latter affection is *chapped nipples*; another is *chapped lips*.

Another form of the red rash originating in cold is the well-known torment of children in the winter season, *chilblain*. In its first stage, a chilblain is a redness of the skin attended with heat, a slight degree of swelling, and more or less itching. So far the chilblain exhibits signs which belong to the family of the red rashes. The next thing that happens is, the chilblain looks blue and purple, and the scarf-skin is raised up by a fluid beneath it, forming a blister. Then the chilblain is said to "break," the blister bursts, the scarf-skin is rolled aside, and the "broken chilblain" exhibits a sullen dis-tempered sore, slow to heal, and slow to get worse; but sometimes becoming a deep ugly ulcer, that may be weeks in getting well. In its essential nature, a chilblain is a chill of the skin; the immediate effects of the chill are to lower the tone of the nerves, as evinced by numbness; to check the circulation, as evinced by whiteness; or to retard the circulation, as shown by blueness; then reaction ensues, the blood is driven forcibly into the previously collapsed and shrunken vessels, the part becomes red and swollen, it itches

violently and throbs. So that the disease is the return of the blood to a part previously emptied of its blood, and lowered in its vitality by cold. Not, however, the return of the blood, simply, but its return with unusual force into vessels weakened and prostrated by the antecedent chill. Thus it is, after coming in from the cold, and sitting down by the fire, that the great suffering from chilblains ensues; in other words, by the addition of a cause which provokes an increased impetuosity of the blood's current. Hence, also, it is, that heat in all shapes gives rise to the production of itching, or increases the itching when already in existence. And now, what is the rationale of treatment of a chilblain? Why, to restore the circulation through the chilled and benumbed part gently and gradually. The child of nature rubs the chilblain with snow, a combination of friction and heat a degree above that of the benumbed part; then, the friction being continued, the temperature of the fluids used in the process may be increased, until friction gradually restores the circulation to its wonted degree and wonted regularity. And the process requires to be repeated every time new chilblains make their appearance; the cure of chilblains being the acquisition of a habit of bearing the cold, or the return of a warmer temperature. The child of art uses stimulants in conjunction with friction, such as vinegar, spirits of camphor, spirits of turpentine, &c., and to save the skin from abrasion by excessive friction or the union of friction and stimulants, the latter are combined with oil, soap, or the yolk of egg. An excellent chilblain remedy is made by shaking well together, in a bottle, spirits of turpentine, white vinegar, and the contents of an egg, in equal proportions. With this the chilblains should be rubbed gently whenever they are in a state of irritation, and until the swelling and redness are dissipated. Flogging the chilblains with furze or holly is bad practice, as also is soaking the feet in warm water. After *the frictions* with the liniment, the chilblains should be

covered with a piece of simple plaster spread on wash leather.

The treatment of red rash, when the functions of health are disturbed, requires such hygienic and medical measures as will restore the disordered functions to their proper equilibrium. The domestic treatment is chiefly of a local nature. For example: evaporating lotions to relieve the heat of the inflamed surface, and a nicely-adjusted cotton-web elastic bandage, when the lower limbs are affected, to give support to the vessels, and aid in the movement of the blood towards the heart. By the term "evaporating lotion," is meant a combination of spirit of wine and water, in the proportion of one part to four, five, or six. A little rose-water added to the simple water makes an agreeable addition, and sometimes camphor-water, or a little Goulard's extract, may be deemed advantageous, when a greater degree of calming effect is required. A divine remedy is gin and water, one part to two or three, not used as an *internal*, but as an external lotion.

The mode of using an evaporating lotion is always that already described; and the chill may be taken off in cold weather, by placing the bottle in warm water. When the case is of long standing, and the redness does not disappear, a stimulating application is then desirable, and there is none better than warm vinegar dabbed on the surface with a sponge, or used as a fomentation. For blotches on the face, the best remedy is camphor spirit, or diluted Eau de Cologne, dabbed on the spot after washing, or twice or thrice in the day. For chap and gall, the treatment consists in keeping the surface as dry as possible, and dusting it frequently with fuller's earth, or starch-powder. For chapped lips, or chapped nipples, the tincture of catechu or benjamin lightly pencilled on the cracks are good remedies. For severely chapped hands and face, the benzoated ointment of oxide of zinc or camphor cerate are admirably suited.

These applications should be gently but briskly rubbed

into the part with the finger or palm of the hand, so as to reach the bottom of the cracks, and then wiped off with a dry towel, in order to leave no trace of grease on the skin. The process should be repeated at bed-time, before sitting near the fire, and after each washing, and the rubbing should be continued, provided it cause no bleeding, until the chapped skin is quite warm.

ROSE RASH.—The rose rash, or the “rose,” is an eruption of small irregular patches of a rose-red tint, which spreads over the surface of the body, and is ushered in by slight febrile symptoms. I have had occasion before, in connection with erysipelas and red rash, to speak of “febrile symptoms,” and as they are common in all eruptive complaints, and indeed in every disease affecting the constitution, from common cold upwards to small-pox, and only differ in degree of severity, I shall now proceed to particularize them in the order in which they occur. They are, chills, varying from a downright shiver to a sensation of water trickling down the back; heat, which may be a mere flush, or succession of flushes, or a burning glow; languor, often evinced by yawning; lassitude; pains in the head, back, loins, knees, and limbs; restlessness; quickened circulation, and respiration; white or red, and frequently dry tongue; thirst; dry, shrunken, or parched skin; absence of appetite, nausea, and checked natural secretion. The whole of these symptoms, collectively, with reasonable allowance for variety depending on constitution, severity of attack, &c., constitute fever, and these symptoms, in a mild form, are present in rose rash. Rose rash, however, is only a slight complaint; it attacks young children under the name of *infantile rose*, and adults of weakly constitution, in the summer and autumn season, under the appellation of *summer* and *autumn rose*, and is sometimes associated with certain constitutional disorders, such as that of inoculated small-pox, cow-pox, rheumatism, and gout.

Rose rash bears a close resemblance to measles in the form of its little patches of red, and is therefore styled

“false measles.” It is, doubtless, frequently mistaken for measles; like them, the efflorescence appears first on the head and breast, and then passes downwards to the feet: there is also redness of the throat, but an absence of the watery eyes and symptoms of cold in the head which accompany measles; there is also much less constitutional disturbance; it lasts a shorter time, not more than three or four days, and is neither contagious nor infectious. Another difference between them is the minor degree of intensity of redness of the eruption. It is accompanied with itching and tingling of the skin, and on this account is often very irritating to infants. Adults bear the annoyance better, and in them the disorder is of so little importance as scarcely to require confinement to the house. The common cause of rose rash in infants is the irritation occasioned by teething, and disorders of the mucous membrane of the intestinal canal. In adults, the more frequent causes are, heat of weather, fatigue, draughts, drinking cold water when heated with exercise, and indigestible substances.

The domestic treatment of rose rash is purely constitutional. The patient should remain at rest in a cool atmosphere, and if in bed, lightly covered with clothes, until the attack be passed away, abstaining from solid food, and taking cool and unstimulating drinks. Drinks of this kind are technically termed *dilutents*, from the influence they exert in diluting and cooling the blood. Effervescing drinks are also useful; they, however, require the direction of the medical practitioner, as do cooling medicines and baths.

NETTLE RASH.—The nettle rash is so characteristically marked by its tingling and pricking pain, its white elevations and wheals on a red ground, and the production of fresh elevations and wheals wherever any part of the skin is rubbed or scratched or even touched, as to be familiar to most persons: it is, for the most part, attended with febrile symptoms of moderate severity, and generally with nausea and a sense of fulness of the stomach, only relieved

by sickness. When the febrile symptoms are severe, it constitutes the *febrile nettle rash* of medical authorities. When the elevations are numerous and closely grouped together, the variety is termed *clustered nettle rash*. One of the characters of the rash is a sudden appearance and disappearance; occasionally, the latter is so conspicuous as to form the basis of a variety, the *evanescent nettle rash*; while at another time it is as remarkable for its permanent character, *persistent nettle rash*. The common cause of nettle rash is some error of digestion, either from the nature of the food, or some state of disorder of the nervous or other system of the body. That which can be best appreciated by the non-medical observer, and at the same time the most frequent cause, is food in an unwholesome state. In other cases, the food, without being itself unwholesome, acts like a poison on the individual, and in the third class of cases, the peculiarity appears to reside in the individual rather than in the food. Among the list of alimentary substances which have been known to cause this troublesome affection, are mussels, lobsters, crabs, shrimps, oysters, dried fish, pork, goose, eggs, almonds, strawberries, raspberries, cucumbers, melons, mushrooms, rice-milk, rice, and porter. Now it is evident that the greater part of these substances are harmless to most persons; those which are most commonly the cause of nettle rash, however, are shell-fish, and particularly mussels. A frequent cause in children is teething.

The occurrence of nettle rash from the use of alimentary substances of a simple and usually harmless nature, is evidently due to some peculiarity of constitution of the individual, to a state, in fact, which in medicine is termed *idiosyncrasy*. In some instances the idiosyncrasy is hereditary or congenital; in others, it is accidental or induced; that is, one which has never been experienced before. Of the latter kind is the following remarkable illustration. A gentleman holding a high civil appointment in the public service, while making his usual official visit to

the seaports, had stopped at one of the principal inns of a large town in the west of England. In the morning at breakfast, he became sensible of a disagreeable feeling of pungency in his mouth and throat immediately after swallowing a spoonful of egg, and in a few minutes subsequently the membrane of the mouth, together with the gums and throat, became hot and swollen, and affected with a painful pricking sensation. In about ten minutes from this time, the skin of the whole body felt hot and swelled, and he experienced a painful sensation as of a legion of hot needles piercing the skin from the central parts of the body. Soon after, an eruption of nettle rash made its appearance, showing itself at first on the inner side of the limbs and front part of the body, and then extending over the entire surface, and attended with the most intolerable itching. These distressing symptoms continued in great severity for about four hours, and subsided slowly and by degrees, so that next morning he was enabled to resume his journey. Now this was an undoubted instance of poisoning, although the poison, on account of the peculiar idiosyncrasy of the individual, was a mere spoonful of one of the most harmless articles of every-day diet.

Subsequently, this gentleman had two other attacks of a similar train of symptoms; one occasioned by swallowing the yolk of an egg beaten up in a glass of sherry; the other, by partaking of a jelly which had been clarified with pounded egg-shells. Indeed, he may be said to be an *ovimeter* of the most sensitive kind; he distinguished the presence of egg in a small fragment of the icing of a bride-cake; and having detected egg in some cakes made for him by his own servant, it was ascertained that she had inadvertently used white of egg for the purpose of glazing their surface.

A like repugnance of the system to another very innocent article of food, namely, rice, is mentioned by Dr. Bernard of Beziers. The instance occurred in a

merchant, who, whenever he attempted to eat it, was suddenly attacked with fits of sneezing and puffiness of the face. We have ourselves met with similar instances.

Whenever food is the cause of the disorder, the attack comes on suddenly a few hours after the meal; for example, in the middle of the night, after a hearty supper. The person suffers at first from a sensation of weight and fulness at the chest, accompanied with nausea, giddiness, and, soon after, vomiting and violent action of the bowels: he feels a pricking and tightness in his throat, which produce cough and difficulty of breathing, amounting almost to a sense of suffocation. These symptoms arise from swelling of the membrane of the mouth and throat. Swelling of the tongue succeeds, and shortly after, the swelling extends to the face and head. The nose, lips, and ears, are burning hot, and itch violently, and by degrees the rash spreads over the whole body, affecting chiefly the skin around the joints. Nettle rash, from irritation caused by obnoxious alimentary substances, sometimes subsides in a few hours; more frequently it continues for a couple of days, and in rare instances is so severe as to prove fatal.

Nettle rash calls for medical aid to set the digestive system in order, and if the cause be indigestible food, this must first be removed from the stomach by the aid of a gentle aperient. As regards domestic treatment, vomiting, where it occurs, is to be encouraged by drinking warm water; and after this symptom has passed away, acidulated diluent drinks, and particularly effervescent drinks, will be found of service. A hot-foot-bath will assist in determining from the head and upper parts of the body, and a compress wrung out of cold water until it cease to drip, and kept in contact with the stomach by means of a dry bandage, will relieve the irritation of the stomach and bowels. When the subject is a child, and the cause teething, the whole body should be immersed in a bath as warm as the child will bear, and wrapped in flannel on being transferred to bed.

All the rashes, at their disappearance, leave behind them a rough and peeling state of the scarf-skin, which rubs off in powdery or branny scales, and makes way for a new scarf-skin that is formed beneath. The speedy removal of the old scarf-skin, and the restoration of pliability of the new, may be promoted by gentle frictions with fresh lard or cold cream.

It would be wrong to quit the subject of the rashes without adverting briefly to the character of those three great scourges of childhood, measles, scarlet fever, and small-pox. These are not diseases of the skin, although they are generally manifested by a cutaneous rash or eruption; they may, however, and do sometimes exist, without any external indications, and in essential nature are fevers of the blood. These fevers commence, like all others, with chills, followed by the usual train of febrile symptoms described in a preceding paragraph, and particularly by drowsiness and languor. In measles, the precursory symptoms constituting the period of sickening last for three days before the appearance of the rash; in scarlet fever, for two; and in small-pox, for two, three, or four. The rash, in all the three disorders, follows the same course of development, appearing first on the face and neck, next on the trunk and arms, and then on the lower limbs: declining in the same order. The appearance which it presents, at this early period, is so similar, that it would be difficult, even for the experienced eye, to distinguish between them. It is necessary, therefore, that some specific rule should be laid down, by which the precise disease may be discovered. This is not difficult, for measles are always preceded by symptoms usually indicative of a severe cold in the head; such as red and watery eyes, running from the nose, sneezing, sore throat, and more or less cough, followed by expectoration. Scarlet fever is known by the absence of symptoms of cold in the head, but the eyes are frequently red, and there is sore throat and a peculiarly red tongue, spotted over with

little scarlet points. Small-pox is distinguished by the negative of these signs, by sickness of stomach, severe pain in the loins, and especially the known-prevailing epidemic. When the rashes are fully developed, measles and scarlet fever offer a striking difference in colour, the former being compared to the hue of a raspberry, the latter to that of a boiled lobster-shell; in the former, also, the patches are small and clustered; in the latter, large and irregular. The rash of small-pox is more decidedly punctated than that of the two preceding, and the minute red points very speedily become prominent pimples. The whole of these rashes are distinguished from those of St. Anthony's fire, red rash, rose rash, and nettle rash, by the redness of the former being dotted, an appearance which is due to the assemblage of numberless minute red points or dots (the walls of the pores distended with blood), and that of the latter being blended and diffused. Small-pox, besides its common type, presents a number of modified and aborted varieties, which I cannot do more than enumerate; they are termed varicella, hives, swine-pox, chicken-pox, and horn-pox.

The period of time which intervenes between exposure of the body to the contagion of these essentially contagious and infectious diseases, and the premonitory symptoms of the fever, the period of "incubation," as it is technically called, is from two to ten days for scarlet fever; from seven to fourteen for measles; and from ten to sixteen for small-pox. Another estimate of time, of equal importance in the history of these complaints, is the period of seclusion of a person who has suffered from the fever. This should not be less than a month in either, and the utmost care should be used in purifying and ventilating the clothes, the furniture, and the apartment which has been inhabited by the sick person. The floor of the chamber should be washed every day with the solution of chloride of zinc or lime, a solution of one of the permanganates, or of carbolic acid, and the walls,

also, if practicable ; the windows should be kept open, the furniture transferred to an airy place before it is again used, and it would be no excess of precaution to re-paper the apartment. Clothes, linen, and bed-furniture, must be aired and washed, and aired again ; indeed, it is scarcely possible to carry caution too far after these diseases.

CHAPTER XI.

ERUPTIONS OF THE SKIN; NAMELY, PIMPLY,
VESICULAR, SCALY, AND ANIMALCULAR.

THE term "rashes" may be properly limited to that state of inflammation of the skin in which the inflammatory action does not proceed beyond its more simple and primary signs, namely, redness, heat, swelling, and pain. Indeed, it must be apparent from the preceding outline of their history, that the rashes are merely parts of a disturbance of health, seated more deeply in the constitution. There are other affections, however, in which the cutaneous disorder is the most conspicuous, and sometimes the only sign of disease in the economy, and in which the inflammatory action seems to expend itself in the skin, and consequently gives rise in that tissue to a more positive state of local disease. It is to affections of this kind that the term *eruptions* is properly applicable. We have seen that in the rashes which accompany measles and scarlatina, the pores of the skin are distended with blood, and assume the appearance of minute red points, and that in small-pox these red points are subsequently developed into pimples, and constitute a real eruption. The same effect is seen in the less violent but more prolonged inflammation of the skin which accompanies the first or *pimpley* group of eruptions; the surface is raised into little elevations, or pimples, which are sometimes distinctly apparent on the surface, and at others are only appreciable by the touch. In another group, the little elevations are obviously filled with a small drop of a transparent and colourless fluid; these form the group

of *watery pimples*. In another series, the little elevations contain an opaque yellow fluid or "matter;" these constitute the *mattery pimples*. In a fourth group, the effect of the inflammation of the skin is the production of a well-marked scale of various dimensions, and generally of a circular form, upon a red ground; these are the *scaly eruptions*. And in a fifth, the inflammation is due to an outward and living cause, namely, a minute animalcule, which burrows in the scarf-skin, and is the occasion of much irritation. This animalcular eruption is the disease termed "itch."

DRY PIMPLES.

The *papular* group* of eruptions or *dry pimples* are remarkable for the high degree of cutaneous irritation which they create, and hence are very annoying companions, and likely to be torn into disagreeable and painful sores by attempts made to relieve the itching. They are common in infants and young children, and in them are known by the popular terms *red gum*, *red gown*, and *tooth rash*. In adults, they are technically termed *lichen*; and another and less distinct form, in which the eruption is only appreciable to the touch, though always distinguishable by the marks of the nails, is denominated *prurigo*, on account of its excessive itching.

In the red gum and tooth rash of infants, the pimples are sometimes paler than the surrounding skin. They are always accompanied with more or less of feverishness, and indicate irritation in the gums from the growth of the teeth, or in the alimentary canal. In a few instances, they are caused by a flannel worn next the skin, or deficient ablution.

LICHEN exhibits great variety in its outward cha-

* Papula, a pimple.

acters in different individuals ; in one, the pimples are brightly red ; in another, of debilitated constitution, they are bluish and livid ; in a third, they are developed around the base of hairs ; in a fourth, they appear as circular groups, and increase by their circumference, while they fade in the centre, forming so many rings of various size ; in a fifth, a modification of the preceding, they have the appearance of flexuous bands ; while, in a sixth, they are remarkable for producing intensity of suffering, or unusual disorganization of the skin. They are all occasioned by constitutional disturbance, sometimes referrible to the digestive, and sometimes to the nervous system. In some instances, however, they depend upon a local cause. I have had a crop of lichenous pimples on the back of my hands from rowing in hot weather ; and in hot climates that annoying disorder called *prickly heat* is a lichen. Wearing woollen garments next the skin in the summer-time is also an occasional cause of this eruption.

PRURIGO presents two degrees of severity, but even in its mildest form is a most annoying and vexatious disorder ; rest and repose are out of the question, and sleep impossible, until exhaustion conquers suffering. But there is yet a severer degree of this distressing malady, termed *ant-bite* prurigo, from the sensations being compared to having the flesh devoured by myriads of ants, or the skin pierced with red-hot needles. And this occurs without any obvious reason in elderly persons, rendering their existence almost unbearable. It is this disease which is referred to in a preceding chapter as having been the scourge of several distinguished persons, among whom were Plato, Charles the Fifth, and Charles the Ninth of France.

The domestic treatment of infants and children is comprised in the application of the laws of health to the mother as well as to the child. The position of parent is one of serious responsibility, both morally and physically, and the law has gone forth, that "the sins of

the parent shall be visited on the children." As the parents bestow their physical likeness on the child, so also do they their moral similitude; and in those whose moral attributes are essentially bad, it is sin to marry. Many diseases are known to be hereditary, and the sin committed by the parents in marriage under such circumstances is fearfully avenged, when in old age their comfort and their prop, and often their support, is taken from them, as the natural consequence of their own want of reflection in due season. If we could insure good mothers, we could improve vastly the race of men. These observations may be thought out of place in a work of this kind, but they bear strongly upon the injunction I am now about to lay upon the nursing mother of a sick infant. She must, by following faithfully the rules of health in respect of the four great hygienic principles of food, clothing, exercise, and ablution, give health with her milk to her offspring; she must also pay close attention to her mind, avoid all sources of irritation and anxiety, and remember that an angry mother sours her milk, and produces a fractious, and often a diseased infant. I am quite of opinion, that if mothers were sound in constitution, and bestowed the requisite care upon the maintenance of their health, we should hear little of diseases of children. In children, as well as in the parent, the rules of health must be carried out, and the judicious use of the bath will often sweep away any little ailment under which they may be suffering. For itching of the skin, both in the infant and in the adult, there is no better remedy than the juice of a lemon squeezed into a pint or half-pint of pure water, and used as a lotion. Distilled vinegar, and vinegar and water, may be used in the same manner, but the remedy for an infant must always be more diluted than that for an adult. In the adult, sponging with vinegar to relieve the itching of the pimply eruptions should be preceded by brisk frictions of the skin with the flesh-brush. In some of

the counties of England, buttermilk is a favourite and good popular remedy for the relief of itching. It may be necessary also to reduce and regulate the diet, eschew stimulants of all kinds, and have recourse occasionally to a vapour-bath or tepid soap-bath.

WATERY PIMPLES.

The watery pimples or vesicles are the result of the same action as that which gives rise to an ordinary blister; inflammation is excited in the sensitive skin by an inward or an outward cause, and the inflamed vessels pour out the watery part of their blood, and so raise the scarf-skin from off the sensitive layer in the form of a small dome, which, in some situations, is conical, in others, a segment of a sphere. As an example of the manner in which these watery pimples may be produced artificially, I may mention that in a case of this kind, of unusual obstinacy, occurring in a young woman in one of the French hospitals, a suspicion arose that the patient herself had some hand in the continuance of the disease, and upon watching her closely, it was found that she was in the habit, every day, after the medical visit, of dusting a blistering powder over her limbs. The watery pimples, as may be supposed, present great variety in point of number and size; some are so minute as scarcely to be discernible without close inspection, while others increase to the magnitude of a hen's egg. They are numerous in the inverse ratio of their size, the smaller ones being very abundant, and the larger ones scanty and few. These primary distinctions in the size of the pimples form the basis of their division into three genera. The smallest vesicles, which are about the size of a pin's head, and are often clustered together in vast numbers, are known by the term *eczema*; when they are of larger dimensions, being equal in size to a small pea, they are termed *herpes*; and when they assume the bulk of blisters, they are termed *pemphigus*.

ECZEMA may be developed upon any single part of the body, or may be scattered over various parts at the same time. In the former instance, it assumes the characters of a local disease, and is not unfrequently met with as such on the scalp, the face, or the ears. It exhibits, also, three degrees of severity: one of these is the simple type; another is remarkable for the vivid ground of red on which the vesicles are developed; while in a third, the fluid of the vesicles changes from its original limpid and watery character to a more or less opaque and yellow matter. There is a fourth state, which most frequently follows the decline of the active forms, namely, chronic eczema, and is characterised by a subdued degree of inflammation, and long continuance. Eczema frequently emits a copious watery discharge, which, spreading upon the sound skin, causes irritation, and an extension of the disease. The discharge, left to itself, dries up by evaporation, and forms a crust, which gets progressively thicker. Around the lips and on the face of children this crust produces a kind of mask, and on the scalp it mats the hair together, and is peculiarly unpleasant. The discharge, however, still continues oozing out through the cracks in the crust, or from its edges, and distilling in small drops from the crimson surface of the exposed skin when the crusts are torn off; and even after the fall of the crust, when the inflamed surface is covered by a thin scarf-skin, there is still some weeping from the pores.

The presence of a copious watery discharge in this eruption, conjoined with the formation of a thick crust, has gained for it the appellation of *humid tetter*, a name which is properly applied. When it affects the scalp, and continues for a long time, the deep tissues of the skin become implicated, and the roots of the hairs may become injured, and the hair fall. In the latter case the disease is a cause of partial baldness, and is entitled to the designation *humid scall*, or *scalled head*. A variety of humid scalled head, in which the humour

from the excoriated surface runs down upon the hairs, and encloses them in little silvery pellicles or sheaths, has received the name of the *asbestos scall*. But the term "scall" is very objectionable, and a fertile source of error and mistake. Infants and young children are subject to attacks of this eruption on the face, and the association derived from the nature of their food, at this period of their lives, has gained for the disease the name of *milk crust*. There is, however, another milk crust, to which I shall have occasion to refer when treating of the next group of diseases, the mattery pimples.

HERPES, like eczema, may be scattered over divers parts of the body at the same time, thus assuming a "general" form, or it may be limited to a spot, and be "local" in its nature. The latter is its more common character. It is easily distinguishable from other eruptions by its little dome-shaped, transparent, and pearly bubbles, distended with fluid, and surmounting a base of crimson red. It is also known, practically, to most persons, as a familiar foe, in the shape of an eruption, which breaks out upon and around the lips on the dispersion of a cold, or any slight ailment accompanied with feverishness. I need not call to mind the little bladders of water which form in that case, nor the hard brown crust which succeeds; but it may be satisfactory to know that this little scourge passes under the dignified title of *herpes labialis*. Sometimes these little patches are seen around the apertures of the nose, or upon the eyelids and ears, but their family likeness to that of the lips at once distinguishes them. I have had occasion before to remark upon a peculiarity of disease affecting the skin, namely, its frequent habit of beginning by a small circular spot, and spreading by the circumference, while it fades gradually at the centre. This character is perceptible in the patches of herpes, when they attain any size, and the eruption is then designated *vesicular ringworm*. In one very remarkable variety, the vesicles are arranged in concentric circles, which acquire by age a difference of tint,

and constitute the *rainbow ringworm*; while another, besides being made up of a number of patches, which assume more or less of the annular character, has a tendency to follow a circular direction in its course: this latter is the eruption so well known under the name of *zona* or *shingles*. The shingles usually embrace one-half the trunk of the body in the situation of the waist, and very rarely the whole trunk. The rarity of the latter occurrence has given rise to an unfounded notion, that if the circle were completed the patient would die. Instances are occasionally met with in which shingles form a demizone upon the neck, face, or head, and they have been seen running, for a short distance, and in a straight line, along the arm or thigh. Shingles are generally regarded as a slight and trivial affection: this is the case in young persons, and adults of good constitution. In them, the little bladders shrink in six or eight days, and are followed by a crust, which in due time is rubbed off by the clothes, and no trace of the eruption remains, other than some degree of redness of the skin. In elderly, or weakly, or nervous persons, however, the disease is not so easily disposed of; the eruption is often intensely painful, small sores are left behind when the crusts are removed, the sores are long in getting well, and a neuralgia is left behind which may last for months or years.

RUPIA.—The term *rupia* is derived from a Greek word, which signifies “dirt,” and it must be confessed that the disease in question is open to the imputation conveyed by its name, from the unsightly appearance of the dirt-coloured crusts which succeed the rupture of its vesicles. As far as the latter are concerned there is nothing to distinguish them from those of the two diseases between which *rupia* is placed; they are generally larger than the vesicles of herpes, and generally, but by no means always, smaller than those of pemphigus. But the main character of distinction between *rupia* and all other diseases of the skin, is the formation of unhealthy, foul,

burrowing sores, which pour out a reddish and ill-conditioned matter in such quantity, that it collects and dries upon the sore, and forms a crust of remarkable thickness. In one variety, called *simple rupia*, the crust is comparable in appearance and apparent construction, and sometimes, also, in size, to an oyster-shell. In another, namely, *prominent rupia*, the crust is conical in shape, and resembles a limpet-shell. These are the two chief varieties of rupia : the third, observed generally in starved and neglected children, is distinguished by its corroding, ill-looking sores (burnt holes), and an absence, or thin and imperfectly-formed condition of crust. Rupia owes its origin to a weakly and debilitated constitution occasioned by a specific poison, and the local disease cannot be removed without renovation of the entire system ; hence it is always tedious, and sometimes dangerous.

PEMPHIGUS.—The term pemphigus, derived from the Greek, and signifying “ a bubble,” is peculiarly applicable to this disease, which consists of an eruption of bubbles of scarf-skin, enclosing a thin and watery fluid. Another term by which the disease is known is *pompholyx*, which means, literally, “ a water-bubble.” The French call it the “ bubble fever,” and the Germans, “ water-bladders.” This is the kind of eruption which I have before referred to as having been imitated by a girl in one of the French hospitals, and it will be seen, from its nature, that this can easily be done by any sufficiently stimulating application.* The bubbles raised under a common blister are a local pemphigus, only differing from the disease in question in being produced

* The formation of a blister is a vital process, and its success may be taken as a proof of the presence of life. Hence, a French physician, Dr. Mandl, has suggested such a stimulation of the skin as would ordinarily cause a blister, as a test of life, in those cases of long-continued trance which we occasionally hear of, where all the functions of life seem to be extinct. Dr. Mandl's plan is to rub the surface with a stick of lunar caustic.

by a known and local cause. The bubbles, in this disease, are raised upon a base of inflamed skin scarcely larger than the bladder which they support ; they occur singly or in patches, and vary in size from the dimensions of a split pea to the half of a walnut-shell, and from that to a hen's egg or an orange. They rise up very rapidly, frequently in the course of a few hours, and break in two or three days, when they are followed by an exco-riated surface, which becomes covered by a thin crust, and slowly heals. The varieties of pemphigus are two, acute and chronic, the former being active and brief in its course, and accompanied with a smart attack of feverishness ; the latter slow, without fever, but with more intrinsic constitutional disturbance. The disease has been known to spread as an epidemic, as was the case in Switzerland in 1752.

The treatment of the class of watery pimples offers to our judgment the two indications which meet us in the treatment of most other surgical diseases, namely, constitutional and local. My Master, Mr. Abernethy, many years ago, pointed out the importance of constitutional remedies in local disease ; and, indeed, without the force of so high an opinion, we must feel their necessity. The blood, the nerves, and their functions, are more or less implicated in every local affection ; and a shock, however trifling, cannot be given to any part of an instrument so well attuned as the animal organism, without producing a simultaneous vibration through all its cords ; therefore it is that so few local disorders exist in which constitutional treatment is not required. The main question is, what do we mean by the term constitutional treatment ? Are we to bleed, and purge, and nauseate, and sweat ? Nay, rather than that, it were better to discard physic altogether. Are we, then, to take the opposite course, of idealizing physic, and make a fool of our judgment by gulping infinitesimals ? Here the error would be, it may be admitted, on the safe side, but it is, nevertheless, error. Are we such infants that we cannot

trust ourselves to shape a middle course? Must we ever be repeating the rash experiment of Phaeton, or the wilful *felo-de-se* of the acknowledged monomaniac, who plunges into destruction in order to escape it? The answer, I fear, is—Such is the perversity of human nature. The four great principles of health, food, raiment, exercise, and ablution, are all powerful constitutional remedies, and, by regulation and modification, may be made to answer many purposes where health is deranged. Then there are certain substances in nature, known as medicinal, and these are also useful assistants,

In the constitutional treatment of the watery pimples the system sometimes requires to be lowered, sometimes to be toned, sometimes to be altered, but *the which* is a question, though simple, requiring the highest qualifications of the medical art. In domestic management, we must be content to reduce the diet in quantity and stimulating quality where there is any tendency to fulness; to employ diluents where there is feverishness; and to be cautious where there is doubt. The principle of local treatment is more obvious; the evaporating lotion, the fomentation, the tepid or warm bath, these are our remedies. When crusts collect so as to be unsightly or a source of irritation, they may be softened by a poultice, or by a fold of wetted rag covered with a piece of oiled silk, and then washed away with warm water and soap; the inflamed surface should be dressed with cold cream, or fomented with warm water if there be much heat or inflammation. Whenever the bladders are large, the fluid may be soaked up by a sponge, or piece of dry linen, in order to prevent the dispersion of an irritating fluid on the skin; and when of smaller size, they may be dusted with fullers'-earth with the same object. For herpes on the lips, bathing with tepid milk and water, or with the evaporating lotion previously mentioned, will be found the best remedy, and a similar application is suited to shingles.

Daniel Turner gives an example of the popular treat-

ment of shingles, which is not likely to be repeated at the present day :—" When I told her mistress (the patient was a servant-maid) it was the shingles, she said she was willing to satisfy me for my visit, and accordingly did so, saying now she knew the distemper, she had a remedy, which she doubted not would cure her. I bid her be advised in what she did, since by improper application the young woman might be damaged. The experiment, as I after understood, was made with the blood of a black cat (for it must be of no other colour), which was smeared on the parts. I should have told you, also, that it was taken from the cat's tail, being cut off for this purpose ; which was tried only once, for hardening upon the place, and shutting in the matter, the anguish was so increased, that the poor wench would not suffer them to go to work again ; the limb also looking black, and smelling strong, they were frightened, as believing the same mortified ; and by a friend they made interest to me, that I would not resent their usage of me, but come to them again ; which I did, and perceiving what had been done, with some warm milk I gently bathed the parts, and got off the blood."

MATTERY PIMPLES.

The mattery pimples form a natural group distinguishable from other diseases of the skin by the nature of the fluid which they contain. This latter is no longer watery and transparent, or whitish and partially opaque, like that of the watery pimples, but opaque, and yellow from the first. It is poured out upon the sensitive skin, and raises the scarf-skin in the same way as the watery pimples, and the resemblance is increased by the formation of crusts, on the drying up of the matter. But the little bubbles of the mattery pimples rarely exceed the dimensions of a split pea in size, and are never so minute as those of eczema. They are developed on a ground of inflamed skin ; and the degree of inflammation of the skin

is the basis of their division into two groups, termed technically, impetigo and ecthyma.* The former presents the slighter degree of inflammation, and sometimes there is scarcely any redness of the skin; the latter is always accompanied with considerable inflammation and redness. The little bubbles attain their full size in the course of two or three days, and either dry up without breaking, or more frequently burst and then dry, forming a hard crust, which offers considerable variety of colour, being sometimes yellowish, sometimes brownish, and sometimes almost black. The production of a crust as one of the characters of the mattery pimples, brings them within the meaning of the term "tetter;" and the nature of the crust, as compared with the simple tetter, herpes, and the humid tetter, eczema, cannot be better expressed than by the common popular name for this eruption, namely, *crusted tetter*. When crusted tetter attacks the head, it will probably destroy the hair, and become a scall, the *crusted scall*.

Among the causes of obscurity which attend the study of complaints of the skin, there is hardly a greater than the multitude of terms which are applied to them; and if the various diseases had been represented by a chess-board, and the names, well shaken together in a bag, had then been emptied upon the board, so that several names should fall indiscriminately on each square, there could hardly have been greater confusion than reigns over the nomenclature of these disorders. Impetigo, for example, is one of the crusted tetter, *the yellow crusted tetter*: its crusts, in some instances, having the aspect of a dab of honey dried upon the skin: this latter resemblance has been deemed sufficient to gain for it the synonym of the "honey disease," or honey scab. This honeyed expression is peculiarly applicable to those in-

* These terms signify *a breaking out with impetuosity*, and simply *breaking out*; the former referring to impetigo, the latter to ecthyma.

crustations which not unfrequently form on the lips and ears of children. Sometimes they constitute a mask over nearly the entire face, and the disease becomes one of the varieties of the "milk-crust." Pretty cognomens, it must be admitted, for unsightly disorders, but conveying, in their appearance, anything but agreeable thoughts of milk and honey, or pleasant associations of honeyed lips. Impetigo, in one respect, resembles the humid tetter, namely, in the oozing of fluid from the excoriated skin. It is this fluid, or humour, which causes the great thickness of the crusts, and their reproduction when once removed. A resemblance may be traced, also, in the manner of evolution of the eruption; for sometimes the mattery pimples break out in clusters of regular form and various size upon a single part of the body, and at other times they are scattered irregularly over the entire surface of the skin; the former are termed *figured*, the latter *scattered*; the former presents occasionally another peculiarity, namely, growth by the circumference and evanescence in the centre, forming a *crusted ringworm*. Crusted tetter sometimes excites St. Anthony's fire, and at other times is remarkable for tardiness and obstinacy of course and duration. When the latter character prevails, the eruption extends over an entire limb, or deposits an uniform incrustation around it, so that the limb has the appearance of a branch of a tree with a cracked and rugged bark. This kind of case necessarily interferes with the motions of the limb, and wherever it cracks, the humour rises up in the crevice, and spreads for a little distance around the opening. Generally, these oozing streams are tinged with blood, and the crusts which form are of a deep brown colour or black.

I have remarked, that the crusted tetter may invade the scalp, and when it does so, and remains on the head for any time, it causes fall of the hair, and becomes, in consequence, a "scall." The varieties of character which it presents on the scalp have given rise to some of the idle names assigned to these eruptions.

For example, when the crust is brittle and greyish in colour, and breaks up into little pieces, which are fixed on the hairs like beads upon a string, or scattered loosely among them, the disease is called the *granulated scall*; and when the crust is harder, and, guided by the hair, forms rigid prominences like stalactites in their shape, the disease becomes a *stalactitic scall*. The scalls caused by the humid tetter have been already described.

ECTHYMA.—The mattery pimple called ecthyma is that which is developed on a deeply inflamed skin; the bladders are generally of the size of a split pea, and surrounded at their base by a broad halo of redness. They are usually separate, not clustered like impetigo, scattered over various parts of the body, and followed either by a hard black crust, or by a sore. Ecthyma occurs either as an acute or chronic eruption; and in the latter shape attacks weakly children, and persons much reduced by sickness and famine. In individuals of the latter class, the inflamed surface is more or less blue and livid, and the matter frequently coloured by admixture with blood.

As respects the treatment of the mattery pimples, the principle of management of all inflammations of the skin will be correct in this. The redness, swelling, and pain, which precede and accompany the evolution of the pimples, call for the use of the evaporating lotion, either cold or tepid, as the sensations may prefer, or if more grateful, the warm fomentation. These remedies will curb the inflammatory excitement without interfering with the separation of any morbid humour from the system, and will facilitate the indications of Nature. The crusts, when they become hard and troublesome, as they do on the scalp, may be removed in the manner described under the head of watery pimples.

But while the minister of cure is busily engaged on the local treatment of these diseases, the moral and the constitutional must not be forgotten. There is no medicine for moral causes of disease so important as gaiety

of spirits, change of thought, change of occupation, and change of scene. Herein lies, in fact, the secret of sea-bathing, the bath being the excuse for the moral physic. But there are persons who would be better suited by swinging on the branch of a certain oak, in a certain forest, in a certain country, and for a certain time. The patient may imagine that it is the concatenation of swinging, tree, and country, that is to do the good, if he please; but the prescriber knows full well that the secret lies in the change of thought, occupation, and scene. Mr. Abernethy's story of his treatment of a patient is a never-to-be-forgotten illustration of the importance of moral medicine in physical disease. A gentleman engaged in duties involving much responsibility and anxiety consulted Mr. Abernethy for the cure of a string of ailments that rendered him incapable of performing the obligations of his office; he assured the surgeon, that to leave town for the sake of health was utterly out of the question, and that he could not be spared for a day from his engagements. Mr. Abernethy pondered; he knew the doctor who would certainly cure the gentleman; but then he lived in one of the most remote towns of Scotland. The gentleman reflected; and upon such strong assurances of cure from Mr. Abernethy, determined on the sacrifice of quitting his business, and seeking the Scottish Æsculapius. He started by mail, full of expectation and hope; business was forgotten: anticipations of cure filled his mind, not unmingled with gratitude towards his adviser. The town was reached, but no physician found; no such house, no such street, no such person known. Enraged at being made the dupe of an eccentric surgeon, he immediately returned to London, thoughts of a very different nature to those which previously engaged him occupying his mind—thoughts so tempestuous, that the loss of a week in travelling and expectation was drowned, and with it also every consideration of his usual occupations. Arrived in town, he drove with all speed to a well-known

door in Bedford-row, and was ushered into the presence of Mr. Abernethy, whom he at once overwhelmed with a storm of indignant expostulation. Mr. Abernethy smiled when a calm was at last restored, and asked after the gout; but the gout and all the other ailments had been forgotten in the excitement of the journey; and the gentleman was bound to acknowledge the wisdom of his adviser. Railroads, unfortunately, put this kind of practice out of the range of possibility at the present day; but they offer, in return, advantages which, if properly used, are in reality superior. An hour takes the invalid to a classic and delicious ramble, thirty miles from London, and the same conveyance brings him back to lunch or dinner. We lack not the opportunities, but the judgment to use them.

To return, however, from this long episode; the moral and constitutional symptoms must be regarded in conjunction with local disease. The constitution may be full and inflammatory, or low and debilitated; it is sometimes difficult to decide which. The doctor must be consulted to solve the doubt.

SCALY ERUPTIONS.

The scaly eruption, or dry tetter, is a form of inflammation of the true skin, distinguished from the rashes and pimples by the alteration of the scarf-skin which immediately covers the inflamed part. In the onset, the eruption makes its appearance as a small, dull-red or salmon-red spot, slightly raised above the level of the surrounding skin, constituting, in point of fact, a flat pimple, almost as large at its summit as at its base, and ranging in size from that of the head of a pin to that of a split pea. Upon the surface of this pimple the scarf-skin becomes roughened, and after a little while, a very distinct circular scale is produced. The little scale increases in thickness by the addition of fresh layers to its *under surface*, and has a bright, silvery lustre, which is

due to the thinness of its laminæ, and the sponginess of its texture. The persistence of the eruption in the form I am now describing—namely, as small raised spots scattered over the skin, each spot being surmounted with a white, silvery, laminated scale, constitutes one variety of scaly disease termed *lepra guttata*, from the Greek and Latin words *lepra*, a roughness, and *gutta*, “a drop,” the appearance of the eruption giving the idea of a number of drops of water hanging from the skin. The eruption does not, however, constantly retain its early spotted character; more frequently, the spots increase in dimensions, and spread out into the form of circular patches, having the size of a shilling, half-a-crown, or crown piece. This enlarged growth naturally requires time: and in proportion to the period occupied in growth is the thickness of the laminated scale; the latter, however, never exceeds in thickness a wafer or a piece of moderately thick cartridge paper, and always preserves its beautiful silvery aspect. There are no humours, no irregular unsightly crusts, no excoriated surfaces in this eruption; in fact, there is nothing repulsive; but, on the contrary, if it were the general, instead of being the exceptional, it would be thought very beautiful, and might become highly fashionable. I have already, more than once, announced a principle of cutaneous pathology in the changes which accompany the circular growth of all the eruptions of the skin—namely, the decline of the disease in the centre, while the onward march takes place by the circumference, until a distinct ring of greater or less dimensions is produced. Another illustration of this principle occurs in the scaly eruptions; for as soon as the spot attains the dimensions of a four-penny or sixpenny piece, and still more as it becomes larger, a distinct depression is apparent in the centre of the little patch, with a consequent rising towards the outward edge. These are the characters which distinguish the common dry tetter, technically, *lepra vulgaris*. By the time the circular patches reach the

size of a shilling or half-crown, the scales usually fall off, the last part to give way being the central point, which, as it is the oldest, is also the most dense, and generally the thickest. When the scale falls, portions of scale continue to be formed on the prominent parts of the patch, but no new scale similar to the first; and, very frequently, the surface looks red and angry, and remains bare until the eruption declines altogether. Sometimes the circles continue to enlarge until they give way at one or two points, and then previous observation and experience can alone determine what the ugly red patches are which remain. Two other designations have been given to the scaly eruption, as characteristic of varieties of appearance, namely, *alphoides* and *nigricans*. The former of these, which simply means "white," is applied to the eruption when the patches cease to enlarge after attaining the size of a fourpenny or sixpenny piece, the scales at this time being whiter than at any other. The other term relates to a lividity in the hue of the patches when they occur in persons of a weakly and debilitated constitution, the livor being of the same nature with the blueness of the lips and fingers of a boy or girl whose energies are not sufficient to keep them warm on a winter's day.

The unprofessional person will, perhaps, long ere this, have indulged a smile at the gravity with which, in magniloquent phrase, I have propounded the laws of cutaneous disease. And I am quite ready to admit, that the subjects for whom I am making such equitable laws are, in many instances, very refractory personages, and very apt to take the law into their own hands; and so it is with the scaly eruptions, for instead of obediently breaking out *secundum artem*, and according to the laws stated in the preceding paragraph, the spots sometimes come out in thick clusters, and so blend and interfere with each other, that the disease can scarcely be distinguished as the same. Instead of distinct circular forms, we have now irregular patches of every size;

instead of one well-developed and thick scale, there are numerous small and thin ones; and instead of a depressed centre and rising edge, the surface is uniform; but the disease is essentially the same, and has received the name of *irregular dry tetter*. The circular dry tetter exhibits a partiality in its eruption for the vicinity of joints, particularly the knees and elbows; and this is remarkably the case with the irregular variety; so much so, that it is common to find the latter about the joints, and the former upon the limbs of the same person. The scaly eruptions have a taste also for symmetry, for not only do they attack both elbows and both knees at the same time, but very frequently the form of the patch is of similar shape on corresponding parts. Another frequent seat of the irregular scaly tetter is the scalp, limiting itself rigidly to the boundary allotted to the hair, but nevertheless, a very troublesome companion. Happily the scaly eruptions have no ambition to appear upon the face, their more common situation, with the exception of the scalp, being the limbs. The variety of scaly eruption described in the preceding paragraph as "lepra guttata" is called by a French author the *isolated* dry tetter, the common form being the *diffused* dry tetter; to these are added a third, but rare variety, characterized by a disposition to creep along the skin in a curved and serpentine course; this is the *gyrating* dry tetter; while the fourth is an aggravated state of the diffused kind, which spreads over an entire limb, and maintains its ground with the obstinacy pictured in its name, *inveterate* dry tetter. Of these dry tetter, there are some annoying and obstinate varieties which occur on separate parts of the body without affecting others; one, for example, locates itself upon the eyelids; another on the lips; a third beneath the finger-nails; and though last, by no means least, on the palms of the hands. In these situations, the disease is a cause of great discomfort, from the unsightliness which it occasions, and from the "bad name" which attaches to all eruptions upon

the hands. Sometimes, curiously enough, it pitches on the tongue.

The preceding forms of dry tetter are sufficiently distinguished from other cutaneous diseases by the swelling, or rather thickening and hardening of the skin which accompany them; by a disposition, when extensive, to crack and chap, the chaps being without humour and dry; and by the formation of scales, sometimes of remarkable construction and of large size, but at all times of considerable dimensions.

I have now to describe a scaly eruption, in which there is more or less of a dry and reddened state of the skin occurring in patches of every variety of size, and accompanied with a copious production of minute bran-like scales. This disease has received a name derived from a Greek word, meaning "bran," namely, *pityriasis*, or the *branny tetter*. It may occur on any part of the body, but, like its predecessors, exhibits a predilection for certain situations, and those, strange to say, generally the opposite to the ones selected by the other dry tetter, from which one might infer that, as all the scaly eruptions are essentially of the same nature, the difference in the characters of the branny tetter is probably referrible to a difference in the nature of the skin, or of the part on which it is developed. The more common seats of the branny tetter are the face, the scalp, the breast, the hands and feet, and the bendings of the different joints. These parts, with the exception of the palms and soles, are usually those in which the scarf-skin is thin and the skin delicate, and the same qualities render persons who have naturally a thin and susceptible skin, most subject to this disease. Hence we find it more commonly in children, women, and elderly persons, than in robust men. All the dry tetter excite some degree of itching, particularly at the period of the fall of the scale, but none so much as the branny tetter, and the latter is particularly annoying when it *affects* the hairy scalp. In this latter situation, the

itching is sometimes unendurable, and the efforts to relieve it bring down a shower of little shining scales. The most careful brushing only clears the hair for a time; they speedily collect in large quantities, and if not carefully and frequently removed, become a source of still further discomfort, and one also of much unsightliness. The annoyances which originate in this vexatious complaint have given birth to the popular expression by which the disease is known, namely *dandruff*, an appellation derived from two Saxon words meaning "itch" and "dirt." Children and elderly persons are more liable to dandruff than others. Those circular red patches of about the size of a shilling or half-crown which appear on the face, and look as though they were dusted over with little scales, are instances of the branny tetter. Sometimes they surround the mouth to the edge of the lips, and sometimes also they attack the eyelids.

There is no class of diseases more firmly rooted in the skin than the scaly eruptions, and none that more obstinately resist medical treatment. The dandruff is, however, an exception to this general accusation. Domestic treatment should be principally directed to the regulation of the health by strict attention to its rules, and especially to cleanliness. Dry friction of the eruption, exercise of the body to perspiration, and the shower-bath, conjoined with an abstemious diet, will often prove beneficial in lepra. Brushing the patches with a flesh-brush, until they become tender, and the abundant use of soap, are also important.

ANIMALCULAR ERUPTION.

The presence of animals in the skin of man, of such minute size as scarcely to be perceptible without the aid of microscopic power, is a phenomenon calculated to excite the lively interest of every zoologist, and it is one to which I very early turned my attention when pursuing

the investigations sketched out in this book. I soon had proof that there existed within the scarf-skin a parasite peculiar to man; and more extended observation led me to believe that the genus was of universal distribution among animals. I have found it in the horse, and figured it in the "Transactions of the Veterinary Medical Association." I have seen it also in the mouse, and more recently in the pheasant. From these observations, I am inclined to think that man forms no exception to the general rule, and that in a state of nature, the little creature may be found abundantly in its peculiar habitat, the human scarf-skin; but that artificial habits and manners have almost driven it beyond the pale of polite society. Occasionally, however, it makes incursions upon its ancient haunts, but is driven back with vengeance whenever it is discovered. It would seem that there are no protective game-laws for the unfortunate "curmudgeon;" "battues" are by no means infrequent under the sunny skies of Italy, and with ourselves it is much indebted to the perpetuation of the tax on soap.* The little parasite has a peculiar objection to soap, and cheap soap would go far towards exterminating it. The bath for the lower orders, which will give them clean skins and fresh linen, are also angry threatenings against a persecuted race, and should be as much as possible discountenanced by a humane and discerning public. The ladies, again, pursue it with their anger; it is known to possess an acute sense of smell, and is sickened by the cruel compounds of the perfumer. To it the "eau de millefleurs" is a thousand daggers, the "eau de Cologne" a stifling enemy, and the little bundles of lavender spikes which the country maiden hoards in her drawers, destructive poison. I trust that none of my readers will take advantage of my candour in pointing out the weak

* The tax on soap no longer exists; and the beneficial results of its removal are everywhere conspicuous.

points of the little "brigand" to torment it any further.

The parasite of the human scarf-skin is a species of *mite*, the "acarus scabiei;" the largest specimen I have examined measured the seventy-seventh part of an inch in length, that is, about the seventh part of a line, and was scarcely distinguishable by the naked eye. It is sub-globular in form; has a brightly shining opaline coat, which reflects the light and gives the animal the appearance of a very minute bladder of water, a com-

Fig. 43.†

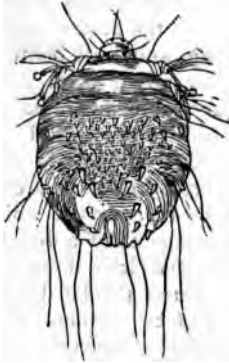
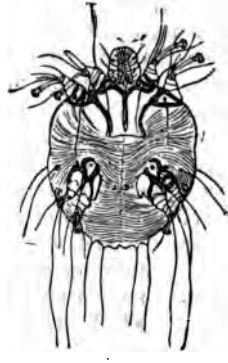


Fig. 44.†



parison suggested by its early observers; eight legs, four in front near the head, and four smaller ones underneath its body, and a strong tortoise-shaped head; indeed, altogether, it offers much the character of a tortoise, with its arched and convex back, a flat under surface, and two large legs, each almost the size of the

* The name by which it is popularly known in Gascony.

† Fig. 43.—The itch animalcule, *acarus scabiei*, viewed upon the back; showing its form and the arrangement of the spines and filaments.

‡ Fig. 44.—The itch animalcule viewed upon the under surface, showing its legs and lobulated feet.

head, on either side of the latter; the resemblance, moreover, is increased by the manner in which the legs appear to project from the front border of the body. But here the likeness ceases, for the hinder legs scarcely show themselves beyond the outline of the body, and the creature runs with considerable rapidity, raising its body above the level of its head. The skin or shell of the animal is white and opaline, and beautifully ribbed, and the head and fore-legs are covered by a layer of reddish skin, like the horny case of the insect tribe. The back presents a number of projecting spines and long porcupine hair-like filaments, set on round tubercles, and similar filaments stand out in all directions from the different segments of the legs. On the hinder legs the hair-like filaments are very long, and trail behind in walking. If we could divest our minds of a certain prejudice, we should, I think, accord to an animal such as I am now describing the epithet "beautiful," and perhaps "elegant." The zoologist cannot do otherwise, and there are parts of its organization that evince a marvellous beauty of structure; the parts to which I allude are the feet, which are composed of a delicately thin membrane, divided into three lobes,

*Fig. 45.**



and furnished with three slender tendons, which raise the surface applied to the ground, and producing a vacuum, secure the footing of the little creature, and make it difficult and almost impossible to displace it against its will. It is this circumstance which renders the animalcule a steadfast foe when it is permitted to set foot on the skin; but its tenacity of hold acts against itself when we seek to bring it out of its burrow for examination. For upon inserting the point of a needle into its hiding-place, it foolishly lays

* *Fig. 45.*—The foot and last joints of the leg of the itch animalcule.

hold upon it with its tenacious feet, and so is easily drawn forth. When placed upon the skin, the acarus sets itself to work, with its head and fore-feet, to make a hole in the scarf-skin; into this it introduces the front half of its body, and the rest speedily follows. The work of burrowing is now easy, and it soon makes a channel or burrow many times its own length, and at the end of this burrow excavates a small chamber, in which it rests from its labours, bores for its food, deposits its eggs, and perforates the roof *Fig. 46.** of its nest with a skylight for the sake of air for itself and its progeny. When it has completed its work in this little cave, it works onward and makes another, where it pursues similar occupations. Finally, it very probably escapes from its burrow, leaving the old domicile to a succession of young broods, which require a convenient situation to wax in strength before they can assume the mining habits of their progenitors.



It will occur to every one, that these evolutions, these sappings and minings, cannot take place in close proximity with so sensitive an organ as the true skin without exciting some tickling, some itching, in fact; and this circumstance has given the popular designation to the annoyance, namely, the *itch*. But the itching is not the painful symptom I have had occasion to describe in connection with the dry pimples: on the contrary, it is so far bearable, that a royal authority, James the First, is said to have remarked, that the itch was fitted only for kings, the scratching being so exquisite an enjoyment. Indeed, nomenclature is so eccentric in its gambols, that we as often hear the thing—for I can hardly call it disease after such evidence—spoken of as the “scratch” as by any other name. But the effects caused by our little engineer are not limited to the production of an uneasy sensation: the skin in its vicinity

* *Fig. 46.*—Ova of the itch animalcule.

looks more or less red, little conical watery pimples rise here and there upon the surface, and where the skin is peculiarly sensitive, or the little animals are unusually active or numerous, mattery pimples even are developed. To which, in very bad cases, when the pimples are scratched and torn, may be added open sores. It must not be supposed, however, that all these signs are necessarily present in itch; I have seen cases in which there was no other indication of the presence of the marauder than its little burrows and the ragged state of the scarf-skin which it invariably occasions. Indeed, this latter character I look upon as the only essential mark of itch, the only proof of an animalcular disorder, and in its absence the suspected disorder is certainly not itch. I make this remark, because the itch is usually regarded as a revolting and unpronounceable disorder, but I have no hesitation in declaring that nineteen out of every twenty cases of so-called itch are not the affection I am now describing, consequently are not itch, and consequently are not communicable.

The cure of itch is founded on the distastes of the little animals; I have found camphor and musk, rubbed together with olive oil, constantly destroy them in young children, in whom delicacy of skin forbade more stimulating remedies. But the most efficient of all the poisons of the *acarus scabiei* is sulphur, in almost any form, provided that it be well rubbed into the skin. This latter consideration is highly important, for the little creature is safely ensconced at the end of a long gallery, and unless the remedy be so applied as to enter the air-holes of the gallery, it is comparatively safe. To obviate this possibility, the instructions for using sulphur ointment are, to rub it in for half an hour together, the warmth of the body rendering it soft and diffuent like oil, and then the patient is to betake himself to bed with a charge of ointment remaining on the skin. One application of this kind is sufficient to exterminate an entire colony, and destroy the eggs; and a thorough

wash afterwards, with plenty of soap, in a warm bath, completes the cure. Delicate skins, however, will not bear this amount of friction, and then the ointment may be used more lightly, and repeated at bedtime, for several days.

Sulphur has obtained the credit of being a specific for itch, and so it undoubtedly is, when properly applied. What its precise mode of action may be, I am not quite sure; but I believe it to depend upon the formation of sulphuretted hydrogen within the skin, this gas being highly destructive of animal life. It must not, however, be inferred that because sulphur cures the itch, everything which sulphur cures is therefore the itch. I have heard such an argument, or rather abuse of argument, used. Nevertheless, as a stimulant is useful in all diseases of the skin that need stimulation, if the latter condition exist, it will cure them. But sulphur, besides being a stimulant, is also an irritant to delicate skins, and if its use be prolonged, may be the occasion of an eruption similar to the eruption of itch. Now, if the eruption, instead of the animalcule, should be looked upon as the disease, why, sulphur ointment will perpetuate the supposed disease, until either the skin gets accustomed to the irritation, or the treatment is changed. This is the explanation of cases of itch being months under cure, when three days is the proper average.

To apply the remedy effectually, it is important to know the common seat of the colony; this is, the thin skin and protected parts between the fingers, the bends of the wrists and elbows, the same parts on the legs, the borders of the armpits, and the front of the trunk of the body and the buttocks; and here the application should be most vigorously used, although not spared on other parts. Another necessary and important precaution is the cleansing or fumigation of all the clothes worn by the affected persons, for one of these minute creatures remaining in the meshes of the cloth will be sufficient to reproduce an entire colony. The sulphur fumigation

is, of course, the best for the purpose, and chlorine will be found a good auxiliary. The clothes should then be kept scented for some time. Latterly it has been suggested to suffocate the animalcules with chloroform; whilst all greasy and oily remedies, by obstructing their spiracles or breathing holes, are rapidly destructive.

CHAPTER XII.

WARTS AND CORNS.

THE next group of disorders of the skin carries us away from the general affections of the true skin termed inflammation, to an unnatural state of one of the constituents of the skin, namely, the papillæ; the proper designation for the state of skin which exists in these disorders being *enlarged papillæ*. We have therefore to consider the causes which are capable of giving rise to enlarged papillæ; and secondly, the effects which result from their enlargement. With regard to the first inquiry, it may be stated that the papillæ obey the law of increase observable in all other structures of the body when subjected to excitation, whether that excitation be natural, that is, dependent on actions taking place within the system: or artificial, that is, resulting from irritation which reaches them from without. The papillæ of the sensitive skin have been described in a former chapter as being uniform in length, and their length so inconsiderable as to be

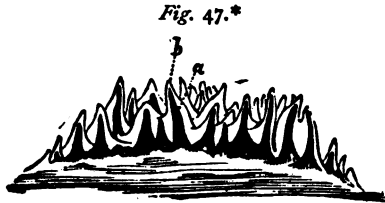


Fig. 47.*

undistinguishable to the eye, excepting in certain situa-

* Fig. 47.—Section of a wart from the armpit, magnified nineteen times. The enlarged papillæ of the sensitive skin, enclosed in conical sheaths of scarf-skin, are seen.

a, One of the enlarged papillæ. b, Its sheath of scarf-skin.

tions. Now, it occasionally happens that a small cluster of these papillæ, amounting to from five to twenty or more in number, take upon themselves to grow in length and bulk until they attain a gigantic stature, in comparison with their fellow papillæ. They may, for example, reach a line in length. Again, it will be remembered that the papillæ of the sensitive skin are covered and protected by the scarf-skin, and that the thickness of the scarf-skin bears an exact relation to the size of the papillæ. It may therefore be inferred, that if the papillæ grow to this prodigious size, they, in their turn, will occasion the production of a proportionate quantity of scarf-skin, which will form a rounded prominence on the surface of the body. Such is the reality, and the little prominence so produced is termed a *wart*. The size of the wart, in height, has reference to the length to which the papillæ have grown: its breadth depends on the number of the enlarged papillæ; and it is quite possible that the growth of a single papilla might be the cause of a wart, which would necessarily be of slender proportions. But the separate papillæ in an enlarged cluster are always more or less isolated, and each papilla acting for its own protection, throws out the material for its own separate sheath of scarf-skin; so that, in reality, the wart of moderate size is a bundle of smaller warts, the number of the latter being the number of the papillæ, and the whole being kept together by the ring of natural scarf-skin which surrounds them. This will serve to explain the well-known fact, that an old and worn wart always looks ragged at the end, as though it were composed of fibres, the fibres being the above-described sheaths; and moreover, the wart has a tendency to split in a longitudinal direction. Again, if we cut off the top of a wart, the section gives the idea of the division of a bundle of fibres; if we cut a little further, we probably divide a point from which the blood oozes; this is the extremity of the longest of the papillæ, and a little nearer the base of the wart we should cut

across several. The common situation of warts is the hands; sometimes they are produced on the face and head, and less frequently on other parts of the body. Their cause is error of function, sometimes resulting from exuberant vitality, as in young persons, sometimes from the opposite condition, as in the elderly. It is a popular belief, that the blood which flows from warts, when wounded, will cause them to grow on whatever parts of the skin the blood touches; and schoolboys, who love experiments, occasionally adopt this method of transplanting them, but without success. Indeed, there is no truth in the supposition, and if a fresh crop should be produced around a wart that has been teased by a schoolboy, the fact, when it happens, admits of a more philosophical explanation.

The wart may be regarded as the effect of an excitation acting generally from within; but instances are not wanting, in medicine, to prove that they may also be dependent on an obvious external cause of irritation.

I now turn to a growth of the skin analogous to the wart, but occasioned by an evident external cause, the cause in this particular case being either pressure or friction, or both combined. Whenever a portion of the skin is subjected to long-continued and unequal pressure, the papillæ of the sensitive skin are stimulated, and grow to an unusual size. Associated with this increase of growth of the papillæ, is the increased thickness of the scarf-skin, and this latter being the outward and perceptible effect, is denominated, according to its size, either "callosity," or "corn." When the pressure, and consequently the thickening of the scarf-skin, is distributed over an extensive surface, the state is properly a *callosity*. Where it is limited, occupying, for example, the prominence of a joint, and where, in consequence of this limitation, the effects produced are more severe, the case is one of *corn*. Callosities may occur on any part of the body where much pressure exists; on the shoulder, for instance, in persons who are in the habit of carrying

burdens; on the hands, in certain crafts; on the elbows and knees; and on different parts of the feet. Corns

Fig. 48.*



are usually limited to the feet, and are, in fact, a more severe degree of callosity. The papillæ of the central part of the corn are destroyed by

the pressure, and the sensitive surface depressed into a small cup; while the scarf-skin produced by the cup in successive layers presents free edges which have the appearance of fibres; the scarf-skin formation in the centre of the cup being the nucleus or eye of the corn. The vertical fibres of the corn have been regarded as its roots, and a corn extracted by its roots is therefore expected never to grow again, because trees, which have roots, when torn up from the ground, never re-appear. But the fact is, that these so-called roots are, in reality, parts of a shell, and they may be cut off, and torn off, and twisted off as long as the possessor lives, without curing the corn, unless the CAUSE, namely the *pressure* and *friction*, be removed. When the cause is taken away, the skin returns by degrees to its pristine state, and the corn disappears.

It will be apparent to every one, that if a shoe of a certain size be worn, and if this shoe, by its too small dimensions, and consequent pressure, occasion a corn, the corn, by increasing the size of the injured part of

* Fig. 48.—The structure of a corn, illustrated by means of a diagram in section. *a, b, b*, The sensitive skin surmounted by its papillæ. *c*, The scarf-skin of the central part of the corn, which is fibrous; this is the part popularly termed the root of the corn. *d, d*, The thickened scarf-skin, covering the smaller papillæ of the declivity of the corn. The scarf-skin is seen to be laminated, and the broad dark streak, *e*, is the discoloured remains of a stratum of blood, poured out when the tissue of the streak rested on the papillæ.

the foot, will necessarily increase the pressure on the already irritated skin. Pain and inflammation follow this injury, and the least mischief that can happen is the enlarged growth of the papillæ, more blood than natural being now habitually sent to them. But, on a particular day, when vanity triumphs over comfort, and the "light fantastic toe" has been more than usually wronged, blood bursts from the pores of the sensitive skin, and the next morning, when the corn is inspected, it has the character of a bruise. The doctor is sent for, a poultice put on, rest enjoined, and in a few days all is again well; too well, in fact, to allow experience even a whisper. A gay party again does slaughter to the unfortunate corn, but similar means restore it as before. Now, I have had the opportunity of examining a corn which had been thus maltreated, and its section is precisely that of the geological section of a stratified mountain, stratum following stratum of various hues, from a delicate yellow to the deep black of dried blood, each black line being the chronological memorial of a white day in its owner's existence.

I must not dismiss the subject of corns without advertising to another torment, and one less easily guarded against than the preceding, namely, the *soft corn*. The soft corn occurs between the toes, and is produced in the same manner as the common corn; but in consequence of the moisture existing in that situation, the thickened scarf-skin becomes saturated, and remains permanently soft. The soft corn, again, rarely becomes convex outwardly, but presses severely on the deep tissues, and gives little indication, as regards size, of the torment which it occasions. It is no uncommon thing to find a blister formed under the soft corn, and its fluid oozing through a small round aperture in the centre of the latter. Sometimes, also, the soft corn is followed by a deep and painful sore, and inflammation of the foot: and on one occasion I saw a soft corn which had eaten into the bones, and produced inflammation of a joint.

Diseased bone originating in soft corns is no infrequent occurrence.

With such results as these in their remembrance, my readers will possibly be disposed to agree with Daniel Turner, that—"Whoever has been soundly plagued therewith, and who almost is not at one time or other? will not think it trifling that we spend some time in describing them, much less that we propose remedies conducive to ease the pain or entirely remove them: for, surely, it was a noble thought of the well-deserving Sydenham, that if one man was to spend his whole lifetime in finding out a certain cure for corns, he would deserve well of posterity, and might be said sufficiently to have served his generation." The cause of corns as explained by this author is less convincing:—"The cause is vulgarly supposed a crass, melancholy, or pituitous humour, which, being other ways useless, is formed into these preternatural bodies. Platerus affirms, with more reason, they are made of the nutritious humours destined for the use of the skin."

The treatment of warts is to pare the hard and dry skin from their tops, and then touch them with the smallest drop of strong acetic acid, taking care that the acid does not run off the wart upon the neighbouring skin, for if it do it will occasion inflammation and much pain. If this practice be continued once or twice daily, *with regularity*, paring the surface of the wart occasionally, when it gets hard and dry, the wart may be effectually cured. A gentleman who takes much pleasure in philosophical pursuits, informs me that he removed an entire crop of warts from his knuckles and fingers by subjecting them to a succession of sparks from one of the poles of an electrical machine. He was in the habit, as is usual, of trying the amount of electric fluid collected in his machine by placing his knuckle near the brass knob, and receiving a spark. Observing that an odd sensation was produced whenever the spark struck a wart, he was tempted for amusement to give them a

round of discharges. When his attention was next directed to his hands, he found to his surprise and satisfaction that all the warts had disappeared. With respect to other modes of treatment, I may say, with Turner, "I shall not stay to enlarge upon some other remedies, having little other than direct foolery or superstition for their foundation: such as cutting a certain stick with so many notches, the stealing of beef to rub them with, and, after, burying the same in the earth."

The treatment recommended for warts will keep corns under, in spite of pressure; but there is a knack in paring them, which I will now explain. The end to be gained in cutting a corn is to take off the pressure of the shoe from the tender surface of the sensitive skin; and to effect this object, the summit of the corn must be cut in such a manner as to excavate it, the edges being left to act as a bolster to protect the central part, where the greatest amount of sensitiveness exists. The professional chiropodist effects this object very adroitly; he generally works around the centre, and takes out the fibrous portion in a single piece. He digs, as he says, for the root. When the corn is of small size, and has not yet risen to the height of being a serious annoyance, the best of all remedies is a piece of soft buff-leather spread with adhesive plaster, and pierced in the centre with a hole of exactly the size of the summit of the corn. If it can be procured, a better substance still for spreading the plaster upon is "amadou," or "German tinder," commonly used for lighting cigars, and kept by the tobacconists. This substance is softer than leather, and does not become hard and ruck up, as the latter does after it has been on for a short time. The soft corn is best relieved by cutting away the thick skin with the point of a pair of scissors, avoiding to wound the flesh, then touching the base with a drop of friar's balsam, and wearing habitually a piece of cotton wool between the toes, changing the cotton daily. Caustic,

as an application for the cure of corns, is a remedy which must be used with caution, and would be better left altogether in the hands of the medical man. The liniment or compound tincture of iodine is a better and a safer remedy, and may be painted on the corn with a camel's hair brush daily after paring away the dry harsh crust which the previous application has occasioned. For callosities the iodine treatment is the best that can be followed.

CHAPTER XIII.

DISORDERS OF BLOOD-VESSELS AND NERVES OF
THE SKIN.

MOTHERS' MARKS.

UNDER the title of abnormal state of the cutaneous vessels, are to be described certain marks and spots on the skin, known by the name of *mothers' marks*; technically, *nævi*. To explain the precise nature of these marks, I must refer my readers to page 26, in which the capillary vessels, and the rich network which they form in the tissue of the true skin, are described. The so-called mothers' marks are nothing more than excessive dilatation of these capillary vessels on a spot of skin varying in size from a mere point to a patch of several inches square. The simplest form of *nævus* is that which is called the "spider-mark;" it is a small red point, from which a number of little straggling vessels radiate on all sides. This mark is usually developed on the face, and not unfrequently on the cheek; sometimes the mark resembles in size and colour a red currant; sometimes a cluster of currants; sometimes a strawberry or raspberry; and sometimes is uniform and of considerable extent, and is compared to a lobster. These marks are generally slightly raised above the level of the surrounding skin, and are subject to much variety in tint of colour, in accordance with the quantity of blood flowing through them. Thus, when the circulation is naturally active, or the individual is excited by moral causes or exercise, the marks are bright-red in colour; while, on the other hand, in cold

weather, or under a depressed state of the mental powers, they become claret-coloured, or bluish, or livid. Again, there are some which are permanently livid and dark coloured, and are styled black currants, blackberries, sloes, unboiled lobsters, and other fantastic names. These blue marks are such as have a more dilated state of the vessels, and a slower current of blood, than the red kind, and consequently afford time for the transition of the blood from its scarlet arterial tint to its venous and dark-coloured hue.

The notion of these marks having any connexion with the imagination of the mother is unproven; so that husbands need be under no apprehension of seeing a red dab on their child's forehead, if their ladies choose to have an ungratified longing for a feast of peaches in mid-winter. Neither need mothers wrong themselves by idle reproaches, from supposing that any unchecked desires on their part have become a cause of deformity to their offspring. They have merely to attend to the four great cardinal rules of health so often spoken of in this book, and cultivate a calm mind; Nature will do the rest. The subject of treatment I may dismiss summarily; cases of this kind should be early submitted to the judgment of the medical man, for the marks are apt to enlarge; and if they increase to any magnitude, they get beyond medical relief, and are sometimes fatal. They should on no account be meddled with or teased by frequent examination. They will sometimes subside by the use of a gentle degree of pressure made with a piece of soap-plaster, spread on leather, which has the additional advantage of keeping them out of sight and observation. When hot and painful, and attended with throbbing, the evaporating lotion will confer temporary relief. There is nothing in the observation of Turner, that "the time of extirpation is the season when they look palest, lie flattest and softest, and are least troublesome." His further remark is amusing, for, says he, "some of these, like the fruits they resemble, have their

times of bloom, ripening, and languishing, though never quite dying or falling of themselves."

DISORDERED STATE OF THE NERVES.

The nervous system, as respects its natural and ordinary functions, is enveloped in mystery. We are acquainted with its laws of action, with the results of that action, and latterly have acquired some new information with regard to its structure. But all the knowledge that has hitherto been obtained, tends only to prove to us how utterly insignificant are our powers of investigation, and how futile our attempts to comprehend the secret workings of the handicraft of the great Architect of the universe. It has been conceived that anatomy and physiology have a tendency to bias the mind of the student of this branch of science in favour of materialism. This is a reflection on the works of the Creator; for to suppose His works capable of giving birth to such a thought, is to imagine a grossness of composition which the real student knows to be incorrect. How opposite is the truth! The material composition of the nervous system may be said to be thoroughly well known; its actions are also known. The brain, for example, is the material abode of the soul, of thought, sensation, and will; then there are nerves of sensation, nerves of motion, and nerves of special perception. The judge of his fellow-man who has the hardihood to stigmatise him in the eyes of the ignorant, by applying to him the appellation "materialist," will probably infer, that science distinguishes a particular apparatus for thought, another for sensation, another for will, and another for motion. How opposite is the fact! One simple, colourless fluid, hardly dissimilar to the colourless element of the blood, is the agent in the hands of the Almighty for the development of these extraordinary powers. The same material element develops the most opposite results. Can an

anatomist and physiologist, then, knowing this fact, be a materialist ?

Everything which relates to sensation is dependent on the nervous system, or, more properly, on the nervous fluid : and, in obedience to the laws of life, the nervous fluid must have a standard of health to render it capable of executing its proper functions. If from neglect of the rules of health the humours be foul, can we expect healthful sensation ? If the nervous fluid be poisoned by alcohol, can we expect the sensations to be undisturbed ? If the nervous fluid enclosed in its protective tubes be surrounded with tissues in an active state of inflammation, can we expect other sensations than those of pain ? The answer is evident. Now, we know from observation, that if a part of the body containing nerves, and consequently nervous fluid, be charged with caloric before the fire, the sensation is one of heat ; and that if ice be substituted the sensation is said to be cold. But we have reason to believe that the nervous fluid takes on a similar state to that caused by heat and cold, without the presence of either of those agents ; for in sickness we have sensations of chill, while the body is unnaturally hot, or the person is in a high temperature, and *vice versâ*. From this we learn, that what we call sensation is a state of the nerves, or rather of the nervous fluid. But all our investigations fail in discovering what that state is. There can be no doubt that it is a disordered state when the sensation is painful ; and the probability is, that the state is healthful when the sensations are agreeable. Now, from some unexplained cause, it too frequently happens that a very distressing state of itching takes possession of the skin, either on part, or on the whole surface. This is obviously a morbid sensation, depending on a present morbid state of the nervous fluid. But what is the cause, and how can we remedy it ? The former question can only be answered by generalities having reference to the health of the organization, such as deranged digestion, disor-

dered functions of other kinds, &c. As respects the latter, we examine all the functions through, and if any be out of order, we endeavour, by general means, to set them right. And with regard to the local inconvenience, experience aids us by recording certain substances which have a decided effect in calming such irritation. Such are, for example, vinegar, diluted lemon-juice, butter-milk, tar, and the evaporating lotion.

Of all the kinds of local pain there are few more severe than continued itching of a degree such as to prevent sleep; indeed, it is sometimes so unbearable as to occasion frenzy, and render life a burden. A poor old man afflicted in this way, with wretchedness and misery depicted on his countenance, often comes to me to ask relief, and tell his piteous tale. The relation between physical and mental suffering, in other words, between the surface of the body and the brain, is easily comprehended by the physiologist. The brain and nerves form one continuous and connected system, and impressions, whether of pain or pleasure, although made on a part, are, if they be vivid or lasting, speedily, and often instantaneously, communicated to the whole; hence the expressions "thrill of pleasure," "thrill of enjoyment," "thrill of horror," &c. It is in this way that a painful irritation of the skin may occasion frenzy, convulsions, and even death. Indeed, it is not even necessary that the impression should be painful, for we know that death may be caused by prolonged tickling. I recollect hearing of a man in Paris, who murdered several wives by a process into which tickling entered as a principal part. At length he excited the suspicion of the brother of his last wife, and the brother determined to watch his proceedings. On a particular night he hid himself in a cupboard of the room in which the man and his wife slept. The husband had prevailed on her to allow him to bandage her limbs, and the brother was surprised at the immoderate laughter of his sister. After a time the laughter became so singular in its tone, that he made an

effort to look through an opening over the door; and he then beheld the poor woman, bandaged tightly up to the waist, her feet fastened together, and her arms to the sides of her body; while the husband was tickling her feet. She had now almost lost the power to laugh, and in a few minutes must have died, but for the timely intervention of her brother.

When a part of the nervous system is thrown into a disordered state by a cause acting on a distant part, the action is expressed by the term sympathy: thus the convulsions of children occasioned by cutting the teeth, are spoken of as a sympathy between the nerves which supply the teeth and the nerves of motion of the convulsed regions of the body. In like manner, the convulsions accompanying locked jaw, are an effect of sympathy between the irritated nerves of the wounded part of the body, and the nerves of the parts in a state of convulsion or spasm. These instances might, if necessary, be multiplied a hundredfold, but it will be more to the point, if I adduce one or two examples in which the skin is more immediately concerned. In the course of the past year a little child was one evening standing before the fire, warming its hands, when a small quantity of boiling water was suddenly ejected from the spout of a tea-kettle, and fell upon its chest, producing a scald of about the size of the palm of its own hand. A blister rose upon the scalded surface, but there was nothing of unusual severity about the case. In eleven hours from the time of the accident, the sympathy between the injured skin and the nerves of motion gave rise to convulsions, and in nineteen hours the child was dead. Now on first hearing of a case of this kind, one is disposed to exclaim with wonder at the occurrence of death from so trivial an accident; but a cooler judgment reminds us of convulsions and death accompanying the simple operation of cutting the teeth. This is the point of view from which must be regarded the death of the soldier at Hounslow, from the effects of military flogging. In him

the cause was neither the cutting of a tooth, nor a burn the size of a hand, but a bruising and laceration of the skin of the back, from the nape of the neck down to the loins. A state, in point of fact, involving the two conditions of an extensively injured surface and a prolonged painful irritation (the punishment was continued for half an hour). After death the existence of internal convulsions was proved in this man, by the disorganization of his heart, and by the rupture and destruction of several of the muscles of his back.

In a previous chapter, page 39, I have mentioned as disorders of sensation, the feelings of tingling, smarting, pricking, shooting, creeping, tickling, burning, scalding, &c. A singular example of one of these sensations, namely, creeping, has several times come before me. I have been consulted by patients for the destruction of living creatures with which they conceived themselves infested. They have never seen any insect, they have only felt them running along their bodies. A young lady, a governess, who suffered in this way, was in the most distressing state of mind; she had changed her lodgings time after time, but the insects ever went with her, and she was afraid of going near the children it was her business to instruct, lest she might communicate her malady to them. I pressed her as to her having seen any of the creatures; she said she had; I then requested her to bring me one or more, if she should catch them, that I might examine them; she was long before she returned, and when she did, she brought three meagre specimens of a small harmless insect, commonly found in the crevices of old wood. She had caught them on her bedroom table. For herself, a cleaner or purer being could not exist; and I had the satisfaction of receiving her thanks for being cured, some weeks afterwards. Then I saw, in consultation, a gentleman who believed his head peopled with an insect multitude; he could feel them running hither and thither; he could see his hair moved by them, but he

had never discovered an animal of any sort, nor could any one else. A gentleman, one day sitting before me, with his chest bared, exclaimed, "There, I feel one running across my breast now." I looked, there was nothing to be seen: it was a visionary ghost; no small annoyance, however, to be haunted by such ghosts. On more than one occasion, I observed that the direction of the creeping or running sensation corresponded with that of the distribution of the nerves, which were the real cause, the feeling being a ghostly sensation. Very commonly the sensation affected the hairs of the limbs, and seemed to give a preference to those organs as their seat of manifestation. A gentleman, a student in the University of Oxford, who has been a great sufferer from this discomfort, came to me saying, that he was much better, so far as the insects were concerned, but that he suffered now from a deeper sensation of motion, in a word, from the feeling of the normal movement of the bowels, the peristaltic motion, as it is called. Now, happily, we are so constituted, that in a state of health we have no sensation of the internal movements of the body, as of the heart, the lungs, the stomach, the alimentary canal, the muscles, or of the motions of the blood in its vessels. Whenever, from unhealthy action, we are made aware of such motion, the condition is one of disease; being either a diseased condition of the parts which create the sensation, or an over-sensitive, and, consequently, a disordered state of the nerves and nervous system. The latter was the case in the last-named gentleman; he said of himself, that he felt un-hinged, unfit for his profession, unfit for everything; he was restless, unsettled, unable to remain in one place for any time, and unable even to sit still. In such a person, we should not be surprised to find unnatural and morbid states of sensation, such as creeping, nor that those feelings should degenerate in time into sensations of a more painful character.

CHAPTER XIV.

DISORDERS OF COLOUR OF THE SKIN.

THE human family exhibits two remarkable extremes in the degree of colour of the skin, these extremes, in their natural state, having reference to opposite conditions of solar light and climate. Between the physical extremes on the surface of the globe, every degree of variety of tint is observed, and similar states are reproduced under the influence of differences of constitution and health. In the chapter on the scarf-skin, I have already pointed out the principal physiological changes which result from augmentation and diminution of pigment; I may therefore confine myself in this place to those excessive alterations which, from their unsightliness, are regarded in the light of disease. Under the head of augmentation of pigment, we have the formation of patches of a dark colour and irregular shape on any part of the surface of the body, whether exposed to the stimulus of the sun, or covered by the dress. When these spots are more or less raised above the surface of the surrounding skin, they are called *moles*, and they constitute, in the popular mind, one of the kinds of "mothers' marks." Moles exhibit every variety of size, form, and tint of colour, and are generally covered by a pretty thick crop of dark-coloured, bristly hairs.

Sometimes, however, there is no elevation of the surface, and the discoloured spot, excepting in tint of colour, presents no difference whatever from the neighbouring skin. These spots offer every variety of size and number, and occasionally overspread the entire

body. In my work on "Diseases of the Skin," several instances of the latter kind are recorded. In one case, that of a lad of seventeen, the skin was originally fair, his hair being light-coloured, and eyes grey; but when he presented himself to the physician, "his appearance was that of a dark-coloured gipsy," and he entertained the apprehension that he was turning into a negro. This change had been in existence not more than fifteen months when the above observation was made. Another case, which fell under my own notice, occurred in a young woman, twenty-eight years of age. At the time of my seeing her, she had the appearance of an East Indian; the blackness had been two years reaching its present height, and occupied the whole of her body; with the exception of her feet and the legs for a few inches above the ankle. Her eyes were black, and her natural complexion that of a brunette. The darkest parts of her body were the back of the trunk and the back of the hands and arms. On the face, the red tint of the cheeks blended with the black, and the yellow of the forehead and nose struggling for mastery with the deeper tint, gave her complexion a singularly Indian appearance. The peculiarity of her colour was heightened by the extension of the blackness to her lips and in patches to the interior of the mouth. Even the teeth had a bluish tint, the lips and teeth seeming as if stained by eating black cherries. The white of her eyes was peculiarly white and brilliant, and offered a strong contrast to her black skin.

In the first of these cases, no cause could be detected; the second, namely, that of the young woman, was the result of typhus fever: while, in a case which was communicated to me by Dr. Sarti, and which I will now relate, the cause was fright. Pietro Nanni, a peasant, of St. Martino al Castagno, fifty years of age, having unluckily got into a fray, was fired upon, and put in danger of his life. The shock caused a severe illness, and three months afterwards, his skin gradually darkened,

until it became quite black. The change was first perceived on his cheeks, and thence extended over the entire body, being greatest on the sides of his chest, the inner side of his legs, and the hands.* In my portraits of "Diseases of the Skin," I have recorded an instance of partial blackening of the skin, producing a mottled appearance of a very remarkable character. The seat of the change was the legs, and the cause, constitutional disease.

The reverse of this condition, namely, diminution of pigment, gives origin to the state of skin which is met with in the Albino, and which also occurs on parts of the body in patches of various dimensions. In Europeans, these white patches differ but little from the tint of the surrounding skin; but in tropical countries they are more striking, and for that reason, probably, more frequently observed. In Hindostan, where these patches are not uncommon, and where they are liable to spread over the entire body, they commence with some degree of itching and pain, and when fully formed, are attended with an insensible state of the skin, showing that the cause lies deeply; very probably in the nervous system. In a young lady, whom I saw lately, these white patches were the sequel of scarlet fever, and were so extensive as to be mistaken by her friends for the sound skin, the deeper tinted skin around being regarded as discoloured spots. When they occur in a more distinctly isolated form, and in a person of dark complexion, the patches are more evident, and become a source of serious annoyance; such an instance I have now before me,† and I regret to add that they have been the cause of much mental disquietude.

Complete Albinism, except in so far as the snowy

* The appearance of the hands of this man is preserved by Dr. Sarti, in one of the wax figures of his famous museum, which was exhibited several years since in London.

† An accurate representation of this case will be found among my portraits of "Diseases of the Skin."

whiteness of the hair is concerned, is less remarkable in the European than in the African. An instance of the latter kind is to be frequently seen in the leading thoroughfares of London, in the person of a tall sickly-looking man, who styles himself, Henry Alexander Commotius Stewart, the African Albino. This man was born in New Providence, of black parents, his father being a negro from Guinea, and his mother a native of the island of Antigua, descended from African slaves. His four brothers and sisters were all black. He is tall, has a complexion like that of a dead leaf, sprinkled over with large and irregular freckles; light-coloured eyes; and a light red woolly hair, surmounting features obviously bearing the African stamp.

The colouring principle of the skin occasionally offers varieties in its tint, dependent, probably, on difference of chemical composition, such difference being referrible to states of constitution of the individual. Thus, when persons of a light complexion are exposed to the influence of the sun and heat during the summer season, numerous round or oval-shaped yellow spots, similar in appearance to stains, are developed in the skin; these spots are popularly termed "freckles," or *summer freckles*, and generally disappear during the darker and colder months of the year. There are, however, other freckles which have no dependence on light or heat, which are equally vivid in the winter as in the summer season, and are, in point of fact, of constitutional origin. These are the *cold freckles*; they offer some variety in colour, being sometimes brightly yellow, and sometimes green, and are not confined, like the summer freckles, to persons of a light complexion. Another discoloration, occurring in the form of patches of various tints of hue, are "saffron spots," "sulphur spots," and "liver spots." In essential nature, these are the same as freckles, but they are not always permanent. They often appear suddenly under the influence of general disturbance of the *system*; they are attended with some degree of itching,

and they fade away gradually when the cause which excited them is removed.

Besides the positive discolorations of the skin, the scarf-skin undergoes a change of much greater importance, so far as the beauty of the skin is concerned, than those above described as being of more frequent occurrence. I allude to that alteration in the composition of the scarf-skin which destroys its transparency, and, by the production of an excess of pigment, renders it grey and opaque. It is this modification of the scarf-skin that gives rise to the sallow, muddy, and dirty complexions that we see so frequently in large cities, a discoloration that no washing will disturb, on account of the cause lying in the system of the individual, and requiring to be removed by attention to the general health. There are certain constitutional diseases in which this state of the scarf-skin is so remarkable as at once to point out the nature of the affection, and serve as a valuable guide to their detection, and in many instances the muddy skin is almost the only sign indicative of disordered health. If anything were wanting to mark distinctly the reciprocal influence of the skin and internal organization, it might be found in this occurrence of daily life and common observation.

CHAPTER XV.

DISORDERS OF THE PERSPIRATORY SYSTEM.

THE disorders of the perspiratory system, though involving important results with regard to health, and, in some instances, fatal diseases, offer so little to interest the general reader, that I may dismiss them with a few passing remarks. The perspiratory apparatus is one of the organs of the body by which unnecessary and noxious elements are separated from the blood; therefore, any interference with its action is necessarily accompanied with disturbance of the circulating fluid, and also of the organs which co-operate with the skin in its functions. The influence of checked perspiration is instantaneously perceived in the alteration of the product of the kidneys, while excess of action of the skin is no less injurious to the system, by causing exhaustion of the nervous powers. Health lies in the equilibrium, and the duty of the individual to himself is to pursue that state as nearly as possible. Excess of perspiration is undoubtedly a state of disease. "Hoffman makes mention of a very old man, subject to continual perspiration, so that his whole nourishment passed through the pores." Willis notices the case of a lady, "whose perspirations were so prodigious" that basins were set beneath her "to receive the trickling humour." And I remember looking on with wonder not very long since at the hollow of the hand of a young lady, which became filled with fluid as she held it out for my inspection.

Defect of perspiration is equally a state of disease, as we find illustrated in the case of a "gentleman near

Leyden, who being much addicted to the study of astronomy, and spending very many nights in star-gazing, had, by the nocturnal wet and cold temper of the air, in such manner obstructed the pores of his skin that little or nothing exhaled from his body; which appeared hence, because that the shirt he had worn five or six weeks was then as white as if he had worn the same but one day.”* The habitually dry skin is not less a state which occasions excessive action of other organs of the body than the habitually moist skin is a cause of other ailments affecting the nervous system, and both call for observation and strict attention to the laws of health.

Partial perspirations are sometimes a cause of great inconvenience and annoyance, and may affect any region of the skin. A gentleman whom I attended lately for a severe gastric disorder, called on me one morning, with rills of perspiration running down one side of his forehead and face, the opposite side being perfectly dry; and a case is related by a German author, in which the disorder affected one half of the entire body. In illustration of this peculiarity, an eminent actor told me the following anecdote of himself. When a young man, starring in America, he had one night, in the summer-time, been playing in a tragedy, in which he was violently heated, and had scarcely time to cool, when he was called to come on the stage again as Sir Archy MacSarcasm, in Macklin's comedy of “Love à la Mode.” The make-up for the latter character required that he should convert his features by means of paint into those of an old man. In the course of the play he was struck by perceiving himself “the cynosure of neighbouring eyes,” particularly those in the front rows of the pit, and concluding that it must be the excellence of his acting which was attracting so much attention, he felt highly flattered, and exerted himself to the utmost. From time to time, however, he was startled at the bursts of laughter and

* Philosophical Transactions. Abridgment. Vol. ii.

applause falling in the wrong places, and was thoroughly puzzled at the unusual sensation he was creating. On retiring to his dressing-room, after making his best and most graceful bow to an hilarious audience, the mystery was explained: it was not his brilliant acting *alone* which had brought down such noisy honours on his head, but the drollery of his face, one half of which was washed clean of its wrinkles by partial perspiration, and displayed the juvenile features of twenty; while the other half exhibited the care-worn lines and withered seams of eighty. In this case, while one half of the face was affected in this peculiar manner, and the other half was dry, his chest was acted on in a precisely opposite manner, the perspiratory side being reversed. At a later period of his life, the perspiratory action ceased over the entire body, and concurrently he suffered bitterly in his health.

At other times, and more frequently, the hands and the feet are the parts principally attacked. The removal of this inconvenience is a problem of much difficulty; but one that I should not hesitate to solve were the after effects of the check to the secretion the only question to be considered. It would be easy to find a sufficient substitute, whatever our forefathers may have thought or said to the contrary. Thus Panarolus remarking that perspiration of the feet doth very much torment people, continues, "for which I can tell them a speedy remedy; namely, if they put some powder of myrtle into their linen socks; but let them have a care they fall not into worse disease by the cure of this, as I have often seen; for this excretion preserves from many diseases, and should rather be promoted than any ways checked."

Alterations of a remarkable kind in the chemical nature and physical qualities of the perspiration are also occasionally met with; such as changes in colour to green, blue, black, yellow and red; changes in odour, &c. One or two cases are on record in which the odour of the *perspiration* resembled musk, another, in which it was

like the fumes of sulphur ; in an insane person, whom I lately saw, the odour resembled that of the mouse ; and I have several times been consulted by persons in whom the odour was like that of onions or garlic.

The red perspiration owes its colouring principle to blood, and the occurrence should rather be regarded as one of oozing of blood in a diluted form through the skin, than a true perspiration. I had lately under my care a young lady, in whom a red-coloured fluid distilled from five circular spots on the face, one being in the centre of the forehead, one on each cheek, and one on the chin. In a case reported in some old Medical Essays, an infant is said to have bled for several days at the shoulder, waist, arms, and finger ends. And in a young woman affected in a similar manner, blood escaped at different times from the ears, fingers, toes, corner of one eye, chest, foot, hands, chin, and tip of the tongue, "and all this in a fortnight's time." The skin in both these cases being unbroken and perfectly sound.

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applause falling in the wrong places, and was thoroughly puzzled at the unusual sensation he was creating. On retiring to his dressing-room, after making his best and most graceful bow to an hilarious audience, the mystery was explained: it was not his brilliant acting *alone* which had brought down such noisy honours on his head, but the drollery of his face, one half of which was washed clean of its wrinkles by partial perspiration, and displayed the juvenile features of twenty; while the other half exhibited the care-worn lines and withered seams of eighty. In this case, while one half of the face was affected in this peculiar manner, and the other half was dry, his chest was acted on in a precisely opposite manner, the perspiratory side being reversed. At a later period of his life, the perspiratory action ceased over the entire body, and concurrently he suffered bitterly in his health.

At other times, and more frequently, the hands and the feet are the parts principally attacked. The removal of this inconvenience is a problem of much difficulty; but one that I should not hesitate to solve were the after effects of the check to the secretion the only question to be considered. It would be easy to find a sufficient substitute, whatever our forefathers may have thought or said to the contrary. Thus Panarolus remarking that perspiration of the feet doth very much torment people, continues, "for which I can tell them a speedy remedy; namely, if they put some powder of myrtle into their linen socks; but let them have a care they fall not into worse disease by the cure of this, as I have often seen; for this excretion preserves from many diseases, and should rather be promoted than any ways checked."

Alterations of a remarkable kind in the chemical nature and physical qualities of the perspiration are also occasionally met with; such as changes in colour to green, blue, black, yellow and red; changes in odour, &c. One or two cases are on record in which the odour of the *perspiration* resembled musk, another, in which it was

like the fumes of sulphur ; in an insane person, whom I lately saw, the odour resembled that of the mouse ; and I have several times been consulted by persons in whom the odour was like that of onions or garlic.

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polish, and also the laminated arrangement of the latter, the laminæ corresponding with the plane of the surface which produces them. It sometimes happens that the aperture of these cavities is so large as to admit the head of a large pin, and then some of the matter which they contain may be drawn out; and sometimes a portion is pushed out by the formative force within, and forms a prominence on the surface similar in its nature to the horny, bristle-like spines mentioned in the preceding paragraph. Such collections as I am now describing may be distinguished from other cutaneous disorders by the name of *accumulations* of the oily product of the skin.

Accumulations of the oily product of the skin naturally give rise to an enlargement or wen of greater or less magnitude, and these tumours are distinguished from others by the presence of an aperture through which the contents of the swelling can be ascertained. But they do not always retain a passive character; in an instance before me the substance collected to such an extent as to render the skin covering it as thin as tissue paper; the skin then gave way, and the substance protruded through the opening. I need hardly say that this was not accomplished without much pain and suffering to the poor woman in whom it occurred. The change which next ensued was, however, the most remarkable. As the matter was forced further and further through the artificial aperture formed in the skin, it dried by exposure to the air, and became as hard and dense as the fingernail, or horn. It was in this state when I first saw it: a decided horn, two inches and three-quarters in length, by one inch and a quarter in thickness, growing from the front of the thigh, and firmly implanted in the skin. I had never before seen so complete a human horn as this; and misled by the imperfect accounts of the nature of horns, contained in medical works, I proposed its removal by the knife, to which she very willingly assented: for the thing was an excessive annoyance to her, catching

against her clothes, very frequently meeting with knocks, and then giving her much pain. The operation was speedily over, and she soon got well; but had I known as much of the nature and origin of the growth, as I learnt from its examination after removal, the pain of an operation might have been spared her. I trust, however, that my experience will serve others as well as myself at a future time, and with that view I communicated the case to the Royal Medical and Chirurgical Society, by whom it was published in the twenty-seventh volume of the Society's Transactions. In the paper alluded to, I have shown the analogy which subsists between the oily product of the skin, scarf-skin, and horn, and have proved that the growth in question was not merely horn-like, but was actually horn, both in intimate and coarser structure.

Having in the above case had my attention so forcibly drawn to the occurrence of horn in the human being, I prosecuted a search into the literature of the subject, and succeeded in collecting no less than ninety recorded instances of horny growths. They appear to have been more prevalent in the earlier than the present times, probably from scarcity of soap; and some curious speculations were excited in the minds of the older physicians by the observation of them. Rhodius, for example, met with a Benedictine monk who had a pair of horns, and was addicted to rumination; and Fabricius having seen a man with a horn growing from his forehead, whose son ruminated, is willing to give the father the credit of transmitting this disposition to the son by virtue of the ruminant character which he bore so conspicuously on his head. The most remarkable case of human horn on record is that of a Mexican porter, named Paul Rodriguez. The horn was situated on the upper and lateral part of the head; it was fourteen inches in circumference around its shaft, and divided above this point into three branches. Voigtel cites the case of an old woman who had a horn with three branches growing

from her forehead ; and M. Dubois had a woman under his care, in the Hospice de Perfectionnement, with a horn that measured seven or eight inches in diameter at its base, and was six inches in length. The length of the horn in some recorded instances is also remarkable. Sir Everard Home saw two cases, in both of which the growth measured five inches, by one in diameter. They were coloured, and had the appearance of isinglass. In one case, the horn was fourteen years growing. Dr. Gregory mentions a horn which was removed from the temple of a woman in Edinburgh, that measured seven inches. Dr. Chariere, of Barnstaple, saw one growing from the nape of a woman's neck, which measured seven inches. A horn in the British Museum is said to measure eleven inches in length by two and a-half in circumference ; and Bartholin, Faget, and several other writers, have

*Fig. 50.**



spoken of horns twelve inches long. A singular instance of horn is mentioned by Cruveilhier, in his "Anatomie Pathologique," as falling under the notice of Dr. Faget, of Bordeaux. The subject was a Mexican Indian, and

* *Fig. 50.*—A horn, in my possession, which grew on the head of a man, during a period of nine years. It measures more than four inches and a-half in length, and is two inches and three-quarters in circumference.

the horn was situated on the left flank. After growing for three years, it had attained a length of four inches by seven or eight inches in circumference, and was sawn off by the patient's son; after another three years, it was submitted to a similar operation, and, at the end of nine or ten years from its first appearance, was extirpated by M. Faget. The portion removed by M. Faget, with the two portions previously cut off, amounted in length to about twelve inches.

In a scarce tract, in small quarto, published in 1676, there is "a brief narrative of a strange and wonderful old woman, that had a pair of horns growing upon her head." "This strange and stupendous effect," continues the pamphlet, "began first from a soreness" of the back part of the head, where the horns grew. "This soreness continued twenty years, in which time it miserably afflicted this good woman, and ripened gradually into a wen near the bigness of a large hen egg, which continued for the space of five years, more sadly tormenting her than before, after which time it was, by a strange operation of nature, changed into horns, which are now in show and substance much like ram's horns, solid and wrinkled, but sadly grieving the old woman, especially upon the change of weather." The horns were shed four times; the first "grew long, but as slender as an oaten straw;" the second was thicker, and on the fall of the latter, two were produced, which were broken off by accident. One of these was presented to the King of France; the other is stated to have been nine inches long, and two inches in circumference. The periods of shedding were three, four, and four years and a-half. There is an engraving of this woman in Dr. Charles Leigh's "Natural History of Lancashire, Cheshire, and the Peak of Derbyshire." Her portrait and one of the horns are in the Ashmolean Museum, and another of the horns in the British Museum.

Grubs and accumulations are both of them due to the collection of the oily product of the skin within the oil-

tubes, attended, in the latter case, with a remarkable state of expansion of the tube. There is, however, another disorder belonging to this group, in which, as in the preceding, the oil-tube is filled; but, in addition, the tubes of the little gland at its base are also distended, and the swollen gland rises up to the surface of the skin, and forms a small tumour, generally about the size of a currant. The resemblance to a currant is not confined to size alone; it is very like one in shape; there is the flattened and indented summit, resembling the point of attachment of the corolla of the currant, lines down its sides marking its division into segments or lobes, and the smooth polish of the distended skin. Its colour is usually lighter than the surrounding skin, from the whiteness of the contained substance, which may sometimes be seen through its thinned walls, and its base is more or less narrowed, so as to give it the character of being independent of the skin. The contents of these little tumours, as may be inferred from their impaction in the tubes, are denser than natural, the cells are more distinct, and apparently filled with a dry granular substance, and retain their oval shape, instead of being, as in the natural state of the oily substance, collapsed and broken. If the little tumour be pressed between the fingers, it frequently happens that a small quantity of milky fluid oozes from its summit; but this is by no means a constant character, for in some the oily product is so dry as not to permit the filtration of this fluid through its mass. These *small sebaceous tumours* are generally met with on the neck or face, particularly in the vicinity of the eyelids, and they are sometimes found dispersed on other parts of the body. They have been described by most authors as being contagious, under the name of *molluscum contagiosum*; but this, I believe, is not the fact.

Closure of the aperture of the tube, and consequent imprisonment of the product of the gland, is a disorder of not unfrequent occurrence. In this case, Nature

seems to accommodate herself to the emergency, for the collected substance loses the bulky character which it ordinarily possesses, and rarely collects in any quantity; indeed, the size of the little tumours occasioned by its accumulation is not greater than that of a mustard or millet seed; and from this latter circumstance they are denominated *miliary tubercles*. These little tumours, or rather tubercles, are perfectly white and pearl-like (pearly tubercles) in their appearance, and of a round form. They are frequently seen scattered about the eyelids, and sometimes on other parts of the face; they give rise to little or no inconvenience, other than that which arises from their unsightly appearance. I have met with but one exception to this statement, namely, in the case of a gentleman who had one of these tubercles, of larger size than usual, at the inner angle of the eye, which interfered with his comfort in the closure of the lid, and threatened to continue growing.

In the preceding instance, the imprisoned growth, though retained permanently within the skin, is in nowise altered from its natural composition. But, occasionally, we find that, besides detention, the unctuous substance is altered in its quality; in other words, certain of its natural constituents have become increased or diminished, and thus give a new character to the product. For example, we sometimes meet with small, whitish tubercles, of the millet-seed kind, which, upon examination of their contents, turn out to be composed of an excess of the salts of lime, and are consequently hard and stony in their nature, or like a piece of mortar. When tested with the microscope, the hard mass is seen to be made of numberless small scales, like those previously described, and within these scales are the minute particles of calcareous salt, which, by their accumulation, give hardness and density to the mass. Two such tubercles as these were removed from the eyelid by John Dalrymple. They have also been seen in other situations. From their obvious relationship to those described

in the preceding paragraph, they may be designated *calcareous miliary tubercles*.

Occasionally, I have seen the place of the sebaceous element of these small tumours occupied by a clear, watery fluid, which collects to such an extent as to render the skin thin and transparent, the tumour, under such circumstances, having the shape, and often the size and appearance, of a grape. I have seen two such grapes hanging to the margin of the upper eyelid, and interfering with the motions of the lid, and even with the sight, besides being a cause of deformity to the person who bore them. These are *watery cysts* of the follicles.

Again, the accumulation of the oily product of the skin occasions certain enlargements known by the name of "wen," or, in technical phraseology, *encysted tumours*. These are most commonly met with on the scalp, but may also occur on other parts of the integument. They are usually globular in form, and sometimes so perfectly round as to look like marbles projecting from the skin. When laid open, they are found to be filled with the unctuous product of the skin, variously modified by its long detention, and sometimes so altered from its original character as to be scarcely distinguishable as the same substance. For example, the contents have sometimes the aspect of bread-sauce, sometimes of more or less solid fat, occasionally they resemble melted wax, and at other times, water of various tints of colour, and holding in suspension floating substances of different kinds. Besides these matters, it is no uncommon thing to find hair within these tumours, having an origin similar to the tufts of hair mentioned at page 84. The pouch of the oil-tube, which is so inordinately distended in this form of tumour, is technically called its "cyst," and this is the meaning of the name by which the tumours are known to medical men. The cyst is sometimes *curiously* modified by the new conditions which it is made to fulfil; for example, it occasionally becomes hard and

rigid, like a piece of parchment, and at other times is calcareous and stony in its nature.

Inflammation of the oil-tubes and glands, extending more or less to the neighbouring skin, gives rise to a well-known eruption of the forehead, face, chest, and back, called *acne*.^{*} These pimples are so well known to most persons as scarcely to need description; they are conical, red, and hard; after a while, they become white and yellow at the point, then discharge a thick, yellow-coloured matter, mingled with a whitish substance, and become covered by a hard, brown scab; and lastly, disappear very slowly, sometimes very imperfectly, often leaving an ugly scar behind them. To these symptoms are not unfrequently added considerable pain, and always much unsightliness. When these little cones have the black head of a "grub" at their point, they constitute the variety termed *spotted acne*. These latter often remain stationary for months, without increasing or becoming red; but when they inflame, they are in no wise different in their course from the common kind.

There is, however, a variety of acne which settles on the nose, and is a subject of some facetiousness of nomenclature, though "no joke" to the possessor. It is called, for example, "bacchia," from its occasional bacchanal origin, and "rosacea," from its rosy redness, I presume, certainly not for its beauty. Occasionally small collections of yellow matter form upon these pimples, but this is by no means their common character. They preserve a heightened colour under all circumstances, but undergo a change having relation to the state of the blood flowing through them. Thus, for example, when the circulation is active, the vessels are fully distended and brightly red; while in cold weather, or under the influence of causes which retard circulation, they are bluish, or even livid in hue.

* Pronounced *äc-nä*.

There is another form of acne [*sycosis*] which occurs upon the chin, and is excessively obstinate and enduring. It attacks women as well as men, but is most common in the latter, and is much aggravated by the operation of shaving. The appearance of the eruption is similar to that of a severe kind of acne, namely, large conical, red pimples, with hard bases, yellow heads in an advanced stage; and later, hard brown scabs. The disease affects the oil-tube and neighbouring hair-tube, and therefore extends somewhat deeply into the skin; moreover, from the relation which subsists between the hair-tube and the disease, each pimple rises at the base of a hair, and looks as if it were transfixed by the shaft of the latter. From the chin, the disorder not unfrequently spreads to the whiskers, and by long continuance, produces considerable thickening and hardness of the skin over the whole extent of those parts of the face.

The treatment of acne must be constitutional as well as local. I am now of course supposing the eruption of a crop of these pimples, and not a few isolated ones, which may occur in any one from local causes, without any disorder of health. The diet should be looked to, the degree of exercise considered, and abuse of nerve power corrected.

CHAPTER XVII.

DISORDERS OF THE HAIRS AND HAIR-TUBES.

IN taking a survey of the disorders of the hair, the divisions previously adopted for the morbid affections of the perspiratory and oil-producing apparatus will be applicable. The unnatural conditions in which the hair and hair-tubes are involved being referrible to augmentation and diminution in quantity, alteration in texture, direction, and colour, diseases of the hairs, and diseases of the hair-tubes.

Augmentation of hair in quantity can only be regarded in the light of a peculiarity, so long as it is confined to those parts of the body which are properly organized for the production of long hairs. It does, however, sometimes happen that hair is produced in places where such a growth is unnatural, and that the unnatural growth is accompanied by an altered state of the entire skin. This is the case in those little patches and spots which sometimes disfigure the face, and are called "moles." Moles are of a dark colour, generally covered with hair of a longer or shorter growth, and come under the popular designation of "mother's marks." For example: when sufficiently large and moderately tufted with hair, no matter what their form, they are the representatives of the "back of a mouse." One, of which I have a model in my possession, of a regularly oval form, and situated on the lower part of the face, is called by its possessor, "the leg of a sucking-pig." In this case it is clear that, the child having been born with the patch, the mother cast back her thoughts for the object which

most excited her "longings" during gestation: the sucking-pig's leg was the only thing having hair on it she could recollect; *ergo*, the patch, though oval, though totally deficient in every kind of resemblance to the object in question, must of necessity be a sucking-pig's leg. Indeed, these *ex-post-facto* deductions are very ridiculous. In moles, the discoloration dependent on alteration of pigment is conjoined with unusual production of hair; but they have none of the dangerous properties of the mother's marks occasioned by disarrangement of the blood-vessels (page 253), and are only sources of annoyance from their size, their colour, or their position. They may be removed by a powerful caustic or by the knife, and sometimes the inconvenience from their presence is such that the latter alternative is submitted to. The operation is trifling; and when judiciously performed, very little trace of the proceeding is left behind.

Under the circumstances above detailed, and in others to which I need not more particularly refer, it comes to be a question, How hairs in improper situations are to be disposed of? They may be removed without difficulty down to the level of the skin either by certain substances called *depilatories* or by the razor, but they speedily grow again, because the root remains behind, and is too deeply implanted to be reached by such means. Occasionally, even the temporary removal of the hairs by the depilatory, and its repetition from time to time, has been embraced as a boon. Several such instances have occurred to me, and indeed, first set me to the task of seeking out the most efficient and least mischievous compositions to be employed as depilatory agents. The ordinary components of depilatories are quicklime, soda, and a combination of sulphur and arsenic; when misapplied or allowed to remain on the skin too long, they are apt to excite inflammation, and therefore require to be used with care. I was visited one morning by a young lady, who had been making an

experiment of this sort upon her forehead, for the purpose of getting rid of a peak which interfered with the fashionable mode of wearing the hair; she had unfortunately permitted the depilatory to remain on the skin too long, and the consequence was a mortified spot of about the size of a shilling-piece,—a mortification to the owner for the rest of life. Another mode of disposing of extraneous hairs is by the tweezers, but this process is painful, and, like the preceding, only temporary. It is equally apt with depilatories to cause a stronger growth of the hair, and sometimes gives rise to ugly marks and scars.

Diminution of hair in quantity, from decadence, involves much more serious considerations than the opposite condition. I do not now allude to the fall of the hair dependent on age; this is a natural consequence of man's infirmity, and cannot be regarded in the light of a disorder; but sometimes the fall of the hair takes place in young persons, and then it becomes a serious evil. The degree of evil is necessarily much modified by circumstances; if the subject be a lady, the inconvenience is greater than if it be of the opposite sex. If the fall be limited to parts usually bald in the aged, again, the visitation may be bearable even in a young man. But when, as I have frequently seen it, the entire scalp is laid bare, and with it the eyebrows, eyelashes, whiskers and beard are lost, the case is one of no common affliction. A wig but ill supplies the place of Nature's foliage, and burnt cork for eyebrows is only passable as a stage effect. But the annoyance is greater than all, when, instead of a total fall, round white patches of scalp become denuded, giving the idea, most unjustly, of some disagreeable or degrading disease.*

* Turner, speaking of this disease, remarks that although unattended with danger, "yet has it much of turpitude or disgrace, insomuch that the slaves among the Romans, labouring under this malady, were undervalued and sold, as Sennertus saith, at much viler price."

This is one of the numerous family of the ringworms of the public, but, like many other popular medical notions, wholly incorrect. The grounds of the misnomer are simply these ; a disease recognised under the name of ringworm produces a loss of the hair on the part affected ; then comes the popular deduction, *ergo*, every fall of the hair is occasioned by a ringworm. But in the patches of which I am now speaking, there has been no previous perceptible disease ; indeed, the case is one, not of disorder of the skin, but of the nerves which supply the skin. I had a curious case, in illustration of this opinion, about twelve months back. A woman was sent to me from the Eye Infirmary, where she was under treatment for disease of the eyes, in order that I might advise her with regard to a remarkable state of baldness. She was a highly nervous person, and subject to frequent and severe pain in the course of four of the principal nerves of the scalp, and it singularly happened that the baldness was limited to the lines of distribution of these nerves. I prescribed for her a remedy to reinstate the hair, and requested to see her again in a week. It was of course too early to expect any appearance of hair, but the pains in the head were gone, and the eyes so much better, that she had no occasion to return to the infirmary. If it were necessary, this is not the only evidence I could adduce of the direct nervous origin of baldness. But to return : in partial baldness of the scalp occurring in round patches, the skin is white, as smooth as if polished, and obviously thinner than the surrounding skin. This thinness of the scalp is very remarkable in the baldness of age, the skin is almost transparent, the seams of the bones may be distinguished through it, and it appears to have scarcely any substance whatever. Indeed, I have in my collection a preparation of the skin of the scalp in which the latter is not thicker than paper. Partial baldness of the scalp is entitled to the designation "scall;" but I think it better to abstain from the use of this word, as scalled head is

the term usually employed to distinguish those cases of baldness of the scalp occurring in patches, resulting from a mattery eruption, or from another disease, shortly to be described, the true ringworm. Partial baldness may occur in any one, and at any time, and more usually attacks adults than children.

In the preceding paragraph, I have not particularly adverted to the loosening of the hair, which frequently occurs in young persons, or in those of the middle period of life, and which, if neglected, would become real baldness. Such a state as I am now describing is not uncommon in women, and generally terminates, in its mildest form, in excessive loosening of the hair. The case, however, is far from being the hopeless one which is generally imagined; and if proper treatment be pursued, the hair will grow afresh, and assume all its pristine strength. An useful practice in men, and those of the opposite sex whose hair is short, is to immerse the head in cold water morning and night, dry the hair thoroughly, and then brush the scalp until a warm glow is produced. In women with long hair this plan is objectionable; and a better one is to brush the scalp until redness* and a warm glow are produced, and then rub among the roots of the hair some stimulating oil or pomatum. The treatment should be practised once or twice a day, or at intervals of a few days, according to the state of the scalp; namely, if tender, less; if insensible, more frequently. When the baldness happens in patches, the skin should be well brushed with a soft tooth-brush dipped in distilled vinegar, morning and evening, and the general plan of brushing, above referred to, followed.

As a general rule, the head cannot be too much brushed, any more than the horse's coat can be too much groomed. The groom knows full well that by plenty of

* Turner says: "Some observe upon the friction or rubbing of the part with coarse cloths, if redness does not succeed, the case is irremediable; and that the sooner this redness does appear the more hopeful and speedy the cure."

combing and brushing he can, not only produce a fine coat, but add very considerably to the healthy condition of the animal. And so is it with man, the more the head be brushed, the more healthy will be the skin, the more healthy its function, namely, the production and maintenance of the hair, and, by a reflected power, the more healthy the individual. I find that hair-dressers are divided on the subject of brushing, one party recommending soft brushes and small brushing; the other, hard brushes, and abundant brushing. As usual, in all these differences, both are right as respects a particular theory; but the brushers have the best of the argument. A hair-dresser in the neighbourhood of Bristol has set the question for ever at rest, by the announcement of the following paradox:—"You cannot brush the head too much, nor the hair too little." He is right: you cannot brush the head too much, but as, by clumsy brushing with hard brushes, you might over-stretch or tear the hair, and so destroy its beauty, be gentle in your surface brushing; for here you cannot, in combination with the deep brushing, brush too little. The fact is, there are two purposes to be attained by brushing: firstly, to give health to the skin of the head, and strength and vigour to the hair; for which end you cannot brush too much, or use brushes too penetrating or too hard, such as will produce active friction of the skin:* secondly, to smooth the hair, or perhaps go the length of freeing it from dust, for which object your brushes may be as soft as you please, and your hand as light as agreeable. So that, in truth, each according to the purpose he has in view, may be perfectly right; but nevertheless, at perfect variance with his brother.

And, now, as to the question of *cutting* the hair. I apprehend that it was Nature's intention in giving us hair as a partial clothing, that we should wear it as it

* The best kind of hair-brush is one made of whalebone fibre, moderately stiff.

grew ; but that circumstances soon arose which rendered it convenient, if not necessary, to cut it in various ways. Thus, hanging before the eyes and impeding the view, the front hair was cut short off across the forehead ; then other circumstances following in course of time, made it at last the fashion for the male sex to wear a short crop. Woman still enjoys the privilege of wearing her hair of the length that Nature gave it, and so long as it retains its health, she has no need of the process of cutting. But the hair is apt to split at the ends, and such split ends require to be snipped off ; that is, such is the present practice, for among our forefathers some attempt seems to have been made to restore this " affect incident to the hairs " by medical means : with this view, " some authors have anointed the ends of them with gall, and after, washed them with a decoction of the capillaries." Another need for cutting is created by the mode in which fashion ordains the wearing of the hair ; some of these modes are very destructive to the hair ; it becomes uneven and ragged, and then the scissors are called into use to set it straight. These are the true circumstances which have given origin to, and serve to perpetuate, the habit of cutting the hair in women. The operation is, in reality, one of trimming, of co-ordinating, not one either of advantage or necessity to the growth and maintenance of healthy hair. The case is altogether different where the hair is in an unhealthy condition, where much has fallen off, and where a partial and impoverished growth has risen up to represent that which is lost. Cutting in this case is indispensable ; not, however, cutting the long hairs, but cutting the short and impoverished hairs, with the view of giving them bulk and strength, and improving their growth. In such a head as I am now describing, the short hairs offer every variety of thickness, colour, and condition, and require the kind of cutting and trimming which a gardener would give to his roses ; here one of weak growth must be cut short off near the surface, that its stem may receive more

sap, and the plant may grow up stronger and thicker ; there, one requires lopping only at the summit ; while every now and then, shrivelled plants require pruning in a particular way, or even plucking up by the root. This particular mode of cutting is the practice, if not the invention, of an ingenious hair-cutter, Williams, of Cheltenham. I was much struck by the obvious truth and efficiency of his principles of operation when he first exhibited his mode of cutting before me ; and I have since seen the most remarkable and happy results follow his method of cultivating the hair. "There would be enough for us (hair-cutters) all to do," he said one day to me, "if the hair were cut as it should be ; but there would be an end of wig-making ;" and I cannot but admit that I entertain the same opinion. Ah ! reader, there is philosophy in cutting a hair.

If anything could supersede the necessity for plentiful brushing of the hair, it would be Williams's method of cutting ; and I was not therefore surprised to find that much brushing was not a necessary element of his plan ; but I found that he had frequent recourse to plucking diseased, or as he calls them, "withered" hairs ; a process necessarily accompanied with much stimulation of the skin ; and therefore a direct representative of the stimulation caused by friction with the hair-brush ; and a good illustration of the maxim of the west country hair-dresser, "you cannot brush the head too much nor the hair too little."

It is now many years back, that in some lectures, published in one of the weekly medical journals, I pointed out the principle of local treatment of falling hair, weak hair, and baldness ; and showed that that principle was simply *excitation or stimulation of the skin*. I do not mean that mere local stimulation will effect all that is required, without the aid of constitutional treatment ; but so far as local treatment alone is concerned, the principle, as I before stated, is stimulation ; the manner of effecting stimulation may be, and is, multifarious. An

old lady who practises the art of hair-producing in London, gets, as I am informed, her patient between her knees, and then begins a system of pommelling, pinching, rubbing, and shampooing the skin of the head, until she stimulates every part of it effectually; another dredges the head with a blistering powder, and a third uses fluid irritants. As far as the end is concerned, the ladies all tend to the same goal; they simply take different paths, and in their want of knowledge of the philosophy of medicine, each believes that her own is the only certain and right road. The same observation applies to the thousand and one remedies and specifics for producing and restoring the hair; the greater part of them are stimulants, though some, it must be admitted, rest their claim upon more doubtful attributes.

As an illustration of the nature of the multitude of remedies, proposed from time to time for the purpose of promoting the growth of the hair, I have arranged the following lists, which are far from including all the substances which have been accredited with this power.

Substances derived from the animal kingdom.

Fat of the bear, deer, hedgehog, rabbit, man, mole, goose, snake.

Ashes of the hedgehog, hedgehog skin, mouse, goat's hair, horses' teeth, bees, wasps.

Spanish flies; house flies distilled with honey in milk; honey; bee glue; red coral.

Substances derived from the vegetable kingdom.

Resins:—Aloes, amber, benzoin, euphorbium, frankincense, laudanum, mastich, myrrh, pine resin, balsam of Peru, cedar tar, common tar, gas tar, turpentine,

Oils :—Of bays, chamomile, dill, paper, southernwood, spikenard.

Roots :—Cyclamen, hellebore, lily (white), onion, orrize, reed, squill, sweetflag, verbascum.

Seeds :—Bitter almonds, bean-flour, colocynth, wild fennel, mustard, nasturtium, burnt nutmeg, psoralea corylifolia, rocket, stavesacre.

Other parts of plants :—Agallochum, althea, asarabacca, box leaves, chamomile flowers, cinchona bark, cresses, cyperus, dock, fœnugreek, fig leaves, house leek, lavender (stœchas), maiden-hair, malva, melilotus, myrtle leaves, parietaria, pomegranate bark and flowers, poplar buds, reeds bark and leaves burnt, leaves of the red rose, rosemary, rue, salvia, St. John's wort, thapsia, verbascum, wormwood.

The only member of the mineral kingdom, that I have found alluded to, is sulphur. And among products not admissible into the above lists, are quinine, tannic acid, honey-water, and burnt linen cloth.

In reviewing the above catalogue of more than ninety substances, the greater part will be found to be stimulants, but some are recommended on a different principle; for example, the fats, which were intended to be nourishers of the hair. In selecting the kind of fat, that of the bear was probably chosen on account of the hairiness of the animal; that of the hedgehog for the strength of its spiny covering; while the fat of the human scalp was supposed to be particularly advantageous, probably on account of its previous offices to its original owner; and in choosing the scalp, I apprehend it must have been a point of the first importance that it was well grown with hair. The fats, however, were not *relied on solely*; they were always preceded by bathing

and frictions, and were generally combined with one or more of the many stimulants mentioned in the list. Some of these substances, besides being stimulants, also possess astringent qualities, which render them suitable to cases where the loss of hair "comes after sickness, or proceeds from too great amplitude of the pores of relaxation of the skin." Daniel Turner cautions us against the abuse of these remedies: "In the use of all which, as before hinted, there is need of circumspection, not only as to the strength, but care also is to be taken that they are continued no longer than till the part change colour and look red, or the patient complain much of a troublesome and painful heat; otherwise the skin itself, by the negligent or too long use of the stronger sort, may be hurt by the pyrotic force of the same, and a perpetual baldness ensue, if no worse accident." As an internal medicine in cases of baldness, Pliny informs us that "the sponge growing out of the wild rose, being reduced to ashes and mixed with honey, is one of the noblest remedies."

Alteration of texture of the hair is a phenomenon too frequently occurring to admit of question or dispute. Under the influence of this change, the hair is inelastic and brittle, and breaks across in the operation of combing and brushing. This state obviously depends upon a want of health of the skin, and a deficiency of the proper constituents of natural hair. A similar condition is sometimes seen in the short and stiff hairs of the body, as in the whiskers, where, instead of breaking entirely, the hair bends at an acute angle, and its texture is merely bruised. The bruises are detected on the shaft of the hair, by being lighter in colour than the rest of the shaft. Oftentimes there are five, six, or even more, bruised points upon a single hair of an inch or two inches in length; and when seen in the mass, the numerous white points suggest the idea of a scurfy or dusty condition of the hair. When examined more closely, the hair looks as if it were jointed, so much so,

that on one occasion several hairs of this kind were sent me by a London physician, who regarded them as specimens of jointed hairs. On placing them in the field of the microscope, the true nature of the appearances was determined. In an instance which lately fell under my notice, of this state of hair affecting the whiskers, the appearance was so remarkable as to have attracted the attention and comment of passing friends. Under the head of altered texture of the hair, must also be included the bent, twisted, dry, brittle, hemp-like hairs of common ringworm, and the turgid and swollen hairs of the Polish plica.

Altered direction of the hair may be discussed in a few words; the only situation in which the hair is known to give rise to inconvenience by irregularity in the direction of its growth, is upon the margin of the eyelids, where the lashes sometimes grow inwards, and by pressing against the front of the eyeball, occasion irritation, and even inflammation. When such a state as this occurs, the erring hair must be removed by means of a pair of fine tweezers, and the inflammation afterwards subdued by cooling and slightly astringent lotions.

In the chapter upon the structure of the hair, I have narrated some instances of altered colour, and given an explanation of the nature of that change. Such alterations are curious, rather than of any practical importance, and they occur so rarely as to call for nothing more than a brief passing notice. A more frequent change, however, is that in which the colouring pigment ceases to be produced, or in which a white calcareous salt is substituted for the natural pigment. This state constitutes "blanching of the hair." It must be a matter of common observation, that in those instances in which the pigment presents the deepest hue, blanching most frequently occurs, and greyness is most common; while in persons with light hair and light complexion, blanching is comparatively rare. There

can be no doubt that the production in this climate of a dark pigment is a greater exertion to the economy than one of a lighter kind ; and hence, when the power of the nervous system is reduced, the formation of pigment is the first function which suffers.* It is wisely ordained that it should be so, for colour of the hair is one of the conditions of existence most easily spared, and it is one also that may well serve as a monitor of human decay. When greyness shows itself in the hair, it is therefore an indication of want of tone in the hair-producing organs ; and if this tone could be restored, the hair would cease to change, and, at the same time, further change would be prevented. The plan of cutting recommended in a previous page, tends very much to prevent the extension of greyness, and, combined with judicious plucking, is capable of correcting the disorder completely. Indeed, it would almost seem that, by proper management, not only might the colour of the hair be preserved for many years beyond the natural period of such a change, but also that the hair itself might be retained to the end of life.

Seeing that cessation in the production of pigment is a consequence of deficient tone in the scalp, resulting from weakened energy in the nervous system, we have an explanation at once of blanching of the hair ensuing after fevers or constitutional disease, or of the same state following intense anxiety or alarm. From such a moment, pigment is no longer elaborated, and all the hair produced, subsequently to the shock, is white ; even that already formed is not free from the change, as I have exemplified in the chapter on the structure of the hair.†

* A German physiologist of great celebrity, Meckel, states the period of life at which greyness of the hair begins, to be thirty ; and another, equally distinguished, namely, Eble, forty. The latter is probably the more correct.

† Another instance, which occurred while these sheets were in the press, is that of John Libeny, the would-be assassin of the Emperor Francis Joseph of Austria. The *Times* correspondent, remarking that when brought to the place of execution, a week

These considerations lead us to another kind of remedy for blanched hair, one which acts only on the formed tissue, and has no power either of reaching that which is implanted below the level of the skin or the bulb. I allude to "dyeing." I have heard of persons who have been led to adopt this artifice under the supposition that the hair being once dyed will grow for ever after of that colour. If they had reflected in time that the dye acts only on the hair above the level of the surface, and that the hair continues to grow of the objectionable colour, so as to require a weekly repetition of a disagreeable process, they would, I think, have hesitated before they had offered themselves as willing slaves to a barbarous practice. Further, as regards the process of dyeing the hair, Daniel Turner very sagely observes:—"In the use of colouring, staining, and dyeing of the hairs, and indeed in all the other administrations about them, great care is to be had of the brain, lest while we are busy about adorning those excrementitious parts (as reckoned by some) of the body, we bring some inconvenience or detriment to the more noble residence of the soul, placed underneath."—"The grey hairs of the ancients, which give that venerable aspect, and for which, if their deportment correspond with their years, they ought by all sober persons to be had in honour; these, I say, are not to be tampered with, being the natural produce of the cold and phlegmatic juices the pores of those in this declining age are stuffed with, from which these parts are nourished and borrow their tincture; and surely, whoever thinks thus to stave off old age, by colouring his white and hoary hairs, that he may seem young again, only renders himself a byword."—"Yet, if untimely or immature baldness comes on, remedies no

after his crime, his appearance was much changed, further observes, that "his hair, which was black, had become nearly snow-white in the preceding forty-eight hours, and hung wildly about his head; his eyes seemed to be starting from their sockets, and his whole frame was convulsed."—*Vide* page 109.

doubt may be used, or if the hairs turn grey in youth, there are some who propose by art to change them black; others, especially of the ancients, to strike the golden dye, or make the yellow locks, in former ages held so lovely, and at this time highly esteemed in some countries, though despised by our people.”*

There are two affections which in their essential nature are diseases of the substance of the hair; one is among the most common of the disorders of the head in this country, namely, common ringworm; the other is a native of Poland and Russia, namely *plica polonica*. The relationship of these two diseases to each other has never been suspected hitherto, but the microscopical investigations prosecuted by me during the last few years render it more than probable that they are closely allied.

In common ringworm, the first symptom that fixes attention to the head of the child is a teasing itching of the skin. When the head is examined, a patch will be perceived, which is slightly raised above the level of the surrounding surface; is white, and, as it were, dusted over with a fine powdery scurf. Moreover, the skin immediately around the hairs is raised up into little pimples like those of goose-skin. All the hairs arising from the diseased patch are affected in the same way, and if the disorder have been in existence for two or three weeks, the hairs will break off when gently pulled or combed. In another week or two the greater number of

* Daniel Turner, who lived more than a century ago, may be excused for not anticipating that in the year of grace 1864-65, the fashion of “striking the golden dye” and the making of “yellow locks” would again be revived; and “esteemed,” and no longer “despised by our people.” The mode in which this change was produced originally was by washing the hair with an alkali, or, to use the expression of a lady who appealed to me for assistance in correcting the serious evils of the process, “potashing the hair.” Subsequently the more scientific process was adopted of soaking the hair with a solution of peroxide of hydrogen.

the hairs will have been broken off, and the patch be left comparatively bald. The baldness, however, is not complete, for numerous short stumps of hair remain, and some of longer growth; but these vestiges are bent and twisted, and more like tow than hair. These grisly remains of hair give one the idea of a plot of grass withered under the conjoined influence of blight and drought; and a similar character may sometimes be observed over the entire head; the hair is slender, dry, wiry, of various length, and obviously starved and impoverished. In a more advanced stage of the disease, a thick crust, composed of matted hair and scurf, glued together by a watery discharge poured out under the influence of irritation, covers the patch, and spreads more or less extensively over the surface. It rarely happens that only one patch exists on the head; usually there are several, sometimes as many as fifteen or twenty, and often similar spots are found on the face, the neck, the arms, and the trunk of the body. The spots on the head, from their oval shape, have been compared to the scuta or shields carried by the ancient warriors, and hence have suggested as a specific name for the disease, *scutulata*. Turner, speaking of this complaint, observes that the hairs "fall off not altogether from the root, but by piece-meal." He then plunges into the error which gave origin to the term *ring-worm* as applied to this disorder. We know full well that there is no worm, or living creature in the case, but that the breaking off of the hair is due to the brittleness occasioned by diseased formation. The appearance of the short stumps of hair is, however, very suggestive of the operations of the moth-grub, and very like the effect produced upon furs by that little agent of destruction. Continuing Turner's remarks upon the broken hair, he speaks of their "being known or eaten asunder by a small worm like that bred in some old wax, decayed fruits, or perhaps the common *mite*; scarce discoverable by the aid of glassss. *Sennertus* saith he hath often seen them, although men-

tioned by very few authors, and been consulted by way of prescription to destroy them. He gives it the name of *tinea capillorum*; for as the moth called *tinea* makes holes by gnawing garments, so does this insect the like by the hairs."

By means of the microscope, I ascertained that the hairs in ringworm are considerably swollen, and that their structure is entirely altered from its original type; that, for example, the outer portion of the fibrous part is converted into small granular cells, having a diameter of about $\frac{1}{8000}$ of an inch; that many such cells are introduced between and among the fibres of the fibrous part, so that the latter is, as it were, disintegrated by the intrusion of these granules, and consequently weakened in its tenacity. This is the cause of the enlargement of the hair, of its lighter colour, twisted, tow-like appearance and fragility.

In the domestic treatment of ringworm, the first consideration is cleanliness; to this end the hair should be well brushed and pomatumed, and the head kept clean by these means. It is not sufficient to brush the hair merely; the skin also should be thoroughly brushed with the view of producing friction and exciting the vital action of the scalp. In earlier editions of this work I recommended washing with soap and water; I now withdraw that recommendation in favour of brushing only, using at the same time sufficient pomatum to keep the roots of the hair moist. Domestic treatment should be limited to these means, as true ringworm is always associated with some error of the constitution, which the medical man alone can treat efficiently. Shaving the

*Fig. 51.**



* *Fig. 51.*—One of the hairs taken from a patch of common ringworm, showing the alteration of its cells resulting from unhealthy nutrition.

head is unnecessary, if proper attention be paid to cleanliness. It is scarcely necessary to observe, that every precaution should be used which is calculated to prevent contagion. Ringworm carries with it an unpleasant *prestige*, and although I am firmly of opinion that the disease is not contagious, I would not recommend the neglect of means adapted to render such an event impossible.

Popular remedies for ringworm are numerous, and comprehend several dangerous applications that men educated to the study of medicine would hesitate to prescribe. As this is the case, all should be looked upon with suspicion. Ringworm is a disorder most easy of cure when the proper remedies are employed; most obstinate and most serious, both in a physical and a moral sense, when improperly treated or neglected. It is no argument that because A walked on the edge of a precipice without destruction, B, and all who follow, may be equally fortunate. A sense of duty compels me to convey this caution. I have seen the desolating misery caused by this disease and its mistreatment, and I desire to warn the sufferer in time from a similar fate. BEWARE THE POPULAR REMEDIES FOR RINGWORM.

One of these remedies, a great favourite, particularly in schools, may be adduced as an instance of the ludicrous rather than of the serious. Common black ink is usually, but by no means always, made of copperas, that is, sulphate of iron, and gall-nuts. Now these substances belong to the class of astringents, and, taken separately, are calculated to form passable, but inferior, remedies for ringworm. But we have first of all to determine whether the ink about to be used be really compounded of these substances; proportion is a gordian knot which offers no obstacle to the amateur physician; but then comes another and not unimportant question. Is the eruption, supposed to be ringworm, for there are twenty ringworms, is it really that kind of ringworm which may be usefully treated by an astringent application? How

mischievous it is that these simple reasonings are omitted by the advocates of popular poisons! But even admitting that copperas alone and gall-nuts alone may be remedies of the lowest class, how monstrous to use them in that combination which constitutes an application of a dirty and often of an irritating kind. I have seen serious ulceration of the skin caused by the use of ink to a cutaneous eruption. Another terrible remedy, occasionally employed, is tobacco-water, a poison so rank and powerful as to be banished entirely from medicine on account of its dangerous qualities.

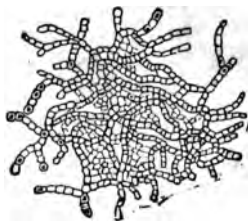
PLICA POLONICA, like ringworm, is distinguished by the swollen condition of the hair, which is distended with a reddish coloured fluid, and has the appearance of being converted into flesh. The scalp is much diseased, and bleeds on the slightest touch, and so much pain is occasioned by the trifling movement which accompanies the cutting of the hair, as to give rise to the impression that the diseased hair is really endowed with nerves. A large quantity of fluid weeps from the hair-tube, and agglutinates the hair into a repulsive mass, which is left for nature to remove; a process which requires from ten to twelve months to accomplish.

The hair-tubes are liable to a peculiar state of disorder, in which they have produced around them a yellow, paste-like substance, which collects in such quantity as to destroy the bulbs of the hair, and by its further increase, to give rise to a most serious form of disease in the scalp, namely, the honeycomb ringworm. The development of this disorder is attended with irritation and itching, and when the skin of the head is examined, a small patch of redness will be detected as the seat of the diseased action. Upon further inspection, a number, and perhaps all the hairs included within the area of this patch, will be found encircled at their base by a minute yellow spot. In a few days this spot expands; and still later, the yellow matter continuing to increase, forms a shallow cup around the hair, the con-

cavity of the cup being directed outwards, and its convexity towards the skin, which it deeply depresses. It generally happens that a number of these sulphur-yellow cups, produced upon a small circular patch of skin, form a cluster; this arrangement constitutes the clustered variety of the disease in question. At other times, they are distributed singly over the scalp, and constitute the scattered variety. When they exist in the clustered form, they have somewhat the appearance of a piece of honeycomb embedded in the hair, and from this resemblance have received the name "favus," which literally means "honeycomb." The disease obeys the law of extension I have before had occasion to advert to as common in cutaneous disorder, namely, exhausting itself in the part first attacked, and extending by the circumference, like a fairy ring, carrying devastation as it goes, and destroying the hair completely. If it remain unchecked, it will destroy the whole of the hair of the scalp, and give rise to deep-seated disease, with enlargement and disease of the glands of the neck.

It is not the least curious part of the history of this complaint, that when the

*Fig. 52.**



yellow paste of the crusts is examined with the microscope, it is found to be composed of numberless cells, connected together in such a way as to suggest the idea of a vegetable formation of the lowest type. Many of the cells are so arranged as to give the idea of stems from which branches pass off;

and at the ends of the branches are smaller bodies, that have the character of seeds. Thus the plant is complete,

* *Fig. 52.*—A portion of the yellow matter from the crust of honeycomb ringworm, showing its plant-like structure.

and the German discoverers of this peculiar structure conceived that the mode of propagating the disease by contagion, was simply the conveyance of the seeds from head to head, and that, finding an appropriate and propitious soil, they at once struck root, and began their existence as independent organisms. We have thus presented to us the curious proposition, of a disease of the human body being a vegetable growth, a kind of mould; this vegetable, endowed with the power of establishing itself upon any favourable part of the skin where its seeds may chance to fall, and there producing fresh seeds, propagates its race from head to head.

But then comes the question, Does it do so? No, it does not; if it did, the disease should be common, but it is rare; the disease should run through a family or a school, which it does not. I had once the opportunity of observing a workhouse boy affected with this disorder; he mingled with the other boys, in school, at play, no restriction was put upon him or them; but the disease went no further. And so it frequently happens that a little hard-headed, practical sense, dissipates, like a ray of sun the morning's mist, the most dazzling scientific theories.

Having my interest raised to discover the nature of this complaint, I found that the yellow paste was produced under the scarf-skin; that it was, in fact, the newly-formed cells of the scarf-skin, converted by a morbid elaboration and development into this cellular and plant-like structure. Thus, then, I had presented to my observation the curious fact of a cell,—that elemental part of organic nature that develops man himself as it develops the meanest fungus,—of a cell, intended by healthful nature to produce a very simple and lowly structure, the scarf-skin, perverted from its purpose by morbid nature, and producing, instead, a structure allied to the vegetable kingdom; in very truth, a plant. The fact was established, morbid nature could at her will produce a plant. But the power of morbid

nature being admitted, being proved, we are not, therefore, warranted in flying to the conclusion that such plant may propagate itself by its seeds. In the first place, it must have for its maintenance congenial nourishment; that nourishment must be morbid fluids, for without them morbid nature cannot overthrow the laws of healthy nature. Now, in the case of a boy afflicted with this complaint, and mixing with five hundred other boys, not one of those boys may have the congenial juices, the morbid nature, and, therefore, not one could produce the vegetable growth, even were he enveloped by its seeds. Then, as I have shown, even were the morbid nature present in all the five hundred boys, the seeds could not possibly reach the appropriate spot for developing their powers of growth; for the plant is produced not in the open pores of the skin, but underneath the scarf-skin, through which it would be impossible for them to pass. So that while we admit the fact of the capability of morbid nature to produce a plant, we are not equally ready to admit the propagation of such a plant by means of seeds.

THE END.

INDEX.

- ABERNETHY, anecdote of, 231.
Ablution, 169.
Absorption, 50.
Acarus scabiei, 239.
Acne, common, 283.
 " punctated, 283.
Affusion, 178, 187.
Agnails, 18.
Air, 157.
Air-cells, 31.
Albino, 13, 263.
Anæsthesia, 39.
Anatomy of skin, 24.
Aniline dyes, 138.
Animalcular eruption, 237.
Apoplexy, 183.
Appetite, 122.
Arteries, 27.
- BACCHIA, 283.
Baldness, 287.
Bandaging, 207.
Bath, cold, 184, 197.
 " douche, 184.
 " hot, 186, 197.
 " morning, 180.
 " public, 195.
 " sea, 185.
 " sedative, 194.
 " shower, 181.
 " sponging, 177.
 " stimulant, 195.
 " temperate, 186.
 " tepid, 194, 197.
 " tumbling, 182.
 " vapour, 187.
 " warm, 186, 197.
- Bathing, 176, 191.
 " rules of, 196.
Baths, Finnish, 188.
 " Indian, 188.
 " Muscovitish, 189.
 " of Nero, 47.
 " Roman, 189.
 " Russian, 189.
Beard, 98.
Beau, M., researches of, 16, 19.
Black-hole of Calcutta, 160.
Blackness of skin, 261.
Bladder eruption, 224.
Blagden's experiments, 46.
Bleaching of skin, 263.
Blister, 224.
Blood-vessels, 30.
Blotch, 199, 204.
Blushing, 33.
Breakfast, 123.
Brittle hair, 295.
Brown patches, 13.
Brushing the skin, 289.
Bubble fever, 225.
- CALLOSITIES, 247.
Cancer-quacks, 53.
Capillaries, 28.
Causes of disease, 200.
Cells, 5.
Chaps, 204.
Chapped lips, 205.
Checked perspiration, 149.
Chemistry of food, 116.
Chest, anatomy of, 162.
Chichen-pox, 214.
Chilblains, 205.

- Childhood, 161.
 Children, diet of, 125.
 Chills, 149.
 Chinese feet, 168.
 Chiromancy, 7.
 Chloroform, inhalation, 36.
 Circulation, 28.
 Cleanliness, 169.
 Clothing, 131.
 " of children, 147.
 " of old persons, 146.
 Coffee, 124.
 Cold, extremes of, 45.
 Cold-bath, 184, 197.
 Cold, common, 150.
 Colour, alterations of, 261.
 Constitution, summer, 142.
 " winter, 142.
 Contagious fevers, 214.
 Convalescence, 203.
 Coppery patches, 13.
 Corium, 22.
 Corns, 247.
 Cotton, 135.
 Creeping sensations, 259.
 Cutting the hair, 290.

 DANDRUFF, 237.
 Depilatories, 286.
 Diet, 115.
 " of invalids, 203.
 Digestion, 117.
 Diluents, 200, 209.
 Dinner, 123.
 Douche or douse bath, 184.
 Drainage of the skin, 43.
 Draughts of cold, 148.
 Dress, 131.
 " colours of, 137.
 " warmth of, 137.
 Dyeing the hair, 298.

 ECTHYMA, 230.
 Eczema, 221.
 Elasticity of skin, 7.
 Encysted tumours, 282.
 Endermic method, 52.
 Eruption, animalcular, 237.
 " matery, 227.
 " pimply, 217.
 " scaly, 232.
 " watery, 220.
 Eruptions, 216.
 Erysipelas, 198.
 Ether, inhalation, 35.
 Evaporating lotion, 202, 207.
 Exercise, 152.
 Exhalation, 44.

 FALSE measles, 209.
 Fashion, 167.
 Febrile symptoms, 208.
 Fiery spot, 199, 204.
 Fish-skin disease, 273.
 Flesh-brush and glove, 193.
 Fomentation, 202.
 Food, 116.
 " variety of, 122.
 Freckles, 13, 264.
 Friction of the skin, 193.

 GALLS, 204.
 Glands of skin, 40, 54.
 Glow of warmth, 177, 191, 196.
 Golden hair, 299.
 Goose-skin, 82.
 Grey hair, 102, 297.
 Grubs, 57, 275, 279.
 Gymnastics, 161.

 HAIR, analysis of, 92.
 " arrangement of, 89.
 " augmented growth, 84,
 285.
 " blanching of, 102, 296.
 " brittle, 295.
 " change of colour, 102,
 296.
 " colour of, 73.
 " curly, 93.
 " discoloration of, 296.
 " dyeing of, 298.
 " electricity of, 95.
 " fabulous stories of, 112.
 " false, 113.
 " form of, 67.

- Hair, golden, 299.
 „ greyness of, 102, 297.
 „ growth after death, 113.
 „ hygrometric, 92.
 „ jointed, 295.
 „ length of, 66.
 „ misdirection of, 296.
 „ ornamental, 97.
 „ purposes of, 95.
 „ restoration of, 292.
 „ strength of, 77.
 „ structure of, 74.
 „ sudden blanching of, 107,
 297.
 „ thickness of, 68.
 „ uses of, 95.
 Hair-bulbs, 80.
 Hair-cutting, 290.
 Hairs, 64.
 „ disorders of, 285.
 „ downy, 84.
 „ invisible, 84.
 „ number of, 71.
 „ spiral, 83.
 Hair-tube, 72.
 Hairy women, 85.
 Heart, 28.
 Heat, extremes of, 45.
 Herpes, 222.
 „ labialis, 222.
 Hip-bath, 180.
 Homœopathy, 156.
 Homo hirsutus, 85.
 Honey disease or scab, 228.
 Honeycomb ringworm, 304.
 Horns, 276.
 Horsehair gloves and rubber,
 193.
 Hot-bath, 186, 197.
 Hummums, 188.

 ICHTHYOSIS, 273.
 Idiosyncrasy, 210.
 Impetigo, 228.
 Infants, treatment of, 218.
 Infectious fevers, 214.
 Inflammation, signs of, 198.
 Itch, 241.

 Itch animalcule, 239.
 Itching, 38, 256.

 JOINTED hairs, 295.
 Joy, 153.

 KHEESAH, 193.

 LEATHER, 134.
 Lichen, 217.
 Linen, 134.
 Lines of the skin, 9.
 Lips, anatomy of, 26.
 Liver spots and patches, 13,
 264.
 Lotions, 207.
 Lunch, 123.
 Lungs, 31.

 MATTERY PIMPLES, 227.
 Meals, 123.
 Measles, false, 209.
 „ true, 213.
 Meibomian glands, 63.
 Miliary tubercles, 281.
 Milk, 116.
 Milk-crust, 222, 229.
 Moles, 285.
 Molluscum, 280.
 Morbid sensations, 256.
 Mortality, among poor, 145.
 „ among rich, 145.
 Mothers' marks, 253, 261, 285.
 Mottling of the skin, 263.
 Mucous membrane, 1.
 Muddy complexion, 265.
 Musk, 62.
 Mustachio, 98.

 NÆVI, 253.
 Nails, indicators of disease, 20.
 „ management of, 18.
 „ morbid changes of, 17.
 „ structure of, 14.
 „ of Negro-skin, 11.
 Nerves, nature of, 255.
 „ of the skin, 33.
 Nettle rash, 199, 209.

- Neuralgia, 34.
 Nursery diet, 125.
 Nutrition, 118.
- OIL APPARATUS, disorders of,**
 270.
- Oil-glands, 54.
 Oily secretion—
 " accumulations, 276.
 " arrest of, 274.
 " black, 271.
 " excess of, 270.
- PALMISTRY, 7.**
 Papillæ, 26.
 Pemphigus, 224.
 Perspiration, analysis of, 48.
 " checked, 49, 149.
 " coloured, 268.
 " deficiency of, 266.
 " disorders of, 266.
 " excess of, 267.
 " hands and feet, 268.
 " insensible, 44.
 " partial, 267.
 " scented, 268.
 " sensible, 44.
 Perspiratory organs, 40.
 Pigment, 11.
 Pimples, 216.
 Pityriasis, 236.
 Plica polonica, 299, 303.
 Poisoned socks, 139.
 Poisoning by eggs, 211.
 Pompholyx, 224.
 Porcupine disease, 274.
 Pores, 3, 40.
 Pricking, 39.
 Prickly heat, 218.
 Prurigo, 218.
- RASHES, 198.**
 Reaction, 177, 191, 196.
 Red gum, 217.
 Red rash, 199, 204.
 Respiration like combustion,
 119.
 Rete mucosum, 3.
- Rice poisoning, 211.
 Ridges of skin, 3.
 Ringworm, common, 299.
 " crusted, 229.
 " honeycomb, 304.
 " rainbow, 223.
 " remedies for, 302.
 " vesicular, 222.
 Roman baths, 189.
 Rosacea, 283.
 Rose rash, 199, 208.
 Rubbers for the skin, 193.
 Rupia, 223.
 Russian baths, 189.
- SAFFRON SPOTS, 264.**
 St. Anthony's fire, 198, 203.
 Salt, 130.
 Salt meats, 130.
 Scalding, 251.
 Scales, 5, 19.
 Scall, 221, 229.
 " crusted, 228.
 " granulated, 230.
 " stalactitic, 230.
 Scalled head, 221.
 Scaly eruptions, 232.
 Scarf-skin, 2.
 " chemical composi-
 " tion, 10.
 Scarletina, 213.
 Scarlet fever, 213.
 School diet, 128.
 Scorbutic, 130.
 Scurf, 6, 80.
 Scurvy, 130.
 Sea-bathing, 185.
 Sebaceous substance, 56.
 " tumours, 280.
 Sensation, nature of, 256.
 Sensations, painful, 34, 256,
 259.
 Sensibility of the skin, 37.
 Sensitive skin, 22.
 Shampooing, 192.
 Shingles, 223.
 Shower-bath, 181.
 Sick-room, 201.

136.
 .pox, 213.
 ing, 39.
 io, 172.
 r mark, 253.
 ed acne, 283.
 s of the skin, 264.
 , 163.
 zoon folliculorum, 58.
 ur-coloured spots, 13,
 264.
 ur, uses of, 242.
 er, 123.
 t glands, 40.
 pores, 3.
 is, 284.
124.
 erate bath, 186.
 erature of the body, 141,
 5.
 il bath, 194, 197.
 r, branny, 236.
 crusted, 228.
 dry, 232.
 humid, 221.
 yellow crusted, 228.
 mæ, Roman, 187.
- Tickling, 257.
 Tingling, 39.
 Tooth rash, 217.
 Trichogenous remedies, 293.
- URTICARIA, 199.**
- VAPOUR-BATH, 187.**
 Vegetables, 129.
 Veins, 28.
 Vesicles, 220.
- WARM-BATH, 186, 197.**
 Warts, 246.
 Wash-powders, 172.
 Washing, process of, 172, 174,
 180.
 Water, 171.
 Water-cresses, 129.
 Watery pimples, 220.
 White hair, 107, 296.
 ,, patches, 263.
 Withered hairs, 292.
 Wool, 133, 136.
- YELLOW HAIR, 299.**
- ZONA, or shingles, 223.**

- Neuralgia, 34.**
Nursery diet, 125.
Nutrition, 118.
- OIL APPARATUS, disorders of, 270.**
Oil-glands, 54.
Oily secretion—
 " accumulations, 276.
 " arrest of, 274.
 " black, 271.
 " excess of, 270.
- PALMISTRY, 7.**
Papillæ, 26.
Pemphigus, 224.
Perspiration, analysis of, 48.
 " checked, 49, 149.
 " coloured, 268.
 " deficiency of, 266.
 " disorders of, 266.
 " excess of, 267.
 " hands and feet, 268.
 " insensible, 44.
 " partial, 267.
 " scented, 268.
 " sensible, 44.
Perspiratory organs, 40.
Pigment, 11.
Pimples, 216.
Pityriasis, 236.
Plica polonica, 299, 303.
Poisoned socks, 139.
Poisoning by eggs, 211.
Pompholyx, 224.
Porcupine disease, 274.
Pores, 3, 40.
Pricking, 39.
Prickly heat, 218.
Prurigo, 218.
- RASHES, 198.**
Reaction, 177, 191, 196.
Red gum, 217.
Red rash, 199, 204.
Respiration like combustion, 119.
Rete mucosum, 3.
- Rice poisoning, 211.**
Ridges of skin, 3,
Ringworm, common, 299.
 " crusted, 229.
 " honeycomb, 304.
 " rainbow, 223.
 " remedies for, 302.
 " vesicular, 222.
- Roman baths, 189.**
Rosacea, 283.
Rose rash, 199, 208.
Rubbers for the skin, 193.
Rupia, 223.
Russian baths, 189.
- SAFFRON SPOTS, 264.**
St. Anthony's fire, 198, 203.
Salt, 130.
Salt meats, 130.
Scalding, 251.
Scales, 5, 19.
Scall, 221, 229.
 " crusted, 228.
 " granulated, 230.
 " stalactitic, 230.
Scalded head, 221.
Scaly eruptions, 232.
Scarf-skin, 2.
 " chemical composition, 10.
Scarlatina, 213.
Scarlet fever, 213.
School diet, 128.
Scorbutic, 130.
Scurf, 6, 80.
Scurvy, 130.
Sea-bathing, 185.
Sebaceous substance, 56.
 " tumours, 280.
Sensation, nature of, 256.
Sensations, painful, 34, 256, 259.
Sensibility of the skin, 37.
Sensitive skin, 22.
Shampooing, 192.
Shingles, 223.
Shower-bath, 181.
Sick-room, 201.





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head is unnecessary, if proper attention be paid to cleanliness. It is scarcely necessary to observe, that every precaution should be used which is calculated to prevent contagion. Ringworm carries with it an unpleasant *prestige*, and although I am firmly of opinion that the disease is not contagious, I would not recommend the neglect of means adapted to render such an event impossible.

Popular remedies for ringworm are numerous, and comprehend several dangerous applications that men educated to the study of medicine would hesitate to prescribe. As this is the case, all should be looked upon with suspicion. Ringworm is a disorder most easy of cure when the proper remedies are employed; most obstinate and most serious, both in a physical and a moral sense, when improperly treated or neglected. It is no argument that because A walked on the edge of a precipice without destruction, B, and all who follow, may be equally fortunate. A sense of duty compels me to convey this caution. I have seen the desolating misery caused by this disease and its mistreatment, and I desire to warn the sufferer in time from a similar fate. BEWARE THE POPULAR REMEDIES FOR RINGWORM.

One of these remedies, a great favourite, particularly in schools, may be adduced as an instance of the ludicrous rather than of the serious. Common black ink is usually, but by no means always, made of copperas, that is, sulphate of iron, and gall-nuts. Now these substances belong to the class of astringents, and, taken separately, are calculated to form passable, but inferior, remedies for ringworm. But we have first of all to determine whether the ink about to be used be really compounded of these substances; proportion is a gordian knot which offers no obstacle to the amateur physician; but then comes another and not unimportant question. Is the eruption, supposed to be ringworm, for there are twenty *ringworms*, is it really that kind of ringworm which may be usefully treated by an astringent application? How

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that on one occasion several hairs of this kind were sent me by a London physician, who regarded them as specimens of jointed hairs. On placing them in the field of the microscope, the true nature of the appearances was determined. In an instance which lately fell under my notice, of this state of hair affecting the whiskers, the appearance was so remarkable as to have attracted the attention and comment of passing friends. Under the head of altered texture of the hair, must also be included the bent, twisted, dry, brittle, hemp-like hairs of common ringworm, and the turgid and swollen hairs of the Polish plica.

Altered direction of the hair may be discussed in a few words; the only situation in which the hair is known to give rise to inconvenience by irregularity in the direction of its growth, is upon the margin of the eyelids, where the lashes sometimes grow inwards, and by pressing against the front of the eyeball, occasion irritation, and even inflammation. When such a state as this occurs, the erring hair must be removed by means of a pair of fine tweezers, and the inflammation afterwards subdued by cooling and slightly astringent lotions.

In the chapter upon the structure of the hair, I have narrated some instances of altered colour, and given an explanation of the nature of that change. Such alterations are curious, rather than of any practical importance, and they occur so rarely as to call for nothing more than a brief passing notice. A more frequent change, however, is that in which the colouring pigment ceases to be produced, or in which a white calcareous salt is substituted for the natural pigment. This state constitutes "blanching of the hair." It must be a matter of common observation, that in those instances in which the pigment presents the deepest hue, blanching most frequently occurs, and greyness is most common; while in persons with light hair and light complexion, blanching is comparatively rare. There

can be no doubt that the production in this climate of a dark pigment is a greater exertion to the economy than one of a lighter kind ; and hence, when the power of the nervous system is reduced, the formation of pigment is the first function which suffers.* It is wisely ordained that it should be so, for colour of the hair is one of the conditions of existence most easily spared, and it is one also that may well serve as a monitor of human decay. When greyness shows itself in the hair, it is therefore an indication of want of tone in the hair-producing organs ; and if this tone could be restored, the hair would cease to change, and, at the same time, further change would be prevented. The plan of cutting recommended in a previous page, tends very much to prevent the extension of greyness, and, combined with judicious plucking, is capable of correcting the disorder completely. Indeed, it would almost seem that, by proper management, not only might the colour of the hair be preserved for many years beyond the natural period of such a change, but also that the hair itself might be retained to the end of life.

Seeing that cessation in the production of pigment is a consequence of deficient tone in the scalp, resulting from weakened energy in the nervous system, we have an explanation at once of blanching of the hair ensuing after fevers or constitutional disease, or of the same state following intense anxiety or alarm. From such a moment, pigment is no longer elaborated, and all the hair produced, subsequently to the shock, is white ; even that already formed is not free from the change, as I have exemplified in the chapter on the structure of the hair.†

* A German physiologist of great celebrity, Meckel, states the period of life at which greyness of the hair begins, to be thirty ; and another, equally distinguished, namely, Eble, forty. The latter is probably the more correct.

† Another instance, which occurred while these sheets were in the press, is that of John Libeny, the would-be assassin of the Emperor Francis Joseph of Austria. The *Times* correspondent, remarking that when brought to the place of execution, a week

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These considerations lead us to another kind of remedy for **blanched hair**, one which acts only on the formed **tissue**, and has no power either of reaching that which is implanted below the level of the skin or the bulb. I allude to "dyeing." I have heard of persons who have been led to adopt this artifice under the supposition that the hair being once dyed will grow for ever after of that colour. If they had reflected in time that the dye acts only on the hair above the level of the surface, and that the hair continues to grow of the objectionable colour, so as to require a weekly repetition of a disagreeable process, they would, I think, have hesitated before they had offered themselves as willing slaves to a barbarous practice. Further, as regards the process of dyeing the hair, Daniel Turner very sagely observes:—"In the use of colouring, staining, and dyeing of the hairs, and indeed in all the other administrations about them, great care is to be had of the brain, lest while we are busy about adorning those excrementitious parts (as reckoned by some) of the body, we bring some inconvenience or detriment to the more noble residence of the soul, placed underneath."—"The grey hairs of the ancients, which give that venerable aspect, and for which, if their deportment correspond with their years, they ought by all sober persons to be had in honour; these, I say, are not to be tampered with, being the natural produce of the cold and phlegmatic juices the pores of those in this declining age are stuffed with, from which these parts are nourished and borrow their tincture; and surely, whoever thinks thus to stave off old age, by colouring his white and hoary hairs, that he may seem young again, only renders himself a byword."—"Yet, if untimely or immature baldness comes on, remedies no

after his crime, his appearance was much changed, further observes, that "his hair, which was black, had become nearly snow-white in the preceding forty-eight hours, and hung wildly about his head; his eyes seemed to be starting from their sockets, and his whole frame was convulsed."—*Vide* page 109.

doubt may be used, or if the hairs turn grey in youth, there are some who propose by art to change them black; others, especially of the ancients, to strike the golden dye, or make the yellow locks, in former ages held so lovely, and at this time highly esteemed in some countries, though despised by our people.”*

There are two affections which in their essential nature are diseases of the substance of the hair; one is among the most common of the disorders of the head in this country, namely, common ringworm; the other is a native of Poland and Russia, namely *plica polonica*. The relationship of these two diseases to each other has never been suspected hitherto, but the microscopical investigations prosecuted by me during the last few years render it more than probable that they are closely allied.

In common ringworm, the first symptom that fixes attention to the head of the child is a teasing itching of the skin. When the head is examined, a patch will be perceived, which is slightly raised above the level of the surrounding surface; is white, and, as it were, dusted over with a fine powdery scurf. Moreover, the skin immediately around the hairs is raised up into little pimples like those of goose-skin. All the hairs arising from the diseased patch are affected in the same way, and if the disorder have been in existence for two or three weeks, the hairs will break off when gently pulled or combed. In another week or two the greater number of

* Daniel Turner, who lived more than a century ago, may be excused for not anticipating that in the year of grace 1864-65, the fashion of “striking the golden dye” and the making of “yellow locks” would again be revived; and “esteemed,” and no longer “despised by our people.” The mode in which this change was produced originally was by washing the hair with an alkali, or, to use the expression of a lady who appealed to me for assistance in correcting the serious evils of the process, “potashing the hair.” Subsequently the more scientific process was adopted of soaking the hair with a solution of peroxide of hydrogen.

- Neuralgia, 34.**
Nursery diet, 125.
Nutrition, 118.
- OIL APPARATUS, disorders of, 270.**
Oil-glands, 54.
Oily secretion—
 " accumulations, 276.
 " arrest of, 274.
 " black, 271.
 " excess of, 270.
- PALMISTRY, 7.**
Papillæ, 26.
Pemphigus, 224.
Perspiration, analysis of, 48.
 " checked, 49, 149.
 " coloured, 268.
 " deficiency of, 266.
 " disorders of, 266.
 " excess of, 267.
 " hands and feet, 268.
 " insensible, 44.
 " partial, 267.
 " scented, 268.
 " sensible, 44.
Perspiratory organs, 40.
Pigment, 11.
Pimples, 216.
Pityriasis, 236.
Plica polonica, 299, 303.
Poisoned socks, 139.
Poisoning by eggs, 211.
Pompholyx, 224.
Porcupine disease, 274.
Pores, 3, 40.
Pricking, 39.
Prickly heat, 218.
Prurigo, 218.
- RASHES, 198.**
Reaction, 177, 191, 196.
Red gum, 217.
Red rash, 199, 204.
Respiration like combustion, 119.
Rete mucosum, 3.
- Rice poisoning, 211.**
Ridges of skin, 3.
Ringworm, common, 299.
 " crusted, 229.
 " honeycomb, 304.
 " rainbow, 223.
 " remedies for, 302.
 " vesicular, 222.
- Roman baths, 189.**
Rosacea, 283.
Rose rash, 199, 208.
Rubbers for the skin, 193.
Rupia, 223.
Russian baths, 189.
- SAFFRON SPOTS, 264.**
St. Anthony's fire, 198, 203.
Salt, 130.
Salt meats, 130.
Scalding, 251.
Scales, 5, 19.
Scall, 221, 229.
 " crusted, 228.
 " granulated, 230.
 " stalactitic, 230.
Scalled head, 221.
Scaly eruptions, 232.
Scarf-skin, 2.
 " chemical composition, 10.
- Scarlatina, 213.**
Scarlet fever, 213.
School diet, 128.
Scorbutic, 130.
Scurf, 6, 80.
Scurvy, 130.
Sea-bathing, 185.
Sebaceous substance, 56.
 " tumours, 280.
Sensation, nature of, 256.
Sensations, painful, 34, 256, 259.
Sensibility of the skin, 37.
Sensitive skin, 22.
Shampooing, 192.
Shingles, 223.
Shower-bath, 181.
Sick-room, 201.

- Silk, 136.
 Small-pox, 213.
 Smarting, 39.
 Soap, 10, 172.
 Spider mark, 253.
 Spotted acne, 283.
 Stains of the skin, 264.
 Stays, 163.
 Steatozoon folliculorum, 58.
 Sulphur-coloured spots, 13,
 264.
 Sulphur, uses of, 242.
 Supper, 123.
 Sweat glands, 40.
 " pores, 3.
 Sycosis, 284.
- TEA, 124.
 Temperate bath, 186.
 Temperature of the body, 141,
 145.
 Tepid bath, 194, 197.
 Tetter, branny, 236.
 " crusted, 228.
 " dry, 232.
 " humid, 221.
 " yellow crusted, 228.
 Thermæ, Roman, 187.
- Tickling, 257.
 Tingling, 39.
 Tooth rash, 217.
 Trichogenous remedies, 293.
- URTICARIA, 199.
- VAPOUR-BATH, 187.
 Vegetables, 129.
 Veins, 28.
 Vesicles, 220.
- WARM-BATH, 186, 197.
 Warts, 246.
 Wash-powders, 172.
 Washing, process of, 172, 174,
 180.
 Water, 171.
 Water-cresses, 129.
 Watery pimples, 220.
 White hair, 107, 296.
 " patches, 263.
 Withered hairs, 292.
 Wool, 133, 136.
- YELLOW HAIR, 299.
- ZONA, or shingles, 223.



